CAPI Reference Manual

Version 6.1

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CAPI Reference Manual

Version 6.1

December 2011

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Preface

This manual contains reference entries for the functions, classes, macros and accessors in the **capi** package, and the **graphics-ports** and **color** packages. Entries are listed alphabetically, and the typographical conventions used are similar to those used in *Common Lisp: the Language* (2nd Edition). Further details on the conventions used are given below. For a more tutorial approach to the CAPI with further examples see the *CAPI User Guide*.

Note: Although the **graphics-ports** and **color** packages are not strictly part of the CAPI, they are included in this manual because the functionality is usually called from CAPI elements such as output panes. Please also see the relevant chapters in the *CAPI User Guide* for further information on Graphics Ports and the LispWorks Color System.

Conventions used for reference entries

Each entry is headed by the symbol name and type, followed by a number of fields providing further details. These fields consist of a subset of the following: “Package”, “Summary”, “Signature”, “Arguments”, “Values”, “Method Signature”, “Initial Value”, “Superclasses”, “Subclasses”, “Initargs”, “Accessors”, “Readers”, “Compatibility Note”, “Description”, “Notes”, “Examples”, and “See also”.

The default package containing each symbol is the **capi** package in the CAPI reference chapter, and so on, unless stated otherwise in the “Package” section of an entry.

Throughout, variable arguments, slots and return values are italicised. They look *like this* in the Description.

Throughout, exported symbols are printed **`like-this`**. The package qualifier is usually omitted, as if the current package is **`capi`** (or **`graphics-ports`** or **`color`**.)

Entries with a long "Description" section usually have as their first field a short "Summary" providing a quick overview of the purpose of the symbol being described.

The "Signature" section provides details of the arguments taken by the functions and macros.

The "Subclasses" section of each CAPI class entry lists the external subclasses, though not subclasses of those.

The "Superclasses" sections of each CAPI class entry lists the external superclasses, though not superclasses of those.

The "Initargs" section describes the initialization arguments of the class. Initargs of superclasses are also valid.

Note: in LispWorks4.2 and previous versions, the "Initargs" section was headed "Slots".

Examples of the use of commands are given under the "Examples" heading. The code is written with explicit package qualifiers such as **`capi:interface`**, so that it can be run as-is, regardless of the current package. Some example files can also be found in your installation directory under **`examples/capi/`**.

Finally, the "See also" section provides a reference to other related symbols.

The LispWorks manuals

The LispWorks manual set comprises the following books:

- The *LispWorks User Guide and Reference Manual* describes the main language-level features and tools available in LispWorks, along with reference pages.
- The *LispWorks IDE User Guide* describes the LispWorks IDE, the user interface for LispWorks. This is a set of windowing tools that help you to develop and test Common Lisp programs.

- The *LispWorks Editor User Guide* describes the keyboard commands and programming interface to the LispWorks IDE editor tool.
- The *CAPI User Guide* and the *CAPI Reference Manual* describe the CAPI. This is a library of classes, functions, and macros for developing graphical user interfaces for your applications. The *CAPI User Guide* is a tutorial guide to the CAPI, and the *CAPI Reference Manual* is an in-depth reference text.
- The *LispWorks Foreign Language Interface User Guide and Reference Manual* explains how you can use C source code in applications developed using LispWorks.
- The *LispWorks Delivery User Guide* describes how you can deliver working, standalone versions of your LispWorks applications for distribution to your customers.
- The *KnowledgeWorks and Prolog User Guide* describes the LispWorks toolkit for building knowledge-based systems. Prolog is a logic programming system within Common Lisp.
- The *Common Lisp Interface Manager 2.0 User's Guide* describes the portable Lisp-based GUI toolkit.

These books are all available in online form, in both HTML format and PDF format. Also in PDF and plain text format is:

- The *LispWorks Release Notes and Installation Guide* which contains notes explaining how to install LispWorks and get it running. It also contains a set of release notes which lists new features and any last minute issues that could not be included in the main manual set.

Commands in the **Help** menu of any of the Common LispWorks tools give you direct access to the online documentation in HTML format, using the HTML browser that is supplied with LispWorks. Details of how to use these commands can be found in the *LispWorks IDE User Guide*.

Documentation is also provided in PDF form. You can use Adobe® Reader® to browse the PDF documentation online or to print it. Adobe Reader is available from Adobe's web site, **`http://www.adobe.com/`**.

Please let us know at **lisp-support@lispworks.com** if you find any mistakes in the LispWorks documentation, or if you have any suggestions for improvements.

1

CAPI Reference Entries

The following chapter documents symbols exported from the **capi** package.

abort-callback *Function*

Summary	Aborts out of the context of the current callback.
Package	**capi**
Signature	**abort-callback &optional** *always-abort*
Arguments	*always-abort* A generalized boolean.
Description	The function **abort-callback** aborts out of the context of the current callback, returning **nil** when it is relevant (for example in an **interface** *confirm-destroy-callback*). If called outside the context of a callback, if *always-abort* is **t** then **abort-callback** calls **(abort)**, otherwise it just returns. The default value of *always-abort* is t.

See also **callbacks**
interface

abort-dialog *Function*

Summary The **abort-dialog** function aborts the current dialog.

Package **capi**

Signature **abort-dialog &rest** *ignored-args*

Description This function is used to abort the current dialog. For example, it can be made a selection callback from a **Cancel** button so that pressing the button aborts the dialog. In a similar manner the complementary function **exit-dialog** can be used as a callback for an **OK** button.

If there is no current dialog then **abort-dialog** does nothing and returns **nil**. If there is a current dialog then **abort-dialog** either returns non-nil or does a non-local exit. Therefore code that depends on **abort-dialog** returning must be written carefully. Constructs like this can be useful:

```
(unless (capi:abort-dialog)
  (foo))
```

Above, *foo* will be called only if there is no current dialog.

It is not useful to do either:

```
(when (capi:abort-dialog)
  (foo))
```

or

```
(progn
  (capi:abort-dialog)
  (foo))
```

as in both cases it is not well-defined whether *foo* will be called if there is a current dialog.

Example

```
(capi:display-dialog
  (capi:make-container
    (make-instance 'capi:push-button
                   :text "Cancel"
                   :callback 'capi:abort-dialog)
                   :title "Test Dialog"))
```

Also see the examples in the directory **examples/capi/dialogs/**.

See also **exit-dialog**
display-dialog
popup-confirmer
interface

abort-exit-confirmer *Function*

Summary Aborts the exiting of a dialog.

Package **capi**

Signature **abort-exit-confirmer**

Description The function **abort-exit-confirmer** can be used to abort the exiting of a confirmer. It can be used in the *ok-function* of a confirmer, to abort the exit and return to the dialog.

If **abort-exit-confirmer** is called outside the exiting of a confirmer, it does nothing.

Example This example asks the user for a string. If the string is longer than 20 characters, it confirms with the user that they really want such a long string, and if they do not it returns to the dialog.

```
(capi:popup-confirmer
 (make-instance 'capi:text-input-pane)
 "New Name"
 :value-function 'capi:text-input-pane-text
 :ok-function
 #'(lambda (value)
     (when (and (> (length value) 20)
                (not (capi:prompt-for-confirmation
                      "Name is very long. Use it?")))
       (capi:abort-exit-confirmer))
     value))
```

See also **popup-confirmer**

accepts-focus-p *Generic Function*

Summary Determines if an element accepts the focus.

Package **capi**

Signature **accepts-focus-p** *element* **=>** *result*

Arguments *element* A CAPI element.

Values *result* A boolean.

Description Determines if the element *element* accepts the focus for user input, and controls tabstops.

The method on **element** uses the value of the *accepts-focus-p* slot, but methods on some subclasses override this.

accepts-focus-p also influences whether a pane is a tabstop. On Microsoft Windows a pane acts as a tabstop if and only if the function **accepts-focus-p** returns true and the **element** *accepts-focus-p* initarg value is **:force**. On Motif and Cocoa, a pane acts as a tabstop if and only if the function **accepts-focus-p** returns true.

See also **element**
pane-has-focus-p
set-object-automatic-resize

activate-pane *Function*

Summary The **activate-pane** function gives the focus to a pane and brings the window containing it to the front.

Package **capi**

Signature **activate-pane** *pane*

Description This brings the window containing *pane* to the front, and gives the focus to the pane (or a sensible alternative inside the same interface if that pane cannot accept the focus).

Example This example demonstrates how to swap the focus from one window to another.

```
(setq text-input-pane
      (capi:contain (make-instance
                     'capi:text-input-pane)))

(setq button
      (capi:contain (make-instance
                     'capi:push-button
                     :text "Press Me")))

(capi:activate-pane text-input-pane)

(capi:activate-pane button)
```

See also **hide-interface**
raise-interface
set-object-automatic-resize
show-interface
quit-interface
simple-pane

active-pane-copy
active-pane-copy-p
active-pane-cut
active-pane-cut-p
active-pane-deselect-all
active-pane-deselect-all-p
active-pane-paste
active-pane-paste-p
active-pane-select-all
active-pane-select-all-p
active-pane-undo
active-pane-undo-p *Functions*

Summary Perform, or check applicability of, an "edit/select operation" on the active pane.

Signature

active-pane-copy &optional *pane*

active-pane-copy-p &optional *pane*

active-pane-cut &optional *pane*

active-pane-cut-p &optional *pane*

active-pane-deselect-all &optional *pane*

active-pane-deselect-all-p &optional *pane*

active-pane-paste &optional *pane*

active-pane-paste-p &optional *pane*

active-pane-select-all &optional *pane*

active-pane-select-all-p &optional *pane*

active-pane-undo &optional *pane*

active-pane-undo-p &optional *pane*

Description These functions perform an "edit/select operation" on the active pane, or check if this operation is currently applicable.

The active pane will be the one on the same screen as *pane* if *pane* is non-nil, or otherwise the same screen as the default interface.

These functions find the active pane, that is the pane where keyboard input currently goes. Note that this is not necessarily a pane that is recognized by CAPI. The predicates (those with names ending **-p**) return true if the operation is currently applicable. The other functions tell the active pane to do the operation.

The edit/select operations are implemented by the **pane-interface-*** generic functions such as **pane-interface-copy-object**.

It is not an error to do the operation even if the predicate returns false. It will just do nothing useful.

Examples See **examples/capi/applications/rich-text-editor.lisp**

See also **pane-interface-copy-object**

append-items *Generic Function*

Summary Adds to the items in a collection.

Signature **append-items** *collection new-items*

Arguments

collection	A collection.
new-items	A sequence.

Description The generic function **append-items** adds the items in *new-items* to the **collection** *collection*.

This is logically equivalent to recalculating the collection items and calling **(setf collection-items)**. However, **append-items** is more efficient and causes less flickering on screen.

append-items can only be used when the **collection** has the default *items-get-function* **svref**.

See also **collection**
remove-items
replace-items

apply-in-pane-process *Function*

Summary Applies a function in the process associated with a pane.

Package **capi**

Signature **apply-in-pane-process** *pane function* **&rest** *args* **=> nil**

Description The function **apply-in-pane-process** applies *function* to *args* in the process that is associated with *pane*. This is required when *function* modifies *pane* or changes how it is displayed. If *pane* has not been displayed yet, then *function* is called immediately.

Notes
1. All accesses (reads as well as writes) on a pane should be performed in the pane's process. Within a callback on the pane's interface this happens automatically, but **apply-in-pane-process** is a useful utility in other circumstances.
2. **apply-in-pane-process** calls *function* on the current process if the pane's interface does not have a process.
3. If the pane's process is no longer active then **apply-in-pane-process** applies *function* directly.

4. **apply-in-pane-process-if-alive** is another way to call *function* in the CAPI process appropriate for *pane.* However it only does this if *pane* is alive so in particular, if *pane* does not have a process, it does not call *function*.

Example

Editor commands must be called in the correct process:

```
(setq editor
      (capi:contain
       (make-instance 'capi:editor-pane
                      :text "Once upon a time...")))

(capi:apply-in-pane-process
 editor 'capi:call-editor editor "End Of Buffer")

(capi:apply-in-pane-process
 editor 'capi:call-editor editor "Beginning Of Buffer")
```

apply-in-pane-process-if-alive *Function*

Summary

Applies a function in the process associated with a pane.

Package

capi

Signature

apply-in-pane-process-if-alive *pane function* **&rest** *args* **=> nil**

Description

The function **apply-in-pane-process-if-alive** applies *function* to *args* in the process that is associated with *pane*, if pane is alive.

This is like **apply-in-pane-process** except that *function* is called only if the *pane* is alive in the sense defined for the *interface* in **execute-with-interface-if-alive**. If *pane* does not have a process, then *function* is not called.

See also

apply-in-pane-process
execute-with-interface-if-alive

arrow-pinboard-object *Class*

Summary A **pinboard-object** that draws itself as an arrow.

Package **capi**

Superclasses **line-pinboard-object**

Subclasses **double-headed-arrow-pinboard-object**
labelled-arrow-pinboard-object

Initargs

:head A keyword specifying the position of the arrowhead on the line.

:head-direction A keyword specifying the direction of the arrowhead.

:head-length The length of the arrowhead.

:head-breadth The breadth of the arrowhead, or **nil**.

:head-graphics-args A graphics args plist.

Description An instance of the class **arrow-pinboard-object** is a **pinboard-object** that draws itself as an arrow.

head must be **:end**, **:middle** or **:start**. The default is **:end**.

head-direction must be **:forwards**, **:backwards** or **:both**. The default is **:forwards**.

head-length is the length of the arrowhead in pixels. It defaults to 12.

head-breadth is the breadth of the arrowhead in pixels, or **nil** which means that the breadth is half of *head-length*. The default is **nil**.

head-graphics-args is a plist of graphics state parameters and values used when drawing the arrow head. For information about the graphics state, see **graphics-state**.

Example

```
(capi:contain
 (make-instance
  'capi:pinboard-layout
  :description
  (list
   (make-instance 'capi:arrow-pinboard-object
                  :start-x 5 :start-y 10
                  :end-x 105 :end-y 60 )
   (make-instance 'capi:arrow-pinboard-object
                  :start-x 5 :start-y 110
                  :end-x 105 :end-y 160
                  :head :middle)
   (make-instance 'capi:arrow-pinboard-object
                  :start-x 5 :start-y 210
                  :end-x 105 :end-y 260
                  :head-direction :both )
   (make-instance 'capi:arrow-pinboard-object
                  :start-x 5 :start-y 310
                  :end-x 105 :end-y 360
                  :head-graphics-args
                  '(:foreground :pink)
                  :head-length 30)
   (make-instance 'capi:arrow-pinboard-object
                  :start-x 5 :start-y 410
                  :end-x 105 :end-y 460
                  :head-length 30 :head-breadth 5)
   (make-instance 'capi:arrow-pinboard-object
                  :start-x 5 :start-y 510
                  :end-x 105 :end-y 560
                  :head-breadth 10
                  :head-direction :backwards))
  :visible-min-width 120
  :visible-min-height 620))
```

attach-interface-for-callback *Function*

Summary Changes the interface that is passed when a callback is made.

Package **capi**

Signature **attach-interface-for-callback** *element interface*

Description The function **attach-interface-for-callback** changes the interface that is passed when a callback is made. Callbacks for *element* get passed *interface* instead of *element*'s parent interface.

See also **callbacks**
element
element-interface-for-callback
interface

attach-simple-sink *Function*

Summary Attaches a sink to the active component in an **ole-control-pane**.

Package **capi**

Signature **attach-simple-sink** *invoke-callback pane interface-name* **&key** *sink-class* **=>** *sink*

Arguments

invoke-callback	A function designator.
pane	An **ole-control-pane**.
interface-name	A refguid or the symbol **:default**.
sink-class	A symbol naming a class.

Values

sink	The sink object.

Description The function **attach-simple-sink** make a sink object and attaches it to the active component in *pane*.

When an event callback is triggered for the source interface named by *interface-name,* the sink object will call the *invoke-callback* with four arguments: the *pane* (see *sink-class* below), the source method name as a string, the source method type (either **:method**, **:get** or **:put**) and a vector of the remaining callback arguments.

interface-name is either a string naming a source interface that the component in *pane* supports or **:default** to connect to the default source interface.

sink-class can be used to control the class of the sink object. This defaults to **ole-control-pane-simple-sink**, but can be a subclass of this class to allow the first argument of the *invoke-callback* to be chosen by a method on the generic function **com:simple-i-dispatch-callback-object**.

Attached sinks are automatically disconnected when the object is closed or can be manually disconnected by calling **detach-simple-sink**.

Notes

This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also

detach-simple-sink
ole-control-pane
ole-control-pane-simple-sink

attach-sink *Function*

Summary

Attaches a sink to the active component in an **ole-control-pane**.

Package

capi

Signature

attach-sink *sink pane interface-name*

Arguments

sink	A class instance.
pane	An **ole-control-pane**.
interface-name	A refguid or the symbol **:default**.

Description

The function **attach-sink** attaches a sink to the active component in the the **ole-control-pane** *pane*.

sink is an instance of a class that implements the source interface *interface-name*.

pane is an **ole-control-pane** which is the pane where the component is.

interface-name is either a string naming a source interface that the component in *pane* supports or **:default** to connect to the default source interface.

Attached sinks are automatically disconnected when the object is closed or can be manually disconnected by calling **detach-sink**.

Notes — This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also — **detach-sink**
ole-control-pane

beep-pane *Function*

Summary — Sounds a beep.

Package — **capi**

Signature — **beep-pane &optional** *pane*

Description — The function **beep-pane** sounds a beep on the screen associated with *pane* or on the current screen if *pane* is **nil**.

Example

```
(capi:beep-pane)
```

See also — **simple-pane**
screen

browser-pane *Class*

Summary — Embeds a pane that can display HTML. Implemented only on Microsoft Windows and Cocoa.

Superclasses — **`simple-pane`**

Subclasses — None

Initargs

`:before-navigate-callback`
A function that is called before navigating, or **`nil`**.

`:navigate-complete-callback`
A function that is called when navigation completes, or **`nil`**.

`:new-window-callback`
A function that is called before opening a new window, or **`nil`**.

`:status-text-change-callback`
A function that is called when there is a new status text or **`nil`**.

`:document-complete-callback`
A function that is called when a document is complete, or **`nil`**.

`:title-change-callback`
A function that is called when the title changes, or **`nil`**.

`:update-commands-callback`
A function that is called when the enabled status of commands related to the pane may need to change, or **`nil`**.

:internet-explorer-callback
Microsoft Windows specific: A function that is whenever there is an event from the underlying IWebBrowser2, or **nil**.

:navigate-error-callback
A function that is called when the pane fails to navigate, or **nil**.

:debug A boolean specifying whether debugging mode is on or not.

:url A string specifying the initial URL.

Accessors

browser-pane-navigate-complete-callback
browser-pane-new-window-callback
browser-pane-status-text-change-callback
browser-pane-document-complete-callback
browser-pane-title-change-callback
browser-pane-update-commands-callback
browser-pane-internet-explorer-callback
browser-pane-before-navigate-callback
browser-pane-navigate-error-callback
browser-pane-debug

Readers

browser-pane-url
browser-pane-successful-p
browser-pane-title

Description

A **browser-pane** is a pane that embeds a pane that can display HTML. Navigation in the pane happens either by the user clicking on hyperlinks, or by the application using **browser-pane-navigate**. The various callbacks gives the program information on what happens in the window and can be used to control (for example, to block or redirect pages).

browser-pane is implemented only on Microsoft Windows (where it embeds an IWebBrowser2) and Cocoa (where it uses WebKit).

The initarg **:url** specifies the initial URL. After being created, the pane automatically navigates to this URL.

When *before-navigate-callback* is non-nil, it is called before any navigation (whether programmatic or by the user), and gives the application control over whether to perform the navigation. The callback must have this signature:

before-navigate-callback *pane url* **&key** *hyper-link-p sub-frame-p frame-name post-data headers* **&allow-other-keys =>** *do-it-p*

before-navigate-callback *pane url* **&key** *sub-frame-p frame-name* **&allow-other-keys =>** *do-it*

pane is the pane that navigates, and *url* is a string to which it wants to navigate. *sub-frame-p* is true when the navigation is for a sub-frame inside the current URL, otherwise *sub-frame-p* is **nil**. *frame-name* is either **nil** or the name of a sub-frame when the navigation is to a sub-frame.

If *before-navigate-callback* returns **nil**, the navigation is cancelled.

Note: To perform a redirection, just call **browser-pane-navigate** to the required URL, and return **nil** from *before-navigate-callback*.

If *new-window-callback* is non-nil, it is called before the pane tries to open a new window. It must have this signature:

new-window-callback *pane url* **&key** *context flags* **&allow-other-keys =>** *do-it-p*

pane is the pane that wants to open a new window, and *url* is a string containing the URL that the new window will navigate to. *context* is a string containing the URL of the page from which the request comes.

flags is implementation specific flags. On Cocoa *flags* is always 0. On Microsoft Windows *flags* contains bits from the NWMF enumeration.

If *new-window-callback* returns **nil**, the opening of the new window is cancelled. If *new-window-callback* returns **t** or is not supplied, it launches a browser using the OS settings.

On Microsoft Windows, *new-window-callback* is invoked from the "NewWindow3" event (or "NewWindow2" for old versions) of the sink of the underlying IWebBrowser2. If not cancelled, the pane opens a new normal Internet Explorer window.

If *document-complete-callback* is non-nil, it is called when the new document in the pane is complete. It must be a function with signature:

document-complete-callback => *pane url title*

url is the loaded URL, and may be **nil** in the case of failure. *title* is a string that is associated with the URL *url* (or the previous URL if the latest call failed).

document-complete-callback is called when, as far as the system is concerned, all the data for the URL has been loaded and is displayed in the pane. There is only one call to *document-complete-callback* for each navigation of the pane.

If *navigate-complete-callback* is non-nil, it is called whenever a navigation completes. *navigate-complete-callback* can be called several times for each navigation of the pane. It must be a function with the signature:

navigate-complete-callback *pane url sub-frame-p* **=>**

pane is the pane that is navigated. *url* is a string to which it navigated, unless the navigation failed, in which case *url* is **nil**. *sub-frame-p* is true when the navigation was in a subframe.

Notes: For most puposes the *document-complete-callback* is more useful than *navigate-complete-callback*. When *navigate-complete-callback* gets a **nil** *url*, the value of the URL in the

pane (that is, what the accessor **browser-pane-url** returns) is still set to the actual URL. The success flag (which you can read with **browser-pane-successful-p**) is set to **nil**.

url can be non-nil even if there was an error in the navigation, if the server supplied another URL. In this case, on Microsoft Windows only, the success flag is set to **:redirected**. You can read it with **browser-pane-successful-p**.

If *navigate-error-callback* is non-nil, it is called when navigation fails for some reason. It should have this signature:

navigate-error-callback *pane url* **&key** *http-code error-symbol implementation-error-code message frame-name sub-frame-p fatal* **&allow-other-keys =>** *cancel*

pane is the navigating pane, and *url* is the URL that got the error.

If the failure is server-side failure, then *http-code* contains the http-code in the response of the server, otherwise (that is, when it failed to connect to a server) it is **nil**.

error-symbol is a keyword uniquely identifying the error. For an http error it is of the form **:HTTP_STATUS***, and for requests with bad syntax *error-symbol* is **:bad-request**.

On Microsoft Windows *implementation-error-code* is the code in the "NavigateError" event. If *http-code* is non-nil then *implementation-error-code* and *http-code* will be the same. On Cocoa *implementation-error-code* will be the same as *http-code* in the case of server-side failure, otherwise it is one of the **NSURLError*** constants.

fatal is a boolean. A non-nil value means that nothing is going to be displayed in the pane to tell the user about the error.

message is a message saying what the error is. *sub-frame-p* is **t** when the navigation is for a sub-frame, otherwise **nil**. *frame-name* is the name of the frame.

The return value *cancel* of *navigate-error-callback* should be one of **nil**, **t**, or **:stop**, with these interpretations:

nil	On Microsoft Windows this means displaying either the substitution page from the server if there is one, or displaying automatically generated (by the underlying IWebBrowser2) error page.
t	Cancel. On Microsoft Windows this means not displaying the automatically generated error page, but displaying server substitution if there is any.
:stop	Stop the navigation immediately.

Note that the effect of the returned value *cancel* is only on the specific navigation, so it possible for a sub-frame to be stopped, while the main page and maybe other sub-frames complete.

On Cocoa there is no automatically generated error page, so the return value of *cancel* **nil** means the same as **t**, and both display whatever the server returned.

Note: To redirect on error, *navigate-error-callback* should just call **browser-pane-navigate** with the new page and return **:stop**.

If *title-change-callback* is non-nil, it is called when the title of the pane should change. It should have this signature:

title-change-callback *pane new-title*

new-title is a string, which the application should use as the title of the pane.

Note: In most cases, using the *title* argument of the *document-complete-callback* is more useful.

If *status-text-change-callback* is non-nil, it is called when the status text of the pane should change. It has this signature:

status-text-change-callback *pane new-status-text*

new-status-text is a string, which the application should use as the status text for the pane.

If *update-commands-callback* is non-nil, it is called when other panes (typically buttons or menu items) that are used to perform commands on the pane need to update. The callback has this signature:

update-commands-callback *pane what enabled-p*

Currently *what* can be one of:

:forward Other panes that are used to go forward in the pane should be enabled or disabled.

:backward Other panes that are used to go backward in the pane should be enabled or disabled.

Additionally on Microsoft Windows only, *what* can be:

t Other panes that may try to anything with the pane may need updating. Note that this callback is called quite often with *what* = **t**, so make sure it usually does not do much work in this case.

enabled-p specifies whether the other panes should be enabled or disabled.

On Windows only, if *internet-explorer-callback* is non-nil, it is called for each event for the pane. It has the signature

internet-explorer-callback *pane event-name args*

event-name is a string specifying the event. *args* is a vector containing the arguments in order. The callback is called before any code that is used to implement the callbacks, which is called afterwards withe same argument vector. That means that the callback should not set anything in the vector, except when debugging.

internet-explorer-callback is intended to add functionality that is not given by the callbacks, and for debugging (but see also **:debug**). If you need more control, you probably wants to define your pane directly: for the basics see **examples/com/ole/html-pane.lisp**.

debug specifies that the pane should be in debugging mode. Currently, on Microsoft Windows this means that it prints each event and the arguments that it receives. Whenever an event is sent to the sink associated with the embedded browser, the method name (which is the same as the event name in this case) and the argument are printed to **mp:*background-standard-output***. On Cocoa it prints some diagnostics to **mp:*background-standard-output***.

browse-pane-url returns the current *url* of the pane. Initially the value is the keyword **:url**, but once the browser completed navigation to some URL it is changed to this. Note that the *url* changes even if the navigation was not successful, as long as it was not stopped or cancelled and there was no substitution page.

browse-pane-title returns the title of the current document. Note that during navigation **browse-pane-title** and **browse-pane-url** may not be synchronised. They are synchronised when *document-complete-callback* is called, until the next *before-navigate-callback* call.

browser-pane-successful-p tests whether the navigation to the current URL completed successfully, returning **nil** for failure and **t** for success. On Microsoft Windows only it can also return **:substituted**, which means that the server returned an error but also supplied a substitution page. On Cocoa, **browser-pane-successful-p** returns only **t** or **nil**.

Notes

browser-pane and related APIs are implemented on Microsoft Windows and Cocoa only.

See also

browser-pane-navigate
browser-pane-busy
browser-pane-refresh

browser-pane-navigate
browser-pane-busy
browser-pane-go-forward
browser-pane-go-back
browser-pane-stop
browser-pane-refresh

Generic Functions

Summary — Controls a **`browser-pane`**.

Signature

`browser-pane-navigate` *pane url* **`=>`** *result*

`browser-pane-busy` *pane* **`=>`** *result*

`browser-pane-go-back` *pane*

`browser-pane-go-forward` *pane*

`browser-pane-stop` *pane*

`browser-pane-refresh` *pane* **`&optional`** *level*

Arguments

pane	A **`browser-pane`**.
url	A string.
level	One of the keywords **`:normal`** and **`:refresh_completely`**.

Values

result	A boolean.
name	A string.

Description

These generic functions are used to control an instance of **`browser-pane`**.

`browser-pane-navigate` navigates to the supplied URL, that is it gets and displays the contents of the URL. Note that if there is any redirection, it is the redirected URL that is displayed.

browser-pane-navigate does the navigation asynchronously, so when the function returns the navigation has just started. If *result* is **t** then the navigation started, and if *result* is **nil** then some error in the url has already been detected. If the pane has an error callback, it already has been called in this case.

Note: **browser-pane-navigate** can be used to effect a redirection from inside the error before navigation and new-window callbacks.

browser-pane-busy tests whether the browser is currently navigating, returning true if it is.

browser-pane-go-forward and **browser-pane-go-back** navigate forward and back in the history, like the buttons on most web browsers.

browser-pane-stop stops the current navigation.

browser-pane-refresh refreshes the pane, which means re-reading the URL. *level* can be one of:

:normal Asks the server for the contents again. This is the default value of *level*.

:refresh_completely
Asks the server for the contents again without looking at any cache (it uses header Pragma:no-cache).

Notes

browser-pane and related APIs are implemented on Microsoft Windows and Cocoa only.

See also

browser-pane

browser-pane-property-get
browser-pane-property-put *Generic Functions*

Summary — Get or set value of a specified Windows property of the underlying browser.

Signature — **`browser-pane-property-get`** *pane property-name*

`browser-pane-property-put` *pane property-name value*

Description — *property-name* has to be one of the properties listed in the Properties section of the documentation of IWebBrowser2 in the MSDN.

Notes

1. **`browser-pane-property-get`** and **`browser-pane-property-put`** are implemented on Microsoft Windows only.
2. **`browser-pane-property-get`** and **`browser-pane-property-put`** do not correspond to the methods "Get-Property" and "PutProperty" of IWebBrowser2.

See also — **`browser-pane`**

button *Class*

Summary — A **`button`** is a pane that displays either a piece of text or an image, and that performs an action when pressed. Certain types of buttons can also be selected and deselected.

Package — **`capi`**

Superclasses — **`simple-pane`**
`item`

Subclasses — **`push-button`**
`radio-button`
`check-button`

Initargs

:interaction The interaction style for the button.

:selected For radio button and check button styles, if **selected** is set to **t**, the button is initially selected.

:callback Specifies the callback to use when the button is selected.

:image An image for the button (or **nil**).

:selected-image
The image used when the button is selected.

:enabled If **nil** the button cannot be selected.

:cancel-p If true the button is the "Cancel" button, that is, the button selected by the **Escape** key.

:default-p If true the button is the default button, that is, the button selected by the **Return** key.

The following two initargs controlling alternate images apply only on Motif and Microsoft Windows:

:disabled-image
The image for the button when disabled (or **nil**).

:selected-disabled-image
The image used when the button is selected and disabled.

The following initarg controlling another alternate image applies only on GTK+ and Motif and Microsoft Windows:

:armed-image The image used when the button is pressed and *interaction* is **:no-selection**.

The following initargs controlling mnemonics apply only on Microsoft Windows:

:mnemonic A character, integer or symbol specifying a mnemonic for the button.

:mnemonic-text

A string specifying the text and a mnemonic.

:mnemonic-escape

A character specifying the mnemonic escape. The default value is **#\&**.

Accessors

button-selected
button-image
button-armed-image
button-selected-image
button-disabled-image
button-selected-disabled-image
button-enabled
button-cancel-p
button-default-p

Description

The class **button** is the class that **push-button**, **radio-button**, and **check-button** are built on. It can be displayed either with text or an image, and a callback is called when the button is clicked. It inherits all of its textual behavior from **item**, including the slot *text* which is the text that appears in the button.

Rather than creating direct instances of **button**, you usually create instances of its subclasses, each of which has a specific interaction style. Occasionally it may be easier to instantiate **button** directly with the appropriate value of *interaction* (for instance, when the interaction style is only known at run-time) but you may not use such a button as an item in a **button-panel**.

The values allowed for *interaction* are as follows:

:no-selection A push button.

:single-selection

A radio button.

:multiple-selection

A check button.

Both radio buttons and check buttons can have a selection which can be set using the initarg **:selected** and the accessor **button-selected**.

The button's callback gets called when the user clicks on the button, and by default gets passed the data in the button and the interface. This can be changed by specifying a callback type as described in the description of callbacks. The following callbacks are accepted by buttons:

:selection-callback
: Called when the button is selected.

:callback
: For buttons this is a synonym of **:selection-callback**.

:retract-callback
: Called when the button is deselected.

By default, *image* and *disabled-image* are **nil**, meaning that the button is a text button, but if *image* is provided then the button displays an image instead of the text. The image can be an **external-image** or any object accepted by **load-image**, including a .ico file on Microsoft Windows. The disabled image is the image that is shown when the button is disabled (or **nil**, meaning that it is left for the window system to decide how to display the image as disabled). On some platforms the system computes the disabled image and so *disabled-image* is ignored.

The button's actions can be enabled and disabled with the *enabled* slot, and its associated accessor **button-enabled**. This means that when the button is disabled, pressing on it does not call any callbacks or change its selection.

Note that the class **button-panel** provides functionality to group buttons together, and should normally be used in preference to creating individual buttons yourself. For instance, a

radio-button-panel makes a number of radio buttons and also controls them such that only one button is ever selected at a time.

A mnemonic is an underlined character within the button *text* or the printed representation of the button *data* which can be entered to select the button. The value *mnemonic* is interpreted as described for **menu**.

An alternative way to specify a mnemonic is to pass *mnemonic-text*. This is a string which provides the text for the button and also specifies the mnemonic character. *mnemonic-text* and *mnemonic-escape* are interpreted in just the same way as the *mnemonic-title* and *mnemonic-escape* of **menu**.

Notes

1. The **simple-pane** initarg *foreground* is not supported for buttons on Windows and Cocoa.
2. The *disabled-image*, *armed-image* and *selected-disabled-image* will work on Microsoft Windows provided you are running with the themed look-and-feel (which is the default). See "Using Windows themes" in the *CAPI User Guide*.

Example

In the following example a button is created. Using the **button-enabled** accessor the button is then enabled and disabled.

```
(setq button
      (capi:contain (make-instance
                     'capi:push-button
                     :text "Press Me")))

(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) nil button)

(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) t button)
```

In the next example a button with an image instead of text is created.

```
(setq button
      (capi:contain
       (make-instance
        'capi:push-button
        :image
        (merge-pathnames
         "capi/applications/images/info.bmp"
         (sys:lispworks-dir "examples")))))
```

The following examples illustrate mnemonics:

```
(defun egg (&rest ignore)
  (declare (ignore ignore))
  (capi:display-message "Egg"))

(capi:contain
 (make-instance 'capi:push-button
                :selection-callback 'egg
                :mnemonic-text "Chicken && Rice"))

(capi:contain
 (make-instance 'capi:push-button
                :data "Chicken"
                :selection-callback 'egg
                :mnemonic #\k))
```

Compare this with the previous example: the **#\k** does not appear and the **#\e** becomes the mnemonic:

```
(capi:contain
 (make-instance 'capi:push-button
                :selection-callback 'egg
                :mnemonic-escape  #\k
                :mnemonic-text "Chicken"))
```

Also see the example in the directory **examples/capi/buttons/**.

See also **button-panel**
callbacks

button-panel *Class*

Summary The class **button-panel** is a pane containing a number of buttons that are laid out in a particular style, and that have group behavior.

Package **capi**

Superclasses **choice**
titled-object
simple-pane

Subclasses **push-button-panel**
radio-button-panel
check-button-panel

Initargs
:layout-class The type of layout for the buttons.

:layout-args Initialization arguments for the layout.

:callbacks The selection callbacks for each button.

:button-class The class of the buttons.

:images A list.

:disabled-images
A list.

:armed-images A list.

:selected-images
A list.

:selected-disabled-images
A list.

:help-keys A list.

:default-button
Specifies the default button.

:cancel-button
Specifies the cancel button.

The following initargs controlling mnemonics apply only on Microsoft Windows:

:mnemonics A list specifying mnemonics for the buttons.

:mnemonic-items
A list of strings, each specifying the text and a mnemonic.

:mnemonic-escape
A character specifying the mnemonic escape. The default value is **#\&**.

:mnemonic-title
A string specifying the title and a mnemonic.

Accessors **pane-layout**

Description The class **button-panel** inherits most of its behavior from **choice**, which is an abstract class providing support for handling items and selections. By default, a button panel has single selection interaction style (meaning that only one of the buttons can be selected at any one time), but this can be changed by specifying an *interaction*.

The subclasses **push-button-panel**, **radio-button-panel** and **check-button-panel** are provided as convenience classes, but they are just button panels with different interactions (**:no-selection**, **:single-selection** and **:multiple-selection** respectively).

The layout of the buttons is controlled by a layout of class *layout-class* (which defaults to **row-layout**) but this can be changed to be any other CAPI layout. When the layout is created, the list of initargs *layout-args* is passed to **make-instance**.

Each button uses the callbacks specified for the button panel itself, unless the argument *callbacks* is specified. *callbacks* should be a list (one element per button). Each element of *callbacks*, if non-nil, will be used as the selection callback of the corresponding button.

button-class, if supplied, determines the class used for each of the buttons. This should be the class appropriate for the *interaction*, or a subclass of it. The default behavior is to create buttons of the class appropriate for the *interaction*.

Each of *images*, *disabled-images*, *armed-images*, *selected-images*, *selected-disabled-images* and *help-keys*, if supplied, should be a list of the same length as *items*. The values are passed to the corresponding item, and interpreted as described for **`button`**. The **`button-panel`** *images* values map to **`button`** *image* arguments, and so on.

For **`button-panel`** and its subclasses, the *items* supplied to the **`:items`** initarg and **`(setf collection-items)`** function can contain button objects. In this case, the button is used directly in the button panel rather than a button being created by the CAPI.

This allows button size and spacing to be controlled explicitly. Note that the button must be of the appropriate type for the subclass of **`button-panel`** being used, as shown in the following table:

Button panel class	Button class
`push-button-panel`	**`push-button`**
`radio-button-panel`	**`radio-button`**
`check-button-panel`	**`check-button`**

Table 1.1 Button and panel classes

For example,

```
(let ((button1 (make-instance 'capi:push-button
                              :text "button1"
                              :internal-border 20
                              :visible-min-width 200))
      (button2 (make-instance 'capi:push-button
                              :text "button2"
                              :internal-border 20
                              :visible-min-width 200)))
  (capi:contain (make-instance 'capi:push-button-panel
                               :items (list button1 button2)
                               :layout-args '(:x-gap 30))))
```

default-button specifies which button is the default (selected by pressing **Return**). It should be equal to a member of *items* when compared by *test-function*. If the items are non-immediate objects such as strings or **button** objects, you must ensure either that the same (**eq**) object is passed in *items* as in *default-button*, or that a suitable *test-function* is supplied.

cancel-button specifies which button is selected by pressing **Escape**. The comparison with members of items is as for *default-button*.

mnemonics is a list of the same length as *items*. Each element is a character, integer or symbol specifying the mnemonic for the corresponding button in the same way as described for **menu**.

mnemonic-items is an alternate way to specify the mnemonics in a button panel. It is a list of the same length as *items*. Each element is a string which is interpreted for the corresponding **button** as its *mnemonic-text* initarg.

mnemonic-title and *mnemonic-escape* are interpreted as for **menu**. *mnemonic-escape* specifies the escape character for mnemonics both in the buttons and in the pane's title.

Compatibility note

Button panels now default to having a maximum size constrained to their minimum size as this is useful when attempting to layout button panels into arbitrary spaces without them changing size. To get the old behavior, specify **`:visible-max-width nil`** in the **`make-instance`**.

Example

```
(capi:contain (make-instance
               'capi:button-panel
               :items '(:red :green :blue)
               :print-function 'string-capitalize))

(setq buttons
      (capi:contain
       (make-instance
        'capi:button-panel
        :items '(:red :green :blue)
        :print-function 'string-capitalize
        :interaction :multiple-selection)))

(capi:apply-in-pane-process
 buttons #'(setf capi:choice-selected-items)
 '(:red :green) buttons)

(capi:contain (make-instance
               'capi:button-panel
               :items '(1 2 3 4 5 6 7 8 9)
               :layout-class 'capi:grid-layout
               :layout-args '(:columns 3)))
```

This example illustrates use of *default-button* and *test-function*:

```
(capi:contain
 (make-instance 'capi:push-button-panel
                :items '("one" "two" "three")
                :default-button "two"
                :test-function 'equalp
                :selection-callback
                'capi:display-message))
```

Also see the example in the directory **`examples/capi/buttons/`**.

See also **radio-button**
check-button
push-button
set-button-panel-enabled-items

calculate-constraints *Generic Function*

Summary Calculates the internal constraints of a pane.

Package **capi**

Signature **calculate-constraints** *pane*

Arguments *pane* A CAPI pane or layout.

Description The generic function **calculate-constraints** calculates the internal constraints for *pane* according to the sizes of its children, and sets these values into *pane*'s geometry cache.

When the pane does not scroll in the relevant dimension, all the geometry hints (**:external-min-width**, **:visible-max-height** and so on) override the values that are computed by **calculate-constraints**.

See "Width and Height Constraints" in the *CAPI User Guide* for description of internal and external constraints.

The CAPI calls **calculate-constraints** for each pane and layout that it displays.

When creating your own layout, you should define a method for **calculate-constraints** that sets the values of the following geometry slots based on the constraints of its children.

%min-width% The minimum width of pane.

%max-width% The maximum width of pane.

%min-height% The minimum height of pane.

%max-height% The maximum height of pane.

(See **with-geometry**.)

The constraints of any CAPI element can be found by calling **get-constraints**.

See also **calculate-layout**
define-layout
get-constraints
element
layout
with-geometry

calculate-layout *Generic Function*

Summary The **calculate-layout** generic function is used to provide a method for laying out the children of a new layout.

Package **capi**

Signature **calculate-layout** *layout x y width height*

Description The generic function **calculate-layout** is called by the CAPI to layout the children of a layout. When defining a new class of layout using **define-layout**, a **calculate-layout** method must be provided that sets the *x*, *y*, *width* and *height* of each of the layout's children. This method must try to obey the constraints specified by its children (its minimum and maximum size) and should only break them when it becomes impossible to fit the constraints of all of the children.

To set the *x*, *y*, *width* and *height* of the layout, use the macro **with-geometry** which works in a similar way as **with-slots**.

See also **get-constraints**
with-geometry
interpret-description

callbacks *Class*

Summary The class **callbacks** is used as a mixin by classes that provide callbacks.

Package **capi**

Superclasses **capi-object**

Subclasses **collection**
item
menu-object

Initargs **:callback-type** The type of arguments for the callbacks.

:selection-callback
The callback for selecting an item.

:extend-callback
The callback for extending the selection.

:retract-callback
The callback for deselecting an item.

:action-callback
The callback for an action.

:alternative-action-callback
The callback for an alternative action in **choice** and its subclasses.

Accessors

callbacks-callback-type
callbacks-selection-callback
callbacks-extend-callback
callbacks-retract-callback
callbacks-action-callback

Description

Each callback function can be one of the following:

function Call the function.

list Apply the head of the list to the tail.

:redisplay-interface

Call **redisplay-interface** on the top-level interface.

:redisplay-menu-bar

Call **redisplay-menu-bar** on the top-level interface.

The slot value *callback-type* determines which arguments get passed to each of the callbacks. It can be any of the following values, and passes the corresponding data to the callback function:

:collection-data

(*collection data***)**

:data **(***item-data***)**

:data-element **(***item-data element***)**

:data-interface

(*item-data interface***)**

:element **(***element***)**

:element-data **(***element item-data***)**

:element-item **(***element item***)**

:interface-data

(*interface item-data***)**

:item **(***item***)**

:item-element (*item element*)

:item-interface
(*item interface*)

:interface-item
(*interface item*)

:interface (*interface*)

:full (*item-data item interface*)

:focus The pane with the current input focus.

:none ()

nil ()

callback-type can also be a list containing any of **:focus**, **:data**, **:element**, **:interface**, **:collection**, **:item**.

The *item-data* variable is the item's data if the item is of type **item**, otherwise it is the item itself, as for *item.* The *item* variable means the item itself. The *interface* is the **element-interface** of the element. *collection* is the element's **collection**, if there is one. The *element* variable means the element containing the callback itself.

In a **choice**, the *alternative-action-callback* is invoked by a gesture which is the *action-callback* gesture modified by the **Shift** key on Windows and GTK+, and modified by the **Command** key on Cocoa.

alternative-action-callback is applicable only to **choice** and its subclasses.

Apart from being invoked with a different gesture, the *alternative-action-callback* has exactly the same semantics as *action-callback*.

Examples **examples/capi/choice/alternative-action-callback.lisp**

See also **abort-callback**
choice
attach-interface-for-callback

call-editor *Generic Function*

Summary Executes an editor command in an **editor-pane**.

Package **capi**

Signature **call-editor** *editor-pane command*

Description The generic function **call-editor** executes the editor command *command* in the current buffer in *editor-pane*.

It can be used directly in a callback in *editor-pane*'s interface. See the demo interface example in the *CAPI User Guide*. In other cases, take care to modify displayed CAPI interfaces only in their own process: **execute-with-interface** and **apply-in-pane-process** are useful for this.

The *before-input-callback* and *after-input-callback* of the **editor-pane** are called when **call-editor** is called.

Example
```
(setq editor (capi:contain
              (make-instance 'capi:editor-pane
                             :text "abc")))

(capi:apply-in-pane-process
 editor 'capi:call-editor editor "End Of Buffer")
```

Also see the example in the directory **examples/capi/editor/**.

See also **apply-in-pane-process**
editor-pane
execute-with-interface

can-use-metafile-p *Function*

Summary Queries whether metafiles can be used.

Package **capi**

Signature **can-use-metafile-p &optional** *screen* **=>** *result*

Arguments
screen An object accepted by the function **convert-to-screen**.

Values
result A boolean.

Description The function **can-use-metafile-p** is the predicate for whether the default library (if no argument is passed) or a specified **screen** (if an argument is passed) can use metafiles.

If the argument *screen* is supplied, it is converted to a screen by **convert-to-screen**.

Examples There is an example in **examples/capi/graphics/meta-file.lisp**.

See also **convert-to-screen**
default-library

capi-object *Class*

Summary The class **capi-object** is the superclass of all CAPI classes.

Package **capi**

Superclasses **standard-class**

Subclasses
item
callbacks
element
interface
pinboard-object

Initargs

:name	The name of the object.
:plist	A property list for storing miscellaneous information.

Accessors
capi-object-name
capi-object-plist

Description
The class **capi-object** provides a name and a property list for general purposes, along with the accessors **capi-object-name** and **capi-object-plist** respectively. A **capi-object**'s name is defaulted by **define-interface** to be the name of the slot into which the object is put.

Example

```
(setq object (make-instance 'capi:capi-object
                            :name 'test))

(capi:capi-object-name object)

(setf (capi:capi-object-plist object)
      '(:red 1 :green 2 :blue 3))

(capi:capi-object-property object :green)
```

See also
capi-object-property

capi-object-property *Function*

Summary
The **capi-object-property** function is used to get and set properties in the property list of a **capi-object**.

Package
capi

Signature
capi-object-property *object property*

Signature **(setf capi-object-property)** *value object property*

Description All CAPI objects contain a property list, similar to the symbol **plist**. The recommended ways of setting properties are **capi-object-property** and **(setf capi-object-property)**. To remove a property, use the function **remove-capi-object-property**.

Example In this example a list panel is created, and a test property is set and examined using **capi-object-property**.

```
(setq pane (make-instance 'capi:list-panel
                          :items '(1 2 3)))

(capi:capi-object-property pane 'test-property)

(setf (capi:capi-object-property pane 'test-property)
      "Test")

(capi:capi-object-property pane 'test-property)

(capi:remove-capi-object-property pane 'test-property)

(capi:capi-object-property pane 'test-property)
```

See also **capi-object**
remove-capi-object-property

check-button *Class*

Summary A check button is a button that can be either selected or deselected, and its selection is independent of the selections of any other buttons.

Package **capi**

Superclasses **button**
titled-object

Description The class **check-button** inherits most of its behavior from the class **button**. Note that it is normally best to use a **check-button-panel** rather than make the individual buttons yourself, as the button panel provides functionality for handling groups of buttons. However, **check-button** can be used if you need to have more control over the button's behavior.

Example The following code creates a check button.

```
(setq button (capi:contain
              (make-instance 'capi:check-button
                             :text "Press Me")))
```

The button can be selected and deselected using this code.

```
(capi:apply-in-pane-process
 button #'(setf capi:button-selected) t button)

(capi:apply-in-pane-process
 button #'(setf capi:button-selected) nil button)
```

The following code disables and enables the button.

```
(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) nil button)

(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) t button)
```

See also **push-button**
radio-button
button-panel

check-button-panel *Class*

Summary A **check-button-panel** is a pane containing a group of buttons each of which can be selected or deselected.

Package **capi**

Superclasses **button-panel**

Description

The class **check-button-panel** inherits all of its behavior from **button-panel**, which itself inherits most of its behavior from **choice**. Thus, the **check-button-panel** can accept *items*, *callbacks*, and so on.

Example

```
(capi:contain (make-instance
               'capi:check-button-panel
               :title "Select some packages"
               :items '("CAPI" "LISPWORKS" "CL-USER")))

(setq buttons (capi:contain
               (make-instance
                'capi:check-button-panel
                :title "Select some packages"
                :items '("CAPI" "LISPWORKS" "CL-USER")
                :layout-class 'capi:column-layout)))

(capi:choice-selected-items buttons)
```

Also see the example in the directory **examples/capi/buttons/**.

See also

check-button
push-button-panel
radio-button-panel

choice *Class*

Summary

A **choice** is an abstract class that collects together a group of items, and provides functionality for displaying and selecting them.

Package

capi

Superclasses

collection

Subclasses

button-panel
extended-selection-tree-view
graph-pane
list-panel
menu-component
option-pane
tree-view

Initargs

:interaction The interaction style of the choice.

:selection The indexes of the choice's selected items.

:selected-item
The selected item for a single selection choice.

:selected-items
A list of the selected items.

:keep-selection-p
If **t**, retains any selection when the items change.

:initial-focus-item
If supplied, this should be an item in the choice.

Accessors

choice-selection

Readers

choice-interaction
choice-initial-focus-item

Description

The class **choice** inherits most of its behavior from **collection**, and then provides the selection facilities itself. The classes **list-panel**, **button-panel**, **option-pane**, **menu-component** and **graph-pane** inherit from it, and so it plays a key role in CAPI applications.

A **choice** can have one of four different interaction styles, and these control how it behaves when an item is selected by the user. *interaction* can be one of:

:no-selection The choice behaves just as a collection.

:single-selection

The choice can have only one selected item.

:multiple-selection

The choice can have multiple selected items, except on Mac OS X.

:extended-selection

An alternative to **multiple-selection**.

With *interaction* **:no-selection**, the choice cannot have a selection, and so behaves just as a collection would.

With *interaction* **:single-selection**, the choice can only have one item selected at a time. When a new selection is made, the old selection is cleared and its *selection-callback* is called. The *selection-callback* is also called when the user invokes the selection gesture on the selected item.

With *interaction* **:multiple-selection**, the choice can have any number of items selected, and selecting an item toggles its selection status. The *selection-callback* is called when an item becomes selected, and the *retract-callback* is called when an item is deselected. **:multiple-selection** is not supported for lists on Mac OS X.

With *interaction* **:extended-selection**, the choice can have any number of items selected as with **:multiple-selection** interaction, but the usual selection gesture removes the old selection. However, there is a window system-specific means of extending the selection. When an item is selected the *selection-callback* is called, when the selection is extended the *extend-callback* is called, and when an item is deselected the *retract-callback* is called.

On Mac OS X, the selection gesture is mouse (left button) click. De-selection and discontinuous selections are made by **Command+Click**, and a continuous selection is made by **Shift+Click**, regardless of whether if *interaction* is **:multiple-selection** or **:extended-selection**.

The choice's selection stores the indices of the currently selected item, and is a single number for single selection choices and a list for all other interactions. Therefore when calling **(setf choice-selection)** you must pass an integer or **nil** if *interaction* is **:single-selection**, and you must pass a list of integers if *interaction* is **:multiple-selection** or **:extended-selection**.The functions **choice-selected-item** and **choice-selected-items** treat the selection in terms of the items themselves as opposed to their indices.

Usually when a choice's items are changed using **(setf collection-items)** the selection is lost.

However, if the choice was created with **:keep-selection-pt**, then the selection is preserved over the change.

initial-focus-item, if supplied, specifies the item which has the input focus when the choice is first displayed.

Notes

When calling **(setf choice-selection)** you must pass an integer or **nil** when *interaction* is **:single-selection**. You must pass a list for other values of *interaction*.

Compatibility note

In LispWorks 5.0 and earlier versions, for interaction **:single-selection** the *selection-callback* is called only after a new selection is made.

Example

The following example defines a choice with three possible selections.

```
(setq choice (make-instance 'capi:choice
                            :items '("One" "Two" "Three")
                              :selection 0))

(capi:display-message "Selection: ~S"
                      (capi:choice-selection choice))

(capi:choice-selected-item choice)
```

The selection is changed using the following code.

```
(setf (capi:choice-selection choice) 1)
```

```
(capi:choice-selected-item choice)
```

Also see the examples in the directory **examples/capi/choice/** and in **examples/capi/graphics/graph-pane.lisp**

See also **choice-selected-item**
choice-selected-item-p
choice-selected-items
choice-update-item

choice-selected-item *Generic Function*

Summary The function **choice-selected-item** returns the currently selected item in a single selection choice.

Package **capi**

Signature **choice-selected-item** *choice*

Signature **(setf choice-selected-item)** *item choice*

Description The function **choice-selected-item** returns the currently selected item in a single selection choice. A **setf** method is provided as a means of setting the selection. Note that the items are compared by *choice*'s *test-function* - see **collection** or the example below.

It is an error to call this function on choices with different interactions — in that case, you should use **choice-selected-items**.

Example This example illustrates setting the selection. First we set up a single selection choice — in this case, a **list-panel**.

```
(setq list (capi:contain
            (make-instance 'capi:list-panel
                           :items '(a b c d e)
                           :selection 2)))
```

The following code line returns the selection of the list panel.

```
(capi:choice-selected-item list)
```

The selection can be changed, and the change viewed, using the following code.

```
(capi:apply-in-pane-process
 list #'(setf capi:choice-selected-item) 'e list)

(capi:choice-selected-item list)
```

This example illustrates the effect of the *test-function*. Make a choice with *test-function* **eq**:

```
(setf *list*
      (capi:contain
       (make-instance 'capi:list-panel
                      :items (list "a" "b" "c")
                      :selection 0
                     :visible-min-height :text-height)))
```

This call loses the selection since **(eq "b" "b")** fails:

```
(capi:apply-in-pane-process
 *list* #'(setf capi:choice-selected-item)
 "b" *list*)
```

Change the test function:

```
(capi:apply-in-pane-process
 *list* #'(setf capi:collection-test-function)
 'equal *list*)
```

This call sets the selection since **(equal "b" "b")** succeeds:

```
(capi:apply-in-pane-process
 *list* #'(setf capi:choice-selected-item)
 "b" *list*)
```

See also

choice
choice-selected-items
collection

choice-selected-item-p *Function*

Summary Checks if an item is currently selected in a choice.

Package **capi**

Signature **choice-selected-item-p** *choice item*

Description The function **choice-selected-item-p** is the predicate for whether an item *item* of the choice *choice* is selected.

Note that the items are compared by *choice*'s *test-function* - see **collection** for details.

Example

```
(setq list
      (capi:contain
       (make-instance 'capi:list-panel
                      :items '(a b c d)
                      :selection 2
                      :visible-min-height
                      '(:character 4))))

(capi:choice-selected-item-p list 'c)
=>
t
```

Now click on another item.

```
(capi:choice-selected-item-p list 'c)
=>
nil
```

See also **choice**
collection

choice-selected-items *Generic Function*

Summary The function **choice-selected-items** returns the currently selected items in a choice as a list of the items.

Package **capi**

Signature **choice-selected-items** *choice*

Signature **(setf choice-selected-items)** *items choice*

Description The function **choice-selected-items** returns the currently selected items in a choice as a list of the items. A **setf** method is provided as a means of setting the currently selected items. Note that the items are compared by *choice*'s *test-function* - see **collection** for details.

In the case of **:single-selection** choices, it is usually easier to use the complementary function **choice-selected-item**, which returns the selected item as its result.

Example First we set up a **:multiple-selection** choice — in this case, a list panel.

```
(setq list (capi:contain
            (make-instance
             'capi:list-panel
             :items '(a b c d e)
             :visible-min-height '(:character 5)
             :interaction :multiple-selection
             :selection '(1 3))))
```

The following code line returns the selections of the list.

```
(capi:choice-selected-items list)
```

The selections of the list panel can be changed and redisplayed using the following code.

```
(capi:apply-in-pane-process
 list #'(setf capi:choice-selected-items)
 '(a c e) list)

(capi:choice-selected-items list)
```

Note that *interaction* **:multiple-selection** is not supported for lists on Mac OS X.

See also **choice**
choice-selected-item
collection

choice-update-item *Function*

Summary Updates an item in a choice.

Package **capi**

Signature **choice-update-item** *choice item*

Description The function **choice-update-item** updates the display of the item *item* in the choice *choice*. It should be called if the display of *item* (that is, the string returned by the *print-function*) changes.

Examples Create a list panel that displays the status of something

```
(defun my-print-an-item (item)
        (format nil "~a: ~a"
                (substitute-if-not #\space
                                   'alphanumericp
                                   (symbol-name item))
                (symbol-value item)))

(defvar *status-one* :on)
(defvar *status-two* :off)

(setq list
      (capi:contain
       (make-instance
        'capi:list-panel
        :items '(*status-one* *status-two*)
        :print-function 'my-print-an-item
        :visible-min-height :text-height
        :visible-min-width :text-width)))
```

Setting the status variables does not change the display:

```
(setq *status-one* :error)
```

Update the item to change the display:

```
(capi:choice-update-item list '*status-one*)
```

This example also demonstrates **choice-update-item**:

examples/capi/choice/alternative-action-callback.lisp

See also **choice**

clipboard *Function*

Summary Returns the contents of the system clipboard.

Package **capi**

Signature **clipboard** *self* **&optional** *format* **=>** *result*

Arguments

self	A displayed CAPI pane or interface.
format	A keyword.

Values

result	A string, an **image**, a Lisp object, or **nil**.

Description The function **clipboard** returns the contents of the system clipboard as a string, or **nil** if the clipboard is empty.

format controls what kind of object is read. The following values of *format* are recognized:

:string	The object is a string. This the default value.
:image	The object is of type **image**, converted from whatever format the platform supports.
:value	The object is the Lisp value.
:metafile	The object is a metafile.

When *format* is **:image**, the image returned by **clipboard** is associated with *self*, so you can free it explicitly with **free-image** or it will be freed automatically when the pane is destroyed.

When *format* is **:metafile** the object is a metafile which should be freed using **free-metafile** when no longer needed. See also **draw-metafile** and **draw-metafile-to-image**. *format* **:metafile** is not supported on GTK+ or X11/Motif.

The Microsoft Windows clipboard is usually set by the user with the **Ctrl+C** and **Ctrl+X** gestures. Note that the LispWorks editor uses these gestures when in Windows emulation mode.

On X11/Motif, various gestures may set the clipboard. Note that LispWorks uses **Ctrl+C** and **Ctrl+X** when in KDE/Gnome editor emulation mode. The X clipboard can also be accessed by running the program **xclipboard** or the Emacs function **x-get-clipboard**.

The Mac OS X clipboard is usually set by the user with the **Command+C** and **Command+X** gestures.

See also

clipboard-empty
draw-metafile
draw-metafile-to-image
free-image
free-metafile
image
selection
set-clipboard
text-input-pane-paste

clipboard-empty *Function*

Summary — Determines whether the system clipboard contains an object of the specified kind.

Package — **capi**

Signature — **clipboard-empty** *self* **&optional** *format* **=>** *result*

Arguments
- *self* — A displayed CAPI pane or interface.
- *format* — A keyword.

Values
- *result* — **t** or **nil**.

Description — The function **clipboard-empty** returns **nil** if there is an object of the kind indicated by *format* on the clipboard, or **t** otherwise.

format controls what kind of object is checked. The allowed values of *format* are as described for **clipboard**.

See also — **clipboard**
image

clone *Generic Function*

Summary — Creates a copy of a CAPI object.

Package — **capi**

Signature — **clone** *capi-object* **=>** *cloned-object*

Arguments
- *capi-object* — An instance of a subclass of **capi-object**

Values
- *cloned-object* — A copy of *capi-object*.

Description The generic function **clone** returns a new object *cloned-object* which is a copy of *capi-object*. It does not share any data with *capi-object*, but has a copy of the useful part of its state.

The system contains methods on **clone**. You may add methods on your own interface classes.

See also **capi-object**

cocoa-default-application-interface *Class*

Summary The class supporting application menus and message processing for a Cocoa application.

Package **capi**

Superclasses **interface**

Initargs **:message-callback**
A function or **nil**.

:application-menu
nil, a **menu**, or the name of a slot containing a **menu** in the application interface.

:dock-menu **nil**, a **menu**, or a function designator.

Accessors **application-interface-message-callback**
application-interface-application-menu
application-interface-dock-menu

Description The class **cocoa-default-application-interface** supports the application menu, application messages and other functionality for a Cocoa application.

All Cocoa applications in LispWorks for Macintosh have an application interface, which is a hidden interface that provides the following:

1. The application menu (the leftmost menu in the menu bar, named after the application). See *application-menu* below.
2. The menu bar items that are displayed when no other interfaces are on the screen. See *menu-bar-items* in **`interface`** and *menu-bar* in **`define-interface`**.
3. An optional Dock context menu. See *dock-menu* below.
4. Optional application message processing. See *message-callback* below.
5. Control over the lifecycle and *display-state* of the application as a whole.

If you wish to override the defaults, then you should first define a subclass of **`cocoa-default-application-interface`** with your changes. Then set a single instance of this subclass as the application interface by calling **`set-application-interface`** before any CAPI functions that make the screen object (such as **`convert-to-screen`** and **`display`**).

Do not call **`display`** with a subclass of **`cocoa-default-application-interface`** - the application interface does not have a window on the screen and should be created in addition to the visible interfaces in your application.

When non-nil, *message-callback* should be a function with signature

interface message **`&rest`** ***args***

message-callback will be called for various application messages. The *interface* argument will be the application interface and the *message* argument will be a keyword. The *message* argument will be one of the following:

`:open-file` This message is invoked when the user double-clicks on a document associated with the application or drags a document into the application icon. The *args* contain the name of the file to open.

:finished-launching

This message is invoked just after the user has started the application and all other initialization has been done (including any **:open-file** message if applicable). You can use it to open a default document for example. There are no *args*.

application-menu controls the application's main menu. If this is **nil**, then a minimal application menu will be made using the title of the application interface, otherwise it should be a **menu** containing the usual items or the name of a slot containing such a menu in the application interface. Note that the **Quit** item in the *application-menu* needs to call **destroy** on the interface, rather than call **lw:quit**.

dock-menu provides a menu for use by the Mac OS X Dock icon. If the value is **nil** (the default), then the standard menu is used. If *dock-menu* is a function designator, it is called with the application interface as its argument when the menu is popped up and should return a menu. Otherwise *dock-menu* should be a menu, which is used directly. The Dock will add the standard items such as **Quit** to the end of the menu you supply.

interface initargs are interpreted as follows:

- The *activate-callback* is called when the application is activated or deactivated.
- The *create-callback* is called when the application starts up.
- The *destroy-callback* is called when the application shuts down.
- The *confirm-destroy-function* is called to confirm whether the application should shut down.

All of these callbacks execute in the thread that runs the Cocoa event loop, so they can call CAPI and GP functions.

The application interface also allows you to control aspects of the application. In particular:

- The function **destroy** will cause the application to shut down.
- The function **top-level-interface-display-state** will return **:hidden** if the whole application is hidden and will return **:normal** otherwise.
- The function **(setf top-level-interface-display-state)** can be used to perform some operations typically found on the application menu.

The *display-state* value can one of:

:normal	Show the application and activate it
:restore	Show the application again without activating it
:hidden	Hide
:others-hidden	Hide Others
:all-normal	Show All

Note: **cocoa-default-application-interface** is implemented only in LispWorks for Macintosh with the Cocoa IDE.

Example

See these files in the **examples** subdirectory of the LispWorks library:

capi/applications/cocoa-application.lisp

capi/applications/cocoa-application-single-window.lisp

delivery/macos/multiple-window-application.lisp

delivery/macos/single-window-application.lisp

See also

set-application-interface

cocoa-view-pane *Class*

Summary A **cocoa-view-pane** allows an arbitrary Cocoa view class to be used on the Macintosh.

Package **capi**

Superclasses **simple-pane**
titled-object

Initargs **:view-class** A string naming the view class to use.

:init-function
A function that initializes the view class.

Accessors **cocoa-view-pane-view-class**
cocoa-view-pane-init-function

Description The **cocoa-view-pane** class allows an instance of an arbitrary Cocoa view class to be displayed within a CAPI interface.

Note: **cocoa-view-pane** is implemented only in LispWorks for Macintosh with the Cocoa IDE.

When the pane becomes visible, the CAPI allocates and initialize a Cocoa view object using the initargs as follows:

- If *view-class* is specified, then it should be a string naming the Cocoa view class to allocate. Otherwise the class **NSView** is allocated.
- If *init-function* is not **nil**, then it should be a function which is called with of two arguments, the pane and a foreign pointer to the newly allocated Cocoa view object. The function should initialize the Cocoa view object in whatever way is required, including invoking the appropriate Objective-C initialization method, and return the initialized view. If *init-function* is **nil** then the Objective-C method **init** is called and the result is returned.

After the Cocoa view has been initialized, the function **cocoa-view-pane-view** can be used the retrieve it.

You can use the functions **(setf cocoa-view-pane-view-class)** and **(setf cocoa-view-pane-init-function)** to modify the *view-class* and *init-function*, but the values will be ignored if this is done after the pane becomes visible.

See the *LispWorks Objective-C and Cocoa Interface User Guide and Reference Manual* for details on using Cocoa.

Example

The following code uses **cocoa-view-pane** to display an **NSMovieView** displaying an existing movie.

```
(defun show-movie (movie)
  (capi:contain
   (make-instance
    'cocoa-view-pane
    :view-class "NSMovieView"
    :init-function
    #'(lambda (pane view)
        (setq view
              (objc:invoke view "init"))
        (objc:invoke view "setMovie:" movie)
        view))))
```

See also

cocoa-view-pane-view

cocoa-view-pane-view *Function*

Summary

Returns the Cocoa view of a **cocoa-view-pane**.

Package

capi

Signature

cocoa-view-pane-view *pane* **=>** *view*

Arguments

pane A **cocoa-view-pane**.

Values

view A foreign pointer to a Cocoa view or **nil**.

Description The function **cocoa-view-pane-view** returns the Cocoa view for the **cocoa-view-pane** *pane* as a foreign pointer. This view is only accessible when the pane is visible and **nil** is returned in other cases.

Note: **cocoa-view-pane-view** is implemented only in LispWorks for Macintosh with the Cocoa IDE. See the *LispWorks Objective-C and Cocoa Interface User Guide and Reference Manual* for details on using Cocoa.

Example See the example in **examples/objc/movie-view.lisp**.

See also **cocoa-view-pane**

collect-interfaces *Generic Function*

Summary Finds all interfaces of a given class.

Package **capi**

Signature **collect-interfaces** *proto* **&key** *screen current-process-first sort-by* **=>** *interfaces*

Arguments

proto	A class, class name, or an interface.
screen	**nil**, the symbol **:any**, a screen, or a keyword naming a library.
current-process-first	A boolean.
sort-by	**:visible** or **:create**.

Values

interfaces	A list.

Description The generic function **collect-interfaces** returns a list of CAPI interfaces which are instances of the class indicated by *proto*, or subclasses thereof.

If screen is **nil**, the interfaces on the default screen are returned. This is the default. If *screen* is **:any**, *interfaces* includes those on any screen. If *screen* is a **screen** object, the interfaces on that screen are returned. *screen* can also be a library name, currently the accepted values are **:win32**, **:motif** and **:cocoa**.

If interfaces on multiple screens are returned, then those on each screen are grouped together in *interfaces*.

Amongst those for each screen, the interfaces are grouped as follows. If *current-process-first* is true, then the interfaces in the current process appear together at the beginning of the group. If *sort-by* is **:create** then these interfaces are sorted by creation time, otherwise *sort-by* is **:visible** and they are are sorted in Z-order. The interfaces of other processes appear at the end of the group, also sorted according to *sort-by*.

If *current-process-first* is **nil**, then the interfaces for each screen are sorted according to *sort-by*.

The default value of *sort-by* is **:create** and of *current-process-first* is **t**.

See also **find-interface**
installed-libraries

collection *Class*

Summary A **collection** collects together a set of items, and provides functionality for accessing and displaying them.

Package **capi**

Superclasses **capi-object**
callbacks

Subclasses **choice**

Initargs

:items The items in the collection.

:print-function
A function that prints an item.

:test-function A comparison function between two items.

:items-count-function
A function which returns the length of items.

:items-get-function
A function that returns the *n*th item.

:items-map-function
A function that maps a function over the items.

:accepts-focus-p
Specifies that the collection should accept input. The default value is **t**.

:help-key An object used for lookup of help.

Accessors

collection-items
collection-print-function
collection-test-function

Readers

collection-items-count-function
collection-items-get-function
collection-items-map-function
help-key

Description

The main use of **collection** is as a part of the class **choice**, which provides selection capabilities on top of the collection handling, and which is used by list panels, button panels and menus amongst others.

The items in the collection are printed by **print-collection-item**.

Items can be instances of the CAPI class **item** or any Lisp object. The main difference is that non-CAPI items use the callbacks specified for the collection, whilst the CAPI **item**s will use their callbacks in preference if these are specified.

By default, *items* must be a sequence, but this can be changed by specifying *items-get-function*, *items-count-function*, and *items-map-function*.

items-get-function should take as arguments the items and an index, and should return the indexed item. The default is **svref**.

items-count-function should take the items as an argument and should return the number of them.

items-map-function should take as arguments the items, a function *function* and a flag *collect-results-p*, and should call *function* on each of the items in return. If *collect-results-p* is non-nil, then it should also return the results of these calls in a list.

test-function should be suitable for comparing the items in your collection. For example, if there are both strings and integers amongst your *items*, you should supply *test-function* **equal**.

You can change the items using **(setf collection-items)**. Note that there is an optimization **append-items** that is sometimes useful when adding items.

accepts-focus-p and *help-key* are intepreted as described in **element**.

Example

The following code uses **push-button-panel**, a subclass of **collection**.

```
(capi:contain (make-instance 'capi:push-button-panel
                             :items '(one two three)))
```

```
(capi:contain (make-instance
               'capi:push-button-panel
               :items '(one two three)
               :print-function 'string-capitalize))
```

The following example provides a collection with all values from 1 to 6 by providing an *items-get-function* and an *items-count-function*.

```
(capi:contain (make-instance
               'capi:push-button-panel
               :items 6
               :items-get-function
                 #'(lambda (items index) (1+ index))
               :items-count-function
                 #'(lambda (items) items)))
```

Here is an example demonstrating the use of CAPI items in a collections list of items to get more specific callbacks.

```
(defun specific-callback (data interface)
  (capi:display-message "Specific callback for ~S"
                        data))

(defun generic-callback (data interface)
  (capi:display-message "Ordinary callback for ~S"
                        data))

(capi:contain (make-instance
               'capi:list-panel
               :items (list (make-instance
                             'capi:item
                             :text "Special"
                             :data 1000
                             :selection-callback
                             'specific-callback)
                            2 3 4)
               :selection-callback 'generic-callback)
              :visible-min-width 200
              :visible-min-height 200)
```

See also

append-items
count-collection-items
get-collection-item
item

map-collection-items
print-collection-item
search-for-item

collection-find-next-string *Generic Function*

Summary — Finds the next occurence of the string that was previously searched for in a collection.

Package — **capi**

Signature — **collection-find-next-string** *collection* **&key** *set* **=>** *index*

Arguments

collection	A **collection**.
set	A boolean.

Values

index	A non-negative integer or **nil**.

Description — The generic function **collection-find-next-string** must be called after one of **collection-search**, **collection-find-string** or **find-string-in-collection** was called on *collection*. It searches for the next item in *collection* with printed representation matching the last string searched for and returns its index, or **nil** if no match is found.

If *set* is true, then if an item matching the string is found, the selection is set to this item. *set* defaults to **t**.

See also
collection-find-string
collection-last-search
collection-search
find-string-in-collection

collection-find-string *Generic Function*

Summary — Finds the next occurence of a string in a collection, prompting for the string if it is not supplied.

Package — **capi**

Signature — **collection-find-string** *collection* **&key** *set string* **=>** *index*

Arguments

collection	A **collection**.
set	A boolean.
string	A string, or **nil**.

Values

index	A non-negative integer or **nil**.

Description — The generic function **collection-find-string** calls **find-string-in-collection** with *collection* and *set*.

string is also passed if non-nil. If *string* is **nil**, **collection-find-string** first prompts the user for a string to pass.

set defaults to **t**.

See also — **collection-search**
find-string-in-collection

collection-last-search *Generic Function*

Summary — Returns the last string searched for in a collection.

Package — **capi**

Signature — **collection-last-search** *collection* **=>** *string*

Arguments

collection	A **collection**.

Values

string	A string, or **nil**.

Description The generic function **collection-last-search** returns the last string searched for in collection by **collection-search** or **find-string-in-collection**.

If neither of these functions has been called on *collection*, then the return value *string* is **nil**.

See also **collection-search**
find-string-in-collection

collection-search *Generic Function*

Summary The generic function **collection-search** calls **find-string-in-collection** with a string provided by the user.

Package **capi**

Signature **collection-search** *collection* **&optional** *set*

Description Prompts the user for a string and calls **find-string-in-collection** with *collection*, *set* and this string.

set defaults to **t**.

See also **collection**
find-string-in-collection

collector-pane *Class*

Summary A **collector-pane** is an **editor-pane** which displays the output sent to a particular type of character stream called an editor stream, the contents of which are stored in an editor buffer.

Package **capi**

Superclasses **editor-pane**

Initargs

:buffer-name	The name of a buffer onto an editor stream.
:stream	The editor stream to be collected.

Readers **collector-pane-stream**

Description A new **collector-pane** can be created to view an existing editor stream by passing the stream itself or by passing the buffer name of that stream.

To create a new stream, either specify *buffer-name* which does not match any existing buffer, or do not pass *buffer-name* in which case the CAPI will create a unique buffer name for you.

To access the stream, use the reader **collector-pane-stream** on the **collector-pane**.

Note that the editor buffer **"Background Output"** is a buffer onto the output stream ***standard-output***.

Example Here is an example that creates two collector panes onto a new stream (that is created by the first collector pane).

```
(setq collector (capi:contain
                 (make-instance 'capi:collector-pane)))

(setq *test-stream*
  (capi:collector-pane-stream collector))

(capi:contain
  (make-instance 'capi:collector-pane
                 :stream *test-stream*))

(format *test-stream* "Hello World~%")
```

Finally, this example shows how to create a collector pane onto the "**Background Output**" stream.

```
(capi:contain (make-instance 'capi:collector-pane
               :buffer-name "Background Output"))
```

See also **with-random-typeout**
map-typeout
unmap-typeout

color-screen *Class*

Package **capi**

Superclasses **screen**

Description This is a subclass of **screen** that gets created for color screens. It is primarily available as a means of discriminating on whether or not to use colors in an interface.

See also **element-screen**
mono-screen

column-layout *Class*

Summary The **column-layout** lays its children out in a column.

Package **capi**

Superclasses **grid-layout**

Initargs

:ratios The size ratios between the layout's children.

:adjust The horizontal adjustment for each child.

:gap The gap between each child.

:uniform-size-p
If **t**, each child in the column has the same height.

Accessors **layout-ratios**

Description The **column-layout** lays its children out by inheriting the behavior from **grid-layout**. The *description* is a list of the layout's children, and the layout also translates the initargs *ratios*, *adjust*, *gap* and *uniform-size-p* into the **grid-layout**'s equivalent initargs *y-ratios*, *x-adjust*, *y-gap* and *y-uniform-size-p*.

description may also contain the keywords **:divider** and **:separator** which automatically create a divider or separator as a child of the **column-layout**. The user can move a divider, but cannot move a separator.

When specifying **:ratios** in a row with **:divider** or **:separator**, you should use **nil** to specify that the divider or separator is given its minimum size, as in the example below.

Compatibility note ***layout-divider-default-size*** and **column-layout-divider** are not supported in LispWorks 4.4 and later.

Example

```
(capi:contain (make-instance
               'capi:column-layout
               :description
                (list
                 (make-instance 'capi:push-button
                                :text "Press me")
                "Title"
                (make-instance 'capi:list-panel
                               :items '(1 2 3)))))
```

```
(setq column (capi:contain
              (make-instance
               'capi:column-layout
               :description
               (list
                (make-instance 'capi:push-button
                               :text "Press me")
                "Title:"
                (make-instance 'capi:list-panel
                               :items '(1 2 3)))
               :adjust :center)))

(capi:apply-in-pane-process
 column #'(setf capi:layout-x-adjust) :right column)

(capi:apply-in-pane-process
 column #'(setf capi:layout-x-adjust) :left column)

(capi:apply-in-pane-process
 column #'(setf capi:layout-x-adjust) :center column)

(flet ((make-list-panel (x y)
         (make-instance
          'capi:list-panel
          :items
          (loop for i below x
                collect i)
          :selection
          (loop for i below x by y
                collect i)
          :interaction
          :multiple-selection)))
  (capi:contain
   (make-instance
    'capi:column-layout
    :description
    (list
     (make-list-panel 100 5)
     :divider
     (make-list-panel 100 10))
    :ratios '(1 nil 2))))
```

See also **row-layout**

component-name *Function*

Summary Gets and sets the *component-name* of an **ole-control-pane**.

Package **capi**

Signature **component-name** *pane* **=>** *name*

(setf component-name) *name pane* **=>** *name*

Description The function **component-name** accesses the *component-name* of an **ole-control-pane**.

When the **ole-control-pane** is created, it automatically opens the component and inserts it.

If **(setf component-name)** is called on a pane that is already created, any existing component is closed, and the new component is opened and inserted. **(setf component-name)** also sets the pane's *user-component* to **nil**.

Notes **component-name** is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Example See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also **ole-control-pane**

confirm-quit *Function*

Summary Quits the Lisp session, potentially after user confirmation.

Package **capi**

Signature **confirm-quit** *application-name*

Arguments *application-name* A string.

Description The function **confirm-quit** calls **quit**, potentially after confirmation from the user.

The behavior of **confirm-quit** when called within LispWorks is determined by a LispWorks user preference, which can be set by **Tools > Preferences... > Environment > General > Confirm Before Exiting**. This preference can also be set programmatically (for example in an application) by **set-confirm-quit-flag**.

If the value of the flag is **:check-editor-files** (the default), **confirm-quit** checks whether there are editor buffers which are associated with files and are modified. If there is at least one such modified buffer, **confirm-quit** prompts the user to decide between three options:

Save Changes Saves all modified buffers before quitting

Discard Changes Quits without saving

Cancel Does not save or quit

If there are no such modified buffers, **confirm-quit** simply calls **quit**.

If the flag is **nil** then **confirm-quit** simply calls **quit**.

If the flag is **t** then **confirm-quit** prompts the user. If there are unsaved buffers, the prompt is as described above, otherwise the prompt is a simple yes/no confirmer dialog.

application-name is used in the prompt to identify the application.

Notes The LispWorks IDE uses **confirm-quit**.

See also **set-confirm-quit-flag**

confirm-yes-or-no *Function*

Summary The function **confirm-yes-or-no** pops up a dialog button containing a message and a **Yes** and **No** button.

Package **capi**

Signature **confirm-yes-or-no** *format-string* **&rest** *format-args*

Description This pops up a dialog box containing a message and the buttons **Yes** and **No**, returns **t** when the **Yes** button is clicked, and **nil** when the **No** button is clicked. The message is obtained by applying the *format-string* and the *format-args* to the Common Lisp function **format**.

This function is actually a convenient version of **prompt-for-confirmation**, but has the disadvantage that you cannot specify any customization arguments. For more flexibility, use **prompt-for-confirmation** itself.

Example
```
(setq pane (capi:contain
             (make-instance 'capi:text-input-pane)
                            :title "Test Interface"))

(when (capi:confirm-yes-or-no "Close ~S?" pane)
  (capi:apply-in-pane-process
   pane 'capi:quit-interface pane))
```

See also **prompt-for-confirmation**
display-dialog
popup-confirmer

confirmer-pane *Function*

Summary Returns the pane associated with a confirmer interface.

Package **capi**

Signature **confirmer-pane** *interface* **=>** *pane*

Arguments

interface	A confirmer interface displayed by **popup-confirmer**.

Values

pane	The *pane* argument passed to **popup-confirmer**.

Description The function **confirmer-pane** returns the pane associated with a confirmer interface that has been displayed by **popup-confirmer**.

In most cases the programmer does not have access to this interface, but it can be passed to the confirmer's callbacks when extra buttons are added via the *buttons* argument.

See also **popup-confirmer**

contain *Function*

Summary Displays a window containing an element.

Package **capi**

Signature **contain** *element* **&rest** *interface-args* **&key** *screen process title* **&allow-other-keys =>** *element*

Description The function **contain** creates and displays a container for the CAPI element *element*. **contain** returns *element* as its result.

contain is provided as a convenient way of testing CAPI functionality and is useful mainly during interactive development. Many of the CAPI examples use it.

The container is created using **make-container**, which can make containers for any of the following classes:

simple-pane
layout
interface
pinboard-object
menu
menu-item
menu-component
list

In the case of a **list**, the CAPI tries to see what sort of objects they are and makes an appropriate container. For instance, if they were all **simple-pane**s it would put them into a **column-layout**.

interface-args, after removing the arguments *screen* and *process*, are passed to **make-container** as the initargs to the interface. *title* is used as the title of the container.

The values of the arguments *screen* and *process* are passed to **display** when displaying the container.

Example

```
(capi:contain (make-instance 'capi:text-input-pane))

(capi:contain (make-instance
               'capi:column-layout
               :description `("Title:"
                              ,(make-instance
                               'capi:text-input-pane))))

(capi:contain (make-instance 'capi:menu-item)
              :title "Test")
```

See also

make-container
display
element

convert-relative-position *Function*

Summary Converts a screen position from one coordinate system to another.

Package **capi**

Signature **convert-relative-position** *from to x y* **=>** *to-x, to-y*

Arguments

from	A pane, interface or screen.
to	A pane, interface or screen.
x	An integer.
y	An integer.

Values

to-x	An integer.
to-y	An integer.

Description The function **convert-relative-position** converts the position *x,y* in the coordinate system of *from* to that of *to*.

Example See the example file **examples/capi/elements/convert-relative-position.lisp**.

See also **top-level-interface-geometry**
with-geometry

convert-to-screen *Function*

Summary The **convert-to-screen** function finds the appropriate screen or container for a CAPI object.

Package **capi**

Signature **convert-to-screen &optional** *object* **=>** *result*

Arguments

object	A CAPI object, a plist, or **nil**.

Values

result	A screen or a container.

Description

This finds the appropriate screen or container for the CAPI object *object*.

If *object* is **nil**, *result* is the default screen. *object* defaults to **nil**.

If *object* is a pane inside a MDI interface, then *result* is the **capi:container** of the interface, rather than the real screen, because this is more useful in most cases. To obtain the real screen, call **convert-to-screen** on the top level interface. See **document-frame** for a description of MDI interfaces.

object can be a keyword representing the CAPI library. This is equivalent to using the **:library** key in the plist case below.

object can be a plist. The keys below are supported on GTK+ and Motif. Other libraries ignore them.

:display The value is an X Window System display string describing the X display and screen to use. The default value is derived from the **DISPLAY** environment variable or (on Motif) the **-display** command-line option, or (on GTK+) the **--display** command-line option. If neither is supplied, the default is to use the default screen on the local host.

:host The name of the host to use for the X Window System display. This key is valid only if no **:display** key/value is supplied. The default value is the local host.

:server-number The number of the display server to use for the X Window System display. This key is valid only if no **:display** key/value is supplied. The default value is 0.

:screen-number The number of the screen to use for the X Window System display. This key is valid only if no **:display** key/value is supplied. The default value is the default screen of the display.

:application-class

The value is a string naming the application class used for X Window System resources. The default value is "Lispworks". When running a delivered LispWorks image, you should specify the **:application-class** key if you want to provide application-specific resources.

On GTK+ the value is used for constructing the default *widget-name* for top-level interfaces. The application-class is prepended to the interface name followed by a ".", so if *application-class* is **"my-application"**, a top-level-interface of class **my-interface** will have a default *widget-name* **"my-application.my-interface"**.

See **element** for the description of *widget-name*.

Example GTK+ resource files are in **lib/6-1-0-0/examples/gtk/**

:fallback-resources

On GTK+ the fallback resources are global, so they cannot be used to define different resources for different screens. Each call to **convert-to-screen** where *fallback-resources* is passed overrides the previous call. The value of *fallback-resources* is either a single string or a list of strings. In either case each string must be a complete specification according to the standard resource specifica-

tion of GTK+ resource files (gtk_rc_parse_string should be able to parse it).

On Motif the value is a list of strings representing the set of application context fallback resources to use (see **XtAppSetFallbackResources**). Each string corresponds to a single line of an X resource file.

:library The value specifies the CAPI library. This is useful on Linux, FreeBSD and x86/x64 Solaris platforms, and in the Mac OS X/GTK+ image, to choose between **:gtk** and **:motif** if the deprecated "capi-motif" module is loaded.

This keys is supported on Motif only. Other libraries ignore it.

:command-line-args

The value is a list of strings representing the set of command-line arguments to pass to **XtOpenDisplay**. Each string corresponds to a single argument. The default value is derived from the command line used to start Lisp.

The resources are used only when no other system resource files can be found. When running a non-delivered LispWorks image, the default value of the **:fallback-resources** key is read from the file whose name is the value of the **:application-class** key in the **app-defaults** directory of the current LispWorks library. When running a delivered LispWorks image, you should specify the **:fallback-resources** key if your application needs fallback resources.

Example

```
(capi:convert-to-screen)
```

See also **document-frame**
screen

count-collection-items *Generic Function*

Summary Returns the number of items in a collection.

Package **capi**

Signature **count-collection-items** *collection* **&optional** *representation*

Description The **count-collection-items** generic function returns the number of items in *collection* by calling the *items-count-function*.

representation defaults to **nil**. If it is non-nil, it is used instead of the *items* of *collection*.

Example The following example uses **count-collection-items** to return the number of items in a list panel.

```
(setq list (make-instance 'capi:list-panel
                          :items '(1 2 3 4 5)))

(capi:count-collection-items list)
```

The following example shows how to count the number of items in a specified list.

```
(capi:count-collection-items list '(1 2))
```

See also **collection**
get-collection-item
search-for-item

current-dialog-handle *Function*

Summary Returns the underlying handle of the current dialog.

Package **capi**

Signature **current-dialog-handle =>** *handle*

Values

handle	A platform-specific value, or **nil**.

Description The function **current-dialog-handle** returns the underlying handle of the current dialog, as follows:

Microsoft Windows	The hwnd of the dialog.
GTK+	A pointer to the GdkWindow.
Motif	A windowid of the dialog.
Cocoa	The value returned by the NSWindow's **windowNumber** method.

This value is useful if you want to perform some operation on the underlying handle that the CAPI does not supply.

If there is no current dialog, **current-dialog-handle** returns **nil**.

Example Press on "Get handle" to see the handle of the dialog.

```
(capi:popup-confirmer
 (make-instance
  'capi:push-button
  :text "Get handle"
  :callback-type :none
  :selection-callback
  #'(lambda ()
      (capi:display-message
       (format nil "current-dialog-handle ~a~%"
               (capi:current-dialog-handle)))))
 nil
 :title "A dialog")
```

See also **simple-pane-handle**

current-document *Generic Function*

Summary	Returns the current document of a MDI interface.	
Package	**capi**	
Signature	**current-document** *mdi-interface* **=>** *child*	
Arguments	*mdi-interface*	An instance of a subclass of **document-frame**.
Values	*child*	The current document of *mdi-interface*.
Description	The generic function **current-document** returns the top child interface of a MDI interface.	
See also	**document-frame**	

current-pointer-position *Function*

Summary	Returns the current position of the pointer.	
Package	**capi**	
Signature	**current-pointer-position &key** *relative-to pane-relative-p* **=>** *x, y*	
Arguments	*relative-to*	A **screen** or a displayed **interface** or a CAPI pane.
	pane-relative-p	A boolean.
Results	*x*	An integer.
	y	An integer.

Description The function **current-pointer-position** returns the current x,y position of the pointer on the screen of *relative-to*, which defaults to the current screen.

If *pane-relative-p* is true then the position is returned relative to *relative-to*, otherwise it is returned relative to the screen. The default value of *pane-relative-p* is **t**.

See also **interface**
screen

current-popup *Function*

Summary Returns the current popup pane if there is one.

Signature **current-popup =>** *result*

Values *result* A pane or **nil**.

Description The function **current-popup** returns the current popup pane or **nil** if there is none. A current popup exists in the scope of callbacks which are done while a dialog is displayed on the screen in the current process.

If the dialog was raised by an explicit call to **display-dialog** or **popup-confirmer**, current-popup returns the first argument of **display-dialog** or **popup-confirmer**. For other functions that raise a dialog (such as the **prompt-for-file**, **prompt-for-confirmation** and so on), the result is CAPI pane created by the system.

See also **display-dialog**
popup-confirmer

current-printer *Function*

Summary Returns the currently selected printer object.

Package **capi**

Signature **current-printer &key** *interactive* **=>** *printer*

Arguments *interactive* A boolean.

Values *printer* A printer, or **nil**.

Description The **current-printer** function returns the currently selected printer object for the default library.

If *interactive* is non-nil and there is no current printer, a confirmer is displayed warning the user and *printer* is **nil**. The default value of interactive is **nil**.

See also **page-setup-dialog**
set-printer-options

default-editor-pane-line-wrap-marker *Variable*

Summary The default line wrap marker for editor panes.

Package **capi**

Initial Value **#\!**

Description The variable ***default-editor-pane-line-wrap-marker*** provides the default value for the *line-wrap-marker* of an **editor-pane**. The value should be a **character** object, or **nil**

See also **editor-pane**

default-library *Function*

Summary Returns the default library.

Package **capi**

Signature **default-library =>** *library*

Values *library* A library name.

Description The function **default-library** returns a keyword naming the the default library.

On Linux, FreeBSD and xw86/x64 Solaris platforms, the default library is **:gtk**. If you load the deprecated "capi-motif" module, then the library will be **:motif**.

On Microsoft Windows platforms, currently the only library available is **:win32**, hence this is the default library.

On Mac OS X platforms, the only library available in the native GUI image is **:cocoa**, hence this is the default library. In the Mac OS X/GTK+ image, the default library is **:gtk**, but you load the deprecated "capi-motif" module, then the library will be **:motif**.

In LispWorks for UNIX only (not LispWorks for Linux, FreeBSD, or x86/x64 Solaris) platforms, currently the only library available is **:motif**, hence this is the default library.

See also **installed-libraries**

define-command *Macro*

Summary The **define-command** macro defines an alias for a mouse or keyboard gesture that can be used in the input model of an output pane.

Package **capi**

Signature **define-command** *name gesture* **&key** *translator host*

Description The macro **define-command** defines an alias for a mouse or keyboard gesture that can then be used in **output-pane**'s input models. The *name* is the name of the alias and the *gesture* is one of the gestures accepted by **output-pane**. The *translator* is a function that gets passed the arguments that would be passed to the callback, and returns a list of arguments to be passed to the callback along with the output-pane (which will be the first argument). The *host* indicates which platforms this gesture should apply for (it defaults to all platforms).

For a full description of the gesture syntax, see **output-pane**.

Example Firstly, here is an example of defining a command which maps onto a gesture.

```
(defun gesture-callback (output-pane x y)
  (capi:display-message
   "Pressed ~S at (~S,~S)"
   output-pane x y))

(capi:define-command :select (:button-1 :press))

(capi:contain (make-instance
               'capi:output-pane
               :input-model '((:select
                               gesture-callback))))
```

Here is a more complicated example demonstrating the use of *translator* to affect the arguments passed to a callback.

```
(capi:define-command
  :select-object (:button-1 :press)
  :translator #'(lambda (output-pane x y)
                  (let ((object
                      (capi:pinboard-object-at-position
                                   output-pane x y)))
                                (when object
                                  (list object)))))
```

```
(defun object-select-callback (output-pane
                               &optional object)
  (when object (capi:display-message
                "Pressed on ~S in ~S"
                object output-pane)))

(setq pinboard
      (capi:contain (make-instance
                     'capi:pinboard-layout
                     :input-model '((:select-object
                             object-select-callback)))))

(make-instance 'capi:item-pinboard-object
               :text "Press Me!"
               :parent pinboard
               :x 10 :y 20)

(make-instance 'capi:line-pinboard-object
               :parent pinboard
               :start-x 20 :start-y 50
               :end-x 120 :end-y 150)
```

There is a further example in the file **capi/output-panes/commands.lisp**.

See also **output-pane**
invoke-command
invoke-untranslated-command

define-interface *Macro*

Summary The **define-interface** macro defines subclasses of **interface**.

Package **capi**

Signature **define-interface** *name superclasses slots* **&rest** *options*

Description The macro **define-interface** is used to define subclasses of **interface**, which when created with **make-instance** has the specified panes, layouts and menus created automatically. The slots and superclasses are used to describe the slots

and superclasses of *name* as in the **defclass** macro, except that if *superclasses* is non-nil it must include **interface** or a subclass of it.

define-interface accepts the same options as **defclass**, plus the following extra options:

:panes	Descriptions of the interface's panes.
:layouts	Descriptions of the interface's layouts.
:menus	Descriptions of the interface's menus.
:menu-bar	A list of menus for the interface's menu bar.
:definition	Options to alter **define-interface**.

The class options **:panes**, **:layouts** and **:menus** add extra slots to the class that will contain the CAPI object described in their description. Within the scope of the extra options, the slots themselves are available by referencing the name of the slot, and the interface itself is available with the variable **capi:interface**. Each of the slots can be made to have readers, writers, accessors or documentation by passing the appropriate **defclass** keyword as one of the optional arguments in the description. Therefore, if you need to find a pane within an interface instance, you can provide an accessor, or simply use **with-slots**.

The **:panes** option is a list of pane descriptions of the following form

```
(:panes
   (slot-name  pane-class  initargs)
   …
   (slot-name  pane-class  initargs)
)
```

where *slot-name* is a name for the slot, *pane-class* is the class of the pane being included in the interface, and *initargs* are the initialization arguments for the pane - the allowed forms are described below.

The **:layouts** option is a list of layout descriptions of the following form

```
(:layouts
   (slot-name  layout-class  children  initargs)
   …
   (slot-name  layout-class  children  initargs)
)
```

where *slot-name* is a name for the slot, *layout-class* specifies the type of layout, *children* is a list of children for the layout, and *initargs* are the initialization arguments for the layout - the allowed forms are described below. The primary layout for the interface defaults to the first layout described, but can be specified as the **:layout** initarg to the interface. If no layouts are specified, then the CAPI will place all of the defined panes into a column layout and make that the primary layout.

The **:menus** option is a list of menu and menu component descriptions of the following form

```
(:menus
   (slot-name  title  descriptions  initargs)
   …
   (slot-name  title  descriptions  initargs)
)
```

slot-name is the slot name for each menu or menu component.

title is the menu's title, the keyword **:menu**, or the keyword **:component**.

descriptions is a list of menu item descriptions. Each menu item description is either a title, a slot name for a menu, or a list of items containing a title, descriptions, and a list of initialization arguments for the menu item.

initargs are the initialization arguments for the menu.

The values given in *initargs* under **:panes**, **:layouts** and **:menus** can be lists of the form

(:initarg *keyword-name***)**
(:initarg *key-spec***)**
(:initarg *key-spec initarg-value***)**

key-spec **:=** *var* **|** **(***var***)** **|** **(***var initform***)** **|** **((***keyword-name var***))** **|** **((***keyword-name var***)** *initform***)**

keyword-name **:= any keyword**

key-spec is interpreted as in the **&key** symbol of ordinary Common Lisp lambda lists. When this form of value is used, the specified *keyword-name* is added as an extra initarg to the class defined by the **define-interface** form.

If *key-spec* is followed by *initarg-value*, then its value is used as the initarg of the pane. Otherwise the value from *key-spec* is used.

Additionally *initargs* may contain the keyword argument **:make-instance-extra-apply-args** which is useful when you want to supply initargs to the pane *slot-name* when the interface is initialized. The value *make-instance-extra-apply-args* should be a keyword which becomes an extra initarg to the interface class *name*. The value of that initarg should be a list of pane initargs and values which is passed when the pane is initialized. For an example, see **examples/capi/applications/argument-passing.lisp**.

The **:menu-bar** option is a list of slot names, where each slot referred to contains a menu that should appear on the menu bar.

The **:definition** option is a property list of arguments which **define-interface** uses to change the way that it behaves. Currently there is only one definition option:

:interface-variable

The name of the variable containing the interface.

Example

Firstly, a couple of pane examples:

```
(capi:define-interface test1 ()
  ()
  (:panes
    (text capi:text-input-pane))
  (:default-initargs :title "Test1"))
(capi:display (make-instance 'test1))
(capi:define-interface test2 ()
  ()
  (:panes
    (text capi:text-input-pane)
    (buttons capi:button-panel :items '(1 2 3)
             :reader test2-buttons))
  (:layouts
    (main-layout capi:column-layout '(text buttons)))
  (:default-initargs :title "Test2"))

(test2-buttons
 (capi:display (make-instance 'test2)))
```

Here are a couple of menu examples:

```
(capi:define-interface test3 ()
  ()
  (:menus
    (color-menu "Colors" (:red :green :blue)
       :print-function 'string-capitalize))
  (:menu-bar color-menu)
  (:default-initargs :title "Test3"))

(capi:display (make-instance 'test3))

(capi:define-interface test4 ()
  ()
  (:menus
   (colors-menu "Colors"
                ((:component
                  (:red :green :blue)
                  :interaction :single-selection
                  :print-function
                  'string-capitalize)
                 more-colors-menu))
   (more-colors-menu "More Colors"
                     (:pink :yellow :cyan)
                     :print-function
                     'string-capitalize))
  (:menu-bar colors-menu)
  (:default-initargs :title "Test4"))
```

```
(capi:display (make-instance 'test4))
```

This example demonstrates inheritance amongst subclasses of **interface**:

```
(capi:define-interface test5 (test4 test1)
  ()
  (:default-initargs :title "Test5"))

(capi:display (make-instance 'test5))
```

The next three examples illustrate the use of **:initarg** in initarg specifications for **:panes**.

Here we initialize the **:selected-items** initarg of the pane **foo** to the value passed by **:select** when making the interface object, or **nil** otherwise:

```
(capi:define-interface init1 () ()
  (:panes
   (foo
    capi:list-panel
    :items '(0 1 2 3 4)
    :visible-min-height '(:character 5)
    :interaction :multiple-selection
    :selected-items (:initarg select))))

(capi:contain (make-instance 'init1
                             :select '(1 3)))

(capi:contain (make-instance 'init1))
```

Here we initialize the **:selected-items** initarg of pane **foo** to the value passed by **:select** initarg when making the interface object, or **(1 3)** otherwise:

```
(capi:define-interface init2 () ()
  (:panes
   (foo
    capi:list-panel
    :items '(0 1 2 3 4)
    :visible-min-height '(:character 5)
    :interaction :multiple-selection
    :selected-items
    (:initarg (select '(1 3))))))

(capi:contain (make-instance 'init2))
```

Here we increment the indices passed in the interface's **:select** initarg before passing them in the **:selected-items** initarg of pane **foo**:

```
(capi:define-interface init3 () ()
  (:panes
   (foo
    capi:list-panel
    :items '(0 1 2 3 4)
    :visible-min-height '(:character 5)
    :interaction :multiple-selection
    :selected-items
    (:initarg select
     (mapcar '1+ select)))))

(capi:contain (make-instance 'init3
                             :select '(1 3)))
```

There are many more examples in the directory **examples/capi/**.

See also **interface**
layout
menu

define-layout *Macro*

Summary The macro **define-layout** creates new classes of **layout**.

Package **capi**

Signature **define-layout** *name superclasses slots* **&rest** *options*

Description The macro **define-layout** is used to create new classes of **layout**. The macro is essentially the same as **defclass** except that its default superclass is **layout**.

To implement a new class of **layout**, methods need to be provided for the following generic functions:

interpret-description

Translate the layout's child descriptions.

calculate-constraints

Calculate the constraints for the layout.

calculate-layout

Layout the children of the layout.

See also

interpret-description
calculate-constraints
calculate-layout
layout

define-menu *Macro*

Summary

The **define-menu** macro defines a menu function.

Package

capi

Signature

define-menu *function-name* **(***self***)** *title menu-body* **&rest** *menu-options*

Description

The macro **define-menu** defines a function called *function-name* with a single argument *self* that will make a menu. The parameters *title*, *menu-body* and *menu-options* take the same form as the **:menus** section of **define-interface**.

Example

```
(capi:define-menu make-test-menu (self)
   "Test"
   ("Item1"
    "Item2"
    (:component
     ("Item3"
      "Item4")
     :interaction :single-selection)
    (:menu
     ("Item5"
      "Item6")
     :title "More Items")))

(setq interface (make-instance 'capi:interface))

(setf (capi:interface-menu-bar-items interface)
      (list (make-test-menu interface)))

(capi:display interface)
```

See also **define-interface**
menu

define-ole-control-component *Macro*

Summary Defines a class that implements the OLE Control protocol for a CAPI pane.

Package **capi**

Signature **define-ole-control-component** *class-name* **(***superclass-name****)** *slots* **&rest** *class-options*

Description The macro **define-ole-control-component** defines an Automation component class *class-name* that also implements the OLE Control protocols and other named interfaces or a coclass. This allows a CAPI pane to be embedded in an OLE Control container implemented outside LispWorks.

Each *superclass-name* argument specifies a direct superclass of the new class, which can be any **standard-class** provided that certain standard classes are included somewhere in the overall class precedence list. These standard classes depend on the other options and provide the default superclass list if none is specified. The following standard classes are available:

ole-control-component is always needed and provides an implementation of the OLE Control protocol.

com:standard-i-dispatch is always needed and provides a complete implementation of the i-dispatch interface, based on the type information in a type library.

com:standard-i-connection-point-container is needed if there are any source interfaces specified (via the **:coclass** or **:source-interfaces** options). This provides a complete implementation of the Connection Point protocols, used to support events.

slots is a list of standard **defclass** slot definitions.

class-options are standard **defclass** options. In addition the following options are recognized:

(:coclass *coclass-name***)**

(:interfaces *interface-name****)**

(:source-interfaces *interface-name****)**

See **com:define-automation-component** in the *LispWorks COM/Automation User Guide and Reference Manual* for details of these options.

Typically the **:pane-function** and **:create-callback** initargs are supplied using the **:default-initarg** option.

Implementations of the methods in the **:coclass** and **:interfaces** options should be defined using **com:define-com-method**, **com:define-dispinterface-method** or **com:com-object-dispinterface-invoke**.

Notes **define-ole-control-component** is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also **ole-control-component**

destroy *Generic Function*

Summary Closes a window and calls the *destroy-callback*.

Package **capi**

Signature **destroy** *interface*

Description The generic function **destroy** closes the window associated with *interface*, and then calls the interface's *destroy-callback* if it has one.

There is a complementary function **quit-interface** which calls the interface's *confirm-destroy-function* to confirm that the destroy should be done, and it is advisable to always use this unless you want to make sure that the interface's *confirm-destroy-function* is ignored.

Note: **destroy** must only be called in the process of *interface*. Menu callbacks on *interface* will be called in that process, but otherwise you probably need to use **execute-with-interface** or **apply-in-pane-process**.

Example

```
(setq interface
      (capi:display (make-instance
                     'capi:interface
                     :title "Test Interface"
                     :destroy-callback
                       #'(lambda (interface)
                           (capi:display-message
                             "Quitting ~S"
                              interface)))))
```

```
(capi:apply-in-pane-process
 interface 'capi:destroy interface)
```

See also

interface
quit-interface
update-screen-interfaces-hooks

detach-simple-sink *Function*

Summary

Detaches a previously-attached simple sink object.

Package

capi

Signature

detach-simple-sink *sink pane*

Arguments

sink A class instance.

pane An **ole-control-pane**.

Description

The function **detach-simple-sink** detaches a sink that was previously attached to the active component in the **ole-control-pane** *pane* by a call to **attach-simple-sink**.

sink is the value returned by **attach-simple-sink** when the sink was attached.

pane is an **ole-control-pane** which is the pane where the component is.

Attached sinks are automatically disconnected when the object is closed.

Notes

This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also

attach-simple-sink
ole-control-pane

detach-sink *Function*

Summary Detaches a previously-attached sink.

Package **capi**

Signature **detach-sink** *sink pane interface-name*

Arguments

sink	A class instance.
pane	An **ole-control-pane**.
interface-name	A refguid or the symbol **:default**.

Description The function **detach-sink** detaches a sink which was previously attached to the active component in the **ole-control-pane** *pane*.

sink is an instance of a class that implements the interface *interface-name*.

pane is an **ole-control-pane** which is the pane where the component is.

interface-name is either a string naming a source interface that the component in *pane* supports or **:default** to disconnect from the default source interface.

Attached sinks are automatically disconnected when the object is closed.

Notes This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also **attach-sink**
ole-control-pane

display *Function*

Summary Displays a CAPI interface on a specified screen.

Package **capi**

Signature **display** *interface* **&key** *screen owner window-styles process* **=>** *interface*

Arguments

interface	A CAPI interface.
screen	A screen, or any argument accepted by **convert-to-screen**.
owner	A CAPI interface.
window-styles	A list of keywords.
process	On GTK+, Windows or Motif, a CAPI process, **t** or **nil**. On Cocoa, this argument is not supported.

Values

interface	A CAPI interface.

Description

The function **display** displays the CAPI interface *interface* on the specified *screen* (or the current one if not supplied).

If *process* is not supplied, then if *owner* is supplied *interface* runs in *owner*'s process, otherwise interface runs in the process of the parent of *interface* if it is a **document-container**, or in a new process created for *interface* if not.

On Windows and Motif, if *process* is **t**, then *interface* runs in a newly-created process. If process is **nil**, *interface* runs in the current process. Otherwise *process* is expected to be a CAPI process, and *interface* runs in it. A CAPI process is a **mp:process** which was created by calling **display**. You can pass only a CAPI process as *process*, because it needs to handle messages using the LispWorks event loop. The default value of *process* is **t**.

On Cocoa, all CAPI interfaces run in the Cocoa Event Loop process (which is the main thread of LispWorks) and therefore the *process* argument is not supported. If the value of *process* is any process other than the Cocoa Event Loop process an error is signalled.

owner specifies an owner for *interface*, which should be another CAPI interface. *interface* inherits a number of attributes from *owner*, including the default process, default screen and default display state.

window-styles, if supplied, sets the *window-styles* slot of *interface*. See **interface** for information about *window-styles*.

display returns its *interface* argument.

Note: Use the function **contain** to display objects other than interfaces.

Note: A generic function **interface-display** is called immediately after **display** displays an interface. You can add post-display code by defining your own **:after** method.

Example

```
(capi:display (make-instance 'capi:interface
                             :title "Test"))
```

See also

contain
convert-to-screen
display-dialog
document-container
execute-with-interface
interface
interface-display
quit-interface
update-screen-interfaces-hooks

display-dialog *Generic Function*

Summary The **display-dialog** function displays a CAPI interface as a dialog box.

Package **capi**

Signature **display-dialog** *interface* **&key** *screen focus modal owner x y position-relative-to continuation callback-error-handler* **=>** *result*, *okp*

Arguments

interface	A CAPI interface.
screen	A screen.
focus	A pane of *interface*.
modal	**t**, **:dismiss-on-input** or **nil**.
owner	A pane.
x, y	Real numbers representing coordinates, or keywords or lists specifying an adjusted position.
position-relative-to	**:owner** or **nil**.
continuation	A function or **nil**.
callback-error-handler	A function designator or **nil**.

Values

result	An object.
okp	A boolean.

Description This is a complementary function that displays the CAPI **interface** *interface* as a dialog box.

screen is the **screen** for the dialog to be displayed on.

focus should be the pane within the interface that should be given the focus initially. If a focus is not supplied, then it lets the window system decide.

A true value of *modal* indicates that the dialog takes over all input to the application. Additionally, if *modal* is **:dismiss-on-input** then any user gesture (a button or key press) causes the dialog to disappear. **:dismiss-on-input** works on platforms other than Motif. The default value of *modal* is **t**.

owner specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

If *x* and *y* are numbers they specify the coordinates of the dialog. Alternatively *x* and *y* can be keywords like **:left** and **:top**, or lists like **(:left 100)**, **(:bottom 50)** and so on.. These values cause the dialog to be positioned relative to its owner in the same way as the *adjust* argument to **pane-adjusted-position**. The default location is at the center of the dialog's owner.

position-relative-to has a default value **:owner**, meaning that *x* and *y* are relative to dialog's owner. The value **nil** means that *x* and *y* are relative to the screen.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **display-dialog**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **display-dialog** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

The values returned depend on how the dialog is dismissed. Typically a user gesture will trigger a call to **abort-dialog**, causing the values **nil**, **nil** to be returned or to **exit-dialog**

causing the values *result*, **t** to be returned, where *result* is the argument to **exit-dialog**. If *continuation* is non-nil, then the returrned values are always **:continuation**, **nil**.

The CAPI also provides **popup-confirmer** which gives you the standard **OK** and **Cancel** button functionality.

callback-error-handler allows error handling in callbacks which is uniform across platforms, as described for **popup-confirmer**.

Notes

1. If you need to replace one dialog with another, you can use **display-replacable-dialog** and **replace-dialog**.
2. In a modal dialog at least one button which aborts or exits the dialog must be provided in *interface*. This is the programmer's responsibility, as without such a button there is no way to clear the modal dialog. A straightforward way to add these buttons is to display the window via **popup-confirmer** which adds the buttons for you.

Example

```
(capi:display-dialog
 (capi:make-container
  (make-instance 'capi:push-button-panel
                 :items '("OK" "Cancel")
                 :callback-type :data
                   :callbacks '(capi:exit-dialog
                                capi:abort-dialog))
  :title "Empty Dialog"))
```

There are further examples in the directory **examples/capi/dialogs/**.

See also

abort-dialog
display
display-replacable-dialog
exit-dialog
interface

```
popup-confirmer
with-dialog-results
*update-screen-interfaces-hooks*
```

display-errors *Macro*

Summary Displays a message if an error is signalled.

Package **capi**

Signature **display-errors &body** *body*

Description The macro **display-errors** executes the code of *body* inside a **handler-case** form. If an error is signalled inside *body,* a message is displayed and the debugger is not entered.

display-message *Function*

Summary The function **display-message** displays a message on the current CAPI screen.

Package **capi**

Signature **display-message** *format-string* **&rest** *format-args*

Description The function **display-message** creates a message from the arguments using **format**, and then displays it on the current CAPI screen.

Note: If you need to make a window-modal sheet on Cocoa, then use the function **prompt-with-message**.

Example

```
(capi:display-message "Current screen = ~S"
                      (capi:convert-to-screen))
```

See also **prompt-with-message**
display-message-for-pane
display-dialog

display-message-for-pane *Function*

Summary The function **display-message-for-pane** displays a message on the same screen as a specified pane.

Package **capi**

Signature **display-message-for-pane** *pane format-string* **&rest** *format-args*

Description The function **display-message-for-pane** creates a message from the arguments using **format**, and then displays it on the same screen as *pane*.

Note: If you need to make a window-modal sheet on Cocoa, then use the function **prompt-with-message**.

Compatibility note The function **display-message-on-screen** is retained for compatibility with previous versions of LispWorks. It is a synonym for **display-message-for-pane**.

Example
```
(setq pane (capi:contain (make-instance
                          'capi:text-input-pane)))

(capi:display-message-for-pane pane
                               "Just created ~S" pane)
```

See also **prompt-with-message**
display-message

display-pane *Class*

Summary The class **display-pane** is a pane that displays several lines of text.

Package **capi**

Superclasses **titled-object**
simple-pane

Initargs **:text** A string or a list of strings to be displayed.

Accessors **display-pane-text**

Description The *text* passed to a display pane can be provided either as a single string containing newlines, or else as a list of strings where each string represents a line.

There are several classes which can display text, as follows:

title-pane
Displays a single line of text.

display-pane
Displays multiple lines of text.

text-input-pane
Inputs a single line of text.

editor-pane
Inputs multiple lines of text.

Example

```
(capi:contain (make-instance
               'capi:display-pane
               :text
                 '("One" "Line" "At" "A" "Time...")))

(setq dp (capi:contain
          (make-instance
           'capi:display-pane
           :text
           '("One" "Line" "At" "A" "Time...")
           :visible-min-height
           '(:character 5))))

(capi:apply-in-pane-process
 dp #'(setf capi:display-pane-text)
 '("Some" "New" "Text") dp)
```

See also **editor-pane**
text-input-pane
title-pane

display-pane-selected-text *Function*

Summary Returns the selected text in a **display-pane**.

Package **capi**

Signature **display-pane-selected-text** *display-pane* **=>** *result*

Arguments *display-pane* An instance of **display-pane** or a subclass.

Values *result* A string or **nil**.

Description The function **display-pane-selected-text** returns the selected text in *display-pane*, or **nil** if there is no selection.

See also **display-pane**
display-pane-selection-p
display-pane-selection

display-pane-selection *Function*

Summary Returns the bounds of the selection in a **display-pane**.

Package **capi**

Signature **display-pane-selection** *pane* **=>** *start*, *end*

Arguments *pane* A **display-pane**.

Values *start, end* Non-negative integers.

Description The function **display-pane-selection** returns as multiple values the bounding indexes of the selection in *pane*. That is, *start* is the inclusive index of the first selected character, and *end* is one greater than the index of the last selected character.

If there is no selection, then both *start* and *end* are the caret position in *pane*.

See also **set-display-pane-selection**
display-pane
display-pane-selected-text
display-pane-selection-p

display-pane-selection-p *Function*

Summary Returns true if there is selected text in a **display-pane**.

Package **capi**

Signature **display-pane-selection-p** *pane* **=>** *selectionp*

Arguments *pane* A **display-pane**.

Values *selectionp* A boolean.

Description The function **display-pane-selection-p** returns **t** if there is a selected region in *pane* and **nil** otherwise.

See also **set-display-pane-selection**
display-pane
display-pane-selected-text
display-pane-selection

display-popup-menu *Function*

Summary Displays a popup menu.

Package **capi**

Signature **display-popup-menu** *menu* **&key** *owner x y button* **=>** *result*

Arguments

menu	A menu.
owner	A pane.
x	The horizontal coordinate of *menu*'s position relative to *owner*.
y	The vertical coordinate of *menu*'s position relative to *owner*.
button	The mouse button that raises the menu.

Description The function **display-popup-menu** displays the **menu** *menu* at position *x,y*. **display-popup-menu** should be used in response to the user clicking a mouse button, and is typically used to implement contextual ("right button") menus.

The user may select an item in the menu, in which case the item's *selection-callback* is invoked, and **display-popup-menu** returns **t**.

Alternatively the user may cancel the menu, by clicking elsewhere or pressing the **Escape** key. In this case, **display-popup-menu** returns **nil**.

owner specifies the owner of the menu, that is, a pane that the menu is associated with. If *owner* is not supplied the system trys to find the appropriate owner, which usually suffices.

x and *y* default to the horizontal and vertical coordinates, relative to *owner,* of the location of the mouse pointer.

button defaults to **:button-3**.

Example

```
(defun popup-test-menu (pinboard x y &optional gspec)
  (capi:display-popup-menu
   (make-instance 'capi:menu :items '(1 2 3))
   :owner pinboard :x x :y y))

(capi:contain
 (make-instance 'capi:pinboard-layout
                :input-model
                '((:post-menu popup-test-menu))
                :visible-min-width 100
                :visible-min-height 100))
```

See also

menu
pinboard-layout

display-replacable-dialog *Function*

Summary

Displays a replacable dialog.

Package

capi

Signature

display-replacable-dialog *interface* **&rest** *args* **=>** *result*

Arguments

interface	An interface.
args	Other arguments as for **display-dialog**.

Values

result	The value returned by the dialog.

Description

The function **display-replacable-dialog** displays a dialog that can be replaced by another dialog.

interface is a CAPI interface to be displayed as a dialog.

The arguments *args* are interpreted the same as the arguments to **display-dialog**, except that *modal* is ignored. **display-replacable-dialog** displays the dialog like **display-dialog**.

Within the scope of **display-replacable-dialog** (that is, inside the callbacks) the programmer can call **replace-dialog** which replaces the dialog by a new dialog and destroys the existing one. There can be many calls to **replace-dialog** inside the same scope of **display-replacable-dialog**.

display-replacable-dialog returns the last dialog that was displayed.

Inside **display-replacable-dialog**, the functions that use the current dialog, such as **exit-dialog** and **abort-dialog**, work in the same way that they work inside **display-dialog**, except that they don't affect the return value of **display-replacable-dialog**.

See also

abort-dialog
display-dialog
exit-dialog
replace-dialog

display-tooltip *Generic Function*

Summary

Displays tooltip help on an output pane.

Package

capi

Signature

display-tooltip *output-pane* **&key** *x y text* **=>** *result*

Arguments

output-pane	An instance of a subclass of **output-pane**.
x	The horizontal coordinate of the tooltip position.
y	The vertical coordinate of the tooltip position.
text	The help text.

Description — The generic function **display-tooltip** displays *text* as tooltip help at position *x*,*y* in *output-pane*.

Notes
1. On GTK+ **display-tooltip** is implemented only for GTK+ versions 2.12 and later
2. On GTK+ the **:x** and **:y** arguments might not be handled.

Compatibility note — On GTK+ **display-tooltip** is not implemented in LispWorks 6.0.

Example — See the example file **examples/capi/graphics/pinboard-help.lisp**

docking-layout *Class*

Summary — A class that implements docking of panes.

Package — **capi**

Superclasses — **simple-layout**

Initargs

:items — A list of pane specifications. The panes become the items in the layout.

:controller — A controller for the layout, which can make multiple **docking-layout**s work together.

:docking-test-function — A function controlling whether a pane can be docked in a **docking-layout**.

:docking-callback — A function called when a pane is docked or undocked.

:divider-p — A boolean allowing a visible edge around the layout.

:orientation One of **:horizontal** or **:vertical**.

Accessors

docking-layout-controller
docking-layout-divider-p
docking-layout-docking-test-function
docking-layout-items

Readers

docking-layout-orientation

Description

The class **docking-layout** defines a region in which panes can be docked and undocked. The undocking functionality works only in LispWorks for Windows.

If *controller* is non-nil, it must be a controller object as returned by a call to **make-docking-layout-controller**. In this case the **docking-layout** is one of a group of **docking-layout**s which share that same controller, known as the Docking Group. The panes that can be docked and undocked are shared between the members of the Docking Group. If *controller* is **nil** (the default value), the **docking-layout** is in a Docking Group of one.

A pane *pane* is dockable in a Docking Group when it is an item of any member of the Docking Group. This is the case when it is one of the *items* passed to **make-instance** for some member of the group, or it has been set in some member by **(setf docking-layout-items)**. The user can dock and undock *pane* in any member of the Docking Group. You can change the dockable status of panes programmatically by **(setf docking-layout-items)**. You can query a pane's docked and visible status in a **docking-layout** by **docking-layout-pane-docked-p** and **docking-layout-pane-visible-p**. You can change a pane's docked and visible status in a **docking-layout** by **(setf docking-layout-pane-docked-p)** and **(setf docking-layout-pane-visible-p)**.

By default, the context menu allows the user to alter the visiblility status of each of the panes in the Docking Group.

items is a list of pane specifications. Each specification in the list is either an atom denoting a pane, or a list wherein the car is an object denoting a pane and the cdr is a plist of options and values. The object denoting the pane can be:

- The pane itself
- A symbol naming a slot in the interface which contains the **`docking-layout`**. The value in that slot, which must be a pane, is used. Typically the slot name is defined in the **`:panes`** or **`:layouts`** class option in the **`define-interface`** form.
- A string, denoting a **`title-pane`** with that text.
- A list, wherein the car is the name of a pane class and the cdr is a list of initialization arguments for that class. This denotes the pane created by applying **`make-instance`** to the list. Note that in this case the list cannot be the item in the *items* list, because it would be wrongly interpreted as a list wherein the car denotes a pane directly and the cdr is a plist of options and values.

When an item in the *items* list is a list, the cdr is a plist of options and values, which can contain these options:

`:title` A string which is title associated with the pane. This is used when the pane is presented to the user, for example in the default context menu.

`:docked-p` A boolean specifying whether the pane should be docked. The default value is **`t`**.When a pane is not docked and is visible, it is displayed in its own window.

`:visible-p` A boolean specifying whether the pane is visible. The default value is **`t`**.

:undocked-geometry

A list of four integers specifying the geometry of the pane when undocked, as **(***x y width height***)**.

:start-new-line-p

A boolean specifying whether to place the pane on a new line in the **docking-layout**. The default value is **nil**.

docking-layout-items always returns the items as lists, with the cdr containing the options and values.

docking-test-function is a function of two arguments with a boolean return value. When the user attempts to dock a pane *pane* in the **docking-layout**, *docking-test-function* is called with the **docking-layout** and *pane*. If it returns **nil**, *pane* is not docked. If it returns true, *pane* is docked. The default behavior is that all panes under the controller which is the *controller* in this **docking-layout**, and only these panes, can be docked.

docking-callback, if non-nil, is a function of three arguments: the **docking-layout**, the pane and a boolean. This third argument is **t** when the pane is docked, and **nil** when the pane is undocked. The default value of *docking-callback* is **nil**.

divider-p controls whether a visible edge is drawn around the border of the **docking-layout**. The default value is **nil**.

orientation specifies whether the items are laid out horizontally or vertically. The default value is **:horizontal**.

Example

See the file **examples/capi/layouts/docking-layout.lisp**

See also

docking-layout-pane-docked-p
docking-layout-pane-visible-p

docking-layout-pane-docked-p *Function*

Package **capi**

Signature **docking-layout-pane-docked-p** *docking-layout pane* **&key** *anywhere* **=>** *dockedp*

Signature **(setf docking-layout-pane-docked-p)** *dockedp docking-layout pane* **=>** *dockedp*

Arguments

docking-layout	An instance of **docking-layout** or a sub-class.
pane	A pane.
anywhere	A boolean.

Values

dockedp	A boolean.

Description The function **docking-layout-pane-docked-p** returns a boolean indicating whether *pane* is currently docked.

If *anywhere* is **t**, *dockedp* is true if *pane* is docked in any member of the Docking Group of *docking-layout*. If *anywhere* is **nil**, *dockedp* is true only if *pane* is docked in *docking-layout* itself. The default value of *anywhere* is **nil**.

(setf docking-layout-pane-docked-p) may be used to change the docking state of pane in *docking-layout* only when *pane* is dockable in the Docking Group of *docking-layout*.

See also **docking-layout**

docking-layout-pane-visible-p *Function*

Package **capi**

Signature **docking-layout-pane-visible-p** *docking-layout pane* **=>** *visiblep*

Signature **(setf docking-layout-pane-visible-p)** *visiblep docking-layout pane* **=>** *visiblep*

Arguments
- *docking-layout* — An instance of **docking-layout** or a subclass.
- *pane* — A pane.

Values
- *visiblep* — A boolean.

Description The function **docking-layout-pane-visible-p** returns a boolean indicating whether *pane* is currently visible in the Docking Group of *docking-layout*. *pane* may be docked in any member of the Docking Group, or undocked.

(setf docking-layout-pane-visible-p) may be used to change the visiblity of pane in *docking-layout* only when *pane* is dockable in the Docking Group of *docking-layout*.

See also **docking-layout**

document-container *Class*

Package **capi**

Superclasses **capi-object**

Readers **screen-interfaces**

Description The class of the container in a **document-frame**.

A document container has some screen-like functionality, responding to **screen-internal-geometry** and **screen-active-interface**.

This works only in LispWorks for Windows.

See also **display**
document-frame
screen-active-interface
screen-internal-geometry

document-frame *Class*

Summary The class **document-frame** is used to implement MDI.

This works only in LispWorks for Windows.

Package **capi**

Superclasses **interface**

Readers **document-frame-container**

Description The class **document-frame** is used to implement Multiple-Document Interface (MDI) which is a standard technique on Microsoft Windows (see the MSDN for documentation).

To use MDI in the CAPI, define an interface class that inherits from **document-frame**, and use the two special slots **capi:container** and **capi:windows-menu** as described below.

In your interface's layouts, use the symbol **capi:container** in the *description* to denote the pane inside the MDI interface in which child interfaces are added.

document-frame-container is a reader which returns the **document-container** of the **document-frame**.

Interfaces of any type other than subclasses of **document-frame** may be added as children. To add a child interface in your MDI interface, call **display** on the child interface and pass the MDI interface as the *screen* argument. This will display the child interface inside the container pane.

To obtain a list of the child interfaces, call the **screen** reader function **screen-interfaces**, passing the frame's **document-container** as the *screen* argument.

You can use most of the normal CAPI window operations such as **top-level-interface-geometry** and **activate-pane** on windows displayed as children of a **document-frame**.

The **capi:windows-menu** slot contains the Windows Menu, which allows the user to manipulate child interfaces. The standard functionality of the Windows Menu is handled by the system and normally you will not need to modify it. However, you will want to specify its position in the menu bar. Do this by adding the symbol **capi:windows-menu** in the **:menu-bar** option of your **define-interface** form.

Note: **capi:windows-menu** is a special slot in **document-frame** and this symbol should not appear elsewhere in the **define-interface** form.

By default the menu bar is made by effectively appending the menu bar of the **document-frame** interface with the menu bar of the current child. You can customize this behavior with **merge-menu-bars**.

Example

This example uses **document-frame** to create a primitive **apropos** browser.

Firstly we define an interface that lists symbols. There is nothing special about this in itself.

```
(capi:define-interface symbols-listing ()
  ((symbols :initarg :symbols))
  (:panes
   ( symbols-pane capi:list-panel
                  :items symbols
                  :print-function
                  'symbol-name))
  (:default-initargs
   :best-width '(character 40)
   :best-height '(character 10)))
```

Next we define the MDI interface. Note:

1. It inherits from **document-frame**.
2. **capi:container** is used in the layout description.
3. **capi:windows-menu** is in the **:menu-bar** list.
4. When the interface showing the symbols is being displayed, the MDI interface is passed as the *screen* argument to **display**.

Otherwise, this example uses standard Common Lisp and CAPI functionality.

```
(capi:define-interface my-apropos-browser
    (capi:document-frame)
  ((string :initarg :string))
  (:panes
   (package-list
    capi:list-panel
    :items
    (loop for package in (list-all-packages)
          when
          (let ((al (apropos-list string package)))
            (when al
              (cons (package-name package) al)))
          collect it)
    :print-function 'car
    :action-callback
    #'(lambda (mdi-interface name-and-symbols)
        (capi:display
         (make-instance
          'symbols-listing
          :symbols  (cdr name-and-symbols)
          :title (car name-and-symbols))
         :screen mdi-interface))
    :callback-type :interface-data)
   )
  (:menu-bar capi:windows-menu)
  (:layouts
   (main
    capi:row-layout
    '(package-list :divider capi:container)
    :ratios '(1 nil 4)))
  (:default-initargs
   :visible-min-height '(character 20)
   :visible-min-width '(character 100)))
```

To browse apropos of a specific string

```
(capi:display
 (make-instance 'my-apropos-browser
                :string "EDITOR"))
```

See also **current-document**

merge-menu-bars

double-headed-arrow-pinboard-object *Class*

Summary A **pinboard-object** that draws itself as an arrow, which can switch dynamically from double-headed to single-headed.

Package **capi**

Superclasses **arrow-pinboard-object**

Initargs **:double-head-predicate**

A function determining whether a single or double arrowhead is drawn.

Description *double-head-predicate* should be a function of two arguments returning a boolean value. The first argument is the output pane on which the arrow pinboard object is drawn. The second argument is the arrow pinboard object itself.

double-head-predicate should return a true value if the arrow is to be double-headed, and **nil** if a single-headed arrow should be drawn. It is called each time the arrow object is redrawn.

Example

```
(defvar *doublep* t)

(let ((dhr
       (capi:contain
        (make-instance
         'capi:pinboard-layout
         :description
         (list
          (make-instance
           'capi:double-headed-arrow-pinboard-object
           :double-head-predicate
           #'(lambda (x y) *doublep*)
           :start-x 5 :start-y 5 :end-x 95 :end-y 95)
          (make-instance
           'capi:double-headed-arrow-pinboard-object
           :double-head-predicate
           #'(lambda (x y) *doublep*)
           :head-direction :backwards
           :start-x 5 :start-y 95 :end-x 95 :end-y 5)))
        :visible-min-width 100
        :visible-min-height 100)))
  (dotimes (x 10)
    (sleep 1)
    (setq *doublep* (not *doublep*))
    (mapcar 'capi:redraw-pinboard-object
            (capi:layout-description dhr))))
```

double-list-panel *Class*

Summary A **choice** which displays its selected items and its unselected items in disjoint lists, and facilitates easy movement of items between these lists.

Package **capi**

Superclasses **choice**
interface

Description

The class **double-list-panel** is a **choice** which displays its *items* in two **list-panel**s. One list contains the selected items and the other contains the unselected items. There is a pair of arrow buttons which move highlighted items between the lists.

The default *interaction* of **double-list-panel** is **:extended-selection**.

The *selection-callback*, *extend-callback* or *retract-callback* is called as appropriate when items are moved between the lists. There is no *action-callback* for **double-list-panel**.

The user selects and de-selects items in the **double-list-panel** by moving them between the two lists. There are three ways to move the items:

1. Highlight the items to move by normal **list-panel** selection gestures, then press an arrow button.
2. Highlight a single item to move by normal **list-panel** selection gestures, then press **Return**.
3. Double click on an item to move it.

Example

```
(capi:display
 (make-instance
  'capi:double-list-panel
  :items '("John" "Geoff" "chicken" "blue" "water")
  :selection-callback
  #'(lambda (item choice)
      (capi:display-message "selecting ~a" item))
  :extend-callback
  #'(lambda(item choice)
      (capi:display-message "extending ~a" item))
  :retract-callback
  #'(lambda(item choice)
      (capi:display-message "deselecting ~a" item))))
```

See also

list-panel

drag-pane-object *Function*

Summary Initiates a dragging operation

Package **capi**

Signature **drag-pane-object** *pane value* **&key** *string plist image-function operations* **=>** *operation*

Arguments

pane	A pane
value	An object to be dragged
string	A string to be dragged or **nil**
plist	A plist of formats and objects to be dragged
image-function	A function or **nil**
operations	A list of operation keywords allowed for the dragged objects

Values

operation	One of the operation keywords

Description The function **drag-pane-object** initiates a dragging operation from within the pane *pane*. It can only be called from within the button **:press** or button **:motion** callbacks of the *input-model* of an **output-pane**.

The *value*, *string* and *plist* arguments are combined to provide an object to be dragged in various formats.

value can be any Lisp object (not necessarily a string) to make available for dropping into a pane within the local Lisp image.

string can be a string representation of *value* to make available, or **nil**. If *string* is **nil** and *value* is a string, then that will be made available as the string.

plist is a property list of additional format/value pairs to make available. The currently supported formats are as described for **set-drop-object-supported-formats**. You can make more than one format available simultaneously.

image-function provides a graphical image for use during the dragging operation on Cocoa. If *image-function* is supplied, then it should be a function of one argument. It might be called to provide an image for use during the dragging operation. The function *image-function* should return three values: a **image** object, an x offset and a y offset. The x and y offsets are the position within the image where the mouse should be located. If the image is **nil** or *image-function* is not supplied then a default image is generated. If the x or y offsets are **nil** or not returned then the image is positioned with the mouse at its center point. The image that is returned by *image-function* is freed automatically in the end of dragging operation. It must be a new image, and cannot be reused.

operations should be a list of operation keywords that the pane will allow the target application to perform. The operation keywords are **:copy**, **:move** and **:link** as described for the effect in **drop-object-drop-effect**. If certain platform-specific modifier keys are pressed, then some of the operations will be ignored.

The return value *operation* indicates which operation was performed by the application where the dragged object was dropped. The value will be **:none** if the object was not dropped anywhere or dragging was abandoned (for example, by the user hitting the **Escape** key). If *operation* is **:move**, then you should update the data structures in your application to remove the object that was dragged.

Notes

1. **drag-pane-object** is not supported on X11/Motif. See **simple-pane** for information about drop callbacks.
2. *image-function* is only called on Cocoa. There is no way to specify an image when dragging on Microsoft Windows.

3. If **:image** is supplied in *plist*, the dragging mechanism automatically frees the **image** object as if by **free-image** when it no longer needs it.

Example — See **examples/capi/output-panes/drag-and-drop.lisp**

See also — **simple-pane**

draw-metafile *Function*

Summary — Draws a metafile to a pane.

Package — **capi**

Signature — **draw-metafile** *pane metafile x y width height*

Arguments

pane	An **output-pane**.
metafile	A metafile, as described in **with-internal-metafile**.
x,*y*	Integers.
width, *height*	Non-negative integers.

Description — The function **draw-metafile** draws the metafile *metafile* to the pane *pane* at position *x*,*y* with size *width*, *height*.

metafile should be a metafile as returned by **with-internal-metafile**.

The **graphics-state** parameters *transform*, *mask* and *mask-transform* affect how the metafile is drawn. The other **graphics-state** parameters are taken from the metafile.

Notes

1. **draw-metafile** is supported on GTK+ only where Cairo is supported (GTK+ 2.8 and later).

2. Metafiles look bad on GTK+, because they transform the image rather than the drawing.
3. **draw-metafile** is not implemented on X11/Motif.

Examples
examples/capi/graphics/metafile.lisp
examples/capi/graphics/metafile-rotation.lisp

See also
can-use-metafile-p
clipboard
draw-metafile-to-image
free-metafile
with-internal-metafile

draw-metafile-to-image *Function*

Summary
Draws a metafile as an image.

Package
capi

Signature
draw-metafile-to-image *pane metafile* **&key** *width height max-width max-height background alpha* **=>** *image*

Arguments

pane	An **output-pane**.
metafile	A metafile.
width,height	Non-negative integers, or **nil**.
max-width,max-height	Non-negative integers, or **nil**.
background	A color specification.
alpha	A generalized boolean.

Values
image An **image**.

Description

The function **draw-metafile-to-image** returns a new **image** object for *pane*, with *metafile* drawn into the image.

metafile should be a metafile as returned by **with-internal-metafile**.

If *width* and *height* are both **nil** then the size of the image is computed from the metafile. If both *width* and *height* are integers, then they specify the size of the image and the metafile is scaled to fit. If one of *width* or *height* is **nil**, then it is computed from the other dimension, preserving the aspect ratio of the metafile. The default values of *width* and *height* are both **nil**.

The *max-width* and *max-height* arguments, if non-nil, constrain the computed or specified values of *width* and *height* respectively. The aspect ratio is retained when the size is constrained, so specifying a *max-width* can also reduce the actual height of the image. The default values of *max-width* and *max-height* are both **nil**.

background should be a color spec, which controls the non-drawn parts of the image. (A color spec can be obtained by **get-color-spec**, **make-rgb** and so on.) If *background* is omitted, then the background color of *pane* is used.

If *alpha* is non-nil, then the image will have an alpha component. The default value of *alpha* is **nil**.

Notes

1. **draw-metafile-to-image** is supported on GTK+ only where Cairo is supported (GTK+ 2.8 and later).
2. Metafiles look bad on GTK+, because they transform the image rather than the drawing.
3. **draw-metafile-to-image** is not implemented on X11/Motif.

See also **clipboard**
draw-metafile
free-metafile
with-internal-metafile

drawn-pinboard-object *Class*

Summary The class **drawn-pinboard-object** is a subclass of **pinboard-object** which is drawn by a supplied function, and is provided as a means of the user creating their own pinboard objects.

Package **capi**

Superclasses **pinboard-object**

Initargs **:display-callback**
Called to display the object.

Accessors **drawn-pinboard-object-display-callback**

Description The *display-callback* is called with the output pane to draw on, the **drawn-pinboard-object** itself, and the *x*, *y*, *width* and *height* of the object, and it is expected to redraw that section. The *display-callback* should not draw outside the object's bounds.

An alternative way of doing this is to create a subclass of **pinboard-object** and to provide a method for **draw-pinboard-object**.

Example

```
(defun draw-an-ellipse
       (output-pane self x y width height)
       (let ((x-radius (floor width 2))
             (y-radius (floor height 2)))
              (gp:draw-ellipse output-pane
                (+ x x-radius) (+ y y-radius)
                x-radius y-radius
                :foreground :red
                :filled t)))

(capi:contain (make-instance
                'capi:drawn-pinboard-object
                :visible-min-width 200
                :visible-min-height 100
                :display-callback 'draw-an-ellipse))
```

See also **pinboard-layout**

draw-pinboard-object *Generic Function*

Summary Draws a pinboard object.

Package **capi**

Signature **draw-pinboard-object** *pinboard object* **&key** *x y width height* **&allow-other-keys**

Description The generic function **draw-pinboard-object** is called whenever a pinboard object needs to be drawn. The *x*, *y*, *width* and *height* arguments indicate the region that needs to be redrawn, but a method is free to ignore these and draw the complete object. However, it should not draw outside the pinboard object's bounds.

Example See the example in the file **examples/capi/graphics/circled-graph-nodes.lisp**

See also **pinboard-layout**
pinboard-object

draw-pinboard-object-highlighted *Generic Function*

Summary Draws highlighting on a pre-drawn pinboard object.

Package **capi**

Signature **draw-pinboard-object-highlighted** *pinboard object* **&key &allow-other-keys**

Description The generic function **draw-pinboard-object-highlighted** draws the highlighting onto a pinboard object that has already been drawn. The default highlighting method draws a box around the object, and should be sufficient for most purposes.

Example See the example in the file **examples/capi/graphics/circled-graph-nodes.lisp**

See also **draw-pinboard-object-unhighlighted** **highlight-pinboard-object**

draw-pinboard-object-unhighlighted *Generic Function*

Summary Removes the highlighting from a pinboard object.

Package **capi**

Signature **draw-pinboard-object-unhighlighted** *pinboard object* **&key &allow-other-keys**

Description The generic function **draw-pinboard-object-unhighlighted** removes the highlighting from a pinboard object.

Example See the example in the file **examples/capi/graphics/circled-graph-nodes.lisp**

See also **draw-pinboard-object-highlighted**
highlight-pinboard-object

drop-object-allows-drop-effect-p *Function*

Summary Queries whether a dropping operation can be performed with a given effect.

Package **capi**

Signature **drop-object-allows-drop-effect-p** *drop-object effect* **=>** *result*

Arguments
- *drop-object* — A *drop-object*, as passed to the *drop-callback*.
- *effect* — An effect keyword

Values
- *result* — A boolean

Description The function **drop-object-allows-drop-effect-p** returns non-nil if the dropping operation can be performed with the given effect *effect*. It returns **nil** if the dropping operation cannot be performed. See **drop-object-drop-effect** for information on drop effect keywords.

Note: **drop-object-allows-drop-effect-p** should only be called within a *drop-callback*. It is not supported on X11/Motif. See **simple-pane** for information about drop callbacks.

See also **drop-object-drop-effect**
simple-pane

drop-object-collection-index *Function*

Summary Gets the index and relative place in the **collection** that an object is being dropped over.

Signature

drop-object-collection-index *drop-object* **=>** *index*, *placement*

(setf (drop-object-collection-index *drop-object*) **(values** *new-index new-placement*))

Arguments

drop-object	A *drop-object*, as passed to the *drop-callback*.
new-index	An integer.
new-placement	One of **:above**, **:item** or **:below**.

Values

index	An integer.
placement	One of **:above**, **:item** or **:below**.

Description

The function **drop-object-collection-index** returns the index and place relative to that index within the **collection** that the object *drop-object* is being dropped over. This information is only meaningful when the pane is an instance of **list-panel** or **tree-view**.

The returned value *index* is the position in the **collection** (see **get-collection-item** or **choice-selection**). The returned value *placement* indicates whether the user is dropping above, on or below the item at *index*.

There is also a setf expander that can be called with these two values within the **:drag** stage of the operation, to adjust where the user will be allowed to drop the object.

Notes

drop-object-collection-index should only be called within a *drop-callback*. It is not supported on X11/Motif. See **simple-pane** for information about drop callbacks.

Example

For an example illustrating the use of drag and drop in a **choice**, see **examples/capi/choice/drag-and-drop.lisp**

See also

drop-object-collection-item

drop-object-collection-item *Function*

Summary — Gets the item and relative place in the **collection** that an object is being dropped over.

Signature — **drop-object-collection-item** *drop-object* **=>** *item*, *placement*

(setf (drop-object-collection-item *drop-object*) **(values** *new-item new-placement*))

Arguments

drop-object	A *drop-object*, as passed to the *drop-callback*.
new-item	An item of a **collection**.
new-placement	One of **:above**, **:item** or **:below**.

Values

item	An item of a collection.
placement	One of **:above**, **:item** or **:below**.

Description — The function **drop-object-collection-item** returns the item and place relative to that item within the **collection** that the object *drop-object* is being dropped over. This information is only meaningful when the pane is an instance of **list-panel** or **tree-view**.

The returned value *placement* indicates whether the user is dropping above, on or below the item.

There is also a setf expander that can be called with these two values within the **:drag** stage of the operation, to adjust where the user will be allowed to drop the object.

Notes — **drop-object-collection-item** should only be called within a *drop-callback*. It is not supported on X11/Motif. See **simple-pane** for information about drop callbacks.

Example — For an example illustrating the use of drag and drop in a **choice**, see **examples/capi/choice/drag-and-drop.lisp**

See also **drop-object-collection-index**

drop-object-drop-effect *Function*

Summary Reads or sets the current effect of a dropping operation.

Package **capi**

Signature **drop-object-drop-effect** *drop-object* **=>** *effect*

Signature **(setf drop-object-drop-effect)** *effect drop-object* **=>** *effect*

Arguments *drop-object* A *drop-object*, as passed to the *drop-callback*.

Values *effect* An effect keyword

Description The function **drop-object-drop-effect** gets or sets the current effect of the dropping operation. *effect* can be one of:

:copy	The object will be copied. This is the most common value for operations between applications.
:move	The object will be moved. This is usually triggered by the user dragging with a platform-specific modifier key pressed.
:link	A link to the object will be created. This is usually triggered by the user dragging with a platform-specific modifier key pressed.
:none	No dragging is possible.

Notes **drop-object-drop-effect** should only be called within a *drop-callback*. It is not supported on X11/Motif. See **simple-pane** for information about drop callbacks.

Example See **examples/capi/output-panes/drag-and-drop.lisp**

See also **simple-pane**

drop-object-get-object *Function*

Summary Returns a dropped object in a given format

Package **capi**

Signature **drop-object-get-object** *drop-object format* **=>** *object*

Arguments
- *drop-object* — A *drop-object*, as passed to the *drop-callback*.
- *format* — A format keyword

Values
- *object* — An object in the given format

Description The function **drop-object-get-object** returns the dropped object in the given format. See **set-drop-object-supported-formats** for information on format keywords.

Notes
1. When receiving an image (by calling **drop-object-get-object** with the **:image** format), the received image should also be freed when you finish with it. However, it will be freed automatically when the pane supplied to **drop-object-get-object** is destroyed, so normally you do not need to free it explictly.
2. **drop-object-get-object** should only be called within a *drop-callback*. It is not supported on X11/Motif. See **simple-pane** for information about drop callbacks.

Example See **examples/capi/output-panes/drag-and-drop.lisp** and **examples/capi/choice/list-panel-drag-images.lisp**.

See also **set-drop-object-supported-formats**
simple-pane

drop-object-pane-x
drop-object-pane-y *Generic Functions*

Summary Gets the coordinates in the pane that an object is being dropped over.

Package **capi**

Signature **drop-object-pane-x** *drop-object* **=>** *x-coord*

drop-object-pane-y *drop-object* **=>** *y-coord*

Arguments *drop-object* A *drop-object*, as passed to the *drop-callback*.

Values *x-coord*, *y-coord* Integers.

Description The accessor functions **drop-object-pane-x** and **drop-object-pane-y** return the x and y coordinates within the pane that the object is being dropped over. This information is only meaningful when the pane is an instance of **output-pane** or one of its subclasses.

Notes **drop-object-pane-x** and **drop-object-pane-y** should only be called within a *drop-callback*. They are not supported on X11/Motif. See **simple-pane** for information about drop callbacks.

See also **simple-pane**

drop-object-provides-format *Function*

Summary Queries whether a dropping operation can provide an object in a given format.

Package **capi**

Signature **drop-object-provides-format** *drop-object format* **=>** *result*

Arguments
- *drop-object* — A *drop-object*, as passed to the *drop-callback*.
- *format* — A format keyword

Values
- *result* — A boolean

Description The function **drop-object-provides-format** returns non-nil if the dropping operation can provide an object in the given format. It returns **nil** if it cannot provide that format.

See **set-drop-object-supported-formats** for information on format keywords.

Notes **drop-object-provides-format** should only be called within a *drop-callback*. It is not supported on X11/Motif. See **simple-pane** for information about drop callbacks.

Example See **examples/capi/output-panes/drag-and-drop.lisp**

See also **set-drop-object-supported-formats**
simple-pane

echo-area-cursor-inactive-style *Variable*

Summary The drawing style of the Echo Area cursor when the window is inactive.

Package **capi**

Initial Value **:invisible**

Description The drawing style of the cursor in the Echo Area of an inactive window in the LispWorks IDE.

The allowed values are **:inverse**, **:outline**, **:underline** and **:invisible**.

echo-area-pane *Class*

Summary The class of the Editor's echo area.

Package **capi**

Superclasses **editor-pane**

Description The class **echo-area-pane** is used to implement the small window for user interaction, known as the Echo Area, which is at the bottom of Editor windows in the LispWorks IDE development environment.

You should not normally need to work with this class directly. To add an Echo Area, pass **:echo-area t** when making the **editor-pane**.

editor-cursor-color *Variable*

Summary The background color of the cursor.

Package **capi**

Initial Value **nil**

Description When non-nil, the value is a color spec or color alias determining the background color of the **editor-pane** cursor. See "The Color System" in the *CAPI User Guide* for information about colors in LispWorks.

The value **nil** means that the cursor background color is the same as the foreground color of the editor pane.

Example
```
(setf capi:*editor-cursor-color* :red)
```

editor-cursor-active-style *Variable*

Summary The drawing style of the editor's cursor when the window is active.

Package **capi**

Initial Value **:inverse**

Description The drawing style of an **editor-pane** cursor when the window is active.

The allowed values are **:inverse**, **:outline**, **:underline**, **:left-bar** and **:caret**.

See also **editor-pane-blink-rate**

editor-cursor-drag-style *Variable*

Summary The drawing style of the editor's cursor during a selection drag.

Package **capi**

Initial Value **:left-bar**

Description The drawing style of an **editor-pane** cursor during a selection drag.

The allowed values are **:inverse**, **:outline**, **:underline**, **:left-bar** and **:caret**.

editor-cursor-inactive-style *Variable*

Summary The drawing style of the editor's cursor when the window is inactive.

Package **capi**

Initial value **:outline**

Description The drawing style of an **editor-pane** cursor when the window is inactive.

The allowed values are **:inverse**, **:outline**, **:underline** or **:invisible**.

editor-pane *Class*

Summary An editor pane is an editor that has all of the functionality described in the *LispWorks Guide To The Editor*.

Package **capi**

Superclasses **output-pane**

Subclasses **interactive-pane**
collector-pane

Initargs

:text	A string or **nil**.
:enabled	**t, nil** or **:read-only**.

:buffer-modes A list specifying the modes of the editor buffer.

:buffer-name The name of the editor buffer.

:change-callback

A function designator, or **nil**.

:before-input-callback

A function designator, or **nil**.

:after-input-callback

A function designator, or **nil**.

:echo-area A flag determining whether the editor pane has an Echo Area.

:fixed-fill An integer specifying the fill length, or **nil**.

:line-wrap-marker

A **character**, or **nil**.

:line-wrap-face

An **editor:face** object, or a symbol naming a face, or **nil**.

:wrap-style An integer specifying the fill length, or **nil**.

:composition-face

Changes the editor face that is used by **editor-pane-default-composition-callback** to display the composition string. The default value is **:default**.

Accessors

editor-pane-text
editor-pane-change-callback
editor-pane-enabled
editor-pane-fixed-fill
editor-pane-line-wrap-marker
editor-pane-line-wrap-face
editor-pane-wrap-style
editor-pane-composition-face

Description

enabled controls how user input affects the **editor-pane**. If enabled is **nil**, all input from the mouse and keyboard is ignored. When enabled is **t**, all input is processed according to the *input-model*. When *enabled* is **:read-only**, input to the pane by keyboard or mouse gestures cannot change the text. More accurately, input via the default *input-model* of editor-pane cannot change the text. The **Cut** and **Paste** menu entries are also disabled. When a user tries to change the text, the operation quietly aborts. Programmatic modifications of the text are still allowed (see Notes below for more detail).

The enabled state can be set by the accessor **editor-pane-enabled**. **capi:simple-pane-enabled** has the same effect when applied to an **editor-pane**.

The **editor-pane** stores text in buffers which are uniquely named, and so to create an **editor-pane** using an existing buffer you should pass the *buffer-name*. To create an **editor-pane** with a new buffer, pass a *buffer-name* that does not match any existing buffer. If *buffer-name* is not passed, then the **editor-pane** uses some existing buffer.

A non-empty string value of *text* specifies the initial text displayed. Otherwise an existing editor buffer is displayed. The accessor **editor-pane-text** is provided to read and write the text in the editor buffer.

buffer-modes allows you to specify the initial major mode and minor modes of the **editor-pane**'s buffer. It should be a list of the form **(***major-mode-name* **.** *minor-mode-names***)**. See the *LispWorks Editor User Guide* for a description of major and minor modes in the LispWorks edtor. *buffer-modes* is used only when the CAPI creates the buffer, and not when it reuses a buffer.

If *echo-area* is non-nil. then an Echo Area is added. *echo-area* defaults to **nil**.

If *fixed-fill* is non-nil, the editor pane tries to form lines of length close to, but no more than, *fixed-fill*. It does this by forcing line breaks at spaces between words. *fixed-fill* defaults to **nil**.

The cursor in an **editor-pane** blinks on and off by the mechanism described in **editor-pane-blink-rate**.

change-callback, if non-nil, should be a function which is called whenever the editor buffer under the **editor-pane** changes. The value *change-callback* can be set either by:

```
(make-instance 'capi:editor-pane :change-callback ...)
```

or

```
(setf capi:editor-pane-change-callback)
```

The current value can be queried by the accessor **editor-pane-change-callback**.

The *change-callback* function must have signature:

change-callback *pane point old-length new-length*

pane is the **editor-pane** itself.

point is an **editor:point** object where the modification to the underlying buffer starts. *point* is a temporary point, and is not valid outside the scope of the change callback. For more information about **editor:point** objects, see "Points" in the *LispWorks Editor User Guide*.

old-length is the length of the affected text following *point*, prior to the modification.

new-length is the length of the affected text following *point*, after the modification has occurred.

Typical calls to the *change-callback* occur on insertion of text (when *old-length* is 0) and on deletion of text (when *new-length* is 0). There can be other combinations, for example, after executing the **Uppercase Region** editor command,

change-callback be called with both *old-length* and *new-length* being the length of the region. The same is true for changing editor text properties.

The *change-callback* is always executed in the process of *pane* (as if by **apply-in-pane-process**).

The *change-callback* is permitted to modify the buffer of *pane*, and other editor buffers. The callback is disabled inside the dynamic scope of the call, so there are no recursive calls to the *change-callback* of *pane*. However, changes done by the callback may trigger *change-callback* calls on other **editor-pane**s, whether in the same process or in another process.

There is an example illustrating the use of *change-callback* in the file **examples/capi/editor/change-callback.lisp**.

You can use the initargs **:before-input-callback** and **:after-input-callback** to add input callbacks which are called when **call-editor** is called. Note that the default *input-model* also generates calls to **call-editor**, so unless you override the default *input-model* the input callbacks are called for all keyboard and mouse gestures (other than gestures that are processed by a non-focus completer window).

In both cases (*before* and *after*) the argument is a function that takes two arguments: the editor pane itself and the input gesture (the second argument to **call-editor**).

call-editor may redirect gestures to another pane. For example, gestures to an **editor-pane** are redirected to the echo area while it is used. In this case the *before* callback is called more than once for the same gesture. The *after* callback is called only once for each gesture, on the pane that actually processed the gesture.

line-wrap-marker specifies the marker to display at the end of a line that is wrapped to the next line, or truncated if *wrap-style* is **nil**. The value must be a **character**, or **nil**

(which is interpreted as **#\Space**). The default value is the value of ***default-editor-pane-line-wrap-marker***. The value can be read by **editor-pane-line-wrap-marker**.

line-wrap-face specifies a face to use when displaying the *line-wrap-marker*. The argument can be **nil**, an **editor:face** object (the result of a call to **editor:make-face**), or a symbol naming a face (that is, the first argument to **editor:make-face**).

The default value of *line-wrap-face* is an internal symbol naming a face. The value can be accessed by **editor-pane-line-wrap-face**. The default face can be modified in the LispWorks IDE via **Tools > Preferences... > Environment > Styles > Colors and Attributes**, style name **Line Wrap Marker**.

wrap-style defines the wrapping of text lines that cannot be displayed in one line of the **editor-pane**. The argument can be one of:

t Normal wrapping. Display as many characters as possible in the **editor-pane** line.

nil Do not wrap. Text lines that are too long are truncated.

:split-on-space
Wrapping, but attempts to split lines on spaces. When the text reaches the end of a line, the code looks backwards for space, and wraps before it.

The default value of *wrap-style* is **t** and the value can accessed by **editor-pane-wrap-style**.

The input behaviour of an **editor-pane** is determined by its *input-model* (inherited from **output-pane**). By default, an **editor-pane** has an *input-model* that implements the functionality of the Editor tool in the LispWorks IDE, and always does it via **call-editor**. You can replace this behavior by supplying **:input-model** when you call **make-instance** or by **(setf capi:output-pane-input-model)**, though this

has an effect only if called before the pane is displayed. It is possible to achieve a minor modification to the default input behavior by prepending the modification (see the example below). Note that functions performing editor operations must do this via **call-editor**.

Editor panes support GNU Emacs keys on all platforms. Additionally on Microsoft Windows they support Windows editor keys, on GTK+ and Motif they support KDE/Gnome keys, and on Cocoa they support Mac OS X editor keys. Exactly one style of emulation is active at any one time for each editor pane. By default, editor panes in the LispWorks IDE development environment use Emacs emulation on all platforms. By default, editor panes in delivered applications use Windows emulation on Microsoft Windows, Mac OS X editor emulation on Cocoa, and Emacs emulation on GTK+ and Motif. To alter the choice of emulation, see **interface-keys-style** or the **deliver** keyord **:editor-style**, described in the *LispWorks Delivery User Guide*.

Notes

1. The **output-pane** initarg **:drawing-mode** controls anti-aliasing of the text displayed in an **editor-pane** on Microsoft Windows and GTK+.
2. For an **editor-pane** with *enabled* **:read-only**, Editor commands (predefined, and user-defined by **editor:defcommand**) may or may not be able to change the text, depending on how they are called. When executed by a key sequence they cannot change the text directly. However Editor commands can also be called via **editor:process-character** or **call-editor**, and then are programmatic input and so can change the text.
3. The effect of *enabled* **:read-only** is on the **editor-pane**. It does not affect the underlying Editor buffer, which can still be modified from other panes. The buffer that is displayed can be changed, and this does not affect the enabled state of the **editor-pane**.

4. To control whether the native input method is used to interpret keyboard input, you can supply the **output-pane** initarg **:use-native-input-method** or call **set-default-use-native-input-method**.

5. The default value of *composition-callback* (see **output-pane**) is **editor-pane-default-composition-call-back**.

Compatibility note

In LispWorks 4.4 and previous versions **editor-pane** supports only fixed-width fonts.

On Cocoa, **editor-pane** supports only fixed-width fonts.

In LispWorks 6.1 and later, variable-width fonts can also be used on Microsoft Windows, GTK+ and Motif. Specify the font via the **:font** initarg (see **simple-pane**).

The **:wrap-style** initarg supersedes **editor:set-window-split-on-space**, which is deprecated.

Example

```
(capi:contain (make-instance 'capi:editor-pane
                             :text "Hello world"))

(setq ed (capi:contain
          (make-instance 'capi:editor-pane
                         :text "Hello world"
                         :enabled nil)))
```

Note that you cannot type into the editor pane.

```
(capi:apply-in-pane-process
  ed #'(setf capi:editor-pane-enabled) t ed)
```

Now you can enter text into the editor pane interactively.

You can also change the text programmatically:

```
(capi:apply-in-pane-process
  ed #'(setf capi:editor-pane-text) "New text" ed)
```

In this example the callback modifies the buffer in the correct editor context so you that see the editor update immediately:

```
(capi:define-interface updating-editor ()
  ()
  (:panes
   (numbers capi:list-panel
          :items '(1 2 3)
          :selection-callback 'update-editor
          :callback-type :interface
          :visible-min-height '(:character 3))
   (editor capi:editor-pane
                 :text
                 "Select numbers in the list above."
                 :visible-min-width
                 (list :character 35))))

(defun update-editor (interface)
  (with-slots (numbers editor) interface
    (editor:process-character
     (list #'(setf capi:editor-pane-text)
           (format nil "~R"
                   (capi:choice-selected-item numbers))
           editor)
     (capi:editor-window editor))))

(capi:display (make-instance 'updating-editor))
```

This example illustrates the use of *buffer-modes* to specify a major mode:

```
(defclass my-lisp-editor (capi:editor-pane) ()
  (:default-initargs
   :buffer-modes '("Lisp")
   :echo-area t
   :text
   ";; Lisp mode functionality such as command bindings
and
;; parenthesis balancing work in this window.

(list 1 2 3)
"
   :visible-min-width '(:character 60)
   :name "My Lisp Editor Pane"))

(capi:define-interface my-lisp-editor-interface ()
  ()
  (:panes
   (ed
    my-lisp-editor
    ))
  (:default-initargs
   :title "My Lisp Editor Interface"))

;; Ensure Emacs-like bindings regardless of platform
(defmethod capi:interface-keys-style
           ((self my-lisp-editor-interface))
  :emacs)

(capi:display
 (make-instance 'my-lisp-editor-interface))
```

This example makes an **editor-pane** with no input behavior:

```
(capi:contain
 (make-instance 'capi:editor-pane :input-model nil))
```

This example makes an **editor-pane** with the default input behavior, except that pressing the mouse button displays a message rather than setting the point. It then displays the pane:

```
(progn
  (defun foo (self x y)
    (capi:display-message "Button-1 Press at ~a/~a"
                          x y))
  (let ((ep (make-instance 'capi:editor-pane)))
    (setf (capi:output-pane-input-model ep)
          (list* '((:button-1 :press) foo)
                 (capi:output-pane-input-model ep)))
    (capi:contain ep)))
```

Also see the examples in the directory **examples/capi/editor/**.

See also **call-editor**
default-editor-pane-line-wrap-marker
editor-pane-blink-rate
editor-cursor-active-style
editor-cursor-color
editor-cursor-drag-style
editor-cursor-inactive-style
interface-keys-style
modify-editor-pane-buffer
output-pane
set-default-use-native-input-method

editor-pane-blink-rate *Generic Function*

Summary Returns the cursor blinking rate for an editor pane.

Package **capi**

Signature **editor-pane-blink-rate** *self* **=>** *blink-rate*

Arguments *self* An editor pane.

Values *blink-rate* A non-negative real number, or **nil**.

Description The system calls the function **editor-pane-blink-rate** to determine the cursor blinking rate in milliseconds. The pane uses the value *blink-rate* each time it gets the focus.

If *blink-rate* is a positive real number, then it is the blinking rate in milliseconds. If *blink-rate* is 0, then there is no blinking. If *blink-rate* is **nil**, then the default blinking rate is used.

The default method on **editor-pane-blink-rate** returns **nil**, which means use the default blinking rate. **set-default-editor-pane-blink-rate**.

You can define your own methods on **editor-pane-blink-rate** for **editor-pane** and subclasses thereof.

See also ***editor-cursor-active-style***
editor-pane
editor-pane-native-blink-rate
set-default-editor-pane-blink-rate

editor-pane-buffer *Function*

Summary Returns the editor buffer associated with an editor pane.

Package **capi**

Signature **editor-pane-buffer** *pane*

Description The function **editor-pane-buffer** returns the editor buffer associated with an editor pane, which can be manipulated in the standard ways with the routines in the editor package.

Example
```
(setq editor-pane
      (capi:contain (make-instance 'capi:editor-pane
                                   :text "Hello world")))

(setq buffer
      (capi:editor-pane-buffer editor-pane))
```

```
(editor:insert-string (editor:buffers-end buffer)
 (format nil "~%Here's some more text..."))
```

See also **editor-pane**

editor-pane-composition-selected-range-face-plist *Variable*

Summary Can modify the face of the default editor composition string.

Initial Value **(:inverse-p t)**

Description The variable ***editor-pane-composition-selected-range-face-plist*** is a plist that is used to modify the face of the composition string when **:selected-range** and **:selection-needs-face** are passed in the plist to **editor-pane-default-composition-callback**. The plist is merged into the plist that is passed into **editor-pane-default-composition-callback**, so keywords in it override the keywords in the face.

See also **editor-pane-default-composition-callback**

editor-pane-default-composition-callback *Function*

Summary The default composition callback of the editor. Composition here means composing input characters into other characters by an input method.

Signature **editor-pane-default-composition-callback** *editor-pane what*

Description The function **editor-pane-default-composition-callback** is the default *composition-callback* of **editor-pane**. It may also be called by your program.

When called with *what* = **:start**, **editor-pane-default-composition-callback** sets the composition placement in the editor by calling **set-composition-placement**, and also makes it move the composition window following the user's mouse cursor movement

When called with *what* = **:end**, it stops the following of the mouse cursor.

When called with a list (which needs to be a plist), **editor-pane-default-composition-callback** checks if it contains a keyword/value pair for **:string-face-lists**, and if it does displays it in the editor temporarily (until the next call to it). See the entry for **output-pane** for the description of the value *string-face-lists*.

By default, **editor-pane-default-composition-call-back** uses the faces that are supplied in *string-face-lists*, but if the plist contains **:selection-needs-face** and **:selected-range**, it displays the selected range with a different face, by merging ***editor-pane-composition-selected-range-face-plist*** into the given face of the selected range.

This can be overriden by setting the *composition-face* in the **editor-pane**, or the global ***editor-pane-default-composition-face*** if the *composition-face* of the pane is **:default**. If *composition-face* is a true value then the exact behavior depends on its type:

A plist — This is appended to each face plist in the the *string-face-lists*. In other words, it provides default values for the attributes of the face.

An **editor:face** — Overrides the supplied face completely.

A function or a symbol

For *string-face-list*, funcalls it with two arguments, the pane and the supplied face plist, and uses the result (which may be an **editor:face** or a face plist).

editor-pane-default-composition-callback is the default value of *composition-callback* for **editor-pane**. This can be overridden by passing **:composition-callback** or using **output-pane-composition-callback** (see entry for **output-pane**).

The user-supplied callback may call **editor-pane-default-composition-callback** to do the actual display, potentially after modifying the argument when it is a plist.

See also **set-composition-placement**

editor-pane-default-composition-face *Variable*

Summary The default composition face for **editor-pane**.

Initial Value **nil**

Description The variable ***editor-pane-default-composition-face*** gives the default composition face for all **editor-pane**s where the *composition-face* is set to **:default**.

:default is the default value for *composition-face*, so normally setting this variable affects the *composition-face* of all **editor-pane**s.

See **editor-pane-default-composition-callback** for a description of how it is used.

See also **editor-pane-default-composition-callback**

editor-pane-native-blink-rate *Function*

Summary Returns the native cursor blinking rate for an **editor-pane**.

Package **capi**

Signature **editor-pane-native-blink-rate** *pane* **=>** *blink-rate*

Arguments *pane* An **editor-pane**.

Values *blink-rate* A non-negative real number, or **nil**.

Description The function **editor-pane-native-blink-rate** returns the native cursor blinking rate for the **editor-pane** *pane*, that is the rate that the GUI library (Motif, Microsoft Windows, Cocoa) uses.

The value *blink-rate* is interpreted as a blinking rate as described in **editor-pane-blink-rate**.

See also **editor-pane-blink-rate**
set-default-editor-pane-blink-rate

editor-pane-selected-text *Generic Function*

Summary Returns the selected text in an **editor-pane**.

Package **capi**

Signature **editor-pane-selected-text** *editor-pane* **=>** *result*

Arguments *editor-pane* An **editor-pane**.

Values *result* A string or **nil**.

Description The function **editor-pane-selected-text** takes an instance of **editor-pane** as its argument and returns the selected text in *editor-pane*, or **nil** if there is no selection.

See also **editor-pane**
editor-pane-selected-text-p

editor-pane-selected-text-p *Generic Function*

Summary The predicate for a current selection in an **editor-pane**.

Package **capi**

Signature **editor-pane-selected-text-p** *editor-pane* **=>** *result*

Arguments *editor-pane* An **editor-pane**.

Values *result* A boolean.

Description The generic function **editor-pane-selected-text-p** takes an instance of **editor-pane** as its argument and returns **t** if there is text currently selected in *editor-pane*, or **nil** if there is no selection.

See also **editor-pane**
editor-pane-selected-text

editor-pane-stream *Function*

Summary Returns the output stream associated with an editor pane.

Package **capi**

Signature **editor-pane-stream** *editor-pane* **=>** *stream*

Arguments *editor-pane* An **editor-pane**.

Values *stream* An output stream.

Description The function **editor-pane-stream** returns the stream where the results of evaluation in the editor buffer currently associated with *pane* are printed to.

See also **editor-pane**

editor-window *Generic Function*

Summary Returns the editor window object.

Package **capi**

Signature **editor-window** *editor* **=>** *editor-window*

Arguments *editor* An **editor-pane** or an Editor interface in the LispWorks IDE.

Values *editor-window* An editor window object.

Description The generic function **editor-window** returns the editor window object associated with *editor*.

The functionality of editor windows is documented in the *LispWorks Editor User Guide*.

See also **editor-pane**

element *Class*

Summary The class **element** is the superclass of all CAPI objects that appear in a window.

Package **capi**

Superclasses **capi-object**

Subclasses **simple-pane**
menu

Initargs

:parent The element containing this element.

:interface The interface containing this element.

:accepts-focus-p
Specifies that the element should accept input.

:help-key An object used for lookup of help. Default value **t**.

:widget-name A string designator.

:initial-constraints
Specifies constraints (geometry hints) that apply to the element during the creation of the element's interface, but not after the interface is displayed.

The following initargs are geometry hints, influencing the initial size and position of an element and constraining its size:

:x The *x* position of the element in a pinboard.

:y The *y* position of the element in a pinboard.

:external-min-width
The minimum width of the element in its parent.

:external-min-height
The minimum height of the element in its parent.

:external-max-width

The maximum width of the element in its parent.

:external-max-height

The maximum height of the element in its parent.

:visible-min-width

The minimum visible width of the element.

:visible-min-height

The minimum visible height of the element.

:visible-max-width

The maximum visible width of the element.

:visible-max-height

The maximum height of the element.

:internal-min-width

The minimum width of the display region.

:internal-min-height

The minimum height of the display region.

:internal-max-width

The maximum width of the display region.

:internal-max-height

The maximum height of the display region.

Accessors

element-parent
element-widget-name

Readers

element-interface
help-key

Description

The class **element** contains the slots *parent* and *interface* which contain the element and the interface that the element is contained in respectively. The writer method **element-parent** can be used to re-parent an element into

another parent (or to remove it from a container entirely by setting its parent to **nil**). Note that an element should not be used in more than one place at a time.

The initarg *accepts-focus-p* specifies that the element can accept input. The default value is **t**. In some subclasses including **display-pane** and **title-pane** the default value of *accepts-focus-p* is **nil**. A pane accepts the input focus if and only if the function **accepts-focus-p** returns true.

accepts-focus-p also influences whether a pane is a tabstop on Microsoft Windows, where a pane acts as a tabstop if and only if the function **accepts-focus-p** returns true and the **:accepts-focus-p** initarg value is **:force**. On Motif and Cocoa, a pane acts as a tabstop if and only if the function **accepts-focus-p** returns true.

help-key is used to determine how help is displayed for the pane. The value **nil** means that no help is displayed. Otherwise, *help-key* is passed to the *help-callback*, except when *help-key* is **t**, when the name of the pane is passed to the *help-callback*. For details of *help-callback*, see **interface**.

widget-name specifies the widget name of the element. This is used to match resources on GTK+ and Motif. Note that this name will be in the path only if the element has a representation. **tab-layout** and **pinboard-layout** always have a representation, as do all elements that show anything on the screen. Other layouts may or may not have a representation and so you should not supply *widget-name* for these.

The actual widget name is the result of a call to **cl:string**, except when *widget-name* is a symbol, in which case the symbol name is downcased to derive the widget name.

If *widget-name* is not supplied, the system constructs a default widget name which is the name of the class of the widget (downcased), except for top level interfaces on GTK+ where the *application-class* is prepended followed by a dot.

Example GTK+ resource files are in **lib/6-1-0-0/examples/gtk/**

Note: When *widget-name* is supplied, the GTK+ library does not prepend the *application-class*.

The accessor **element-widget-name** gets and (with **setf**) sets the *widget-name*. *widget-name* is used when the widget is created, that is when **display** is called on the top level interface of the element. Setting *widget-name* afterwards has no effect.

All elements accept initargs (listed above) representing hints as to the initial size and position of the element. By default elements have a minimum pixel size of one by one, and a maximum size of **nil** (meaning no maximum), but the hints can be specified to change these values. The possible values for these hints are as follows:

integer	The size in pixels.
t	For **:visible-max-width**, **t** means use the value of **:visible-min-width**.
	For **:visible-max-height**, **t** means use the value of **:visible-min-height**.
:text-width	The width of any text in the element.
:text-height	The height of any text in the element.
:screen-width	The width of the screen.
:screen-height	The height of the screen.

Also, hints can be a list starting with any of the following operators, followed by one or more hints.

max	The maximum size of the hints.
min	The minimum size of the hints.
+	The sum of the hints.
-	The subtraction of hints from the first.

`*` The multiplication of the hints.

`/` The division of hints from the first.

Also, a hint can be a two element list specifying the size of a certain amount of text when drawn in the element:

`(:character` *integer*`)`

`(character` *integer*`)`

The size of *integer* characters.

`(:string` *string*`)`

`(string` *string*`)`

The size of *string*.

A hint can be a two-element list interpreted as the value of a symbol:

`(symbol-value` *foo*`)`

The size of the **`symbol-value`** of *foo*.

Finally, you can choose to **`apply`** or **`funcall`** an arbitrary function, by passing a list starting with **`funcall`** or **`apply`**, followed by the function and then the arguments.

The hints of an element can be changed dynamically using **`set-hint-table`**: such a call might change the geometry.

initial-constraints must be a plist of constraints, where the keywords are geometry hints as described above.

Notes

1. If the *visible-max-width* is the same as the *visible-min-width*, then the element is not horizontally resizable. If the *visible-max-height* is the same as the *visible-min-height*, then the element is not vertically resizable.
2. Some classes have default initargs providing useful hints. For example, **`display-pane`** has **`:text-height`** as the default value of **`:visible-min-height`**, ensuring that the text is visible.

3. The *ratios*, *x-ratios* and *y-ratios* settings in some layouts (for example **grid-layout**) also control the actual size of the pane when the constraints are not specified. In particular, if **nil** is used in the ratios then the associated pane(s) will be fixed at their minimum size.

Compatibility note

The initargs **:min-width**, **:max-width**, **:min-height**, and **:max-height** are still accepted for compatibility with LispWorks 3.2, but their use is discouraged.

In LispWorks 4, **:visible-min-width** means the same as **:min-width**, but takes precedence if both are specified. The use of **:min-width** can lead to confusion because some CAPI classes have default values for **:visible-min-width** which will override **:min-width**. Similarly for **:min-height**, **:max-width**, and **:max-height**. Therefore, your code should use **:visible-min-width** and friends.

Example

```
(capi:display (make-instance 'capi:interface
                             :title "Test"
                             :visible-min-width 300))

(capi:display (make-instance 'capi:interface
                             :title "Test"
                             :visible-min-width 300
                             :visible-max-height 200))
```

Here is a simple example that demonstrates the use of the **element-parent** accessor to place elements.

```
(setq pinboard (capi:contain
                (make-instance
                 'capi:pinboard-layout)
                :visible-min-width 520
                :visible-min-height 395))

(setq object
      (make-instance
       'capi:image-pinboard-object
       :x 10 :y 10
       :image
       (sys:lispworks-file
        "examples/capi/graphics/Setup.bmp")
       :parent pinboard))

(capi:apply-in-pane-process
 pinboard #'(setf capi:element-parent) nil object)

(capi:apply-in-pane-process
 pinboard #'(setf capi:element-parent) pinboard object)
```

These final two examples illustrate the effect of *initial-constraints*.

Create a pane that starts at least 600 pixel high, but can be made shorter by the user:

```
(capi:contain
 (make-instance 'capi:output-pane
                :initial-constraints '(:visible-min-
height 600)))
```

Compare with this, which creates a pane at least 600 pixels high but which cannot be made shorter.

```
(capi:contain
 (make-instance 'capi:output-pane
                :visible-min-height 600))
```

See also **set-hint-table**

element-container *Function*

Summary Returns the container of an element.

Package **capi**

Signature **element-container** *element* **=>** *container*

Arguments *element* An **element**.

Values *container* A **screen** or a **document-frame**.

Description The function **element-container** returns the container of the element *element*.

If *element* is inside a standalone interface, then *container* is the **screen** object.

If *element* is inside an interface that is inside a MDI interface, then *container* is the **capi:container** object of that MDI interface. See **document-frame** for details.

See also **document-frame**
element

element-interface-for-callback *Generic Function*

Summary Returns the interface that is used in an element's callbacks.

Package **capi**

Signature **element-interface-for-callback** *element* **=>** *interface*

Description The function **element-interface-for-callback** returns the interface that is passed to callbacks in *element*. Normally this is the interface that *element* is in, but that can be changed by **attach-interface-for-callback**.

See also **attach-interface-for-callback**
element

element-screen *Function*

Summary Returns the screen that an element is associated with.

Package **capi**

Signature **element-screen** *element* **=>** *screen*

Description The function **element-screen** returns the screen that the element *element* is associated with.

See also **element**

ellipse *Class*

Summary A pinboard object that draws itself as an ellipse.

Package **capi**

Superclasses **pinboard-object**

Accessors **filled**

Initargs **:filled** A boolean.

Description The class **ellipse** is a **pinboard-object** that draws itself as an ellipse.

If *filled* is true, then the ellipse is filled with the foreground color. *filled* defaults to **nil**.

ensure-area-visible *Generic Function*

Summary Ensures an area is visible in a scrollable pane.

Package **capi**

Signature **ensure-area-visible** *self x y width height*

Arguments

self	A **simple-pane** with internal scrolling.
x,*y*	The coordinates of the origin of the area to make visible.
width, *height*	The dimensions of the area to make visible

Description The generic function **ensure-area-visible** ensures that the area specified by *x*, *y*, *width* and *height*, or at least part of it, is visible.

This function works only for subclasses of **simple-pane** that do internal scrolling (such as **editor-pane**). An error is signalled if it is called with other classes.

ensure-interface-screen *Function*

Summary Ensures that a top level interface is displayed on a given screen.

Package **capi**

Signature **ensure-interface-screen** *self* **&key** *screen*

Description The function **ensure-interface-screen** ensures that the top level interface is displayed on the given *screen* (or the default) if **display** is called later without a *screen* argument. This allows the querying of font and color information associated with a particular screen. It returns the screen that is used.

See also **screen**
display
interface

execute-with-interface *Function*

Summary Allows functions to be executed in the event process of a given interface.

Package **capi**

Signature **execute-with-interface** *interface function* **&rest** *args*

Arguments

interface	An **interface**
function	A function designator
args	Arguments passed to *function*

Description The function **execute-with-interface** is a useful way of operating on an **interface** owned by another process. It takes a top-level interface, a function and some arguments and queues the function to be run by that process when it next enters its event loop (for an interface owned by the current process, it calls the function immediately).

Notes

1. **execute-with-interface** applies *function* even if *interface* does not have a screen representation, for example when it is destroyed. To call *function* only if *interface* has a representation, use **execute-with-interface-if-alive**.
2. All accesses (reads as well as writes) on a CAPI interface and its sub-elements should be performed in the interface process. Within a callback on the interface this happens automatically, but **execute-with-interface** is a useful utility in other circumstances.
3. **execute-with-interface** calls *function* on the current process if *interface* does not have a process.

4. **apply-in-pane-process** and **apply-in-pane-process-if-alive** are other ways to call a function in the appropriate CAPI process. They takes panes of all classes, not merely **interface**.

Example

```
(setq a (capi:display (make-instance 'capi:interface)))

(capi:execute-with-interface
 a 'break
 "Break inside the interface process")
```

See also

apply-in-pane-process
apply-in-pane-process-if-alive
execute-with-interface-if-alive

execute-with-interface-if-alive *Function*

Summary

Executes a function in the event process of a given interface if it is alive.

Package

capi

Signature

execute-with-interface-if-alive *interface function* **&rest** *args* **=> nil**

Description

The function **execute-with-interface-if-alive** applies the function *function* to the arguments *args* in the process of the interface *interface*, if the interface is "alive". An interface is alive if it has a representation on the screen.

If *interface* is not alive, *function* is not applied. This is in contrast to **execute-with-interface**, which in this case applies the function in the current process.

execute-with-interface-if-alive is useful for automatic updating of interfaces that may be destroyed by the user, where the update is redundant if the interface is not alive.

Notes — All accesses (reads as well as writes) on a CAPI interface and its sub-elements should be performed in the interface process. Using **execute-with-interface-if-alive** is one way of ensuring this.

See also — **apply-in-pane-process-if-alive**
execute-with-interface

exit-confirmer *Function*

Summary — Called by the **OK** button on a dialog created with **popup-confirmer**.

Package — **capi**

Signature — **exit-confirmer &rest** *dummy-args*

Description — The function **exit-confirmer** is called by the **OK** button on a dialog created using **popup-confirmer**, and it is provided as an entry point so that other callbacks can behave in the same way. There is a full description of the **OK** button in **popup-confirmer**.

Example — This example demonstrates the use of **exit-confirmer** to make the dialog exit when pressing **Return** in the text input pane. It also demonstrates the use of *value-function* as a means of deciding the return value from **popup-confirmer**.

```
(capi:popup-confirmer (make-instance
                       'capi:text-input-pane
                       :callback 'capi:exit-confirmer)
                      "Enter some text:"
                      :value-function
                      'capi:text-input-pane-text)
```

See also — **popup-confirmer**
display-dialog
interface

exit-dialog *Function*

Summary Exits the current dialog.

Package **capi**

Signature **exit-dialog** *value*

Description The function **exit-dialog** is the means to successfully return a value from the current dialog. Hence, it might be called from an **OK** button so that pressing the button would cause the dialog to return successfully, whilst the **Cancel** button would call the counterpart function **abort-dialog**.

If there is no current dialog then **exit-dialog** does nothing and returns **nil**. If there is a current dialog then **exit-dialog** either returns non-nil or does a non-local exit. Therefore code that depends on **exit-dialog** returning must be written carefully - see the discussion under **abort-dialog** for details.

Example

```
(capi:display-dialog
  (capi:make-container
    (make-instance 'capi:text-input-pane
                   :callback-type :data
                   :callback 'capi:exit-dialog)
    :title "Test Dialog"))
```

There is another example in the file **examples/capi/dialogs/simple-dialog.lisp**.

See also **abort-dialog**
display-dialog
popup-confirmer
interface

expandable-item-pinboard-object *Class*

Summary A class used to implement nodes in **graph-pane**.

Package **capi**

Superclasses **item-pinboard-object**

Description The class **expandable-item-pinboard-object** is a **pinboard-object** that **graph-pane** uses by default to implement nodes in a graph.

expandable-item-pinboard-object draws itself with a small circle to indicate that the node has children.

See also **graph-pane**

extended-selection-tree-view *Class*

Summary A pane that displays a hierarchical list of items which (unlike **tree-view**) allows extended selection.

Package **capi**

Superclasses **tree-view**

Description The class **extended-selection-tree-view** is like **tree-view** but allows more than one item to be selected at once.

Notes
1. Although **extended-selection-tree-view** is a subclass of **collection**, it does its own items handling and you must not access its *items* and related slots directly. In particular for **extended-selection-tree-view** do not pass **:items**, **:items-count-function**, **:items-get-function** or **:items-map-function**, and do not use the corresponding accessors.

2. The delete item callback (see *delete-item-callback* in **tree-view**) is called in **extended-selection-tree-view** with the second argument being a list of the selected items, unless *interaction* is **:single-selection**, in which case it behaves the same as in **tree-view**.

See also **tree-view**

filtering-layout *Class*

Summary A layout that can be used for filtering.

Package **capi**

Superclasses **row-layout**

Initargs

:callback-object
The argument for the callbacks. If it is **nil** the top-level-interface of the layout is used.

:change-callback
A function of one argument (the *callback-object*). It is called whenever the text in the filter changes. Also if *callback* is not supplied, *change-callback* is called instead.

:callback A function of one argument (the *callback-object*). It is called when the user presses **Return**, makes a selection from the menu, or clicks the **Confirm** button. If *callback* is not supplied, *change-callback* is called instead.

:text A string specifying the initial text of the filter, or **nil**.

:matches-title
A string, **t** or **nil**.

:help-string

A string, **t** or **nil**.

:label-style

:short, **:medium** or **:long**.

Accessors

filtering-layout-state
filtering-layout-matches-text

Description

The main part of a filtering layout is a **text-input-pane** which allows the user to enter a string. The string is used for filtering. The user can control how it is used by a menu that allows her to specify whether:

- the string is used as a regular expression or plain string
- the filter excludes matches or includes matches
- filtering is case-sensitive or case-insensitive

The filtering layout defines the parameters to use, and calls the callbacks to perform the filtering. It does not do any filtering itself.

To actually do the filtering, the using code needs to call **filtering-layout-match-object-and-exclude-p**, which returns as multiple values a precompiled regexp and a flag specifying whether to exclude matches. The regexp should be used to perform the filtering, typically by using **lisp-works:find-regexp-in-string**. Note that **filtering-layout-match-object-and-exclude-p** returns **nil** when there is no string in the **text-input-pane**, and that even when the filter is set to plain match it returns a regexp (which matches a plain string).

You supply a **filtering-layout** amongst the *panes* of your interface definition (not its *layouts*). The description of a **filtering-layout** is set by the **initialize-instance** method of the class, and therefore the description cannot be passed as an initarg and should not be manipulated.

filtering-layout-state returns a "state" object which can be used later to set the state of any **filtering-layout** by **(setf capi:filtering-layout-state)**. When setting the state, the value can also be a string or **nil**. A string means setting the filter string to it and making the filtering state be plain string, includes matches, and case-insensitive. **nil** means the same as the empty string.

matches-title controls whether the **filtering-layout** contains a **display-pane** (the "matches pane") showing the number of matches. If *matches-title* is a string, it provides the title of the matches pane. If *matches-title* is **t** the title is **Matches:**. Note that the actual text in the matches pane must be set by the caller by **(setf capi:filtering-layout-matches-text)**.

If *help-string* is non-nil then the filter has a Help button which raises a default help text if *help-string* is **t**, or the text of *help-string* if it is a string.

If *label-style* is **:short** the filter menu has a short title. For example if the filter is set for case-sensitive plain inclusive matching the short label is **PMC**. If *label-style* is **:medium** then this label would be **Filter:C**. Any other value of *label-style* would make a long label **Plain Match Cased** .

Example

```
(defvar *things* (list "Foo" "Bar" "Baz" 'car 'cdr))

(capi:define-interface my-interface ()
  ((things :reader my-things
           :initform *things*))
  (:panes
   (my-things-list-panel
    capi:list-panel
    :reader my-interface-list-panel
    :items things
    :visible-min-height `(:character ,(length
*things*)))
   (my-filtering
    capi:filtering-layout
    :change-callback 'update-my-interface
    :reader my-interface-filtering))
  (:layouts
   (a-layout
    capi:column-layout
    '(my-filtering my-things-list-panel)))
  (:default-initargs :title "Filtering example")
  )

(defun update-my-interface (my-interface)
  (let* ((things (my-things my-interface))
         (filtered-things
          (multiple-value-bind (regexp excludep)
              (capi:filtering-layout-match-object-and-
exclude-p
               (my-interface-filtering my-interface)
               nil)
            (if regexp
                (loop for thing in things
                      when (if (find-regexp-in-string
                                regexp
                                (string thing))
                               (not excludep)
                               excludep)
                      collect thing)
                things))))
    (setf (capi:collection-items
           (my-interface-list-panel my-interface))
          filtered-things)))
```

See also **filtering-layout-match-object-and-exclude-p**

filtering-layout-match-object-and-exclude-p *Function*

Summary Returns filtering parameters for a **`filtering-layout`**.

Package **`capi`**

Signature **`filtering-layout-match-object-and-exclude-p`** *filtering-layout display-message* **`=>`** *regexp*, *excludep*

Arguments

filtering-layout	A **`filtering-layout`**
display-message	A generalized boolean

Values

regexp	A precompiled regular expression
excludep	A boolean

Description The function **`filtering-layout-match-object-and-exclude-p`** returns a regexp to use for filtering in the *filtering-layout*. The second returned value *excludep* specifies whether the filter should be used to exclude or include matches.

display-message is a generalised boolean controlling whether a message is displayed to the user if there is an error when compiling the regexp.

See **`filtering-layout`** for details.

See also **`filtering-layout`**

find-graph-edge *Generic Function*

Summary Finds and returns an edge in a graph given two items.

Package **`capi`**

Signature **`find-graph-edge`** *graph from to* **`=>`** *edge*

Arguments

graph	A **`graph-pane`**.

	from	An item in *graph*.
	to	An item in *graph*.
Values	*edge*	A graph edge, or **nil**.

Description The generic function **find-graph-edge** finds the edge that goes from the node corresponding to *from* to the node corresponding to *to*.

If there is no such edge, **find-graph-edge** returns **nil**.

See also **find-graph-node**
graph-pane

find-graph-node *Generic Function*

Summary Finds and returns a node in a graph corresponding to an item.

Package **capi**

Signature **find-graph-node** *graph object* **=>** *node*

Arguments	*graph*	A **graph-pane**.
	object	An item in *graph*.
Values	*node*	A node of *graph*, or **nil**.

Description The generic function **find-graph-node** finds the node that corresponds to the item *object*.

If there is no such node, **find-graph-node** returns **nil**.

See also **find-graph-edge**
graph-pane

find-interface *Generic Function*

Summary Displays an interface of a given class, making it if necessary.

Package **capi**

Signature **find-interface** *class-name* **&rest** *initargs* **&key** *screen* **&allow-other-keys =>** *interface*

Arguments

class-name	A specifier for a subclass of **interface**.
initargs	Initialization arguments for *class-name*.
screen	A **screen** or **nil**.

Values

interface	An interface of class *class-name*.

Description The generic function **find-interface** finds and displays an interface of the given class *class-name* that matches *initargs* and *screen*.

class-name can be the name of a suitable class, the class itself, or an instance of the class.

screen can be a CAPI object as accepted by **convert-to-screen**. *screen* defaults to the default screen.

find-interface calls **locate-interface** to locate an existing interface:

1. If an interface of the class specified by *class-name* matching *initargs* exists already on *screen*, then this interface is activated and returned.
2. Otherwise, if an interface of the class specified by *class-name* exists already on *screen*, then **reinitialize-interface** is applied to this interface which is then activated and returned.

If no instance of class *class-name* exists on *screen*, then **find-interface** creates one by passing *class-name* and *initargs* to **make-instance**, and displays the result on *screen*.

Notes — There are many uses of **find-interface** in the LispWorks IDE development environment.

See also — **locate-interface**
reinitialize-interface

find-string-in-collection *Generic Function*

Summary — The **find-string-in-collection** generic function returns the next item whose printed representation matches a given string.

Package — **capi**

Signature — **find-string-in-collection** *self string* **&optional** *set*

Description — The **find-string-in-collection** generic function returns the next item whose printed representation matches *string*. If *set* is non-nil, the choice selection is set to this item. The search is started from the previous search point. If the choice selection is set, the next search will start from the first selected item.

See also — **collection-search**
collection

force-screen-update *Function*

Summary — Ensures a screen is up to date.

Package — **capi**

Signature — **force-screen-update &key** *screen*

Description The function **force-screen-update** makes sure that the **screen** specified by *screen* is up to date.

screen can be a CAPI object as accepted by **convert-to-screen**. The default for *screen* is **nil**.

See also **force-update-all-screens**

force-update-all-screens *Function*

Summary Ensures a screen is up to date.

Package **capi**

Signature **force-update-all-screens**

Description The function **force-update-all-screens** makes sure that all screens are up to date.

See also **force-screen-update**

foreign-owned-interface *Class*

Package **capi**

Superclasses **interface**

Description The class **foreign-owned-interface** allows another application's window to be the owner of a CAPI dialog. Instances should be created by calling **make-foreign-owned-interface**.

foreign-owned-interface is implemented only on Microsoft Windows.

See also **make-foreign-owned-interface**

form-layout *Class*

Summary The class **form-layout** lays its children out in a form.

Package **capi**

Superclasses **layout**

Initargs

:vertical-gap The gap between rows in the form.

:vertical-adjust
The adjustment made to the rows.

:title-gap The gap between the two columns.

:title-adjust The adjustment made to the left column.

Accessors

form-vertical-gap
form-vertical-adjust
form-title-gap
form-title-adjust

Description The form layout lays its children out in two columns, where the children in the left column (which are usually titles) are right adjusted whilst the children in the right column are left adjusted.

Compatibility note This class has been superseded by **grid-layout**, and will probably be removed at some point in the future. The examples below demonstrate the use of grid layouts as an alternative to forms.

Example

```
(setq children (list
                "Button:"
                (make-instance 'capi:push-button
                               :text "Press Me")
                "Enter Text:"
                (make-instance 'capi:text-input-pane)
                "List:"
                (make-instance 'capi:list-panel
                               :items '(1 2 3))))
```

```
(capi:contain (make-instance
               'capi:grid-layout
               :description children
               :x-adjust '(:right :left)
               :y-adjust :center))
```

See also **grid-layout**
layout

free-metafile *Function*

Summary Frees a metafile.

Package **capi**

Signature **free-metafile** *metafile*

Arguments *metafile* A metafile.

Description The function **free-metafile** releases the window system storage used by the metafile.

free-metafile must be called when the metafile is no longer needed, to avoid memory leaks.

free-metafile is supported on GTK+ only where Cairo is supported (GTK+ 2.8 and later).

Notes **free-metafile** is not implemented on X11/Motif.

Examples There is an example in **examples/capi/graphics/meta-file.lisp**.

See also **clipboard**
draw-metafile
draw-metafile-to-image

free-sound *Function*

Summary Frees a loaded sound object on Microsoft Windows and Cocoa.

Package **capi**

Signature **free-sound** *sound*

Arguments *sound* An array returned by **load-sound**.

Description The function **free-sound** unloads (frees) the loaded sound object *sound*.

Notes **free-sound** is not implemented on GTK+ and Motif.

See also **load-sound**
read-sound-file

get-collection-item *Generic Function*

Summary Returns the item at a specified position in a collection.

Package **capi**

Signature **get-collection-item** *self index*

Description The generic function **get-collection-item** returns the item at position *index* from the **collection** *self*. It achieves this by calling the *items-get-function* of the collection. There is also a complementary function, **search-for-item** which finds the index for a given item in a collection.

See also **collection**
search-for-item

get-constraints *Function*

Summary Returns a list of the constraints for an element.

Package **capi**

Signature **get-constraints** *element*

Description The function **get-constraints** returns the constraints for *element* as multiple values (the values are the minimum width, the minimum height, the maximum width and the maximum height).

This function calls the generic function **calculate-constraints** to calculate these sizes initially, but then just uses the values in the geometry cache for the element. To force an element to take account of its new constraints, call the function **invalidate-pane-constraints**.

See also **calculate-constraints**
define-layout
element
invalidate-pane-constraints

get-horizontal-scroll-parameters *Generic Function*

Summary Queries the scroll parameters of a horizontal scroll bar.

Package **capi**

Signature **get-horizontal-scroll-parameters** *self* **&rest** *keys* **=>** *parameter, parameter,...*

Arguments

self	A displayed **simple-pane**.
keys	Keywords as below.

Values *parameter* The parameters are returned as multiple values, one for each key passed in *keys* and in the same order as the arguments.

Description Retrieves the specified parameters of the horizontal scroll bar of *self*, which should be a displayed instance of a subclass of **simple-pane** which does internal scrolling (such as **editor-pane**).

The valid *keys* are:

:min-range The minimum data coordinate.

:max-range The maximum data coordinate.

:slug-position
The current scroll position.

:slug-size The length of the scroll bar slug.

:page-size The scroll page size.

:step-size The scroll step size.

Note: For the other pane classes, such as **list-panel**, the underlying widget decides what the scroll range and units are.

Example See the following CAPI example files:
output-panes/scroll-test.lisp
output-panes/scrolling-without-bar.lisp

See also **get-scroll-position**
scroll
set-horizontal-scroll-parameters
simple-pane

get-page-area *Function*

Summary Calculates the dimensions of suitable rectangles for use with **with-page-transform**.

Package **capi**

Signature **get-page-area** *printer* **&key** *scale dpi screen*

Description The **get-page-area** function is provided to simplify the calculation of suitable rectangles for use with **with-page-transform**. It calculates and returns the width and height of the rectangle in the user's coordinate space that corresponds to one printable page, based on the logical resolution of the user's coordinate space in dpi.

For example, if a logical resolution of 72 dpi was specified, this means that each unit in user space would map onto 1/72 of an inch on the printed page, assuming that no *scale* is specified.

If *dpi* is **nil** or unspecified, the logical resolution of the specified screen is used, or the logical resolution of the default screen if no screen is specified. The *dpi* argument can be a number, or a list of two elements representing the logical resolution of the coordinate spaces in the x and y directions respectively.

If *scale* is specified the rectangle is calculated so that the image is scaled by this factor when printed. It defaults to 1.0.

See also **printer-metrics**
with-page-transform

get-printer-metrics *Function*

Summary Returns the metrics for a printer.

Package **capi**

Signature **get-printer-metrics** *printer*

Description The **get-printer-metrics** functions takes a *printer* as its argument and returns a **printer-metrics** object.

The metrics values in this object should be accessed by the **printer-metrics** readers.

See also **set-printer-metrics**
printer-metrics
with-page-transform

get-scroll-position *Function*

Summary Returns the current scroll position of a pane such as **list-panel**, **display-pane** or **tree-view**.

Package **capi**

Signature **get-scroll-position** *pane dimension* **=>** *position*

Arguments

pane	A pane with built-in scrolling.
dimension	A keyword, either **:horizontal** or **:vertical**.

Values

position	An integer or **nil**.

Description The function **get-scroll-position** returns the scroll position of the pane *pane* in the given *dimension*.

pane should be an instance of a pane class that has built-in scrolling. That is, the scrolling is implemented by the underlying widget. Examples include **list-panel**, **display-pane** and **tree-view**.

In general, the units in the returned value *position* are unspecified, but they can be passed to the generic function **scroll** with *operation* **:move** to restore the position.

For a **list-panel**, the vertical units are items.

position is **nil** if *pane* is not displayed on the screen, for example if **get-scroll-position** is called after *pane* is destroyed.

See also **get-horizontal-scroll-parameters**
get-vertical-scroll-parameters
scroll

get-vertical-scroll-parameters *Generic Function*

Summary Queries the scroll parameters of a vertical scroll bar.

Package **capi**

Signature **get-vertical-scroll-parameters** *self* **&rest** *keys* **=>** *parameter, parameter,...*

Arguments

self	A displayed **output-pane** or **layout**.
keys	Keywords as below.

Values

parameter	The parameters are returned as multiple values, one for each key passed in *keys* and in the same order as the arguments.

Description The function **get-vertical-scroll-parameters** retrieves the specified parameters of the vertical scroll bar of *self*, which should be a displayed instance of a subclass of **output-pane** (such as **editor-pane**) or **layout**.

The valid *keys* are:

:min-range	The minimum data coordinate.
:max-range	The maximum data coordinate.
:slug-position	The current scroll position.
:slug-size	The length of the scroll bar slug.

:page-size	The scroll page size.
:step-size	The scroll step size.

Note: For the other pane classes, such as **list-panel**, the underlying widget decides what the scroll range and units are.

Example

See the following CAPI example files:
output-panes/scroll-test.lisp
output-panes/scrolling-without-bar.lisp

See also

get-scroll-position
scroll
get-horizontal-scroll-parameters
simple-pane

graph-edge *Class*

Summary

The class of objects that represent edges in a graph.

Package

capi

Superclasses

graph-object

Initargs

:from	The node where the edge starts.
:to	The node where the edge ends.

Accessors

graph-edge-from
graph-edge-to

Description

The class of objects that represent edges in a **graph-pane**.

from and *to* are the nodes that the edge connects.

See also

graph-pane

graph-node *Class*

Summary The class of objects that represent nodes in a graph.

Package **capi**

Superclasses **graph-object**

Readers **graph-node-x**
graph-node-y
graph-node-width
graph-node-height
graph-node-in-edges
graph-node-out-edges

Description The default class of nodes in a **graph-pane**.

The **graph-pane** generates a graph of **graph-node** and **graph-edge** objects.

See also **graph-edge**
graph-pane

graph-node-children *Generic Function*

Summary Returns the children of a graph node.

Package **capi**

Signature **graph-node-children** *node* **=>** *result*

Arguments *node* A **graph-node**.

Values *result* A list.

Description The generic function **graph-node-children** returns a list of all the 'children' of the node *node*. These children are the nodes which are at the other end of some edge in the **graph-node-out-edges** of the **graph-node** *node*.

See also **graph-node**

graph-object *Class*

Summary The superclass of node and edge objects.

Package **capi**

Subclasses **graph-edge**
graph-node

Readers **graph-object-element**
graph-object-object

Description The class **graph-object** is the superclass of **graph-edge** and **graph-node**.

The reader **graph-object-element** returns the CAPI object that is displayed.

The reader **graph-object-object** returns the user object associated with the graph object.

graph-pane *Class*

Summary A graph pane is a pane that displays a hierarchy of items in a graph.

Package **capi**

Superclasses **simple-pinboard-layout**
choice

Subclasses **simple-network-pane**

Initargs

:roots The roots of the graph.

:children-function
Returns the children of a node.

:layout-function
A keyword denoting how to layout the nodes.

:layout-x-adjust
The adjust value for the *x* direction.

:layout-y-adjust
The adjust value for the *y* direction.

:node-pinboard-class
The class of pane to represent nodes.

:edge-pinboard-class
The class of pane to represent edges.

:node-pane-function
A function to return a pane for each node.

Accessors **graph-pane-layout-function**
graph-pane-roots

Description A graph pane calculates the items of the graph by calling the *children-function* on each of its *roots*, and then calling it again on each of the children recursively until no more children are found. The *children-function* gets called with an item of the graph and should return a list of the children of that item.

Each item is represented by a node in the graph.

The *layout-function* tells the graph pane how to lay out its nodes. It can be one these values:

:left-right Lay the graph out from the left to the right.

:top-down Lay the graph out from the top down.

:right-left Lay the graph out from the right to the left.

:bottom-up Lay the graph out from the bottom up.

layout-x-adjust and *layout-y-adjust* act on the underlying layout to decide where to place the nodes. The values should be a keyword or a list of the form **(*keyword n*)** where *n* is an integer. These values of *adjust* are interpreted as by **pane-adjusted-position**. **:top** is the default for *layout-y-adjust* and **:left** is the default for *layout-x-adjust*.

When a graph pane wants to display nodes and edges, it creates instances of *node-pinboard-class* and *edge-pinboard-class* which default to **item-pinboard-object** and **line-pinboard-object** respectively. These classes must be subclasses of **simple-pane** or **pinboard-object**, and there are some examples of the use of these keywords below.

The *node-pane-function* is called to create a pane for each node, and by default it creates an instance of *node-pinboard-class*. It gets passed the graph pane and the item corresponding to the node, and should return an instance of a subclass of **simple-pane** or **pinboard-object**.

To expand or contract a node, the user clicks on the circle next to the node. An expandable node has a unfilled circle and a collapsable node has a filled circle.

graph-pane is a subclass of **choice**, so for details of its selection handling, see **choice**.

The highlighting of the children is controlled as described for **pinboard-layout**, but for **graph-pane** the default value of *highlight-style* is **:standard**.

Notes

The **output-pane** initarg **:drawing-mode** controls quality of drawing in a **graph-pane**, including anti-aliasing of any text displayed on Microsoft Windows and GTK+.

Compatibility note

In LispWorks 4.3 the double click gesture on a **graph-pane** node always calls the *action-callback*, and the user gesture to expand or collapse a node is to click on the circle drawn alongside the node.

In LispWorks 4.2 and previous versions, the double click gesture was used for expansion and contraction of nodes and the *action-callback* was not always called.

Example

```
(defun node-children (node)
  (when (< node 16)
    (list (* node 2)
          (1+ (* node 2)))))

(setq graph
      (capi:contain
       (make-instance 'capi:graph-pane
                      :roots '(1)
                      :children-function
                      'node-children)
       :best-width 300 :best-height 400))

(capi:apply-in-pane-process
 graph #'(setf capi:graph-pane-roots) '(2 6) graph)

(capi:contain
 (make-instance 'capi:graph-pane
                :roots '(1)
                :children-function
                'node-children
                :layout-function :top-down)
 :best-width 300 :best-height 400)

(capi:contain
 (make-instance 'capi:graph-pane
                :roots '(1)
                :children-function
                'node-children
                :layout-function :top-down
                :layout-x-adjust :left)
 :best-width 300 :best-height 400)
```

This example demonstrates a different style of graph output with right-angle edges and parent nodes being adjusted towards the top instead of at the center.

```
(capi:contain
 (make-instance
  'capi:graph-pane
  :roots '(1)
  :children-function 'node-children
  :layout-y-adjust '(:top 10)
  :edge-pinboard-class
  'capi:right-angle-line-pinboard-object)
 :best-width 300
 :best-height 400)
```

This example demonstrates the use of **:node-pinboard-class** to specify that the nodes are drawn as push buttons.

```
(capi:contain
 (make-instance
  'capi:graph-pane
  :roots '(1)
  :children-function 'node-children
  :node-pinboard-class 'capi:push-button)
 :best-width 300
 :best-height 400)
```

There are more examples in the directory **examples/capi/graphics/**.

See also **item-pinboard-object**
line-pinboard-object
output-pane

graph-pane-add-graph-node *Generic Function*

Summary Adds a node to a graph.

Package **capi**

Signature **graph-pane-add-graph-node** *graph-pane object parent-node* **=>** *new-node*

Arguments *graph-pane* A **graph-pane**.

	object	An object.
	parent-node	A **graph-node**.
Values	*new-node*	A **graph-node**.

Description The generic function **graph-pane-add-graph-node** adds a new node in the graph *graph-pane* corresponding to *object*, and links it as a child of *parent-node*.

See also **graph-node**
graph-pane

graph-pane-delete-object *Generic Function*

Summary Removes a node from a graph.

Package **capi**

Signature **graph-pane-delete-object** *graph-pane object*

Arguments	*graph-pane*	A **graph-pane**.
	object	An object.

Description The generic function **graph-pane-delete-object** deletes the node corresponding to *object* in the graph *graph-pane*.

See also **graph-node**
graph-pane
graph-pane-add-graph-node
graph-pane-delete-objects

graph-pane-delete-objects *Generic Function*

Summary Removes nodes from a graph.

Package **capi**

Signature **graph-pane-delete-objects** *graph-pane objects*

Arguments *graph-pane* A **graph-pane**.

objects A list of objects.

Description The generic function **graph-pane-delete-objects** deletes the node in the graph *graph-pane* corresponding to each object in the list *objects*.

See also **graph-node**
graph-pane
graph-pane-delete-object

graph-pane-delete-selected-objects *Generic Function*

Summary Removes selected nodes from a graph.

Package **capi**

Signature **graph-pane-delete-selected-objects** *graph-pane*

Arguments *graph-pane* A **graph-pane**.

Description The generic function **graph-pane-delete-selected-objects** deletes the currently selected nodes in the graph *graph-pane*.

See also **graph-node**
graph-pane
graph-pane-delete-object

graph-pane-direction *Generic Function*

Summary Returns or sets the direction of a graph.

Package **capi**

Signature **graph-pane-direction** *graph-pane* **=>** *direction*

(setf graph-pane-direction) *direction graph-pane* **=>** *direction*

Arguments *graph-pane* A **graph-pane**.

Values *direction* One of **:forwards** or **:backwards**.

Description The generic function **graph-pane-direction** returns the direction of the graph *graph-pane*. If the *layout-function* of *graph-pane* is **:top-down** or **:left-right** then *direction* is **:forwards**. Otherwise *direction* is **:backwards**.

The generic function **(setf graph-pane-direction)** maintains the dimension of the *layout-function* but potentially reverses its direction.

Example

```
(setf gp
      (make-instance 'capi:graph-pane
                     :layout-function :top-down))
=>
#<CAPI:GRAPH-PANE [0 items] 20603294>

(setf (capi:graph-pane-direction gp)
      :backwards)
=>
NIL

(capi:graph-pane-layout-function gp)
=>
:TOP-DOWN
```

See also **graph-pane**

graph-pane-edges *Function*

Summary Returns the edges of a graph.

Package **capi**

Signature **graph-pane-edges** *graph-pane* **=>** *edges*

Arguments *graph-pane* A **graph-pane**.

Values *edges* A list.

Description The function **graph-pane-edges** returns a list of all the **graph-edge** objects in the graph *graph-pane.*

See also **graph-edge**
graph-pane

graph-pane-nodes *Function*

Summary Returns the nodes of a graph.

Package **capi**

Signature **graph-pane-nodes** *graph-pane* **=>** *nodes*

Arguments *graph-pane* A **graph-pane**.

Values *nodes* A list.

Description The function **graph-pane-nodes** returns a list of all the **graph-node** objects in the graph *graph-pane.*

See also **graph-node**
graph-pane

graph-pane-object-at-position *Function*

Summary Returns the graph object at a given position in a graph.

Package **capi**

Signature **graph-pane-object-at-position** *graph-pane x y => object*

Arguments
- *graph-pane* — A **graph-pane**.

Values
- *object* — A **graph-object**, or **nil**.
- *x*, *y* — Non-negative numbers.

Description The function **graph-pane-object-at-position** returns the **graph-object** (either a **graph-edge** or a **graph-node**) at the coordinates *x*, *y* in the graph *graph-pane*.

If there is no **graph-object** at position *x*,*y* then **graph-pane-object-at-position** returns **nil**.

See also **graph-pane**

graph-pane-select-graph-nodes *Generic Function*

Summary Selects nodes in a graph according to a predicate.

Package **capi**

Signature **graph-pane-select-graph-nodes** *graph-pane predicate*

Arguments
- *graph-pane* — A **graph-pane**.
- *predicate* — A function of one argument with boolean result.

Description The generic function **graph-pane-select-graph-nodes** applies *predicate* to all of the **graph-node**s in *graph-pane,* and sets the *selected-items* to be the objects corresponding to those nodes for which *predicate* returns a true value.

See also **choice-selected-items**
graph-node
graph-pane

graph-pane-update-moved-objects *Generic Function*

Summary Updates a graph after the user moves objects.

Package **capi**

Signature **graph-pane-update-moved-objects** *graph-pane objects*

Arguments *graph-pane* A **graph-pane**.
objects A list.

Description The generic function **graph-pane-update-moved-objects** is called after some objects in the graph *graph-pane* were moved by a user gesture.

objects is a list containing the objects that were moved.

The primary method updates the geometry of edges connected to the moved objects. You can add non-primary methods to perform other operations at that point.

See also **graph-pane**

grid-layout *Class*

Summary The **grid-layout** is a layout which positions its children on a two dimensional grid.

Package **capi**

Superclasses **x-y-adjustable-layout**

Subclasses **row-layout**
column-layout

Initargs

:columns The number of columns in the grid.

:has-title-column-p
A boolean specifying whether the first column is a title column.

:orientation The orientation of the children.

:rows The number of rows in the grid.

:x-ratios The ratios between the columns.

:y-ratios The ratios between the rows.

:x-gap The gap between each column.

:y-gap The gap between each row.

:x-uniform-size-p
If **t**, make each of the columns the same size.

:y-uniform-size-p
If **t**, make each of the rows the same size.

Accessors **layout-x-ratios**
layout-y-ratios
layout-x-gap
layout-y-gap

Description

The row and column sizes are controlled by the constraints on their children. For example, the *visible-min-width* of any column is the maximum of the *visible-min-width* in of the children in the column. The size of the layout is controlled by the constraints on the rows and columns.

For **grid-layout** *description* is either a two dimensional array or a list in the order specified by *orientation* (which defaults to **:row**). In the case of a list, one of *columns* or *rows* can be supplied to specify the dimensions (the default is two columns). As well as panes, slot names and strings, *description* may contain the element **nil**, which is interpreted as a special dummy pane with suitable geometry for resizable gaps. This special interpretation of **nil** in the *description* is specific to **grid-layout** and its subclasses.

The *x-ratios* and *y-ratios* slots control the sizes of the elements in a grid layout in the following manner:

The elements of *x-ratios* (or *y-ratios*) control the size of each child relative to the others. If an element in *x-ratios* (or *y-ratios*) is **nil** the child is fixed at its minimum size. Otherwise the size is calculated as follows

```
(round (* total ratio) ratio-sum)
```

where *ratio-sum* is the sum of the non-nil elements of *x-ratios* (or *y-ratios*) and *ratio* is the element of ratios corresponding to the child. If this ideal ratio size does not fit the maximum or minimum constraints on the child size, and the constraint means that changing the ratio size would not assist the sum of the child sizes fitting the total space available, then the child is fixed at its constrained size, the child is removed from the ratio calculation, and the calculation is performed again. If *x-ratios* (or *y-ratios*) has fewer elements than the number of children, 1 is used for each of the missing ratios. Leaving *x-ratios* (or *y-ratios*) **nil** causes all of the children to be the same size.

The positions of each pane in the layout can be specified using *x-adjust* and *y-adjust* like every other **x-y-adjustable-layout**, except that if there is one value then it is used for all of the panes, whereas if it is a list then each value in the list refers to one row or column. If the list does not contain a value for every row or column then the last value is taken to refer to all of the remaining panes.

Normally, the items in a **grid-layout** are arranged to look like a set of columns that are joined horizontally and rows that are joined vertically. All the cells in each column have the same width and all the cells in each row have the same height. The keyword **:right-extend** (or **:bottom-extend**) can be used to allow an item to span more than one column (or row). The keyword should be placed in the cell of the *description* that you want the item to expand into. For **:right-extend**, the cell immediately to the left will be extended to fill both columns in that row. For **:bottom-extend**, the cell immediately above will be extended to fill both rows in that column.

If *has-title-column-p* is true, then the items in the description which correspond to the first column are treated specially:

A string — Equivalent to specifying **(:title** *string***)**

A list of the form **(:title** *string* **.** *options***)**

Make a title using the given list as initargs. *options* is a plist of options, which can include the keys **:title-font**, **:title-args**, **:mnemonic** or **:mnemonic-escape**. See **titled-object** for how these are processed.

A list of the form **(:mnemonic-title** *string* **.** *options***)**

Make a title using the given list as initargs. *string* can contain the mnemonic escape. *options* is a plist of options, which can include the keys **:title-font**,

:title-args, or **:mnemonic-escape**. See **titled-object** for how these are processed.

Note: mnemonics are not supported on all platforms.

Example

```
(capi:contain (make-instance
               'capi:grid-layout
               :description '("1" "2" "3"
                              "4" "5" "6"
                              "7" "8" "9")
               :columns 3))

(capi:contain (make-instance
               'capi:grid-layout
               :description (list "List:"
                                  (make-instance
                                   'capi:list-panel
                                   :items '(1 2 3))
                                   "Buttons:"
                                  (make-instance
                                   'capi:button-panel
                                   :items '(1 2 3)))))

(capi:contain (make-instance
               'capi:grid-layout
               :description (list "List:"
                                  (make-instance
                                   'capi:list-panel
                                   :items '(1 2 3))
                                  "Buttons:"
                                  (make-instance
                                   'capi:button-panel
                                   :items '(1 2 3)))
               :x-adjust '(:right :left)
               :y-adjust '(:center :bottom)))
```

```
(capi:contain (make-instance
               'capi:grid-layout
               :description (list "List:"
                                  (make-instance
                                   'capi:list-panel
                                   :items '(1 2 3))
                                  "Buttons:"
                                  (make-instance
                                   'capi:button-panel
                                   :items '(1 2 3)))
               :orientation :column))
```

This example illustrates the special interpretation of **nil** in the *description*:

```
(capi:contain
 (make-instance
  'capi:grid-layout
  :description
  (cdr
   (loop for i below 5
         appending
         (list
          nil
          (make-instance 'capi:simple-pane
                         :background :red
                         :visible-min-width 50
                         :visible-max-width t
                         :visible-min-height 50
                         :visible-max-height t))))
  :columns 3)
 :height 150 :width 150 :title "Resize Me")
```

This example illustrates the use of **:right-extend** and **:bottom-extend** to make cells span multiple columns and rows:

examples/capi/layouts/extend.lisp

There are more examples in the directory **examples/capi/applications/**.

This example is a grid with **:has-title-column-p t**: **examples/capi/layouts/titles-in-grid.lisp**

See also **layout**

hide-interface *Function*

Summary The function **hide-interface** hides the interface containing a specified pane.

Package **capi**

Signature **hide-interface** *pane* **&optional** *iconify*

Description The function **hide-interface** hides the interface containing *pane* from the screen. If *iconify* is non-nil then it will iconify it, else it will just remove it from the screen. To show it again, use **show-interface**.

The default value of *iconify* is **t**.

See also **interface**
show-interface
quit-interface

hide-pane *Function*

Summary Hides the specified pane.

Package **capi**

Signature **hide-pane** *pane* **=>** *pane*

Arguments *pane* An instance of **simple-pane** or a subclass.

Description The function **hide-pane** hides the pane *pane,* removing it from the screen. *pane*'s children, if any, are hidden too.

To restore *pane* to the screen, use **show-pane**.

See also **hide-interface**
show-pane

highlight-pinboard-object *Generic Function*

Summary Highlights a specified pinboard object.

Package **capi**

Signature **highlight-pinboard-object** *pinboard object* **&key** *redisplay*

Arguments

pinboard	A **pinboard-layout**.
object	A **pinboard-object**.
redisplay	A generalised boolean.

Description The generic function **highlight-pinboard-object** causes the pinboard object *object* to become highlighted until **unhighlight-pinboard-object** is called on it.

The pinboard object highlighting is drawn according to the *highlight-style* of the **pinboard-layout** *pinboard.*

If *redisplay* is non-nil the highlighting is drawn immediately. The default value for *redisplay* is **t**.

See also **unhighlight-pinboard-object**
draw-pinboard-object-highlighted
pinboard-object
pinboard-layout

image-list *Class*

Summary An object used to manage the images displayed by tree views and list views.

Package **capi**

Superclasses **capi-object**

Initargs

:image-width The width of the images in this image list.

:image-height The height of the images in this image list.

:image-sets A list of images or image sets.

Description

The **:image-sets** initarg specifies a list. Each item in the list *image-sets* may be one of the following.

A pathname or string

This specifies the filename of a file suitable for loading with **load-image**.

A symbol

The symbol must be a predefined image identifier, or have been registered by means of a call to **register-image-translation**.

An image object, as returned by **load-image**.

An image-set object

See **image-set** for further details.

Note that image sets are added in their entirety; it is not possible to use image-locators to extract a single image from an image set.

The images added to the image list are numbered in order, starting from zero. An **image-set** containing *n* images contributes *n* images to the image list, and hence consumes *n* consecutive integer indices.

Example

See the files
examples/capi/choice/tree-view.lisp
examples/capi/choice/extended-selection-tree-view.lisp

See also

image-set
load-image
register-image-translation

image-pinboard-object *Class*

Summary An image pinboard object is a pinboard object that displays itself as an image.

Package **capi**

Superclasses **pinboard-object**
titled-object

Initargs **:image** The image to be displayed.

Accessors **image-pinboard-object-image**

Description The *image* initarg for an **image-pinboard-object** should either be an **external-image** or any other object accepted by **load-image**. The image displayed in the object can be changed dynamically using the writer function

```
(setf image-pinboard-object-image)
```

Example

```
(cd (sys:lispworks-dir "examples/capi/"))

(setf image
      (capi:contain
       (make-instance
        'capi:image-pinboard-object
        :image "applications/images/info.bmp")))

(capi:apply-in-pane-process
 (capi:element-parent image)
 #'(setf capi:image-pinboard-object-image)
 "graphics/Setup.bmp" image)

(capi:apply-in-pane-process
 (capi:element-parent image)
 #'(setf capi:image-pinboard-object-image)
 "applications/images/info.bmp" image)

(capi:contain
 (make-instance
  'capi:image-pinboard-object
  :image "graphics/Setup.bmp"
  :title "LispWorks Splashscreen"
  :title-adjust :right
  :title-position :bottom))
```

See also **pinboard-layout**

image-set *Class*

Package **capi**

Description An image set is an object that identifies the location of an image. The image is typically a large image to be broken down into sub-images. The sub-images must all have the same size and be positioned side by side.

The following functions are available to create image set objects:

See also **make-general-image-set**
make-icon-resource-image-set
make-scaled-image-set
make-scaled-general-image-set
make-resource-image-set

install-postscript-printer *Function*

Summary Installs or modifies a Postscript printer definition.

Package **capi**

Signature **install-postscript-printer** *name* **&key** *if-exists default savep ppd-file description use-jcl command use-file always-print-to-file orientation installed-options*

Arguments

name	A string.
if-exists	One of **:supersede**, **:error** or **nil**.
default	One of **t**, **nil** or **:when-none**.
savep	A boolean.
ppd-file	A string or pathname.
description	A string, or **:preserve**.
use-jcl	A boolean, or **:preserve**.
command	A string, or **:preserve**.
use-file	A boolean, or **:preserve**.
always-print-to-file	A boolean, or **:preserve**.
orientation	One of **:landscape**, **:portrait** or **:preserve**.
installed-options	An association list, or **:preserve**.

Description

The function **install-postscript-printer** installs or modifies a Postscript printer definition for the given printer name.

This applies only on GTK+ and Motif.

name is a string naming the printer.

if-exists controls what happens if the named printer is already known. The default value is **:supersede**.

default controls whether the default printer is set. The value **t** forces the default printer to be set. The value **:when-none** causes the default printer to be set if there is currently no default. The default value of *default* is **nil**.

savep, if true, causes the printer to be saved for subsequent sessions, by writing a file to the path specified by the first item of ***printer-search-path***.

ppd-file, if non-nil, should be a pathname or string specifying the name of a PPD file (PostScript Printer Description File) which comes with the printer and specifies the printer properties. *ppd-file* must be supplied when installing a new printer. The default value is **nil**.

All the other arguments provide optional printer information. Each defaults to the value **:preserve**, which means that appropriate defaults are used. These correspond to the settings on the dialog displayed by **printer-configuration-dialog**. Non-default values are as follows:

description is a string describing the printer.

use-jcl controls whether to use Job Control Language (JCL).

command is the command to execute to print with the printer.

use-file controls how to pass data to the printer. A true value means a file is used, **nil** means a pipe is used.

always-print-to-file controls whether printing always goes to a file.

orientation controls the orientation of the output.

installed-options is an association list, with pairs of strings where the **car** is an option name and the **cdr** is its value. Which options are available and their potential values is defined by the *OpenUI/*CloseUI and *JCLOpenUI/*JCLCloseUI entries in the PPD file.

See also

printer-configuration-dialog
ppd-directory
printer-search-path
uninstall-postscript-printer

installed-libraries *Function*

Summary

Returns the installed libraries.

Package

capi

Signature

installed-libraries => ***libraries***

Values

libraries A list of library names.

Description

The function **installed-libraries** returns the list of installed CAPI libraries.

A library name is a keyword naming a library.

On Linux, FreeBSD and x86/x64 Solaris platforms, libraries is initially **(:gtk)** but may also include **:motif** if the deprecated "capi-motif" module is loaded.

On Microsoft Windows platforms, currently *libraries* is always **(:win32)**.

On Mac OS X platforms, in the native GUI image *libraries* is always **(:cocoa)**. In the Mac OS X/GTK+ image, libraries is initially **(:gtk)** but may also include **:motif** if the deprecated "capi-motif" module is loaded.

In LispWorks for UNIX only (not LispWorks for Linux, FreeBSD, or x86/x64 Solaris), currently *libraries* is always **(:motif)**.

See also **default-library**

interactive-pane *Class*

Summary An **interactive-pane** is an editor with a process reading and processing input, and that collects any output into itself. The class **listener-pane** is built upon this, and adds functionality for handling Lisp forms.

Package **capi**

Superclasses **editor-pane**

Subclasses **listener-pane**
shell-pane

Initargs **:top-level-function**

The input processing function.

Readers **interactive-pane-stream**
interactive-pane-top-level-function

Description An **interactive-pane** contains its own GUI stream. The *top-level-function* is called once, when the interactive pane is created: it needs to repeatedly take input from the GUI stream and write output to it.

The first argument to *top-level-function* is the interface containing the interactive pane. The second argument is the interactive pane itself. The third argument is the GUI stream. The default for *top-level-function* is a function which runs a Lisp listener top-loop.

Compatibility note

This class was named **interactive-stream** in LispWorks 3.2 but has been renamed to avoid confusion (this class is not a stream but a pane that contains a stream). The class **interactive-stream** and its accessors **interactive-stream-top-level-function** and **interactive-stream-stream** have been kept for compatibility but may be dropped in future versions of LispWorks.

Example

This example assumes there is just one line of output from each command sent to the pipe

```
(capi:contain
 (make-instance
  'capi:interactive-pane
  :top-level-function
  #'(lambda (interface pane stream)
      (declare (ignore interface pane))
      (with-open-stream (s (sys:open-pipe
                            '("/usr/local/bin/bash")
                            :direction :io))
        (loop
         (progn
           (format stream "primitive xterm$ ")
           (let ((input (read-line stream nil nil)))
             (if input
                 (progn
                   (write-line input s)
                   (force-output s))
               (return))))
         (let ((output (read-line s nil nil)))
           (if output
               (progn
                 (write-line output stream)
                 (force-output stream))
             (return)))))))
 :best-height 300
 :best-width 300)
```

See also

collector-pane

interactive-pane-execute-command *Generic Function*

Summary Simulates user entry of commands in an **interactive-pane**.

Package **capi**

Signature **interactive-pane-execute-command** *interactive-pane command* **&key** *command-modification-function editp* **&allow-other-keys**

Arguments

interactive-pane An **interactive-pane**.

command A Lisp form.

command-modification-function A function or **nil**.

editp A generalized boolean.

Description The generic function **interactive-pane-execute-command** has the same effect as the user typing the Lisp form *command* into the **interactive-pane** *interactive-pane*, and pressing **Return**.

interactive-pane-execute-command may be called from any process.

If *command-modification-function* is non-nil, it is a function of one argument. It is called with argument *command* in the process in which *interactive-pane* runs. The result of this call is used as the command to enter. The default value of *command-modification-function* is **nil**.

If *editp* is true then the command is left at the end of the pane for the user to edit before pressing **Return**. If *editp* is **nil** then **interactive-pane-execute-command** simulates the user pressing **Return**. The default value of *editp* is **nil**.

See also **interactive-pane**
listener-pane-insert-value

interface *Class*

Summary The class **interface** is the top level window class, which contains both menus and a hierarchy of panes and layouts. Interfaces can also themselves be contained within a layout, in which case they appear without their menu bar.

Package **capi**

Superclasses **simple-pane**
titled-object

Initargs

:title The title of the interface.

:layout The layout of the interface.

:menu-bar-items
The items on the menu bar.

:auto-menus A flag controlling the automatic addition of system menu objects.

:create-callback
A callback done on creating the window, before display and user interaction.

:destroy-callback
A callback done on closing the window.

:confirm-destroy-function
A function to verify closing of the window.

:best-x The best *x* position for the interface.

:best-y The best *y* position for the interface.

:best-width The best width of the interface.

:best-height The best height of the interface.

:geometry-change-callback

A function called when the interface geometry changes.

:activate-callback

A function called when the interface is activated or deactivated.

:iconify-callback

A function called when the interface is iconified or restored.

:override-cursor

A cursor that takes precedence over the cursors of panes inside the interface.

override-cursor is not supported on Cocoa.

override-cursor is ignored by **text-input-pane** on GTK+.

:message-area A boolean determining whether the interface has a message area.

:enable-pointer-documentation

A boolean determining whether Pointer Documentation is enabled.

enable-pointer-documentation is supported only on Motif. It is possible to implement equivalent functionality for **output-pane** and subclasses such as **pinboard-layout** by using the *focus-callback* of **output-pane**.

:enable-tooltips

A boolean determining whether Tooltip Help is enabled.

:help-callback

A function called when a user gesture requests help.

:top-level-hook

A function called around the top level event handler.

:external-border

An integer or **nil**.

:initial-focus

A pane, a symbol naming a pane, or **nil**.

:display-state

One of the keywords **:normal**, **:maximized**, **:iconic** and **:hidden**.

:transparency

A real number in the inclusive range [0,1], used on Cocoa, later versions of Microsoft Windows, and GTK+.

:window-styles

A list of keywords, or **nil**.

:toolbar-items

A list of items for the toolbar.

:toolbar-states

A toolbar state plist.

:default-toolbar-states

A toolbar state plist.

:pathname

A pathname designator.

:drag-image

nil, **t** or an image specifier (that is, a value acceptable as the *id* argument of **load-image**).

Accessors

interface-title
pane-layout
interface-menu-bar-items
interface-create-callback
interface-destroy-callback
interface-confirm-destroy-function
interface-geometry-change-callback
interface-activate-callback
interface-iconify-callback
interface-override-cursor
interface-message-area
interface-pointer-documentation-enabled
interface-tooltips-enabled
interface-help-callback
top-level-interface-external-border
top-level-interface-transparency
interface-toolbar-items
interface-toolbar-states
interface-default-toolbar-states
interface-pathname
interface-drag-image

Readers

interface-window-styles

Description

Every interface can have a title *title* which when it is a top level interface is shown as a title on its window, and when it is contained within another layout is displayed as a decoration (see the class **titled-object** for more details).

The argument *layout* specifies a layout object that contains the children of the interface. To change this layout you can either use the writer **pane-layout**, or you can use the layout **switchable-layout** which allows you to easily switch the currently visible child.

The argument *menu-bar-items* specifies a list of menus to appear on the interface's menu bar.

auto-menus defaults to **t**, which means that an interface may have some automatic menus created by the environment in which it is running (for example the **Works** menu in the LispWorks IDE). To switch these automatic menus off, pass **:auto-menus nil**.

When you have an instance of an interface, you can display it either as an ordinary window or as a dialog using respectively **display** and **display-dialog**. The CAPI calls *create-callback* (if supplied) with the interface as its single argument, after all the widgets have been created but before the interface appears on screen. Then to remove the interface from the display, you use **quit-interface** and either **exit-dialog** or **abort-dialog** respectively. When the interface is about to be closed, the CAPI calls the *confirm-destroy-function* (if there is one) with the interface, and if this function returns non-nil the interface is closed. Once the interface is closed, the *destroy-callback* is called with the interface.

Note: *create-callback* should be used only for operations that must be done with the interface already created and cannot be done in **interface-display**. Otherwise they should be either done in **initialize-instance** or between your calls to **make-instance** and **display**. An operation that needs to run after the interface is created but just before displaying the interface as an ordinary window (typical cases are font queries and loading images) can be put in the **interface-display :before** method. An operation that needs to run just after displaying the interface as an ordinary window can be put in the **interface-display :after** method.

The interface also accepts a number of hints as to the size and position of the interface for when it is first displayed. The arguments *best-x* and *best-y* must be the position as an integer or **nil** (meaning anywhere), while the arguments *best-width* and *best-height* can be any hints accepted by **:visible-max-width** and **:visible-max-height** for elements.

Whether or not an interface window is resizable is indicated as allowed by the window system. For non-resizable windows on Cocoa the interface window's maximize button is disabled and the resize indicator is not shown, and on Microsoft Windows the maximize box is disabled.

geometry-change-callback may be **nil**, meaning there is no callback. This is the default value. Otherwise *geometry-change-callback* is a function of five arguments: the interface and the geometry. Its signature is:

geometry-change-callback *interface x y width height*

x and *y* are measured from the top-left of the screen rectangle representing the area of the primary monitor (the primary screen rectangle).

activate-callback may be **nil**, meaning there is no callback. This is the default value. Otherwise *activate-callback* is a function of two arguments: the interface and a boolean *activatep* which is true on activation and false on deactivation. Its signature is:

activate-callback *interface activatep*

inconify-callback may be **nil**, meaning there is no callback. This is the default value. Otherwise *inconify-callback* is a function of two arguments: the interface and a boolean *iconify* which is true when *interface* is iconified and and false when it is restored. Its signature is:

iconify-callback *interface iconifyp*

override-cursor, if non-nil, specifies a cursor that is used instead of the cursor of each pane inside the interface. The default value of *override-cursor* is **nil**. See below for an example of setting and unsetting the override cursor. *override-cursor* is not supported on Cocoa. *override-cursor* is ignored by **text-input-pane** on GTK+.

If *message-area* is true, then the interface is created with a message area at the bottom. The text of the message area can be accessed using the **titled-object** accessor **titled-object-message**. The default value of *message-area* is **nil**.

enable-pointer-documentation is a boolean controlling whether Pointer Documentation is enabled, on Motif. The default value is **t**. The actual action is done by the *help-callback*.

enable-tooltips is a boolean controlling whether Tooltip Help is enabled. The default value is **t**. The actual action is done by the *help-callback*.

help-callback may be **nil**, meaning there is no callback. This is the default value. Otherwise *help-callback* is a function of four arguments: the interface, the pane inside interface where help is requested, the type of help requested, and the help key of the pane. Its signature is:

help-callback *interface pane type help-key*

Here *type* can be one of:

:tooltip A tooltip is requested. The function needs to return a string to display in the tooltip, or **nil** if no tooltip should be displayed.

:help The function should display a detailed, asynchronous help. This value is passed when the user presses the **F1** key (not implemented on Cocoa). **:help** is also passed when the user clicks the '?' box in the title bar of a Microsoft Windows dialog with window style **:contexthelp** (see *window-styles* below).

On Motif only, *type* can also be one of:

:pointer-documentation-enter
The cursor entered the pane. The function should set the pointer documentation.

:pointer-documentation-leave
The cursor left the pane. The function needs to reset the pointer documentation.

help-key is the *help-key* of *pane*, as described in **element**. There is an example illustrating *help-callback* in **examples/capi/elements/help.lisp** and there is another example below.

top-level-hook can be used on Microsoft Windows and Motif to specify a hook function that is called around the interface's top level event handler. The hook is passed two arguments: a continuation function (with no arguments) and the interface. The hook must call the continuation, which normally does not return. *top-level-hook* is designed especially for error handling (see below for an example). It can also be used for other purposes, for instance to bind special variables around the top level function. **:top-level-hook** is not supported on Cocoa.

external-border controls how close to the edge of the screen the interface can be placed with explicit positioning using the *best-x*, *best-y, best-height* and *best-width* initargs or implicit positioning when a dialog is centered within its owner. The value **nil** allows the window to be anywhere, on or off the screen. The value 0 allows the window can be anywhere on the screen. If *external-border* is a positive integer then the window can be anywhere within *external-border* pixels from the edge of the screen. If *external-border* is a negative integer then the window be anywhere on the screen or up to *external-border* pixels off the edge of the screen. This does not affect whether the use can move the window after it has been displayed. It also does not affect the default positioning of interfaces, where the window system chooses the position.The default value of *external-border* is 0.

initial-focus specifies a pane which has the input focus when the interface is first displayed. See **pane-initial-focus** for more information about the initial focus pane.

display-state controls the initial display of the interface window, as described for **top-level-interface-display-state**.

transparency is the overall transparency of the whole interface, where 0 is fully transparent and 1 is fully opaque. This has no effect on whether the user can click on the window. This is implemented for Cocoa and for Microsoft Windows,

excluding Windows 98, Millennium Edition and NT 4.0. It also works on GTK+, provided that GTK+ and the X server support it. On GTK+ it is supported in version 2.12 and later. The X server needs compositing manager to do it. **:transparency** should only be used for top-level interfaces.

window-styles is a list of keywords controlling various aspects of the top level window's appearance and behavior. Each keyword is supported only on the Window systems explicitly mentioned below.

The following keywords apply to ordinary windows:

:no-geometry-animation

Cocoa: Programmatic changes to window geometry happen without animation.

:hides-on-deactivate-window

Cocoa: The window is only visible when the application is the current application.

Microsoft Windows and GTK+: The window is only visible when it is the active window.

:toolbox

Cocoa, Microsoft Windows and GTK+: A window with a small title bar. This window style is used in **docking-layout**.

:borderless

Cocoa, Microsoft Windows, GTK+ and Motif: A window with no external decoration or frame.

:internal-borderless

Cocoa and Motif: Remove the default border between the window's edge and its contents.

Microsoft Windows: Remove the default border between the window's edge and its contents for dialogs.

:never-iconic

Cocoa, Microsoft Windows, GTK+ and Motif: The window cannot be minimized.

:movable-by-window-background

Cocoa and Microsoft Windows: The user can move the window by grabbing at any point not in an inner pane.

:shadowed

Cocoa: Force a shadow on windows with window style **:borderless**. (Other windows have a shadow by default.)

Windows XP (and later): The window has a shadow.

:shadowless

Cocoa: The window has no shadow.

:textured-background

Cocoa: The window has a textured background (like the Finder).

:always-on-top

Cocoa, Microsoft Windows and GTK+: The window is always above all other windows. Such a window is also known as a windoid.

:ignores-keyboard-input

Cocoa and GTK+: The window cannot be given the focus for keyboard input.

:no-character-palette

Cocoa: The **Special Characters...** menu item is not inserted automatically. (This menu item is added to the **Edit** menu by default.)

:motion-events-without-focus

Cocoa: **output-pane**s in the window will see **:motion** input model events even if the output pane does not have the focus. This is the same behavior as on Microsoft Windows.

The following keywords are supported in *window-styles* when the interface is displayed as a dialog:

:resizable

Microsoft Windows: The dialog has a border to allow resizing. (Generally Windows dialogs do not allowing resizing.)

:contexthelp

Microsoft Windows: A '?' box appears in the window's title bar that sends *help-callback* type **:help**.

If *toolbar-items* is non-nil, then the interface will have a toolbar, which is typically displayed at the top of the window. The value of *toolbar-items* is a list of objects of type **toolbar-button**, **toolbar-component** or **simple-pane**, which are items that might be shown on the toolbar. The set of visible items, their order and their appearance is determined by the current *toolbar-state*, which can be changed if the user customizes the toolbar interactively. Each **toolbar-button** or **simple-pane** in the *toolbar-items* list (including those within a **toolbar-component**) should have a *name* that is not **eql** to any other item in the list. Each **toolbar-button** should have *image* and *text* specified, to control the image and title that is shown for the item. Each **simple-pane** should have *toolbar-title* specified, to control the title that is shown for the item.

toolbar-states is a plist containing information about the state of the toolbar. The user can also change this by customizing the toolbar, so you cannot assume that the value will be the same each time you read it. See **interface-toolbar-state** for a description of the keys and values in this plist.

default-toolbar-states is a plist containing information about the default state of the toolbar, which you can provide as the suggested toolbar state for the interface. The **:items** key will be used in the Customize dialog as the "default" set of toolbar buttons. If both *default-toolbar-states* and *toolbar-states* are supplied, then the value of any key in *toolbar-states* takes precedence over that of the same key in *default-toolbar-states*. See **interface-toolbar-state** for a description of the keys and values in this plist.

pathname specifies the interface pathname. You can get and set this with the accessor **interface-pathname**. The pathname may be displayed in some way to the user, depending on the GUI library.

Currently, only Cocoa uses *pathname*, in two ways:

- It makes the interface display a drag image on the title bar (This is the same image that is set by **interface-drag-image**, and the *drag-image* takes precedence if it not nil). The user can drag from the drag image, and if there is no *drag-callback* or if the *drag-callback* returns **:default** it will drag the pathname as a one item in a **:filenames-list**. For information about *drag-callback*, see **simple-pane**'s description of **:drag-callback** and **simple-pane-drag-callback**.
- The context menu (invoked by right-mouse-click) on the drag image or on the title raises a menu containing the components of the path. Selecting a component opens the Finder with it.

drag-image is currently only effective on Cocoa. A non-nil value specifies that the **interface** should have a drag image, which on Cocoa is a small image (16x16px) to the left of the window title.

When the user drags this image, if the **interface** has a *drag-callback* it is called and if this returns non-nil LispWorks performs drag-and-drop with the image. See **simple-pane** for details of the *drag-callback*.

It is possible to have the image for aesthetic purposes only by supplying *drag-image* and not specifying a *drag-callback*. When *drag-callback* is non-nil, it can dynamically decide whether to allow a dragging, or to disallow dragging (by returning **nil**).

The image specification can be an already converted image (made by **load-image**, **convert-external-image**, **make-sub-image** or **make-image-from-port**). The image will be freed automatically when the interface is destroyed or when *drag-image* is set by **(setf interface-drag-image)**. Otherwise the system uses **load-image** to create a new image, which is also freed automatically.

The value **t** for *drag-image* is interpreted specially: it means display some image. If *drag-image* is set to **t** after an image has already been set, it just displays the previous image. This is useful if an image was displayed but then removed by **(setf interface-drag-image)** with **nil**. If there was no previous image, a default image is displayed.

Notes

1. *create-callback* can only be used for actions that are part of the creation of the pane, that is preparing the pane for display. The *create-callback* is called before the pane is actually displayed, and therefore cannot interact with the user.
2. On Microsoft Windows **F1** always calls *help-callback* if it is non-nil.
3. **(setf capi:interface-message-area)** has an effect only before display. After display, this writer has no effect unless the interface is destroyed and re-created.

4. Even though **interface** is a subclass of **titled-object**, the accessor **titled-object-message-font** cannot be used to get and set the font of the interface's message.
5. On Cocoa in the presence of a **cocoa-default-application-interface**, an **interface** with no menus of its own and with **:auto-menus nil** uses the menu bar from the application interface.

Compatibility note

interface-iconize-callback is deprecated. Use the synonym **interface-iconify-callback** instead.

Example

```
(capi:display (make-instance 'capi:interface
                             :title "Test Interface"))

(capi:display (make-instance
               'capi:interface
               :title "Test Interface"
               :destroy-callback
                 #'(lambda (interface)
                           (capi:display-message
                            "Quitting ~S"
                            interface))))

(capi:display (make-instance
               'capi:interface
               :title "Test Interface"
               :confirm-destroy-function
               #'(lambda (interface)
                         (capi:confirm-yes-or-no
                          "Really quit ~S"
                          interface))))

(capi:display (make-instance
               'capi:interface
               :menu-bar-items
                 (list
                   (make-instance 'capi:menu
                                  :title "Menu"
                                  :items '(1 2 3)))
               :title "Menu Test"))
```

```
(setq interface
      (capi:display
       (make-instance
        'capi:interface
        :title "Test Interface"
        :layout
        (make-instance 'capi:simple-layout
                       :description
                       (list (make-instance
                              'capi:text-input-pane
                              :text "Text Pane"))))))

(capi:execute-with-interface interface
 #'(setf capi:pane-layout) (make-instance
                            'capi:simple-layout
                            :description
                            (list (make-instance
                                   'capi:editor-pane
                                  :text "Editor Pane")))

 interface)

(capi:display
 (make-instance
  'capi:interface
  :title "Test"
  :best-x 200
  :best-y 200
  :best-width '(/ :screen-width 2)
  :best-height 300))
```

The following forms illustrate the use of *help-callback*:

```
(capi:define-interface my-interface ()
  ()
  (:panes
   (a-pane
    capi:text-input-pane
    :help-key 'input)
   (another-pane
    capi:display-pane
    :help-key 'output
    :text "some text"))
  (:menu-bar a-menu)
  (:menus
   (A-menu
    "A menu"
    (("An item" :help-key "item 1")
     ("Another item" :help-key "item 2"))
    :help-key "a menu"))
  (:layouts
   (main-layout
    capi:column-layout
    '(a-pane another-pane)))

  (:default-initargs
   :help-callback 'my-help-callback
   :message-area t))

(defun do-detailed-help (interface)
  (capi:contain
   (make-instance
    'capi:display-pane
    :text "Detailed help for my interface")
   :title
   (format nil "Help for ~a"
           (capi:capi-object-name interface))))

(defun my-help-callback (interface pane type key)
  (declare (ignore pane))
  (case type
    (:tooltip (if (eq key 'input)
                  "enter something"
                (when (stringp key) key)))
    (:pointer-documentation-enter
     (when (stringp key)
       (setf (capi:titled-object-message interface)
             key)))
    (:pointer-documentation-leave
     (setf (capi:titled-object-message interface)
```

```
          "Something else"))
    (:help (do-detailed-help interface ))))

(capi:display
 (make-instance 'my-interface :name "Helpful"))
```

The following forms illustrate the use of *override-cursor* to set and then remove an override cursor.

Create an interface with panes that have various different cursors. Move the pointer across each pane.

```
(setf interface
      (capi:element-interface
       (car
        (capi:contain
         (loop for cursor
               in '(:crosshair :hand :v-double-arrow)
               collect
               (make-instance 'capi:editor-pane
                              :cursor cursor
                              :text
                              (format nil "~A CURSOR"
                                      cursor)))))))
```

Override the pane cursors by setting the override cursor on the interface, and move the pointer across each pane again.

```
(setf (capi:interface-override-cursor interface)
      :i-beam)
```

Remove the override cursor.

```
(setf (capi:interface-override-cursor interface)
      :default)
```

This example illustrates *top-level-hook*. Evaluate this form and then get an error by the interrupt gesture in the editor pane. (For example, the interrupt gesture is **Meta+Control+C** on Motif and **Control+Break** on Microsoft Windows). Then select the Destroy Interface restart.

```
(capi:display
 (capi:make-container
  (make-instance
   'capi:editor-pane)
  :top-level-hook
  #'(lambda (func interface)
      (restart-case (funcall func)
        (nil ()
             :report
             (list "Destroy Interface ~a" interface)
             (capi:destroy interface))))))
```

The code in **examples/capi/applications/simple-symbol-browser.lisp** illustrates the use of *toolbar-items*.

See also

layout
switchable-layout
menu
display
display-dialog
interface-display
quit-interface
define-interface
activate-pane
titled-object
interface-document-modified-p
interface-toolbar-state
interface-customize-toolbar

interface-customize-toolbar *Function*

Summary Displays a window which allows the user to customize the toolbar.

Signature **interface-customize-toolbar** *interface*

Arguments *interface* A CAPI interface.

The function **interface-customize-toolbar** displays a window owned by the interface *interface* that allows the user to customize the toolbar of that interface.

interface must be displayed at the time **interface-customize-toolbar** is called.

See also **interface**
toolbar

interface-display *Generic Function*

Summary The function called to display an interface on screen.

Package **capi**

Signature **interface-display** *interface*

Arguments *interface* An instance of a subclass of **interface**.

Description The generic function **interface-display** is called by **display** to display an interface on screen.

The primary method for **interface** actually does the work. You can add **:before** methods on your own interface classes for code that needs to be executed just before the interface appears, and **:after** methods for code that needs to be executed just after the interface appears.

interface-display is useful when you need to make changes to the interface which require it to be already be created. Font queries and loading images are typical cases.

Notes 1. **interface-display** is called in the process of *interface*.

2. **interface-display** is not called when *interface* is displayed as a dialog. Another way to run code before it appears on screen is to supply a *create-callback* for *interface*.

Example

This example shows how **interface-display** can be used to set the initial selection in a choice whose items are computed at display-time:

```
(capi:define-interface my-tree ()
  ((favorite-color :initform :blue))
  (:panes
   (tree
    capi:tree-view
    :roots '(:red :blue :green)
    :print-function
    'string-capitalize))
  (:default-initargs
   :width 200
   :height 200))

(defmethod capi:interface-display :after
  ((self my-tree))
  (with-slots (tree favorite-color) self
    (setf (capi:choice-selected-item tree)
          favorite-color)))

(capi:display (make-instance 'my-tree))
```

See also

display
interface

interface-display-title *Function*

Summary

Returns the interface title to use on screen.

Package

capi

Signature

interface-display-title *interface* **=>** *string*

Arguments *interface* A CAPI **interface**.

Values *string* A string.

Description The function **interface-display-title** returns the title to use when displaying the interface *interface* on screen.

This is equivalent to:

```
(capi:interface-extend-title
 interface
 (capi:interface-title interface))
```

See also **interface-extend-title**
set-default-interface-prefix-suffix

interface-document-modified-p *Function*

Summary Gets and sets the document-modified flag in the interface.

Package **capi**

Signature **interface-document-modified-p** *interface* **=>** *value*

(setf interface-document-modified-p) *value interface*

Arguments *interface* A CAPI interface.

Values *value* A boolean.

Description The function **interface-document-modified-p** gets and sets the document-modified flag in the interface *interface*.

Currently this only has a visible effect on Cocoa, where an interface whose document is modified is flagged by adding a dark dot in the middle of its Close button (the red button at top-left of the window).

On other platforms the document-modified state is merely remembered.

See also **interface**

interface-editor-pane *Generic Function*

Summary Finds an **editor-pane** in an interface.

Package **capi**

Signature **interface-editor-pane** *interface* **=>** *pane*

Arguments *interface* An instance of a subclass of **interface**.

Values *pane* An **editor-pane** or **nil**.

Description The generic function **interface-editor-pane** finds the first pane of interface that is an **editor-pane**, and returns it.

If there is no **editor-pane**, then **interface-editor-pane** returns **nil**.

See also **editor-pane**
interface

interface-extend-title *Generic Function*

Summary Calculates the complete interface title.

Package **capi**

Signature **interface-extend-title** *interface title* **=>** *string*

Arguments *interface* A CAPI **interface**.

title A string.

Description The generic function **interface-extend-title** is called by the system with an interface and its title before actually displaying the title on the screen. The result must be a string, which is actually displayed. There is no requirement for any relation between the title argument and the result.

The return value *string* is the title to display on the screen.

The default method uses the values set by **set-default-interface-prefix-suffix**. You can specialize **interface-extend-title** to get other effects.

See also **interface-display-title**
set-default-interface-prefix-suffix

interface-geometry *Generic Function*

Summary Returns the geometry of an interface. This function is deprecated. Use **top-level-interface-geometry** instead.

Package **capi**

Signature **interface-geometry** *interface* **=>** *geometry*

Arguments *interface* An instance of a subclass of **interface**.

Values *geometry* A list.

Description The generic function **interface-geometry** returns a list representing the geometry of interface in pixel values.

This function is deprecated. Use **top-level-interface-geometry** instead.

See also **top-level-interface-geometry**

interface-iconified-p *Function*

Summary The predicate for whether an interface is iconified.

Package **capi**

Signature **interface-iconified-p** *pane* **=>** *iconifiedp*

Arguments *pane* A CAPI element.

Values *iconifiedp* A boolean.

Description The function **interface-iconified-p** returns **t** if the top level interface containing *pane* is iconified. This means that the window is visible as an icon, also referred to as minimized.

If the top level interface is not iconified, then **interface-iconified-p** returns **nil**.

See also **hide-interface**
top-level-interface
top-level-interface-display-state

interface-keys-style *Generic Function*

Summary Determines the emulation for an interface.

Package **capi**

Signature **interface-keys-style** *interface* **=>** *keys-style*

Arguments *interface* An instance of a subclass of **interface**.

Values *keys-style* A keyword, **:pc**, **:emacs** or **:mac**.

Description

The generic function **interface-keys-style** returns a keyword indicating a keys style, or *emulation*. It is called when *interface* starts running in a new process, and *keys-style* determines how user input is interpreted by output panes (including **editor-pane**) in *interface*.

The editor (that is, instances of **editor-pane** and its subclasses) responds to user input gestures according to one of three basic models.

When *keys-style* is **:emacs**, the editor emulates GNU Emacs. This value is allowed on all platforms.

When *keys-style* is **:pc**, the editor emulates standard Microsoft Windows keys on Windows, and KDE/Gnome keys on GTK+ and Motif. This value is allowed in the Windows, GTK+ and X11/Motif implementations.

When *keys-style* is **:mac**, the editor emulates Mac OS X editor keys. This value is allowed only in the Mac OS X Cocoa implementation.

The most important differences between the styles are in the handling of the **Alt** key on Microsoft Windows, selected text, and accelerators:

:emacs

Alt is interpreted on Microsoft Windows as the Meta key (used to access many Emacs commands).

The **:meta** modifier is used in an **output-pane** *input-model* gesture specification.

Control characters such as **Ctrl+S** are not interpreted as accelerators.

The selection is not deleted on input.

:pc — **Alt** is interpreted as **Alt** on Microsoft Windows and can be used for shortcuts.

The **:meta** modifier is not used in an **output-pane** *input-model* gesture specification.

Control keystrokes are interpreted as accelerators. Standard accelerators are added for standard menu commands, for example **Ctrl+S** for **File > Save**.

The selection is deleted on input, and movement keys behave like a typical Microsoft Windows or KDE/Gnome editor.

:mac — Emacs **Control** keys are available, since they do not clash with the Macintosh **Command** key.

The selection is deleted on input, and movement keys behave like a typical Mac OS X editor.

By default *keys-style* is **:pc** on Microsoft Windows platforms and **:emacs** on Unix/Linux and Mac OS X platforms. You can supply methods for **interface-keys-style** on your own interface classes that override the default methods.

In the Cocoa implementation, **Command** keystrokes such as **Command+X** are available if there is a suitable **Edit** menu, regardless of the Editor emulation.

See the chapter "Emulation" in the *LispWorks Editor User Guide* for more detail about the different styles.

Notes

On Motif the code to implement accelerators and mnemonics clashes with the LispWorks meta key support. Therefore the keyboard must be configured so that none of the keysyms connected to mod1 (see xmodmap) are listed in the variable

capi-motif-library:*meta-keysym-search-list*, which must be also be non-nil. Note also that Motif requires Alt to be on mod1.

See also **editor-pane**

interface-match-p *Generic Function*

Summary Determines whether an interface is suitable for displaying initargs.

Package **capi**

Signature **interface-match-p** *interface* **&rest** *initargs* **&key &allow-other-keys =>** *matchp*

Arguments

interface	An instance of a subclass of **interface**.
initargs	Initargs for *interface*.

Values

matchp	A boolean

Description The generic function **interface-match-p** returns a true value if *interface* is suitable for displaying the *initargs*.

interface-match-p is used by **locate-interface**. When there is an existing interface for which **interface-match-p** returns true, then **locate-interface** returns it.

The default method for **interface-match-p** always returns **nil**. You can add methods for your own interface classes.

See also **locate-interface**

interface-menu-groups *Generic Function*

Summary — Used when an embedded document sets the *menu-bar-items* to its menus, on Windows.

Package — **capi**

Signature — **interface-menu-groups** *interface* **=>** *result*

Arguments — *interface* A CAPI **interface**.

Values — *result* A list.

Description — The generic function **interface-menu-groups** is called when an embedded document sets the menu bar of its containing interface.

Then, the menu bar for the embedded document includes three groups of menus that are supplied by the container (file-group, view-group, windows-group). **interface-menu-groups** is used to define these groups of menus.

interface-menu-groups should return a list of length 3. Each element is a list of menus. In this list, each item is either a menu object, or a cons. When it is a cons, the car is a menu object and the cdr is a string, which overrides the the title of the menu.

The default method, on interface, simply returns **(nil nil nil)**.

Notes — **interface-menu-groups** is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Example — See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also — **ole-control-pane**

interface-preserve-state *Generic Function*

Summary Called before an interface is destroyed during session saving.

Signature **interface-preserve-state** *interface*

Arguments *interface* An **interface**.

Description The generic function **interface-preserve-state** is called by **hcl:save-current-session** just before it destroys an interface, on the interface process. You can specialize this for your own interface classes. Your methods should not interact with the user or other external sources, and should not interact with other processes, because it is called after **hcl:save-current-session** already started to destroy interfaces.

The return value is not used.

The default method does nothing.

See also **interface-preserving-state-p**

interface-preserving-state-p *Function*

Summary The predicate for whether an interface is in "preserving-state" context.

Signature **interface-preserving-state-p** *interface* **=>** *result*

Arguments *interface* An **interface**.

Values *result* **t**, **:different-invocation** or **:keeping-processes**.

Description An interface enters "preserving-state" context just before it is destroyed by **hcl:save-current-session**, and exits the context just after **interface-display** returns.

If the interface *interface* is in "preserving-state" context, the result of **:interface-preserving-state-p** is either **t** or **:different-invocation**. The value **t** means that the current invocation of LispWorks is still the same invocation. The value **:different-invocation** means it is a different invocation, in other words it is the saved image that is restarted.

In other circumstances **interface-preserving-state-p** can return **:keeping-processes**, which means that the interfaces are destroyed but processes that are not associated with *interface* are not killed. That currently happens only on Microsoft Windows when the programmer changes the arrangement of IDE windows via **Preferences... > Environment > General > Window Options**.

interface-preserving-state-p is typically used in the *destroy-callback* of an interface or a pane to decide whether really to destroy the information, and in the *create-callback* or **interface-display** to decide whether the existing information can be used. Note that if it is a pane, it needs to find the **top-level-interface**.

Information that is made entirely of Lisp objects can be preserved in all cases. Information that is associated with external objects is invalid when the image is restarted. So when **interface-preserving-state-p** is used inside the *create-callback* or **interface-display**, external information can be preserved only if it returns **t**. When **interface-preserving-state-p** returns **t**, the external information may be preserved, unless it is tied to the lightweight process.

See also **interface**
interface-display
interface-preserve-state

interface-reuse-p *Generic Function*

Summary Determines whether an interface is suitable for re-use.

Package **capi**

Signature **interface-reuse-p** *interface* **&rest** *initargs* **&key** **&allow-other-keys =>** *reusep*

Arguments

interface	An instance of a subclass of **interface**.
initargs	Initargs for *interface*.

Values

reusep	A boolean

Description The generic function **interface-reuse-p** returns a true value if *interface* is suitable for reuse with *initargs*.

interface-reuse-p is used by **locate-interface** if no matching interface is found first by **interface-match-p**. In this case, when there is an interface for which **interface-reuse-p** returns true, then **locate-interface** reinitializes it by **reinitialize-interface** and returns it.

Notes **interface-reuse-p** should not be confused with **reuse-interfaces-p**, which determines the global re-use state.

See also **interface-match-p**
locate-interface

interface-toolbar-state *Function*

Signature **interface-toolbar-state** *interface key* **=>** *value*

(setf interface-toolbar-state) *value interface key* **=>** *value*

Arguments

interface	An instance of **interface** or a subclass.
key	One of the *toolbar-states* plist keys.
value	The value associated with the *toolbar-states* plist key.

Values

value — The value associated with the *toolbar-states* plist key.

Description

The functions **interface-toolbar-state** and **(setf interface-toolbar-state)** read or change the properties of a toolbar that give information about its state. The user can also change these properties by customizing the toolbar, so you cannot assume that the value will be the same each time you read it.

key can be one of the following, with the corresponding value:

:visible — *visible* is true if the toolbar is visible and false if it is hidden. The default is true.

:items — *items* is a list of the names of the *toolbar-items* which are shown on the toolbar, in the order they are shown. The built-in names **:separator**, **:space** and **:flexible-space** represent various kinds of gap between items. On Microsoft Windows, an item can be a list of the form **(:titled-separator** *title***)** which starts a dockable group of items that displays *title* when it is undocked. The default *items* includes all items in *toolbar-items*, with **:separator** between each **toolbar-component**.

:display — *display* is a keyword describing what is displayed for each item. It can be **:image** (just shows an image), **:title** (just shows the title), **:image-and-title** (shows both title and image) or **:image-and-title-horizontal** (shows title and image horizontally, only supported on GTK+). The default is platform-specific.

	:size	*size* is a keyword describing the size of the items. It can be one of **:small**, **:normal** or **:large**. Some of these sizes might be the same as others. The default is platform-specific.

You can set all of the keys simultaneously by setting the **interface-toolbar-state** accessor or providing the *toolbar-states* initarg.

See also **interface**
interface-customize-toolbar

interface-visible-p *Function*

Summary The predicate for whether the interface containing a pane is visible.

Package **capi**

Signature **interface-visible-p** *pane* **=>** *visiblep*

Arguments		
	pane	A CAPI pane.

Values		
	visiblep	A boolean.

Description The function **interface-visible-p** returns **nil** if

1. *pane* is not associated with any interface, or
2. *pane* is associated with an interface which is not displayed, or
3. *pane* is associated with an interface which is minimized or iconified, or
4. *pane* is known to be fully obscured by other windows. This can happen on Motif, but is not detected on Microsoft Windows.

An error is signalled if *pane* is not a CAPI pane (that is, it is not an instance of a subclass of **element**, **collection** or **pinboard-object**).

Otherwise **interface-visible-p** returns **t**.

Notes

On Microsoft Windows, **interface-visible-p** may return **t** even though the interface is entirely obscured by another window.

interpret-description *Generic Function*

Summary

Converts an abstract description of a layout's children into a list of the children's geometry objects.

Package

capi

Signature

interpret-description *layout description interface*

Description

The generic function **interpret-description** translates an abstract description of the *layout*'s children into a list of those children's geometry objects.

For example, **column-layout** expects as its description a list of items where each item in the list is either the slot-name of the child or a string which should be turned into a title pane. This is the default handling of a layout's description, which is done by calling the generic function **parse-layout-descriptor** to do the translation for each item.

Example

See the examples in the directory **examples/capi/layouts/**.

See also

parse-layout-descriptor
define-layout
layout
interface

invalidate-pane-constraints *Function*

Summary — Causes the resizing of a pane if its minimum and maximum size constraints have changed. It returns **t** if resizing was necessary.

Package — **capi**

Signature — **invalidate-pane-constraints** *pane*

Description — This function informs the CAPI that *pane*'s constraints (its minimum and maximum size) may have changed. The CAPI then checks this, and if the pane is no longer within its constraints it resizes it so that it is and then makes the pane's parent layout lay its children out and display them again at their new positions and sizes. If the pane is resized, then **invalidate-pane-constraints** returns **t**.

See also — **get-constraints**
layout
element
define-layout

invoke-command *Function*

Summary — Invokes a command in the input model for a specified output pane.

Package — **capi**

Signature — **invoke-command** *command output-pane* **&rest** *event-args*

Description — This invokes the command in the input model for the given *output-pane*, with the translator being called to process the gesture information. To avoid the translation, use **invoke-untranslated-command**.

See also **invoke-untranslated-command**
define-command
output-pane

invoke-untranslated-command *Function*

Summary Invokes a command in the input model for a specified output pane, without the translator being called.

Package **capi**

Signature **invoke-untranslated-command** *command output-pane* **&rest** *event-args*

Description The function **invoke-untranslated-command** invokes the command in the input model for the given *output-pane*, without the translator being called to process the gesture information. To perform the translation, use **invoke-command**.

See also **invoke-command**
define-command
output-pane

item *Class*

Summary The class **item** groups together a title, some data and some callbacks into a single object for use in collections and choices.

Package **capi**

Superclasses **callbacks**
capi-object

Subclasses

menu-item
button
item-pinboard-object
popup-menu-button
toolbar-button

Initargs

:collection The collection in which item is displayed

:data The data associated with the item.

:text The text to appear in the item (or **nil**).

:print-function
If *text* is nil, this is called to print the data.

:selected If **t** the item is selected.

Accessors

item-collection
item-data
item-text
item-print-function
item-selected

Description

An item can provide its own callbacks to override those specified in its enclosing *collection*, and can also provide some data to get passed to those callbacks.

An item is printed in the collection by **print-collection-item**. By default this returns a string using *item*'s *text* if specified, or else calls a print function on the item's *data*. The *print-function* will either be the one specified in the item, or else the *print-function* for its parent collection.

The *selected* slot in an item is non-nil if the item is currently selected. The accessor **item-selected** is provided to access and to set this value.

Example

```
(defun main-callback (data interface)
  (capi:display-message "Main callback: ~S"
                        data))
```

```
(defun item-callback (data interface)
  (capi:display-message "Item callback: ~S"
                        data))

(capi:contain (make-instance
               'capi:list-panel
               :items (list
                        (make-instance
                         'capi:item
                         :text "Item"
                         :data '(some data)
                         :selection-callback
                          'item-callback)
                        "Non-Item 1"
                        "Non-Item 2")
               :selection-callback 'main-callback))
```

See also **itemp**
collection
choice
print-collection-item

itemp *Generic Function*

Package **capi**

Signature **itemp** *object*

Description This is equivalent to

```
(typep object 'capi:item)
```

See also **item**
collection

item-pane-interface-copy-object *Generic Function*

Summary Determines what **pane-interface-copy-object** returns from a **choice**.

Signature **item-pane-interface-copy-object** *item choice interface* **=>** *object, string, plist*

Description The generic function **item-pane-interface-copy-object** is used by the method of **pane-interface-copy-object** that specializes on **choice** to decide what to return.

If only one item is selected, the **pane-interface-copy-object** method for **choice** returns what **item-pane-interface-copy-object** returns for this item. In this case all three of the return values are used.

If multiple items are selected, **pane-interface-copy-object** applies **item-pane-interface-copy-object** to each one, and returns a list of the returned objects as the first value, and a concatenation of returned strings (separated by newlines) as the second value. The plist is ignored if the there more than one element.

The default method returns the item and its print representation (using the *print-function* of the **choice**), and no third return value.

You can define your own methods for **item-pane-interface-copy-object**. This is useful to make **active-pane-copy** work properly for a **choice**, in cases where the actual items in the choice are not the objects that are displayed in the choice as far as the user is concerned. For example, you may have a structure

```
(defstruct my-item
  real-object
  color)
```

To give different colors to different lines in a **list-panel**. In this case **pane-interface-copy-object** (and hence **active-pane-copy** when the **list-panel** is active) will return the **my-item** structure, while the user will expect the real object. This can be fixed by adding a method:

```
(defmethod item-pane-interface-copy-object
           ((item my-item) pane interface)
  (let ((real-object (my-item-real-object item)))
    (values real-object
            (print-a-real-object real-object))))
```

See also **pane-interface-copy-object**
active-pane-copy

item-pinboard-object *Class*

Summary An **item-pinboard-object** is a **pinboard-object** that displays a single piece of text.

Package **capi**

Superclasses **pinboard-object**
item

Description The **item-pinboard-object** displays an item on a pinboard layout. It displays the text specified by the item in the usual way (either by the text field, or through printing the data with the print function).

Example

```
(capi:contain (make-instance
                'capi:item-pinboard-object
                :text "Hello World"))

(capi:contain (make-instance 'capi:item-pinboard-object
                             :data :red
                             :print-function
                               'string-capitalize))
```

See also **image-pinboard-object**
pinboard-layout

labelled-arrow-pinboard-object *Class*

Package **capi**

Superclasses **arrow-pinboard-object**
labelled-line-pinboard-object

Description A subclass of **pinboard-object** which displays an arrow and draws a label on it.

Example See **labelled-line-pinboard-object**.

See also **pinboard-layout**

labelled-line-pinboard-object *Class*

Summary A subclass of **pinboard-object** which draws a labelled line.

Package **capi**

Superclasses **item-pinboard-object**
line-pinboard-object

Subclasses **labelled-arrow-pinboard-object**

Initargs **:text-foreground**

A valid color specification, as defined for the **graphics-state** parameter *foreground*.

:text-background

A valid color specification, as defined for the **graphics-state** parameter *foreground*, or the keyword **:background**, or **nil**.

Accessors **labelled-line-text-foreground**
labelled-line-text-background

Description

A subclass of **pinboard-object** which displays a line and draws a label in the middle of it.

Note that the label text is inherited from **item**.

text-foreground defines the color of the label text.

text-background defines the background for the text, which is the color used to draw a filled rectangle in the area of the text before drawing the text. The value **:background** means use the *background* of the **pinboard-layout** of the object. The value **nil** means do not draw a background rectangle. The default value of *text-background* is **:background**.

Example

```
(capi:contain
 (make-instance
  'capi:pinboard-layout
  :description
  (list (make-instance
         'capi:labelled-line-pinboard-object
         :text "Labelled Line"
         :start-x 10 :start-y 10
         :end-x 80 :end-y 60)
        (make-instance
         'capi:labelled-arrow-pinboard-object
         :text "Labelled Arrow"
         :start-x 10 :start-y 70
         :end-x 80 :end-y 120
         :head-direction :both))))
```

See also

pinboard-layout

layout *Class*

Summary

A **layout** is a simple pane that positions one or more child panes within itself according to a layout policy.

Package

capi

Superclasses

titled-object
simple-pane

Subclasses

simple-layout
grid-layout
pinboard-layout

Initargs

:default A flag to mark the default layout for an interface.

:description The list of the layout's children.

:initial-focus
A child of the layout, or its *name*, specifying where the input focus should be, or **nil**.

Accessors

layout-description

Description

The layout's *description* is an abstract description of the children of the layout, and each layout defines its format. Generally, *description* is a list, each element of which is one of:

- a pane
- a slot name, where the name refers to a slot in the layout's interface containing a pane
- a string, where the string gets converted to a **title-pane**

For **grid-layout** and its subclasses, elements of *description* can also be **nil**. See **grid-layout** for the interpretation of this value.

Setting the layout description causes the layout to translate it, and then to layout the new children, adjusting the size of its parent if necessary.

A number of default layouts are provided which provide the majority of layout functionality that is needed. They are as follows:

simple-layout A layout for one child.

row-layout Lays its children out in a row.

column-layout Lays its children out in a column.

grid-layout Lays its children out in an n by m grid.

pinboard-layout

Places its children where the user specifies.

switchable-layout

Keeps only one of its children visible.

initial-focus specifies which child of the layout has the input focus when the layout is first displayed. Panes are compared by **eq** or **capi-object-name**.

Note: for a **pinboard-layout**, the order of the objects in *description* defines the Z-order, with the first object in the list being at the bottom.That is,

```
(setf (capi:layout-description pinboard-layout)
      (cons object
            (capi:layout-description pinboard-layout)))
```

is equivalent to

```
(capi:manipulate-pinboard pinboard-layout object
                          :add-bottom)
```

See also **define-layout**
manipulate-pinboard

line-pinboard-object *Class*

Summary A subclass of **pinboard-object** which displays a line drawn between two corners of the area enclosed by the pinboard object.

Package **capi**

Superclasses **pinboard-object**

Subclasses **arrow-pinboard-object**
right-angle-line-pinboard-object

Initargs

:start-x	The x coordinate of the start of the line.
:start-y	The y coordinate of the start of the line.
:end-x	The x coordinate of the end of the line.
:end-y	The y coordinate of the end of the line.

Description

start-x, *start-y*, *end-x* and *end-y* default to values computed from the *x*, *y*, *width* and *height*. They are used to compute the size of the object, and the proper value of *x* and *y*. Note that *width* and *height* may be larger, for example to accomodate the label in a **labelled-line-pinboard-object**, and the *x* and *y* are adjusted for that.

To change the end points of the line, call **move-line**.

A complementary class **right-angle-line-pinboard-object** is provided which draws a line around the edge of the pinboard object.

Example

```
(capi:contain
 (make-instance
  'capi:line-pinboard-object
  :start-x 0 :end-x 100
  :start-y 100 :end-y 0))
```

See also

move-line
pinboard-layout

line-pinboard-object-coordinates *Function*

Summary

Returns the coordinates of a **line-pinboard-object**.

Package

capi

Signature

line-pinboard-object-coordinates *object* **=>** *start-x*, *start-y*, *end-x*, *end-y*

Arguments

object	A **line-pinboard-object**.

Values

start-x	An integer.
start-y	An integer.
end-x	An integer.
end-y	An integer.

Description The function **line-pinboard-object-coordinates** returns the start and end coordinates of the **line-pinboard-object** *object*.

See also **move-line**

list-panel *Class*

Summary The class **list-panel** is a pane that can display a group of items and provides support for selecting items and performing actions on them. Each item may optionally have an image.

Package **capi**

Superclasses
choice
simple-pane
sorted-object
titled-object

Subclasses
list-view
multi-column-list-panel

Initargs

:right-click-selection-behavior
A keyword or **nil**. Controls the behavior on a right mouse button click.

:color-function
A function designator or **nil**. Controls item text color on Microsoft Windows, Cocoa and GTK+.

:alternating-background

A boolean influencing the use of alternating background color on Cocoa and GTK+.

:filter A boolean. The default value is **nil**.

The following initargs take effect only when *filter* is non-nil.

:filter-automatic-p

A boolean. The default value is **t**.

:filter-callback

A function designator or the keyword **:default**, which is the default value.

:filter-change-callback-p

A boolean.

:filter-short-menu-text

A boolean. The default value is **nil**.

:filter-matches-title

A string, **t** or **nil**.

:filter-help-string

A string, **t** or **nil**.

:keyboard-search-callback

A function that is used to search for an item when the user types ordinary characters.

Initargs for handling images:

:image-function

Returns an image for an item.

:state-image-function

Returns a state image for an item.

:image-lists

A plist of keywords and **image-list** objects.

:use-images Flag to specify whether items have images. Defaults to **t**.

:use-state-images
Flag to specify whether items have state images. Defaults to **nil**.

:image-width Defaults to 16.

:image-height Defaults to 16.

:state-image-width
Defaults to *image-width*.

:state-image-height
Defaults to *image-height*.

Accessors

list-panel-right-click-selection-behavior
list-panel-keyboard-search-callback
list-panel-image-function
list-panel-state-image-function

Description

The class **list-panel** gains much of its behavior from **choice**, which is an abstract class that handles items and their selection. By default, a list panel has both horizontal and vertical scrollbars.

The **list-panel** class does not support the **:no-selection** interaction style. For a non-interactive list use a **display-pane**.

To scroll a **list-panel**, call **scroll** with *scroll-operation* **:move**.

mnemonic-title is interpreted as for **menu**.

right-click-selection-behavior can take the following values:

nil Corresponds to the behavior in LispWorks 4.4 and earlier. The data is not passed.

All non-nil values pass the clicked item as data to the pane menu:

:existing-or-clicked/restore/discard

If the clicked item is not already selected, make it be the entire selection while the menu is displayed. If the clicked item is already selected, do not change the selection. If the menu is cancelled, the original selection is restored. If the user chooses an item from the menu, the selection is not restored.

:temporary-selection

A synonym for **:existing-or-clicked/restore/discard**.

:existing-or-clicked/restore/restore

If the clicked item is not already selected, make it be the entire selection while the menu is displayed. If the clicked item is already selected, do not change the selection. If the user chooses an item from the menu and the item's callback does not set the selection then the original selection is restored after the callback. If the callback sets the selection, then this selection remains. The original selection is restored if the user cancels the menu.

:temporary-restore

A synonym for **:existing-or-clicked/restore/restore**.

:clicked/restore/discard

Make the clicked item be the entire selection while the menu is displayed. If the menu is cancelled, the original selection is restored. If the user chooses an item from the menu, the selection is not restored.

:temporary-always

A synonym for **:clicked/restore/discard**.

:clicked/restore/restore

Make the clicked item be the entire selection while the menu is displayed. If the user chooses an item from the menu and the item's callback does not set the selection then the original selection is restored after the callback. If the callback sets the selection, then this selection remains. The original selection is restored if the user cancels the menu.

:existing-or-clicked/discard/discard

If the clicked item is not already selected, make it be the entire selection while the menu is displayed. If the clicked item is already selected, do not change the selection. The original selection is never restored, regardless of whether the user chooses an item from the menu or cancels the menu.

:discard-selection

A synonym for **:existing-or-clicked/discard/discard**.

:clicked/discard/discard

Make the clicked item be the entire selection. The original selection is never restored, regardless of whether the user chooses an item from the menu or cancels the menu.

:discard-always

A synonym for **:clicked/discard/discard**.

:no-change

Does not affect the selection, but the clicked item is nonetheless passed as the data.

The default value of *right-click-selection-behavior* is **:no-change**.

color-function allows you to control the text colors on Microsoft Windows, Cocoa and GTK+. If *color-function* is non-nil, then it is a function used to compute the text color of each item, with signature

color-function *list-panel item state* **=>** *result*

When *alternating-background* is true, the list panel is drawn with alternating background on Cocoa. On GTK+ it provides a hint, which the theme can override. Experience suggests that theme may draw with alternating background even when *alternating-background* is false, but when it is true they tend to draw it always. The default value of *alternating-background* is **nil**.

state is a keyword representing the state of the item. It can be one of **:normal**, **:selected** or **:disabled**. The value *result* should be a value suitable for the function **convert-color**. The pane uses the converted color as the foreground color for the item *item*. *color-function* is called while *list-panel* is being drawn, so it should not do heavyweight computations.

If *filter* is non-nil, the system automatically adds a **filtering-layout** above the list. The items in the **list-panel** are filtered by the value in the **filtering-layout**. Filtering displays only those items whose print representation matches the filter. (The print representation is the result of **print-collection-item**, and is what the user sees.) Only the items that match, or those that do not match if **Exclude** is set, are displayed in the **list-panel**.

Here filtering means mapping over the unfiltered items, collecting each item that matches the current setting in the filter, and then setting the items of the **list-panel** to the collected items.

For a **list-panel** with a filter, **collection-items** returns only the filtered items, and the selection (that is, the result of **choice-selection** and the argument to **(setf choice-selection)** index into the filtered items.

Calling **(setf collection-items)** on a filtered **list-panel** sets an internal unfiltered list, and then clears the filtering so that all items are visible.

To get and set the unfiltered items, use the accessor **list-panel-unfiltered-items**. To access the filter-state, use **list-panel-filter-state**. To access both the unfiltered items and the filter simultanously, which is especially useful when setting both of them at the same time, use **list-panel-items-and-filter**.

filter-automatic-p controls whether the filter automatically does the filtering whenever the text in the filter changes, and *filter-callback* defines the callback of the **filtering-layout**.

If *filter-automatic-p* is **t**, whenever a change occurs in the filter the list is refreshed against the new value in the filter. The *filter-callback* (if non-nil) is called with two arguments, the **filtering-layout** and the **list-panel** itself, when the user "confirms" (that is, she presses **Return** or clicks the **Confirm** button). If *filter-automatic-p* is false and *filter-callabck* is **:default**, then the **filtering-layout** is given a callback that does the filtering when the user "confirms". If *filter-automatic-p* is false and *filter-callback* is non-nil, then no filtering is done explicitly, and it is the responsibility of the callback to do any filtering that is required.

filter-matches-title (default **t**) and *filter-help-string* (default **t**) are passed down to the filtering layout through the corresponding **filtering-layout** initargs:

filter-matches-title **:matches-title**

filter-help-string **:help-string**

See **filtering-layout** for a description of these initargs.

If *filter-short-menu-text* is true, the filter menu has a short title. For example if the filter is set for case-sensitive plain inclusive matching the short label is **PMC**. If *filter-short-menu-text* were false then this label would be **Filter:C**.

keyboard-search-callback should be a function with signature:

keyboard-search-callback *pane string position* **=>** *index*, *last-match*, *last-match-reset-time*

pane is the **list-panel**, *string* is a string to match and *position* is the item index from which the system thinks that the search should start.

string contains the character that the user typed, appended to the "last match", if there is one. There is a "last match" if the previous call to *keyboard-search-callback* returned it (see below).

index is an index in the **collection-items** to move to. Apart from an integer inside the items range of the **list-panel**, this can be **nil**, which means do nothing, or **:no-change**, which selects the current item.

last-match is a string that should be recorded as the "last match" (if it is not a string, the "last match" is reset). This is prepended to the character in the next call, if the character is typed before the "last match" is reset.

last-match-reset-time is the time to wait before resetting the "last match", in seconds. Once this time passes, the last match is reset to **nil**. If *last-match-reset-time* is **nil**, the default value (which defaults to 1) is used. This default value can be changed by **set-list-panel-keyboard-search-reset-time**.

You can simplify the implementation of *keyboard-search-callback* by using **list-panel-search-with-function**.

As a special case, passing **:keyboard-search-callback t** tells CAPI to use its own internal search mechanism in preference to the native one. That can be useful on GTK+, where the default is to use the native search mechanism (for GTK+ versions after 2.4).

The *image-function* is called on an item to return an image associated with the item. It can return one of the following:

A pathname or string

: This specifies the filename of a file suitable for loading with **load-image**. Currently this must be a bitmap file.

A symbol

: The symbol must have been previously registered by means of a call to **register-image-translation**. It can also one of the following symbols, which map to standard images: **:std-cut**, **:std-copy**, **:std-paste**, **:std-undo**, **:std-redo**, **:std-delete**, **:std-file-new**, **:std-file-open**, **:std-file-save**, **:std-print**, **:std-print-pre**, **:std-properties**, **:std-help**, **:std-find** and **:std-replace**.

  On Microsoft Windows, the following symbols are also recognized. They map to view images: **:view-large-icons**, **:view-small-icons**, **:view-list**, **:view-details**, **:view-sort-name**, **:view-sort-size**, **:view-sort-date**, **:view-sort-**

type, **:view-parent-folder**, **:view-net-connect**, **:view-net-disconnect** and **:view-new-folder**.

Also on Microsoft Windows, these symbols are recognized. They map to history images: **:hist-back**, **:hist-forward**, **:hist-favorites**, **:hist-addtofavorites** and **:hist-viewtree**.

An image object, as returned by **load-image**.

An image locator object

This allowing a single bitmap to be created which contains several button images side by side. See **make-image-locator** for more information. On Microsoft Windows, it also allows access to bitmaps stored as resources in a DLL.

An integer — This is a zero-based index into the list panel's image lists. This is generally only useful if the image list is created explicitly. See **image-list** for more details.

The *state-image-function* is called on an item to determine the state image: an additional optional image used to indicate the state of an item. It can return one of the above, or **nil** to indicate that there is no state image.

If *image-lists* is specified, it should be a plist containing the following keywords as keys. The corresponding values should be **image-list** objects.

:normal — Specifies an **image-list** object that contains the item images. The *image-function* should return a numeric index into this **image-list**.

:state Specifies an **image-list** object that contains the state images. The *state-image-function* should return a numeric index into this **image-list**.

Notes

If you use *filter*:

1. You should not rely on the **element-parent** of the **list-panel**, because it is implemented by wrapping some layouts around the **list-panel**.
2. The filter is actually a filtering layout, so it has the same interactive semantics as **filtering-layout**.

Example

```
(setq list (capi:contain
            (make-instance 'capi:list-panel
                           :items '(:red :blue :green)
                           :selected-item :blue
                           :print-function
                           'string-capitalize)))

(capi:apply-in-pane-process
 list #'(setf capi:choice-selected-item) :red list)

(capi:apply-in-pane-process
 list #'(setf capi:choice-selected-item) :green list)

(capi:contain (make-instance
               'capi:list-panel
               :items '(:red :blue :green)
               :print-function 'string-capitalize
               :selection-callback
                 #'(lambda (data interface)
                           (capi:display-message
                            "~S" data))))
```

This example illustrates the use of **:right-click-selection-behavior**:

```
(capi:define-interface click ()
  ((keyword :initarg :right-click-selection-behavior))
  (:panes
   (list-panel
    capi:list-panel
    :items '("foo" "bar" "baz" "quux")
    :visible-min-height '(:character 4)
    :pane-menu 'my-menu
    :interaction :multiple-selection
    :right-click-selection-behavior keyword)))

(defun my-menu (pane data x y)
  (declare (ignore pane x y))
  (make-instance 'capi:menu
                 :items (list "Hi There"
                              ""
                              "Here's the data:"
                              data)))

(capi:display
   (make-instance 'click
                  :right-click-selection-behavior
      :clicked/restore/restore))
```

See also the example in **examples/capi/choice/list-pane-pane-menu.lisp**.

There are further examples in the directory **examples/capi/choice/**.

This example illustrates the use of *color-function*:

examples/capi/applications/simple-symbol-browser.lisp

See also **button-panel**

list-panel-enabled *Generic Function*

Summary Gets or sets the enabled state of a **list-panel**.

Package **capi**

Signature **list-panel-enabled** *list-panel* **=>** *enabledp*

Signature **(setf list-panel-enabled)** *enabledp list-panel* **=>** *enabledp*

Arguments *list-panel* A **list-panel**.

Values *enabledp* A boolean.

Description The generic function **list-panel-enabled** determines whether **list-panel** is currently enabled. It is equivalent to the **simple-pane** accessor **simple-pane-enabled**.

The generic function **(setf list-panel-enabled)** enables *list-panel* when *enabledp* is true, and disables it otherwise. It is equivalent to **(setf simple-pane-enabled)**.

See also **simple-pane**

list-panel-filter-state *Generic Function*

Summary Accesses the state of the filter in a filtered **list-panel**.

Signature **list-panel-filter-state** *list-panel* **=>** *filter-state*

(setf list-panel-filter-state) *new-state list-panel*

Description The generic function **list-panel-filter-state** accesses the state of the filter in a filtered **list-panel** (that is, a **list-panel** created with *filter* **t**).

list-panel-filter-state returns the state of the filter in *list-panel*. The return value *filter-state* is the same type as the state that is used in **filtering-layout**.

(setf list-panel-filter-state) sets the filter in *list-panel*, filters the unfiltered items and displays those that match the *new-state*. The *new-state* has the same semantics as the *new-value* of **(setf filtering-layout-state)**. It can be

a result of a call to **list-panel-filter-state** or to **filtering-layout-state** (on a **filtering-layout**), or a string (meaning plain match, case-insensitive), or **nil** (meaning match everything).

On an unfiltered **list-panel** **list-panel-filter-state** returns **nil**, and **(setf list-panel-filter-state)** does nothing.

See also **list-panel**
list-panel-unfiltered-items
filtering-layout

list-panel-items-and-filter *Function*

Summary Accesses the unfiltered items and filter in a **list-panel**

Signature **list-panel-items-and-filter** *list-panel*

(setf list-panel-items-and-filter) **(values** *items filter***)** *list-panel*

The function **list-panel-items-and-filter** accesses the unfiltered items and the filter in the list panel *list-panel* simultanously. It is especially useful for setting the filter and the items without flickering.

list-panel-items-and-filter returns the items and filter in *list-panel* as multiple values. It is equivalent to

```
(values (list-panel-unfiltered-items list-panel)
        (list-panel-filter-state list-panel))
```

but is more efficient.

(setf list-panel-items-and-filter) takes the items and filters as two values and sets them in *list-panel*:

```
(setf (list-panel-items-and-filter list-panel)
      (values new-items new-filter))
```

ends up in the same state as

```
(progn
  (setf (list-panel-unfiltered-items list-panel) new-items)
  (setf (list-panel-filter-state list-panel) new-filter))
```

but the latter form will filter the *new-items* with the old filter and display the result, and then filter the *new-items* again with the *new-filter*, whereas **(setf list-panel-items-and-filter)** filters the *new-items* just once, with the *new-filter*.

See also **list-panel**
list-panel-filter-state
list-panel-unfiltered-items

list-panel-search-with-function *Function*

Summary Searches a **list-panel**.

Signature **list-panel-search-with-function** *list-panel function arg* **&key** *start-index wrap-around reset-time*

Arguments

list-panel	A **list-panel**.
function	A function taking two arguments. The first is *arg*, the second is an item in *list-panel*.
arg	Any Lisp object.
start-index	An integer, default 0.
reset-time	A real number. The default is an internal value which can be set by **set-list-panel-keyboard-search-reset-time**.
wrap-around	A boolean, default **t**.

Description The function **list-panel-search-with-function** searches *list-panel* using *function*. **list-panel-search-with-function** is intended to simplify the implementation of the *keyboard-search-callback* of **list-panel**.

list-panel-search-with-function searches *list-panel* for a match. It applies *function* to each item and *arg*, until *function* returns non-nil.

When *function* returns non-nil, *list-panel-search-with-function* returns three values: the index of the item, *arg*, and *reset-time*.

The search starts at *start-index* if supplied, and at 0 otherwise. When the search reaches the end of the list panel and it did not start from 0, it wraps around to the beginning, unless *wrap-around* is supplied as **nil**. The default value of *wrap-around* is **t**.

Example

```
(defun string-equal-prefix (string item)
  (let* ((start 0)
         (len (length item))
         (end (+ start (length string))))
    (and (>= len end )
         (string-equal string item
                       :start2 start
                       :end2 end))))

(capi:contain
 (make-instance
  'capi:list-panel
  :items '("ae" "af" "bb" "cc")
  :keyboard-search-callback
  #'(lambda (pane string position)
      (capi:list-panel-search-with-function
       pane
       'string-equal-prefix ; or 'string-not-greaterp
       string
       :start position
       :reset-time 1
       :wrap-around t))))
```

Pressing "a" slowly cycles between "ae" and "af". Running the same example with **string-not-greaterp** instead causes "a" to cycle around all of the items.

See also

list-panel

set-list-panel-keyboard-search-reset-time

list-panel-unfiltered-items *Generic Function*

Summary Accesses the unfiltered items of a filtered **list-panel**.

Signature **list-panel-unfiltered-items** *list-panel*

(setf list-panel-unfiltered-items) *new-items list-panel*

Description The generic function **list-panel-unfiltered-items** accesses the unfiltered items of a filtered **list-panel** (that is, a **list-panel** created with **:filter t**).

list-panel-unfiltered-items returns the unfiltered items of *list-panel* (that is all of them, as opposed to the accessor **collection-items**, which returns only those items that match the filter).

(setf list-panel-unfiltered-items) sets the items of *list-panel* without affecting the filter (as opposed to **(setf collection-items)** which resets the filter). The items are then filtered, and only those that match the filter are displayed.

list-panel-unfiltered-items behaves the same as **collection-items** when called on an unfiltered **list-panel**.

See also **list-panel**
list-panel-items-and-filter
list-panel-filter-state

list-view *Class*

Summary The list view pane is a **choice** that displays its items as icons and text in a number of formats.

Note: **list-view** is not implemented on Cocoa

Package **capi**

Superclasses **list-panel**

Initargs

:view Specifies which view the list view pane shows. The default is **:icon**.

:subitem-function

Returns additional information to be displayed in report view.

:subitem-print-functions

Used in report view to print the additional information.

:image-function

Returns an image for an item

:state-image-function

Returns a state image for an item.

:image-lists

A plist of keywords and **image-list** objects.

:columns Defines the columns used in report view

:auto-reset-column-widths

Determines whether columns automatically resize. Defaults to **:all**.

:auto-arrange-icons

Determines whether icons are automatically arranged to fit the size of the window.

:use-large-images

Indicates whether large icons will be used (generally only if the icon view will be used). Defaults to **t**.

:use-small-images

Indicates whether small icons will be used. Defaults to **t**.

:use-state-images

Indicates whether state images will be used. Defaults to **nil**.

:large-image-width

Width of a large image. Defaults to 32.

:large-image-height

Height of a large image. Defaults to 32.

:small-image-width

Width of a small image. Defaults to 16.

:small-image-height

Height of a small image. Defaults to 16.

:state-image-width

Width of a state image. Defaults to *small-image-width*.

:state-image-height

Height of a state image. Defaults to *small-image-height*.

Accessors

list-view-view
list-view-subitem-function
list-view-subitem-print-functions
list-view-image-function
list-view-state-image-function
list-view-columns
list-view-auto-reset-column-widths
list-view-auto-arrange-icons

Description

The list view inherits its functionality from **choice**. In many ways it may be regarded as a kind of enhanced list panel, although its behavior is not identical. It supports single selection and extended selection interactions.

The list view displays its items in one of four ways, determined by the value in the *view* slot. An application may use the list view pane in just a single view, or may change the view between all four available views using **(setf list-view-view)**.

See the notes below on using both large and small icon views.

In all views, the text associated with the item (the label) is returned by the *print-function*, as with any other choice.

- The icon view — **:icon**

  In this view, large icons are displayed, together with their label, positioned in the space available. See also *auto-arrange-icons*, below.

- The small icon view — **:small-icon**

  In this view, small icons are displayed, together with their label, positioned in the space available. See also *auto-arrange-icons*, below.

- The list view — **:list**

  In this view, small icons are displayed, arranged in vertical columns.

- The report view — **:report**

  In this view, multiple columns are displayed. A small icon and the item's label is displayed in the first column. Additional pieces of information, known as subitems, are displayed in subsequent columns.

  To use the view **:report**, *columns* must specify a list of column specifiers. Each column specifier is a **plist**, in which the following keywords are valid:

:title The column heading.

:width The width of the column in pixels. If this keyword is omitted or has the value **nil**, the width of the column is automatically calculated, based on the widest item to be displayed in that column.

:align May be **:left**, **:right** or **:center** to indicate how items should be aligned in this column. The default is **:left**. Only left alignment is available for the first column.

If *auto-arrange-icons* is true, then the icons are automatically arranged to fit the size of the window when the view is showing **:icon** or **:small-icon**. The default value of *auto-arrange-icons* is **nil**.

The *subitem-function* is called on the item to return subitem objects that represent the additional information to be displayed in the subsequent columns. Hence, *subitem-function* should normally return a list, whose length is one less than the number of columns specified. Each subitem is then printed in its column using the appropriate subitem print function. *subitem-print-function* may be either a single print function, to be used for all subitems, or a list of functions: one for each subitem column.

Note that the first column always contains the item label, as determined by the *choice-print-function*.

The *image-function* is called on an item to return an image associated with the item. It can return one of the following:

A pathname or string

This specifies the filename of a file suitable for loading with **load-image**. Currently this must be a bitmap file.

A symbol The symbol must have been previously registered by means of a call to **register-image-translation**.

An image object

As returned by **load-image**.

An image locator object

Allowing a single bitmap to be created which contains several button images side by side. See **make-image-locator** for more information. On Microsoft Windows, this also allows access to bitmaps stored as resources in a DLL.

An integer — This is a zero-based index into the list view's image list. This is generally only useful if the image list is created explicitly. See **image-list** for more details.

The *state-image-function* is called on an item to determine the state image, an additional optional image used to indicate the state of an item. It can return one of the above, or **nil** to indicate that there is no state image. State images may be used in any view, but are typically used in the report and list views.

If *image-lists* is supplied, it should be a plist containing the following keywords as keys. The corresponding values should be **image-list** objects.

:normal — Specifies an image-list object that contains the large item images. The *image-function* should return a numeric index into this image-list.

:small — Specifies an image-list object that contains the small item images. The *image-function* should return a numeric index into this image-list.

:state — Specifies an image-list object that contains the state images. The *state-image-function* should return a numeric index into this image-list

If both the large icon view (icon view) and one or more of the small icon views (small icon view, list view, report view) are to be used, special considerations apply.

The image lists must be created explicitly, using the **:image-lists** initarg, and the *image-function* must return an integer. Care must be taken to ensure that corresponding images in the **:normal** and **:small** image lists have the same numeric index.

Returning pathnames, strings or image-locators from the image function cause the CAPI to create the image-lists automatically; however, if large and small icon views are mixed, this will lead to incorrect icons (or no icons) being displayed in one or other view.

Notes

1. **list-view** is not implemented on Cocoa.
2. For some applications **multi-column-list-panel** will suffice instead of **list-view**.

See also

image-list
list-panel
make-image-locator
multi-column-list-panel

listener-pane *Class*

Package **capi**

Superclasses **interactive-pane**

Description

A listener pane is an editor pane that accepts Lisp forms, entered by the user at a prompt, which it then evaluates. All of the output that is sent to ***standard-output*** is sent to the listener, and finally the results of the evaluation are displayed.

Example
```
(capi:contain (make-instance 'capi:listener-pane)
              :best-width 300 :best-height 200)
```

See also **collector-pane**
interactive-pane

listener-pane-insert-value *Function*

Summary Evaluates a form and inserts the result in a **listener-pane**.

Package **capi**

Signature **listener-pane-insert-value** *pane form*

Arguments
pane A **listener-pane**.
form A Lisp form.

Description The function **listener-pane-insert-value** evaluates the form *form* and inserts the result in the **listener-pane** *pane*, as if it resulted from user input. The result is printed, and the values of the history variables *****, ******, *******, **/**, **//**, and **///** are set.

listener-pane-insert-value may be called in any process.

Multiple values in the result of evaluating form are not supported: the first value only is inserted in *pane*

See also **interactive-pane-execute-command**

load-cursor *Function*

Summary Loads a cursor.

Package **capi**

Signature **load-cursor** *filename-or-list* **=>** *cursor*

Arguments *filename-or-list* A string or a list.

Values *cursor* A cursor object.

Description The function **load-cursor** loads a cursor from your cursor file, or loads a built-in cursor. It returns a cursor object which can be supplied as the value of the **simple-pane :cursor** initarg.

The cursor object can also be set with **(setf simple-pane-cursor)** to change a pane's cursor. This must be done in the process of the pane's interface.

If *filename-or-list* is a string, then it names a file which should be in a suitable format for the platform, as follows:

Microsoft Windows **.cur** or **.ani** format.

Cocoa TIFF format.

GTK+ Any image format that **load-image** supports.

Note: The image can be of any dimension, but it will be clipped to what the server thinks is an appropriate size, 32x32 or 16x16. Using large images would waste space, because the image would still be in memory.

The file is loaded at the time **load-cursor** is called, so the cursor object does not require the file at the time the cursor is displayed. The cursor object survives saving and delivering the image.

If *filename-or-list* is a list then it names a file or a built-in cursor to be loaded for a particular library, optionally together with arguments to be passed to the library. It should be of the form:

```
((libname_1 filename_1 arg_1a arg_1b ...)
 (libname_2 filename_2 arg_2a arg_2b ...)
 ...
 )
```

where *libname_n* is a keyword naming a supported library such as **:cocoa**, **:win32** or **:gtk** (see **default-library** for the values) and *filename_n* is either a string naming the cursor file to load for this library or a keyword naming one of the built-in cursors. *arg_na*, *arg_nb* and so on are library specific arguments. Currently these are not used on Microsoft Windows. Hotspot keyword arguments **:x-hot** and **:y-hot** are supported on Cocoa and GTK+ as in the example below. They specify the hotspot of the cursor. The values must be integers inside the image dimensions, that is they satisfy:

```
(and (> image-width x-hot -1)
     (> image-height y-hot -1))
```

On GTK+ the library specific arguments also include the keywords **:transparent-color-index** and **:type**, which are passed to **read-external-image**. Note that supplying the *transparent-color-index* allows making a useful cursor with a simple format image file which does not have transparency.

Example

This example loads a standard Microsoft Windows cursor file:

```
(setq cur1 (capi:load-cursor "arrow_l"))
```

This example loads a standard Windows cursor file, and on Motif uses one of the built-in cursors:

```
(setq cur2
      (capi:load-cursor '((:win32 "3dwns")
                          (:motif :v-double-arrow))))
```

This example loads a horizontal double-arrow on Windows, and a vertical double-arrow on Motif:

```
(setq cur3
      (capi:load-cursor '((:win32 :h-double-arrow)
                          (:motif :v-double-arrow))))
```

This example loads a custom .cur file:

```
(setq cur4
      (capi:load-cursor
"C:/Temp/Animated_Cursors/1a.cur"))
```

In this extended example, firstly we load a custom cursor for two platforms:

```
(setq cur
      (capi:load-cursor
       '((:win32
          "c:/WINNT40/Cursors/O_CROSS.CUR")
         (:cocoa

"/Applications/iPhoto.app/Contents/Resources/retouch-
cursor.tif"
          :x-hot 2
          :y-hot 2))))
```

Now we display a pane with the custom cursor loaded above:

```
(setq oo
      (capi:contain
       (make-instance
        'capi:output-pane
        :cursor cur
        :input-model
        `(((:button-1 :press)
           ,(lambda (&rest x)
              (print x)))))))
```

We can remove the custom cursor:

```
(capi:apply-in-pane-process
 oo
 (lambda ()
   (setf (capi:simple-pane-cursor oo)
         :default)))
```

And we can restore the custom cursor:

```
(capi:apply-in-pane-process
 oo
 (lambda ()
   (setf (capi:simple-pane-cursor oo)
         cur)))
```

See also **simple-pane**

load-sound *Function*

Summary Converts data to a loaded sound object on Microsoft Windows and Cocoa.

Package **capi**

Signature **load-sound** *source* **&key** *owner* **=>** *sound*

Arguments

source	A pathname designator or an array returned by **read-sound-file**.
owner	A CAPI **interface**, or **nil**.

Values

sound	An array of element type **(unsigned-byte 8)**.

Description The function **load-sound** converts *source* into a loaded sound which can be played by **play-sound**.

source can be a pathname designator or an array returned by **read-sound-file**.

owner should be a CAPI **interface** object, or **nil** which means that the sound's owner is the current top level interface.

The loaded sound *sound* will be unloaded (freed) automatically when its owner is destroyed. To create a sound that is never unloaded, pass the **screen** as the argument *owner*.

Notes

1. The array *sound* contains the contents of the file. Its bytes are interpreted by the OS functions, so the format can be whatever they can deal with, for example WAV on

Microsoft Windows. The fact that this date is represented as an **(unsigned-byte 8)** array in Lisp does not constrain the output size.

2. **load-sound** is not implemented on GTK+ and Motif.

See also **free-sound**
play-sound
read-sound-file

locate-interface *Generic Function*

Summary Finds an interface of a given class that matches supplied initargs.

Package **capi**

Signature **locate-interface** *class-spec* **&rest** *initargs*
&key *screen no-busy-interface*
&allow-other-keys => *interface*

Arguments

class-spec	A specifier for a subclass of **interface**.
initargs	Initialization arguments for *class-spec*.
screen	A **screen** or **nil**.
no-busy-interface	A boolean, defaulting to **nil**.

Values

interface	An interface of class *class-spec*, or **nil**.

Description The generic function **locate-interface** finds an interface of the class specified by *class-spec* that matches *initargs* and *screen*.

First, **locate-interface** finds all interfaces of the class specified by *class-spec* by calling **collect-interfaces** with *class-spec* and *screen*. The first of these which match *initargs* (by **interface-match-p**) is returned.

If there is no match, then **locate-interface** finds the first of these which can be reused for *initargs*, by **interface-reuse-p**. This reusable interface is reinitialized by **reinitialize-interface** and returned.

no-busy-interface controls the use of the busy cursor during reinitializing of a reusable interface. If *no-busy-interface* is **nil**, then this interface has the busy cursor during reinitialization. If *no-busy-interface* is true, then there is no busy cursor.

If no matching or reusable interface is found, or if global interface re-use is disabled by **(setf reuse-interfaces-p)**, then **locate-interface** returns **nil**.

See also
collect-interfaces
interface-match-p
interface-reuse-p
reuse-interfaces-p

lower-interface *Function*

Summary
The **lower-interface** function pushes the window containing a specified pane to the back of the screen.

Package
capi

Signature
lower-interface *pane*

Description
This pushes the window containing *pane* to the back of the screen. To bring it back use **raise-interface**, and to iconify it use **hide-interface**.

See also **hide-interface**
interface
lower-interface
raise-interface
quit-interface

make-container *Generic Function*

Summary The generic function **make-container** creates a container for a specified element.

Package **capi**

Signature **make-container** *element* **&rest** *interface-args*

Description This creates a container for *element* such that calling **display** on it will produce a window containing *element* on the screen. It will produce a container for any of the following classes of object:

simple-pane
layout
interface
pinboard-object
menu
menu-item
menu-component
list

In the case of a **list**, the CAPI tries to see what sort of objects they are and makes an appropriate container. For instance, if they were all simple panes it would put them into a column layout.

The arguments *interface-args* will be passed through to the **make-instance** of the top-level interface, assuming that pane is not a top-level interface itself.

The complementary function **contain** uses **make-container** to create a container for an element which it then displays.

Example

```
(capi:display (capi:make-container
                (make-instance
                 'capi:text-input-pane)))
```

See also **contain**
display
interface
element

make-docking-layout-controller *Function*

Package **capi**

Signature **make-docking-layout-controller => *controller***

Values *controller* A docking layout controller.

Description The function **make-docking-layout-controller** returns a docking layout controller object for use as the *controller* initarg in **docking-layout**.

Layouts which share a docking layout controller are known as a Docking Group. See **docking-layout** for information about Docking Groups.

See also **docking-layout**

make-foreign-owned-interface *Function*

Summary Creates a dummy interface which allows another application's window to be the owner of a CAPI dialog.

Package **capi**

Signature **make-foreign-owned-interface &key *handle name* => *interface***

Arguments

handle A Microsoft Windows hwnd.

name A string naming *interface*.

Values

interface An instance of **foreign-owned-interface**.

Description

The function **make-foreign-owned-interface** creates an instance of **foreign-owned-interface**. *interface* can be used as the *owner* argument when displaying a dialog. For information about dialog owners, see the "Prompting for Input" chapter in the *CAPI User Guide*.

handle must be supplied and is the window handle (Windows hwnd) of a window in some application. For a CAPI window this window handle can be obtained by **simple-pane-handle**. For non-CAPI applications, the method of finding the window handle will depend on the language and the way windows are represented, so you should consult the appropriate documentation.

name becomes the name of *interface*, and has no other meaning.

make-foreign-owned-interface is implemented only on Microsoft Windows.

Example

This example shows how a CAPI window can be the owner of a dialog in another LispWorks image.

Start LispWorks for Windows.

1. In the Listener, do **Tools > Interface > Listen**. This puts the Listener interface in the value of *****.
2. In the Listener enter **(capi:simple-pane-handle *)**. The returned value is the window handle, it should be an integer. Denote this value by *hwnd*.

Start another LispWorks for Windows image (do not quit the first image). In the Listener of this second LispWorks image:

1. Enter **(setq foi (capi:make-foreign-owned-interface :handle** *hwnd*)).
2. Enter **(capi:prompt-for-color "Color?" :owner foi)**.

Now note that the Color dialog is owned by the Listener of the first LispWorks image.

make-general-image-set *Function*

Summary: Creates an **image-set** object.

Package: **capi**

Signature: **make-general-image-set &key** *image-count width height id* **=>** *image-set*

Arguments:

image-count	An integer.
width	An integer or **nil**.
height	An integer or **nil**.
id	A pathname, string or symbol.

Values:

image-set	An **image-set** object.

Description: The **make-general-image-set** function creates an **image-set** object that refers to an image or a file containing an image.

id is a pathname or string identifying an image file, or a symbol previously registered with **register-image-translation**.

width and *height* are the dimensions of a single sub-image within the main image, and *image-count* specifies the number of sub-images in the image.

Example See the files
examples/capi/choice/tree-view.lisp
examples/capi/choice/extended-selection-tree-view.lisp
examples/capi/elements/toolbar.lisp

See also **image-set**
make-resource-image-set

make-icon-resource-image-set *Function*

Summary Constructs an image set object identifying a icon resource in a Windows DLL.

Package **capi**

Signature **make-icon-resource-image-set &key** *image-count width height library id* **=>** *image-set*

Arguments

image-count	An integer.
width	An integer.
height	An integer.
library	A string.
id	A string or an integer.

Values

image-set	An **image-set** object.

Description The function **make-icon-resource-image-set** constructs an image set object that identifies an image stored as a icon resource in a DLL on Microsoft Windows.

width and *height* are the dimensions of a single sub-image within the main image, and *image-count* specifies the number of sub-images in the image.

library should be a string specifying the name of the DLL.

id should be either an integer which is the resource identifier of the icon, or a string naming the icon resource.

Notes **make-icon-resource-image-set** is only available in LispWorks for Windows.

See also **image-set**
make-general-image-set

make-image-locator *Function*

Summary Creates an image locator object to use with toolbars, list views and tree views.

Package **capi**

Signature **make-image-locator &key** *image-set index*

Description The function **make-image-locator** creates an image locator object for use with toolbars, list views, and tree views. It is used to specify a single sub-image from a larger image that contains many images side by side. It is also useful for accessing some images that can only be specified by means of image sets.

See also **image-set**

make-menu-for-pane *Function*

Summary Makes a **menu** or a **menu-component** for a pane.

Package **capi**

Signature **make-menu-for-pane** *pane items* **&key** *title menu-name component-p* **=>** *menu*

Arguments

pane	A pane.
items	A list of **menu-object**s.
title	A string or **nil**.
menu-name	A string or **nil**.
component-p	A boolean.

Values

menu	A **menu** or a **menu-component**.

Description

The function **make-menu-for-pane** makes a **menu** or a **menu-component** for the pane *pane* with the items specified by *items*.

items should be a list in which each element is a **menu-item**, **menu-component** or **menu**.

title and *menu-name* provide a title and name for *menu*. *title* and *menu-name* both default to **nil**.

If *component-p* is true, then **make-menu-for-pane** creates a **menu-component** rather than a **menu**. The default value of *component-p* is **nil**.

menu is set up so that by default each callback inside it is done on the pane *pane* itself. This is the useful feature of **make-menu-for-pane** because it avoids the need to set up items to do their callbacks on *pane* explicitly.

Note that this is merely the default behavior. You can specify different callback behavior on a per-item basis, using *setup-callback-argument* and *callback-data-function* (see **menu-object**), *callback-type* (see **callbacks**) and *data* for **menu-item** (see **item**).

See also

make-pane-popup-menu
pane-popup-menu-items

make-pane-popup-menu *Generic Function*

Summary Generates a popup **menu** or **menu-component**.

Package **capi**

Signature **make-pane-popup-menu** *pane interface* **&key** *title menu-name component-p* **=>** *menu*

Arguments

pane	A pane in an interface.
interface	An interface or **nil**.
title	A string or **nil**.
menu-name	A string or **nil**.
component-p	A boolean.

Values

menu	A **menu** or a **menu-component**.

Description The generic function **make-pane-popup-menu** generates a popup menu for *pane*.

interface can be **nil** if *pane* has already been created, in which case the *interface* of *pane* is used (obtained by the **element** accessor **element-interface**).

title and *menu-name* provide a title and name for *menu*. *title* and *menu-name* both default to **nil**.

If *component-p* is true, then **make-pane-popup-menu** creates a **menu-component** rather than a **menu**. The default value of *component-p* is **nil**.

Example This code makes an interface with two **graph-pane**s. The **initialize-instance** method uses **make-pane-popup-menu** to add a menu to the menu bar from which the user can perform operations on the graphs.

Note that, because **make-pane-popup-menu** calls **make-menu-for-pane** to make each menu, the callbacks in the menus are automatically done on the appropriate graph.

```
(capi:define-interface gg ()
  ()
  (:panes
   (g1 capi:graph-pane)
   (g2 capi:graph-pane))
  (:layouts
   (main-layout capi:column-layout '(g1 g2)))
  (:menu-bar)
  (:default-initargs
   :visible-min-width 200
   :visible-min-height 300))

(defmethod initialize-instance :after ((self gg)
                                       &key)
  (with-slots (g1 g2) self
    (setf
     (capi:interface-menu-bar-items self)
     (append
      (capi:interface-menu-bar-items self)
      (list
       (make-instance
        'capi:menu
        :title "Graphs"
        :items
        (list
         (capi:make-pane-popup-menu
          g1 self :title "graph1")

         (capi:make-pane-popup-menu
          g2 self :title "graph2")))))))))

(capi:display (make-instance 'gg))
```

See also **make-menu-for-pane**

make-resource-image-set *Function*

Summary — Constructs an image set object identifying a bitmap resource in a Windows DLL.

Package — **capi**

Signature — **make-resource-image-set &key** *image-count width height library id* **=>** *image-set*

Arguments

image-count	An integer.
width	An integer.
height	An integer.
library	A string.
id	A string or an integer.

Values

image-set	An **image-set** object.

Description — The function **make-resource-image-set** constructs an image set object that identifies an image stored as a bitmap resource in a DLL on Microsoft Windows.

width and *height* are the dimensions of a single sub-image within the main image, and *image-count* specifies the number of sub-images in the image.

library should be a string specifying the name of the DLL.

id should be either an integer which is the resource identifier of the bitmap, or a string naming the bitmap resource.

Notes — **make-resource-image-set** is only available in LispWorks for Windows.

See also — **image-set**
make-icon-resource-image-set
make-general-image-set

make-scaled-general-image-set *Function*

Summary — Constructs an image set object which scales images in another image set on Windows.

Package — **capi**

Signature — **make-scaled-general-image-set &key** *width height id image-count* **=>** *image-set*

Arguments

width	An integer.
height	An integer.
id	A pathname, string or symbol.
i*mage-count*	An integer.

Values

image-set	An **image-set** object.

Description — The function **make-scaled-general-image-set** constructs an image set that provides scaled images based on an **image-set** object constructed from *id* as if by **make-general-image-set**.

width and *height* are the dimensions of a single sub-image within the main image, and *image-count* specifies the number of sub-images in both images. That is, the sub-images are scaled to this size.

The default value of *image-count* is 1.

Notes — **make-scaled-general-image-set** is only available in LispWorks for Windows.

See also — **image-set**
make-general-image-set

make-scaled-image-set *Function*

Summary — Creates an image set by scaling the images of another image set on Windows.

Package — **capi**

Signature — **make-scaled-image-set &key** *image-count width height base-image-set* **=>** *image-set*

Arguments

image-count	An integer.
width	An integer.
height	An integer.
base-image-set	An **image-set** object.

Values

image-set	An **image-set** object.

Description — The function **make-scaled-image-set** constructs an image set that provides scaled images based on an existing image set object *base-image-set*.

width and *height* are the dimensions of a single sub-image within the main image. That is, the sub-images in *base-image-set* are scaled to this size to produce the sub-images of *image-set*.

image-count specifies the number of sub-images in the image. It is unspecified what happens if *image-count* is different from the image count in *base-image-set*.

Notes — **make-scaled-image-set** is only available in LispWorks for Windows.

See also — **image-set**
make-general-image-set

make-sorting-description *Function*

Summary Makes a sort description suitable for use in a **sorted-object**.

Package **capi**

Signature **make-sorting-description &key** *type key sort reverse-sort sort-function* **=>** *sorting-description*

Arguments

type	A Lisp object naming the type of sorting.
key	A function of one argument.
sort	A function of two arguments.
reverse-sort	A function of two arguments.
sort-function	A sorting function.

Description The function **make-sorting-description** makes a sort description object that can be used as one of the *sort-descriptions* in a **sorted-object** such as a **list-panel**.

type is a name that should be unique amongst the *sort-descriptions* of a **sorted-object**.

key is a function that is passed to *sort-function* as its **:key** argument. The default value of *key* is **identity**.

sort is a predicate function that is passed to *sort-function* to compare pairs of items.

reverse-sort is a predicate function that is passed to *sort-function* for reverse sorting.

sort-function is the function that is called to actually do the sorting. Its signature is

sort-function *items predicate* **&key** *key*

The default value of *sort-function* is **sort**.

Example

```
(setq lp
      (capi:contain
       (make-instance
        'capi:list-panel
        :items '("Apple"
                 "Orange"
                 "Mangosteen"
                 "Pineapple")
        :visible-min-height '(:character 5)
        :sort-descriptions
        (list (capi:make-sorting-description
               :type :length
               :sort
               #'(lambda (x y)
                   (> (length x) (length y)))
               :reverse-sort
               #'(lambda (x y)
                   (< (length x) (length y))))
              (capi:make-sorting-description
               :type :alphabetic
               :sort 'string-greaterp
               :reverse-sort 'string-lessp)))))

(capi:sorted-object-sort-by lp :length)

(capi:sorted-object-sort-by lp :alphabetic)
```

See also **sort-object-items-by**
sorted-object
sorted-object-sort-by

manipulate-pinboard *Generic Function*

Summary Adds or removes one or more **pinboard-object**s on a pinboard.

Package **capi**

Signature **manipulate-pinboard** *pinboard-layout pinboard-object action* **&key** *position*

Arguments *pinboard-layout* A **pinboard-layout**.

pinboard-object	A **pinboard-object** to be added, or (with *action* **:add-many**) a list of **pinboard-object**s to be added. With *action* **:delete-if**, *pinboard-object* can also be a function of one argument, for multiple deletion.
action	One of **:add**, **:add-top**, **:add-bottom**, **:add-many** or **:delete**. Can also be **:delete-if**, for multiple deletion.
position	One of **:top** or **:bottom**, or a non-negative integer.

Description

The generic function **manipulate-pinboard** adds *pinboard-object* to *pinboard-layout*, or removes one or more **pinboard-object**s from *pinboard-layout*. These operations can also be effected using **(setf layout-description)**, but **manipulate-pinboard** is much more efficient and produces a better display.

If *action* is **:add**, then the **pinboard-object** *pinboard-object* is added according to the value of *position*:

:top	On top of the other pinboard objects.
:bottom	Below the other pinboard objects.
An integer	At index *position* in the sequence of pinboard objects, where 0 is the index of the topmost pinboard object. Values of *position* greater than the number of pinboard objects are interpreted as **:bottom**.

action **:add-top** is the same as passing *action* **:add** and *position* **:top**.

action **:add-bottom** is the same as passing *action* **:add** and *position* **:bottom**.

action **:add-many** is like calling the function with *action* **:add** several times, but is more efficient. The value of *pinboard-object* must be a list of **pinboard-object**s, each of which is added at the specified *position*, as for **:add**.

action **:delete** deletes the **pinboard-object** *pinboard-object* from *pinboard-layout*.

When *action* is **:delete-if**, *pinboard-object* should be a function which takes one argument, a **pinboard-object**. This function is applied to each **pinboard-object** in *pinboard-layout* and each object for which it returns true is deleted from *pinboard-layout*.

Notes

You can control automatic resizing of *pinboard-object* using **set-object-automatic-resize**.

Example

```
(setq pl
      (capi:contain
       (make-instance 'capi:pinboard-layout
                      :visible-min-height 500
                      :visible-min-width 200)))
```

Add some **pinboard-object**s:

```
(capi:apply-in-pane-process
 pl #'(lambda (pp)
        (dotimes (y 10)
          (let ((yy (* y 40)))
            (capi:manipulate-pinboard
             pp
             (make-instance 'capi:line-pinboard-object
                            :start-x 4  :start-y yy
                           :end-x 54   :end-y (+ 6 yy))
             :add-top)
            (capi:manipulate-pinboard
             pp
             (make-instance 'capi:pinboard-object
                            :x 4  :y (+ 20 yy)
                            :width 50 :height 6
                            :graphics-args
                            '(:background :red))
             :add-top))))
 pl)
```

Remove some **pinboard-object**s:

```
(capi:apply-in-pane-process
 pl
 #'(lambda (pp)
     (dotimes (y 15)
       (let ((po (capi:pinboard-object-at-position pp
                                                   10
                                                   (* y
30))))
         (when po (capi:manipulate-pinboard pp
                                            po
                                           :delete)))))
 pl)
```

Remove all **line-pinboard-object**s:

```
(capi:apply-in-pane-process
 pl 'capi:manipulate-pinboard pl
 #'(lambda (x)
     (typep x 'capi:line-pinboard-object))
 :delete-if)
```

See also **pinboard-layout**
set-object-automatic-resize

map-collection-items *Generic Function*

Summary The generic function **map-collection-items** calls a specified function on all the items in a collection.

Package **capi**

Signature **map-collection-items** *collection function* **&optional** *collect-results-p*

Arguments

collection	A **collection**.
function	A function designator for a function of one argument.
collect-results-p	A generalized boolean.

Description Calls *function* on each item in the *collection* by calling the **collection**'s *items-map-function*. If *collect-results-p* is true, the results of these calls are returned in a list.

Example

```
(setq collection (make-instance 'capi:collection
                                :items '(1 2 3 4 5)))

(capi:map-collection-items collection
                           'princ-to-string t)
```

See also **collection**
choice

map-pane-children *Generic Function*

Summary Calls a function on each of a pane's children.

Package **capi**

Signature **map-pane-children** *pane function* **&key** *visible test reverse*

Arguments

pane	A CAPI pane.
function	A function of one argument.
visible	A boolean. The default value is **nil**.
test	A function of one argument, or **nil**. The default is **nil**.
reverse	A boolean. The default value is **nil**.

Description The function **map-pane-children** applies *function* to *pane*'s immediate children.

If *visible* is true, then *function* is applied only to the visible children.

If *test* is non-nil, it is a function which is applied first to each child, and only those for which *test* returns a true value are then passed to *function*.

If *reverse* is non-nil, the order in which the children are processed is reversed.

Example

This example constructs a pinboard containing random ellipses. A repainting function is mapped over them, restricted to those with width greater than height.

```
(defun random-color ()
  (aref #(:red :blue :green :yellow :cyan
          :magenta :pink :purple :black :white)
        (random 10)))

(defun random-origin ()
  (list (random 350) (random 250)))

(defun random-size ()
  (list (+ 10 (random 40))
        (+ 10 (random 40))))

(setf ellipses
      (capi:contain
       (make-instance
        'capi:pinboard-layout
        :children
        (loop for i below 40
              for origin = (random-origin)
              for size = (random-size)
              collect
              (make-instance 'capi:ellipse
                             :x (first origin)
                             :y (second origin)
                             :width (first size)
                             :height (second size)
                             :graphics-args
                             (list :foreground
                                   (random-color))
                             :filled t)))))

(defun repaint (ellipse)
  (setf (capi:pinboard-object-graphics-args ellipse)
        (list :foreground (random-color)))
  (capi:redraw-pinboard-object ellipse t))

(defun widep (ellipse)
  (capi:with-geometry ellipse
      (> capi:%width% capi:%height%)))


(capi:map-pane-children ellipses 'repaint :test 'widep)
```

See also **map-pane-descendant-children**

map-pane-descendant-children *Generic Function*

Summary Calls a function on each of the descendant panes of a pane.

Package **capi**

Signature **map-pane-descendant-children** *pane function* **&key** *visible test reverse leaf-only*

Arguments

pane	A CAPI pane.
function	A function of one argument.
visible	A boolean. The default value is **nil**.
test	A function of one argument, or **nil**. The default is **nil**.
reverse	A boolean. The default value is **nil**.
leaf-only	A generalized boolean. The default value is **nil**.

Description The function **map-pane-descendant-children** applies *function* to *pane*'s descendent panes (that is, the children and each of their children recursively), depth first.

If *visible* is true, then *function* is applied only to the visible descendant panes.

If *test* is non-nil, it is a function which is applied first to each descendant pane, and only those for which *test* returns a true value are then passed to *function*.

If *reverse* is non-nil, the order in which the children are processed is reversed.

If *leaf-only* is true, then *function* is applied only to those panes which do not have children.

See also **map-pane-children**
pane-descendant-child-with-focus

map-typeout *Function*

Package **capi**

Signature **map-typeout** *pane* **&rest** *args*

Description Makes a **collector-pane** the visible child of a **switchable-layout**, and returns it as well. The switchable layout is found by looking up the parent hierarchy starting from *pane*.

The switchable layout should have one or more children. If it has one child, a new collector pane is made using *args* as the *initargs* with *buffer-name* defaulting to **"Background Output"**. If it has more than one, it searches through the children to find the first collector pane.

See also **unmap-typeout**
with-random-typeout
collector-pane

maximum-moving-objects-to-track-edges *Variable*

Summary Limits the tracking of edges in a graph.

Package **capi**

Initial Value 15

Description If there are more than ***maximum-moving-objects-to-track-edges*** objects being moved in a graph, then edges are not tracked.

The value should be an integer.

menu *Class*

Summary The class **menu** creates a menu for an interface when specified as part of the menu bar (or as a submenu of a menu on the menu bar). It can also be displayed as a context menu.

Package **capi**

Superclasses **element**
titled-menu-object

Initargs

:items The items to appear in the menu.

:items-function
A function to dynamically compute the items.

:mnemonic A character, integer or symbol specifying a mnemonic for the menu.

:mnemonic-escape
A character specifying the mnemonic escape. The default value is **#\&**.

:mnemonic-title
A string specifying the title and a mnemonic.

:image-function
A function providing images for the menu items, or **nil**.

Accessors **menu-items**
menu-image-function

Description A menu has a title, and has items appearing in it, where an item can be either a **menu-item**, a **menu-component** or another **menu**.

The simplest way of providing items to a menu is to pass them as the argument *items*, but if you need to compute the items dynamically you should provide the setup callback *items-function*. This function should return a list of menu items for the new menu. By default *items-function* is called on the menu's interface, but a different argument can be specified using the **`menu-object`** initarg *setup-callback-argument*.

Note: *items-function* is called before the menu is raised (in order to initialize accelerators) and in particular it may be called before the interface is created. Therefore *items-function*, if you supply it, should work at this early stage.

If an item is not of type **`menu-object`**, then it gets converted to a **`menu-object`** with the item as its data. This function is called before the *popup-callback* and the *enabled-function* which means that they can affect the new items.

To specify a mnemonic in the menu title, you can use the initarg **`:mnemonic`**. The value *mnemonic* can be:

An integer	The index of the mnemonic in the title.
A character	The mnemonic in the title.
`nil`	A character is chosen from a list of common mnemonics, or the **`:default`** behavior is followed. This is the default.
`:default`	A mnemonic is chosen using some rules.
`:none`	The title has no mnemonic.

An alternative way to specify a mnemonic is to pass *mnemonic-title* (rather than *title*) This is a string which provides the text for the menu title and also specifies the mnemonic character. The mnemonic character is preceded in *mnemonic-title* by *mnemonic-escape*, and *mnemonic-escape* is removed from *mnemonic-title* before the text is displayed. For example:

```
:mnemonic-title "&Open File..."
```

At most one character can be specified as the mnemonic in *mnemonic-title*. To make *mnemonic-escape* itself appear in the button, precede it in *mnemonic-title* with *mnemonic-escape*. For example:

```
:mnemonic-title "&Compile && Load File..."
```

If *image-function* is non-nil, it should be a function of one argument. *image-function* is called with the data of each menu item and should return one of:

nil No image is shown.

An **image** object

The menu displays this image.

An image id or **external-image**

The system converts the value to a temporary **image** for the menu item and frees it when it is no longer needed.

If *image-function* is **nil**, no items in the menu have images. This is the default value.

Notes

1. On Cocoa and GTK+, menu items can contain both images and strings, so the *print-function* should return the appropriate string or "" if no string is required. On Microsoft Windows and Motif, if there is an image then the string is ignored. You can test programmatically whether menus with images are supported with **pane-supports-menus-with-images**.
2. When debugging a menu, it may be useful to pop up a window containing a menu with the minimum of fuss. The function **contain** will do just that for you.
3. To display a menu as a context (right button) menu, use **display-popup-menu**, and to display a menu via a labelled button use **popup-menu-button**.

4. By default Microsoft Windows hides mnemonics when the user is not using the keyboard. In Windows XP (and later) a system preference controls this:

   Display > Appearance > Effects > Hide underlined letters...

Example

```
(capi:contain (make-instance 'capi:menu
                             :title "Test"
                           :items '(:red :green :blue)))

(capi:contain (make-instance
                 'capi:menu :title "Test"
                            :items '(:red :green :blue)
                             :print-function
                             'string-capitalize))

(capi:contain (make-instance
               'capi:menu
               :title "Test"
               :items '(:red :green :blue)
               :print-function 'string-capitalize
               :callback #'(lambda (data interface)
                             (capi:display-message
                              "Pressed ~S" data))))
```

Here is an example showing how to add submenus to a menu:

```
(setq submenu (make-instance 'capi:menu
                             :title "Submenu..."
                             :items '(1 2 3)))

(capi:contain (make-instance
               'capi:menu
               :title "Test"
               :items (list submenu)))
```

Here is an example showing how to use the *items-function*:

```
(capi:contain (make-instance
               'capi:menu
               :title "Test"
               :items-function #'(lambda (interface)
                                   (loop for i below 8
                                    collect (random 10)
                                   ))))
```

Finally, some examples showing how to specify a mnemonic in a menu title:

```
(capi:contain (make-instance
               'capi:menu
               :title "Mnemonic Title"
               :mnemonic 1
               :items '(1 2 3)))

(capi:contain (make-instance
               'capi:menu
               :mnemonic-title "M&nemonic Title"
               :items '(1 2 3)))

(capi:contain (make-instance
               'capi:menu
               :mnemonic-title "M&e && You"
               :items '("Me" "You")))
```

There is an example showing how to make a menu with images in **examples/capi/elements/menu-with-images.lisp**.

There are further examples in the directory **examples/capi/applications/**.

See also

display-popup-menu
menu-component
menu-item
menu-object
ole-control-add-verbs
pane-supports-menus-with-images
popup-menu-button

menu-component *Class*

Summary

The class **menu-component** is a choice that is used to group menu items and submenus both visually and functionally. The items contained by the **menu-component** appear separated from other items, menus, or menu components, by separators.

Package **capi**

Superclasses **choice**
titled-menu-object

Initargs **:items** The items to appear in the menu.

:items-function
A setup callback function to dynamically compute the items.

:selection-function
A setup callback function to dynamically compute the selection.

:selected-item-function
A setup callback function to dynamically compute the selected item.

:selected-items-function
A setup callback function to dynamically compute the selected items.

Description Because **menu-component** is a choice, the component can have *interaction* **:no-selection**, **:single-selection** or **:multiple-selection** (extended selection does not apply here). This is represented visually in the menu as appropriate to the window system that the CAPI is running on (by ticks in Microsoft Windows, and by radio buttons and check buttons in Motif).

Note that it is not appropriate to have menu components or submenus inside **:single-selection** and **:multiple-selection** components, but it is OK in **:no-selection** components.

items and *items-function* behave as in **menu**.

No more than one of *selection-function*, *selected-item-function* and *selected-items-function* should be non-nil. Each defaults to **nil**. If one of these setup callbacks is supplied, it should be a function which is called before the **menu-component** is displayed and which determines which items are selected. By default the setup callback is called on the interface of the **menu-component**, but this argument can be changed by passing the **menu-object** initarg *setup-callback-argument*.

selection-function, if non-nil, should return a value which is suitable for passing to the **choice** accessor **(setf choice-selection)**. This will be **nil**, or a single index (for *interaction* **:single-selection**), or a list of item indices (for *interaction* **:multiple-selection** and **:extended-selection**).

selected-item-function, if non-nil, should return an object which is an item in the **menu-component**, or is equal to such an item when compared by the **menu-component**'s *test-function*.

selected-items-function, if non-nil, should return a list of such objects.

Example

```
(capi:contain (make-instance
               'capi:menu-component
               :items '(:red :green :blue)
               :print-function 'string-capitalize
               :interaction :single-selection))

(capi:contain (make-instance
               'capi:menu-component
               :items '(:red :green :blue)
               :print-function 'string-capitalize
               :interaction :multiple-selection))
```

```
(capi:contain (make-instance
               'capi:menu
               :items (list
                       "An Item"
                       (make-instance
                        'capi:menu-component
                        :items '(:red :green :blue)
                        :print-function
                         'string-capitalize
                        :interaction :no-selection)
                       "Another Item")))
```

See also **menu**
menu-item

menu-item *Class*

Summary A menu item is an individual item in a menu or menu component, and instances of **menu-item** are created automatically by **define-interface**.

Package **capi**

Superclasses **item**
titled-menu-object

Initargs **:accelerator**
A character, string or plist, or the keyword **:default**.

:alternative
A generalized boolean.

:help-key An object used for lookup of help. Default value **t**.

:mnemonic A character, integer or symbol specifying a mnemonic for the menu item.

:mnemonic-escape

A character specifying the mnemonic escape. The default value is **#\&**.

:mnemonic-title

A string specifying the text and a mnemonic.

:selected-function

A setup callback determining whether the item is selected.

:enabled-function-for-dialog

nil, **t**, **:same-as-normal** or a function designator. Determines enabled state when a dialog is on screen.

Readers

help-key

Description

The text displayed in the menu item is the contents of the *text* slot, or the contents of the *title* slot, otherwise it is the result of applying the *print-function* to the *data*.

If *selected-function* is non-nil it should a function which is called before the **menu-item** is displayed and which determines whether or not the **menu-item** is selected. By default *selected-function* is called on the interface of the **menu-item**, but this argument can be changed by passing the **menu-object** initarg *setup-callback-argument*. The default value of *selected-function* is **nil**.

Callbacks are made in response to a user gesture on a **menu-item**. The *callback-type* (see **callbacks**), *callback* and *callback-data-function* (see **menu-object**) are found by looking for a non-nil value, first in the **menu-item**, then the **menu-component** (if any) and finally the **menu**. This allows a whole menu to have, for example, *callback-type* **:data** without having to specify this in each item. Some items could override this by having their *callback-type* slot non-nil if needed.

To specify a mnemonic in the menu item, you can use the initarg **:mnemonic**, or the initargs **:mnemonic-title** and **:mnemonic-escape**. These initargs are all interpreted just as in **menu**.

A menu item should not be used more in more than one place at a time.

help-key is interpreted as described for **element**.

accelerator can be a character or string specifying a key gesture which will be the accelerator for the menu item.

Note that **both-case-p** characters are not allowed with the single modifier **Shift** in the accelerator argument. So instead of

```
:accelerator "shift-x"
```

use

```
:accelerator "X"
```

Note that the **Shift** modifier still appears in the menu.

A **both-case-p** character is allowed with **Shift** if there are other modifiers, for example

```
:accelerator "alt-shift-x"
```

If *accelerator* is a **character** then the system adds the normal modifier for the platform. That is, **Command** on Cocoa and **Control** on Microsoft Windows. The shortcut is validated for the platform.

If *accelerator* is a **string** with modifier keys then the system uses it only if it follows the normal conventions for the platform. The shortcut is validated for the platform.

The special virtual modifier name "accelerator" is allowed in string values of *accelerator*. It is interpreted as the normal modifier key for the platform. For example:

```
:accelerator "accelerator-x"
```

means **Control+X** on Microsoft Windows and Motif, and **Command+X** on Cocoa.

If *accelerator* is a plist then its keys are keywords naming some or all of the supported libraries (as returned by **default-library**). The plist's values are characters or strings which the system interprets as above, except that no check is made that the keyboard shortcut is valid for the platform.

accelerator has a special default value **:default**, which means that, depending on **interface-keys-style** for the interface, a standard accelerator is added if the item title matches a standard menu command.

alternative, when true, makes the **menu-item** an "alternative item". Alternative items are invoked if modifiers are held while selecting the "main item". These modifiers are defined by the item's *accelerator*. The main item is the one before the first alternative item, and each alternative item must be within the same menu and menu component. For an example see **examples/capi/elements/accelerators.lisp** and for more information see the section "Alternative menu items" in the *CAPI User Guide*.

enabled-function-for-dialog determines whether the item is enabled when a dialog is on the screen. Items in the menu bar menus and sub-menus are disabled by default while a dialog is on the screen on top of the active window. You can override this by specifying *enabled-function-for-dialog*. The value can be one of:

t	The item is enabled whenever there is a dialog.
nil	The item is disabled whenever there is a dialog.

:same-as-normal

Do the same as when there is no dialog. This depends on the *enabled-function* (see **menu-object**).

A function — A function that is called instead of the *enabled-function* to decide if the item should be enabled. It is called with one argument, by the default the menu interface, which can be overriden by the initarg **:setup-call-back-argument** (see **menu-object** for details).

The default value of *enabled-function-for-dialog* is **nil**.

Notes

Some accelerators do not work on some platforms because they have other standard meanings, for example on Microsoft Windows **F1** always invokes the *help-callback*.

On X11/Motif the accelerators of alternative items do not work.

Example

```
(capi:contain (make-instance 'capi:menu-item
                             :text "Press Me"))

(capi:contain (make-instance 'capi:menu-item
                             :data :red
                             :print-function
                              'string-capitalize))

(capi:contain (make-instance
               'capi:menu-item
               :data :red
               :print-function 'string-capitalize
               :callback #'(lambda (data interface)
                             (capi:display-message
                              "Pressed ~S"
                              data))))
```

In this example note how the **File** menu gets accelerators automatically for its standard items:

```
(defun do-menu-item (item)
  (capi:display-message
   (format nil "~A" (capi:item-data item))))

(capi:define-interface mmm () ()
  (:menu-bar f-menu a-menu)
  (:menus
   (f-menu
     "File"
    (("Open..." :data "Open...")
     ("New"     :data "New"))
    :callback 'do-menu-item
    :callback-type :item)
   (a-menu
    "Another Menu"
    (("Open..." :data "Another Open")
     ("New" :data "Another New")
     ("Blancmange" :data "Blancmange"
                   :accelerator "accelerator-b"))
    :callback 'do-menu-item
    :callback-type :item))
  (:default-initargs
   :width 300
   :height 200))

;; This causes automatic accelerators on all platforms.

;; That is the default behavior on Microsoft Windows.
(defmethod capi:interface-keys-style ((self mmm))
  :pc)

(capi:contain (make-instance 'mmm))
```

There are further examples in the files **examples/capi/applications/hangman.lisp** and **examples/capi/printing/fit-to-page.lisp**.

See also

choice
interface-keys-style
menu
menu-component

menu-object *Class*

Summary The class **menu-object** is the superclass of all menu objects, and provides functionality for handling generic aspects of menus, menu components and menu items.

Package **capi**

Superclasses **callbacks**

Subclasses **titled-menu-object**

Initargs

:popup-callback
Callback before the menu appears.

:enabled-function
Returns true if the menu is enabled.

:enabled-slot The object is enabled if the slot is non-nil.

:callback The selection callback for the object.

:callback-data-function
A function to return data for the callback.

:setup-callback-argument
If non-nil, specifies the argument to the setup callbacks (listed below) that are used to set up the **menu-object**.

Accessors **menu-popup-callback**

Readers **menu-object-enabled**

Description When the menu object is about to appear on the screen, the CAPI does the following:

1. The setup callback *items-function* (if there is one) is called and the result is used to set the items, for **`menu`** and **`menu-component`**. The argument passed to *items-function* is the same as for the other setup callbacks (see below).
2. The *popup-callback* (if there is one) is called and can make arbitrary changes to that object. The *popup-callback* is always called with the menu object, regardless of the value of *setup-callback-argument*.
3. The other setup callbacks are called to set up the selection, enabled state and title. These setup callbacks include *enabled-function* for all **`menu-object`**s and *title-function* for all **`titled-menu-object`**s. The additional setup callbacks for **`menu-component`** are *selection-function*, *selected-item-function*, and *selected-items-function*. **`menu-item`** has the additional setup callback *selected-function*.

   By default *setup-callback-argument* is **`nil`**, which means that each of the setup callbacks is called on the interface of the **`menu-object`**. If *setup-callback-argument* is non-nil, then it is passed (instead of the interface) as the argument to each of the setup callbacks.
4. The menu containing the object appears with all of the changes made.

Note that *enabled-slot* is a short-hand means of creating an *enabled-function* which checks the value of a slot in the menu object's interface.

The enabled state of a **`menu-object`** is computed each time the menu is displayed, using *enabled-function* or *enabled-slot*. Therefore the accessor **`menu-object-enabled`** is only useful as a reader.

The *callback* argument is placed in the *selection-callback*, *extend-callback* and *retract-callback* slots unless these are given explicitly, and so will get called when the menu object is selected or deselected.

The *callback-data-function* is a function that is called with no arguments and the value it returns is used as the data to the callbacks.

Notes

The function *enabled-function* should not display a dialog or do anything that may cause the system to hang. In general this means interacting with anything outside the Lisp image, including files, databases and so on.

Example

```
(capi:contain (make-instance
               'capi:menu-item
               :text "Press Me"
               :enabled-function #'(lambda (item)
                                     (eq (random 2)
                                     1))))
```

The next example illustrates the use of *setup-callback-argument*. The **`initialize-instance`** method adds to the "Some Numbers" menu a sub-menu that lists the selected items in the **`list-panel`**. By using *setup-callback-argument* in this menu, the setup callbacks (in this case *enabled-function* and *items-function*) are called directly on the **`list-panel`**.

Note that, while this example uses a CAPI object as the *setup-callback-argument*, any object of any type can be used.

```
(capi:define-interface my-interface ()
  ()
  (:panes
   (list-panel
    capi:list-panel
    :items '(1 2 3 4 5 6 7 8 9 0)
    :interaction :extended-selection
    :visible-min-height '(character 10)))
  (:menus
   (a-menu
    "Some Numbers"
    ("One" "Two")
    ))
  (:menu-bar a-menu))

(defmethod initialize-instance :after
  ((self my-interface) &key)
  (with-slots (a-menu list-panel) self
    (setf (capi:menu-items a-menu)
          (append
           (capi:menu-items a-menu)
           (list
            (make-instance 'capi:menu
                           :items-function
                           'capi:choice-selected-items
                           :setup-callback-argument
                           list-panel
                           :enabled-function
                           'capi:choice-selection
                           :title
                           "Selected Items"))))))

(capi:display (make-instance 'my-interface))
```

See also **menu**
menu-item
menu-component

merge-menu-bars *Generic Function*

Summary Computes the menu bar for a **document-frame** on Windows.

Package **capi**

Signature **merge-menu-bars** *frame document* **=>** *menus*

Arguments

frame	A **document-frame**.
document	An **interface** or **nil**.

Values

menus	A list of **menu** objects.

Description

The generic function **merge-menu-bars** is called by the system to compute the menu bar for a **document-frame** interface.

The set of visible menus in such an interface is typically made up from those of the frame and those of the active document within it.

There is a built-in unspecialized method that appends the menu bars of the two interfaces and is equivalent to this:

```
(defmethod capi:merge-menu-bars ((frame t)
                                 (document t))
  (append
   (capi:interface-menu-bar-items frame)
   (and document
        (capi:interface-menu-bar-items document))))
```

You can customize the menu bar by adding methods which specialize on particular frame and document interface classes.

Notes **merge-menu-bars** is implemented only in LispWorks for Windows.

See also **document-frame**
interface
menu

message-pane *Class*

Summary The class displaying the message when a pane is created with the **:message** initarg.

Package **capi**

Superclasses **title-pane**

Description The class **message-pane** is used to implement the message decoration on subclasses of **titled-object**.

A **message-pane** with *text* "Message" is created automatically when a **titled-object** is created with *message* "Message".

See also **titled-object**

modify-editor-pane-buffer *Function*

Summary The **modify-editor-pane-buffer** function allows you to modify the contents and fill mode of a specified buffer.

Package **capi**

Signature **modify-editor-pane-buffer** *pane* **&key** *contents flag fill fixed-fill force*

Description The **modify-editor-pane-buffer** function modifies the **editor-pane** *pane* according to the keyword arguments.

The argument *contents* (if non-nil) supplies a new string to place in the buffer.

flag, if given, sets the flag slot of the editor buffer, which is used to mark it for various specialized uses.

If *fill* is non-nil the editor fills each paragraph in the buffer. If *fill* is a fixnum then the buffer is filled at that width. If *fill* is **:default** (the default value) and *fixed-fill* is supplied then the value *fixed-fill* is used. Otherwise the buffer is filled to the window width.

fixed-fill defaults to **nil**.

See also **editor-pane**

mono-screen *Class*

Summary The **mono-screen** class is created for monochrome screen.

Package **capi**

Superclasses **screen**

Description This is a subclass of **screen** that gets created for monochrome screens. It is primarily available as a means of discriminating on whether or not to use colors in an interface.

See also **color-screen**

move-line *Generic Function*

Summary Moves a **line-pinboard-object**.

Package **capi**

Signature **move-line** *line-pinboard-object start-x start-y end-x end-y* **&key** *redisplay*

Arguments

line-pinboard-object
: An instance of **line-pinboard-object** or a subclass.

start-x
: The x coordinate of the start of the line.

start-y
: The y coordinate of the start of the line.

end-x
: The x coordinate of the end of the line.

end-y
: The y coordinate of the end of the line.

redisplay
: A boolean.

Description

The generic function **move-line** moves a line to a new location with end points specified by the corrdinate arguments.

This automatically adjusts the geometry of the object, taking into account other constraints. Examples of such constraints are the label in a **labelled-line-pinboard-object** and the arrowhead in a **arrow-pinboard-object**.

The default value of *redisplay* is **t**, which means that the changed line is redrawn immediately. If you are moving many objects at the same time, it is useful to pass **:redisplay nil**.

See also

line-pinboard-object
line-pinboard-object-coordinates

multi-column-list-panel *Class*

Summary

A list panel with multiple columns of text.

Package

capi

Superclasses

list-panel

Initargs

:column-function
A function of one argument. The default is **identity**.

:item-print-functions
A function of one argument, or a list of such functions.

:columns A list of column specifications.

:header-args A plist of keywords and values.

:auto-reset-column-widths
A boolean. The default is **t**.

Description

The class **multi-column-list-panel** is a list panel which displays multiple columns of text. The columns can each have a title.

Note that this is a subclass of **list-panel**, and hence of **choice**, and inherits the behavior of those classes.

Each item in a **multi-column-list-panel** is displayed in a line of multiple objects. The corresponding objects of each line are aligned in a column.

The *column-function* generates the objects for each item. It should take an item as its single argument and return a list of objects to be displayed. The default *column-function* is **identity**, which works if each item is a list.

The *item-print-functions* argument determines how to calculate the text to display for each element. If *item-print-functions* is a single function, it is called on each object, and must return a string. Otherwise *item-print-functions* should be a sequence of length no less than than the number of columns. The text to display for each object is the result (again, a string) of calling the corresponding element of *item-print-functions* on that object.

The *columns* argument specifies the number of columns, and whether the columns have titles and callbacks on these titles.

Each element of *columns* is a specification for a column. Each column specification is a plist of keyword and values, where the allowed keywords are as follows:

:title Specifies the title to use for the column. If any of the columns has a title, a header object is created which displays the titles. The values of the **:title** keywords are passed as the *items* of the header, unless *header-args* specifies **:items**.

:adjust Specifies how to adjust the column. The value can be one of **:right**, **:left**, or **:center**.

:width Specifies a fixed width of the column.

:default-width
Specifies the default initial width of the column. The user can resize it. If **:width** is supplied it overrides **:default-width**.

:visible-min-width
Minimum width of the column.

:gap Specifies an additional gap alongside the text in the column. **:gap** is not supported consistently across platforms (see Notes below).

The values of **:width**, **:visible-min-width** and **:gap** are interpreted as standard geometric hints. See **element** for information about these hints.

columns should indicate how many columns to display. At a minimum the value needs to be **(() ())** for two columns without any titles

header-args is a plist of initargs passed to the header which displays the titles of the columns. The header object is a **collection**. The following **collection** initargs are useful to pass in *header-args*:

:selection-callback

The callback for clicking on the header.

:callback-type

Defines the arguments of the *selection-callback*.

:items The items of the header object. Note that **:items** overrides **:title** if that is supplied in *columns*.

:print-function

Controls how each of *items* is printed, providing the title of each column.

header-args may also contain the keyword **:alignments**. The value should be a list of alignment keywords, each of which is interpreted like an **:adjust** value in *columns*. The alignment is applied to the title only.

If *auto-reset-column-widths* is true, then the widths of the columns are recomputed when the items of the **multi-column-list-panel** are set.

Notes

1. Similiar and enhanced functionality is provided by **list-view**.
2. On Microsoft Windows, **:width** in a column specification does not actually make the column width be fixed, though it does supply the initial width.
3. On Microsoft Windows, **:gap** in a column specification adds the gap on both sides of the text. On Motif it adds the gap only on the right side of the text. On GTK+ and Cocoa **:gap** is ignored.

Example

This example uses the *columns* initarg:

```
(capi:contain
 (make-instance
  'capi:multi-column-list-panel
  :visible-min-width 300
  :visible-min-height :text-height
  :columns '((:title "Fruits"
              :adjust :right
              :width (character 15))
             (:title "Vegetables"
              :adjust :left
              :visible-min-width (character 30)))
  :items '(("Apple" "Artichoke")
           ("Pomegranate" "Pumkpin"))))
```

This example uses *header-args* to add callbacks and independent alignment on the titles:

```
(defun mclp-header-callback (interface item)
  (declare (ignorable interface))
  (capi:display-message "Clicked on ~a" item))

(capi:contain
 (make-instance
  'capi:multi-column-list-panel
  :visible-min-width 300
  :visible-min-height :text-height
  :columns '((:adjust :right
              :width (character 15))
             (:adjust :left
              :visible-min-width (character 30)))
  :header-args '(:items ( "Fruits" "Vegetables")
                 :selection-callback
                 mclp-header-callback
                 :alignments (:left :right))
  :items '(("Apple" "Artichoke")
           ("Pomegranate" "Pumkpin"))))
```

This example uses *column-function* to implement a primitive process browser:

```
(defun get-process-elements (process)
  (list (mp:process-name process)
        (mp:process-whostate process)
        (mp:process-priority process)))


(capi:contain
 (make-instance
  'capi:multi-column-list-panel
  :visible-min-width '(character 70)
  :visible-min-height '(character 15)
  :items (mp:list-all-processes)
  :columns '((:title "Name" :adjust :left
              :visible-min-width (character 30))
             (:title "State" :adjust :center
              :visible-min-width (character 20))
             (:title "Priority" :adjust :center
              :visible-min-width (character 12)))
  :column-function 'get-process-elements))
```

See also **collection**
list-panel
list-view

multi-line-text-input-pane *Class*

Summary A pane allowing several lines of text to be entered.

Package **capi**

Superclasses **text-input-pane**

Description The **multi-line-text-input-pane** class behaves like a **text-input-pane**, except that the text entered by the user is allowed to span several lines — that is, it is allowed to contain Newline characters.

See also **text-input-pane**

non-focus-list-interface *Class*

Summary Created (and destroyed) only by **prompt-with-list-non-focus** and **text-input-pane-in-place-complete**.

Superclasses **interface**

Description The class **non-focus-list-interface** is the class of interface created and destroyed only by **prompt-with-list-non-focus** and **text-input-pane-in-place-complete**. Do not instantiate this class directly.

See also **prompt-with-list-non-focus**
text-input-pane-in-place-complete

non-focus-list-toggle-enable-filter *Function*

Summary Toggles the enabled state of the filter.

Signature **non-focus-list-toggle-enable-filter** *non-focus-list-interface*

Arguments *non-focus-interface*

A **non-focus-list-interface**.

Description The function **non-focus-toggle-enable-filter** toggles the enabled state of the filter in a non-focus list created by **prompt-with-list-non-focus** or **text-input-pane-in-place-complete**. It has no effect if the filter is off.

It is used as the callback of the *filtering-toggle*.

See also **prompt-with-list-non-focus**

non-focus-list-toggle-filter
non-focus-list-add-filter
non-focus-list-remove-filter *Functions*

Summary Add or remove the filter in a non-focus list.

Signature **`non-focus-list-toggle-filter`** *non-focus-list-interface*

`non-focus-list-add-filter` *non-focus-list-interface*

`non-focus-list-remove-filter` *non-focus-list-interface*

Arguments *non-focus-interface*

A **`non-focus-list-interface`**.

Description These functions add or remove the filter in a non-focus list.

`non-focus-list-toggle-filter` calls **`non-focus-list-add-filter`** if the filter is off, otherwise it calls **`non-focus-list-remove-filter`** (it is used as the callabck for the *filtering-gesture*).

`non-focus-list-add-filter` adds a filter is it is not already on, resets the text in it to empty string, and enables it.

`non-focus-list-remove-filter` removes the filter if it is on.

See also **`prompt-with-list-non-focus`**

non-focus-maybe-capture-gesture *Generic Function*

Summary Maybe capture a gesture by the non-focus-interface.

Signature **`non-focus-maybe-capture-gesture`** *non-focus-interface gesture* **`=>`** *result*

Arguments

non-focus-interface A **non-focus-list-interface**.

gesture A gesture specifier.

Values

result A generalized boolean.

Method Signature

non-focus-maybe-capture-gesture (*non-focus-interface* **non-focus-list-interface)** *gesture*

Description

The generic function **non-focus-maybe-capture-gesture** needs to return non-nil if the gesture *gesture* was captured, which means it should not be processed any more, or **nil** if *gesture* was not captured.

gesture should be a gesture specifier, which is an object that can be coerced to a Gesture Spec by **sys:coerce-to-gesture-spec**.

The method on **non-focus-list-interface** does the following:

1. If the gesture is **Escape** it calls **non-focus-terminate** on the non-focus window.
2. It checks whether the gesture matches any of the gestures in the *gesture-callbacks* of the window. The gesture callbacks are either explicitly defined using the initargs **:gesture-callbacks** or **:add-gesture-callbacks**, or implicitly. By default, all the gestures that are used in in-place completion (see "In-place completion" in the *CAPI User Guide*) are defined implicitly. These include **Up**, **Down**, **PageUp**, **PageDown** (selection in the list panel), **Return** (action), **Control+Return** and **Control+Shift+Return** (control of the filter). The implicitly defined gestures are affected by *gesture-callbacks*, *filtering-gesture* and *filtering-toggle*.

If a match is found, it is invoked as described for *gesture-callbacks* in **prompt-with-list-non-focus**.

3. If filtering is enabled, it checks if the gesture is captured by the filter. A gesture is captured by the filter if it is:

A plain graphic character.

It is inserted to the filter

`Backspace`

The last character in the filter is deleted

One of the gestures which update the state of the filter (by default **`Control+Shift+R`**, **`Control+Shift+E`**, **`Control+Shift+C`**)

The state of the filter is updated.

In any case, where a gesture is captured by the filter the list panel is updated.

If the gesture is captured by one of the possibilities above, the method returns **`t`**, otherwise it returns **`nil`**.

See also **`non-focus-terminate`**
`prompt-with-list-non-focus`

non-focus-terminate *Generic Function*

Summary Terminates the non-focus interface.

Signatures **`non-focus-terminate`** *non-focus-interface*

Method Signature **`non-focus-terminate (`***non-focus-interface* **`non-focus-list-interface)`**

Description The generic function **`non-focus-terminate`** closes the non-focus interface.

It has no return value.

The method terminates a **`non-focus-list-interface`**. It destroys the interface in the correct process.

See also **prompt-with-list-non-focus**

non-focus-update *Generic Function*

Summary Updates the non-focus-interface.

Signature **non-focus-update** *non-focus-interface*

Method Signature **non-focus-update (***non-focus-interface* **non-focus-list-interface)**

Description The generic function **non-focus-update** updates the non-focus-interface.

It has no return value.

The method on **non-focus-list-interface** needs to be invoked in the process in which the *list-updater* that was passed to **prompt-with-list-non-focus** is expecting to run.

It invokes the *list-updater* without arguments, and then updates the non-focus-interface with result. See the description of *list-updater* in **prompt-with-list-non-focus**.

Note that if *list-updater* returns **:destroy**, this invokes **non-focus-terminate** on the interface.

See also **prompt-with-list-non-focus**
non-focus-terminate

ole-control-add-verbs *Function*

Summary Adds to the menu entries for the "verbs" that a component in an **ole-control-pane** supports.

Signature **ole-control-add-verbs** *pane menu item-identifier*

Arguments

pane	An **ole-control-pane**.
menu	A **menu**.
item-identifier	A string or symbol.

Description

The function **ole-control-add-verbs** adds to the menu entries for the "verbs" that the component supports. The **ole-control-pane** *pane* must have an object already, and the **menu** *menu* must have already been created, so **ole-control-add-verbs** is typically called in the *popup-callback* of *menu*.

item-identifier identifies an item in the menu or a component in the menu (but not in a sub-menu), either by being **eq** to the name of the item or **equalp** to the title of the item. If the item is found, it is replaced either by a sub-menu with the verbs that the object supports, or, if the object supports only one verb, by an entry for this.

When the user selects an added menu item, the verb is passed to the object (by a call to **IOleObject::DoVerb**).

Notes

This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Example

See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also

menu
ole-control-pane

ole-control-close-object *Function*

Summary

Closes the object in an **ole-control-pane**.

Signature

ole-control-close-object *pane*

Arguments *pane* An **ole-control-pane**.

Description The function **ole-control-close-object** closes the object that is currently in the **ole-control-pane** *pane*.

Notes This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Example See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also **ole-control-pane**

ole-control-component *Class*

Summary An implementation of the interfaces in the OLE Control protocol.

Package **capi**

Superclasses **com:standard-i-unknown**

Initargs **:pane-function**
A function that is called when OLE embeds the Control in a container.

:create-callback
A function called just after the pane is created.

:destroy-callback
A function called just before the pane is destroyed.

Readers **ole-control-component-pane**

Description

The class **ole-control-component** provides an implementation of the interfaces in the OLE Control protocol, to allow a CAPI pane to be embedded in an OLE Control container implemented outside LispWorks. It is typically used with the macro **define-ole-control-component** to define a subclass of **ole-control-component** that implements a particular coclass from a type library. Instances of this class are usually created by the COM runtime system, not by explicit calls to **make-instance**.

A function designator *pane-function* must be supplied. *pane-function* that is called when OLE embeds the Control in a container. It receives the component as its argument and should return a CAPI pane that will implement the visual aspects of the control.

Note: The pane returned by *pane-function* must be a **output-pane**, **layout** or **interface** in the current implementation. The pane is stored in the component and can be accessed using the reader **ole-control-component-pane**.

create-callback, if non-nil, is a function called when the pane returned by *pane-function* has been created in the window system. The argument is the pane itself. *create-callback* can perform initialization such as loading images.

destroy-callback, if non-nil, is a function called when the pane returned by *pane-function* is going to be destroyed. The argument is the pane itself. *destroy-callback* can perform cleanups.

Notes

When using an **ole-control-component**, the normal hierarchy of CAPI objects such as a layout and an interface do not exist above it. The layout and control of the top level window is the responsibility of the application that embeds the control. It can communicate with the control by using COM/Automation.

ole-control-component is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also **define-ole-control-component**

ole-control-doc *Class*

Summary A class that implements the document around the object inside an **ole-control-pane**.

Package **capi**

Superclasses **pinboard-layout**

Sublcasses **ole-control-frame**

Description The pane class **ole-control-doc** can be used to implement the document around the object inside an **ole-control-pane**. That is, it supports the **IOleInPlaceUIWindow** interface. Note that this is optional, and is rarely useful.

To use it the **ole-control-doc** pane needs to be the parent, not necessarily directly, of an **ole-control-pane**. When the object calls **IOleInPlaceSite::GetWindowContext**, it will get (in the **ppdoc [out]** argument) an **IOleInPlaceUIWindow** interface associated with the **ole-control-doc**.

A **ole-control-doc** must have exactly one sub-pane (that is, the length of its *description* must be 1), but underneath this pane there can be many panes.

Normally the program does not need to do anything else with the **ole-control-doc**. It acts in response to resizing of the window and method calls from the object on the **IOleInPlaceUIWindow** interface.

Notes **ole-control-doc** is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Even though it is a subclass of **pinboard-layout**, normally you should not use the **pinboard-layout** functionality when using **ole-control-doc**.

Example — See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also — **ole-control-pane**

ole-control-frame *Class*

Summary — Implements the frame of components in an **ole-control-pane**.

Package — **capi**

Superclasses — **ole-control-doc**

Description — The pane class **ole-control-frame** implements the frame of components, that is it supports the **IOleInPlaceFrame** interface. When an **ole-control-pane** pane is created, it looks upwards in the hierarchy of panes, and if finds an **ole-control-frame** pane it uses this as the frame. It uses the first such pane found. When the object in the **ole-control-pane** calls **IOleInPlaceSite::GetWindowContext**, it gets back in the **ppframe arg** an interface associated with this frame.

Like **ole-control-doc**, a **ole-control-frame** can have only one sub-pane, which itself may contain many panes.

Normally the program does not need to do anything else with the **ole-control-frame**. It acts in response to resizing of the window and method calls from the object on the **IOleInPlaceFrame** interface.

Note that having a frame is optional, and ActiveX does not need it. It is required when embedding an application by **ole-control-insert-object**.

Notes

ole-control-frame is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Even though it is a subclass of **pinboard-layout**, normally you should not use the **pinboard-layout** functionality when using **ole-control-frame**.

Example

See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also

ole-control-insert-object
ole-control-pane

ole-control-i-dispatch *Function*

Summary

Returns the **com:i-dispatch** of the component of an **ole-control-pane**.

Signature

ole-control-i-dispatch *pane* **=>** *result*

Arguments

pane An **ole-control-pane**.

Values

result A **com:i-dispatch** or **nil**.

Description

The function **ole-control-i-dispatch** returns the **com:i-dispatch** (that is, the **IDispatch** interface) of the component, or **nil** if there isn't any. The **com:i-dispatch** is the one that would be returned by **com:query-interface** on the **I-Ole-object**.

Notes

Calling **ole-control-i-dispatch** does not affect the reference count of the interface.

This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also **ole-control-pane**

ole-control-insert-object *Function*

Summary Embeds a user-specified document in an **ole-control-pane**.

Signature **ole-control-insert-object** *pane*

Arguments *pane* An **ole-control-pane**.

Description The function **ole-control-insert-object** prompts the user for a document using the Microsoft Windows function **OleUIInsertObject**.

When the user specifies a document in the dialog presented, **ole-control-insert-object** embeds this document in the **ole-control-pane** *pane*.

Notes This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Example See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also **ole-control-pane**

ole-control-ole-object *Function*

Summary Returns the **com:i-ole-object** of the component of an **ole-control-pane**.

Signature **ole-control-ole-object** *pane* **=>** *result*

Arguments *pane* An **ole-control-pane**.

Values *result* A **com:i-ole-object** or **nil**.

Description The function **ole-control-ole-object** returns the **com:i-ole-object** (that is, the **IOleObject** interface) of the component of the **ole-control-pane** *pane*, or **nil** if there isn't any.

Notes Calling **ole-control-ole-object** does not affect the reference count of the interface.

This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**

See also **ole-control-pane**

ole-control-pane *Class*

Summary A class that implements embedding of external components on Microsoft Windows.

Package **capi**

Superclasses **pinboard-layout**

Initargs **:component-name**
A string or **nil**.

:user-component
A COM interface pointer or **nil**.

:save-name A string.

:insert-callback
A function.

:close-callback

A function.

:sinks

A list of sink specifications.

Description

The class **ole-control-pane** is used to implement embedding of external components.

Note: **ole-control-pane** is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Note: even though it is a subclass of **pinboard-layout**, normally you should not use the **pinboard-layout** functionality when using **ole-control-pane**.

component-name (if non-nil) specifies the *component-name* of the pane, as used by **component-name.**

user-component (if non-nil) is a COM interface pointer of an object that supports the **I-OLE-OBJECT** interface, and is ready to display as described in **ole-control-user-component**.

save-name is used when creating the **IStorage** object for this component.

insert-callback (if non-nil) is a function that takes a single argument, the pane. It is called immediately after a component was inserted into the pane. This can be used for any additional initialization that is required, for example setting the properties of the control.

close-callback (if non-nil) is a function that takes a single argument, the pane. It is called just before the component is going to be closed, and can be used to do any cleanups that may be required.

sinks is a list of sink specifications for attaching event handlers to the source interfaces of the control. Each element of *sinks* should be a list of the form:

(*interface-name* &key *invoke-callback sink-class sink*)

The *interface-name* is used to specify the name of the source interface in the control, which is either a string naming the interface or **:default** for the default source interface. If *invoke-callback* is given, then it should be a function which will be called with the pane, method-name, method-kind and arguments vector for each source event. The *sink-class* can be given to set the class of the internal object used for the sink interface. This is similar to calling **attach-simple-sink**. Alternatively, instead of calling *invoke-callback*, the *sink* can be specified directly. This is similar to calling **attach-sink**.

When the **ole-control-pane** is destroyed, the sinks are automatically detached.

There are currently three ways to insert an external component into an **ole-control-pane**. These are:

1. Call **ole-control-user-component**, which asks the user for something to insert.
2. Set the *component-name* of the pane. This can be done either via the initarg **:component-name** or by calling **(setf component-name)**.
3. Set the *user-component* of the pane, either via the initarg **:user-component** or by calling **(setf ole-control-user-component)**.

Example

```
(capi:contain
 (list
  (make-instance 'capi:ole-control-pane
                 :component-name "OWC.Spreadsheet.9")))
```

See **examples/com/ole/simple-container/sink.lisp** for a full example.

See also

attach-sink
component-name
detach-sink
interface-menu-groups
ole-control-add-verbs

ole-control-close-object
ole-control-i-dispatch
ole-control-insert-object
ole-control-ole-object
ole-control-pane-frame
ole-control-user-component
report-active-component-failure

ole-control-pane-frame *Function*

Summary Returns the **ole-control-frame** of an **ole-control-pane**.

Signature **ole-control-pane-frame** *pane* **=>** *result*

Arguments *pane* An **ole-control-pane**.

Values *result* An **ole-control-frame** or **nil**.

Description The function **ole-control-pane-frame** returns the **ole-control-frame** of the **ole-control-pane** *pane*, if there is one.

Note: this function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also **ole-control-frame**
ole-control-pane

ole-control-pane-simple-sink *Class*

Summary A class that implements a sink interface for an embedded component on Microsoft Windows.

Package **capi**

Superclasses **com:simple-i-dispatch**

Initargs **:ole-control-pane**
A class instance.

Description The class **ole-control-pane-simple-sink** is used by the function **attach-simple-sink** to implement a sink interface for an embedded component on Microsoft Windows.

ole-control-pane is the object of type **ole-control-pane** to whose source interface the sink is being attached.

This class can be subclassed to provide additional functionality in callbacks. See **com:simple-i-dispatch** in the *LispWorks COM/Automation User Guide and Reference Manual* for more details.

Note: **ole-control-pane-simple-sink** is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also **attach-simple-sink**
ole-control-pane

ole-control-user-component *Function*

Summary Gets and sets the *user-component* of an **ole-control-pane**.

Signature **ole-control-user-component** *pane* **=>** *user-component*

(setf ole-control-user-component) *user-component pane* **=>** *user-component*

Arguments *pane* An **ole-control-pane**.

user-component A COM interface pointer.

Description The function **ole-control-user-component** gets and sets the *user-component* of the **ole-control-pane** *pane*.

user-component (if non-nil) is a COM interface pointer of an object that supports the **I-OLE-OBJECT** interface, and has been opened and initialized and is ready to be displayed. This is typically created by calling **OleCreate**, **OleCreate-FromFile**, **OleCreateFromData** or **OleLoad** with *pCLientSite* null.

The *user-component* is closed and released by the **ole-control-pane** *pane*, so after you have called **(setf ole-control-user-component)** you should not try to use it again or release it. Setting *user-component* also sets the pane's *component-name* to **nil**.

Notes

This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

See also

ole-control-pane

option-pane *Class*

Summary

A pane which offers a choice of items, but which displays only the currently selected item.

Package

capi

Superclasses

choice
titled-object
simple-pane

Initargs

:enabled Non-nil if the option pane is enabled.

:visible-items-count
An integer or the symbol **:default**.

:popup-callback
A function called just before the popup menu appears, or **nil**.

:image-function

A function providing images for items, or **nil**.

:image-lists

A plist of keywords and **image-list** objects.

:separator-item

An item that acts as a separator between other items, or **nil**.

:enabled-positions

A list of fixnums, or the keyword **:all**.

:window-styles

A list of keywords.

Accessors

option-pane-enabled
option-pane-image-function
option-pane-visible-items-count
option-pane-popup-callback
option-pane-separator-item
option-pane-enabled-positions

Description

The class **option-pane** provides a pane which offers a choice between a number of items via a popup menu. Only the currently selected item is displayed.

The class **option-pane** inherits from **choice**, and so has all of the standard choice behavior such as selection and call-backs. It also has an extra *enabled* slot along with an accessor which is used to enable and disable the option pane.

visible-items-count is implemented only on Microsoft Windows. If *visible-items-count* is an integer then the popup menu is no longer than this, and is scrollable if there are more items. If *visible-items-count* is **:default**, then the popup menu is no longer than 10. This is the default value.

When *popup-callback* is non-nil, it should be a function of one argument that will be called just before the popup menu appears when the user clicks on it. The single argument to the function is the option pane and the return value is ignored. If required, the function can change the items or selection of the pane. The default value of *popup-callback* is **nil**.

If *image-function* is non-nil, it should be a function of one argument which is called with each item. The return value depends on *image-lists*. If *image-lists* contains an **image-list** for the **:normal** key, then the result of *image-function* should be one of the following:

A pathname or string

: This specifies the filename of a file suitable for loading with **load-image**. Currently this must be a bitmap file.

A symbol

: The symbol must have been previously registered by means of a call to **register-image-translation**.

An image object, as returned by **load-image**.

An image locator object

: This allowing a single bitmap to be created which contains several button images side by side. See **make-image-locator** for more information. On Microsoft Windows, it also allows access to bitmaps stored as resources in a DLL.

An integer

: This is a zero-based index into the option-pane's **image-list**. This is generally only useful if the image list is created explicitly. See **image-list** for more details.

Otherwise if there is no **image-list** then it should return one of:

nil No image is shown.

An **image** object

The pane displays this image.

An image id or **external-image**

The system converts the value to a temporary **image** for the item and frees it when it is no longer needed.

If *image-function* is **nil**, no items have images. This is the default value..

If *image-lists* is specified, it should be a plist containing the keyword **:normal** as a key. The corresponding value should be an **image-list** object. No other keys are supported at the present time. The **image-list** associated with the **:normal** key is used with the *image-function* (see above) to specify an image to display in each tab.

separator-item should be an item (compared using *test-function*) that acts as a separator between other items. A separator item is not selectable. The default value **nil** means that there are no separators (regardless of *test-function*).

If *enabled-positions* is **:all** then all the items can be selected. Otherwise the value is a list of fixnums indicating the positions in the item list which can be selected. The default value is **:all**.

On Microsoft Windows Vista and Windows 7, if *window-styles* contains the keyword **:simple-text-only**, then the **option-pane** is displayed using the UI theme and the *enabled-positions*, *separator-item*, *image-function* and *visible-items-count* initargs are not supported. Otherwise it is displayed without the UI theme and those options work as documented. This is a limitation in Microsoft Windows.

Notes

1. **:image-function** and **:image-lists** are currently only implemented for Microsoft Windows, GTK+ and Cocoa.

2. On Motif, the separator is represented simply as a blank item between the other items.
3. On Motif and GTK+ versions older than 2.12, there is no visible representation of the disabled items.

Example

This example sets the selection and changes the enabled state of an **option-pane**:

```
(setq option-pane (capi:contain
                   (make-instance 'capi:option-pane
                                  :items '(1 2 3 4 5)
                                  :selected-item 3)))

(capi:apply-in-pane-process
 option-pane #'(setf capi:choice-selected-item)
 5 option-pane)

(capi:apply-in-pane-process
 option-pane #'(setf capi:option-pane-enabled)
 nil option-pane)

(capi:apply-in-pane-process
 option-pane #'(setf capi:option-pane-enabled)
 t option-pane)
```

This example illustrates the use of *visible-items-count* (Windows only):

```
(capi:contain
 (make-instance 'capi:option-pane
                :items
                (loop for i below 20 collect i)
                :visible-items-count 6))
```

There are further examples in the files **examples/capi/choice/option-pane.lisp** and **examples/capi/choice/option-pane-with-images.lisp**.

output-pane *Class*

Summary

An output pane is a pane whose display and input behavior can be controlled by the programmer.

Package **capi**

Superclasses **titled-object**
simple-pane
gp:graphics-port-mixin

Subclasses **pinboard-layout**
editor-pane

Initargs **:display-callback**

A function called to redisplay the pane.

:drawing-mode

A keyword controlling quality of drawing, especially anti-aliasing of text.

:graphics-options

A platform-specific plist of options controlling how graphics are drawn.

:draw-with-buffer

A boolean controlling whether output is buffered, on Windows and Motif.

:input-model A list of input specifications, otherwise known as a command table.

:scroll-callback

A function called when the pane is scrolled, or **nil**. The default is **nil**.

:pane-can-scroll

A generalized boolean specifying whether the pane itself is responsible for drawing into the visible area.

:focus-callback

A function called when the pane gets or loses the input focus, or **nil**. The default is **nil**.

:resize-callback

A function called when the pane is resized, or **nil**. The default is **nil**.

:create-callback

A function called just after the pane is created.

:destroy-callback

A function called just before the pane is destroyed.

:use-native-input-method

Controls whether to use native input method to interpret keyboard input. Currently this has an effect only on GTK+.

:composition-callback

This is called for various events related to composition, which here means composing input characters into other characters by an input method.

Accessors

output-pane-display-callback
output-pane-focus-callback
output-pane-resize-callback
output-pane-scroll-callback
output-pane-create-callback
output-pane-destroy-callback
output-pane-composition-callback
output-pane-input-model

Readers

output-pane-graphics-options

Description

The class **output-pane** is a subclass of **gp:graphics-port-mixin** which means that it supports many of the graphics ports drawing operations. When the CAPI needs to redisplay a region of the output pane, the *display-callback* gets called with the **output-pane** and the *x*, *y*, *width* and *height* of the region that needs redrawing. The *display-callback* should then use graphics port operations to redisplay that area. To force an area to be re-displayed, use the function **invalidate-rectangle**.

drawing-mode should be either **:compatible** which causes drawing to be the same as in LispWorks 6.0, or **:quality** which causes all the drawing to be transformed properly, and allows control over anti-aliasing on Microsoft Windows and GTK+. The default value of *drawing-mode* is **:quality**.

For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

graphics-options is currently only used by the Mac OS X Cocoa implementation. The single option defined is **:text-rendering**, with allowed values:

:glyph Draw glyphs directly using Core Graphics. This only draws characters with glyphs in the chosen font.

:atsui Draw using ATSUI APIs where possible.This is slower but can handle more characters.

When *draw-with-buffer* is true, display of the **output-pane** (that is drawing the background and calling the *display-callback*) is done by first drawing to a pixmap buffer, and then drawing from that buffer. This is useful to avoid flickering if the display is complex. The default value of *draw-with-buffer* is **nil**.

The *input-model* provides a means to get callbacks on mouse and keyboard gestures. An *input-model* is a list of mappings from gesture to callback, where each mapping is a list

(*gesture callback . extra-callback-args*)

gesture specifies the type of gesture, which can be Gesture Spec, character, button, key, command or motion.

In a Gesture Spec mapping, *gesture* can be simply the keyword **:gesture-spec**, which matches any keyboard input. For specific mappings, *gesture* is a list

(:gesture-spec *data [modifier])**

in which *data* is a character object or an integer between 0 and **char-code-limit** (interpreted as the character object obtained by **code-char**), or a keyword naming a function key, and each *modifier* is one of the keywords **:shift**, **:control** and **:meta**. Note that the **:meta** modifier is received only when the keys style is **:emacs** (see **interface-keys-style**).

Also *data* can be a string which is interpreted as a Gesture Spec as if by **sys:coerce-to-gesture-spec**. See the *LispWorks User Guide and Reference Manual* for a description of this and other functions for manipulating Gesture Spec objects.

Note: on Cocoa you cannot receive **Command** key gestures via Gesture Spec mapping in *input-model*. To receive **Command** key gestures you should add corresponding menu items with accelerators. See **menu-item** for information about accelerators.

In a character mapping, *gesture* can be simply the keyword **:character**, which matches any character input. For specific mappings, *gesture* can be a list containing a single character object *char*, or a list

(*char*)

Note: where input would match both a Gesture Spec mapping and a character mapping, the Gesture Spec mapping takes precedence.

In a button mapping, *gesture* should be list

(*button action [modifiers])**

where *button* is one of **:button-1**, **:button-2** or **:button-3** denoting the mouse buttons. *action* is one of **:press**, **:release**, **:second-press**, **:third-press**, **:nth-press** and **:motion**, and each *modifier* is one of the keywords **:shift**, **:control**, **:meta** and **:hyper**. The **:meta** modifier will be the **Alt** key on most keyboards. On Cocoa, the **:hyper** modifier is interpreted as the **Command** key for button and motion gestures. On Windows, the **:hyper** modifier is currently never generated, so gestures mappings using it will never be invoked. **:third-press** and **:nth-press** are supported only on Cocoa and Motif.

Key mappings are intended for detecting low-level keyboard input. In a key mapping, *gesture* should be a list

(:key [*keyname*] *action* [*modifiers*]*)

where the optional *keyname* is a character naming a key (no modifiers) or one of the valid Gesture Spec keywords, *action* is one of **:press** or **:release** and each modifier is one of the keywords **:shift**, **:control** and **:meta**. The callback will receive a Gesture Spec object, with its data set to an integer ASCII code or a keyword representing the primary item on the key and its modifiers representing the set of modifiers pressed. The **:meta** modifier will be the **Alt** key on most keyboards. On Cocoa, the **:hyper** modifier is interpreted as the **Command** key for **:key** input.

In a motion mapping, *gesture* can either be defined in terms of dragging a button (in which case it is defined as a button gesture with *action* **:motion**), or it can be defined for motions whilst no button is down by just specifying the keyword **:motion** with no additional arguments.

In a command mapping, gesture should be a command which is defined using **define-command**, and provides an alias for a gesture. The following commands are predefined:

:post-menu **(:button-3 :release)** on Microsoft Windows.

(:button-3 :press) on Motif.

(:button-1 :press :control) on Mac OS X.

:control-post-menu

(:button-3 :press :control) on Microsoft Windows, Motif and Mac OS X.

:keyboard-post-menu

(:gesture-spec :f10 :shift) on Microsoft Windows, Motif and Mac OS X.

Note that it is recommended you follow the style guidelines and conventions of the platform you are developing for when mapping gestures to results.

When user input matches *gesture*, *callback* is called with standard arguments and any *extra-callback-args* as extra arguments. The standard arguments are the **output-pane**, the x cursor position, the y cursor position, and in the case of Gesture Spec, character or key mappings, the input object that matched.

Button mappings with *action* **:press** are matched on the first button click, and they pass the standard arguments to their *callback*. Button mappings with *action* **:second-press** and **:third-press** are matched on the second and third button click made in quick succession, and again they pass the standard arguments to their *callback*. Button mappings with *action* **:nth-press** are matched on the *n*th button click made in quick succession when there is not a more specific match with **:press**, **:second-press** or **:third-press**. Then the integer *n* is also passed as the fourth argument to *callback*, representing the number of times that the button has been pressed in quick succession. If there is a **:press**, **:second-press** or **:third-press** handler then that is invoked instead of **:nth-press** for the corresponding number of presses.

Note: mouse gestures with **:press**, **:second-press**, **:third-press** and **:nth-press** actions can each be expected to be followed by a **:release** action.

Note: In some circumstances **:motion** events can be received even when the **output-pane** does not have the input focus. See window style **:motion-events-without-focus** under **interface** for details.

input-model can be set before the pane is displayed, but changes after that are ignored.

Also note that some built-in subclasses of **output-pane** specify their own *input-model*, so care should be taken when setting it. Generally an initial value supplied using the **:input-model** initarg will be prepended to any *input-model* specified by the built-in subclass (so your input gestures will override matching supplied gestures). However this is not true of **editor-pane**, where the **:input-model** initarg replaces the specified default *input-model*.

If *pane-can-scroll* is true then the pane is responsible for handling scrolling, by redrawing. It should draw into the visible area according to the scroll parameters. This is known as internal scrolling and an example is **editor-pane**. If *pane-can-scroll* is **nil**, then the CAPI is responsible for scrolling over the data range. The default value is **nil**. This is known as ordinary scrolling and there is an example in **output-panes/scroll-test.lisp**.

When the output pane is scrolled, the CAPI calls the *scroll-callback* if this is non-nil. The arguments of the scroll callback are the **output-pane**, the direction (**:vertical**, **:horizontal** or **:pan**), the scroll operation (**:move**, **:drag**, **:step** or **:page**), the amount of scrolling (an integer), and a keyword argument **:interactive**. This has value **t** if the scroll was invoked interactively, and value **nil** if the scroll was programmatic, such as via the function **scroll**. In the Mac OS X Cocoa implementation the direction is always **:pan**. See the following CAPI example files:

output-panes/scroll-test.lisp
output-panes/scrolling-without-bar.lisp
graphics/scrolling-test.lisp

focus-callback, if non-nil, is a function of two arguments. The first argument is the **output-pane** itself, and the second is a boolean. When the **output-pane** gets the focus, *focus-callback* is called with second argument **t**, and when the **output-pane** loses the focus, *focus-callback* is called with second argument **nil**.

resize-callback, if non-nil, is a function of five arguments called when the **output-pane** is resized. The first argument is the **output-pane** itself, and the rest are its new geometry: *x*, *y*, *width* and *height*.

create-callback, if non-nil, is a function of one argument which is called just after the pane is created (but before it becomes visible). The argument is the pane itself. This function can perform initialization such as loading images.

destroy-callback, if non-nil, is a function of one argument which is called just before the pane is destroyed, for example when the window is closed or the pane is removed from its layout. The argument is the pane itself. This function can perform cleanup operations (though note that images associated with the pane are automatically freed).

use-native-input-method should be **nil**, **t** or **:default**. If *use-native-input-method* is not supplied, or is **:default**, the default is used, which is controlled by **set-default-use-native-input-method**. The default setting is always to use native input methods.

composition-callback is a function with signature

composition-callback *pane what*

where *pane* is the output pane and *what* can be one of:

:start	The composition operation is starting.
:end	The composition ends.

A list — A plist describing the "preedit" string, which is a string containing the partial input that should be displayed while the composition is ongoing. These calls with a plist occur only when the underlying system does not display the partial input itself. Currently on Microsoft Windows the system always displays the preedit string itself, so these calls occur only on GTK+ and Cocoa.

During composition there will be repeated calls with a list, in general each time that the preedit string changes. Each call is a complete description of what needs to be displayed. The data from previous calls should be ignored.

The keys that can appear in the plist are currently:

`:string-face-lists` — The value is a list where each element is itself a list, where the first element is a string and the second a plist describing a face (a face plist). The strings are the strings that need to be displayed, and the face plist describing the face that the underlying GUI thinks that each string needs to be displayed. The face plist may contain any of the following keywords: **`:foreground`**, **`:background`**, **`:font`**, **`:bold-p`**, **`:italic-p`**, **`:underline-p`**. The argument *string-face-lists* may be **`nil`**, which means display nothing.

`:cursor` — The argument is an integer describing where the "cursor" should be displayed. The index is into the string that is concatenation of the strings in *string-face-lists*.

:selected-range

If present, the value specifies the selected range as a cons of start and length in characters. The start is an index into the string that is a concatenation of the strings in the *string-face-list*.

:selection-needs-face

A boolean specifying whether the *selected-range* should have a different face to the unselected range.

The editor uses the **:start** call to position the composition window at the cursor by using **set-composition-placement** and the calls with a list to display the partial composition string.

Notes

1. *draw-with-buffer* is typically useful for a **pinboard-layout** with large number of pinboard objects, or any other feature that may cause it to flicker.
2. The GTK+ and Cocoa libraries always buffer, so *draw-with-buffer* is ignored on these platforms.
3. In GTK+ versions before 2.12 the **:start** and **:end** calls are not reliable.

Example

Firstly, here is an example that draws a circle in an output pane.

```
(defun display-circle (self x y width height)
  (declare (ignore x y width height))
  (gp:draw-circle self 200 200 200 :filled t))

(capi:contain (make-instance
               'capi:output-pane
               :display-callback 'display-circle)
              :best-width 200 :best-height 200)
```

Here is an example that shows how to use a button gesture.

```
(defun test-callback (self x y)
  (capi:display-message
   "Pressed button 1 at (~S,~S) in ~S" x y self))

(capi:contain
 (make-instance
  'capi:output-pane
  :title "Press button 1:"
  :input-model `(((:button-1 :press)
                  test-callback)))
 :best-width 200 :best-height 200)
```

This example illustrates Gesture Spec mappings.

```
(defun draw-input (self x y gspec)
  (let ((data (sys:gesture-spec-data gspec))
        (mods (sys:gesture-spec-modifiers gspec)))
    (gp:draw-string
     self
     (with-output-to-string (ss)
       (sys:print-pretty-gesture-spec
        gspec ss :force-shift-for-upcase nil))
     x y)))

(capi:contain
 (make-instance
  'capi:output-pane
  :title "Press keys in the pane..."
  :input-model '((:gesture-spec
                  draw-input)))
 :best-width 200 :best-height 200)

(capi:contain
 (make-instance
  'capi:output-pane
  :title "Press Control-a in the pane..."
  :input-model '(((:gesture-spec "Control-a")
                  draw-input)))
 :best-width 200 :best-height 200)
```

Here is a simple example that draws the character typed at the cursor point.

```
(defun draw-character (self x y character)
  (gp:draw-character self character x y))

(capi:contain
 (make-instance
  'capi:output-pane
  :title "Press keys in the pane..."
  :input-model '((:character draw-character)))
 :best-width 200 :best-height 200)
```

This example shows how to use the motion gesture.

```
(defun draw-red-blob (self x y)
  (gp:draw-circle self x y 3
                  :filled t
                  :foreground :red))

(capi:contain
 (make-instance
  'capi:output-pane
  :title "Drag button-1 across this pane."
  :input-model '(((:button-1 :motion)
                  gp:draw-point)
                 ((:button-1 :motion :control)
                  draw-red-blob)))
 :best-width 200 :best-height 200)
```

This example illustrates the use of *focus-callback*:

```
(capi:contain
 (make-instance
  'capi:output-pane
  :focus-callback
  #'(lambda (x y)
      (format t
              "Pane ~a ~:[lost~;got~] the focus~%"
              x y))))
```

This example illustrates the use of *graphics-options* to specify ATSUI drawing on Cocoa:

```
(defvar *string*
  (coerce (loop for i from 0 below 60
                collect (code-char (* 5 i)))
          'text-string))

(capi:contain
 (make-instance 'capi:output-pane
                :visible-min-width 400
                :visible-max-height 50
                :display-callback
                #'(lambda (pane x y w h)
                    (gp:draw-string pane
                                    *string*
                                    10 10))
                :graphics-options
                '(:text-rendering :atsui)))
```

This example illustrates some effects of *drawing-mode*:

examples/capi/graphics/catherine-wheel.lisp

There are further examples in the directory **examples/capi/output-panes/**.

See also

define-command
pinboard-object
scroll
set-default-use-native-input-method
set-composition-placement

over-pinboard-object-p *Generic Function*

Summary

Tests whether a point lies within the boundary of a pinboard object.

Package

capi

Signature

over-pinboard-object-p *pinboard-object x y*

Description The generic function **over-pinboard-object-p** returns non-nil if the *x* and *y* coordinates specify a point within the boundary of a pinboard object. To find the actual object at this position, use **pinboard-object-at-position**.

The default method returns **t** if *x* and *y* are within the bounding area of the pinboard object. A method is supplied for **line-pinboard-object** and you may add methods for your own **pinboard-object** subclasses.

See also **pinboard-object-at-position**
pinboard-object-overlap-p
pinboard-object
pinboard-layout

page-setup-dialog *Function*

Summary Displays the page setup dialog for a given printer.

Package **capi**

Signature **page-setup-dialog &key** *screen owner printer continuation*

Description The **page-setup-dialog** function displays the page setup dialog for *printer*. If *printer* is not specified, the dialog for the current printer is displayed.

The CAPI screen on which to display the dialog is given by *screen*, which is the current screen by default.

owner specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts one argument. The *continuation* function is called with the values that would normally be returned by **page-setup-dialog**. On Cocoa, passing *contin-*

uation causes the dialog to be made as a window-modal sheet and **display-dialog** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

See also **current-printer**

pane-adjusted-offset *Generic Function*

Summary The **pane-adjusted-offset** generic function calculates the offset required to place a pane correctly in a layout.

Package **capi**

Signature **pane-adjusted-offset** *pane adjust available-size actual-size* **&key &allow-other-keys**

Description This function calculates the offset required by the *adjust* keyword so that the pane *pane* is placed correctly within the available space in its parent layout. It is called by all of the layouts that inherit from **x-y-adjustable-layout** to interpret the values of *x-adjust* and *y-adjust*.

Typically the value of *adjust* will be a keyword or a list of the form **(***keyword n***)** where *n* is an integer. These values of *adjust* are interpreted as by **pane-adjusted-position**.

However, new methods can accept alternative values for *adjust* where required and can also add extra keywords. For example, **grid-layout** allows *adjust* to be a list of adjust values, and then passes the offset into this list as an additional keyword.

Notes Only a keyword value for *adjust* should be supplied when *pane* is a **column-layout** or **row-layout**.

Example
```
(setq button-panel (make-instance 'capi:button-panel
                                  :items '(1 2 3)))
```

```
(capi:pane-adjusted-offset button-panel
                           :center 200 100)

(capi:pane-adjusted-offset button-panel
                           :left 200 100)

(capi:pane-adjusted-offset button-panel
                           :right 200 100)
```

See also **layout**
x-y-adjustable-layout

pane-adjusted-position *Generic Function*

Summary Calculates how to place a pane correctly within a layout, given a minimum and maximum position.

Package **capi**

Signature **pane-adjusted-position** *pane adjust min-position max-position* **&key &allow-other-keys**

Description The **pane-adjusted-position** generic function calculates the position required by the *adjust* argument so that the pane *pane* is placed correctly within the available space in its parent layout, given a minimum and maximum position. It is a complementary function to **pane-adjusted-offset**, and the default method actually calls **pane-adjusted-offset** with the gap between the two positions, and then adds on the minimum position to get the new position.

The default method accepts the following values for *adjust*.

:top	Place *pane* at the top of the region.
:bottom	Place *pane* at the bottom of the region.
:left	Place *pane* at the left of the region.
:right	Place *pane* at the right of the region.
:center	Place *pane* in the center of the region.

(:top *n*)	Place the top of *pane n* pixels below the top of the region.
(:bottom *n*)	Place the bottom of *pane n* pixels above the bottom of the region.
(:left *n*)	Place the left of *pane n* pixels after the left of the region.
(:right *n*)	Place the right of *pane n* pixels before the right of the region.
(:center *n*)	Place the center of *pane n* pixels below the center of the region.

However, new methods can accept alternative values for *adjust* where required and can also add extra keywords. For example, **grid-layout** allows *adjust* to be a list of adjust values, and then passes the offset into this list as an additional keyword. It is preferable to add new methods to **pane-adjusted-offset** as these changes will be seen by the default method of **pane-adjusted-position**.

Example

```
(setq button-panel (make-instance 'capi:button-panel
                                  :items '(1 2 3)))

(capi:pane-adjusted-position button-panel
                             :center 100 200)

(capi:pane-adjusted-position button-panel
                             :right 100 200)

(capi:pane-adjusted-position button-panel
                             :left 100 200)
```

See also

layout
graph-pane
x-y-adjustable-layout

pane-close-display *Function*

Summary Closes the X display of a pane.

Package **capi**

Signature **pane-close-display** *pane* **=>** *closedp*

Arguments *pane* A CAPI element.

Values *closedp* A boolean.

Description The function **pane-close-display** closes the X display connection on which *pane* is currently displayed. This destroys all the other panes on the same connection.

closedp is true if the connection was closed.

Notes **pane-close-display** works in the X11/Motif implementation only, and not on Microsoft Windows.

pane-descendant-child-with-focus *Function*

Summary Finds the child with the input focus.

Signature **pane-descendant-child-with-focus** *pane* **=>** *result*

Arguments *pane* A pane or layout.

Values *result* A pane or **nil**.

Description The function **pane-descendant-child-with-focus** attempts to find the pane inside *pane* that currently has the input focus, and returns this pane if successful.

pane-descendant-child-with-focus may return **nil** if it does not find a pane with the focus.

See also **pane-has-focus-p**

pane-got-focus *Generic Function*

Summary A function called when the focus is set programmatically.

Package **capi**

Signature **pane-got-focus** *interface pane*

Arguments
- *interface* The interface of *pane*.
- *pane* A CAPI element.

Description The generic function **pane-got-focus** is called just before the focus is set by **set-object-automatic-resize**.

The supplied primary method does nothing. You may add methods on your own interface classes, which can be useful for example when the focus is set programmatically to a pane which is hidden inside a **tab-layout** or **switchable-layout**. Your method can check for this case and modify the layout as required.

See also **set-object-automatic-resize**

pane-has-focus-p *Generic Function*

Summary Determines whether a pane has the focus.

Package **capi**

Signature **pane-has-focus-p** *pane* **=>** *focusp*

Arguments
- *pane* A CAPI element.

Values
- *focusp* A boolean.

Description The function **pane-has-focus-p** is the predicate for whether *pane* currently has the input focus.

Notes On Motif, **pane-has-focus-p** cannot be used in menu functions such as the *enabled-function* or *popup-callback* of a menu item. It will always return **nil,** because the focus is on the menu button when the user clicks on it.

See also **accepts-focus-p**
pane-descendant-child-with-focus
set-object-automatic-resize

pane-initial-focus *Generic Function*

Summary Gets or sets the initial focus pane.

Package **capi**

Signature **pane-initial-focus** *pane-with-children* **=>** *pane*

Signature **(setf pane-initial-focus)** *pane pane-with-children* **=>** *pane*

Arguments *pane-with-children*
A pane with children.

Values *pane* A child of *pane-with-children*.

Description The generic function **pane-initial-focus** returns the child of *pane-with-children* that has the input focus when *pane-with-children* is first displayed.

(setf pane-initial-focus) may be used to set the initial focus pane, but only before *pane-with-children* has been created. If the setter is called after *pane-with-children* has been created, an error is signalled.

pane-with-children should be a pane with child panes such as a **layout**, an **interface**, a **button-panel** or a **toolbar**.

See also **pane-has-focus-p**

pane-interface-copy-object
pane-interface-copy-p
pane-interface-cut-object
pane-interface-cut-p
pane-interface-deselect-all
pane-interface-deselect-all-p
pane-interface-paste-object
pane-interface-paste-p
pane-interface-select-all
pane-interface-select-all-p
pane-interface-undo
pane-interface-undo-p

Generic Functions

Summary Implements "edit/select operations" and the associated predicates for the active pane.

Signature **pane-interface-copy-object** *pane interface* => *object, string, plist*

pane-interface-copy-p *pane interface*

pane-interface-cut-object *pane interface*

pane-interface-cut-p *pane interface*

pane-interface-deselect-all *pane interface*

pane-interface-deselect-all-p *pane interface*

pane-interface-paste-object *pane interface*

pane-interface-paste-p *pane interface*

pane-interface-select-all *pane interface*

pane-interface-select-all-p *pane interface*

pane-interface-undo *pane interface*

pane-interface-undo-p *pane interface*

Description

The active pane "edit/select operations" call these generic functions when the active pane does not specify how to perform the operation. Do not call these directly.

interface is the top level interface of the pane. The predicate functions (those with names ending with **-p**) should return true if the operation can be performed. The other functions should perform the operations.

You can implement your own methods specializing on pane and interface classes.

Notes

1. These generic functions should not display a dialog or do anything that may cause the system to hang. In general this means interacting with anything outside the Lisp image, including files, databases and so on.
2. The three return values of **pane-interface-copy-object** are passed to **set-clipboard**.

See also

active-pane-copy
item-pane-interface-copy-object
set-clipboard

pane-popup-menu-items *Generic Function*

Summary

Generates the items for the menu associated with a pane.

Package

capi

Signature

pane-popup-menu-items *pane interface* **=>** *items*

Arguments	*pane*	A pane in interface *interface*.
	interface	An interface.
Values	*items*	A list in which each element is a **menu-item**, **menu-component** or **menu**.

Description

The generic function **pane-popup-menu-items** generates the items for the menu associated with the pane *pane*. The default method of **make-pane-popup-menu** calls **pane-popup-menu-items** to find the items for the menu. If **pane-popup-menu-items** returns **nil**, then **make-pane-popup-menu** returns **nil**.

To specify items for menus associated with panes in your interfaces, define **pane-popup-menu-items** methods specialized on your interface class.

For most supplied CAPI pane classes, the system method returns **nil**. The exceptions are **editor-pane** and **graph-pane**. To inherit the items from the system method (or other more general method), call **call-next-method**.

Notes

1. **pane-popup-menu-items** is not supported for text panes on Cocoa such as **rich-text-pane**.
2. **pane-popup-menu-items** is intended to allow multiple calls on the same pane, to generate menus in different places (as in the example in **make-pane-popup-menu**). Therefore the **menu-object**s that it returns, and their descendent **menu-object**s, must be constructed each time that **pane-popup-menu-items** is called, so that no two menus share any menu item.
3. The *items* returned by **pane-popup-menu-items** may specify the arguments for their callbacks, but it is not required. If they do not specify the arguments, then **make-pane-popup-menu** (by calling **make-menu-for-pane**) sets up the callbacks such that they are called on the pane *pane*.

Example

The methods below specialized on interface class **edgraph**:

1. Append the items that were returned by the system method in the bottom of the menu for the **editor-pane**, and
2. Add them as a sub-menu for the menu of the **graph-pane**.

```
(capi:define-interface edgraph ()
  ()
  (:panes
   (e1 capi:editor-pane)
   (g1 capi:graph-pane))
  (:layouts
   (main-layout capi:column-layout '(e1 g1)))
  (:menu-bar  )
  (:default-initargs
   :visible-min-width 200
   :visible-min-height 300))

(defun my-callback (pane)
  (capi:display-message "Callback on pane ~S." pane))

(defmethod capi:pane-popup-menu-items
           ((self capi:editor-pane) (interface edgraph))
  (list*
   (make-instance 'capi:menu-item
                  :title "Item for My Editor Menu."
                  :selection-callback 'my-callback)
   (call-next-method)))

(defmethod capi:pane-popup-menu-items
            ((self capi:graph-pane) (interface edgraph))
  (list
   (make-instance 'capi:menu-item
                  :title "Item for My Graph Menu."
                  :selection-callback 'my-callback)
   (capi:make-menu-for-pane self (call-next-method)
                            :title "Default Graph Menu")))

(capi:display (make-instance 'edgraph))
```

There is a further example in:

```
examples/capi/elements/pane-popup-menu-items.lisp
```

See also **make-pane-popup-menu**

pane-screen-internal-geometry *Function*

Summary Returns the internal geometry of the monitor in which a pane's interface is displayed.

Package **capi**

Signature **pane-screen-internal-geometry** *pane* **=>** *x*, *y*, *width*, *height*

Arguments

pane	A CAPI pane.

Values

x	An integer.
y	An integer.
width	A positive integer.
height	A positive integer.

Description The function **pane-screen-internal-geometry** returns the internal geometry of the "monitor" in which the interface that contains *pane* is displayed. A "monitor" is typically a physical monitor, but can be anything that the underlying GUI system considers a monitor.

pane must be inside an interface that is already displayed. **pane-screen-internal-geometry** returns the internal geometry of the monitor on which this interface is displayed. If the interface spreads across multiple monitors, it returns the geometry for the monitor on which the largest area of the interface is displayed.

The internal geometry of a monitor is a rectangle which excludes "system areas" like taskbars and global menu bars and so on. Examples of these include the Windows taskbar,

the Mac OS X menu bar, and the Mac OS X dock. See **screen-internal-geometry** for information about displaying CAPI windows in system areas.

x, *y*, *width* and *height* specify a screen rectangle, in which the *x* and *y* coordinates are offsets from the top-left of the primary monitor.

Notes

On GTK+ the internal geometry is of the workspace in which the interface is displayed. When there are multiple monitors these values may be incorrect. You can check the number of monitors by **screen-monitor-geometries**.

See also

screen-internal-geometry
screen-internal-geometries
virtual-screen-geometry

pane-string *Generic Function*

Summary

Returns the text displayed in an **editor-pane**.

Package

capi

Signature

pane-string *pane* **=>** *text*

Arguments

pane An **editor-pane**.

Values

text A string.

Description

The generic function **pane-string** returns as a string the text of the buffer that is currently displayed in the **editor-pane** *pane*.

See also

editor-pane

pane-supports-menus-with-images *Function*

Summary Tests whether a pane supports menus with images.

Signature **pane-supports-menus-with-images** *pane* **=>** *result*

Arguments *pane* A displayed CAPI pane.

Values *result* A boolean.

Description The function **pane-supports-menus-with-images** returns **t** if the pane supports menus with images. This means that the menus display both the images and the text correctly.

See the *image-function* of **menu** for details of creating a menu with images.

When **pane-supports-menus-with-images** returns **nil**, menus can display images, but not together with text at the same item They may also display images with transparency incorrectly.

Whether the pane supports menus with images depends on the library in which it is displayed. Support is currently limited to GTK+ and Cocoa.

See also **menu**

parse-layout-descriptor *Generic Function*

Summary Returns the geometry object associated with a layout's child.

Package **capi**

Signature **parse-layout-descriptor** *child-descriptor interface layout*

Description The generic function **parse-layout-descriptor** takes a description of a layout's child, and returns the geometry object associated with that child. It is called by **interpret-description** to parse individual children in a layout.

The default method accepts a *child-desc* argument which can be a pane (subclass of **simple-pane** or **pinboard-object**), a geometry object, or a symbol naming a slot in the interface which contains such a pane.

See also **interpret-description**
define-layout
layout

password-pane *Class*

Summary The password pane is a pane designed for entering passwords, such that when the password is entered it is not visible on the screen.

Package **capi**

Superclasses **text-input-pane**

Initargs **:overwrite-character**
A **base-char**.

Readers **password-pane-overwrite-character**

Description The password pane inherits most of its functionality from **text-input-pane**. It starts with the initial text and caret position specified by the arguments *text* and *caret-position* respectively, and limits the number of characters entered with the *max-characters* argument (which defaults to **nil**, meaning there is no maximum).

The password pane can be enabled and disabled with the **text-input-pane** accessor **text-input-pane-enabled**.

overwrite-character is a **base-char** which is the character to display instead of the real characters. The default value of *overwrite-character* is #*.

Example

```
(setq password-pane (capi:contain
                     (make-instance
                      'capi:password-pane
                      :callback
                      #'(lambda (password interface)
                                (capi:display-message
                                "Password: ~A"
                                password)))))

(capi:text-input-pane-text password-pane)

(setq password-pane
      (capi:contain
       (make-instance 'capi:password-pane
                      :max-characters 5
                      :text "abc"
                      :overwrite-character #\$)))

(capi:password-pane-overwrite-character password-pane2)
```

See also

editor-pane
text-input-pane

play-sound *Function*

Summary Plays a loaded sound on Microsoft Windows and Cocoa.

Package **capi**

Signature **play-sound** *sound* **&key** *wait*

Arguments

sound	A sound object returned by **load-sound**.
wait	A generalized boolean.

Description The function **play-sound** plays the loaded sound *sound*.

If *wait* is true then **play-sound** will not return until *sound* has finished playing. That is, it plays the sound synchronously. The default value of *wait* is **nil**.

Notes
1. **:wait t** is only implemented on Microsoft Windows.
2. **play-sound** is not implemented on GTK+ and Motif.

See also **load-sound**
stop-sound

pinboard-layout *Class*

Summary The class **pinboard-layout** provides two very useful pieces of functionality for displaying CAPI windows. Firstly it is a subclass of **static-layout** and so it allows its children to be positioned anywhere within itself (like a pinboard). Secondly it supports **pinboard-object**s which are rectangular areas within the layout which have size and drawing functionality.

Package **capi**

Superclasses **output-pane**
static-layout

Subclasses **simple-pinboard-layout**

Initargs **:highlight-style**
A keyword.

Description When a **pinboard-layout** lays out its children, it positions them at the *x* and *y* specified as hints (using **:x** and **:y**), and sizes them to their minimum size (which can be specified using **:visible-min-width** and **:visible-max-width**).

By default, the **pinboard-layout** is made sufficiently large to accomodate all of its children, as specified by *fit-size-to-children* in the superclass **static-layout**. Note that results in the pinboard resizing itself automatically when objects are added, moved or removed. If you need the sizing capabilities, then use the class **simple-pinboard-layout** which surrounds a single child, and adopts the size constraints of that child.

The pinboard layout handles the display of pinboard objects itself by calculating which objects are visible in the region that needs redrawing, and then by calling the generic function **draw-pinboard-object** on these objects in the order that they are specified in the layout description. This means that if two pinboard objects overlap, the later one in the layout description will be on top of the other one. In other words, the description defines the Z-order for objects of type **pinboard-object**. For information about controlling this order, see **layout** and **manipulate-pinboard**.

Note: objects of type **simple-pane** are drawn directly by the windowing system and cannot be clipped relative to **pinboard-object**s, which are drawn by CAPI. Therefore **simple-pane**s always appear on top in a pinboard, and their position in the description does not affect the Z-order.

Highlighting of the layout's children by **highlight-pinboard-object** is controlled by the value of *highlight-style*, as follows:

:invert	Swaps the foreground and background colors.
:standard	Uses system colors.
:default	Calls **draw-pinboard-object-highlighted**.

The default value of *highlight-style* is **:default**.

Notes

1. The **output-pane** initarg **:drawing-mode** controls quality of drawing in a **pinboard-layout**, including anti-aliasing of any text displayed on Microsoft Windows and GTK+.
2. If redrawing flickers on Microsoft Windows or Motif, perhaps because there are many pinboard objects, you can pass the **output-pane** initarg **:draw-with-buffer t**, which uses a pixmap to buffer the output before drawing it to the screen. See **output-pane** for more information.

Example

Here are some examples of the use of pinboard objects with pinboard layouts.

```
(capi:contain
 (make-instance
  'capi:pinboard-layout
  :description
  (list
   (make-instance
    'capi:image-pinboard-object
    :image
    (sys:lispworks-file
     "examples/capi/graphics/Setup.bmp")
    :x 20 :y 20)))
 :best-width 540 :best-height 415)

(capi:contain
 (make-instance
  'capi:pinboard-layout
  :description (list
                (make-instance
                 'capi:item-pinboard-object
                 :text "Hello"
                 :x 40 :y 10)
                (make-instance
                 'capi:line-pinboard-object
                 :x 10 :y 30
                 :visible-min-width 100)))
                :best-width 200 :best-height 200)
```

There are further examples in the directories **examples/capi/applications/** and **examples/capi/graphics/**.

This example illustrates use of *draw-with-buffer* **t**:

examples/capi/graphics/compositing-mode.lisp

See also

manipulate-pinboard
output-pane
pinboard-object
redraw-pinboard-object
static-layout

pinboard-object *Class*

Summary

Provides a rectangular area in a **pinboard-layout** with drawing capabilities.

Package

capi

Superclasses

capi-object

Subclasses

ellipse
item-pinboard-object
image-pinboard-object
line-pinboard-object
drawn-pinboard-object
rectangle

Initargs

:pinboard The output pane on which the pinboard object is drawn.

:activep If **t**, the pinboard object is made active.

:graphics-args
A plist of Graphics Ports drawing options.

:automatic-resize
A plist.

The following initargs are geometry hints, influencing the initial size and position of a **pinboard-object**:

:x The *x* position of the pinboard object in the pinboard.

:y The *y* position of the pinboard object in the pinboard.

:external-min-width

The minimum width of the pinboard object in the pinboard.

:external-min-height

The minimum height of the pinboard object in the pinboard.

:external-max-width

The maximum width of the pinboard object in the pinboard.

:external-max-height

The maximum height of the pinboard object in the pinboard.

:visible-min-width

The minimum visible width of the pinboard object.

:visible-min-height

The minimum visible height of the pinboard object.

:visible-max-width

The maximum visible width of the pinboard object.

:visible-max-height

The maximum height of the pinboard object.

:internal-min-width

The minimum width of the display region.

:internal-min-height

The minimum height of the display region.

:internal-max-width

The maximum width of the display region.

:internal-max-height

The maximum height of the display region.

Accessors

pinboard-object-pinboard
pinboard-object-activep
pinboard-object-graphics-args

Description

The class **pinboard-object** provides a rectangular area in a **pinboard-layout** with drawing and highlighting capabilities. A pinboard object behaves just like a simple pane within layouts, meaning that they can be placed into rows, columns and other layouts, and that they size themselves in the same way. The main distinction is that a pinboard object is a much smaller object than a simple pane as it does not need to create a native window for itself.

Each pinboard object is placed into a pinboard layout (or into a layout itself inside a pinboard layout), and then when the pinboard layout wishes to redisplay a region of itself, it calls the function **draw-pinboard-object** on each of the pinboard objects that are contained in that region (in the order that they are specified as children to the layout).

The *graphics-args* slot allows drawing options to be set. These include the font, the background and foreground colors, and others (see **graphics-state**).

The geometry hints are interpreted as described for **element**.

By default a **pinboard-object** does not accept the input focus.

There are a number of predefined pinboard objects provided by the CAPI. They are as follows:

ellipse Draws an ellipse.

rectangle Draws a rectangle.

item-pinboard-object

Draws a title.

line-pinboard-object

Draws a line.

right-angle-line-pinboard-object

Draws a right-angled line.

image-pinboard-object

Draws an image.

drawn-pinboard-object

Uses a user-defined display function.

The main user of pinboard objects in the CAPI is the graph pane, which uses **item-pinboard-object** and **line-pinboard-object** to display its nodes and edges respectively.

To force a pinboard object to redraw itself, either call the function **invalidate-rectangle** on it (in which case the redrawing is done immediately), or call **redraw-pinboard-object** in which case the redrawing may be cached and displayed at a later date.

Call the generic functions **highlight-pinboard-object** and **unhighlight-pinboard-object** to highlight a pinboard and remove its highlighting. If you want non-standard highlighting, you can implement methods for your subclass of **pinboard-object**.

You can test whether a whether a point or region coincides with a pinboard object by the generic functions **over-pinboard-object-p** and **pinboard-object-overlap-p**. The default methods assume a rectangle based on the geometry, which must always be the enclosing rectangle of the whole pinboard object. Therefore you only need to implement methods if your subclass of **pinboard-object** has a non-rectangular shape.

automatic-resize makes the pinboard object resize automatically. This has an effect only if it is placed inside a **static-layout** (including subclasses like **pinboard-layout**). The effect is that when the **static-layout** is resized then the pinboard object also changes its geometry.

The value of *automatic-resize* defines how the pinboard object's geometry changes. It must be a plist of keywords and values which match the keywords of the function **set-object-automatic-resize** and are interpreted in the same way.

Notes

You can also control automatic resizing of a pinboard object using **set-object-automatic-resize**.

Example

See the file **examples/capi/graphics/pinboard-test.lisp**.

See also

pinboard-layout
draw-pinboard-object
graph-pane
highlight-pinboard-object
over-pinboard-object-p
redraw-pinboard-object
redraw-pinboard-layout
pinboard-object-overlap-p
set-object-automatic-resize
unhighlight-pinboard-object

pinboard-object-at-position *Generic Function*

Summary

The generic function **pinboard-object-at-position** returns the uppermost pinboard object containing a specified point.

Package

capi

Signature **pinboard-object-at-position** *pinboard x y*

Description This function returns the uppermost pinboard object in the pinboard that contains the point specified by *x* and *y*. It determines this by mapping over every pinboard object within the pinboard until it finds one for which the generic function **over-pinboard-object-p** returns **t**.

Example

```
(setq pinboard
      (capi:contain
       (make-instance
        'capi:pinboard-layout)
       :best-width 300
       :best-height 300))

(make-instance 'capi:item-pinboard-object
               :text "Hello world"
               :x 100 :y 100
               :parent pinboard)

(capi:pinboard-object-at-position pinboard 0 0)

(capi:pinboard-object-at-position pinboard 110 110)
```

See also **over-pinboard-object-p**
pinboard-object-overlap-p
pinboard-object
pinboard-layout

pinboard-object-graphics-arg *Generic Function*

Summary Gets or sets the value of a particular drawing parameter in a **pinboard-object**.

Package **capi**

Signature **pinboard-object-graphics-arg** *self keyword* **=>** *value*

Signature **(setf pinboard-object-graphics-arg)** *value self keyword* **=>** *value*

Arguments	*self*	A **pinboard-object**.
	keyword	A keyword denoting a graphics state parameter.
Values	*value*	The value of the drawing option *keyword* in *self*.

Description The generic function **pinboard-object-graphics-arg** returns or sets the value of the graphics state parameter *keyword* in *self*.

See **graphics-state** for details of the drawing parameters.

See also **graphics-state**
pinboard-object

pinboard-object-overlap-p *Generic Function*

Summary Tests whether a specified region overlaps with the region of a pinboard object.

Package **capi**

Signature **pinboard-object-overlap-p** *pinboard-object top-left-x top-left-y bottom-right-x bottom-right-y* **=>** *result*

Description The generic function **pinboard-object-overlap-p** returns true if the region of the pinboard object *pinboard-object* overlaps with the region specified by the other arguments.

See also **pinboard-object-at-position**
over-pinboard-object-p
pinboard-object
pinboard-layout

pinboard-pane-position *Generic Function*

Summary Gets and sets the location of an object inside its parent **pinboard-layout**.

Package **capi**

Signature **pinboard-pane-position** *self* **=>** *x*, *y*

setf (pinboard-pane-position *self***) (values** *x y***) =>** *x*, *y*

Arguments

self	A **pinboard-object** or **simple-pane**.

Values

x, *y*	The horizontal and vertical coordinates in the **pinboard-layout** parent of *self*.

Description The generic function **pinboard-pane-position** returns as multiple values *x*, *y* the coordinates of *self* inside its parent **pinboard-layout**.

There is also a **setf** expansion which sets the location of *self* in its parent.

Example

```
(let* ((po (make-instance 'capi:item-pinboard-object
                          :text "5x5" :x 5 :y 5
                          :graphics-args
                          '(:background :red)))
       (pl (capi:contain
            (make-instance 'capi:pinboard-layout
                           :description (list po)
                           :visible-min-width 200
                           :visible-min-height 200))))
  (capi:execute-with-interface
   (capi:element-interface pl)
   #'(lambda (po)
       (dotimes (x 20)
         (mp:wait-processing-events 1)
         (let ((new-x (* (1+ x) 10))
               (new-y (* 5 (+ 2 x))))
           (setf (capi:item-text po)
                 (format nil "~ax~a" new-x new-y))
           (setf (capi:pinboard-pane-position po)
                 (values new-x new-y)))))
   po))
```

See also **pinboard-layout**
pinboard-pane-size

pinboard-pane-size *Generic Function*

Summary Gets and sets the size of an object inside its parent **pinboard-layout**.

Package **capi**

Signature **pinboard-pane-size** *self* **=>** *width*, *height*

setf (pinboard-pane-size *self***) (values** *width height***) =>** *width*, *height*

Description The generic function **pinboard-pane-size** returns as multiple values *width*, *height* the dimensions of *self*.

There is also a **setf** expansion which sets the dimensions of *self*.

Example

```
(let* ((po (make-instance 'capi:pinboard-object
                          :x 5 :y 5
                          :width 5 :height 5
                          :graphics-args
                          '(:background :red)))
       (pl (capi:contain
            (make-instance 'capi:pinboard-layout
                           :description (list po)
                           :visible-min-width 200
                           :visible-min-height 200))))
  (capi:execute-with-interface
   (capi:element-interface pl)
   #'(lambda(po)
       (dotimes (x 20)
         (mp:wait-processing-events 1)
         (let ((new-x (* (1+ x) 10))
               (new-y (* 5 (+ 2 x))))
           (setf (capi:pinboard-pane-size po)
                 (values new-x new-y)))))
   po))
```

See also **pinboard-layout**
pinboard-pane-position

popup-confirmer *Function*

Summary The **popup-confirmer** function creates a dialog with predefined implementations of **OK** and **Cancel** buttons and a user specified pane in a layout with the buttons.

Package **capi**

Signature **popup-confirmer** *pane message* **&rest** *interface-args* **&key** *modal title title-font value-function exit-function apply-function apply-check apply-button ok-function ok-check ok-button no-button no-function all-button all-function cancel-button help-button help-function buttons print-function callbacks callback-type button-position buttons-uniform-size-p foreground background font screen focus owner x y position-relative-to button-container button-font continuation callback-error-handler* **=>** *result, successp*

Arguments *pane* A CAPI pane or interface.

message A string or **nil**.

modal, *screen*, *focus*, *owner*, *x*, *y*, and *position-relative-to*
These are passed to **display-dialog**.

title A string specifying the title of the dialog window.

title-font The font used in the title.

value-function Controls the value returned, and whether a value can be returned.

exit-function Called on exiting the dialog.

apply-function, apply-check, apply-button
Define the callback, check function and title an **Apply** button.

ok-function, ok-check, ok-button
Define the callback, check function and title of an **OK** button.

no-button, no-function
Define the title and callback of a **No** button.

all-button, *all-function*
Define the title and callback of an **All** button.

cancel-button Defines the title of a **Cancel** button.

help-button, *help-function*
Define the title and callback of a **Help** button.

buttons Defines extra buttons.

print-function Displays *ok-button*, *no-button*, *cancel-button*, *apply-button* and *all-button* as button titles.

callbacks Defines callbacks for *buttons*.

callback-type Specifies the callback-type of *buttons*.

button-position One of **:bottom**, **:top**, **:left**, **:right**.

buttons-uniform-size-p

Controls relative button sizes.

foreground, *background*

Specify colors.

font A font or a font description.

button-font A font or a font description.

button-container A layout controlling where the buttons of the dialog appear.

continuation A function or **`nil`**.

callback-error-handler

A function designator or **`nil`**.

Values

result The result of *value-function*, or *pane*, or **`nil`**.

successp **`nil`** if the dialog was cancelled, **`t`** otherwise.

Description

The function **`popup-confirmer`** provides the quickest means to create new dialogs, as it will create and implement **OK**, **Cancel** and other buttons as required by your dialog, and will place a user-specified pane in a layout along with the buttons.

Generally the **`Return`** key selects the dialog's **OK** button and the **`Escape`** key selects the **Cancel** button, if there is one.

The argument *value-function* should provide a callback which is passed *pane* and should return the value to return from **`popup-confirmer`**. If *value-function* is not supplied, then *pane* itself will be returned as *result*. If the *value-function* wants to indicate that the dialog cannot return a value currently, then it should return a second value that is non-nil.

The *ok-check* function is passed the result returned by the *value-function* and should return true if it is acceptable for that value to be returned. These two functions are used by **`popup-confirmer`** to decide when the **OK** button should be

enabled, thus stopping the dialog from returning with invalid data. The **OK** button's state can be updated by a call to **redisplay-interface** on the top-level, so the dialog should call it when the button may enable or disable.

The arguments *ok-button*, *no-button* and *cancel-button* are the text strings for each button, or **nil** meaning do not include that button. The *ok-button* returns successfully from the dialog (with the result of *value-function*), the *no-button* means continue but return **nil**, and the *cancel-button* aborts the dialog. Note that there are clear expectations on the part of users as to the functions of these buttons — check the style guidelines of the platform you are developing for.

apply-button, if passed, specifies the title of an extra button which appears near to the **OK** button. *apply-check* and *apply-function* define its functionality.

all-button, if passed, specifies the title of an extra button which is always enabled and which appears near to the *apply-button* (if that exists) or the **OK** button. *all-function* defines its functionality.

help-button, if passed, specifies the title of a help button which appears to the right of the **Cancel** button. *help-function* defines its functionality.

print-function is called on the various *button* arguments to generate a string to display for each button title.

button-position specifies where to put the buttons. The default is **:bottom**.

buttons-uniform-size-p specifies whether the buttons are all the same size, regardless of the text on them. The default is **t**, but **nil** can be passed to make each button only as wide as its text.

foreground and *background* specify colors to use for the parts of the dialog other than *pane*, including the buttons

font specifies the font to use in the *message*.

button-font specifies the font to use in the buttons.

button-container indicates where the buttons of the dialog appear. It must be a layout which is a descendent of *pane*. The description of this layout is automatically set to the button-panel containing the buttons.

The arguments *exit-function*, *ok-function* and *no-function* are the callbacks that get done when exiting, pressing **OK** and pressing **No** respectively. The *exit-function* defaults to **exit-confirmer**, the *ok-function* defaults to the *exit-function* and the *no-function* defaults to a function exiting the dialog with **nil**.

The arguments *buttons*, *callbacks* and *callback-type* are provided as a means of extending the available buttons. The buttons provided by *buttons* will be placed after the buttons generated by **popup-confirmer**, with the functions in *callbacks* being associated with them. Finally *callback-type* will be provided as the callback type for the buttons.

If any of *callbacks* need to access *pane*, you could use **confirmer-pane** together with a *callback-type* that passes the interface.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **popup-confirmer**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **popup-confirmer** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

callback-error-handler, if non-nil, should be a function designator for a function of one argument which is a condition, like the *handler-function* in **cl:handler-bind**. The handler is established (by **cl:handler-bind** with type **cl:error**) around each callback call inside the scope of **popup-con-**

firmer or **display-dialog**. In recursive calls, only the handler of the innermost call to **popup-confirmer** or **display-dialog** is established.

callback-error-handler can use **current-popup** to find the popup (first argument to the innermost call of **display-dialog** or **popup-confirmer**).

If *callback-error-handler* wants to do a non-local exit, it should either call **abort-callback** to abort the callback but leave the dialog, or **exit-dialog** (or **abort-dialog**) to exit (or abort) the dialog.

All other arguments will be passed to the call to **make-instance** for the interface that will be displayed using **display-dialog**. Thus geometry information, colors, and so on can be passed in here as well. By default, the dialog will pick up the foreground, background and font of *pane*.

Notes

1. On Windows and Motif, the effect of *callback-error-handler* can be achieved by using **cl:handler-bind** around the call to **display-dialog** or **popup-confirmer** (the handler will also handle errors during raising the dialog, but these are not expected to happen). On Cocoa, using such an error handler does not necessarily work, because the callback may happen in another process. *callback-error-handler* ensures that the callback is in the scope of the handler on all plaforms. From the same reason the handler should not rely on the dynamic environment (including catchers and restarts), and needs to use **current-popup** to find its "context" and use **abort-callback**, **exit-dialog** or **abort-dialog** for non-local exit.
2. If the callback itself calls **popup-confirmer** or **display-dialog**, the *callback-error-handler* handler will stay until the callback returns. Unless the recursive call handles the error, the handler of the outer call may be called to handle it, and needs to be written to deal with this possibility correctly. If the handler inside a recursive call needs to

access the popup that was used in the same call that the handler was used, it should close over it, because **`current-popup`** returns the innermost one.

3. A handler that is established by the callback (by **`cl:handler-bind`** or **`cl:handler-case`**) is inside the scope of the *callback-error-handler*, and therefore will be called first.

Example

Here are two simple examples which implement the basic functionality of two CAPI prompters: the first implements a simple **`prompt-for-string`**, while the second implements **`prompt-for-confirmation`**.

```
(capi:popup-confirmer
  (make-instance 'capi:text-input-pane
                 :callback
                 'capi:exit-confirmer)
  "Enter some text:"
  :value-function 'capi:text-input-pane-text)

(capi:popup-confirmer nil
  "Yes or no?"
  :callback-type :none
  :ok-button "Yes"
  :no-button "No"
  :cancel-button nil
  :value-function #'(lambda (dummy) t))
```

This example demonstrates the use of **`:redisplay-interface`** to make the **OK** button enable and disable on each keystroke.

```
(defun pane-integer (pane)
  (ignore-errors (values
                   (read-from-string
                    (capi:text-input-pane-text
                     pane)))))

(capi:popup-confirmer
  (make-instance 'capi:text-input-pane
                 :callback 'capi:exit-confirmer
                 :change-callback :redisplay-interface)
  "Enter an integer"
  :value-function 'pane-integer
  :ok-check 'integerp)
```

An example illustrating the use of **:button-container**:

```
(let* ((bt (make-instance 'capi:simple-layout
                          :title "Button Container"
                          :title-position :left))
       (tip1 (make-instance 'capi:text-input-pane
                            :title "Top"))
       (tip2 (make-instance 'capi:text-input-pane
                            :title "Bottom"))
       (layout (make-instance 'capi:column-layout
                              :description
                              (list tip1
                                    bt
                                    tip2))))
  (capi:popup-confirmer layout nil
                        :title
                       "Dialog using button-container"
                        :button-container bt))
```

An example with all the defined buttons in use:

```
(defun all-buttons-dialog (&optional (num 20))
  (let ((pane
         (make-instance 'capi:list-panel
                        :items
                        (loop for ii from 1
                              to num
                              collect
                              (format nil "~r" ii))
                        :visible-min-width
                        '(character 20))))
    (capi:popup-confirmer
     pane
     "All Buttons"
     :callback-type :none
     :button-position :right
     :cancel-button "Cancel Button"
     :ok-button "OK Button"
     :ok-function #'(lambda (x)
                      (declare (ignorable x))
                      (capi:exit-dialog
                       (capi:choice-selected-item pane)))
     :no-button "No Button"
     :no-function
     #'(lambda ()
         (capi:exit-dialog
          (cons :no
                (capi:choice-selected-item pane))))
     :apply-button "Apply Button"
     :apply-function
     #'(lambda ()
         (capi:display-message
          "Applying to ~a"
          (capi:choice-selected-item pane)))
     :help-button "Help Button"
     :help-function
     #'(lambda ()
         (capi:display-message
          "~a is ~:[an odd~;an even~] number"
          (capi:choice-selected-item pane)
          (oddp (capi:choice-selection pane))))
     :all-button "All Button"
     :all-function
     #'(lambda()
         (capi:exit-dialog
          (capi:collection-items pane))))))

(all-buttons-dialog)
```

A dialog with arbitrary buttons:

```
(capi:popup-confirmer
 (make-instance 'capi:text-input-pane)
 "Dialog with arbitrary buttons"
 :buttons '(:abc :xyz)
 :callbacks
 (list #'(lambda (data)
           (capi:display-message
            "Button ~A was pressed" data))
       #'(lambda (data)
           (capi:display-message
            "Button with ~A was pressed, exiting with
~S" data data)
           (capi:exit-dialog data)))
 :callback-type :data)
```

This example illustrates the use of *callback-error-handler*:

```
(defun my-error-handler (condition)
  (let ((pane (capi:current-popup)))
    (capi:display-message
     "Error inside dialog: ~a : ~a"
     (capi:capi-object-name pane)
     condition)
    (capi:abort-callback)))

(let*
    ((foo-callback
      (lambda ()
        (let ((md (make-instance
                   'capi:push-button
                   :text "Error inside Callback-Error-
Handler"
                   :name "Chicken"
                   :callback-type :data
                   :data "Twisted ankle."
                   :callback 'error)))
          (capi:popup-confirmer
           md nil
           :callback-error-handler 'my-error-handler))))
     (foo (make-instance
           'capi:push-button
           :text
           "Popup confirmer with Callback-Error-Handler"
           :callback-type :none
           :callback foo-callback))
     (bar (make-instance
           'capi:push-button
           :text "Error without a handler"
           :callback-type :data
           :data "Broken leg."
           :callback 'error)))
  (capi:contain (list foo bar)))
```

See also

abort-dialog
abort-exit-confirmer
confirmer-pane
display-dialog
exit-confirmer
exit-dialog

popup-menu-button *Class*

Summary A button with a popup menu.

Package **capi**

Superclasses **item**

Initargs **:menu** A **menu** or **nil**.

:menu-function
A function designator or **nil**.

Accessors **popup-menu-button-menu**
popup-menu-button-menu-function

Description The class **popup-menu-button** provides a button with a popup menu, which is displayed when the user clicks on the button.

If *menu-function* is non-nil, it should be function of one argument (the pane) and should return a **menu** object. Otherwise, *menu* should be a **menu** object.

popup-menu-button inherits from **item**, so you can supply *text*, *data* and so on.

Example See the example in **capi/elements/popup-menu-button.lisp**

See also **menu**

ppd-directory *Variable*

Summary The directory in which LispWorks looks for PPD files.

Package **capi**

Initial value **nil**

Description The variable ***ppd-directory*** specifies where LispWorks looks for PostScript Printer Definition (PPD) files.

This applies only on GTK+ and Motif.

The directory which is the value of ***ppd-directory*** should contain PPD files (files with extension ppd) either directly, or under subdirectories. The PPD files under each subdirectory are grouped together, with the name of the directory as the group name. PPD files in ***ppd-directory*** itself are grouped under the "Other" group.

print-capi-button *Generic Function*

Summary Generates the text for a button.

Package **capi**

Signature **print-capi-button** *button* **=>** *text*

Arguments *button* A **button**.

Values *text* A string.

Description The generic function **print-capi-button** is used to generate the text for a button.

You can add methods for your own button classes.

See also **button**

print-collection-item *Generic Function*

Summary Prints an item as a string.

Package **capi**

Signature **print-collection-item** *item collection*

Arguments

item	An **item** or an Lisp object.
collection	A **collection** or any Lisp object.

Description The generic function **print-collection-item** prints *item* as a string. It is used when *item* is known to be an item in *collection*.

An **item** in a collection prints using the first of these which returns non-nil: the item's *text*, the item's *print-function*, the collection's *print-function* or the item's *data*. An **item** not known to be in the collection is printed simply using **print-object**.

The method on **(t collection)** uses the collection's *print-function*.

Example

```
(setq collection (make-instance
                  'capi:collection
                  :items '(1 2 3 4 5)
                  :print-function #'(lambda (x)
                                      (format nil
                                       "<~A:>"
                                       x))))

(capi:print-collection-item 2 collection)
```

In this example we provide our own **print-collection-item** method:

```
(defclass my-tree-view (capi:tree-view) ())

(defmethod capi:print-collection-item ((item capi:item)
                                       (tree my-tree-view))
  (string-capitalize (svref (capi:item-data item) 0)))

(capi:contain
 (make-instance 'my-tree-view
                :roots
                (list (make-instance 'capi:item
                                     :data
                                     (vector "foo")))))
```

See also **get-collection-item**
collection

print-dialog *Function*

Summary Displays a print dialog and returns a printer object.

Package **capi**

Signature **print-dialog &key** *screen owner first-page last-page print-selection-p print-pages-p print-copies-p continuation* **=>** *printer*

Values *printer* A printer, or **nil**.

Description The function **print-dialog** displays a print dialog and returns a printer object. The printer object returned will print multiple copies if requested by the user.

If *print-pages-p* is **t**, the user can select a range of pages to print. This should always be the case unless the application only produces single page output. If *print-pages* is **t**, *first-page* and *last-page* can be used to initialize the page range. For example, they could be set to be the first and last pages of the document.

The *print-copies-p* argument indicates whether the application handles production of multiple copies for drivers that do not support this function. Currently this should be **nil** if the application uses Page Sequential printing and **t** if the application uses Page on Demand printing.

If *print-selection-p* is **t**, the user is given the option of printing the current selection. Only specify this if the application has a notion of selection and selecting printing functionality is provided.

The dialog is displayed on the current screen unless *screen* specifies otherwise.

owner specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts one argument. The *continuation* function is called with the values that would normally be returned by **print-dialog**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **print-dialog** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

Note that the printer object itself is opaque but programmatic setting of some printer options is available via the function **set-printer-options**.

See also **print-file**
print-text
set-printer-options

print-editor-buffer *Function*

Summary Prints the contents of an editor buffer to the printer.

Package **capi**

Signature **print-editor-buffer** *buffer* **&key** *start end printer interactive font*

Description The **print-editor-buffer** function prints the contents of *buffer* to *printer*, which is the current printer by default.

By default the entire editor buffer is printed, but by specifying *start* and *end* to be editor points, a part of the buffer can be printed. See the *LispWorks Editor User Guide* for information about editor points.

If *interactive* is **t**, the default value, then a printer dialog is displayed.

font is interpreted as described for **print-text**.

See also **print-file**
print-text

print-file *Function*

Summary Prints the contents of a specified file.

Package **capi**

Signature **print-file** *file* **&key** *printer interactive font*

Description The **print-file** function prints *file* to *printer*, which defaults to the current printer. If *interactive* is **t**, then a print dialog is displayed. This is the default behavior.

font is interpreted as described for **print-text**.

See also **print-editor-buffer**
print-text

print-rich-text-pane *Function*

Summary Prints the contents of a **rich-text-pane**, on Microsoft Windows.

Package **capi**

Signature **print-rich-text-pane** *pane* **&key** *jobname printer interactive selection* **=>** *result*

Arguments

pane	A **rich-text-pane**.
jobname	A string, or **nil**.
printer	A printer, or **nil**.
interactive	A boolean.
selection	A boolean.

Values

result	A boolean.

Description The function **print-rich-text-pane** prints the contents in *pane*.

jobname is the name of the print job. The default value is **nil**, meaning that the name "Document" is used.

printer is the printer to use. The default value is **nil**, meaning that the **current-printer** is used.

interactive, if true, specifies that a **print-dialog** is displayed before printing. The default value of *interactive* is **t**.

selection is a boolean specifiying what to print. If true, only the current selection is printed. If **nil**, all the contents of *pane* are printed. The default value is **nil**.

Notes **print-rich-text-pane** is supported only on Microsoft Windows.

See also **rich-text-pane**

print-text *Function*

Summary Prints plain text to a printer.

Package **capi**

Signature **print-text** *line-function* **&key** *printer tab-spacing interactive font*

Description The **print-text** function prints plain text to a printer specified by *printer*, and defaulting to the current printer.

The *line-function* is called repeatedly with no arguments to enumerate the lines of text. It should return **nil** when the text is exhausted.

The *tab-spacing* argument, which defaults to 8, specifies the number of spaces printed when a tab character is encountered.

If *interactive* is **t**, then a print dialog is displayed. This is the default behavior.

font should be a **gp:font** object, or a Font Description object, or a symbol which is a font alias as defined by **define-font-alias**. The printed text is line wrapped on the assumption that the font is fixed width, so be sure to pass a suitable font. The default value of *font* is a Font Description for a fixed pitch font of size 10.

See also **print-editor-buffer**
print-file

printer-configuration-dialog *Function*

Summary Displays a dialog allowing the user to configure printers.

Package **capi**

Signature **printer-configuration-dialog &key** *screen owner*

Description The **printer-configuration-dialog** function displays the printer configuration dialog that allows users to add and configure PostScript printers.

This applies only on GTK+ and Motif.

The *screen* argument specifies a CAPI screen on which to display the dialog. The *owner* argument controls which interface owns the dialog. If it is specified it should be a currently displayed CAPI interface; it defaults to the current top level interface.

The general options that are available are described under **install-postscript-printer**. In addition, printer-specific options (which are defined in the printer PPD file) are available.

The printers that are visible in the dialog are defined by files in the directories in the list ***printer-search-path***.

See also **install-postscript-printer**
printer-search-path

printer-metrics *Structure Class*

Summary The type of objects containing printer metrics.

Package **capi**

Description A **printer-metrics** object is returned by **get-printer-metrics**. The readers for the slots of a **printer-metrics** object are described below.

printer-metrics-device-height and **printer-metrics-device-width** respectively return the height and width of the printable page in the internal units used by the printer driver or printing subsystem of the

printer. These functions should not be used to determine the aspect ratio of the printable page as some printers have size units that differ in the x and y directions.

printer-metrics-dpi-x and **printer-metrics-dpi-y** return the number of printer device units per inch in the x and y directions respectively. This typically corresponds to the printer resolution, although in some cases this may not be known. For example, a generic PostScript language compatible driver might always return 300dpi, even though it cannot know the resolution of the printer the PostScript file will actually be printed on.

printer-metrics-height and **printer-metrics-width** respectively return the height and width of the printable area in millimeters.

printer-metrics-left-margin and **printer-metrics-top-margin** respectively return the current left margin and current top margin of the printable area in millimeters.

printer-metrics-max-height and **printer-metrics-max-width** respectively return the greatest possible height and width of the printable area in millimeters.

printer-metrics-min-left-margin and **printer-metrics-min-top-margin** respectively return the smallest possible left margin and top margin of the printable area in millimeters.

printer-metrics-paper-height and **printer-metrics-paper-width** respectively return the height and width of the paper selected for this printer in millimeters.

See also **get-printer-metrics**

printer-port-handle *Function*

Summary Returns the underlying handle to a printer port.

Package **capi**

Signature **printer-port-handle &optional** *port* **=>** *handle*

Arguments *port* A printer port.

Values *handle* Platform-dependent.

Description The function **printer-port-handle** returns a platform-dependent value which represents the underlying handle to the printer port.

On Microsoft Windows, *handle* is the HDC for the printer device.

If *port* is passed it should be the value bound to *var* in **with-print-job**. If *port* is not supplied it defaults to the current printer port (dynamically bound within **with-print-job**).

See also **with-print-job**

printer-port-supports-p *Function*

Summary Detects if the printer port can support a certain feature.

Package **capi**

Signature **printer-port-supports-p** *feature* **&optional** *port* **=>** *supportedp*, *validp*

Arguments *feature* A keyword.

port A printer port.

Values *supportedp* A boolean.

validp A boolean.

Description The function **printer-port-supports-p** detects if the printer port can support the feature named by *feature*.

If *port* is passed it should be the value bound to *var* in **with-print-job**. If *port* is not supplied it defaults to the current printer port (dynamically bound within **with-print-job**).

supportedp indicates if the feature is supported.

validp indicates if the feature was recognised.

Currently the only value of *feature* that is recognised is **:postscript** and the *supportedp* value is true if the printer supports PostScript.

See also **with-print-job**

printer-search-path *Variable*

Summary Specifies where to look for printer definition files.

Package **capi**

Initial value **("~/.lispworks-printers/" nil)**

Description The variable ***printer-search-path*** specifies where to look for printer definition files.

This applies only on GTK+ and Motif.

The value is a list containing directory pathname designators specifying where to look for printer definition files. The list can also include the value **nil**, which is interpreted as the **printers** directory in the LispWorks library.

To find known printers the system loads all files in these directories. If there are duplicate printer definitions, the printer in the first directory takes precedence.

The default path is useful when printing from the Common LispWorks IDE, but applications that want to allow users to use printers should set the list appropriately.

The first path in the **`*printer-search-path*`** list is regarded as the "local" path. New printers are saved in this path. When the user edits a printer that was found in another directory on **`*printer-search-path*`** and then tries to save it, the system prompts for whether to overwrite the original or save it in the "local" directory.

The printer files can be copied to other directories, on the same machine, and hence to install printers in different directories.

A printer file can be copied to other machines, provided the printer is installed on the other machine and the PPD file is available in the same path.

process-pending-messages *Function*

Summary — Processes all the pending messages in the current process.

Package — **`capi`**

Signature — **`process-pending-messages`** *ignored* **`=> nil`**

Arguments — The single argument is ignored.

Description — The function **`process-pending-messages`** processs all the pending messages in the current process, and then returns **`nil`**. It is useful when your code needs to continuously do something, but also needs to respond to user input or other messages.

progress-bar *Class*

Summary A pane that is used to show progress during a lengthy task.

Package **capi**

Superclasses **range-pane**
titled-object
simple-pane

Description This pane is used to display progress during a lengthy task. It has no interactive behavior.

The **range-pane** accessors **(setf range-start)** and **(setf range-end)** are used to specify integers delimiting the range of values the progress bar can display.

The accessor **(setf range-slug-start)** is used to set an integer value for the progress indicator.

See also **range-pane**
titled-object

prompt-for-color *Function*

Summary Presents a dialog box allowing the user to choose a color.

Package **capi**

Signature **prompt-for-color** *message* **&key** *color colors owner* **=>** *result, successp*

Arguments

message	A string.
color	A color specification.
colors	A list.
owner	An owner window.

Values

result A color specification, or **nil**.

successp A boolean.

Description

The function **prompt-for-color** pops up a dialog box allowing the user to choose a color.

message supplies a title for the dialog on GTK+ and Motif. On Microsoft Windows *message* is ignored.

color provides the default color in the dialog.

colors is a list of custom color specifications that the user can choose from.

For a description of color specifications, see the "The Color System" chapter in the *CAPI User Guide*.

owner specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

prompt-for-confirmation *Function*

Summary

Displays a dialog box with a message and **Yes** and **No** buttons.

Package

capi

Signature

prompt-for-confirmation *message* **&key** *screen owner cancel-button default-button continuation* **=>** *result, successp*

Arguments

message A string.

screen A screen.

owner An owner window.

cancel-button A boolean.

default-button A keyword, or **nil**.

continuation A function or **nil**.

Values

result A boolean.

successp A boolean.

Description

The function **prompt-for-confirmation** displays a dialog box containing *message*, with **Yes** and **No** buttons. When either **Yes** or **No** is pressed, it returns two values:

- a boolean indicating whether **Yes** was pressed
- **t** (for compatibility with other prompt functions)

cancel-button specifies whether a **Cancel** button also appears on the dialog. When **Cancel** is pressed, **abort** is called and the dialog is dismissed. The default value of *cancel-button* is **nil**.

default-button specifies which button has the input focus when the dialog appears (and is thus selected when the user immediately presses **Return**).The value **:ok** means **Yes**, the value **:cancel** means **Cancel**, and any other value means **No**. The default value of *default-button* is **nil**.

owner specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-continuation**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-confirmation** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

Example

```
(capi:prompt-for-confirmation "Continue?")
```

```
(multiple-value-bind (res success)
    (capi:prompt-for-confirmation  "Yes, No or Cancel"
                                   :cancel-button t)
  (if success
      res
    (abort)))
```

See also **confirm-yes-or-no**

prompt-for-directory *Function*

Summary Displays a dialog prompting the user for a directory.

Package **capi**

Signature **prompt-for-directory** *message* **&key** *if-does-not-exist pathname file-package-is-directory pane-args popup-args owner continuation* **=>** *result, successp*

Arguments

message	A string.
if-does-not-exist	One of **:ok**, **:prompt** or **:error**.
pathname	A pathname, or **nil**.
file-package-is-directory	A generalized boolean.
pane-args	Arguments to pass to the pane.
popup-args	Arguments to pass to the confirmer.
owner	An owner window.
continuation	A function or **nil**.

Values

result	A directory pathname, or **nil**.
successp	A boolean.

Description

The function **prompt-for-directory** prompts the user for a directory pathname using a dialog box. Like all the prompters, **prompt-for-directory** returns two values: the directory pathname and a flag indicating success. The *successp* flag will be **nil** if the dialog was cancelled, and **t** otherwise.

On Windows and Motif, if *if-does-not-exist* is **:ok**, a non-existent directory can be chosen. When set to **:prompt**, if a non-existent directory is chosen, the user is prompted for whether the directory should be created. When set to **:error**, the user cannot choose a non existent directory. The default value of *if-does-not-exist* is **:prompt**.

On Cocoa it is never possible to choose a non-existent directory, and the value of *if-does-not-exist* is ignored.

pathname, if non-nil, supplies an initial directory for the dialog. The default value for *pathname* is **nil**, and with this value the dialog initializes with the current working directory.

file-package-is-directory is handled as by **prompt-for-file**.

owner specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-directory**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-directory** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

The prompt itself is created by passing an appropriate pane to **popup-confirmer**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively. Currently, the pane used to create the file prompter is internal to the CAPI.

See also **popup-confirmer**
prompt-for-file

prompt-for-file *Function*

Summary Displays a dialog prompting the user for a filename.

Package **capi**

Signature **prompt-for-file** *message* **&key** *pathname ok-check filter filters if-exists if-does-not-exist file-package-is-directory operation owner pane-args popup-args continuation* **=>** *filename, successp, filter-name*

Arguments

message	A string or **nil**.
pathname	A pathname designator or **nil**.
ok-check	A function or **nil**.
filter	A string or **nil**.
filters	A property list.
if-exists	One of **:ok** or **:prompt**.
if-does-not-exist	One of **:ok**, **:prompt** or **:error**.
file-package-is-directory	A generalized boolean.
operation	One of **:open** or **:save**.
owner	An owner window.
continuation	A function or **nil**.

Values

filename	A pathname or **nil**.
successp	A boolean.
filter-name	A string.

Description

The function **prompt-for-file** prompts the user for a file using a dialog box.

pathname, if non-nil, is a pathname designator providing a default filename for the dialog.

ok-check, if non-nil, should be a function which takes a pathname designator argument and returns a true value if the pathname is valid.

filter specifies the initial filter expression. The default value is **"*.*"**. An example filter expression with multiple filters is **"*.LISP;*.LSP"**.

filter is used on all platforms. However on Motif, if *filter* contains multiple file types, only the first of these is used.

On Cocoa **prompt-for-file** supports the selection of application bundles as files if they match the filter. For example, they will match if the filter expression contains ***.app** or ***.***.

filters is a property list of filter names and filter expressions, presenting filters which the user can select in the dialog. If the *filter* argument is not one of the expressions in *filters*, an extra filter called **"Files"** is added for this expression.

On Microsoft Windows the default value of *filters* is:

```
("Lisp Source Files" "*.LISP;*.LSP"
 "Lisp Fasls" "*.OFASL"
 "Text Documents" "*.DOC;*.TXT"
 "Image Files" "*.BMP;*.DIB;*.ICO;*.CUR"
 "All Files" "*.*")
```

The **"Lisp Fasls"** extension may vary depending on the implementation.

On Cocoa the default value of *filters* is:

```
("Lisp Source Files" "*.lisp;*.lsp"
 "Text Documents" "*.txt;*.text"
 "All Files" "*.*")
```

filters is ignored on Motif.

When *if-exists* is **:ok**, an existing file can be returned. Otherwise the user is prompted about whether the file can be overwritten. The default for *if-exists* is **:ok** when *operation* is **:open** and **:prompt** when operation is **:save**.

When *if-does-not-exist* is **:ok**, a non-existent file can be chosen. When it is **:prompt**, the user is prompted if a non-existent file is chosen. When it is **:error**, the user cannot choose a non-existent file. The default for *if-does-not-exist* is **:prompt** if *operation* is **:open** and **:ok** if *operation* is **:save**.

operation chooses the style of dialog used, in LispWorks for Windows only. The default value is **:open**.

owner, if non-nil, specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts three arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-file**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-file** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

On Motif, the prompt itself is created by passing an appropriate pane to **popup-confirmer**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively. Currently, the pane used to create the file prompter is internal to the CAPI. *pane-args* and *popup-args* are ignored on Microsoft Windows.

filename is the full pathname of the file selected, or **nil** if the dialog was cancelled.

successp is a flag which is **nil** if the dialog was cancelled, and **t** otherwise.

On Microsoft Windows **prompt-for-file** returns a third value: *filter-name* is the name of the filter that was selected in the dialog.

file-package-is-directory controls how to treat file packages on Cocoa. By default it is **nil**, which means that a file package is treated as file. If *file-package-is-directory* is non-nil, the a file package is treated as a directory. *file-package-is-directory* corresponds to the **treatsFilePackagesAsDirectories** method of **NSSavePanel** in Cocoa. It has no effect on other platforms.

Example

```
(capi:prompt-for-file "Enter a filename:")

(capi:prompt-for-file "Enter a filename:"
                      :pathname "/usr/bin/cal")

(capi:prompt-for-file "Enter a filename:"
                      :ok-check 'probe-file)
```

See also

popup-confirmer
prompt-for-string
prompt-for-directory

prompt-for-files *Function*

Summary Displays a dialog which returns multiple filenames.

Package **capi**

Signature **prompt-for-files** *message* **&key** *pathname ok-check filter filters if-exists if-does-not-exist file-package-is-directory operation owner pane-args popup-args continuation* **=>** *filenames*, *successp*, *filter-name*

Values

filenames	A list.
successp	A boolean.
filter-name	A string.

Description

The function **prompt-for-files** presents the user with a dialog box similarly to **prompt-for-file**, but in which multiple filenames can be selected.

The arguments are as for **prompt-for-file**, except that *filters* defaults to:

```
("MS Word files" "*.doc"
  "HTML files" "*.htm;*.html"
  "Plain Text files" "*.txt;*.text"
  "All files" "*.*")
```

filenames is a list of filenames, or **nil** if the user cancels the dialog.

successp is a flag which is **nil** if the dialog was cancelled, and **t** otherwise.

filter-name is the name of the filter that was selected in the dialog.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts three arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-files**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-files** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

Notes

prompt-for-files is currently implemented only in LispWorks for Windows and Cocoa.

See also

prompt-for-file

prompt-for-font *Function*

Summary

Presents a dialog box allowing the user to choose a font.

Package

capi

Signature **prompt-for-font** *message* **&key** *font owner* **=>** *result, successp*

Arguments

message	A string.
font	A font, a font description, or **nil**.
owner	An owner window, or **nil**.

Values

result	A font, or **nil**.
successp	A boolean.

Description The function **prompt-for-font** displays a dialog box allowing the user to choose a font.

message supplies a title for the dialog.

font, if non-nil, provides defaults for the dialog box. The default value is **nil**.

owner specifies an owner window for the dialog. See the "Prompting for Input" chapter in the *CAPI User Guide* for details.

For a description of Graphics Ports fonts and font descriptions, see the *CAPI User Guide*.

See also **find-best-font**

prompt-for-form *Function*

Summary Displays a text input pane and prompts the user for a form.

Package **capi**

Signature **prompt-for-form** *message* **&key** *package initial-value evaluate quotify ok-check value-function pane-args popup-args continuation* **=>** *result, okp*

Description

The function **prompt-for-form** prompts the user for a form by providing a text input pane that the form can be typed into.

The form is read in the *package* if specified or ***package*** if not. If *evaluate* is non-nil then the result is the evaluation of the form, otherwise it is just the form itself. The printed version of *initial-value* will be placed into the text input pane as a default, unless *quotify*, which defaults to *evaluate*, specifies otherwise. If *value-function* is provided it overrides the default value function which reads the form and evaluates it when required. If the *ok-check* is provided it will be passed the entered form and should return **t** if the form is a valid result.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-form**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-form** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

The prompter is created by calling **prompt-for-string**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively, and an input history can be implemented by supplying a *history-function* or *history-symbol* in *popup-args*.

Example

Try the following examples, and each time enter **(+ 1 2)** into the input pane.

```
(capi:prompt-for-form "Enter a form:")

(capi:prompt-for-form "Enter a form:" :evaluate nil)
```

See also

prompt-for-forms
prompt-for-string
popup-confirmer
text-input-pane

prompt-for-forms *Function*

Summary — Displays a text input pane prompting the user for a number of forms.

Package — **capi**

Signature — **prompt-for-forms** *message* **&key** *package initial-value value-function pane-args popup-args continuation* **=>** *result, okp*

Description — The function **prompt-for-forms** prompts the user for a number of forms by providing a text input pane that the forms can be typed into, and it returns the forms in a list. The forms are read in the specified *package* or ***package*** if not. If *evaluate* is non-nil then the result is the evaluation of the form, else it is just the form itself.

The printed version of *initial-value* will be placed into the text input pane as a default.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-forms**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-forms** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

The prompter is created by passing an appropriate pane (in this case a text input pane) to **popup-confirmer**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively.

Example — Try the following example, and enter **1 2 3** into the input pane.

```
(capi:prompt-for-forms "Enter some forms:")
```

See also **prompt-for-form**
prompt-for-string
popup-confirmer
text-input-pane

prompt-for-integer *Function*

Summary Prompts the user for an integer.

Package **capi**

Signature **prompt-for-integer** *message* **&key** *min max initial-value ok-check pane-args popup-args continuation* **=>** *result, successp*

Arguments

message	A string.
min	An integer or **nil**.
max	An integer or **nil**.
initial-value	An integer or **nil**.
ok-check	A function or **nil**.
pane-args	Arguments to pass to the pane.
popup-args	Arguments to pass to the confirmer.
continuation	A function or **nil**.

Description The function **prompt-for-integer** pops up a **text-input-pane** and prompts the user for an integer, which is returned in *result*.

When *min* or *max* are specified the allowable result is constrained accordingly.

initial-value determines the initial value displayed in the dialog. *initial-value* defaults to the value of *min*, or if *min* is **nil** then no initial value is displayed.

Further restrictions can be applied by passing an *ok-check* function. *ok-check* should take one argument, the currently entered number, and should return **t** if it is valid. If *ok-check* is **nil** (the default) then there is no further restriction.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-integer**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-integer** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

The prompter is created by passing **text-input-pane** to **popup-confirmer**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively.

Example

```
(capi:prompt-for-integer "Enter an integer:")

(capi:prompt-for-integer "Enter an integer:" :max 10)

(capi:prompt-for-integer "Enter an integer:"
                         :min 100 :max 200)

(capi:prompt-for-integer "Enter an integer:"
                         :ok-check 'evenp)
```

See also

prompt-for-string
popup-confirmer
text-input-pane

prompt-for-items-from-list *Function*

Summary Prompts with a choice of items.

Package **capi**

Signature **prompt-for-items-from-list** *items message* **&key** *pane-args popup-args interaction choice-class continuation* **=>** *result, successp*

Arguments

items	A sequence.
message	A string.
pane-args	Arguments to pass to the pane.
popup-args	Arguments to pass to the confirmer.
interaction	One of **:single-selection**, **:multiple-selection**, or **:extended-selection**.
choice-class	A class name.
continuation	A function or **nil**.

Description The function **prompt-for-items-from-list** is similar to **prompt-with-list**. *interaction* defaults to **:extended-selection**.

See also **prompt-with-list**

prompt-for-number *Function*

Summary Prompts the user for a number.

Package **capi**

Signature **prompt-for-number** *message* **&key** *min max initial-value ok-check pane-args popup-args continuation* **=>** *result, successp*

Arguments

message	A string.
min	A number or **nil**.
max	A number or **nil**.
initial-value	A number or **nil**.

ok-check	A function or **nil**.
pane-args	Arguments to pass to the pane.
popup-args	Arguments to pass to the confirmer.
continuation	A function or **nil**.

Description The function **prompt-for-number** pops up a **text-input-pane** and prompts the user for a number, which is returned in *result*.

The functionality corresponds exactly to that of **prompt-for-integer**, except that all types of numbers are allowed.

See also **prompt-for-integer**

prompt-for-string *Function*

Summary Displays a text input pane and prompts the user for a string.

Package **capi**

Signature **prompt-for-string** *message* **&key** *pane-args popup-args ok-check value-function text initial-value print-function history-symbol history-function continuation* **=>** *result, okp*

Description The function **prompt-for-string** prompts the user for a string and returns that string in *result* and a flag *okp* indicating that the dialog was not cancelled. The initial string can either be supplied directly as a string using the *text* argument, or by passing *initial-value* and a *print-function* for that value. *print-function* defaults to **princ-to-string**. The value returned can be converted into a different value by passing a *value-function*, which by default is the identity function. This *value-function* gets passed the text that was entered into the pane, and should return both the value to return and a flag

that should be non-nil if the value that was entered is not acceptable. If an *ok-check* is passed, then it should return non-nil if the value about to be returned is acceptable.

prompt-for-string creates an instance of **text-input-pane** or **text-input-choice** depending on the value of *history-function*. Arguments can be passed to the **make-instance** of this pane using *pane-args*. **prompt-for-string** then passes this pane to **popup-confirmer**. Arguments can be passed to the call to **popup-confirmer** using *popup-args*.

history-symbol, if non-nil, provides a symbol whose value is used to store an input history, when *history-function* is not supplied. The default value of *history-symbol* is **nil**.

history-function, if supplied, should be a function designator for a function with signature:

history-function **&optional** ***push-value***

history-function is called with no argument to obtain the history which is used as the *items* of the **text-input-choice**, and with the latest input to update the history.

The default value of *history-function* is **nil**. In this case, if *history-symbol* is non-nil then a history function is constructed which stores its history in the value of that symbol.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-string**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-string** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

Example

```
(capi:prompt-for-string "Enter a string:")
```

```
(capi:prompt-for-string
 "Enter an integer:"
 :initial-value 10
 :value-function  #'(lambda (x)
                      (let ((integer
                             (ignore-errors
                             (read-from-string x))))
                      (values integer
                         (not (integerp integer))
                      ))))
```

See also **popup-confirmer**
text-input-pane

prompt-for-symbol *Function*

Summary Prompts the user for a symbol.

Package **capi**

Signature **prompt-for-symbol** *message* **&key** *initial-value symbols package ok-check pane-args popup-args continuation* **=>** *result*, *okp*

Description The function **prompt-for-symbol** prompts the user for a symbol which they should enter into the pane.

initial-value, if non-nil, should be a symbol which is initially displayed in the pane.

The symbols that are valid can be constrained in a number of ways.

symbols, if non-nil, should be a list of all valid symbols. The default is **nil**, meaning all symbols are valid.

package, if non-nil, is a package in which the symbol must be available. The value **nil** means that the value of ***package*** is used, and this is the default.

ok-check is a function which when called on a symbol will return non-nil if the symbol is valid.

The prompter is created by calling **prompt-for-string**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively, and an input history can be implemented by supplying a *history-function* or *history-symbol* in *popup-args*.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-symbol**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-symbol** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

Example

```
(capi:prompt-for-symbol "Enter a symbol:")

(capi:prompt-for-symbol "Enter a symbol:"
                        :package 'cl)

(capi:prompt-for-symbol "Enter a symbol:"
                        :symbols
                        '(foo bar baz))

(capi:prompt-for-symbol "Enter a symbol:"
                        :ok-check #'(lambda (symbol)
                                      (string< symbol "B")))
```

This last example shows how to implement a symbol prompter with an input history:

```
(defvar *my-history* (list "cdr" "car"))

(capi:prompt-for-symbol "Enter a symbol"
                        :popup-args
                       '(:history-symbol *my-history*))
```

See also

prompt-for-form
prompt-for-string
popup-confirmer
text-input-pane

prompt-for-value *Function*

Summary Prompts the user for a form to evaluate.

Package **capi**

Signature **prompt-for-value** *message* **&key** *package initial-value value-function pane-args popup-args continuation*

Description The function **prompt-for-value** prompts the user for a form and returns the result of evaluating that form.

The form is read in the *package* if specified or ***package*** if not and the result is the evaluation of the form.

If *initial-value* is supplied it provides a default form.

If *value-function* is supplied it overrides the default value function which reads the form and evaluates it.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-for-value**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-for-value** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

The prompter is created by passing a **text-input-pane** to **popup-confirmer**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively.

Example
```
(capi:prompt-for-value
 "Square"
 :initial-value '(+ 1 2 3)
 :value-function
 #'(lambda (text)
     (let ((res (eval (read-from-string text))))
       (* res res))))
```

See also **prompt-for-form**

prompt-with-list *Function*

Summary Prompts the user to select an item or items from a **choice**.

Package **capi**

Signature **prompt-with-list** *items message* **&key** *choice-class interaction value-function pane-args popup-args continuation buttons callbacks all-button none-button* **=>** *result, successp*

Arguments

items	A sequence.
message	A string.
choice-class	A class name.
interaction	One of **:single-selection**, **:multiple-selection**, or **:extended-selection**.
value-function	A function, or **nil**.
pane-args	Arguments to pass to the pane.
popup-args	Arguments to pass to the confirmer.
continuation	A function or **nil**.
buttons	A list of strings or the keyword **:none**.
callbacks	A list of callback specs.
all-button	A string, **nil** or **t**.
none-button	A string, **nil** or **t**.

Description The function **prompt-with-list** prompts the user with a **choice**. The user's selection is normally returned by the prompter.

items supplies the items of the **choice**.

message supplies a title for the **choice**.

choice-class determines the type of **choice** used in the dialog. *choice-class* defaults to **list-panel**, and must be a sublass of **choice**.

interaction determines the interaction style of the **choice** in the dialog. By default *interaction* is **:single-selection**. For single selection, the dialog has an **OK** and a **Cancel** button, while for other selection styles it has **Yes**, **No** and **Cancel** buttons where **Yes** means accept the selection, **No** means accept a null selection and **Cancel** behaves as normal. Note that *interaction* **:multiple-selection** is not supported for lists on Mac OS X.

The primary returned value is usually the selected items, but a *value-function* can be supplied that gets passed the result and can then return a new result. If *value-function* is **nil** (this is the default), then *result* is simply the selection.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-with-list**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-with-list** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

In addition to the choice showing the items, **prompt-with-list** can also display a panel of push buttons (the "action buttons") which perform actions related to the choice. Note that these buttons are separated from the "dialog buttons" such as **OK** and **Cancel**. The dialog buttons are controlled separately by keywords in *popup-args*.

By default, **prompt-with-list** does not display action buttons. However, if *interaction* is **:multiple-selection**, the default behavior is to display two action buttons, **All** and **None**. These change the selection to all of the items or none of the items respectively.

When *buttons* is **:none**, it specifies no action buttons in any case (including no **All** and **None** buttons). Otherwise *buttons* must be a list of strings specifying additional action buttons. Each of the strings specifies a button, and the string is displayed in the button.

callbacks specifies the callbacks of the buttons. It should be a list of callback specifiers matching the list in *buttons*. Each callback specifier is either a callable (a function or a symbol) which takes one argument, the choice, or a list where the **car** is a callable which is called as follows:

```
(apply (car callback-spec) choice (cdr callback-spec))
```

When *all-button* and *none-button* are supplied they override the default behavior of the **All** and **None** buttons. If *all-button* (*none-button*) is **nil**, then **All** (**None**) is not displayed. If *all-button* (*none-button*) is non-nil and *buttons* is not **:none**, the **All** (**None**) button is displayed, and if the value is string, that string is used instead of the default string.

The prompter is created by passing an appropriate pane (in this case an instance of class *choice-class*) to **popup-confirmer**. Arguments can be passed to the **make-instance** of the pane and the call to **popup-confirmer** using *pane-args* and *popup-args* respectively. The initial selection can be specified using **choice** initargs **:selection**, **:selected-item** or **:selected-items** in *pane-args*.

Example

```
(capi:prompt-with-list
  '(1 2 3 4 5) "Select an item:")
```

```
(capi:prompt-with-list
 '(1 2 3 4 5) "Select some items:"
 :interaction :multiple-selection
 :selection '(0 2 4))

(capi:prompt-with-list
 '(1 2 3 4 5) "Select an item:"
 :interaction :multiple-selection
 :choice-class 'capi:button-panel)

(capi:prompt-with-list
  '(1 2 3 4 5) "Select an item:"
  :interaction :multiple-selection
  :choice-class 'capi:button-panel
  :pane-args
  '(:layout-class capi:column-layout))
```

There is a more complex example in

```
examples/capi/choice/prompt-with-buttons.lisp
```

See also **popup-confirmer**
list-panel
choice

prompt-with-list-non-focus *Function*

Summary Raises a non-focus window.

Signature **prompt-with-list-non-focus** *items* **&key** *owner x y choice-class vertical-scroll print-function selection selected-item visible-items selection-callback action-callback destroy-callback list-updater gesture-callbacks add-gesture-callbacks alternative-y alternative-x alternative-bottom alternative-right widget-name filtering-gesture filtering-toggle* **&allow-other-keys =>** *interface*

Arguments

owner A displayed CAPI pane.

x,y Integers.

alternative-x, alternative-y
Integers.

	alternative-bottom, *alternative-right*	Integers or **t**.
	choice-class	A subclass of **list-panel**.
	selection	An integer.
	selected-item	An item.
	visible-items	A positive integer.
	vertical-scroll	A boolean.
	print-function	A function designator or **nil**.
	selection-callback	A function designator or **nil**.
	action-callback	A function designator or **nil**.
	destroy-callback	A function designator or **nil**.
	list-updater	A function designator or **nil**.
	gesture-callbacks	A list of pairs of the form **(*gesture* . *callback*)**.
	add-gesture-callbacks	A list of pairs of the form **(*gesture* . *callback*)**.
	filtering-gesture	A Gesture Spec.
	filtering-toggle	A Gesture Spec.
	widget-name	A string.
Values	*interface*	A **non-focus-list-interface**, or **nil**.

Description

The function **prompt-with-list-non-focus** raises a non-focus window, displaying the items *items* in a list of class *choice-class*, which should be **list-panel** or a subclass.

The non-focus window does not take the input focus, and hence does not see any keyboard input unless this is passed to it by **non-focus-maybe-capture-gesture**. It responds to mouse gestures.

Note that even moving the selection in the list vertically in response to the arrow keys cannot happen without **non-focus-maybe-capture-gesture**.

owner is required, and must be a CAPI pane visible on the screen. The position of the non-focus window is determined relative to *owner*, and the callbacks are invoked in the process of *owner*.

x and *y* are required pixel coordinates with respect to *owner* of the top left corner of the non-focus window.

alternative-bottom, *alternative-right*, *alternative-x* and *alternative-y* specify alternative locations for use when positioning the window at *x* or *y* would cause it to be off the screen. If *alternative-bottom* or *alternative-right* are specified, they specify alternative bottom or alternative right. For example, both Editor completion and **text-input-pane** completion specify a *y* coordinate below the text, and *alternative-bottom* above the text.

alternative-bottom and *alternative-right* can also take the special value **t**, which denotes the *height* or *width* of the **screen**.

alternative-x and *alternative-y* can be used to specify alternative *x* and alternative *y*. *alternative-bottom* overrides *alternative-y* and *alternative-right* overrides *alternative-x*.

The default value of *choice-class* is **list-panel**.

selection or *selected-item* can be used to specify the initially selected item in the list. If neither of these initargs is supplied, the first item is selected.

visible-items specifies the height of the list panel when the filter is not visible. The default value of *visible-items* is 20.

vertical-scroll is supplied to **cl:make-instance** when making the list. The default value of *vertical-scroll* is **t**.

print-function is also supplied to **cl:make-instance** when making the list. The default value of *print-function* is **nil**.

selection-callback, if non-nil, should be a function of two arguments, the selected item and the non-focus interface. *selection-callback* is called (in the process of owner) when an item is selected in the list panel. Note that *callback-type* does not affect the arguments passed to *selection-callback*.

action-callback, if non-nil, should also be a function of two arguments, the selected item and the non-focus interface. *action-callback* is called (in the process of *owner*) when an item is double-clicked in the list panel, or when **Return** is passed to **non-focus-maybe-capture-gesture** (by default, see *gesture-callbacks*). Note that *callback-type* does not affect the arguments passed to *action-callback*.

destroy-callback, if non-nil, should be a function of one argument, the non-focus window (a CAPI interface). *destroy-callback* is called when the non-focus window is destroyed. It is invoked in the process of *owner*.

list-updater, if non-nil, should be a function with signature

list-updater => *result*

list-updater is called in the process of *owner* whenever **non-focus-update** is called. *result* must be a list of items to put into the list panel, or one of the special values **t** (meaning no effect) and **:destroy** (meaning destroy the non-focus window).

gesture-callbacks and *add-gesture-callbacks* define gesture callbacks which the non-focus window can "capture" (when **non-focus-maybe-capture-gesture** is called). *gesture-callbacks* and *add-gesture-callbacks* should both be a list of pairs of the form **(***gesture* **.** *callback***)**. Each *gesture* must be a gesture specifier, that is an object that **sys:coerce-to-gesture-spec** can coerce to a Gesture Spec. Each *callback* is either a callable (symbol or function) which takes one argument, the non-focus window, or a list of the form **(***function arguments***)**. Note that when it is a list, the window is not automatically

passed to the function *function* amongst the arguments *arguments*. The gesture callbacks are used only when **non-focus-maybe-capture-gesture** is called.

add-gesture-callbacks adds more gesture callbacks to those that are implicitly defined for controlling the list panel (see **non-focus-maybe-capture-gesture**). *gesture-callbacks*, if supplied, replaces the gesture callbacks that are implicitly defined for the list panel. In both cases, a gesture callback that is defined explicitly overrides any implicitly define gesture callback.

filtering-gesture defines whether it is possible for the user to add a filter to the non-focus window with a keyboard gesture, and defines that gesture. The gesture is actually a toggle: it destroys a filter that is on, and adds a filter when none is present. When the filter is added, its text is reset and it is always enabled, that is it captures characters and **Backspace**. While the filter is visible, the list panel diplays only items that match the filter. The default value of *filtering-gesture* is a Gesture Spec matching **Control+Return**.

filtering-toggle defines whether it is possible for the user to disable/enable the filter with a keyboard gesture, and defines that gesture. When a filter is visible and enabled, the non-focus window captures characters and **Backspace** (when **non-focus-maybe-capture-gesture** is called) and passes them to the filter. When the filter is visible and disabled, characters and **Backspace** are captured. The default value of *filtering-toggle* is a Gesture Spec matching **Control+Shift+Return**.

widget-name has an effect only on Motif. It defines the widget name of the interface, which can then be used to define resources specific to the non-focus window. Note that the non-focus completers in **editor-pane** and **text-input-pane** use the default *widget-name* which is **"non-focus-list-prompter"**, so defining resources for non-focus-list-prompter will affect them.

If *items* is **nil**, **prompt-with-list-non-focus** returns **nil** without doing anything. Otherwise, it raises the non-focus window and returns the interface, which is of class **non-focus-list-interface**.

The non-focus window is "passive", because it does not see keyboard input. It is the responsibility of the caller to pass any keyboard input that the non-focus window needs to process to the window, by using **non-focus-maybe-capture-gesture**. In general, that should be all keyboard gestures, and **non-focus-maybe-capture-gesture** decides which gestures it wants to process.

The caller can also use **non-focus-terminate**, **non-focus-update**, **non-focus-list-toggle-filter**, **non-focus-list-add-filter**, **non-focus-list-remove-filter** and **non-focus-list-toggle-enable-filter** to control the non-focus window.

See also
list-panel
non-focus-terminate
non-focus-update
non-focus-list-toggle-filter
non-focus-list-toggle-enable-filter
non-focus-maybe-capture-gesture

prompt-with-message *Function*

Summary Prompts the user to select an item or items from a **choice**.

Package **capi**

Signature **prompt-with-message** *message* **&key** *owner continuation*

Arguments
message A string.
owner An owner window, or **nil**.

continuation A function or **nil**.

Description The function **prompt-with-message** displays *message* in a dialog owned by *owner*.

If *continuation* is non-nil, then it must be a function with a lambda list that accepts two arguments. The *continuation* function is called with the values that would normally be returned by **prompt-with-message**. On Cocoa, passing *continuation* causes the dialog to be made as a window-modal sheet and **prompt-with-message** returns immediately, leaving the dialog on the screen. The **with-dialog-results** macro provides a convenient way to create a *continuation* function.

Example
```
(capi:prompt-with-message
  "No items were deleted.")
```

See also **display-message-for-pane**
display-message

push-button *Class*

Summary A **push-button** is a pane that displays either a piece of text or an image and when it is pressed it performs an action.

Package **capi**

Superclasses **button**
titled-object

Initargs **:alternate-callback**

A callback invoked on Microsoft Windows, Cocoa and GTK+ when pressing the mouse button over the **push-button** while a platform-specific modifier key is held down.

:press-callback

A callback invoked on Microsoft Windows, GTK+ and Motif when pressing the mouse button over the **push-button**.

Accessors

button-alternate-callback
button-press-callback

Description

The class **push-button** inherits most of its behavior from **button**. Note that it is normally best to use a **push-button-panel** rather than make the individual buttons yourself, as the button panel provides functionality for handling groups of buttons. However, push buttons can be used if you need to have more control over the button's behavior.

press-callback, if non-nil, should be a function which is called when the user presses the mouse left button over the push button. The arguments to *press-callback* are as specified by *callback-type*. This initarg is not supported on Cocoa.

alternate-callback, if non-nil, should be a function. On Microsoft Windows and GTK+, it is called instead of *callback* when the button is clicked with the **Control** key held down. On Cocoa, it is called instead of *callback* when the button is clicked with the **Command** key held down. *alternate-callback* is not implemented for Motif or for other classes of **button**.

Notes

callback (from superclass **button**) is the general callback, triggered when the user clicks the button, either by pressing and releasing the mouse button or by a keyboard gesture.

press-callback is called only when the user presses the mouse button.

Example

```
(setq button (capi:contain
              (make-instance
               'capi:push-button
               :text "Press Me"
               :data '(:some :data)
               :callback #'(lambda (data interface)
                             (capi:display-message
                              "Pressed ~S"
                              data)))))

(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) nil button)

(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) t button)
```

See also

radio-button
check-button
button-panel
push-button-panel

push-button-panel *Class*

Summary

A **push-button-panel** is a pane containing a group of buttons.

Package

capi

Superclasses

button-panel

Description

The class **push-button-panel** inherits all of its behavior from **button-panel**, which itself inherits most of its behavior from **choice**. Thus, the push button panel can accept items, callbacks, and so on.

Example

```
(defun test-callback (data interface)
       (capi:display-message
                          "Pressed ~S" data))
```

```
(capi:contain (make-instance 'capi:push-button-panel
                             :title "Press a button:"
                             :items
                               '("Press Me" "No, Me")
                             :selection-callback
                               'test-callback))

(capi:contain (make-instance 'capi:push-button-panel
                             :title "Press a button:"
                             :items
                               '("Press Me" "No, Me")
                             :selection-callback
                               'test-callback
                             :layout-class
                               'capi:column-layout))

(capi:contain (make-instance 'capi:push-button-panel
                               :title "Press a button:"
                            :items '(1 2 3 4 5 6 7 8 9)
                               :selection-callback
                                 'test-callback
                               :layout-class
                                 'capi:grid-layout
                               :layout-args
                                 '(:columns 3)))
```

There is a further example in the file **examples/capi/buttons/buttons.lisp**.

See also **push-button**
radio-button-panel
check-button-panel

quit-interface *Function*

Summary Closes the top level interface containing a specified pane.

Package **capi**

Signature **quit-interface** *pane* **&key** *force* **=>** *result*

Arguments *pane* A CAPI element.

force A boolean. The default value is **nil**.

Values

result **t** if the interface was closed, **nil** otherwise.

Description

The function **quit-interface** closes the top level interface containing *pane*, but first it verifies that it is okay to do this by calling the interface's *confirm-destroy-function*. If it is OK to close the interface, it then calls **destroy** to do so. If *force* is true, then neither the *confirm-destroy-function* or the *destroy-callback* are called, and the window is just closed immediately.

Note: **quit-interface** must only be called in the process of the top level interface of *pane*. Menu callbacks on that interface will be called in that process, but otherwise you probably need to use **execute-with-interface** or **apply-in-pane-process**.

Example

Here are two examples demonstrating the use of **quit-interface** with the *destroy-callback* and the *confirm-destroy-function*.

```
(setq interface (capi:display
                 (make-instance
                  'capi:interface
                  :title "Test Interface"
                  :destroy-callback
                  #'(lambda (interface)
                      (capi:display-message
                       "Quitting ~S" interface)))))

(capi:apply-in-pane-process
 interface 'capi:quit-interface interface)
```

With this second example, the user is prompted as to whether or not to quit the interface.

```
(setq interface (capi:display
                 (make-instance
                  'capi:interface
                  :title "Test Interface"
                  :confirm-destroy-function
                  #'(lambda (interface)
                      (capi:confirm-yes-or-no
                       "Really quit ~S"
                       interface)))))

(capi:apply-in-pane-process
 interface 'capi:quit-interface interface)
```

See also

destroy
display
interface

radio-button *Class*

Summary

A button that can be either selected or deselected, but when selecting it any other buttons in its group will be cleared.

Package

capi

Superclasses

button
titled-object

Description

The class **radio-button** inherits most of its behavior from **button**. Note that it is normally best to use a **radio-button-panel** rather than make the individual buttons yourself, as the **button-panel** provides functionality for handling groups of buttons. However, radio buttons are provided in case you need to have more control over the button's behavior.

Example

```
(setq button (capi:contain
              (make-instance 'capi:radio-button
                             :text "Press Me")))

(capi:apply-in-pane-process
 button #'(setf capi:button-selected) t button)

(capi:apply-in-pane-process
 button #'(setf capi:button-selected) nil button)

(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) nil button)

(capi:apply-in-pane-process
 button #'(setf capi:button-enabled) t button)
```

There is a further example in the file **examples/capi/buttons/buttons.lisp**.

See also

push-button
check-button
button-panel
radio-button-panel

radio-button-panel *Class*

Summary

A pane containing a group of buttons of which only one can be selected at any time.

Package

capi

Superclasses

button-panel

Description

The class **radio-button-panel** inherits all of its behavior from **button-panel**, which itself inherits most of its behavior from **choice**. Thus, the radio button panel can accept items, callbacks, and so forth.

Example

```
(capi:contain (make-instance
               'capi:radio-button-panel
               :title "Select a color:"
               :items '(:red :green :blue)
               :print-function 'string-capitalize))

(setq buttons (capi:contain
                (make-instance
                 'capi:radio-button-panel
                 :title "Select a color:"
                 :items '(:red :green :blue)
                 :print-function 'string-capitalize
                  :layout-class 'capi:column-layout)))

(capi:choice-selected-item buttons)
```

There is a further example in the file **examples/capi/buttons/buttons.lisp**.

See also **radio-button**
push-button-panel
check-button-panel

raise-interface *Function*

Summary Raises the interface containing a specified pane to the front of the screen.

Package **capi**

Signature **raise-interface** *pane*

Description The function **raise-interface** raises the window containing *pane* to the front of the screen. To push it to the back use **lower-interface**, and to iconify it use **hide-interface**.

Example

```
(setq pane (capi:contain
             (make-instance
              'capi:text-input-pane)))

(capi:apply-in-pane-process
 pane 'capi:lower-interface pane)

(capi:apply-in-pane-process
 pane 'capi:raise-interface pane)
```

See also

activate-pane
hide-interface
interface
lower-interface
quit-interface

range-pane *Class*

Summary A class supporting **progress-bar** and **slider**.

Package **capi**

Superclasses None

Subclasses

progress-bar
scroll-bar
slider

Initargs

:start	An integer specifying the lowest value of the range.
:end	An integer specifying the highest value of the range.
:slug-start	An integer specifying the start of the slug, corresponding to the current value of the range.
:slug-end	An integer specifying the end of the slug.
:callback	Called when the user changes the value.

:orientation	One of **:horizontal** (the default) or **:vertical**.

Accessors

range-start
range-end
range-slug-start
range-slug-end
range-callback
range-orientation

Description

The class **range-pane** exists to support the **progress-bar** and **slider** classes. Consult the reference pages for **progress-bar** and **slider** for further information.

See also

progress-bar
slider

range-set-sizes *Function*

Summary

Set values in a **range-pane**.

Signature

range-set-sizes *range-pane* **&key** *start end slug-start slug-end redisplay*

Arguments

range-pane	A **range-pane**.
start	A real number or nil.
end	A real number or nil.
slug-start	A real number or nil.
slug-end	A real number or nil.

Description

The function **range-set-sizes** set the values in the **range-pane** *range-pane* for any value of *start*, *end*, *slug-start* or *slug-end* that is supplied as non-nil.

For each of *start*, *end*, *slug-start* and *slug-end*, if the value is **nil** or not supplied, the corresponding value in *range-pane* is not changed.

If *redisplay* is true then *range-pane* is redisplayed with the new values.

The default value of *redisplay* is **t**.

Notes

The values can be also set individually by the accessors **(setf range-start)** and so on. **range-set-sizes** has the advantage over the accessors that it causes fewer calls to redisplay.

See also

range-pane

read-sound-file *Function*

Summary

Reads data from a sound file on Microsoft Windows and Cocoa.

Package

capi

Signature

read-sound-file *source* **=>** *array*

Arguments

source A pathname designator.

Values

array An array of element type **(unsigned-byte 8)**.

Description

The function **read-sound-file** reads data from *source* and returns an array of its contents.

Notes

1. **read-sound-file** can be called during image building.
2. **read-sound-file** is not implemented on GTK+ and Motif.

See also **load-sound**

rectangle *Class*

Summary A **pinboard-object** that draws a rectangle.

Package **capi**

Superclasses **pinboard-object**

Subclasses None.

Initargs **:filled** A boolean, default value **nil**.

Accessors **filled**

Description The class **rectangle** provides a simple **pinboard-object** that draws a rectangle.

The rectangle is always drawn with *shape-mode* **:plain** (that is, without anti-aliasing).

filled determines whether the rectangle is filled.

redisplay-collection-item *Generic Function*

Summary Redisplays the area in a **collection** that belongs to an item.

Package **capi**

Signature **redisplay-collection-item** *collection item*

Description The generic function **redisplay-collection-item** redisplays *item* in *collection*.

There are methods supplied for **graph-pane** and **tree-view**.

See also **collection**

redisplay-interface *Generic Function*

Summary Updates the state of an interface.

Package **capi**

Signature **redisplay-interface** *interface*

Description The generic function **redisplay-interface** updates the state of an interface, such as enabling and disabling menus, buttons, and so forth, that might have changed since the last call. When using this as a callback, you can use **:redisplay-interface** instead of the symbol, and then it will get passed the correct arguments regardless of the callback type.

Notes This method is called by **popup-confirmer** to update its button's enabled state, and so it should be called when state changes in a dialog.

See also **interface**
redisplay-menu-bar
redraw-pinboard-layout
display

redisplay-menu-bar *Function*

Summary Updates the menu bar of an interface.

Package **capi**

Signature **redisplay-menu-bar** *interface* **&key** *redo-items*

Arguments *interface* An **interface**.

redo-items A generalized boolean.

Description The function **redisplay-menu-bar** updates the interface's menu bar, such that menus become enabled and disabled as appropriate.

When *redo-items* is non-nil, **redisplay-menu-bar** redoes the items in **menu** and **menu-component** that have an *items-function*, by calling the *items-function* and setting the items. The default value of *redo-items* is **t**.

Notes *redo-items* defaults to **t** in order to ensure that any accelerator associated with any item is up-to-date. When the menu bar contains menus (including sub-menus and menu-components) that have an *items-function*, **redisplay-menu-bar** may take a relatively long time (tens of milliseconds). If it is called often (for example, each time the user types a character), then it is better to call **redisplay-menu-bar** with *redo-items* **nil**.

Compatibility note This function has been superseded by **redisplay-interface**, which updates the menu bar, but also updates other state objects such as buttons, list panels and so on.

See also **interface**
redisplay-interface

redraw-pinboard-layout *Function*

Summary Redraws any pinboard objects within a specified rectangle.

Package **capi**

Signature **redraw-pinboard-layout** *pinboard x y width height* **&optional** *redisplay*

Description The function **redraw-pinboard-layout** causes any pinboard objects within the given rectangle of the pinboard layout to get redrawn.

If *redisplay* is **nil**, then the redisplay will be cached until a later update. The default for *redisplay* is **t**.

See also **pinboard-object**
redraw-pinboard-object

redraw-pinboard-object *Function*

Summary Redraws a specified pinboard object.

Package **capi**

Signature **redraw-pinboard-object** *object* **&optional** *redisplay*

Description The function **redraw-pinboard-object** causes the pinboard object *object* to be redrawn, unless *redisplay* is **nil** in which case the redisplay will be cached until a later update. The default for *redisplay* is **t**.

Example There are examples in the directory **examples/capi/graphics/**.

See also **pinboard-object**
pinboard-layout
redraw-pinboard-layout

reinitialize-interface *Generic Function*

Summary Reinitializes an existing **interface**.

Package **capi**

Signature **reinitialize-interface** *interface* **&rest** *initargs*

Description The generic function **reinitialize-interface** reinitializes an existing instance of a subclass of **interface**.

reinitialize-interface is called automatically by **find-interface** when this re-uses an interface.

You can add methods to specialize on subclasses of **interface** which you define.

See also **find-interface**
interface-reuse-p

remove-capi-object-property *Function*

Summary Removes a property from the property list of an object.

Package **capi**

Signature **remove-capi-object-property** *object property*

Description The **remove-capi-object-property** function removes a property from the property list of an object.

All CAPI objects contain a property list, similar to the symbol **plist**. The functions **capi-object-property** and **(setf capi-object-property)** are the recommended ways of setting properties, and **remove-capi-object-property** is the way to remove a property.

Example
```
(setq pane (make-instance 'capi:list-panel
                          :items '(1 2 3)))

(capi:capi-object-property pane 'test-property)

(setf (capi:capi-object-property pane 'test-property)
                                 "Test")
```

```
(capi:capi-object-property pane 'test-property)

(capi:remove-capi-object-property pane 'test-property)

(capi:capi-object-property pane 'test-property)
```

See also **capi-object-property**
capi-object

remove-items *Generic Function*

Summary Removes some items from a collection.

Package **capi**

Signature **remove-items** *collection list-or-predicate*

Arguments

collection	A collection.
list-or-predicate	A list, or a function of one argument returning a boolean value.

Description The generic function **remove-items** removes from the **collection** *collection* those items determined by *list-or-predicate*.

If *list-or-predicate* is list, then the items removed are those matching some element of *list-or-predicate*, compared by the *test-function* of *collection*. Otherwise, the items removed are those for which the function *list-or-predicate* returns true.

This is logically equivalent to recalculating the collection items and then calling **(setf collection-items)**. However, **remove-items** is more efficient and causes less flickering on screen.

remove-items can only be used when the **collection** has the default *items-get-function* **svref**.

See also **append-items**
collection
replace-items

replace-dialog *Function*

Summary Replaces a replacable dialog.

Package **capi**

Signature **replace-dialog** *interface* **&rest** *args* **=> nil**

Arguments *interface* An interface.
args Other arguments as for **display-dialog**.

Description The function **replace-dialog** displays a dialog in the same way the **display-dialog** does, except that it also destroys the existing dialog.

interface is a CAPI interface to be displayed as a dialog.

The arguments *args* are interpreted the same as the arguments to **display-dialog**, except that *modal* is ignored. **replace-dialog** displays the dialog like **display-dialog**.

See also **display-replacable-dialog**

replace-items *Generic Function*

Summary Replaces some items in a collection.

Package **capi**

Signature **replace-items** *collection items* **&key** *start new-selection*

Arguments *collection* A collection.

items	A list.
start	A non-negative integer.
new-selection	A list specifying the selection.

Description

The generic function **`replace-items`** replaces some items in the **`collection`** *collection* from *items*. **`replace-items`** can only be used when the **`collection`** has the default *items-get-function* **`svref`**.

start should be a non-negative integer and less than the number of items in *collection*.

Items in *collection* are replaced starting at index *start*, and proceeding until the end of the list *items*, or the end of the items in *collection*. If *items* is too long, the surplus is quietly ignored. **`replace-items`** never alters the number of items in the collection.

If supplied, *new-selection* should be a list of items specifying the new selection in collection. To specify no selection, pass **`nil`**.

If *new-selection* is not supplied, then **`replace-items`** attempts to preserve the selection. If some of the selected items are replaced, then the selection on these items is removed, but if a selected item simply moves, then the selection moves with it.

See also

`append-items`
`collection`
`remove-items`

report-active-component-failure *Generic Function*

Summary

Reports on failures to find or create a component.

Package

`capi`

Signature **report-active-component-failure** *pane component-name error-string function-name hresult*

Arguments

pane	An **ole-control-pane**.
component-name	A string or **nil**.
error-string	A string.
hresult	An integer or **nil**.

Description The generic function **report-active-component-failure** is used to report on failures to find or create a component.

component-name is the name of the component it tried to find.

error-string is the error string.

function-name is the name of the function that actually failed.

hresult is the hresult that came back. It may be **nil** if the error is that the guid of the named component could not be found.

When the system fails to open the component, it calls **report-active-component-failure**, with the first argument the **ole-control-pane** *pane*. The default method for **ole-control-pane** tries to call **report-active-component-failure** again on its top level interface. The default method on **interface** calls **error**.

You can add your own methods, specializing on subclasses of **ole-control-pane** or subclasses of **interface**.

Notes This function is implemented only in LispWorks for Windows. Load the functionality by **(require "embed")**.

Example See the example in **examples/com/ole/simple-container/doc-viewer-pair.lisp**

See also **ole-control-pane**

reuse-interfaces-p *Function*

Summary Determines whether global interface re-use is enabled.

Package **capi**

Signature **reuse-interfaces-p =>** *result*

Signature **(setf reuse-interfaces-p)** *value* **=>** *value*

Arguments *value* A boolean.

Values *result* A boolean.

Description The function **reuse-interfaces-p** is the predicate for whether global interface re-use is enabled.

The function **(setf reuse-interfaces-p)** enables or disables global interface re-use.

If global re-use is enabled, then **locate-interface** and **find-interface** may return existing interfaces. If global re-use is disabled, then **locate-interface** returns **nil** and **find-interface** returns a new interface.

See also **find-interface**
locate-interface

rich-text-pane *Class*

Summary A text pane with extended formatting.

Package **capi**

Superclasses **simple-pane**

Initargs

:character-format
A plist.

:paragraph-format
A plist.

:change-callback
A function called when a change is made.

:protected-callback
A function determining whether the user may edit a protected part of the text, on Microsoft Windows.

:filename A file to display.

:text A string or **nil**.

:text-limit An integer.

Accessors

rich-text-pane-change-callback
rich-text-pane-limit
rich-text-pane-text

Description

The class **rich-text-pane** provides a text editor which supports character and paragraph formatting of its text.

character-format is the default character format. It is a plist which is interpreted in the same way as the *attributes-plist* argument of **set-rich-text-pane-character-format**. The default value of *character-format* is **nil**.

paragraph-format is the default paragraph format. It is a plist which is interpreted in the same way as the *attributes-plist* argument of **set-rich-text-pane-paragraph-format**. The default value of *paragraph-format* is **nil**.

change-callback, if non-nil, is a function of two arguments: the pane itself, and a keyword denoting the type of change. This second argument is either **:text** or **:selection**. The default value of *change-callback* is **nil**.

protected-callback, if supplied, is called when the user tries to modify protected text (by setting the *protected* attribute, see **set-rich-text-pane-character-format**). It must be a function of four arguments: the pane itself, bounding indexes of the protected text, and a boolean which is true when the change would affect the selection. If the change would affect just a single character, this last argument is **nil**. If *protected-callback* returns **nil**, then the change is not performed. If *protected-callback* is not supplied, then the user cannot modify protected text. *protected-callback* is supported only on Microsoft Windows.

filename, if non-nil, should be a string or pathname naming a file to display in the pane. *filename* takes precedence over *text* if both are non-nil.

text, if non-nil, should be a string which is displayed in the pane if *filename* is **nil**.

text-limit, if non-nil, should be an integer which is an upper bound for the length of text displayed in the pane.

Notes

1. **rich-text-pane** is supported only on Microsoft Windows, and Cocoa in Mac OS X 10.3 and later. Some of its features are supported only on Microsoft Windows, as mentioned above.
2. *change-callback* and *protected-callback* are not yet implemented on Cocoa.
3. The functions that are specific to **rich-text-pane** cannot be called before the pane is created. If you need to perform operations on the pane before it appears, and which cannot be performed using the initargs, the best approach is to define an **:after** method on **interface-display** on the class of the interface containing the **rich-text-pane**, and perform the operations inside this method.

See also **print-rich-text-pane**
rich-text-pane-character-format
rich-text-pane-operation
set-rich-text-pane-character-format
rich-text-pane-paragraph-format
set-rich-text-pane-paragraph-format

rich-text-pane-character-format *Function*

Summary Returns the character format.

Package **capi**

Signature **rich-text-pane-character-format** *pane* **&key** *selection* **=>** *result*

Arguments
pane A **rich-text-pane**.
selection Must be **t**. This argument is deprecated.

Values
result A plist.

Description The function **rich-text-pane-character-format** returns as a plist the current character attributes for *pane*.

If there is a current selection in the pane, then the attributes are those set for the selected text. If there is no selection, then it gets the "typing attributes", which are applied to characters that are typed by the user. Note that any cursor movement changes these attributes, so their values are ephemeral.

The *selection* argument is deprecated. If *selection* is **nil** an error is signalled. The default value of *selection* is **t**.

An attribute appears in *result* only if its value is the same over all of the range. Therefore this form

```
(getf
 (capi:rich-text-pane-character-format pane) :bold
 :unknown)
```

will return:

- **t** if all the selection is bold
- **nil** if all the selection is not bold
- **:unknown** if the selection is only partially bold.

For the possible attributes, see **set-rich-text-pane-character-format**.

Compatibility note

The value **nil** for the keyword argument **:selection** is not supported in LispWorks 6.1 and later. See the description above for details of the current behavior with respect to the current selection in the **rich-text-pane**.

See also

rich-text-pane
set-rich-text-pane-character-format

rich-text-pane-operation *Function*

Summary

Gets and sets values and performs various operations on the pane.

Package

capi

Signature

rich-text-pane-operation *pane operation* **&rest** *args* **=>** *result, result2*

Arguments

pane	A **rich-text-pane**.
operation	A keyword specifying the operation to perform.
args	The value or values to use, when the operation is setting something.

Values

result	Various, see below.

result2 Returned only for *operation* **:get-selection**, see below.

Description The valid values of *operation* on Microsoft Windows and Cocoa are:

:pastep, **:cutp** or **:copyp**

result is a boolean indicating whether it is currently possible to perform a **:paste**, **:cut** or **:copy** operation.

:paste, **:cut**, or **:copy**

Performs the indicated operation.

:select-all Selects all the text.

:set-selection

args should be two integers *start* and *end*. Sets the selection to the region bounded by *start* (inclusive) and *end* (exclusive).

:get-selection

Returns as multiple values the bounding indexes of the selection. *result* is the start (inclusive) and *result2* is the end (exclusive). If there is no selection, both values are the index of the insertion point.

:can-undo or **:can-redo**

result is a boolean indicating whether it is currently possible to perform an **:undo** or **:redo** operation.

:undo Undoes the last editing operation. Note that, after typing, it is the whole input, rather than a single character, that is undone. The

:undo operation may be repeated successively, to undo previous editing operations in turn.

Note: with RichEdit 1.0, **:undo** does not work repeatedly - it only undoes one previous editing operation. See **rich-text-version**

:redo Undoes the effect of the last **:undo** operation. The **:redo** operation may be repeated successively, to cancel the effect of previous **:undo** operations in turn.

Note: with RichEdit 1.0, **:redo** does not work. See **rich-text-version**.

:get-modified *result* is the value of a boolean modified flag. This flag can be set by the **:set-modified** operation. Also, editing the text sets it to true.

:set-modified Sets the modified flag. The argument is a boolean.

:save-file Saves the text to a file. Details below.

:load-file Loads the text from a file. Details below.

Additionally these values of *operation* are valid on Microsoft Windows, only:

:get-word-wrap

Returns a value indicating the word wrap, which can be the keyword **:none**. *result* can also be the keyword **:window** or a CAPI printer object, meaning that the text wraps according to the width of the window or the printer.

:set-word-wrap

Sets the word wrap. The argument can be as described for **:get-word-wrap**, and additionally it can be the keyword **:printer**, meaning the **current-printer**.

:hide-selection

Specifies whether the selection should be hidden (not highlighted) when *pane* does not have the focus. The argument is a boolean.

For operations **:save-file** and **:load-file**, *args* is a lambda list

filename* &key *selection format plain-text

filename is the file to save or load.

selection is a boolean, with default value **nil**.

format is **nil** or a keyword naming the file format. Values include **:rtf** and **:text** meaning Rich Text Format and text file respectively.

plain-text is a boolean, with default value **nil**.

With *operation* **:save-file**, if *selection* is true, only the current selection is saved. If *selection* is **nil**, all the text is saved. The default value of *format* is **:rtf** and there are two further allowed values, **:rtfnoobjs** and **:textized**. These are like **:rtf** and **:text** except in the way they deal with COM objects. See the documentation for SF_RTFNOOBJS and SF_TEXTIZED in the EM_STREAMOUT entry in the MSDN for details. When saving with *format* **:rtf** or **:rtfnoobjs**, if *plain-text* is true, then keywords that are not common to all languages are ignored. With other values of *format*, *plain-text* has no effect.

With *operation* **:load-file**, if *selection* is true, the unselected text is preserved. If there is a selection, the new text replaces it. If there is no selection, the new text is inserted at the cur-

rent insertion point. If *selection* is **nil**, all the text is replaced. The default value of *format* is **nil**, meaning that the RTF signature is relied upon to indicate a Rich Text Format file. If *plain-text* is true, then keywords that are not common to all languages are ignored.

Example

```
(setq rtp
      (capi:contain
       (make-instance
        'capi:rich-text-pane
        :text (format nil "First paragraph.~%Second
paragraph, a little longer.~%Another paragraph, which
should be long long enough that it spans more than one
line. ~%" ))))
```

Set the selection to characters 9 to 18:

```
(capi:rich-text-pane-operation rtp :set-selection 9 18)
```

Write all the text to a file in text format:

```
(capi:rich-text-pane-operation
 rtp :save-file "mydoc.txt" :format :text)
```

Paste:

```
(capi:rich-text-pane-operation rtp :paste)
```

See also

rich-text-pane
rich-text-version

rich-text-pane-paragraph-format *Function*

Summary Returns the paragraph format.

Package **capi**

Signature **rich-text-pane-paragraph-format** *pane* **=>** *result*

Arguments *pane* A **rich-text-pane**.

Values *result* A plist.

Description The function **rich-text-pane-paragraph-format** returns as a plist the paragraph attributes of the current paragraphs in *pane*.

For the possible attributes, see **set-rich-text-pane-paragraph-format**.

See also **rich-text-pane**

rich-text-version *Function*

Summary Identifies the version of RichEdit in use, on Microsoft Windows.

Package **capi**

Signature **rich-text-version => *result***

Values *result* A keyword indicating the version of the RichEdit control in use.

Description *result* is **:rich-edit-2.0** if RichEdit 2.0 or newer is loaded. Otherwise *result* is **:rich-edit-1.0**.

rich-text-version is supported only on Microsoft Windows.

See also **rich-text-pane**

right-angle-line-pinboard-object *Class*

Summary A subclass of **pinboard-object** that displays a line drawn around two edges of the area enclosed by the pinboard object.

Package **capi**

Superclasses **line-pinboard-object**

Initargs **:type** The type of line.

Description A subclass of **line-pinboard-object** which displays a line around the edge of the pinboard object rather than diagonally.

type can be one of two values.

:vertical-first

Draw top-left to bottom-left to bottom-right.

:horizontal-first

Draw top-left to top-right to bottom-right.

The main use of this class is to produce graphs with right-angled edges rather than diagonal ones.

Example

```
(capi:contain
 (make-instance
  'capi:right-angle-line-pinboard-object
  :start-x 20 :start-y 20
  :end-x 280 :end-y 100))

(capi:contain
 (make-instance
  'capi:right-angle-line-pinboard-object
  :start-x 20 :start-y 120
  :end-x 280 :end-y 200
  :type :horizontal-first))
```

See also **pinboard-layout**

row-layout *Class*

Summary The **row-layout** class lays its children out in a row.

Package **capi**

Superclasses **grid-layout**

Initargs

:ratios The size ratios between the layout's children.

:adjust The vertical adjustment for each child.

:gap The gap between each child.

:uniform-size-p
If **t**, each child in the row has the same width.

Accessors **layout-ratios**

Description This lays its children out by inheriting the behavior from **grid-layout**. The *description* is a list of the layout's children, and the layout also translates the initargs *ratios*, *adjust*, *gap* and *uniform-size-p* into the grid layout's equivalent arguments *x-ratios*, *y-adjust*, *x-gap* and *x-uniform-size-p*.

description may also contain the keywords **:divider** and **:separator** which automatically create a divider or separator as a child of the **row-layout**. The user can move a divider, but cannot move a separator.

When specifying **:ratios** in a row with **:divider** or **:separator**, you should use **nil** to specify that the divider or separator is given its minimum size.

Compatibility note ***layout-divider-default-size*** and **row-layout-divider** are not supported in LispWorks 4.4 and later.

Example

```
(setq row (capi:contain
           (make-instance
            'capi:row-layout
            :description
            (list
             (make-instance 'capi:push-button
                            :text "Press me")
             (make-instance 'capi:title-pane
                            :text "Title")
             (make-instance 'capi:list-panel
                            :items '(1 2 3)))
            :adjust :center)))

(capi:apply-in-pane-process
 row #'(setf capi:layout-y-adjust) :bottom row)

(capi:apply-in-pane-process
 row #'(setf capi:layout-y-adjust) :top row)
```

This last example shows a row with a stretchable dummy pane between two other elements which are fixed at their minimum size. Try resizing it:

```
(capi:contain
 (make-instance 'capi:row-layout
                :description
                (list (make-instance 'capi:push-button
                                     :text "foo")
                      nil
                      (make-instance 'capi:push-button
                                     :text "bar"))
                :ratios '(nil 1 nil)))
```

See also **column-layout**

screen *Class*

Summary A **screen** is an object that represents the known monitor screens.

Package **capi**

Superclasses **capi-object**

Subclasses **color-screen**
mono-screen

Initargs

:width	The width in pixels of the screen.
:height	The height in pixels of the screen.
:number	The screen number.
:depth	The number of color planes in the screen.
:interfaces	A list of all of the interfaces visible on the screen.

Readers **screen-width**
screen-height
screen-number
screen-depth
screen-interfaces
screen-width-in-millimeters
screen-height-in-millimeters

Description When the CAPI initializes itself it creates one or more screen objects and they are then used to specify where a window is to appear. A **screen** object can also be queried for information that the program may need to know about the screen that it is working on, such as its width, height and depth.

On Microsoft Windows and Cocoa there is exactly one CAPI screen. When there are multiple monitors, there are several rectangles of pixels within the single CAPI screen.

On Motif, there is one CAPI screen for each X11 screen.

Compatibility note In LispWorks for Macintosh 4.3 there is one CAPI screen for each Cocoa screen. In LispWorks for Macintosh 4.4 and later, there is exactly one CAPI screen.

Example

```
(setq screen (capi:convert-to-screen))

(capi:screen-width screen)
```

```
(capi:screen-height screen)

(capi:display (make-instance
               'capi:interface :title "Test")
                               :screen screen)

(capi:screen-interfaces screen)
```

See also **convert-to-screen**

screen-active-interface *Function*

Summary Returns the active interface on a screen.

Package **capi**

Signature **screen-active-interface** *screen* **=>** *interface*

Arguments *screen* A **screen** or **document-container**

Values *interface* An **interface**, or **nil**.

Description The function **screen-active-interface** returns the currently active interface on the **screen** *screen*, or **nil** if no CAPI interface is active or if this cannot be determined.

screen-active-interface also works with **document-container**, returning the active interface within the container.

See also **document-container**
screen

screen-active-p *Function*

Summary Determines whether a screen is active.

Package **capi**

Signature **screen-active-p** *screen* **=>** *result*

Arguments *screen* A screen.

Values *result* A boolean.

Description The function **screen-active-p** is the predicate for whether a screen is active.

See also **screen**

screen-logical-resolution *Function*

Summary Returns the logical resolution of *screen*.

Package **capi**

Signature **screen-logical-resolution** *screen* **=>** *xlogres*, *ylogres*

Arguments *screen* A screen.

Values *xlogres, ylogres* Integers representing the logical resolution of *screen* in DPI.

Description The function **screen-logical-resolution** returns the logical resolution of *screen*, as dots per inch in the x and y directions.

See also **screen**

screen-internal-geometries *Function*

Summary Returns the internal geometries of all the monitors of a screen.

Package **capi**

Signature **screen-internal-geometries** *screen* **=>** *internal-geometries*

Arguments *screen* A CAPI screen.

Values *internal-geometries* A list of screen rectangles.

Description The function **screen-internal-geometries** returns the internal geometries of all the "monitors" of screen. A "monitor" typically corresponds to a physical monitor, but can be anything that the underlying GUI system considers a monitor.

The internal geometry of a monitor is a rectangle which excludes "system areas" like taskbars and global menu bars and so on. Examples of these include the Windows taskbar, the Mac OS X menu bar, and the Mac OS X dock. See **screen-internal-geometry** for information about displaying CAPI windows in system areas.

Each internal geometry is represented as a screen rectangle. A screen rectangle is a list of four numbers: *x* and *y* being the coordinates as offsets from the top-left of the primary monitor, and *width* and *height*.

The first screen rectangle in the *internal-geometries* list corresponds to the usable area of the primary monitor.

Notes On GTK+ when using a desktop with separate workspaces, the workspaces may be considered as separate "monitors". When there are multiple real monitors, the values may be

incorrect. You can use **screen-monitor-geometries** to check the number of monitors, and to check the full size of the monitors.

See also **pane-screen-internal-geometry**
virtual-screen-geometry
screen-internal-geometry
screen-monitor-geometries

screen-monitor-geometries *Function*

Summary Returns the geometries of all of a screen's monitors.

Package **capi**

Signature **screen-monitor-geometries** *screen* **=>** *monitor-geometries*

Arguments *screen* A CAPI screen.

Values *monitor-geometries* A list of screen rectangles.

Description The function **screen-monitor-geometries** returns the geometries of all the monitors of screen. A monitor corresponds to an entity that the host machine regards as a physical monitor. **screen-monitor-geometries** ignores software manipulations like the desktop on GTK+.

The monitor geometry is a rectangle which includes all of its display area, including "system areas" like menubar and taskbar and so on. Examples of these include the Windows taskbar, the Mac OS X menu bar and the Mac OS X dock.

Each monitor geometry screen rectangle is represented by a list of four numbers: the *x* and *y* coordinates as offsets from the top-left of the primary monitor, and the *width* and *height*.

The first screen rectangle in the *monitor-geometries* list corresponds to the primary monitor.

Notes

1. **screen-monitor-geometries** differs from **screen-internal-geometries** by returning screen rectangles which include all the monitor areas, and also by ignoring desktop manipulations.
2. You cannot display a CAPI window on the Mac OS X menu bar. You can display a CAPI window in the area occupied by the Mac OS X dock or the Windows task bar, but the window will be obscured.

See also

pane-screen-internal-geometry
screen-internal-geometries
virtual-screen-geometry

screen-internal-geometry *Function*

Summary

Returns the geometry of the unobscured region of a screen or document container.

Package

capi

Signature

screen-internal-geometry *screen* **=>** *x*, *y*, *width*, *height*

Arguments

screen	A **screen**.

Values

x	An integer.
y	An integer.
width	A positive integer.
height	A positive integer.

Description

The function **screen-internal-geometry** returns the geometry (as multiple values representing a screen rectangle) of the region of the screen that can be used to display windows without obstruction. This region excludes "system

areas" like menubar and taskbar and so on. Examples of these include the Windows taskbar, the Mac OS X menu bar and the Mac OS X dock.

x and *y* are the screen rectangle's coordinates as offsets from the top-left of the primary monitor, and *width* and *height* are its dimensions.

On Microsoft Windows **`screen-internal-geometry`** works with **`document-container`**, returning the current size of the container (which may vary over time).

Notes

1. The internal geometry is a snapshot of the unobscured region of a screen. If a system area moves or changes size, then the screen rectangle returned by **`screen-internal-geometry`** changes.
2. It may be possible to display a CAPI window outside the screen's internal geometry, for example under the Mac OS X dock, but it will be obscured.
3. The primary monitor is that represented by the first screen rectangle in the list returned by **`screen-internal-geometries`**.

See also

`document-container`
`pane-screen-internal-geometry`
`screen`
`screen-internal-geometries`

screens *Function*

Summary Returns the active screens for a library.

Package **`capi`**

Signature **`screens &optional`** *library* **`=>`** *result*

Arguments *library* A library name, a list, or **:any**.

Values *result* A list.

Description The function **screens** returns as a list all the active screens for *library*.

A library name is a keyword naming a library, currently **:win32** on Microsoft Windows, **:gtk** on GTK+, **:motif** on Motif and **:cocoa** on Mac OS X with the native GUI.

library can be a library name, or a list of library names, or the keyword **:any**, meaning all the libraries. The default value of *library* is the result of **default-library**.

See also **default-library**
screen

scroll *Generic Function*

Summary Moves the scrollbar and calls the *scroll-callback*.

Package **capi**

Signature **scroll** *self scroll-dimension scroll-operation scroll-value* **&rest** *options*

Arguments
- *self* — A pane that supports scrolling.
- *scroll-dimension* — **:vertical**, **:horizontal** or **:pan**.
- *scroll-operation* — **:move**, **:step** or **:page**.
- *scroll-value* — An integer, or a list of two integers, or a keyword, or a list of two keywords.
- *options* — A list.

Description The generic function **scroll** works for panes that support scrolling - these are subclasses of **output-pane** and **layout**.

scroll moves the scrollbar of a scrollable pane according to *scroll-dimension*, *scroll-operation* and *scroll-value*. It then calls the *scroll-callback* (see **output-pane**) with these arguments and *options*.

scroll-dimension determines whether the scrolling is vertical, horizontal or, if the value is **:pan**, in both dimensions.

scroll-operation determines the extent of the scroll. The value **:move** means that the pane scrolls to the position on the scroll range given by *scroll-value*, regardless of the current scroll position. The value **:step** means scroll from the current scroll position by *scroll-value* times the scroll step size. In the case of panes which do their own scrolling the scroll step size is determined by the operating system (OS). In the case of panes for which the CAPI computes the scroll, the scroll step size is as described in **with-geometry**. The value **:page** means scroll from the current scroll position by *scroll-value* times the scroll page size (which is also determined by the OS or the pane's geometry).

scroll-value should be an integer or keyword if *scroll-dimension* is **:horizontal** or **:vertical**. Allowed keyword values are **:start** and **:end**. *scroll-value* should be a list of two integers or keywords representing the horizontal and vertical scroll values if *scroll-dimension* is **:pan**.

options is a list containing arbitrary user data.

Compatibility note

scroll supersedes **set-scroll-position**, which is deprecated and no longer exported. The call

```
(capi:scroll pane :pan :move (list x y))
```

is equivalent to

```
(capi:set-scroll-position pane x y)
```

See also

ensure-area-visible
get-scroll-position
output-pane

set-horizontal-scroll-parameters
set-vertical-scroll-parameters
with-geometry

scroll-bar *Class*

Summary A pane which displays a scroll bar.

Package **capi**

Superclasses **range-pane**
simple-pane
titled-object

Initargs

:line-size	The distance scrolled by the scroll-line gesture.
:page-size	The distance scrolled by clicking inside the scroll bar.
:callback	A function called after a scroll gesture, or **nil**.

Accessors **scroll-bar-line-size**
scroll-bar-page-size

Description The class **scroll-bar** implements panes which display a scroll bar and call a callback when the user scrolls. It is not however the most usual way to add scroll bars - see the note below about **simple-pane**.

line-size is the logical size of a line, and is the distance moved when the user enters a scroll-line gesture, that is clicking on one of the arrow buttons at either end of the scroll bar or using a suitable arrow key. The default value of *line-size* is 1.

page-size is the logical size of a page, and is the distance moved when the user clicks inside the scroll bar. The default value of *page-size* is 10.

callback can be **nil**, meaning there is no callback. This is the default value. Otherwise, is a function of four arguments, the interface containing the scroll-bar, the scroll-bar itself, the mode of scrolling and the amount of scrolling. It has this signature:

callback *interface scroll-bar how where*

how can be one of **:line**, **:page**, **:move**, or **:drag**.

If *how* is **:line**, then *where* is an integer indicating how many lines were scrolled.

If *how* is **:page**, then *where* is an integer indicating how many pages were scrolled.

If *how* is **:move** or **:drag**, then *where* is an integer giving the new location of the *slug-start*, or **:start** or **:end**.

Note: the location of the slug can be found by the **range-pane** accessor **range-slug-start**.

Note: Rather than using **scroll-bar**, it is more usual to add scroll bars to a pane by the **simple-pane** initargs **:horizontal-scroll and :vertical-scroll**

Example

```
(defun sb-callback (interface sb how where)
  (declare (ignorable interface))
  (format t "Scrolled ~a where ~a : ~a~%"
          how where (range-slug-start sb)))

(contain
 (make-instance 'capi:scroll-bar
                :callback 'sb-callback
                :page-size 10
                :line-size 2
                :visible-min-width 200))
```

See also **simple-pane**

scroll-if-not-visible-p *Generic Function*

Summary — Accesses the *scroll-if-not-visible-p* attribute of a pane.

Signature

scroll-if-not-visible-p *pane* **=>** *value*

(setf scroll-if-not-visible-p) *value pane*

Values

value — One of **t**, **nil** or **:non-mouse**.

Method Signature

scroll-if-not-visible-p simple-pane

(setf scroll-if-not-visible-p) *value* **simple-pane**

Description

The generic function **scroll-if-not-visible-p** accesses the *scroll-if-not-visible-p* attribute of a pane.

The value of this attribute has these meanings:

t — When *pane* is given the input focus, and it is not fully visible, and its parent can be scrolled to make the pane visible, then the parent is scrolled automatically. This is the default value.

nil — Never scroll the parent to make a pane visible.

:non-mouse — Like **t**, except that it does not scroll when the focus is given as a result of a mouse click in *pane*.

scroll-if-not-visible-p is called by CAPI each time it may need to scroll the parent. The method on **simple-pane** returns a value that is kept internally, and can be set by the default setf method.

You can specialize **scroll-if-not-visible-p** on your classes, but note that it is called often when the user clicks on any pane, so it must be reasonably fast.

The setter sets the *scroll-if-not-visible-p* attribute. It is called when the initarg **:scroll-if-not-visible-p** is used in making a **simple-pane** (or a subclass) instance, and can be called by your program. *value* must be **t**, **nil** or **:non-mouse**.

The method on **simple-pane** sets the internal value that is used by **scroll-if-not-visible-p** on **simple-pane**.

See also **simple-pane**

search-for-item *Generic Function*

Summary The generic function **search-for-item** returns the index of an item in a collection.

Package **capi**

Signature **search-for-item** *collection item*

Description Returns the index of *item* in the *collection*, using the *collection-test-function* to determine equality, and returns **nil** if no match is found.

search-for-item is the counterpart function to **get-collection-item** which given an index, finds the appropriate item.

See also **get-collection-item**
collection

selection *Function*

Summary Returns the primary selection.

Package **capi**

Signature **selection** *self* **&optional** *format* **=>** *result*

Arguments

self	A displayed CAPI pane or interface.
format	A keyword.

Values

result	A string, an **image**, a Lisp object, or **nil**.

Description The function **selection** returns the contents of the primary selection as a string, or **nil** if there is no selection.

format controls what kind of object is read. The following values of *format* are recognized:

:string	The object is a string. This the default value.
:image	The object is of type **image**, converted from whatever format the platform supports.
:value	The object is the Lisp value.

When *format* is **:image**, the image returned by **selection** is associated with *self*, so you can free it explicitly with **free-image** or it will be freed automatically when the pane is destroyed.

On Microsoft Windows there is no notion of selection, so this mechanism is internal to Lisp.

Note that X applications may or may not use the primary selection for their paste operations. For instance, Emacs is configurable by the variable interprogram-paste-function.

See also **clipboard**
free-image
image
selection-empty
set-selection

selection-empty *Function*

Summary Determines whether there is a primary selection of a particular kind.

Package **capi**

Signature **selection-empty** *self* **&optional** *format* **=>** *result*

Arguments
- *self* — A displayed CAPI pane or interface.
- *format* — A keyword.

Values
- *result* — **t** or **nil**.

Description The function **selection-empty** returns **nil** if there is a primary selection of the kind indicated by *format*, or **t** if there is no such selection.

format controls what kind of object is checked. The following values of *format* are recognized:

- **:string** — The object is a string. This the default value.
- **:image** — The object is of type **image**, converted from whatever format the platform supports.
- **:value** — The object is the Lisp value.

See also **image**, **selection**

set-application-interface *Function*

Summary Specifies the main Cocoa application interface.

Package **capi**

Signature **set-application-interface** *interface*

Arguments

interface An object of type **cocoa-default-application-interface**

Description

The function **set-application-interface** sets *interface* as the main application interface. This interface is used to supply the application menu and receives various callbacks associated with the application.

set-application-interface must be called before any CAPI functions that make the **screen** object (such as **convert-to-screen** and **display**).

interface should not be displayed like a normal interface.

An application can only have one application menu and one dock menu. Because the LispWorks IDE already provides these menus, calling **set-application-interface** while running the LispWorks IDE will add a submenu to the **LispWorks** application menu to contain the *application-menu* and *menu-bar-items* of your application, and you can test them there. Likewise, a submenu will be added to the LispWorks Dock icon menu. Other aspects of the application interface can only be tested when running it standalone.

set-application-interface is only applicable when running under Cocoa.

Example

See these files in the **examples** subdirectory of the LispWorks library:

capi/applications/cocoa-application.lisp

capi/applications/cocoa-application-single-window.lisp

delivery/macos/multiple-window-application.lisp

delivery/macos/single-window-application.lisp

See also

cocoa-default-application-interface

set-button-panel-enabled-items *Generic Function*

Summary Sets the enabled state of the items in a button panel.

Package **capi**

Signature **set-button-panel-enabled-items** *button-panel* **&key** *enable disable set test key*

Description The generic function **set-button-panel-enabled-items** sets the enabled state of the items in a button panel. If *set* is **t**, then *enable* is ignored and all items are enabled except those in the *disable* list. If *set* is **nil**, *disable* is ignored and all items are disabled except those in the *enable* list. If *set* is not given, the items in the *enable* list are enabled and the items in the *disable* list are disabled. If an item is in both lists, it is enabled. A button is in a list when the data of the button matches one of the items in the list. A match is defined as a non-nil return value from the test function. The default test function is **equal**.

See also **button-panel**
redisplay-interface

set-clipboard *Function*

Summary Sets the contents of the system clipboard.

Package **capi**

Signature **set-clipboard** *self value* **&optional** *string plist* **=>** *result*

Arguments

self	A displayed CAPI pane or interface.
value	A Lisp object (not necessarily a string) to make available within the local Lisp image.

	string	The string representation of *value* to export, or **nil**. If **nil** and *value* is a string, then that will be exported as the string.
	plist	A property list of additional format/value pairs to export. The currently supported formats are as described for **clipboard**. You can export more than one format simultaneously.
Values	*result*	A string, or **nil**.

Description

The function **set-clipboard** sets the contents of the system clipboard to be the text of *string*.

In Microsoft Windows applications (including LispWorks in Windows emulation mode), the contents of the system clipboard is usually accessed by the user with the **Ctrl+V** gesture.

The X clipboard can be accessed by the **Ctrl+V** gesture in KDE/Gnome emulation, or by running the program **xclipboard** or the Emacs function **x-get-clipboard**. The most likely explanation for apparent inconsistencies after **set-clipboard** is that the pasting application doesn't use the X clipboard.

In Cocoa applications (including LispWorks), the contents of the system clipboard is usually accessed by the user with the **Command+V** gesture.

Example

To export an image:

```
(capi:set-clipboard pane nil nil (list :image image))
```

To export an image with a text description

```
(capi:set-clipboard pane nil nil
                    (list :image image
                          :string "my image"))
```

See also **clipboard**
selection
text-input-pane-copy

set-composition-placement *Function*

Summary Specifies the placement of the composition window relative to the pane. Composition here mean composing input characters into other characters by an input method.

Signature **set-composition-placement** *pane x y* **&key** *width height force*

Description The function **set-composition-placement** tells the system where to place the composition window in pixel coordinates relative to the pane *pane*.

On systems where the composition text is displayed by the application (rather than by the system, when the composition callback is called with a plist), the placement coordinates are used to place the composition menu when it is raised.

x and *y* are the top left coordinates. If both *width* and *height* are supplied, they specify the dimensions of the composition window. If *force* is supplied with a true value, the coordinates are forced, overriding adjustments that the system may otherwise do.

x, *y* and, when supplied, *width* and *height* must all be positive integers.

Notes **set-composition-placement** does not raise the composition window. It merely tells the system where to place the composition window when it does appear.

See also **output-pane**

set-confirm-quit-flag *Function*

Summary Controls the behavior of **confirm-quit**

Package **capi**

Signature **set-confirm-quit-flag** *flag*

Arguments *flag* One of **t**, **nil** or **:check-editor-files**

Description The function **set-confirm-quit-flag** sets a flag which controls the behavior of **confirm-quit**.

See **confirm-quit** for the effect.

Note: on initialization, the LispWorks IDE sets the flag to the stored value of the option **Tools > Preferences... > Environment > General > Confirm Before Exiting**.

See also **confirm-quit**

set-default-editor-pane-blink-rate *Function*

Summary Sets the default cursor blinking rate for editor panes.

Package **capi**

Signature **set-default-editor-pane-blink-rate** *blink-rate*

Arguments *blink-rate* A non-negative real number, or **nil**.

Description The function **set-default-editor-pane-blink-rate** sets the default to use for the editor pane cursor blinking rate. This default value is used when **editor-pane-blink-rate** returns **nil**.

Initially the setting is if this call has been made:

```
(set-default-editor-pane-blink-rate nil)
```

This means that the native blink rate will be used.

The argument *blink-rate* is interpreted as a blinking rate as described in **editor-pane-blink-rate**.

See also **editor-pane-blink-rate**
editor-pane-native-blink-rate

set-default-interface-prefix-suffix *Function*

Summary Sets the default suffix and prefix that are added to each interface title.

Package **capi**

Signature **set-default-interface-prefix-suffix &key** *prefix suffix child-prefix child-suffix* **=>** *prefix, suffix, child-prefix, child-suffix*

Arguments

prefix	A string or **nil**.
suffix	A string or **nil**.
child-prefix	A string or **nil**.
child-suffix	A string or **nil**.

Values

prefix	A string or **nil**.
suffix	A string or **nil**.
child-prefix	A string or **nil**.
child-suffix	A string or **nil**.

Description The function **set-default-interface-prefix-suffix** sets the global default suffix and prefix that are added to each **interface** title. The prefix and suffix are added by the default method of **interface-extend-title**.

If *prefix*, *suffix*, *child-prefix* or *child-suffix* are supplied, their value must be either a string or **nil**. If any of them is not passed, the corresponding previously set value is not changed.

prefix and *suffix* specify the prefix and suffix to use for interfaces that are children of a **screen** object. These values do not affect *child-prefix* and *child-suffix*.

child-prefix and *child-suffix* specify the prefix and suffix to use for interfaces that are not children of a **screen** object, such as an interface inside a Multiple Document Interface (MDI) window. These values do not affect *prefix* and *suffix*.

The return values are the settings of the prefix, suffix, child prefix and child suffix after the call.

To check the current settings, call **set-default-interface-prefix-suffix** with no arguments. This does not change the current settings.

Before setting the title on a window on the screen, the system calls **interface-extend-title** with the interface and the title of the interface, and uses the result for the actual title. The default method of **interface-extend-title** checks *prefix* and *suffix* (or *child-prefix* and *child-suffix* for MDI) as were set by **set-default-interface-prefix-suffix**, and if they are non-nil adds the value to the title.

set-default-interface-prefix-suffix can be called after some windows are displayed. It automatically updates all current interface windows as if by calling **update-all-interface-titles**.

Example

If you work in an environment when it is not always obvious on which machine your image is running, you can add the name of the machine to all windows by:

```
(capi:set-default-interface-prefix-suffix
       :suffix (format nil "-- ~a" (machine-instance)))
```

See also **interface-extend-title**
update-all-interface-titles

set-default-use-native-input-method *Function*

Summary Controls the default of using native input method on GTK+.

Signature **set-default-use-native-input-method &key** *output-pane editor-pane* **=> t**

Arguments *output-pane* A boolean.
editor-pane A boolean.

Values **set-default-use-native-input-method** returns **t**.

Description The function **set-default-use-native-input-method** controls whether the native input method is used by default. Currently it has an effect only on GTK+.

The values of the keyword arguments are booleans. *editor-pane* changes the default for **editor-pane** and subclasses. *output-pane* controls the default for **output-pane** and subclasses, except **editor-pane** and its subclasses.

If a keyword argument is not supplied, the corresponding default is not set.

See also **output-pane**
editor-pane

set-display-pane-selection *Generic Function*

Summary Sets the selection in a **display-pane**.

Package **capi**

Signature **set-display-pane-selection** *pane start end*

Arguments

pane	A **display-pane**.
start, end	Bounding indexes for a subsequence of the text of *pane*.

Description The generic function **set-display-pane-selection** sets the selection in *pane* to be the text bounded by the indexes *start* (inclusive) and *end* (exclusive).

See also **display-pane-selection**
display-pane

set-drop-object-supported-formats *Function*

Summary Sets the list of formats for a drop object

Package **capi**

Signature **set-drop-object-supported-formats** *drop-object formats*

Arguments

drop-object	A *drop-object*, as passed to the *drop-callback*
formats	A list of format keywords

Description The function **set-drop-object-supported-formats** sets the list of formats that the drop object *drop-object* wants to receive.

The **:string** format can be used to receive a string from another application and the **:filename-list** format can be used to receive a list of filenames from another application such as the Macintosh Finder or the Windows Explorer.

GTK+ supports dragging of list of URIs. LispWorks uses a list of URIs to pass/receive the data with the format **:filename-list**, and also adds the format **:uris**. The behavior is as follows:

- For dragging with format **:filename-list** (that is, call **drag-pane-object** with a plist containing **:filename-list**, or including **:filename-list** in the value that *drag-callback* returns) the argument must be a list of pathname designators. LispWorks canonicalizes the pathnames and converts them to file URIs.
- For dragging with format **:uris**, each value in the list must either a string containing a colon, or a pathname designator. A string containing a colon is passed unchanged. Other it is assumed to be a pathname designator, and is converted to a file URI.
- For dropping with format **:filename-list** (that is, calling **drop-object-get-object** with **:filename-list**), LispWorks converts each file URI to the corresponding filename string (without checking whether it is a proper file name), and discards all other URIs.
- For dropping with format **:uris**, LispWorks returns all the URIs as strings.

There is an example of **:filename-list** and **:uris** in **examples/capi/elements/gtk-filename-list-and-uris.lisp**

On Cocoa and GTK+ the **:image** format can be used to receive images. The value passed needs to be an **image** obtect.

Any other keyword in *formats* is assumed to be a private format that can only be used to receive objects from with the same Lisp image.

Notes **set-drop-object-supported-formats** should only be called within a *drop-callback*. See **simple-pane** for information about drop callbacks.

Example See
examples/capi/output-panes/drag-and-drop.lisp
examples/capi/choice/drag-and-drop.lisp
examples/capi/choice/list-panel-drag-images.lisp

See also **drop-object-provides-format**
simple-pane

set-editor-parenthesis-colors *Function*

Summary Sets the colors that are used for parenthesis coloring.

Signature **set-editor-parenthesis-colors** *colors*

Arguments *colors* A list of colors, **t** or **nil**.

Description The function **set-editor-parenthesis-colors** sets the colors that are used for parenthesis coloring in an **editor-pane** in Lisp mode.

If *colors* is a non-nil list, each of its elements must be a valid color specification or a defined color alias. See "The Color System" in the *CAPI User Guide* for information about colors.

If it is called when CAPI is running, **set-editor-parenthesis-colors** checks that the colors are valid. If it is called when CAPI is not running, **set-editor-parenthesis-colors** does not check the colors, and a bad color will cause an error later. The colors have an effect only on coloring that happens after the call.

If *colors* is **t** or **nil**, parenthesis coloring is switched on or off, without changing the list of colors.

When parenthesis coloring is off, parentheses are drawn like other characters.

See also **editor-pane**

set-geometric-hint *Function*

Summary The **set-geometric-hint** function sets the hint associated with a key.

Package **capi**

Signature **set-geometric-hint** *element key value*
&optional *override*

Description Set the hint associated with *key* to *value*. If *override* is **nil**, the value is not changed when there is already a hint for this key. The default is **t**.

See also **set-hint-table**
element

set-hint-table *Function*

Summary Modifies the hint table for an element.

Package **capi**

Signature **set-hint-table** *element plist*

Description The function **set-hint-table** modifies the hint table for the element *element* to include *plist*. All existing hints are retained for keys not in the *plist*.

This may or may not change the on-screen geometry. To change the geometry of an interface, use **set-top-level-interface-geometry**.

Notes — If a hint keyword is repeated in *plist*, the first value is used.

See also — **element**
set-geometric-hint
set-top-level-interface-geometry

set-horizontal-scroll-parameters *Generic Function*

Summary — Allows programmatic control of the parameters of a horizontal scroll bar.

Package — **capi**

Signature — **set-horizontal-scroll-parameters** *self* **&key** *min-range max-range slug-position slug-size page-size step-size*

Description — The function **set-horizontal-scroll-parameters** sets the specified parameters of the horizontal scroll bar of *self*, which should be a displayed instance of a subclass of **output-pane** (such as **editor-pane**) or **layout**.

The other arguments are:

min-range	The minimum data coordinate.
max-range	The maximum data coordinate.
slug-position	The current scroll position.
slug-size	The length of the scroll bar slug.
page-size	The scroll page size.
step-size	The scroll step size.

Compatibility note

The function **set-horizontal-scroll-parameters** supersedes the function **set-scroll-range**, which is deprecated and no longer exported.

The call

```
(set-horizontal-scroll-parameters pane
                                  :min-range 0
                                  :max-range 42)
```

is equivalent to

```
(set-scroll-range pane 42 nil)
```

Example

See the following files:
examples/capi/output-panes/scroll-test.lisp
examples/capi/output-panes/scrolling-without-bar.lisp

See also

scroll
get-horizontal-scroll-parameters
simple-pane

set-interactive-break-gestures *Function*

Summary

Sets the break gestures on GTK+ and Motif.

Signature

set-interactive-break-gestures *gestures* **=>** *result*

Arguments

gestures A list of gesture specifiers, or **t**

The function **set-interactive-break-gestures** sets the gestures that can be used to break by typing at an interface.

gestures is a list of gesture specifiers. A gesture specifier is an object that **sys:coerce-to-gesture-spec** can recognize.

When an interface is created, the break gestures are set such that typing any one of them when the interface is on top causes an "interface break". This means that, if the interface process is busy, it tries to break it. In a Listener tool, it tries to break the REPL. Otherwise it tries to find a process that

appears busy, and breaks that. In the LispWorks IDE, if there is no busy process it raises the Process Browser tool. Otherwise it breaks the current process.

set-interactive-break-gestures always returns the list of interactive break gestures.

gestures can also be **t**, which means do not change the gestures. This is useful to get the current list.

Notes

1. **set-interactive-break-gestures** has an effect only on GTK+ and Motif.
2. **set-interactive-break-gestures** has no effect on interfaces that are already created.
3. On GTK+ the list can be overriden by the resources file as illustrated in **examples/gtk/gtkrc-break-gestures**

set-list-panel-keyboard-search-reset-time *Function*

Summary

Sets the default length of time before resetting the "last match" in keyboard searching in a **list-panel**.

Signature

set-list-panel-keyboard-search-reset-time *time*

Arguments

time A positive real number.

Description

The function **set-list-panel-keyboard-search-reset-time** sets the default length of time before resetting the "last match" in keyboard searching in a **list-panel**. The argument *time* specifies this time in seconds.

When the user types a character into a **list-panel**, if there is a "last match" the system searches for a string made of the "last match" followed by the character, otherwise it searches for a string made of the character only. The system sets the "last match" when it matches, and remembers the "last

match" for one second by default. **set-list-panel-keyboard-search-reset-time** can be used to change the time for which the "last match" is kept.

Notes

When *keyboard-search-callback* returns a third value non-nil, the value that **set-list-panel-keyboard-search-reset-time** sets is ignored.

See also

list-panel
list-panel-search-with-function

set-object-automatic-resize *Function*

Summary

Controls automatic resizing and repositioning of objects in a static layout.

Package

capi

Signature

set-object-automatic-resize *object* **&key** *x-align y-align x-offset y-offset x-ratio y-ratio width-ratio height-ratio aspect-ratio aspect-ratio-y-weight pinboard*

Arguments

object	A **pinboard-object** or a **simple-pane**.
x-align	**nil**, **:left**, **:center** or **:right**.
y-align	**nil**, **:top**, **:center** or **:bottom**.
x-offset	A real number, default value 0.
y-offset	A real number, default value 0.
x-ratio	A positive real number or **nil**.
y-ratio	A positive real number or **nil**.
width-ratio	A positive real number or **nil**.
height-ratio	A positive real number or **nil**.
aspect-ratio	A positive real number, **t** or **nil**.

aspect-ratio-y-weight

A real number, default value 0.5.

pinboard A **`static-layout`**, if supplied. This argument is deprecated, and can always be omitted.

Description

The function **`set-object-automatic-resize`** arranges for *object* to be resized and/or re-positioned automatically when *pinboard* is resized, or removes such a setting.

The value of *aspect-ratio* can be **`t`**, which means use the current aspect ratio of *object* (that is, its height divided by its width).

object should be either a **`pinboard-object`** or a **`simple-pane`** which is (or will be) displayed in a **`static-layout`**. This *object* will be added to the *description* of the layout by one of its **`:description`** initarg, **`(setf capi:layout-description)`** or **`manipulate-pinboard`**.

pinboard is the layout for *object*. If *pinboard* is already displayed with *object* in its *description*, the argument *pinboard* can be omitted.

When *pinboard* is resized, *object* is resized if either *height-ratio* or *width-ratio* are set.

The new width of *object* is calculated as follows:

- If *width-ratio*, *height-ratio* and *aspect-ratio* are all set, the new width is the width of *pinboard* multiplied by *width-ratio*, and then modified as described below.
- If *width-ratio* is set and either *height-ratio* or *aspect-ratio* is not set, the new width is the width of *pinboard* multiplied by *width-ratio*.
- If *width-ratio* is not set, and both *height-ratio* and *aspect-ratio* are set, the new width is the new height divided by *aspect-ratio*.

- Otherwise, the new width is the same as the old width.

The new height of *object* is calculated as follows:

- If *width-ratio* and *aspect-ratio* are set, the new height is the new width multiplied by the aspect ratio. Note that if *height-ratio* is set, the new width will depend on *height-ratio* too.
- If *height-ratio* is set and either *width-ratio* or *aspect-ratio* are not set, the new height is the height of *pinboard* multiplied by *height-ratio*.
- If *height-ratio* is not set, but both *width-ratio* and *aspect-ratio* are set, the new height is the new width multiplied by *aspect-ratio*.
- Otherwise, the new height is the same as the old height.

If all of *width-ratio*, *height-ratio* and *aspect-ratio* are set, the new width and height of object are calculated as follows:

1. Compute *calculated-width* as the width of *pinboard* multiplied by *width-ratio*, and *calculated-height* as the height of *pinboard* multiplied by *height-ratio*.
2. Compute *aspect-ratio-ratio* as

```
(/ (/ calculated-height calculated-width) aspect-ratio)
```

3. Compute *correction* as

```
(expt aspect-ratio-ratio aspect-ratio-y-weight)
```

4. Compute the new width as *calculated-width* multiplied by *correction*, and the new height as the new width multiplied by *aspect-ratio*.

The result is that if *aspect-ratio-y-weight* is 0, *correction* is 1 and *height-ratio* is effectively ignored, while if *aspect-ratio-y-weight* is 1, *correction* cancels the effect of *width-ratio*. With the default value of 0.5, the resulting position is in the (geometric) middle, and *object* takes a fixed fraction of the area of the pinboard.

After resizing (if needed), *object* is also positioned horizontally if *x-align* is non-nil, and vertically if *y-align* is non-nil.

The new x coordinate of *object* is calculated as follows:

- If *x-ratio* is set, the new x coordinate is the sum of *x-ratio* multipled by the width of *pinboard* plus *x-offset*, otherwise it is simply *x-offset*.
- The actual value of the x coordinate for *object* is adjusted according to the value of *x-align* such that the left, center or right of *object* align with the new coordinate.

The new y coordinate of object is calculated similarly, using *y-ratio* and *y-offset*, with an adjustment such that the top, center or bottom of *object* aligns with the new coordinate according to *y-align*.

If all of *width-ratio*, *height-ratio*, *x-align* and *y-align* are **`nil`**, automatic resizing/re-positioning of *object* is removed.

`set-object-automatic-resize` can be called before *object* is actually displayed, and its effect persists over calls adding and removing *object* to/from **`static-layout`**s. The effect of **`set-object-automatic-resize`** also persists if *object* is removed and added again, either to the same layout or another layout.

Repeated calls to **`set-object-automatic-resize`** set only the values that are passed to **`set-object-automatic-resize`**. Keys that are not passed are left with their previous value. A call that removes the automatic resizing (because *width-ratio*, *height-ratio*, *x-align* and *y-align* are all **`nil`**) erases all the values.

`set-object-automatic-resize` returns **`t`** if the object is set up for automatic resizing, or **`nil`** if the object is set up for no automatic resizing.

Notes

1. The initarg **`:automatic-resize`** can be used to set up automatic resizing in the call to **`make-instance`**.

2. The name **set-object-automatic-resize** is slightly inaccurate, because this function can alter an object's position without actually changing its size.

Compatibility note

In LispWorks 6.0 the effect of **set-object-automatic-resize** does not persist if the object is removed and then added, to any layout.

In LispWorks 6.0 each call to **set-object-automatic-resize** sets all the values.

Example

Put an object of fixed size at the top right corner:

```
(set-object-automatic-resize object
                             :x-ratio 1 :x-align :right)
```

Put an object in the bottom-right quadrant:

```
(set-object-automatic-resize
 object
 :x-ratio 0.5 :y-ratio 0.5
 :width-ratio 0.5 :height-ratio 0.5)
```

Put an object with a fixed aspect ratio and object width linear with the width of the layout in the center:

```
(set-object-automatic-resize
 object
 :x-align :center :y-align :center
 :x-ratio 0.5 :y-ratio 0.5
 :aspect-ratio 0.6 :width-ratio 0.1)
```

There is a further example in

```
(example-file "capi/layouts/automatic-resize.lisp")
```

See also

manipulate-pinboard
static-layout
pinboard-object
simple-pane

set-pane-focus *Generic Function*

Summary Sets the input focus to a pane.

Package **capi**

Signature **set-pane-focus** *pane*

Arguments
- *pane* — An instance of a subclass of **simple-pane** or **choice**.

Description The function **set-pane-focus** sets the input focus to *pane* or one of its children.

See also **pane-has-focus-p**

set-rich-text-pane-character-format *Function*

Summary Sets the character format.

Package **capi**

Signature **set-rich-text-pane-character-format** *pane* **&key** *selection attributes-plist* **=>** *result*

Arguments
- *pane* — A **rich-text-pane**.
- *selection* — Must be **t**. This argument is deprecated.
- *attributes-plist* — A plist or **:default**.

Values
- *result* — A plist.

Description The function **set-rich-text-pane-character-format** sets current character attributes for text in *pane*.

If there is a current selection in the pane, then the attributes are set for the selected text. If there is no selection, then it sets the "typing attributes", which are applied to characters that are typed by the user. Note that any cursor movement changes these attributes, so the setting is ephemeral.

The *selection* argument is deprecated. If *selection* is **nil** an error is signalled. The default value of *selection* is **t**.

If *attributes-plist* is the symbol **:default** then the default character format of the pane (that is, the value of the **rich-text-pane** initarg **:character-format**) is used. Otherwise *attributes-plist* is a plist of keywords and values. These are the valid keywords on Microsoft Windows and Cocoa:

:bold A boolean.

:italic A boolean.

:underline A boolean.

:face A string naming a font.

:color A color spec or alias specifying the foreground color.

:size The size of the font.

Additionally these *attributes-plist* keywords are valid on Microsoft Windows only:

:strikeout A boolean.

:offset An integer specifying the vertical offset of characters from the line (a positive value makes them superscript and a negative value makes them subscript).

:protected A boolean. See the description of *protected-callback* in **rich-text-pane**.

:charset A cons **(***charset* **.** *pitch-and-family***)** where *charset* has the value of a Microsoft Windows charset identifier, and *pitch-and-family* is the

value of **(logior** *pitch family***)** where pitch and family have the value of a Windows pitch and a Windows font family respectively.

Compatibility note

The value **nil** for the keyword argument **:selection** is not supported in LispWorks 6.1 and later. See the description above for details of the current behavior with respect to the current selection in the **rich-text-pane**.

Example

Note: This example uses some features which are supported only on Microsoft Windows:

```
(defun ok-to-edit-p (pane start end s)
  (declare (ignore pane))
  (capi:prompt-for-confirmation
   (format nil "Editing~:[ ~; selection ~]from ~a to ~a"
           s start end)))

(setq rtp
      (capi:contain
       (make-instance
        'capi:rich-text-pane
        :protected-callback 'ok-to-edit-p
        :character-format
        '(:size 14  :color :red)
        :visible-min-height 300
        :visible-min-width 400
        :paragraph-format
        '(:start-indent 20 :offset -15)
        :text-limit 160
        :text (format nil "First paragraph.~%Second
paragraph, a little longer.~%Another paragraph, which
should be long long enough that it spans more than one
line. ~%" ))))
```

Enter some characters in the rich text window and select a range.

Set the selection to blue:

```
(capi:set-rich-text-pane-character-format
 rtp
 :attributes-plist '(:color :blue))
```

Make it protected:

```
(capi:set-rich-text-pane-character-format
 rtp :attributes-plist '(:protected t))
```

Now try to delete a character, and also to delete the selection. In both cases the **ok-to-edit-p** callback is called.

See also **rich-text-pane**
rich-text-pane-character-format

set-rich-text-pane-paragraph-format *Function*

Summary Sets the paragraph format.

Package **capi**

Signature **set-rich-text-pane-paragraph-format** *pane attributes-plist* **=>** *result*

Arguments
- *pane* — A **rich-text-pane**.
- *attributes-plist* — A plist, or **:default**.

Values
- *result* — A plist.

Description The function **set-rich-text-pane-paragraph-format** sets paragraph attributes for the current paragraphs in *pane*.

The current paragraphs are those paragraphs which overlap the current selection, or the paragraph containing the insertion point if there is no selection.

If *attributes-plist* is the symbol **:default** then the default paragraph format of the *pane* is used. Otherwise *attributes-plist* is a plist of keywords and values. These are the valid keywords on Microsoft Windows and Cocoa:

:alignment **:left**, **:right** or **:center**.

:start-indent A number setting the indentation.

:offset-indent A number modifying the indentation.

:offset A number setting the relative indentation of subsequent lines in a paragraph.

:right-indent A number setting the right margin.

:tab-stops A list of numbers.

Additionally this *attributes-list* keyword is valid on Microsoft Windows, only:

:numbering **nil**, **t**, **:bullet**, **:arabic**, **:lowercase**, **:uppercase**, **:lower-roman** or **:upper-roman**.

numbering specifies the numbering style. Rich Edit 3.0 supports all the above values of *numbering*. Please note that the Arabic and Roman styles start numbering from zero, and that only **t** and **:bullet** work with versions of Rich Edit before 3.0 (other values of *numbering* are quietly ignored).

start-indent specifies the indentation of the first line of a paragraph. A negative value removes the indentation.

offset-indent takes effect only when *start-indent* is not passed. It specifies an increase in the current indentation. Therefore, a negative value of *offset-indent* decreases the indentation.

offset specifies the offset of the second and following lines relative to the first line of the paragraph. That is, when the indentation of the first line is *indent*, the indentation of the second and subsequent lines is *indent* + *offset*. When *offset* is

negative, the second and subsequent lines are indented less than the first line. If *indent* + *offset* is negative, then these lines are not indented.

tab-stops should be a list of numbers specifiying the locations of tabs. No more than 32 tabs are allowed.

Example

```
(setq rtp
      (capi:contain
       (make-instance
        'capi:rich-text-pane
        :visible-min-height 300
        :visible-min-width 400
        :paragraph-format
        '(:start-indent 20 :offset -15)
        :text (format nil "First paragraph.~%Second
paragraph, a little longer.~%Another paragraph, which
should be long long enough that it spans more than one
line. ~%" ))))

(capi:set-rich-text-pane-paragraph-format
 rtp '(:offset-indent 30 :numbering :lowercase))
```

See also

rich-text-pane
rich-text-pane-paragraph-format

set-selection *Function*

Summary

Sets the primary selection.

Package

capi

Signature

set-selection *self value* **&optional** *string plist* **=>** *result*

Arguments

self	A displayed CAPI pane or interface.
value	A Lisp object (not necessarily a string) to make available within the local Lisp image.

	string	The string representation of *value* to export, or **nil**. If **nil** and *value* is a string, then that will be exported as the string.
	plist	A property list of additional format/value pairs to export. The currently supported formats are **:string**, whose value should be a string, and **:image** whose value should be a **image** object. This allows you to export more than one format simultaneously.
Values	*result*	A string, or **nil**.

Description

The function **set-selection** sets the primary selection to be the text of *string*.

On Microsoft Windows there is no notion of selection, so this mechanism is internal to Lisp.

Note that X applications may or may not use the primary selection for their paste operations. The most likely explanation for apparent inconsistencies after **set-selection** is that the pasting application doesn't use the primary selection. For instance, Emacs is configurable by the variable interprogram-paste-function.

See also

selection
set-clipboard

set-printer-metrics *Function*

Summary

Sets the metrics in the given printer.

Package

capi

Signature

set-printer-metrics *printer* **&key** *left-margin top-margin width height*

Description The function **set-printer-metrics** sets the left margin and top margin, and the printable width and printable height, of the given printer. Values outside the bounds of the printer will be corrected.

Example To set the margins as large as possible:

```
(let ((metrics (capi:get-printer-metrics printer)))
  (capi:set-printer-metrics printer
        :left-margin 0
        :top-margin 0
        :width
        (capi:printer-metrics-paper-width metrics)
        :height
        (capi:printer-metrics-paper-height metrics)))
```

Actually this sets the margins to the whole paper size, but the printer driver will move these in to take account of the minimum margins of the device.

See also **get-printer-metrics**
set-printer-options
print-dialog

set-printer-options *Function*

Summary Sets various options in the given printer.

Package **capi**

Signature **set-printer-options** *printer* **&key** *output-file first-page last-page orientation copies*

Description The function **set-printer-options** allows some printer options for the current job to be set programmatically. Note that the user can change the various printer options in the dialog displayed by **print-dialog**.

The *printer* argument should be a printer object returned by **current-printer** or **print-dialog**. This *printer* should then be passed to **with-print-job** to print using the options specified.

The keyword arguments control which options are set. If a keyword is not passed then the option remains unchanged.

Values of *output-file* are:

nil	Print directly to the device.
t	Print to a file chosen by the user at printing time.
A pathname	Print to the file given by pathname.

Values of *first-page* are:

:all	Print all pages.
A integer	Print from this page to the page given by *last-page.*

Values of *orientation* are:

:landscape	Print in landscape mode.
:portrait	Print in portrait mode.

Values of *copies*:

A integer	The number of copies to print.

Notes

Printer objects cannot be reused after changing their options or metrics. Call **current-printer** after **set-printer-options** to get a new printer object containing the latest settings.

Example

```
;; Print two copies to the current printer.
(let ((printer (capi:current-printer)))
  (capi:set-printer-options printer :copies 2)
  (capi:with-print-job (port :printer printer)
        (print-my-document port)))
```

See also **print-dialog**
current-printer
with-print-job

set-text-input-pane-selection *Generic Function*

Summary Sets the selection in a **text-input-pane**.

Package **capi**

Signature **set-text-input-pane-selection** *pane start end*

Arguments
pane A **text-input-pane**.
start, end Bounding indexes for a subsequence of the text of *pane*.

Description The function **set-text-input-pane-selection** sets the selection in *pane* to be the text bounded by the indexes *start* (inclusive) and *end* (exclusive).

See also **text-input-pane-selection**
text-input-pane

set-top-level-interface-geometry *Generic Function*

Summary Sets the geometry of a top level interface.

Package **capi**

Signature **set-top-level-interface-geometry** *interface* **&key** *x y width height*

Arguments
interface A CAPI interface.

x, *y*, *width*, *height*

Integers specifying the new geometry.

Description

The coordinates of *interface* are modified according to the keyword arguments passed. The value of *interface* should be a top level interface. If a keyword is omitted then that part of the coordinates is not changed.

x and *y* are measured from the top-left of the screen rectangle representing the area of the primary monitor (the primary screen rectangle).

Notes

On Cocoa **set-top-level-interface-geometry** behaves as if an interface toolbar is not present, even if *interface* does contain an interface toolbar.

Example

```
(setf ii
      (capi:element-interface
       (capi:contain
        (make-instance 'capi:text-input-pane))))

(multiple-value-bind (x y width height)
    (capi:top-level-interface-geometry ii)
  (capi:execute-with-interface
   ii
   'capi:set-top-level-interface-geometry
   ii
   :x (round (+ x (/ width 4)))
   :y y
   :width (round (* 0.75 width))
   :height height))
```

See also

top-level-interface-p
top-level-interface-geometry
top-level-interface-display-state
interface

set-vertical-scroll-parameters *Generic Function*

Summary Allows programmatic control of the parameters of a vertical scroll bar.

Package **capi**

Signature **set-vertical-scroll-parameters** *self* **&key** *min-range max-range slug-position slug-size page-size step-size*

Description The function **set-vertical-scroll-parameters** sets the specified parameters of the vertical scroll bar of *self*, which should be a displayed instance of a subclass of **output-pane** (such as **editor-pane**) or **layout**.

The other arguments are:

min-range	The minimum data coordinate.
max-range	The maximum data coordinate.
slug-position	The current scroll position.
slug-size	The length of the scroll bar slug.
page-size	The scroll page size.
step-size	The scroll step size.

Compatibility note The function **set-vertical-scroll-parameters** supersedes the function **set-scroll-range**, which is deprecated and no longer exported.

The call

```
(set-vertical-scroll-parameters pane
                                :min-range 0
                                :max-range 42)
```

is equivalent to

```
(set-scroll-range pane nil 42)
```

Example See the following CAPI example files:

examples/capi/output-panes/scroll-test.lisp
examples/capi/output-panes/scrolling-without-bar.lisp

See also **scroll**
set-horizontal-scroll-parameters
simple-pane

shell-pane *Class*

Summary A pane allowing the user to interact with a subprocess.

Package **capi**

Superclasses **interactive-pane**

Initargs **:command** The command which is run as a subprocess.

Accessors **shell-pane-command**

Description The class **shell-pane** creates an editor in which a subprocess runs.

User input is interpreted as input to the subprocess. In particular, when the user enters **Return** in the last line, the line is sent to the subprocess. The output of the subprocess is displayed in the pane.

The default value of command is **nil**, which means that the actual command is determined as follows:

On Unix/Linux and Mac OS X, the value of the environment variable **ESHELL** is used if set, and otherwise the environment variable **SHELL** is consulted. If that is not set, then **/bin/csh** (**/bin/sh** on SVR4 platforms) is run.

On Microsoft Windows 98/ME, **command** is run.

On Windows 2000/XP/Vista/Windows 7, **cmd** is run.

Example This function emulates user input on *pane*:

```
(defun send-keys-to-pane-aux (pane string newline-p)
  (loop for char across string
        do (capi:call-editor pane char))
  (if newline-p
      (capi:call-editor pane #\Return)))
```

This function trampolines to **send-keys-to-pane-aux** on the right process:

```
(defun send-keys-to-pane (pane string newline-p)
  (capi:apply-in-pane-process pane
                              'send-keys-to-pane-aux
                              pane string newline-p))

(setq sp (capi:contain
          (make-instance 'capi:shell-pane
                         :visible-min-width
                         '(character 60)
                         :visible-min-height
                         '(character 30))))
```

This call emulates the user typing **dir** followed by **Return**:

```
(send-keys-to-pane sp "dir" t)
```

show-interface *Function*

Summary The **show-interface** function brings the interface containing a specified pane back onto the screen.

Package **capi**

Signature **show-interface** *pane*

Description This brings the interface containing *pane* back onto the screen. To hide it again, use **hide-interface**.

See also **hide-interface**
activate-pane
interface

show-pane *Function*

Summary Restores the specified pane to the screen.

Package **capi**

Signature **show-pane** *pane* **=>** *pane*

Arguments *pane* An instance of **simple-pane** or a subclass.

Description The function **show-pane** restores the pane *pane* to the screen if it is hidden (for instance by **hide-pane**) or iconified.

See also **hide-pane**
show-interface

simple-layout *Class*

Summary A **simple-layout** is a layout with a single child, and the child is resized to fill the space (where possible).

Package **capi**

Superclasses **x-y-adjustable-layout**

Subclasses **switchable-layout**

Description A simple layout's description can be either a single child, or a list containing just one child. The simple layout then adopts the size constraints of its child, and lays the child out inside itself.

Example
```
(capi:contain (make-instance
               'capi:simple-layout
               :description (list (make-instance
                                   'capi:text-input-pane))))
```

See also **layout**
row-layout
column-layout

simple-network-pane *Class*

Summary A graph pane which arranges its nodes in a grid.

Package **capi**

Superclasses **graph-pane**

Initargs
:x-gap	The horizontal node spacing.
:y-gap	The vertical node spacing.

Description The class **simple-network-pane** provides a graph which lays out its nodes in a rectangular grid by a simple algorithm.

The default values of *x-gap* and *y-gap* are 200 and 100 respectively.

simple-network-pane is a subclass of **choice**, so for details of its selection handling, see **choice**.

Example See the file **examples/capi/graphics/network.lisp**.

simple-pane *Class*

Summary The class **simple-pane** is the superclass for any elements that actually appear as a native window, and is itself an empty window.

Package **capi**

Superclasses **element**

Subclasses

display-pane
interface
title-pane
button-panel
list-panel
option-pane
output-pane
progress-bar
slider
text-input-pane
tree-view
toolbar
layout
button

Initargs

:enabled A boolean controlling whether the pane is enabled.

:background The background color of the pane.

:foreground The foreground color of the pane.

:font The default font for the pane.

:horizontal-scroll

t, **:without-bar**, or **nil**. If true the pane can scroll horizontally.

:vertical-scroll

t, **:without-bar**, or **nil**. If true the pane can scroll vertically.

:visible-border

A boolean or a keyword controlling whether the pane has a border, for some pane classes.

:internal-border

A non-negative integer, or **nil**. Controls the width of the internal border.

:cursor A keyword naming a built-in cursor, or a cursor object, or **nil**.

:pane-menu Specifies a menu to be raised by the **:post-menu** gesture.

:drop-callback

Specifies a drop callback for **output-pane**, **interface**, **list-panel** or **tree-view**.

Note that this is now supported for **list-panel** and **tree-view** on Cocoa and GTK+.

:drag-callback

Specifies a drag callback for **list-panel** or **tree-view**.

:automatic-resize

A plist.

:scroll-if-not-visible-p

Defines whether, when the focus is given to the pane and the pane is not fully visible, the pane's parent is automatically scrolled to show it.

:toolbar-title A string.

Accessors

simple-pane-enabled
simple-pane-background
simple-pane-foreground
simple-pane-font
simple-pane-cursor
simple-pane-scroll-callback
simple-pane-drop-callback
simple-pane-drag-callback

Readers

simple-pane-horizontal-scroll
simple-pane-vertical-scroll
simple-pane-visible-border

Description

enabled determines whether the pane is enabled. The default value is **t**. Note that changing the enabled state of a visible pane changes its appearance.

background and *foreground* are colors specified using the Graphics Ports color system. Additionally on Cocoa, the special value **:transparent** is supported, which makes the pane's background match that of its parent.

font should be a **font**, a **font-description**, or **nil**. If it is not a **font**, it is converted to a **font** when the pane is created. **nil** is converted to the default font, and a **font-description** is converted as if by calling **find-best-font**.

The value for *visible-border* can be any of the following, with the stated meanings where applicable:

nil	Has no border.
t	Has a border.
:default	Use the default for the window type.
:outline	Add an outline border.

There are various platform/pane class combinations which do not respond to all values of *visible-border*. For instance, on Windows XP with the default theme, **text-input-choice** and **option-pane** always have a visible border regardless of the value of *visible-border*, while other classes including **display-pane**, **text-input-pane**, **list-panel**, **editor-pane** and **graph-pane** have three distinct border styles, with *visible-border* **:default** meaning the same as *visible-border* **t**.

If *internal-border* is non-nil, it should be a non-negative integer specifying the width of an empty region around the edge of the pane.

Any simple pane can be made scrollable by specifying **t** to **:horizontal-scroll** or **:vertical-scroll**. By default these values are **nil**, but some subclasses of **simple-pane** default them to **t** where appropriate (for instance **editor-pane**s always default to having a vertical scroll-bar).

For a pane which is scrollable but does not display a scroll bar, pass the value **:without-bar** for **:horizontal-scroll** or **:vertical-scroll**. See the example in **output-panes/scrolling-without-bar.lisp**.

The height and width of a scrollable simple pane can be specified by the initargs **:scroll-height** and **:scroll-width**, which have the same meaning as **:internal-min-height** and **:internal-min-width**. See the *CAPI User Guide* for more information about height and width initargs.

cursor specifies a cursor for the pane. **nil** means use the default cursor, and this is the default value. *cursor* can also be a cursor object as returned by **load-cursor**. The other allowed values are keywords naming built-in cursors which are supported on each platform as shown in the table below.

cursor	Cocoa	Windows	Motif
:busy	No	Yes	Yes
:i-beam	Yes	Yes	Yes
:top-left-arrow	Yes	Yes	Yes
:h-double-arrow	Yes	Yes	Yes
:v-double-arrow	Yes	Yes	Yes
:left-side	Yes	Yes	Yes
:right-side	Yes	Yes	Yes
:top-side	Yes	Yes	Yes
:bottom-side	Yes	Yes	Yes
:wait	No	Yes	Yes
:crosshair	Yes	Yes	Yes
:gc-notification	No	Yes	Yes
:top-left-corner	No	Yes	Yes
:top-right-corner	No	Yes	Yes

Table 1.2

cursor	Cocoa	Windows	Motif
:bottom-left-corner	No	Yes	Yes
:bottom-right-corner	No	Yes	Yes
:hand	Yes	Yes	Yes
:fleur	Yes	Yes	Yes
:move	Yes	Yes	Yes
:closed-hand	Yes	No	No
:open-hand	Yes	No	No
:disappearing-item	Yes	No	No

Table 1.2

pane-menu can be used to specify or create a menu to be displayed when the **:post-menu** gesture is received by the pane. It has the default value **:default** which means that **make-pane-popup-menu** is called to create the menu. For a full description of *pane-menu*, see the section "Popup menus for panes" in the *CAPI User Guide*.

drop-callback can be specified for a pane that is an instance of **output-pane**, **interface**, **list-panel**, **tree-view** or a subclass of one of these. When the user drags an object over a window, the CAPI first tries to call the *drop-callback* of any pane under the mouse and otherwise calls the *drop-callback* of the top-level interface. The default value of *drop-callback* is **nil**, which means that there is no support for dropping into the pane.

For **editor-pane**, *drop-callback* can be **:default**, which provides support for dropping a string into the pane and inserting the string into the pane's editor buffer.

If *drop-callback* is any other non-nil value, it should be either a list (for simple cases) or function designator (to use all options). When it is a function designator, it needs to have this signature:

drop-callback *pane drop-object stage*

The function *drop-callback* is called by the CAPI at various times such as when the pane is displayed and when the user attempts to drop data into the pane. *pane* is the pane itself, *drop-object* is an object used to communicate information about the current dropping operation (see below) and *stage* is a keyword. *drop-callback* should handle these values of *stage*:

:formats This might occur when the pane is being displayed or might occur each time the user drags or drops an object over the pane. It should call **set-drop-object-supported-formats** with the *drop-object* and a list of formats that the pane wants to receive. Each format is a keyword. The list of the formats must be the same each time it is called.

:enter This occurs when the user drags an object over the pane which is an **output-pane** or **interface** (not **tree-view** or **list-panel**). It can query the *drop-object* using **drop-object-provides-format** and **drop-object-allows-drop-effect-p** to discover what the user is dragging. It can also use **drop-object-pane-x** and **drop-object-pane-y** to query the mouse position relative to the pane. It should call **(setf drop-object-drop-effect)** with an effect if it wants to allow the object to be dropped. If this is not called, then the object cannot be dropped into the pane.

:drag This occurs while the user is dragging an object over the pane. It can query the *drop-object* using **drop-object-provides-format** and **drop-object-allows-drop-effect-p** to discover what the user is dragging. For **output-pane**, it can use **drop-**

object-pane-x and **drop-object-pane-y** to query the mouse position relative to the pane. For **list-panel** and **tree-view**, it can use **drop-object-collection-index** or **drop-object-collection-item** to query where the user is attempting to drop the object and can call their setf functions to adjust this position. It should call **(setf drop-object-drop-effect)** with an effect if it wants to allow the object to be dropped. If this is not called, then the object cannot be dropped into the pane. For **output-pane** and **interface**, it might also want to update the pane to indicate where the object will be dropped.

:drop This occurs when the user drops an object over the pane. It can query the *drop-object* as for the **:drag** stage, but can also obtain the object itself using **drop-object-get-object** for one of the formats in the list returned by **drop-object-provides-for-mat**. Once the object is received, it should call **(setf drop-object-drop-effect)** with the effect that has been used by the call-back. It should also update the pane to incorporate the object in whatever way the application requires.

When *drop-callback* is a list, it specifies a simple response. The list should be of the form:

(*effects formats drop-stage-callback* **&optional** *checker***)**

Both *effects* and *formats* can be either a list of effects or formats, or an atom which is interpreted as a list of one element. *effects* and *formats* specify which effects and formats are allowed.

For the stages except **:formats**, the first effect of the given effects that the *drop-object* allows is set (by calling **(setf drop-object-drop-effect)**), except when *checker* is supplied. In the latter case, before setting an effect it loops through the formats and calls the checker with three arguments:

funcall *checker pane effect format*

If *checker* returns non-nil it sets the effect. If *checker* returns **nil** for the formats, it goes to the next effect.

In the **:drop** stage, after setting the effect, it gets the object with first format that is provided by the *drop-object*, and then calls the *drop-stage-callback* with four arguments:

funcall *drop-stage-callback pane object x-or-index y-or-placement*

If the pane is a **tree-view** or **list-panel**, the last two arguments are the item index (for **get-collection-item**) and placement (**:above**, **:item**, **:below**), which are the results of **drop-object-collection-index**. Otherwise, the last two arguments are the *x* and *y* (results of **drop-object-pane-x** and **drop-object-pane-y**). It is the responsibility of the *drop-stage-callback* to perform whatever dropping should mean.

drag-callback can be specified for a pane that is an instance of **list-panel** or **tree-view**. The default value of *drag-callback* is **nil**, which means that there is no support for dragging from the pane. Otherwise, it should be a function designator with this signature:

drag-callback *pane info* **=>** *result*

When the user drags items in the pane, the CAPI calls the *drag-callback*. *pane* is the pane itself and *info* is a list of item indices that are being dragged (compare with **choice-selection**).

The *drag-callback* should normally return a plist *result* whose keys are the data formats to be dragged, with a value associated with each format. Formats are arbitrary keywords that must be interpreted by the pane where you intend to drop the values (see the *drop-callback*). The **:string** format is understood by some other panes that expect text.

The plist *result* returned by *drag-callback* can contain the key **:image-function** with a function *image-function* as value.

This function is used to generate the image that is used in the dragging itself, exactly as the *image-function* in **drag-pane-object** is used. On Cocoa, **tree-view** and **list-panel** ignore this key in *result*.

drag-callback can also be used in top-level interfaces. In this case the second argument *info* is a flag describing the gesture that caused the call. Currently the only value is **:drag-image**, which means it was invoked by dragging the *drag-image* (see **interface**).

drag-callback is allowed to return the *result* **:default** rather than a plist. **:default** tells the system to do default dragging if there is any. At the time of writing the only place where there is default dragging is on Cocoa for an interface with an **:interface-pathname**. *drag-callback* is allowed to return the *result* **nil**, meaning do not do dragging.

On **output-pane** you add dragging by adding an entry to the *input-model* and which initiates the dragging by calling **drag-pane-object**.

automatic-resize makes the pane resize automatically. This has an effect only if it is placed inside a **static-layout** (including subclasses like **pinboard-layout**). The effect is that when the **static-layout** is resized then the pane also changes its geometry.

The value of *automatic-resize* defines how the pane's geometry changes. It must be a plist of keywords and values which match the keywords of the function **set-object-automatic-resize** and are interpreted in the same way.

scroll-if-not-visible-p controls scrolling behavior of the parent when the pane is given the input focus. *scroll-if-not-visible-p* can be **t**, **nil**, or **:non-mouse**. See **scroll-if-not-visible-p** for details. When this initarg is supplied, the generic function **(setf scroll-if-not-visible-p)** is called with it.

If the pane is used in the *toolbar-items* list of an **interface**, then *toolbar-title* should be a short string that will be shown near to the pane if required for the toolbar.

Notes

1. *foreground* is ignored for buttons on Windows and Cocoa.
2. In order to display a simple pane, it needs to be contained within an interface. The two convenience functions **make-container** and **contain** are provided to create an interface with enough support for that pane. The function **make-container** just returns a container for an element, and the function **contain** displays an interface created for the pane using **make-container**.
3. On Cocoa in Mac OS X 10.2, the only supported *cursor* is **:i-beam**.
4. If **:image** is supplied in the *plist* returned by *drag-callback*, the dragging mechanism automatically frees the **image** object as if by **free-image** when it no longer needs it.
5. You can also control automatic resizing of a **simple-pane** using **set-object-automatic-resize**.

Example

```
(capi:contain (make-instance 'capi:output-pane
                             :background :red
                             :scroll-width 300
                             :horizontal-scroll t))

(setf ep
      (capi:contain
       (make-instance 'capi:editor-pane
                      :visible-border t)))

(setf (capi:simple-pane-cursor ep) :crosshair)
```

For an example illustrating the use of *drag-callback*, see **examples/capi/choice/drag-and-drop.lisp**

See also

contain
set-object-automatic-resize

simple-pane-handle *Function*

Summary

Returns the window handle of a pane.

Package

capi

Signature

simple-pane-handle *pane* **=>** *handle*

Values

handle An integer, or **nil**.

Description

The function **simple-pane-handle** returns the handle of *pane* in the system that displays it, if there is an underlying window.

On Microsoft Windows *handle* is the hwnd of *pane*.

On X11/Motif, *handle* is the windowid of the main part of *pane* (type Window in the X library).

If *pane* is not displayed, or if *pane* does not have an underlying window, then *handle* is **nil**. Note that layouts do not always have an underlying window.

Use this function with caution: in general, drawing and moving of CAPI windows should be done through the CAPI.

See also **current-dialog-handle**

simple-pane-visible-height *Generic Function*

Summary Gets the visible height of a pane.

Package **capi**

Signature **simple-pane-visible-height** *pane* **=>** *result*

Arguments *pane* A simple pane.

Values *result* The height of the visible part of *pane*, or **nil**.

Description The generic function **simple-pane-visible-height** returns the height in pixels of the visible part of *pane*, that is the height of the viewport, not including any borders or scroll bars. If *pane* is not displayed the function returns **nil**.

See the *CAPI User Guide* for a description of the visible size of a pane.

See also **simple-pane-visible-size**
simple-pane-visible-width
with-geometry

simple-pane-visible-size *Generic Function*

Summary Gets the visible size of a pane.

Package **capi**

Signature **simple-pane-visible-size** *pane* **=>** *width*, *height*

Arguments

pane	A simple pane.

Values

width	The width of the visible part of *pane*, or **nil**.
height	The height of the visible part of *pane*, or **nil**.

Description The generic function **simple-pane-visible-size** returns the size in pixels of the visible part of *pane*, that is the width and height of the viewport, not including any borders or scroll bars. If *pane* is not displayed the return values are **nil**.

See the *CAPI User Guide* for a description of the visible size of a pane.

See also **simple-pane-visible-height**
simple-pane-visible-width
with-geometry

simple-pane-visible-width *Generic Function*

Summary Gets the visible width of a pane.

Package **capi**

Signature **simple-pane-visible-width** *pane* **=>** *result*

Arguments

pane	A simple pane.

Values

result	The width of the visible part of *pane*, or **nil**.

Description The generic function **simple-pane-visible-width** returns the width in pixels of the visible part of *pane*, that is the width of the viewport, not including any borders or scroll bars. If *pane* is not displayed the function returns **nil**.

See the *CAPI User Guide* for a description of the visible size of a pane.

See also **simple-pane-visible-height**
simple-pane-visible-size
with-geometry

simple-pinboard-layout *Class*

Summary A **simple-pinboard-layout** is a **pinboard-layout** that can contain just one pinboard object or pane as its child, and it adopts the size constraints of that child.

Package **capi**

Superclasses **pinboard-layout**
simple-layout

Subclasses **graph-pane**

Initargs **:child** The child of the pinboard layout.

Description The class **simple-pinboard-layout** is normally used to place pinboard objects in a layout by placing the layout inside a **simple-pinboard-layout**, thus displaying the pinboard objects. It inherits all of its layout behavior from **simple-layout**.

Example

```
(setq column
      (make-instance
       'capi:column-layout
       :description
       (list
        (make-instance
         'capi:image-pinboard-object
         :image
         (sys:lispworks-file
          "examples/capi/graphics/Setup.bmp"))
        (make-instance
         'capi:item-pinboard-object
         :text "LispWorks"))
       :x-adjust :center))

(capi:contain (make-instance
               'capi:simple-pinboard-layout
               :child column))
```

See also **pinboard-object**

simple-print-port *Function*

Summary Prints the contents of an output pane to a printer.

Package **capi**

Signature **simple-print-port** *port* **&key** *jobname scale dpi printer drawing-mode interactive background*

Description The **simple-print-port** function prints the output pane specified by *port* to the default printer, unless specified otherwise by *printer*. The arguments of *scale* and *dpi* are used to determine how to transform the output pane's coordinate space to physical units. Their meaning here is the same as in **get-page-area**, except that *scale* may also take the value **:scale-to-fit**, in which case the pane is printed as large as possible on a single sheet.

The background color of the pane is ignored, and the value given by *background* is used instead. This defaults to **:white**.

drawing-mode should be either **:compatible** which causes drawing to be the same as in LispWorks 6.0, or **:quality** which causes all the drawing to be transformed properly, and allows control over anti-aliasing on Microsoft Windows and GTK+. The default value of *drawing-mode* is **:quality**.

For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

If *interactive* is **t**, a print dialog is displayed. This is the default. If *interactive* is **nil**, then the document is printed to the current printer without prompting the user.

See also **print-dialog**

slider *Class*

Summary A pane with a sliding marker, which allows the user to control a numerical value within a specified range.

Package **capi**

Superclasses **range-pane**
titled-object
simple-pane

Initargs **:print-function**
A function of two arguments, or a format string.

:show-value-p A generalized boolean.

:start-point A keyword.

:tick-frequency
An integer, a ratio or the keyword **:default**.

Accessors **slider-print-function**

Readers

slider-show-value-p
slider-start-point
slider-tick-frequency

Description

The **slider** class allows the user to enter a number by moving a marker on a sliding scale to the desired value.

show-value-p determines whether the slider displays the current value, on Microsoft Windows and GTK+. The default value is **t**. *show-value-p* is ignored on Cocoa.

start-point specifies which end of the slider is the start point in the range. The values allowed depend on the *orientation* of the slider. For horizontal sliders, *start-point* can take these values:

:left	The start point is on the left.
:right	The start point is on the right.
:default	The start point is at the default side (the left).

For vertical sliders, *start-point* can take these values:

:top	The start point is at the top.
:bottom	The start point is at the bottom.
:default	The start point is at the default position, which is the top on Microsoft Windows and Motif, and the bottom on Cocoa.

tick-frequency specifies the spacing of tick marks drawn on the slider. If *tick-frequency* is **:default**, then the slider may or may not draw tick marks according the OS conventions. If *tick-frequency* is 0, then no tick marks are drawn. If *tick-frequency* is a ratio 1/N for integer N>1, then tick marks are drawn to divide the slider range into N sections. Otherwise *tick-frequency* should be an integer greater than 1 which specifies the spacing of tick marks in units between *start* and *end*. The default value of *tick-frequency* is **:default**.

print-function, when supplied, should be a function with signature

print-function *pane value* **=>** *result*

where *pane* is the slider pane, *value* is its current value, and *result* is a string or **nil**. When the slider pane displays the current value, it calls *print-function* and displays the value as *result*, unless that is **nil**, in which case the value is printed normally.

As a special case, *print-function* can also be a string, which is used as the format string in a call to **format** with one additional argument, the value, that is

(format nil *print-function value***)**

and the result of this call to **format** is displayed.

Notes

1. **:print-function** is not implemented on Motif.
2. **:print-function** has no effect on Cocoa because the slider pane never displays the value
3. Use of the *print-function* is determined when the slider pane is displayed. Setting the *print-function* in a slider that did not have a *print-function* when it was first displayed does not work until the slider is destroyed and displayed again. Therefore, if you want to display a **slider** without a *print-function* but set it later, initially you should supply a *print-function* that always returns **nil**, for example:

```
(make-instance 'capi:slider
               :start 10 :end 34
               :print-function 'false)
```

4. *print-function* is useful for displaying fractional values or values that grow logarithmically (or any other non-linear function), because the actual values in a **slider** are always integers that increase linearly as the slider moves.
5. On Windows the **slider**'s value is displayed (when *show-value-p* is true) in a tooltip that is visible only while the user moves the marker with a mouse.

Compatibility note

In LispWorks 6.0 and earlier versions, ticks are drawn as if *tick-frequency* is **:default**.

Example

Given the default *start* and *end* of 0 and 100, this gives ticks at 0, 25, 50, 75 and 100:

```
(make-instance 'slider :tick-frequency 25)
```

whilst this gives ticks at 0, 20, 40, 60, 80 and 100:

```
(make-instance 'slider :tick-frequency 1/5)
```

This example illustrates the use of *print-function* to display fractional and non-linear values ranges:

capi/elements/slider-print-function.lisp

sort-object-items-by *Function*

Summary

Sorts items according to a **sorted-object**.

Package

capi

Signature

sort-object-items-by *sorted-object items* **=>** *result*

Arguments

sorted-object — An instance of **sorted-object** or a sub-class.

items — A list.

Values

result — A permutation of *items*.

Description

The function **sort-object-items-by** sorts *items* according to the current sort type of *sorted-object*, as set by **sorted-object-sort-by**.

Note: if the sort type is reversed, *items* will be sorted in reverse order.

See also **sorted-object**
sorted-object-sort-by
sorted-object-sorted-by

sorted-object *Class*

Summary Defines sorting operations.

Package **capi**

Superclasses **standard-object**

Subclasses **list-panel**

Initargs **:sort-descriptions**
A list.

Description The **sorted-object** class defines sorting operations.

Each element of *sort-descriptions* is a sort description object, as returned by **make-sorting-description**. These define various sorting options and are used by **sorted-object-sort-by** and **sort-object-items-by**.

See also **make-sorting-description**
sort-object-items-by
sorted-object-sort-by
sorted-object-sorted-by

sorted-object-sort-by *Generic Function*

Summary Sets the sorting type of a **sorted-object**.

Package **capi**

Signature **sorted-object-sort-by** *pane new-sort-type* **&key** *allow-reverse*

Arguments

pane	An instance of **sorted-object** or a subclass.
new-sort-type	The sort type to set.
allow-reverse	A boolean.

Description The generic function **sorted-object-sort-by** sets the sort type of *pane* to *new-sort-type*.

new-sort-type must match the type of one of the sort descriptions of *pane*.

If *allow-reverse* is non-nil and the sort type already matches *new-sort-type*, then the sort reverses the order of the *items*. The default value of *allow-reverse* is **t**.

If *pane* is a **list-panel**, then **sorted-object-sort-by** also calls **sort-object-items-by** to sort the items with the new sort type. For your own subclasses of **sorted-object** which are not subclasses of **list-panel**, if you need this behavior define an **:after** method that calls **sort-object-items-by**. You can also define **:after** methods on subclasses of **list-panel** to perform other tasks each time the items are sorted.

See also **sort-object-items-by**
sorted-object
sorted-object-sorted-by

sorted-object-sorted-by *Function*

Summary Returns the current sorting type and reverse flag of a **sorted-object**.

Package **capi**

Signature **sorted-object-sorted-by** *pane* **=>** *sort-type*, *reversed*

Arguments	*pane*	An instance of **sorted-object** or a sub-class.
Values	*sort-type*	A sort type.
	reversed	A boolean.

Description The function **sorted-object-sorted-by** returns the current sorting type *sort-type* and reverse flag *reversed* of *pane*.

sort-type is the *type* of one of the sort descriptions of *pane*. *reversed* is true if the pane is sorted in reverse order and false if it is sorted in normal order.

See also **sorted-object**
sorted-object-sort-by

start-gc-monitor *Function*

Summary Starts a Lisp Monitor window.

Package **capi**

Signature **start-gc-monitor** *screen* **=>** *result*

Arguments	*screen*	A screen.
Values	*result*	A boolean.

Description The function **start-gc-monitor** starts a Lisp Monitor window (otherwise known as the GC or Garbage Collector monitor) on the screen *screen*.

result is **t** if it started a Lisp monitor, and **nil** if a Lisp monitor was already running on *screen*.

Note that this works only on Motif. There is no Lisp Monitor window on other platforms.

On Motif, **start-gc-monitor** is called automatically when the LispWorks IDE starts, but you can call **stop-gc-monitor** and **start-gc-monitor** any time.

See also **stop-gc-monitor**

static-layout *Class*

Summary A layout that allows its children to be positioned anywhere within itself.

Package **capi**

Superclasses **layout**

Subclasses **pinboard-layout**

Initargs **:fit-size-to-children**

A generalized boolean.

Description The class **static-layout** is a layout that allows its children to be positioned anywhere within itself.

When a **static-layout** lays out its children, it positions them at the *x* and *y* specified as hints (using **:x** and **:y**), and sizes them to their minimum size (which can be specified using **:visible-min-width** and **:visible-max-width**).

If *fit-size-to-children* is true, the **static-layout** is made sufficiently large to accomodate all of its children, and grows if necessary when a child is added. This is the default behavior. Otherwise the static layout has a minimum size of one pixel by one pixel which is not affected by the size of its children. If you need the sizing capabilities, then use the class **simple-layout** which surrounds a single child, and adopts the size constraints of that child.

Example Here is an example of a static layout placing simple panes at arbitrary positions inside itself.

```
(capi:contain
 (make-instance
  'capi:pinboard-layout
  :description
  (list (make-instance
         'capi:text-input-pane
         :x 20
         :y 100)
        (make-instance
         'capi:push-button-panel
         :x 30
         :y 200
         :items '(1 2 3))))
 :best-width 300 :best-height 300)
```

See also **pinboard-layout**

stop-gc-monitor *Function*

Summary Stop a Lisp Monitor.

Package **capi**

Signature **stop-gc-monitor** *screen* **=>** *result*

Arguments *screen* A screen.

Values *result* A boolean.

Description The function **stop-gc-monitor** stops the Lisp Monitor window on the screen *screen*.

result is **t** if it stopped a Lisp monitor, and **nil** if there was no Lisp monitor running on *screen*.

Note that this works only on Motif. The Lisp monitor can be restarted with **start-gc-monitor**.

See also **start-gc-monitor**

stop-sound *Function*

Summary Stops a sound from playing.

Signature **stop-sound** *sound*

Arguments *sound* A sound object returned by **load-sound**.

Description The function **stop-sound** stops the sound *sound* from playing.

See also **play-sound**

switchable-layout *Class*

Summary A subclass of **simple-layout** that displays only one of its children at a time, and provides functionality for switching the displayed child to one of the other children.

Package **capi**

Superclasses **simple-layout**

Initargs **:visible-child**
The currently visible pane from the children.
:combine-child-constraints
A generalized boolean.

Readers **switchable-layout-visible-child**
switchable-layout-combine-child-constraints

Description

The **switchable-layout** has a *description* which is its list of children. The argument *visible-child* specifies the initially visible child (which defaults to the first of the children).

switchable-layout inherits most of its layout behavior from **simple-layout** as it only ever lays out one child at a time.

combine-child-constraints influences the initial size of the layout. When *combine-child-constraints* is **nil** the constraints of the switchable layout depend only on its currently visible child pane. Switching to a different child pane might cause the layout to resize. When *combine-child-constraints* is non-nil, the constraints depend on all of the child panes, including those that are not visible. This might increase the time taken to create the switchable layout initially, but can prevent unexpected resizing later. The default value of *combine-child-constraints* is **nil**.

Example

```
(setq children (list
                (make-instance 'capi:push-button
                               :text "Press Me")
                (make-instance 'capi:list-panel
                               :items '(1 2 3 4 5))))

(setq layout (capi:contain
              (make-instance
               'capi:switchable-layout
               :description children)))

(capi:apply-in-pane-process
 layout #'(setf capi:switchable-layout-visible-child)
 (second children) layout)

(capi:apply-in-pane-process
  layout #'(setf capi:switchable-layout-visible-child)
  (first children) layout)
```

There is a further example in the file **examples/capi/layouts/switchable.lisp**.

See also **simple-layout**
switchable-layout-switchable-children

switchable-layout-switchable-children *Generic Function*

Summary Finds the switchable children of a **switchable-layout**.

Package **capi**

Signature **switchable-layout-switchable-children** *switchable-layout* **=>** *result*

Arguments *switchable-layout*
An instance of **switchable-layout** or a subclass.

Values *result* A list of panes.

Description The generic function **switchable-layout-switchable-children** returns as a list all the children of *switchable-layout* that could be made visible by calling the **switchable-layout** accessor **(setf switchable-layout-visible-child)**.

See also **switchable-layout**

tab-layout *Class*

Summary The class **tab-layout** has two distinct modes. Switchable mode lays a number of panes in a switchable layout. Each pane has an associated tab which, when clicked on, pulls the pane to the front. In callback mode the tabs are linked to a *selection-callback* as for **button-panel**.

Package **capi**

Superclasses **choice**
layout

Initargs

:description The main layout description.

:items Specifies the tabs of the tab layout.

:visible-child-function
Returns the visible child for a given selection in switchable mode.

:combine-child-constraints
A generalized boolean which influences the initial size of the layout.

:key-function Specifies a function to use in referring to items in the *items* list.

:print-function
The function used to print a name on each tab.

:callback-type The type of data passed to the callback function in callback mode.

:selection-callback
The function called when a tab is selected, in callback mode.

:image-function
Returns an image for an item, on Microsoft Windows.

:image-lists
A plist of keywords and **image-list** objects, on Microsoft Windows.

Accessors **tab-layout-visible-child-function**

Readers **tab-layout-combine-child-constraints**
tab-layout-image-function

Description

A **tab-layout** has one of two distinct modes. It is in switchable mode if *visible-child-function* is supplied and non-nil. It is in callback mode otherwise.

In switchable mode, the tab layout consists of a number of panes, each with its own tab. Clicking on a tab pulls the corresponding pane to the front. In this mode the tab layout is like a **switchable-layout** with the switching performed by the user selecting a tab. In this mode the *visible-child-function* is used to specify which child to make visible for a given tab selection.

In callback mode the tab layout does not work as a switchable layout, and the result of any selection is specified using a callback specified by *selection-callback*, in a similar way to a **button-panel** callback. In this mode the *description* slot is used to describe the main layout of the tab pane.

In either mode *combine-child-constraints* influences the initial size of the layout. When *combine-child-constraints* is **nil** the constraints of the tab layout depend only on its currently visible tab. Switching to a different tab might cause the layout to resize. When *combine-child-constraints* is non-nil, the constraints depend on all of the tabs, including those that are not visible. This might increase the time taken to create the tab layout initially, but can prevent unexpected resizing later. The default value of *combine-child-constraints* is **nil**.

If *image-lists* is specified, it should be a plist containing the keyword **:normal** as a key. The corresponding value should be an **image-list** object. No other keys are supported at the present time. The **image-list** associated with the **:normal** key is used with the *image-function* to specify an image to display in each tab.

The *image-function* is called on an item to return an image associated with the item. It can return one of the following:

A pathname or string

: This specifies the filename of a file suitable for loading with **load-image**. Currently this must be a bitmap file.

A symbol

: The symbol must have been previously registered by means of a call to **register-image-translation**.

An image object, as returned by **load-image**.

An image locator object

: This allowing a single bitmap to be created which contains several button images side by side. See **make-image-locator** for more information. On Microsoft Windows, it also allows access to bitmaps stored as resources in a DLL.

An integer

: This is a zero-based index into the tab-layout's **image-list**. This is generally only useful if the image list is created explicitly. See **image-list** for more details.

Notes

image-lists and *image-function* are implemented only on Microsoft Windows.

Example

The following example shows the use of the switchable mode of **tab-layout**. Each tab is linked to an output pane by pairing them in the *items* list.

```
(defun switchable-tab-layout ()
  (let* ((red-pane (make-instance
                    'capi:output-pane
                    :background :red))
         (blue-pane (make-instance
                     'capi:output-pane
                     :background :blue))
         (tl (make-instance
              'capi:tab-layout
              :items
              (list (list "Red" red-pane)
                    (list "Blue" blue-pane))
              :print-function 'car
              :visible-child-function 'second)))
    (capi:contain tl)))

(switchable-tab-layout)
```

Here is an example of the callback mode of **tab-layout**, which uses the selection of a tab to change the nodes of a graph pane through the *selection-callback*.

```
(defun non-switchable-tab-layout (tabs)
  (let* ((gp (make-instance
              'capi:graph-pane))
         (tl (make-instance
              'capi:tab-layout
              :description (list gp)
              :items tabs
              :visible-child-function nil
              :key-function nil
              :print-function
              (lambda (x)
                (format nil "~R" x))
              :callback-type :data
              :selection-callback
              #'(lambda (data)
                  (setf (capi:graph-pane-roots gp)
                        (list data))))))
    (capi:contain tl)))

(non-switchable-tab-layout '(1 2 4 5 6))
```

See also **callbacks**
simple-layout
switchable-layout
tab-layout-panes
tab-layout-visible-child

tab-layout-panes *Function*

Summary Returns the panes in a **tab-layout**.

Package **capi**

Signature **tab-layout-panes** *tab-layout* **=>** *panes*

Arguments *tab-layout* A **tab-layout**.

Values *panes* A list.

Description The function **tab-layout-panes** returns the panes in a **tab-layout**. Note that this is not necessarily the same as the items of *tab-layout*, since *visible-child-function* and/or *key* may be specified.

See also **tab-layout**

tab-layout-visible-child *Function*

Summary Returns the visible child in a **tab-layout**.

Package **capi**

Signature **tab-layout-visible-child** *tab-layout* **=>** *result*

Arguments *tab-layout* A **tab-layout**.

Values *result* A pane.

Description The function **tab-layout-visible-child** returns the currently-visible pane in a **tab-layout**.

See also **tab-layout**

text-input-choice *Class*

Summary This pane consists of a text input area, and a button. Clicking on the button displays a drop-down list of strings, and selecting one of the strings automatically pastes it into the text input area.

Package **capi**

Superclasses **choice**
text-input-pane

Initargs **:visible-items-count**

An integer specifying the maximum length of the drop-down list, or the symbol **:default**.

:popup-callback

A function called just before the drop-down list appears, or **nil**.

Description The **text-input-choice** class behaves in the same way as a **text-input-pane**, but has additional functionality. The element inherits from **choice**, and the choice *items* are used as the items to display when the user clicks on the button.

The *callback* is called when the user presses the **Return** key.

The *selection-callback* is called when the user selects an item using the drop-down list.

Compatibility note — In LispWorks 6.0 and earlier versions the **text-input-pane** initarg value *enabled* **:read-only** is not supported for **text-input-choice** on Microsoft Windows. This restriction is removed for LispWorks 6.1 and later versions.

Examples — See **examples/capi/elements/text-input-choice.lisp**.

See also — **choice**
text-input-pane

text-input-pane *Class*

Summary — The class **text-input-pane** is a pane for entering a single line of text.

Package — **capi**

Superclasses — **titled-object**
simple-pane

Subclasses — **multi-line-text-input-pane**
password-pane
text-input-choice

Initargs

:text The text in the pane.

:caret-position
The position of the caret in the text (from 0).

:max-characters
The maximum number of characters allowed.

:enabled Controls the enabled state of the pane.

:completion-function
A function called to complete the text.

:in-place-completion-function

A function designator.

:file-completion

t, **nil** or a pathname designator.

:in-place-filter

A boolean.

:directories-only

A boolean.

:ignore-file-suffices

A list of strings or the keyword **:default**.

:callback-type The type of arguments to *callback*.

:callback A function usually called when the user presses **Return**.

:change-callback-type

The type of arguments to *change-callback*.

:change-callback

A function called when a change is made.

:confirm-change-function

A function called to validate a change. **Note:** Implemented for Motif only, not Microsoft Windows or Mac OS X.

:navigation-callback

A function called when certain keyboard gestures occur in the pane.

:editing-callback

A function called when editing starts or stops.

:gesture-callbacks

A list of pairs **(***gesture* **.** *callback***)**.

:complete-do-action
A boolean.

:text-change-callback
A function designator.

:buttons A plist specifying buttons to add, or **t** or **nil**.

:search-field
Along with the next four initargs, this is implemented only on Cocoa. It specifies that the pane has "recent-items", which also means using **NSSearchField**.

:recent-items
See **:search-field** above.

:recent-items-name
See **:search-field** above.

:maximum-recent-items
See **:search-field** above.

:recent-items-mode
See **:search-field** above.

Accessors
text-input-pane-text
text-input-pane-max-characters
text-input-pane-completion-function
text-input-pane-callback
text-input-pane-confirm-change-function
text-input-pane-change-callback
text-input-pane-navigation-callback
text-input-pane-editing-callback
text-input-pane-enabled
text-input-pane-buttons-enabled

Readers
text-input-pane-caret-position

Description
The class **text-input-pane** provides a great deal of flexibility in its handling of the text being entered. It starts with the initial text and caret-position specified by the arguments *text*

and *caret-position* respectively. It limits the number of characters entered with the *max-characters* argument (which defaults to **nil**, meaning there is no maximum).

If *enabled* is **nil**, the pane is disabled. If *enabled* is **:read-only**, then the pane shows the text and allows it to be selected without it being editable. In this case the visual appearance varies between window systems, but often the text can be copied and the caret position altered. If *enabled* is any other true value, then the pane is fully enabled. The default value of *enabled* is **t**.

A *completion-function* can be specified which will get called when the completion gesture is made by the user (by pressing the **Tab** key) or when **text-input-pane-complete-text** is called. The function should have signature:

completion-function *pane string* **=>** *completions*, *start*, *end*

where *pane* is the **text-input-pane** itself and *string* is the string to complete. When completion is invoked *completion-function* is called with *pane* and a string containing the text of pane to the left of the cursor.

The *completion-function* is called with the pane and the text to complete and should return either **nil**, the completed text as a string or a list *completions* of candidate completions. In the latter case, the CAPI will prompt the user for the completion they wish, and this will become the new text. In addition, the *completion-function* can return two more values, *start* and *end*, which specify a range in the text that is to be replaced if the completion is successful.

in-place-completion-function tells the pane to do in-place completion and specifies the function to use. The function should have signature:

in-place-completion-function *pane string* **=>** *completions*, *start*, *end*

where *pane* is the **text-input-pane** itself and *string* is the string to complete. When in-place completion is invoked *in-place-completion-function* is called with *pane* and a string containing the text of pane to the left of the cursor.

completions needs to be a list of strings that are possible completions, a single string that is a unique completion, or the symbol **:destroy**. **:destroy** means that the in-place completion needs to stop and close the in-place window. In addition, the completion function can return two more values, *start* and *end*, which specify a range in the text that is to be replaced if the completion is successful. The function is called repeatedly whenever there is a change to the text that should be completed.

Note: If *in-place-completion-function* needs some dynamic information, it can put it in a property of the pane (using **capi-object-property**).

Note: The initarg **:file-completion** overrides **:in-place-completion-function**.

Note: The in-place completion mechanism uses *gesture-callbacks* to implement the functionality.

Note: **:in-place-filter** can be used to specify that the in-place window can have a filter.

See "In-place completion" in the *CAPI User Guide* for the user interaction.

file-completion, if non-nil, tells the pane to do file completion using an in-place window. See "In-place completion" in the *CAPI User Guide* for the interaction.

If *file-completion* is a pathname designator, its location is used as the root path for the completion.

Note: **:file-completion** overrides **:in-place-completion-function**.

Note: The behavior of in-place completion is somewhat different from other completion.

Note: The initargs **:directories-only** and **:ignore-file-suffices** can be used to change the behavior of the completion.

The default value of *file-completion* and *in-place-completion-function* is **nil**.

in-place-filter takes effect only when either *in-place-completion-function* or *file-completion* is non-nil. If *in-place-filter* is **t** then the in-place window can have a filter. Note that the filter needs to requested by a user gesture. **Control+Return** is the default in-place filter gesture. The default value of *in-place-filter* is **t**.

directories-only takes effect only if *file-completion* is used. If *directories-only* is **t** then in-place completion shows only directories. The default value of *directories-only* is **nil**.

ignore-file-suffices takes effect only if *file-completion* is used. It tells in-place completion to ignore files whose file namestring (the result of **cl:file-namestring**) ends with any of the strings in the list *ignore-file-suffices*. If *ignore-file-suffices* is **:default**, then completion uses the default value, which is the value of **editor:*ignorable-file-suffices*** (see **config/a-dot-lispworks.lisp**).

callback, if non-nil, is called when the user presses **Return**, unless *navigation-callback* is non-nil, in which case *navigation-callback* is called instead. If the pane has "recent-items" (implemented only on Cocoa) then the timing of calls to *callback* is modified: see the discussion of *recent-items* below for the details.

When the *text* or *caret-position* is changed, the callback *change-callback* is called with the *text*, the pane itself, the interface and the *caret-position*. The arguments that are passed to the *change-callback* can be altered by specifying the *change-callback-type* (see the **callbacks** class for details of possible values).

Note: the *change-callback* is potentially called more than once for each user gesture.

With the Motif implementation it is possible to check changes that the user makes to the **text-input-pane** by providing a *confirm-change-function* which gets passed the new text, the pane itself, its interface and the new caret position, and which should return non-nil if it is OK to make the change. If **nil** is returned, then the pane will be unaltered and a beep will be signalled to indicate that the new values were invalid.

navigation-callback, if non-nil, is a function that will be called when certain navigation gestures are used in the **text-input-pane**. The function is called with two arguments, the pane itself, and one of the following keywords:

:tab-forward
: **Tab** was pressed.

:tab-backward
: **Tab Backwards** (usually **Shift+Tab**) was pressed.

:return
: **Return** was pressed.

:shift-return
: **Shift+Return** was pressed.

:enter
: **Enter** was pressed.

:shift-enter
: **Shift+Enter** was pressed.

Note: Enter is the key usually found on the numeric keypad.

When *navigation-callback* is non-nil, it is called instead of *callback* when **Return** is pressed. *callback* is still called via an OK button if there is one (see *buttons* below).

navigation-callback is implemented only on Microsoft Windows and Cocoa.

editing-callback, if non-nil, is a function of two arguments:

editing-callback *pane type*

pane is the **`text-input-pane`** and *type* is a keyword. *editing-callback* is called with *type* **`:start`** when the user starts editing and *type* **`:end`** when the user stops editing. In general, this occurs when the focus changes, but on Cocoa *type* **`:start`** is passed when the first change is made to the text.

gesture-callbacks provides callbacks to perform for specific keyboard gestures. Each *gesture* must be an object that **`sys:coerce-to-gesture-spec`** can coerce to a gesture-spec. Each *callback* can be a callable (symbol or function) which takes one argument, the pane. Alternatively each *callback* can be a list of the form **`(`***`function arguments`***`)`**. Note that in this case, the pane itself is not automatically passed to the *function* amongst *arguments*.

When the user enters a gesture that matches *gesture* in any pair amongst *gesture-callbacks*, the *callback* is executed and the gesture is not processed any more.

Note: The interaction of in-place completion is implemented using *gesture-callbacks*. Gestures which you define explicitly by *gesture-callbacks* override the gestures which are defined implicitly by the in-place completion mechanism.

Note: For gestures that change the text, *text-change-callback* is probably better than *gesture-callbacks*.

When *complete-do-action* is non-nil, completion of the text in the pane automatically invokes *callback* (if *callback* is non-nil). The default value of *complete-do-action* is **`nil`**.

text-change-callback is a change callback (see *change-callback*) that is called only when the text in the pane changes. In contrast, *change-callback* is also called when the caret moves. If both *text-change-callback* and *change-callback* are supplied, only *text-change-callback* is invoked.

buttons specifies toolbar buttons which appear next to the pane and facilitate user actions on it. It also specifies the position of the buttons relative to the pane. This feature appears in the LispWorks IDE, for example the Class box of the Class Browser.

The allowed keys and values of the plist *buttons* are:

:ok A boolean or a plist, default value **t**. If true, a button which calls *callback* appears. If the value is a plist then this plist supplies details for the button, as described below.

:cancel A boolean or a plist, default value **nil**. If true, a button which calls *cancel-function* appears. A plist value is interpreted as for **:ok** and can also contain the key **:accelerator** which specifies an accelerator used for the button. There is no default accelerator.

:completion A boolean or a plist. If true, a button which calls *completion-function* appears. The default value is **t** if *completion-function* is non-nil, and **nil** otherwise. A plist value is interpreted as for **:ok**.

:browse-file

A keyword or a plist. If true, a button which invokes **prompt-for-file** appears. If the value is **:save** or **:open** then it is passed as the operation argument to **prompt-for-file**, replacing the text in the pane if successful. If the value is a plist, then it supplies details for the button, as described below, and can also contain the keywords **:message** to specify a message for the file prompter; **:pathname** to specify the default pathname of the file prompter (defaults to the text in the **text-input-pane**) or any of the keywords **:ok-check**, **:filter**, **:fil-**

ters, **:if-exists**, **:if-does-not-exist**, **:operation**, **:owner**, **:pane-args** or **:popup-args** which are passed directly to **prompt-for-file**.

:cancel-function

A function that expects the pane as its single argument. The default is a function which sets *text* to the empty string.

:help

Specifies a help button. The value must be a plist containing either keys **:function** and optionally **:arguments**, or the keys **:title**, **:message** and optionally **:dialog-p**.

If *function* is supplied, when the user presses the help button it calls

(apply *function pane arguments***)**

where pane is the **text-input-pane**. *title*, *message* and *dialog-p* are ignored in this case.

Otherwise when the user presses the help button it opens a window with title *title* displaying the string *message* in a **display-pane**. The message can be long, and can include newlines. The window is owned by the pane, but is not modal, so the user can interact with the pane while the help window is displayed. If *dialog-p* is true, the help window is raised as a dialog. The default value for *dialog-p* is **nil**. *function* and *arguments* are ignored in this case.

The plist can contain other keys as described below.

:orientation

The value is either **:horizontal** or **:vertical**. *orientation* controls the orientation of the toolbar. This is useful for **multi-line-text-input-pane**. The default value is **:horizontal**.

:adjust The value is **:top**, **:center**, **:centre** or **:bottom**. *adjust* controls how the buttons are adjusted vertically relative to the text input pane. This is useful for **multi-line-text-input-pane**. The default value is **:center**.

:position The value is **:top**, **:bottom**, **:left** or **:right**. *position* determines whether the buttons appear above, below, left or right of the text input pane. If **:position** is not supplied, then the buttons appear to the right of the pane.

The value **nil** for *buttons* means there are no buttons - this is the default. When *buttons* is true the buttons appear or not according to their specified values or their default values.

All of the button plists (for **:ok**, **:cancel**, **:help** and so on) can contain the following keys and values in addition to those mentioned above:

:enabled A value that controls whether the button is enabled. (See the reader **text-input-pane-buttons-enabled**).

:image The image to use for the button. This should be either a pathname or string naming an image file to load, a symbol giving the id of an image registered with **register-image-translation**, an **image** object as returned by **load-image** or an **external-image**. The default image is one of the symbols **ok-but-**

	ton, **cancel-button** or **complete-button**, which are pre-registered image identifers corresponding to each button.
:help-key	The *help-key* used to find a tooltip for the button.

The **text-input-pane-buttons-enabled** reader returns a list containing keywords such as **:ok**, **:cancel** and **:completion**, one for each corresponding button (as specified by *buttons*) that is currently enabled.

The **(setf text-input-pane-buttons-enabled)** writer takes a list of keywords as described for the reader and sets the enabled state of the buttons, enabling each button if it appears in the list and disabling it otherwise. The value **t** can also be passed: this enables all the buttons.

For more than one line of input, use **multi-line-text-input-pane**.

If *search-field* is a string and *recent-items-name* is not supplied, then the value *search-field* is used as the name. See the discussion of *recent-items* below.

If any of *search-field*, *recent-items* or *recent-items-name* is supplied and is non-nil, the pane uses **NSSearchField**, and also has "recent items". The **NSSearchField** has a different appearance from **text-input-pane**, can display recent items menu, and its input behavior is a little different too.

If *recent-items* is non-nil, it must be a list of strings, or **t**. When it is a list of strings, it specifies the initial list of "recent items". When it is **t**, it simply specifies that the pane should handle recent items.

If *recent-items-name* is non-nil, it should be a string. The string specifies the autosave name of the pane. When a pane has an autosave name, Cocoa remembers the list of recent items for pane with the same autosave name and same application. The record persists between invocations of the application.

If *recent-items-name* is not supplied or is **nil**, and *search-field* is a string, it is used instead as the name.

The maximum number of recent items defaults to 50 and can be controlled by the initarg value *maximum-recent-items*. The value 0 can be used to switch off the "recent items" feature, including the menu.

The recent items list can be read and set by **text-input-pane-recent-items**, or modified by any of **text-input-pane-replace-recent-items**, **text-input-pane-delete-recent-items**, **text-input-pane-append-recent-items**, **text-input-pane-prepend-recent-items** and **text-input-pane-set-recent-items**.

The input behavior of **text-input-pane** with "recent items" is the same is that of other **text-input-pane**s except for the timing of calls to *callback*. Note that this refers to the function that is passed with the initarg **:callback**. The **:change-callback** is not affected.

By default, each time the user types a character it causes a scheduling of *callback* some short time later. If the user types another character before the callback, it is re-scheduled later. The result is that as long as the user types, there are no callbacks, but once the user stops a callback is generated.

The behavior of *callback* can be controlled by the initarg value *recent-items-mode*, which can be one of **:explicit**, **:delayed** or **:immediate**. **:explicit** gives the same behavior as a normal **text-input-pane**, **:delayed** is the default described above, and **:immediate** means doing a callback immediately after each character. In addition, when the user selects an item from the recent items menu or clicks its **Cancel** button, the *callback* is called. In the case of the **Cancel** button, the string would be empty.

Compatibility note

The *confirm-change-function* was called *before-change-callback* in LispWorks 3.1. Both the old initarg **:before-change-callback** and the old accessor **text-input-pane-before-change-callback** are still supported, but may not be in future releases.

Example

```
(capi:contain (make-instance 'capi:text-input-pane
                             :text "Hello world"))

(setq tip (capi:contain
                       (make-instance
                        'capi:text-input-pane
                        :enabled nil)))

(capi:apply-in-pane-process
  tip #'(setf capi:text-input-pane-enabled) t tip)

(capi:apply-in-pane-process
 tip #'(setf capi:text-input-pane-enabled) nil tip)

(capi:apply-in-pane-process
 tip #'(setf capi:text-input-pane-text) "New text" tip)

(capi:contain (make-instance
               'capi:text-input-pane
               :text "Hello world"
               :callback #'(lambda (text interface)
                             (capi:display-message
                              "Interface ~S's text: ~S"
                              interface text))))
```

This example uses a plist value for the *buttons* key **:cancel** to specify that the Cancel button is initially disabled:

```
(capi:contain
 (make-instance 'capi:text-input-pane
                :buttons
                '(:ok t :cancel (:enabled nil))))
```

This example shows how to specify a Help button which displays a help message:

```
(defvar *help-message* "A long help message.")

(capi:contain
 (make-instance 'capi:text-input-pane
                :buttons
                `(:help
                  (:title "help window"
                   :message ,*help-message*))))
```

This example illustrates the use of *gesture-callbacks*. **Ctrl+e** moves the cursor to the end of the input, **Ctrl+a** moves it to the start, and **Ctrl+6** does something else:

```
(capi:contain
 (make-instance
  'capi:text-input-pane
  :gesture-callbacks
  (list
   (cons
    #\Ctrl-\e
    #'(lambda (tip)
        (setf (capi:text-input-pane-caret-position tip)
              (length (capi:text-input-pane-text
tip)))))
   (cons
    #\Ctrl-\a
    #'(lambda (tip)
        (setf (capi:text-input-pane-caret-position tip)
              0)))
   (cons
    #\Ctrl-6 'do-something-else))))
```

There is a further example in the file **examples/capi/elements/text-input-pane.lisp**

See also

display-pane
editor-pane
multi-line-text-input-pane
text-input-choice
text-input-pane-complete-text
text-input-range
title-pane

text-input-pane-append-recent-items *Function*

Summary Modifies the recent items list in a **text-input-pane** on Cocoa.

Signature **text-input-pane-append-recent-items** *text-input-pane* **&rest** ***strings***

Arguments *text-input-pane* A **text-input-pane** with recent items.

strings Strings.

Values There is no meaningful return value.

Description The function **text-input-pane-append-recent-items** modifies the recent items list in a **text-input-pane** that has recent-items (see **text-input-pane** initargs **:search-field**, **:recent-items** and **:recent-items-name**). It appends the strings at the end of the recent items, using **text-input-pane-set-recent-items** with *where* = **:end**.

Notes **text-input-pane-append-recent-items** is implemented only on Cocoa.

See also **text-input-pane**
text-input-pane-set-recent-items

text-input-pane-delete-recent-items *Function*

Summary Modifies the recent items list in a **text-input-pane** on Cocoa.

Signature **text-input-pane-delete-recent-items** *text-input-pane* **&rest** ***strings***

Arguments *text-input-pane* A **text-input-pane** with recent items.

strings Strings.

Values — There is no meaningful return value.

Description — The function **text-input-pane-delete-recent-items** modifies the recent items list in a **text-input-pane** that has recent-items (see **text-input-pane** initargs **:search-field**, **:recent-items** and **:recent-items-name**). It deletes from the recent items any item that matches any of the strings (compared using **cl:string-equal**), using **text-input-pane-set-recent-items** with *where* = **:delete**.

Notes — **text-input-pane-delete-recent-items** is implemented only on Cocoa.

See also — **text-input-pane**
text-input-pane-set-recent-items

text-input-pane-prepend-recent-items *Function*

Summary — Modifies the recent items list in a **text-input-pane** on Cocoa.

Signature — **text-input-pane-prepend-recent-items** *text-input-pane* **&rest** *strings*

Arguments — *text-input-pane* A **text-input-pane** with recent items.
strings Strings.

Values — There is no meaningful return value.

Description — The function **text-input-pane-prepend-recent-items** modifies the recent items list in a **text-input-pane** that has recent-items (see **text-input-pane** initargs **:search-field**, **:recent-items** and **:recent-items-name**). It prepends the strings at the beginning of the recent items, using **text-input-pane-set-recent-items** with *where* = **:start**.

Notes **text-input-pane-prepend-recent-items** is implemented only on Cocoa.

See also **text-input-pane**
text-input-pane-set-recent-items

text-input-pane-recent-items *Function*

Summary Gets and sets the recent items in a **text-input-pane** on Cocoa.

Signature **text-input-pane-recent-items** *text-input-pane* **=>** *list-of-strings*

(setf text-input-pane-recent-items) *list-of-strings text-input-pane* **=>** *list-of-strings*

Arguments *text-input-pane* A **text-input-pane** with recent items.

list-of-strings A list of strings.

Description The function **text-input-pane-recent-items** gets and sets the recent items in a **text-input-pane** that has recent-items. (see **text-input-pane** initargs **:search-field**, **:recent-items** and **:recent-items-name**).

The value *list-of-strings* passed to **(setf text-input-pane-recent-items)** must be a list of strings.

Notes **text-input-pane-recent-items** is implemented only on Cocoa.

text-input-pane-recent-items does not work properly before the pane is displayed.

See also **text-input-pane**
text-input-pane-set-recent-items

text-input-pane-replace-recent-items *Function*

Summary Modifies the recent items list in a **text-input-pane** on Cocoa.

Signature **text-input-pane-replace-recent-items** *text-input-pane* **&rest** *strings*

Arguments *text-input-pane* A **text-input-pane** with recent items.

strings Strings.

Values There is no meaningful return value.

Description The function **text-input-pane-replace-recent-items** modifies the recent items list in a **text-input-pane** that has recent-items (see **text-input-pane**, initargs **:search-field**, **:recent-items** and **:recent-items-name**), using **text-input-pane-set-recent-items** with *where* = **:replace**.

text-input-pane-replace-recent-items replaces the recent items in the pane by the strings. It has the same effect as **(setf text-input-pane-recent-items)**, but takes the strings as **&rest** arguments.

Notes **text-input-pane-replace-recent-items** is implemented only on Cocoa.

See also **text-input-pane**
text-input-pane-set-recent-items

text-input-pane-set-recent-items *Function*

Summary Sets the recent items in a **text-input-pane**.

Signature **text-input-pane-set-recent-items** *text-input-pane strings where*

Arguments

text-input-pane A **text-input-pane** with recent items.

strings A list of strings.

where One of the keywords **:replace**, **:delete**, **:start** and **:end**, or a non-negative integer.

Values

text-input-pane-set-recent-items does not return a meaningful value.

Description

The function **text-input-pane-set-recent-items** sets the recent items in a **text-input-pane**. The **text-input-pane** must have recent items, that is it must have been created with one of the keyword arguments **:search-field**, **:recent-items** or **:recent-items-name**. The *strings* argument must be a list of strings.

text-input-pane-set-recent-items modifies the recent items according to the argument *where*, which can one of:

:replace The strings replace the recent items in the text-input-pane.

:delete Delete from the recent items any item that matches any of the string (using cl:string-equal).

:start Insert the strings at the beginning of the recent items.

:end Insert the strings at the end of the recent items.

A non-negative integer

Insert the strings at the position indicated by the value. 0 means the same as **:start**. If the integer is greater than the length of the current recent items list, the strings are inserted in the end of the list.

In all cases, if any of the strings is already in the recent-items list (as compared by **cl:string-equal**), it is first deleted from the list. This means that passing strings that already exist just moves them around in the list.

Notes **text-input-pane-set-recent-items** is a little more efficient than using **text-input-pane-recent-items** and **(setf text-input-pane-recent-items)** but the different is unlikely to be significant.

See also **text-input-pane**
text-input-pane-replace-recent-items
text-input-pane-delete-recent-items
text-input-pane-append-recent-items
text-input-pane-prepend-recent-items

text-input-pane-complete-text *Function*

Summary Calls the *completion-function* in a **text-input-pane**.

Package **capi**

Signature **text-input-pane-complete-text** *pane* **=>** *result*

Arguments *pane* A **text-input-pane**.

Values *result* A string, or **nil**.

Description The function **text-input-pane-complete-text** calls the *completion-function* of *pane* with the current *text*. If this call is successful, then the *text* of *pane* is set to the result, and **text-input-pane-complete-text** returns this result. Otherwise, *result* is **nil**.

Note: the *completion-function* may return a list of completion candidates, in which case **text-input-pane-complete-text** prompts the user to select one of the candidates.

See also **text-input-pane**

text-input-pane-copy *Function*

Summary Copies the selected text in a **text-input-pane** to the clipboard

Package **capi**

Signature **text-input-pane-copy** *text-input-pane*

Arguments *text-input-pane* An instance of **text-input-pane** or a subclass.

Description The function **text-input-pane-copy** performs the clipboard copy operation on the selected text in *text-input-pane*. It does nothing if there is no selection.

See also **clipboard**
text-input-pane
text-input-pane-selection
text-input-pane-cut
text-input-pane-delete
text-input-pane-paste

text-input-pane-cut *Function*

Summary Cuts the selected text in a **text-input-pane** to the clipboard

Package **capi**

Signature **text-input-pane-cut** *text-input-pane*

Arguments *text-input-pane* An instance of **text-input-pane** or a subclass.

Description The function **text-input-pane-cut** performs the clipboard cut operation on the selected text in *text-input-pane*. It does nothing if there is no selection.

See also **clipboard**
text-input-pane
text-input-pane-selection
text-input-pane-copy
text-input-pane-delete
text-input-pane-paste

text-input-pane-delete *Function*

Summary Deletes the selected text in a **text-input-pane**.

Package **capi**

Signature **text-input-pane-delete** *text-input-pane*

Arguments *text-input-pane* An instance of **text-input-pane** or a subclass.

Description The function **text-input-pane-delete** deletes the selected text in *text-input-pane*. It does nothing if there is no selection.

See also **clipboard**
text-input-pane
text-input-pane-selection
text-input-pane-cut
text-input-pane-copy
text-input-pane-paste

text-input-pane-in-place-complete *Function*

Summary Raises the non-focus completion window.

Signature **text-input-pane-in-place-complete** *text-input-pane*

Arguments *text-input-pane* A **text-input-pane**

Description The function **text-input-pane-in-place-complete** raises the non-focus completion window.

The pane *text-input-pane* must have been made with either *in-place-completion-function* or *file-completion*. See the description of this functionality in **text-input-pane**.

See also **text-input-pane**

text-input-pane-paste *Function*

Summary Pastes the clipboard text into a **text-input-pane**.

Package **capi**

Signature **text-input-pane-paste** *text-input-pane*

Arguments *text-input-pane* An instance of **text-input-pane** or a subclass.

Description The function **text-input-pane-paste** performs the clipboard paste operation on *text-input-pane*, replacing any selected text.

See also **clipboard**
text-input-pane
text-input-pane-selection
text-input-pane-cut
text-input-pane-copy
text-input-pane-delete

text-input-pane-selected-text *Function*

Summary Returns the selected text in a **text-input-pane**.

Package **capi**

Signature **text-input-pane-selected-text** *text-input-pane* **=>** *result*

Arguments *text-input-pane* An instance of **text-input-pane** or a subclass.

Values *result* A string or **nil**.

Description The function **text-input-pane-selected-text** returns the selected text in *text-input-pane*, or **nil** if there is no selection.

See also **text-input-pane**
text-input-pane-selection
text-input-pane-selection-p

text-input-pane-selection *Function*

Summary Returns the bounds of the selection in a **text-input-pane**.

Package **capi**

Signature **text-input-pane-selection** *pane* **=>** *start*, *end*

Arguments *pane* A **text-input-pane**.

Values *start*, *end* Non-negative integers.

Description The function **text-input-pane-selection** returns as multiple values the bounding indexes of the selection in *pane*. That is, *start* is the inclusive index of the first selected character, and *end* is one greater than the index of the last selected character.

If there is no selection, then both *start* and *end* are the caret position in *pane*.

See also **set-text-input-pane-selection**
text-input-pane
text-input-pane-selected-text
text-input-pane-selection-p

text-input-pane-selection-p *Function*

Summary Returns true if there is selected text in a **text-input-pane**.

Package **capi**

Signature **text-input-pane-selection-p** *pane* **=>** *selectionp*

Arguments *pane* A **text-input-pane**.

Values *selectionp* A boolean.

Description The function **text-input-pane-selection-p** returns **t** if there is a selected region in *pane* and **nil** otherwise.

See also **set-text-input-pane-selection**
text-input-pane
text-input-pane-selected-text
text-input-pane-selection

text-input-range *Class*

Summary The class **text-input-range** is a pane for entering a number in a given range. Typically there are up and down buttons at the side which can used to quickly adjust the value.

Package **capi**

Superclasses **titled-object**
simple-pane

Initargs

:start	An integer specifying the lowest possible value in the range.
:end	An integer specifying the highest possible value in the range.
:wraps-p	A generalized boolean.
:value	An integer specifying the current value in the pane.
:callback	A function called when the value is changed by the user.
:change-callback	A function called called when the user edits the text in the pane.
:callback-type	The type of arguments passed to the callback.

Accessors
text-input-range-start
text-input-range-end
text-input-range-wraps-p
text-input-range-value
text-input-range-callback
text-input-range-change-callback
text-input-range-callback-type

Description

The class **text-input-range** provides numeric input of integers in a given range (some systems refer to this a spinner or spin-box).

The range is controlled by the **:start** and **:end** initargs. *start* defaults to **0** and *end* defaults to **10**. The initial value is set with the argument *value* (which defaults to **0**).

wraps-p controls what happens if the user presses the up or down button until the start or end is reached. If *wraps-p* is **nil**, then it stops at the limit. If *wraps-p* is true then it wraps around to the other end. The default value of *wraps-p* is **nil**.

callback, if non-nil, should be a function to be called whenever the value is changed by the user. The arguments to callback are specified by *callback-type* (see the **callbacks** class for details of possible values, noting that the "data" is the value and the "item" is the pane itself). The default *callback-type* is **(:item :data)**. Note that, if the value is changed by the user editing the text, then *change-callback*, if supplied, is called as well.

change-callback, if non-nil, should be a function of four arguments, to be called when the user edits the text in the pane. It should have this signature:

change-callback *string pane interface caret-position*

where the arguments are interpreted just as for the change-callback of **text-input-pane**. Note that editing of the text may or may not change the value in the **text-input-range** (that is, what **text-input-range-value** returns). If the value does change, then *callback* is called too.

Notes

On Cocoa, *change-callback* is not called for a cursor move only.

Example

```
(capi:contain
  (make-instance 'capi:text-input-range
                 :start 0
                 :end 100
                 :value 42))
```

See also **text-input-pane**
text-input-choice
option-pane

title-pane *Class*

Summary This class provides a pane that displays a single line of text.

Package **capi**

Superclasses **titled-object**
simple-pane

Subclasses **message-pane**

Initargs **:text** The text to appear in the title pane.

Accessors **title-pane-text**

Description The most common use of title panes is as a title decoration for a pane, and so the class **titled-object** is provided as a class that supports placing title panes around itself.

A **title-pane** with *text* "Title" is created automatically when a **titled-object** is created with *title* "Title".

By default, a **title-pane** is constrained so that it cannot resize (that is, the values of *visible-max-width* and *visible-max-height* are **t**). This can be overidden by passing **:visible-max-width nil** or **:visible-max-height nil**.

Example
```
(setq title-pane (capi:contain
                  (make-instance
                   'capi:title-pane
                   :text "This is a title pane")))

(capi:apply-in-pane-process
 title-pane #'(setf capi:title-pane-text)
 "New title" title-pane)
```

See also **display-pane**
text-input-pane
editor-pane

titled-menu-object *Class*

Summary The class **titled-menu-object** is a subclass of **menu-object** which supports titles, and it is used by menus, menu components and menu items.

Package **capi**

Superclasses **menu-object**

Subclasses **menu**
menu-component
menu-item

Initargs **:title** The title for the object.

:title-function
A setup callback which returns the title for the object, and optionally a mnemonic for the title.

Accessors **menu-title**
menu-title-function

Description The simplest way to give a title to a **titled-menu-object** is to just supply a *title* string, and this will then appear as the title of the object.

Alternatively, a *title-function* can be provided which will be called when the menu is about to appear and which should return the title to use. By default *title-function* is called on the interface of the **titled-menu-object**, but this argument can be changed by passing the **menu-object** initarg *setup-callback-argument*.

To specify a mnemonic in the title returned by *title-function*, make *title-function* return the mnemonic as a second value. This value is interpreted in the same way as the *mnemonic* argument for **menu**.

Example

```
(capi:contain (make-instance 'capi:menu-item
                             :title "Press Me"))

(capi:contain (make-instance
               'capi:menu-item
               :title-function #'(lambda (item)
                                   (princ-to-string
                                    (random 5)))))
```

titled-object *Class*

Summary The class **titled-object** is a mixin class which provides support for decorating a pane with a title (a piece of text positioned next to the pane) and with a message (a piece of text below the pane).

Package **capi**

Subclasses
interface
layout
title-pane
display-pane
text-input-pane
toolbar
button-panel
list-panel
option-pane
progress-bar
output-pane
slider

Initargs

:title	A title string for the pane (or **nil**).
:title-args	Initargs to the title **make-instance**.
:title-font	The font used for the title.

:title-position
The position of the title.

:title-adjust How to adjust the title relative to the pane.

:title-gap The gap between the title and the pane.

:message A message string for the pane (or **nil**).

:mnemonic-title
A string specifying the title and a mnemonic. Applies only to the subclasses specified below.

:message-gap
The gap between the message and the pane.

Accessors

titled-object-title
titled-object-title-font
titled-object-message
titled-object-message-font

Description

The titled pane makes its title decoration from a **title-pane** and the message decoration from a **message-pane**.

The *text* of the **title-pane** is passed via the **titled-object** initarg *title* and the *text* of the **message-pane** is passed via the **titled-object** initarg *message*.

The initargs and font for the **title-pane** are passed via the **titled-object** initargs *title-args* and *title-font* respectively.

title-gap specifies the size in pixels of the gap between the title and the pane. The default value of *title-gap* is 3.

For subclasses other than **interface**, the font used for the *message* can be found by **titled-object-message-font** and set by **(setf titled-object-message-font)**.

message-gap specifies the size in pixels of the gap between the message and the pane. The default value of *message-gap* is 3.

The message is always placed below the pane, but the title's position can be adjusted by specifying *title-position* which can be any of the following.

:left	Place the title to the left of the pane.
:right	Place the title to the right of the pane.
:top	Place the title above the pane.
:bottom	Place the title below the pane.
:frame	Place the title in a frame (like a groupbox) around the pane.

The *title-adjust* slot is used to adjust the title so that it is left justified, right justified or centered. The value of *title-adjust* can be any of the values accepted by the function **pane-adjusted-offset**, which are **:left**, **:right**, **:top**, **:bottom**, **:center** and **:centre**.

Note: *title-adjust* cannot handle both x and y. It is designed for cases like this:

```
(capi:contain
 (make-instance 'capi:list-panel
                :items '(1 2 3 4 5)
                :title "Temp"
                :title-position :left
                :title-adjust :center
                :title-args
                '(:visible-min-width (:character 12))))
```

mnemonic-title offers an alternate way to provide the pane's title, and with a mnemonic. It takes effect only for **button-panel**, **list-panel**, **list-view**, **option-pane**, **output-pane**, **progress-bar**, **scroll-bar**, **slider**, **text-input-pane**, **text-input-range**, **tree-view** and their subclasses, and is interpreted as described for **menu**.

Note: titles and mnemonic titles can now be added in a **grid-layout**.

Compatibility note

titled-object corresponds to the LispWorks 4.1 class **titled-pane**. For backwards compatibility the accessors **titled-pane-title** and **titled-pane-message**, including setf methods, are provided. These simply trampoline to **titled-object-title** and **titled-object-message**, and may not be supported in future releases.

Example

Try each of these examples to see some of the effects that titled panes can produce. Note that **text-input-pane** is a subclass of **titled-object**, and that it has a default *title-position* of **:left**.

```
(capi:contain (make-instance 'capi:text-input-pane))

(capi:contain (make-instance 'capi:text-input-pane
                             :title "Enter some text:"))

(capi:contain (make-instance
               'capi:text-input-pane
               :title "Enter some text:"
               :title-position :top))

(capi:contain (make-instance 'capi:text-input-pane
                              :title "Enter some text:"
                              :title-position :top
                              :title-adjust :center))

(capi:contain (make-instance 'capi:text-input-pane
                             :title "Enter some text:"
                             :title-position :top
                             :title-adjust :right))

(capi:contain (make-instance 'capi:text-input-pane
                              :message "A message"))

(capi:contain (make-instance 'capi:text-input-pane
                              :message "A message"
                            :title "Enter some text:"))

(capi:contain (make-instance 'capi:text-input-pane
                             :title "Enter some text:"
                             :title-args
                              '(:foreground :red)))
```

See also

message-pane
title-pane

titled-pinboard-object *Class*

Summary A pinboard object with a title.

Package **capi**

Superclasses **pinboard-object**
titled-object

Subclasses **image-pinboard-object**

Description The class **titled-pinboard-object** provides a pinboard object with a title. The title is regarded as part of the object in geometry calculations.

Note: **titled-pinboard-object** does not allow the value **:frame** for the **titled-object** initarg *title-position*. The values **:top**, **:bottom**, **:left** and **:right** are allowed.

Example This example creates three instances of **titled-pinboard-object** and one of **item-pinboard-object**, all with with a yellow background. Note that:

1. The title does not have the yellow background in the **titled-pinboard-object**, as opposed to the **item-pinboard-object**. To specify the title background, we pass it in the *title-args*.
2. The width of the title area is determined by the title, but passing **:visible-min-width** (and other geometric hints) can be used to override this.
3. Setting the **titled-object-title** of the **titled-pinboard-object** does not reset its width.

```
(setq tpo1 (make-instance 'capi:titled-pinboard-object
                          :graphics-args
                          '(:background :yellow)
                          :x 10 :y 10
                          :width 150 :height 20
                          :title "Short"
                          :title-position :left
                          :title-args
                          '(:background :red ))
      tpo2  (make-instance 'capi:titled-pinboard-object
                          :graphics-args
                          '(:background :yellow)
                          :x 10 :y 40
                          :width 150 :height 20
                          :title "Long title"
                          :title-position :left)
      tpo3  (make-instance 'capi:titled-pinboard-object
                          :graphics-args
                          '(:background :yellow)
                          :x 10 :y 70
                          :width 150 :height 20
                          :title "Short"
                          :title-position :left
                          :title-args
                          '(:visible-min-width 100))
      ipo  (make-instance 'capi:item-pinboard-object
                         :graphics-args
                         '(:background :yellow)
                         :x 10 :y 100
                         :width 150 :height 20
                         :text "Item Pinboard" ))
(setq pl (capi:contain
          (make-instance 'capi:pinboard-layout
                         :visible-min-width  200
                         :visible-min-height 200
                         :description
                         (list tpo1 tpo2 tpo3 ipo))))

(capi:apply-in-pane-process
 pl
 #'(lambda()
     (setf (capi:titled-object-title tpo1)
           "Longer...")))
```

See also **item-pinboard-object**

toolbar *Class*

Summary This class provides a pane containing toolbar buttons and panes.

Package **capi**

Superclasses **collection**
simple-pane
titled-object
toolbar-object

Initargs

:dividerp If **t**, a divider line is drawn above the toolbar, to separate it from the menu bar. The default value is **nil**.

:images A list of images.

:callbacks A list of callback functions.

:tooltips A list of tooltip strings used on Microsoft Windows.

:button-width The width of the toolbar buttons.

:button-height The height of the toolbar buttons.

:stretch-text-p
A generalized boolean.

:image-width The width of images in the toolbar.

:image-height The height of images in the toolbar.

:default-image-set
An optional **image-set** object which can be used to specify images. See **toolbar-button** and **image-set** for more details.

:flatp A generalized boolean.

Readers **toolbar-flat-p**

Description

The class **toolbar** inherits from **collection**, and therefore has a list of *items*. It behaves in a similar manner to **push-button-panel**, which inherits from **choice**.

The *items* argument may be used to specify a mixture of **toolbar-button**s and **toolbar-component**s, or it may contain arbitrary objects as items. The list may also contain CAPI panes, which will appear within the toolbar. This is typically used with **text-input-pane**, **option-pane**, and **text-input-choice**.

For items that are not toolbar buttons or toolbar components, a toolbar button is automatically created, using the appropriate elements of the *images*, *callbacks* and *tooltips* lists. If no image is specified, the item itself is used as the image. For more information on acceptable values for *images*, see **toolbar-button**.

Each of the *images*, *callbacks* and *tooltips* lists should be in one-to-one correspondence with the items. Elements of these lists corresponding to **toolbar-button** items or **toolbar-component** items are ignored.

Note: **:tooltips** is now deprecated. Use the **interface** *help-callback* with *help-key* **:tooltip** instead.

All toolbar buttons within the item list behave as push buttons. However, toolbar button components may have **:single-selection** or **:multiple-selection** interaction. See **toolbar-component** for further details.

button-width and *button-height* specify the size of each button in the toolbar. If a button contains text and *stretch-text-p* is true, then the button stretches to the width of the toolbar if needed.

images, if supplied, must specify images all of the same size.

image-width and *image-height* must match the sub-image dimensions in *default-image-set* or the dimensions of the *images*.

flatp specifies whether the toolbar is 'flat' on Cocoa. If *flatp* is true, then the buttons do not have a visible outline until the user moves the mouse over them. *flatp* is only implemented on Cocoa. (On Microsoft Windows, all toolbars are flat. On Motif, no toolbar is flat.) The default value of *flatp* is **:default**.

Notes **text-input-pane**, **option-pane**, and **text-input-choice** and so on cannot contain titles when embedded in a **toolbar**.

See also **collection**
image-set
push-button-panel
toolbar-component

toolbar-button *Class*

Summary This class is used to create instances of toolbar buttons.

Package **capi**

Superclasses **item**
toolbar-object

Initargs

:callback A function that is called when the user presses the toolbar button and *popup-interface* is non-nil.

:image Specifies the image to use for the toolbar button.

:selected-image Specifies the image to use for the toolbar button when it is selected.

:tooltip An optional string which is displayed, on Microsoft Windows, when the mouse moves over the button. **:tooltip** is deprecated.

:help-key An object used for lookup of help. Default value **t**.

:remapped Links the button to a menu item.

:dropdown-menu

A **menu** or **nil**.

:dropdown-menu-function

A function of no arguments, or **nil**.

:dropdown-menu-kind

One of the keywords **:button**, **:only** and **:delayed**.

:popup-interface

An **interface** or **nil**.

Accessors

toolbar-button-image
toolbar-button-selected-image
toolbar-button-dropdown-menu
toolbar-button-dropdown-menu-function
toolbar-button-dropdown-menu-kind
toolbar-button-popup-interface

Readers

help-key

Description

Toolbar buttons may be placed within toolbars and toolbar components. However, there is usually no need to create toolbar buttons explicitly; instead, the *callbacks* and *images* arguments to **toolbar** or **toolbar-component** can be used. To add tooltips, use the **interface** *help-callback* with *help-key* **:tooltip**.

In addition, an **interface** can have its own toolbar buttons, specified by its *toolbar-items*. There is no toolbar object in that situation.

image and *selected-image* may each be one of the following:

A pathname or string

This specifies the filename of a file suitable for loading with **load-image**. Currently this must be a bitmap file.

A symbol

The symbol must either have been previously registered by means of a call to **register-image-translation**, or be one of the following symbols, which map to standard images: **:std-cut**, **:std-copy**, **:std-paste**, **:std-undo**, **:std-redo**, **:std-delete**, **:std-file-new**, **:std-file-open**, **:std-file-save**, **:std-print**, **:std-print-pre**, **:std-properties**, **:std-help**, **:std-find** and **:std-replace**

On Microsoft Windows, the following symbols are also recognized for view images: **:view-large-icons**, **:view-small-icons**, **:view-list**, **:view-details**, **:view-sort-name**, **:view-sort-size**, **:view-sort-date**, **:view-sort-type**, **:view-parent-folder**, **:view-net-connect**, **:view-net-disconnect** and **:view-new-folder**.

Also on Microsoft Windows, these symbols are recognized for history images: **:hist-back**, **:hist-forward**, **:hist-favorites**, **:hist-addtofavorites** and **:hist-viewtree**.

An image object, as returned by **load-image**.

An image locator object

This allows a single bitmap to be created which contains several button images side by side. See **make-image-locator** for more

	information. On Microsoft Windows, this also allows access to bitmaps stored as resources in a DLL.
An integer	This is a zero-based index into the *default-image-set* of the toolbar or toolbar component in which the toolbar button is used.

Each image should be of the correct size for the toolbar. By default, this is 16 pixels wide and 16 pixels high.

help-key is interpreted as described for **`element`**.

remapped, if non-nil, should match the *name* of a **`menu-item`** in the same interface as the button. Then, the action of pressing the button is remapped to selecting that **`menu-item`** and calling its *callback*. The default value of *remapped* is **`nil`**.

Toolbar buttons can be made with an associated dropdown menu by passing the **`:dropdown-menu`** or **`:dropdown-menu-function`** initargs.

If *dropdown-menu* is non-nil then it should be a **`menu`** object to display for the button.

If *dropdown-menu-function* is non-nil then it should be a function which will be called with the **`toolbar-button`** as its single argument. It should return a **`menu`** object to display for the button.

dropdown-menu-kind can have the following values:

`:button`	There is a separate smaller button for the dropdown menu next to the main button.
`:only`	There is no main button, only the smaller button for the dropdown.
`:delayed`	There is only one button and the menu is displayed when the user holds the mouse down over the button for some short delay. If the user clicks on the button then the normal *callback* is called.

Note: *dropdown-menu-kind* is not supported for toolbar buttons in the **interface** *toolbar-items* list.

popup-interface, if non-nil, should be an **interface**. When the user clicks on the toolbar button, the interface *popup-interface* is displayed near to the button. The normal *callback* is not called, but you can detect when the interface appears by using its *activate-callback*. *popup-interface* is useful for popping up windows with more complex interaction than a menu can provide. The default value of *popup-interface* is **nil**.

Note: *popup-interface* is not supported for toolbar buttons in the **interface** *toolbar-items* list.

Toolbar buttons can display text, which should be in the *data* or *text* slot inherited from **item**.

Note: display of text in toolbar buttons is implemented only on Motif and Cocoa.

Example

A callback function:

```
(defun do-redo (data interface)
  (declare (ignorable data interface))
  (capi:display-message "Doing Redo"))
```

A simple interface:

```
(capi:define-interface redo ()
  ()
  (:panes
   (toolbar
    capi:toolbar
    :items
    (list
     (make-instance
      'capi:toolbar-component
      :items
      (list (make-instance
             'capi:toolbar-button
             ;; remap it to the menu item
             :remapped  'redo-menu-item
             :image :std-redo))))))
  (:menu-bar a-menu)
  (:menus
   (a-menu
    "A menu"
    (("Redo" :name 'redo-menu-item
             :selection-callback 'do-redo
             :accelerator "accelerator-y"))))
  (:layouts
   (main
    capi:row-layout
    '(toolbar)))
  (:default-initargs
   :title "Redo"))
```

In this interface, pressing the toolbar button invokes the menu item callback:

```
(capi:display (make-instance 'redo))
```

This last example illustrates the use of **`:selected-image`**.

```
(capi:contain
 (make-instance
  'capi:toolbar
  :items
  (list
   (make-instance
    'capi:toolbar-component
    :interaction :multiple-selection
    :items
    (list (make-instance 'capi:toolbar-button
                         :image 0
                         :selected-image 1))
    ))))
```

See also **item**
make-image-locator
menu-item
toolbar
toolbar-component

toolbar-component *Class*

Summary A toolbar component is used to group several toolbar buttons together. Each component is separated from the surrounding components and buttons.

Toolbar components are choices, and may be used to implement toolbars on which groups of button have single-selection or multiple-selection functionality.

Package **capi**

Superclasses **toolbar-object**
choice

Initargs **:images** A list of images, in one-to-one correspondence with the items. Elements corresponding to **toolbar-button** items or **toolbar-component** items are ignored

:callbacks A list of callback functions, in one-to-one correspondence with the items.Elements corresponding to **toolbar-button** items or **toolbar-component** items are ignored

:tooltips A list of tooltip strings, in one-to-one correspondence with the items. Elements corresponding to **toolbar-button** items or **toolbar-component** items are ignored

:default-image-set

An optional **image-set** object which can be used to specify images. See **toolbar-button** and **image-set** for more details.

:selection-function

A function to dynamically compute the selection.

:selected-item-function

A function to dynamically compute the selected item.

:selected-items-function

A function to dynamically compute the selected items.

Description

The class **toolbar-component** inherits from **choice**, and hence has a list of *items*. Its behavior is broadly similar to **button-panel**.

The *items* argument may be used to specify a mixture of **toolbar-button**s and **toolbar-component**s, or may contain arbitrary objects as items. The list may also contain CAPI panes, which will appear within the toolbar. This is typically used with **text-input-pane**, **option-pane**, and **text-input-choice**.

For items that are not toolbar buttons or toolbar components, a toolbar button is automatically created, using the appropriate elements of the *images*, *callbacks* and *tooltips* lists. If no image is specified, the item itself is used as the image. For more information on acceptable values for images, see **toolbar-button**.

No more than one of *selection-function*, *selected-item-function* and *selected-items-function* should be non-nil. Each defaults to **nil**. If one of these is non-nil, it should be a function which is called before the **toolbar-component** is displayed and when **update-toolbar** is called and which determines which items are selected. The function takes a single argument, which is the **interface** of the **toolbar-component**.

selection-function, if non-nil, should return a list of indices suitable for passing to the **choice** accessor **(setf choice-selection)** .

selected-item-function, if non-nil, should return an object which is an item in the **toolbar-component**, or is equal to such an item when compared by the **toolbar-component**'s *test-function* and *key-function*.

selected-items-function, if non-nil, should return a list of such objects.

Example See **examples/capi/elements/toolbar.lisp**.

See also **toolbar**
toolbar-button

toolbar-object *Class*

Summary This is a common superclass of all toolbar objects.

Package **capi**

Superclasses None

Subclasses **toolbar**
toolbar-button
toolbar-component

Initargs **:enabled** If **t**, the toolbar object is enabled.

:enabled-function
A function determining the enabled state.

Accessors **simple-pane-enabled**
toolbar-object-enabled-function

Description Any toolbar object may be disabled, by setting its *enabled* slot to **nil**. Disabling a toolbar or toolbar component prevents the user from interacting with any buttons contained in it.

All toolbar objects may also have an *enabled-function* specified. This is called whenever **update-toolbar** is called. If it returns **t**, the toolbar object will be enabled; if it returns **nil**, the object will be disabled.

Notes The function *enabled-function* should not display a dialog or do anything that may cause the system to hang. In general this means interacting with anything outside the Lisp image, including files, databases and so on.

See also **toolbar**
toolbar-button
toolbar-component
update-toolbar

top-level-interface *Generic Function*

Summary Returns the top level interface containing a specified pane.

Package **capi**

Signature **top-level-interface** *pane*

Description Returns the top level interface that contains *pane*.

See also **top-level-interface-p**
interface
element

top-level-interface-display-state *Generic Function*

Summary Returns a value which indicates how the top level interface is displayed.

Package **capi**

Signature **top-level-interface-display-state** *interface*

Arguments *interface* A top level interface or dialog window

Description Top level interfaces and dialogs can be manipulated by the user, such as being iconifed or maximized. The program can manipulate these windows too. The function **top-level-interface-display-state** returns a value that indicates the current state of the interface *interface*. The following values can be returned:

:normal The window is visible and has its normal size.

:maximized The window is visible and has been maximized.

:iconic The window is visible as an icon.

:hidden The window is not visible.

These values can also be passed as the **:display-state** initarg when making a top level interface.

In addition, the function **(setf top-level-interface-display-state)** can be used to change the state of a top level interface. The value can be set to one of the above, or to **:restore** if the current state is **:iconic** or **:hidden**. When set to **:restore**, the state will become **:normal** or **:maximized** depending on how the interface was visible in the past.

See also **top-level-interface-p**
top-level-interface-geometry
set-top-level-interface-geometry
interface

top-level-interface-geometry *Generic Function*

Summary Returns the geometry of the top level interface.

Package **capi**

Signature **top-level-interface-geometry** *interface* **=>** *tx*, *ty*, *twidth*, *theight*

Arguments *interface* An interface.

Values *tx*, *ty*, *twidth*, *theight*
Integers.

Description The generic function **top-level-interface-geometry** returns the coordinates of the given interface in a form suitable for use as the **:best-x**, **:best-y**, **:best-width** and **:best-height** initargs to **interface**. The value of *interface* should be a top level interface.

tx and *ty* are measured from the top-left of the screen rectangle representing the area of the primary monitor (the primary screen rectangle).

Notes

On Cocoa, the result does not account for the size of the interface toolbar, if present in *interface*.

Example

```
;; Define and display an interface.
(capi:define-interface test ()
  ()
  (:panes (panel capi:list-panel)))

(setq int (capi:display (make-instance 'test)))

;; Now manually position the interface somewhere.

;; Find where the interface is.
(multiple-value-setq (tx ty twidth theight)
  (capi:top-level-interface-geometry int))

;; Now manually close the interface.

;; Create a new interface in the same place.
(setq int
      (capi:display
       (make-instance
        'test
        :best-x tx
        :best-y ty
        :best-width twidth
        :best-height theight)))
```

See also

top-level-interface-p
top-level-interface-display-state
set-top-level-interface-geometry
interface

top-level-interface-geometry-key *Generic Function*

Summary

Determines where the geometry of an interface is saved.

Package

capi

Signature

top-level-interface-geometry-key *interface* **=>** *key*, *product-name*

Arguments	interface	A top level interface.
Values	*key*	A symbol.
	product-name	A symbol, a string or a list of strings.

Description

The generic function **`top-level-interface-geometry-key`** returns as multiple values a key and a product name, which determine where the geometry of *interface* is saved. The saved geometry is used when displaying a future instance.

The supplied method on **`interface`** returns the class name of *interface* as the *key*, and **`nil`** as the *product-name*. You can define methods for your interfaces and products.

key must be a symbol.

product-name is used to derive the *product-registry-path*.

product-name can be a symbol which was previously defined to have a registry path by **`(setf sys:product-registry-path)`**.

product-name can alternatively be a string, which is taken directly as *product-registry-path*.

product-name can alternatively be a list of strings, denoting multiple path components. These are concatenated together with the appropriate separator for the platform to give *product-registry-path*.

The geometry of *interface* is saved at the path which is constructed by concatenating (with appropriate separators) these values:

user-path product-registry-path **`"Environment" (symbol-package`** *key***`) (symbol-name`** *key***`)`**

where *user-path* is the registry branch HKEY_CURRENT_USER on Microsoft Windows and the home directory on Unix/Linux and Mac OS X.

Note: for your interface classes for which you want the geometry to be saved, define a method on **top-level-interface-save-geometry-p**.

Note: in an image delivered at delivery level 5, symbol names are removed by default. This breaks the saved geometry mechanism as the registry path is constructed using **symbol-name**. To make this work in a level 5 delivered image, explicitly keep the *key* symbol. See the *LispWorks Delivery User Guide* for details.

See also **top-level-interface-save-geometry-p**

top-level-interface-p *Generic Function*

Summary The predicate for top level interfaces.

Package **capi**

Signature **top-level-interface-p** *pane*

Description The generic function **top-level-interface-p** returns true if *pane* is a top level interface.

See also **top-level-interface**
top-level-interface-geometry
top-level-interface-display-state
interface
element

top-level-interface-save-geometry-p *Generic Function*

Package **capi**

Signature **top-level-interface-save-geometry-p** *interface* **=>** *result*

Description The generic function **top-level-interface-save-geometry-p** returns true if the geometry of *interface* should be saved for use by a future instance.

The default method (on **interface**) returns **nil**.

See also **top-level-interface-geometry-key**

tracking-pinboard-layout *Class*

Summary A pinboard with automatic highlighting.

Package **capi**

Superclasses **pinboard-layout**

Description The class **tracking-pinboard-layout** provides a pinboard which tracks mouse movement by highlighting its objects as the mouse cursor moves over them.

This functionality is implemented via a **:motion** specification in the *input-model*. Therefore, you may not specify **:motion** in the *input-model* of a **tracking-pinboard-layout**. See **output-pane** for a description of *input-model*.

Example

```
(defclass my-ellipse (capi:drawn-pinboard-object)
  ((color :initarg :color
          :initform :red
          :accessor my-ellipse-color)))

(defun draw-my-ellipse
       (output-pane self x y width height)
       (let ((x-radius (floor width 2))
             (y-radius (floor height 2)))
              (gp:draw-ellipse output-pane
                (+ x x-radius) (+ y y-radius)
                x-radius y-radius
                :foreground
                (my-ellipse-color self)
                :filled t)))

(defun change-ellipse-color (pinboard x y)
  (let ((ellipse
         (capi:pinboard-object-at-position
          pinboard x y)))
    (when ellipse
      (let ((color
             (capi:prompt-for-color
              "New color"
              :color
              (my-ellipse-color ellipse)
              :owner
              (capi:convert-to-screen))))
        (when color
          (setf (my-ellipse-color ellipse) color)
          (capi:with-geometry ellipse
            (gp:invalidate-rectangle
             pinboard
             capi:%x%
             capi:%y%
             capi:%width%
             capi:%height%)))))))

(capi:contain
 (make-instance
  'capi:tracking-pinboard-layout
  :description
  (loop for i below 20
        collect
        (make-instance 'my-ellipse
                       :x (+ 5 (random 290))
                       :y (+ 5 (random 290))
```

```
                        :height (+ 10 (random 50))
                        :width (+ 10 (random 50))
                        :color
                        (apply 'color:make-rgb
                         (loop for i below 3
                               collect (random 1.0)))
                        :display-callback
                        'draw-my-ellipse))
  :input-model '(((:button-1 :press)
                  change-ellipse-color))))
```

tree-view *Class*

Summary A tree view is a pane that displays a hierarchical list of items. Each item may optionally have an image and a checkbox.

Package **capi**

Superclasses **choice**
titled-object
simple-pane

Initargs

:roots A list of the root nodes.

:children-function

Returns the children of a node.

:leaf-node-p-function

Optional function which determines whether a node is a leaf node (that is, has no children). This is useful if it can be computed faster than the *children-function*.

:retain-expanded-nodes

Specifies if the tree view remembers whether hidden nodes were expanded.

:expandp-function

A designator for a function of one argument, or **nil**.

:action-callback-expand-p

A boolean. The default value is **nil**.

:delete-item-callback

A function designator for a function of two arguments.

:right-click-extended-match

Controls the area within which selection by the mouse right button occurs. Default **t**.

:has-root-line

Controls whether the line and expanding boxes of the root nodes are drawn. Default **t**.

Initargs for handling check boxes. Note that these do not work on Cocoa:

:checkbox-status

Controls whether the tree has checkboxes, except on Cocoa. If non-nil, the value should be a non-negative integer less than the length of the image-list, or **t**.

An integer specifies the default initial status, and **t** means the same as 2 (that is, by default the checkboxes are checked initially).

The default is **nil**, meaning no checkboxes.

:checkbox-next-map

Controls the change in status when the user clicks on a checkbox. Can be an array, a function or an integer. Default **#(2 2 0)**.

:checkbox-parent-function

Controls the changes in the ancestors when the status of an item is changed.

:checkbox-child-function

Controls the changes in the descendents when the status of an item is changed.

:checkbox-change-callback

A function called when the status of an item is changed interactively.

:checkbox-initial-status

Specifies the initial status of specific items.

Initargs for handling images:

:image-function

Returns an image for a node.

:state-image-function

Returns a state image for a node.

:image-lists

A plist of keywords and **image-list** objects.

:use-images Flag to specify whether items have images. Defaults to **t**.

:use-state-images

Flag to specify whether items have state images. Defaults to **nil**.

:image-width Defaults to 16.

:image-height Defaults to 16.

:state-image-width

Defaults to *image-width*.

:state-image-height

Defaults to *image-height*.

Accessors

tree-view-roots
tree-view-children-function
tree-view-image-function
tree-view-state-image-function
tree-view-leaf-node-p-function
tree-view-retain-expanded-nodes
tree-view-expandp-function
tree-view-action-callback-expand-p
tree-view-right-click-extended-match
tree-view-has-root-line
tree-view-checkbox-next-map
tree-view-checkbox-parent-function
tree-view-checkbox-status
tree-view-checkbox-child-function
tree-view-checkbox-change-callback
tree-view-checkbox-initial-status

Readers

tree-view-checkbox-status

Description

The tree view pane allows the user to select between items displayed in a hierarchical list. Although it is a choice, only single selection interaction is supported. Use **extended-selection-tree-view** if you need other selection interaction styles.

expandp-function controls automatic expansion of nodes (items) in the **tree-view**. By default, initially only the items specified by the *roots* argument are displayed. This initial display can be altered by supplying a function *expandp-function* which allows further items to be displayed. If supplied, *expandp-function* should be a function which is called on the *roots* and is called recursively on the children if it returns true. When the user expands a node, *expandp-function* is called on each newly created child node, which is expanded if this call returns true, and so on recursively. The default value of *expandp-function* is **nil** so that there is no automatic expansion and only the root nodes are visible initially.

The default value of *retain-expanded-nodes* is **t**.

Any item which has children has a small expansion button next to it to indicate that it can be expanded. When the user clicks on this button, the children nodes (as determined by the children function) are displayed.

If *action-callback-expand-p* is true, then the activate gesture expands a collapsed node, and collapses an expanded node. This expansion and contraction of the node is additional to any supplied *action-callback*.

delete-item-callback is called when the user presses the **Delete** key. Two arguments are passed: the **`tree-view`** and the selected item *item*. Note that, apart from calling the callback, the system does nothing in response to the **Delete** key. In particular, if you want to remove the selected *item*, *delete-item-callback* needs to do it by changing what the *children-function* returns when called on the parent of *item*. Normally you also need to to call **`tree-view-update-item`** with *in-parent* = **`t`** to actually update the tree on the screen.

Note also that in **`extended-selection-tree-view`** (a subclass of **`tree-view`**), if the *interaction* was not explictly changed to **`:single-selection`**, the second argument to *delete-item-callback* is a list of the selected items (even when only one item is selected).

The *image-function* is called on an item to return an image associated with the item. It can return one of the following:

A pathname or string

: This specifies the filename of a file suitable for loading with **`load-image`**. Currently this must be a bitmap file.

A symbol

: The symbol must have been previously registered by means of a call to **`register-image-translation`**. It can also one of the following symbols, which map to standard images: **`:std-cut`**, **`:std-copy`**, **`:std-paste`**, **`:std-undo`**, **`:std-redo`**, **`:std-delete`**,

:std-file-new, **:std-file-open**, **:std-file-save**, **:std-print**, **:std-print-pre**, **:std-properties**, **:std-help**, **:std-find** and **:std-replace**.

On Microsoft Windows, the following symbols are also recognized. They map to view images: **:view-large-icons**, **:view-small-icons**, **:view-list**, **:view-details**, **:view-sort-name**, **:view-sort-size**, **:view-sort-date**, **:view-sort-type**, **:view-parent-folder**, **:view-net-connect**, **:view-net-disconnect** and **:view-new-folder**.

Also on Microsoft Windows, these symbols are recognized. They map to history images: **:hist-back**, **:hist-forward**, **:hist-favorites**, **:hist-addtofavorites** and **:hist-viewtree**.

An image object, as returned by **load-image**.

An image locator object

This allowing a single bitmap to be created which contains several button images side by side. See **make-image-locator** for more information. On Microsoft Windows, it also allows access to bitmaps stored as resources in a DLL.

An integer — This is a zero-based index into the tree-view's image lists. This is generally only useful if the image list is created explicitly. See **image-list** for more details.

The *state-image-function* is called on an item to determine the state image: an additional optional image used to indicate the state of an item. It can return one of the objects listed above,

just as for *image-function*, or **nil** to indicate that there is no state image. See also *checkbox-status*, which overrides the *state-image-function*.

If *image-lists* is specified, it should be a plist containing the following keywords as keys. The corresponding values should be **image-list** objects.

:normal	Specifies an **image-list** object that contains the item images. The *image-function* should return a numeric index into this **image-list**.
:state	Specifies an **image-list** object that contains the state images. The *state-image-function* should return a numeric index into this **image-list**.

If *right-click-extended-match* is **nil**, the mouse right button gesture within the tree view selects an item only when the cursor is on the item. Otherwise, this gesture also selects an item to the left or right of the cursor. The default for *right-click-extended-match* is **t**.

If *has-root-line* is **nil**, the vertical root line and expanding boxes of the root nodes are not drawn. This is useful in two cases:

- When the tree view needs to be neater. Note that the user does not have a mouse gesture to expand the root node. Normally the programmer would compensate for this by making some other gesture call **(setf tree-view-expanded-p)**.
- If a *children-function* is not supplied, this can be used to create a pane like a list view with checkboxes (see below for details of checkboxes). This pane can be handled as if it is a typical choice, except that setting the items is done by **(setf tree-view-roots)** or by passing **:roots** to

make-instance. In a typical choice, you would do **(setf collection-items)** or pass **:items** to **make-instance**.

The default for *has-root-line* is **t**.

If the *checkbox-status* is non-nil then the tree view provides an automatic way of using the state images as checkboxes (except on Cocoa where check boxes are not supported). The *state-image* is defaulted to a set of images containing check-boxes and the *state-image-function* is ignored, but each *item* has a status that is a non-negative integer no greater than the number of images in *state-image-list*. The status specifies which image is displayed alongside *item*.

When *item* is expanded in the tree for the first time, the status of each child is set to *item*'s status. The status can be changed interactively by the user:

- Left mouse button on a checkbox changes its status
- Space changes the status of all selected items.

The status can also be read and set programmatically (see **tree-view-item-checkbox-status**).

When the status of an item changes:

- The statuses of its ancestors may change if a *checkbox-parent-function* was supplied.
- The statuses of an items descendents may change if a *checkbox-child-function* was supplied.
- A callback given by *checkbox-callback-function* will be called, if this was supplied.

By default checkboxes have three statuses indicated by images: un-checked(0), grey-checked(1) and checked(2). If an item is checked or un-checked, then all its decendents have the same status. If an item is grey-checked, then its descen-

dents have various statuses. When the status of an item changes, all the descendents of that item change to the same status, and all its ancestors change to grey-checked.

For non-default status-changing behavior, specify *checkbox-next-map*. The value can be

- An array of statuses. When the user clicks on *item*'s checkbox, the status of *item* is used to index into *checkbox-next-map*, and the status at that index becomes the new status of *item*. For example, with the default checkbox-next-map, checked(0) changes to un-checked(2), grey-checked(1) changes to un-checked(2), and un-checked(2) changes to checked(0).
- A function of two arguments. The first argument is a list of items and the second argument is their current status (and if the items have various statuses, the most common is used). *checkbox-next-map* should return the new status to use.
- An integer: the status is increased by 1, until this integer is reached, at which point the status becomes 0 again.

When the status of an item is changed, the statuses of items above and below it in the tree may also be changed: the system recurses up and down the tree using *checkbox-parent-function* and *checkbox-child-function* respectively.

To recurse upwards, *checkbox-parent-function* is called on the parent with five arguments: the parent, the parent's status, the item, the item's status and an flag which is non-nil if all the items at the same level as the item now have the same status:

checkbox-parent-function ***parent parent-status item item-status all-items-same-p => new-parent-status, recurse-up, recurse-down***

If *new-parent-status* differs from *parent-status*, then the status of *parent* is set to *new-parent-status*. If *recurse-up* is non-nil, then the system recurses up from parent, and if *recurse-down*

is non-nil, the system recurses down. The default *checkbox-parent-function* returns **(values** *new-item-status* **t nil)** where *new-item-status* is *item-status* if *all-items-same-p* is non-nil and **1** otherwise.

To recurse downwards, *checkbox-child-function* is called on each child with four arguments and the results are used similarly to those of *checkbox-parent-function*:

checkbox-child-function *child child-status item item-status* **=>** *new-child-status, recurse-up, recurse-down*

The default *checkbox-child-function* returns **(values** *parent-status* **nil t)**.

Note: if an item has never been expanded, then it has no children. If an item has been collapsed, then it has children even though they are not currently visible.

checkbox-parent-function and *checkbox-child-function* should not modify the tree in any way.

checkbox-change-callback takes three arguments: the tree, a list of items and their new status:

checkbox-change-callback *tree items new-status*

This is called after the new statuses of *items* and their ancestors and descendents have been resolved.

checkbox-initial-status is used the first time that each specified item, which can be anywhere in the tree, appears. The value is a list of conses of items and their initial statuses, for example **((item1. 2) (item2. 0))**. When *item* is displayed, its status is set from this list or, if item is not specified, from *checkbox-status*. Items are removed from the list when they are displayed and setting the list does not affect the checkbox status of items that have already been displayed. Note that check boxes are not supported on Cocoa.

The default value of *vertical-scroll* in a **tree-view** is **t**.

Notes

1. Since the items of a tree view are not computed until display time, the **choice** initarg **:selected-item** has no effect. See the examples in **interface-display** for a way to set the selected item in a tree view.
2. Although **tree-view** is a subclass of **collection**, it does its own items handling and you must not access its *items* and related slots directly. In particular for **tree-view** do not pass **:items**, **:items-count-function**, **:items-get-function** or **:items-map-function**, and do not use the corresponding accessors.
3. On Microsoft Windows, the system always sets the input focus to the **tree-view** after its *selection-callback* returns. If you need this callback to set the focus elsewhere, call **set-pane-focus** outside the callback, like this:

```
(mp:process-send process
  (list 'capi:set-pane-focus pane))
```

See also

choice
extended-selection-tree-view
tree-view-ensure-visible
tree-view-expanded-p
tree-view-item-checkbox-status
tree-view-item-children-checkbox-status
tree-view-update-item

tree-view-ensure-visible *Function*

Summary Ensures that an item in a **tree-view** is visible.

Package **capi**

Signature **tree-view-ensure-visible** *tree-view item*

Arguments

tree-view	A tree view.
item	A displayed item of *tree-view*.

Description The function **tree-view-ensure-visible** ensures that an item in a tree view is visible, scrolling the tree view if necessary.

Note that *item* must be an item that is displayed in *tree-view*.

See also **tree-view**

tree-view-expanded-p *Generic Function*

Summary Gets and sets the expanded state of an item in a **tree-view**.

Package **capi**

Signature **tree-view-expanded-p** *tree-view item*

Signature **(setf tree-view-expanded-p)** *on tree-view item*

Arguments

tree-view	A **tree-view**.
item	An item.
on	A boolean.

Description The generic function **tree-view-expanded-p** is the predicate for whether *item* is expanded in *tree-view*. If item is not in *tree-view*, the function returns **nil**.

(setf tree-view-expanded-p) sets the expanded state of *item* in *tree-view* to *on*. If *item* is not in *tree-view*, the function does nothing.

See also **tree-view**

tree-view-item-checkbox-status *Function*

Summary Gets and sets the checkbox status of an item in a **tree-view**.

Package **capi**

Signature **tree-view-item-checkbox-status** *tree-view item* **=>** *status*

Signature **(setf tree-view-item-checkbox-status)** *status tree-view item*

Arguments

tree-view	A tree view.
item	An item.
status	A non-negative integer.

Description The function **tree-view-item-checkbox-status** retrieves the checkbox status of *item* in *tree-view*, except on Cocoa.

(setf tree-view-item-checkbox-status) sets the checkbox status of *item* in *tree-view*. The *status* must be an non-negative integer smaller than the number of images in *tree-view*'s *state-image-list*.

See also **tree-view**
tree-view-item-children-checkbox-status

tree-view-item-children-checkbox-status *Function*

Summary Gets the checkbox statuses of a **tree-view** item's children.

Package **capi**

Signature **tree-view-item-children-checkbox-status** *tree-view item* **=>** *result*

Arguments

tree-view	A **tree-view**.
item	An item.

Values

result	A list of conses (*child* . *status*) where each *child* is a child of *item* and *status* is *child*'s checkbox status.

Description The function **tree-view-item-children-checkbox-status** returns *item*'s children together with their checkbox statuses, except on Cocoa.

Note that, if *item* has not been expanded in *tree-view*, then it has no children and *result* will be **nil**.

See also **tree-view**
tree-view-item-checkbox-status

tree-view-update-an-item *Generic Function*

Summary Updates an item in a **tree-view**.

Package **capi**

Signature **tree-view-update-an-item** *tree-view item in-parent*

Description The generic function **tree-view-update-an-item** is a synonym for **tree-view-update-item**.

Note: **tree-view-update-an-item** is deprecated. Please use **tree-view-update-item** instead.

See also **tree-view**
tree-view-update-item

tree-view-update-item *Generic Function*

Summary Updates an item in a **tree-view**.

Package **capi**

Signature **tree-view-update-item** *tree-view item in-parent*

Arguments	*tree-view*	A **tree-view**.
	item	An item.
	in-parent	A boolean.

Description The generic function **tree-view-update-item** updates the item *item* in *tree-view*. This includes recomputing the text, images and children of *item*. This is useful when the data in *tree-view* changes, but the entire tree does not need recomputing.

When *in-parent* is non-nil, **tree-view-update-item** updates the children of the parent of *item*. This is useful when *item* is actually removed from *tree-view*, causing the children of its parent to be re-positioned.

See also **tree-view**

undefine-menu *Macro*

Package **capi**

Signature **undefine-menu** *function-name* **&rest** *args*

Description This function undefines a menu created with **define-menu**.

See also **define-menu**
menu

unhighlight-pinboard-object *Generic Function*

Summary Removes the highlighting from a **pinboard-object**.

Package **capi**

Signature **unhighlight-pinboard-object** *pinboard object* **&key** *redisplay*

Description This removes the highlighting from a pinboard object if necessary, and then if *redisplay* is non-nil it redisplays it. The default value of *redisplay* is **t**.

To highlight a pinboard object use **highlight-pinboard-object**.

See also **highlight-pinboard-object**
pinboard-object

uninstall-postscript-printer *Function*

Summary Uninstalls a Postscript printer definition.

Package **capi**

Signature **uninstall-postscript-printer** *name* **&key** *if-does-not-exist deletep*

Arguments

name	A string.
if-does-not-exist	One of **nil** or **:error**.
deletep	A boolean.

Description Uninstalls a PostScript printer definition for the given device *name*.

This applies only on GTK+ and Motif.

if-does-not-exist controls what happens if the named printer does not exist. The default value is **:error**.

deletep, if true, causes the printer to be removed for subsequent sessions as well as the current session, by deleting the file on the disk. The default value of *deletep* is **nil**.

See also **install-postscript-printer**

unmap-typeout *Function*

Package **capi**

Signature **unmap-typeout** *collector-pane*

Description This switches the *collector-pane* out from its switchable layout, and brings back the pane that was there before **map-typeout** was called.

See also **map-typeout**
with-random-typeout
collector-pane

update-all-interface-titles *Function*

Summary Updates interface window titles.

Package **capi**

Signature **update-all-interface-titles**

Description The function **update-all-interface-titles** can be used to update all the **interface** window titles when needed.

This is useful when **interface-extend-title** may return a new, different, value.

update-all-interface-titles calls **update-screen-interface-titles** on all the screens.

See also **interface-extend-title**
update-screen-interface-titles

update-interface-title *Generic Function*

Summary Updates the title of an interface window.

Package **capi**

Signature **update-interface-title** *interface*

Arguments *inteface* A CAPI **interface**.

Description The generic function **update-interface-title** updates the title of interface *interface*. This is useful when **interface-extend-title** may return a new, different, value.

You can specialize **update-interface-title** if needed.

To update all the interface titles, use **update-all-interface-titles** or **update-screen-interface-titles**.

See also **interface-extend-title**
update-all-interface-titles
update-screen-interface-titles

update-pinboard-object *Function*

Package **capi**

Signature **update-pinboard-object** *object*

Description This function checks the *object*'s constraints, and adjusts the *object*'s size as necessary. It then forces the layout to redisplay the *object* at its new size. Finally, it returns **t** if a resize was necessary.

See also **redraw-pinboard-object**
pinboard-object

update-screen-interface-titles *Function*

Summary Updates interface window titles.

Package **capi**

Signature **update-screen-interface-titles** *screen*

Arguments *screen* A CAPI **screen**.

Description The function **update-screen-interface-titles** can be used to update the titles of all the interface windows on the screen *screen* when needed.

This is useful when **interface-extend-title** may return a new, different, value.

update-screen-interface-titles calls **update-interface-title** on all the relevant interfaces.

See also **interface-extend-title**
update-interface-title

update-screen-interfaces-hooks *Variable*

Summary A list of functions that are called when a CAPI interface is created or destroyed.

Package **capi**

Description Each function in the list ***update-screen-interfaces-hooks*** is called when an interface *interface* is created or destroyed.

Each function takes two arguments: the screen and *interface*.

You should not remove system functions from this variable so take care if setting its value. Only add or delete your own functions.

update-toolbar *Function*

Summary — Updates a toolbar object.

Package — **capi**

Signature — **update-toolbar** *self*

Description — The **update-toolbar** function updates the toolbar object *self*. It computes the enabled function of *self* and the enabled functions of any toolbar components or toolbar buttons contained in it. Each toolbar object is enabled if the enabled function returns **t**, and is disabled if it returns **nil**.

See also — **toolbar**
toolbar-button
toolbar-component

virtual-screen-geometry *Function*

Summary — Returns, as multiple values, a screen rectangle covering the full area of all the monitors associated with a screen.

Package — **capi**

Signature — **virtual-screen-geometry** *screen* **=>** *x*, *y*, *width*, *height*

Arguments — *screen* — A CAPI screen.

Values — *x* — An integer.
y — An integer.

width A positive integer.

height A positive integer.

Description The function **virtual-screen-geometry** returns the "virtual" geometry of the screen *screen*, which is a screen rectangle covering the full area of all the monitors that are associated with screen.

The screen rectangle is at coordinates *x* and *y* as offsets from the top-left of the primary screen, with dimensions *width* and *height*.

See also **pane-screen-internal-geometry**
screen-internal-geometries
screen-monitor-geometries

with-atomic-redisplay *Macro*

Summary The **with-atomic-redisplay** macro delays the updating of specified panes until all state changes have been performed.

Package **capi**

Signature **with-atomic-redisplay (&rest** *panes***) &body** *body*

Description Most CAPI pane slot writers update the visual appearance of the pane at the point that their state changes, but it is sometimes necessary to cause all updates to the pane to be left until after they are all completed. The macro **with-atomic-redisplay** defers all visible changes to the state of each pane in *panes* until the end of the scope of the macro.

Notes **with-atomic-redisplay** does not cause Graphics Ports drawing operations to the *panes* to be deferred.

See also **display**
simple-pane

with-busy-interface *Macro*

Summary Displays an alternate cursor during the execution of some code, on platforms other than Cocoa.

Package **capi**

Signature **with-busy-interface (***pane* **&key** *cursor delay)* **&body** *body*

Description The macro **with-busy-interface** switches the cursor of the interface containing *pane* to be the busy cursor, evaluates *body*, and then restores the cursor. This is useful when a piece of code may take significant time to run, and visual feedback should be provided.

cursor specifies the cursor to use while *body* is running. The default value is **:busy**. For other allowed values, see **simple-pane**.

delay specifies a time in seconds before the cursor is switched, so if *body* runs in less than *delay* seconds, then the cursor is not switched at all. This is usually more useful behavior than switching the cursor immediately. The default value of *delay* is 0.5.

with-busy-interface must be called in the process of the interface containing *pane*.

with-busy-interface has no effect on Cocoa.

See also **simple-pane**

with-dialog-results *Macro*

Summary Displays a dialog and executes a body when the dialog is dismissed.

Package **capi**

Signature **with-dialog-results (&rest** *results***)** *dialog-form* **&body** *body* **=> :continuation, nil**

Arguments

results	Variables.
dialog-form	A function call form.
body	Forms.

Description The macro **with-dialog-results** is designed to evaluate the *dialog-form* in a special way to allow dialogs on Cocoa to use window-modal sheets. It is not needed unless you want to make code that is portable to Cocoa. The *dialog-form* should be a function call form that displays a dialog.

The overall effect is that the *body* forms are evaluated with the *results* variables bound to the values returned by the *dialog-form* when the dialog is dismissed.

The dynamic environment in which the body is evaluated varies between platforms:

- On Microsoft Windows, GTK+ and Motif, the **with-dialog-results** macro waits until the dialog has been dismissed and then evaluates the *body* forms.
- On Cocoa, the *dialog-form* creates a sheet attached to the active window and the **with-dialog-results** macro returns immediately. The *body* forms are evaluated when the user dismisses the sheet.

The *dialog-form* must be a cons with one of the following two formats:

- **(***function-name* **.** *arguments***)**

- **(apply** *function-name* **.** *arguments***)**

The *function-name* is called with all the given *arguments*, plus an additional pair of arguments, **:continuation** and a continuation function created from *body*. In the first format, the additional arguments are placed after all the given *arguments*. In the second format, the additional arguments are placed just before the last of the given *arguments* (i.e. before the list of remaining argument to **apply**).

The continuation function binds the *results* variables to its arguments and evaluates the *body* forms. If there are more arguments than *results* variables, the extra arguments are discarded.

This macro is designed for use with *function-name*s such as **popup-confirmer** or **prompt-for-string**, which take a **:continuation** keyword. You can define your own such functions provided that they call one of the CAPI functions, passing the received *continuation* argument.

Examples

On Microsoft Windows, GTK+ and Motif, this displays a dialog, calls **record-label-in-database** when the user clicks OK and then returns. On Cocoa, this creates a sheet and returns; **record-label-in-database** will be called when the user clicks OK.

```
(with-dialog-results (new-label okp)
    (prompt-for-string "Enter a label")
  (when okp  ; the user clicked in the OK button
    (record-label-in-database new-label)))
```

Here is an example with skeleton code for using **with-dialog-results**. Note that the dialog function (**choose-file** below) that is called by **with-dialog-results** must take a *continuation* keyword argument and pass it to a CAPI prompting function. Also note that the call to the CAPI prompting function must be the last form in the dialog func-

tion. Forms after the CAPI prompting function will be executed at an indeterminate time, and their values will not be used in the body of **with-dialog-results**

```
(defun choose-file (&key continuation)
  (print 'in-choose-file)
  (capi:prompt-for-file "Choose File"
                        :pathname "~/Desktop/"
                        :continuation continuation))

(defun open-file (rep)
  (format t "~%Opening ~a~%" rep))

(defun my-callback ()
  (print 'doing-something-before)
  (capi:with-dialog-results (res ok-p)
      (choose-file)
    (print 'after-choose-file)
    (if ok-p
        (open-file res)
      (print 'cancelled))))

(defun prompt-for-file-working ()
  (capi:contain
   (make-instance
    'capi:push-button
    :text "Click Here"
    :callback-type :none
    :callback 'my-callback)))

(prompt-for-file-working)
```

See also **display-dialog**
popup-confirmer

with-document-pages *Macro*

Summary Executes a body of code repeatedly with a variable bound to the number of the page to be printed each iteration.

Package **capi**

Signature **with-document-pages** *page-var first-page last-page* **&body** *body*

Description The **with-document-pages** evaluates *body* repeatedly, with *page-var* bound to the number of the page to print on each iteration. It is used to by applications providing Page on Demand printing.

The *first-page* and *last-page* arguments are evaluated to yield the page numbers of the first and last pages in the document.

with-document-pages takes care of *first-page* and *last-page* when the user sets them in **print-dialog**, by evaluating *body* for the pages that are in the intersection of what user chose and the other arguments.

See also **print-dialog**
with-page
with-print-job

with-external-metafile *Macro*

Summary Creates a metafile on disk using Graphics Ports operations.

Package **capi**

Signature **with-external-metafile (***var* **&key** *pane bounds format pathname drawing-mode***) &body** *body* **=> nil**

Arguments

var	A variable.
pane	A graphics port, or **nil**.
bounds	A list of four integers. Can also be **nil** on Microsoft Windows.
format	One of the keywords **:enhanced**, **:enhanced-plus**, **:enhanced-gdi** and **:windows**.
pathname	A pathname or string.

drawing-mode	One of the keywords **:compatible** and **:quality**.
body	Code containing Graphic Ports operations that draw to *var*.

Description

The macro **with-external-metafile** creates a metafile at the location given by *pathname* containing records corresponding to the Graphics Ports operations in *body* that draw to *var*.

On Microsoft Windows the metafile is a device-independent format for storing pictures. For more information about metafiles, see the Microsoft documentation.

On Cocoa and GTK+ the metafile format is PDF.

If *pane* is **nil**, the macro binds *var* to a graphics port object representing the metafile. If *pane* is non-nil then it must be an instance of **output-pane** or a subclass. In this case *var* is bound to *pane*, and *pane* is modified within the dynamic extent of **with-external-metafile** so all drawing operations draw to the metafile instead of *pane*. This can be useful when reusing existing redisplay code that is written expecting an **output-pane**. The default value of pane is **nil**.

If *bounds* is **nil** the metafile size will be computed from the drawing done within the body. This value is not allowed on Cocoa.

If *bounds* is non-nil (required on Cocoa), it should be a list of integers specifying the coordinate rectangle (*x y width height*) that the metafile contains.

format is used only on Microsoft Windows. It can be one of:

:enhanced	Generate an Enhanced-metafile file containing "dual drawing" both in GDI+ and GDI.
:enhanced-plus	Generate an Enhanced-metafile file containing drawing only in GDI+.

:enhanced-gdi Generate an Enhanced-metafile file containing drawing only in GDI.

:windows Generate a Windows-metafile.

The default value of *format* is **:enhanced**.

When *drawing-mode* is **:compatible** (rather than the default value **:quality**) **:enhanced** and **:enhanced-plus** behave like **:enhanced-gdi**.

Note: GDI+ gives the best quality, so normally that is what you would want. However some programs may be able to display only GDI (and not GDI+), which is why the default is dual drawing. This however generates a larger file and is presumably slightly slower, so if you are sure that the file will be used only by programs that can draw GDI+ emf files (sometimes called EMF+), you can use *format* **:enhanced-plus**.

On Cocoa the metafile format is always PDF as a single page, and the *format* argument is ignored.

pathname specifies the filename of the metafile. If its **pathname-type** is **nil**, then the file extension **"EMF"** is used for an Enhanced-metafile, or **"WMF"** for a Windows-metafile.

drawing-mode should be either **:compatible** which causes drawing to be the same as in LispWorks 6.0, or **:quality** which causes all the drawing to be transformed properly, and allows control over anti-aliasing on Microsoft Windows and GTK+. The default value of *drawing-mode* is **:quality**.

For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

Notes

with-external-metafile is not implemented on X11/Motif.

See also

draw-metafile
with-internal-metafile

with-geometry *Macro*

Summary The **with-geometry** macro is used for defining layouts and for creating new **pinboard-object** subclasses, by binding a set of variables to a pane's geometry.

Package **capi**

Signature **with-geometry** *pane* **&body** *body*

Description The main uses of the macro **with-geometry** are defining layouts and for creating new **pinboard-object** subclasses.

with-geometry binds the following variables across the forms in *body* to slots in the pane's geometry in much the same way as the Common Lisp macro **with-slots**. Except the special cases which are mentioned below, these variables are read-only and should not be set.

Four variables define the geometry of the pane. If you define define your own **calculate-layout** method, it can set these variables:

%x% An integer specifying the x position of the pane in pixels relative to its parent.

%y% An integer specifying the y position of the pane in pixels relative to its parent.

%width% An integer specifying the width in pixels of the pane.

%height% An integer specifying the height in pixels of the pane.

Four variables specify constraints on the pane. If you define your own **calculate-constraints** method, it can set these variables:

%min-width% A real number specifying the minimum width of the pane.

%min-height% A real number specifying the minimum height of the pane.

%max-width% A real number specifying the maximum width of the pane.

%max-height% A real number specifying the maximum height of the pane.

The following variables are also bound but apply only to classes with internal scrolling, such as **editor-pane**. They can be retrieved by **get-horizontal-scroll-parameters** and **get-vertical-scroll-parameters**. They can be set by **set-horizontal-scroll-parameters** and **set-vertical-scroll-parameters**.

%scroll-width%
The extent of the horizontal scroll range.

%scroll-height%
The extent of the vertical scroll range.

%scroll-horizontal-page-size%
The horizontal scroll page size.

%scroll-horizontal-slug-size%
The width of the scroll bar slug.

%scroll-horizontal-step-size%
The horizontal scroll step size.

%scroll-start-x%
The start of the horizontal scroll range.

%scroll-start-y%
The start of the vertical scroll range.

%scroll-vertical-page-size%
The vertical scroll page size.

%scroll-vertical-slug-size%
The height of the scroll bar slug.

%scroll-vertical-step-size%
: The vertical scroll step size.

%scroll-x%
: x coordinate of the current scroll position.

%scroll-y%
: y coordinate of the current scroll position

The following two variables access the object for which the representation is:

%object%
: The object whose geometry this is.

%child%
: The same as **%object%** (kept for compatibility with LispWorks 3.1).

See also

calculate-constraints
calculate-layout
convert-relative-position
element
get-horizontal-scroll-parameters
get-vertical-scroll-parameters
scroll
set-horizontal-scroll-parameters
set-vertical-scroll-parameters

with-internal-metafile *Macro*

Summary
: Creates a metafile in memory using Graphics Ports operations.

Package
: **capi**

Signature
: **with-internal-metafile (***var* **&key** *pane bounds format drawing-mode***) &body** *body* **=>** *metafile*

Arguments

var
: A variable.

pane
: A graphics port, or **nil**.

	bounds	A list of four integers. Can also be **nil** on Microsoft Windows.
	format	One of the keywords **:enhanced**, **:enhanced-plus** and **:enhanced-gdi**.
	drawing-mode	One of the keywords **:compatible** and **:quality**.
	body	Lisp code.
Values	*metafile*	A metafile.

Description

The macro **with-internal-metafile** creates a metafile containing records corresponding to the Graphics Ports operations in *body* that draw to *var*.

with-internal-metafile behaves like **with-external-metafile** except that an object representing the metafile is returned, and no file is created on disk.

var, *pane*, *bounds*, *format*, *drawing-mode* and *body* are interpreted as for **with-external-metafile** except that *format* cannot have the value **:windows**.

Note: GDI+ gives the best quality, so normally that what you want. But you cannot put a GDI+ only metafile on the clipboard, which is why the default is to make a "dual" metafile containing both GDI and GDI+ drawing. If are not going to put the metafile on the clipboard (by calling **set-clipboard** with *format* **:metafile**) you can use *format* **:enhanced-plus** which is slightly faster and uses less memory.

metafile must be freed after use, by calling **free-metafile**.

Notes

1. **with-internal-metafile** is supported on GTK+ only where Cairo is supported (GTK+ version 2.8 and later).
2. On GTK+, the internal metafile is slow to resize, so it is probably not useful when it is frequently resized (that is, drawn with different width or height).

3. **with-internal-metafile** is not implemented on X11/Motif.

Examples **examples/capi/graphics/metafile.lisp**
examples/capi/graphics/metafile-rotation.lisp

See also **draw-metafile**
free-metafile
with-external-metafile

with-output-to-printer *Macro*

Summary Binds a stream variable and prints its output.

Package **capi**

Signature **with-output-to-printer** (*stream* **&key** *printer tab-spacing interactive jobname*) **&body** *body* **=>** *result*

Arguments

stream	A variable.
printer	A printer or **nil**.
tab-spacing	An integer.
interactive	A boolean.
jobname	A string.

Values

result	The result of evaluating *body*.

Description The macro **with-output-to-printer** binds the variable *stream* to a stream object, and prints everything is that is written to it in the code of *body*.

If *interactive* is **t** then **print-dialog** is called to select the printer to use. If *interactive* is **nil** then *printer* is used unless it is **nil** in which case the **current-printer** is used. The default value of *interactive* is **t** and the default value of *printer* is **nil**.

The values of *jobname* and *tab-spacing* are passed to **print-text**, which is used to actually do the printing. The default value of *tab-spacing* is 8 and the default value of *jobname* is "Text".

See also

current-printer
print-dialog
print-text

with-page *Macro*

Summary

Binds a variable to either **t** or **nil**, and executes a body of code to print a page only if the variable is **t**.

Package

capi

Signature

with-page (*printp***) &body** *body*

Description

The **with-page** macro binds *printp* to **t** if a page is to be printed, or **nil** if it is to be skipped. The *body* is executed once, and is expected to draw the document only if *printp* is **t**.

Each call to **with-page** contributes a new page to the document.

Note: **with-page** does not work on Cocoa.

See also

with-document-pages
with-page-transform

with-page-transform *Macro*

Summary — Defines a rectangular region within the coordinate space of an output pane or printer port.

Package — **capi**

Signature — **with-page-transform (***x y width height***) &body** *body*

Description — The **with-page-transform** macro evaluates *x*, *y*, *width* and *height* to define a rectangular region within the coordinate space of an output pane or printer port. Within *body* the region is mapped onto the printable area of the page. If the specified rectangle does not have the same aspect ratio as the printable area of the page, then non-isotropic scaling will occur.

Any number of calls to **with-page-transform** can occur during the printing of a page; for example, it is sometimes convenient to use a different page transform from that used to print the main body of the page when printing headers and footers.

See also — **get-printer-metrics**

with-print-job *Macro*

Summary — Creates a print job that prints to the specified printer.

Package — **capi**

Signature — **with-print-job (***var* **&key** *pane jobname printer drawing-mode***) &body** *body*

Description

The **with-print-job** macro creates a print job which prints to *printer*. If *printer* is not specified, the default printer is used. The macro binds *var* to a graphics port object, and printing is performed by using graphics port operations to draw the object.

If *pane* is specified it must be an instance of **output-pane** or a subclass. In this case *var* is bound to *pane*, and *pane* is modified within the dynamic extent of the **with-print-job** so all drawing operations draw to the printer instead of *pane*. This can be useful when implementing printing by modifying existing redisplay code that is written expecting an **output-pane**.

jobname is the name of the print job. The default value is **nil**, meaning that the name "Document" is used.

drawing-mode should be either **:compatible** which causes drawing to be the same as in LispWorks 6.0, or **:quality** which causes all the drawing to be transformed properly, and allows control over anti-aliasing on Microsoft Windows and GTK+. The default value of *drawing-mode* is **:quality**.

For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

See also

printer-port-handle
printer-port-supports-p
set-printer-options
with-document-pages
with-page
with-page-transform

with-random-typeout *Macro*

Summary

Binds a stream variable to a collector pane.

Package

capi

Signature **with-random-typeout** (*stream-variable pane*) **&body** *body*

Description The macro **with-random-typeout** binds the variable *stream-variable* to a collector pane stream associated with *pane* for the scope of the macro. The collector pane is automatically mapped and unmapped around the body. If the body exits normally, the typeout is not unmapped until the space bar is pressed or the mouse is clicked.

See also **map-typeout**
unmap-typeout
collector-pane

wrap-text *Function*

Summary Wraps text for a given character width.

Package **capi**

Signature **wrap-text** *text width* **&key** *start end* **=>** *strings*

Arguments

text	A string.
width	A positive integer.
start, end	Bounding index designators of *text*.

Values

strings	A list of strings.

Description The function **wrap-text** takes a string *text* and returns a list of strings, each of which is no longer than *width*. Together the strings in *strings* contain all the non-whitespace characters of *text* between *start* and *end* and are suitable for displaying this text on multiple lines of length *width*.

See also **wrap-text-for-pane**

wrap-text-for-pane *Function*

Summary Wraps text for a given pane.

Package **capi**

Signature **wrap-text-for-pane** *pane text* **&key** *external-width visible-width font start end* **=>** *strings*

Arguments

text	A string.
pane	A displayed CAPI pane.
external-width	An integer or **nil**.
visible-width	An integer or **nil**.
font	A font object.
start	An integer.
end	An integer or **nil**.

Values

strings	A list of strings.

Description The function **wrap-text-for-pane** takes a string *text* and returns a list of strings. Together the strings in *strings* contain all the non-whitespace characters of *text* and are suitable for displaying this text on *pane*. That is, each string has a display width no greater than the width of *pane* when drawn using the font of *pane*. The arguments *start* and *end* are used as bounding index designators for *text* and characters outside these bounds are ignored.

If *visible-width* is non-nil then text is wrapped to that width. Otherwise, if *external-width* is non-nil then text is wrapped as if the pane had that external width (that is, taking account of any borders in the pane). If both *visible-width* and *external-width* are **nil**, then the text is wrapped to the current visible width of the pane. The default value of both *visible-width* and *external-width* is **nil**.

The *font* is used to perform the wrapping calculations. If it is **nil** (the default), then the **graphics-state-font** is used for panes such as **output-pane** that have a **graphics-state** and the **simple-pane-font** is used for other panes.

See also **wrap-text**

x-y-adjustable-layout *Class*

Summary The class **x-y-adjustable-layout** provides functionality for positioning panes in a space larger than themselves (for example, it is used to choose whether to center them, or left justify them).

Package **capi**

Superclasses **layout**

Subclasses **simple-layout**
grid-layout

Initargs

:x-adjust	The adjust value for the *x* direction.
:y-adjust	The adjust value for the *y* direction.

Accessors **layout-x-adjust**
layout-y-adjust

Description The values *x-adjust* and *y-adjust* of the slots are used by layouts to decide what to do when a pane is smaller than the space in which it is being laid out. Typically the values will be a keyword or a list of the form **(*keyword n*)** where *n* is an integer. These values of *adjust* are interpreted as by **pane-adjusted-position**.

:top is the default for *y-adjust* and **:left** is the default for *x-adjust*.

Example

Note: **column-layout** is a subclass of **x-y-adjustable-layout**.

```
(setq column (capi:contain
               (make-instance
                'capi:column-layout
                :description (list
                               (make-instance
                                'capi:push-button
                                :text "Ok")
                               (make-instance
                                'capi:list-panel
                                :items '(1 2 3 4 5)
                               )))))

(capi:apply-in-pane-process
 column #'(setf capi:layout-x-adjust) :right column)

(capi:apply-in-pane-process
 column #'(setf capi:layout-x-adjust) :center column)
```

See also **pane-adjusted-position**

2

GP Reference Entries

The following chapter provides reference entries for the symbols exported from the **graphics-ports** package. You can use these to draw graphics in CAPI output panes, which are a kind of graphics port. See the Graphics Ports chapter in the *CAPI User Guide* for more information on graphics ports and their associated types.

2pi *Constant*

Summary **(* 2 pi)** as a **double-float**.

Package **graphics-ports**

Description The constant **2pi** is the result of **(* 2 cl:pi)**. It is a **cl:double-float**.

See also **fpi**
pi-by-2

analyze-external-image *Function*

Summary Gets the properties of DIB data in an external image.

Package **graphics-ports**

Signature **analyze-external-image** *external-image* **=>** *width height color-table number*

Arguments

external-image	An **external-image**.

Values

width	An integer.
height	An integer.
color-table	A color table.
number	An integer.

Description The **analyze-external-image** function returns the width, height, color-table, and number of important colors for the external image *external-image*.

The image data in *external-image* must be in Device Independent Bitmap (DIB) format.

apply-rotation *Function*

Summary Modifies a transform such that a rotation of a given number of radians is performed on any points multiplied by the transform.

Package **graphics-ports**

Signature **apply-rotation** *transform theta* **=>** *transform*

Arguments

transform	A transform.
theta	A real number.

Description The function **apply-rotation** modifies *transform* such that a rotation of *theta* radians is performed on any points multiplied by the transform. Any operations already contained in the transform occur before the new rotation.

The rotation is around the point (0,0).

If *theta* is positive, then the rotation is clockwise.

apply-rotation returns the transform.

Examples **examples/capi/graphics/metafile-rotation.lisp**

See also **apply-rotation-around-point**
apply-scale
apply-translation

apply-rotation-around-point *Function*

Summary Modifies a transform such that a specified rotation around a specified point is performed on any points multiplied by the transform.

Package **graphics-ports**

Signature **apply-rotation-around-point** *transform theta x y* **=>** *transform*

Arguments

transform	A **transform**.
theta	A real number.
x	A real number.
y	A real number.

Description The function **apply-rotation-around-point** modifies *transform* such that a clockwise rotation of *theta* radians around the point (*x*,*y*) is performed on any points multiplied by the transform. Any operations already contained in the transform occur before the new rotation.

apply-rotation-around-point returns the transform.

Examples **examples/capi/graphics/rotation-around-point.lisp**

See also **apply-rotation**

apply-scale *Function*

Summary Modifies a transform such that a scaling occurs on any points multiplied by the transform.

Package **graphics-ports**

Signature **apply-scale** *transform sx sy* **=>** *transform*

Arguments

transform	A transform.
sx	A real number.
sy	A real number.

Description The function **apply-scale** modifies *transform* such that a scaling of *sx* in *x* and *sy* in *y* is performed on any points multiplied by the transform. Any operations already contained in the transform occur before the new scaling.

apply-scale returns the transform.

Examples **examples/capi/graphics/metafile-rotation.lisp**

See also **apply-rotation**
apply-rotation-around-point
apply-translation

apply-translation *Function*

Summary Modifies a transform such that a translation is performed on any points multiplied by the transform.

Package **graphics-ports**

Signature **apply-translation** *transform dx dy* **=>** *transform*

Arguments

transform	A transform.
dx	A real number.
dy	A real number.

Description The function **apply-translation** modifies *transform* such that a translation of (*dx dy*) is performed on any points multiplied by the transform. Any operations already contained in the transform occur before the new translation.

apply-translation returns the transform.

Examples **examples/capi/graphics/metafile-rotation.lisp**

See also **apply-rotation**
apply-rotation-around-point
apply-scale

augment-font-description *Function*

Summary Returns a font description combining the attributes of a given font description with a set of font attributes.

Package **graphics-ports**

Signature **augment-font-description** *fdesc* **&rest** *font-attribute** **=>** *return*

Arguments

fdesc	A font description.
font-attribute	A font attribute.

Values

return	A font description.

Description The **augment-font-description** function returns a font description that contains all the attributes of *fdesc* combined with the extra *font-attribute*s. The **:stock** attribute is handled specially: it is omitted from *return*, unless it is the only attribute specified.

If an attribute appears in both *fdesc* and a *font-attribute*, the value in the *font-attribute* is used. The contents of *fdesc* are not modified.

See also **make-font-description**

clear-external-image-conversions *Function*

Summary Clears external image conversions for a port.

Package **graphics-ports**

Signature **clear-external-image-conversions** *external-image gp-or-null* **&key** *free-image all errorp*

Arguments

external-image	An external image.
gp-or-null	A graphics port or **nil**.
free-image	A boolean.
all	A boolean.
errorp	A boolean.

Description The **clear-external-image-conversions** function clears the external image conversions for a port. If *gp-or-null* is **nil** all conversions are cleared using the image-color-users. If *all* is non-**nil** all conversions for all ports are cleared using *gp-or-null*. Conversions are also freed if *free-image* is non-**nil**. By default, *free-image* is **t**, *all* is **(null** *gp-or-null***)**, and *errorp* is **t**.

clear-graphics-port *Function*

Summary Draws a filled rectangle covering the entire port in the port's background color.

Package **graphics-ports**

Signature **clear-graphics-port** *port*

Arguments *port* A graphics port.

Description The **clear-graphics-port** function draws a filled rectangle covering the entire port in the port's *background*. All other graphics state parameters are ignored.

clear-graphics-port-state *Function*

Summary Sets the graphics state of a port back to its default values.

Package **graphics-ports**

Signature **clear-graphics-port-state** *port*

Arguments *port* A graphics port.

Description The **clear-graphics-port-state** function sets the graphics state of *port* back to its default values, which are the ones it possessed immediately after creation.

See also **graphics-state**

clear-rectangle *Function*

Summary Draws a rectangle in the port's background color.

clear-rectangle is deprecated.

Package **graphics-ports**

Signature **clear-rectangle** *port x y width height*

Arguments

port	A graphics port.
x	A real number.
y	A real number.
width	A real number.
height	A real number.

Description The deprecated function **clear-rectangle** draws the rectangle specified by *x*, *y*, *width*, and *height* in *port*'s background color. All other **graphics-state** parameters are ignored.

clear-rectangle is deprecated because it ignores the graphics state args, which means it does not work properly with other drawing functions. In particular, it does not work properly in the *display-callback* of **output-pane**.

Use instead:

```
(draw-rectangle pane x y width height
                :filled t
                :foreground color
                :compositing-mode :copy
                :shape-mode :plain)
```

compositing-mode is needed only when the color has alpha.

foreground is needed only if it is different from the foreground in the graphics state.

Note that **draw-rectangle** does take into account the transformation in the **graphics-state**.

See also **draw-rectangle**

compress-external-image *Function*

Summary Compresses DIB data in an external image.

Package **graphics-ports**

Signature **compress-external-image** *external-image* **=>** *result*

Arguments *external-image* An **external-image**.

Values *result* The difference in bytes between size of the original image and the size of the compressed version.

Description The **compress-external-image** function converts the *external-image* data into compressed DIB format.

The image data in *external-image* must be in Device Independent Bitmap (DIB) format.

compute-char-extents *Function*

Summary Returns the *x* coordinates of the end of each of the characters in a string if the string was printed to a graphics port.

Package **graphics-ports**

Signature **compute-char-extents** *port string* **&optional** *font* **=>** *extents*

Arguments	*port*	A CAPI pane.
	string	A string.
	font	A font.
Values	*extents*	An array of integers.

Description Returns the *extents* of the characters in *string* in the font associated with *port*, or the *font* given. The extents are an array, one element per character, which gives the ending *x* coordinate of that character if the string was drawn to *port*.

Note: To compute the extents of the entire string for a given port or font, use **`port-string-width`** or **`get-string-extent`**.

See also **`get-string-extent`**
`port-string-width`

convert-external-image *Function*

Summary Returns an image derived from an external image format.

Package **`graphics-ports`**

Signature **`convert-external-image`** *gp external-image*
`&key` *cache force-new* **`=>`** *image*

Arguments	*gp*	A CAPI pane.
	external-image	An external image.
	cache	A boolean.
	force-new	A boolean.
Values	*image*	An image.

Description The **convert-external-image** function returns an image derived from *external-image*. The image is ready for drawing to the given graphics port.

If *cache* is non-**nil** image conversions are cached in the *external-image*. The default value of *cache* is **nil**.

If *force-new* is non-**nil** a new image is always created, and put in the cache. The default value of *force-new* is **nil**.

convert-to-font-description *Function*

Summary Converts a font-spec to a font description.

Package **graphics-ports**

Signature **convert-to-font-description** *port font-spec* **=>** *fdesc*

Arguments

port	A graphics port
font-spec	A font description object, font or symbol

Values

fdesc	A font-description

Description The function **convert-to-font-description** converts *font-spec* to a font description object *fdesc* for the graphics port *port*. If *font-spec* is a font, then its description is returned. If *font-spec* is a font description object, then it is returned. If *font-spec* is a symbol naming a font alias, then **convert-to-font-description** converts this alias to a font and returns its font description. Other platform-specific values of *font-spec* are also accepted.

See also **font-description**
make-font-description

copy-area *Function*

Summary Copies a rectangular area from one port to another.

Package **graphics-ports**

Signature **copy-area** *to-port from-port to-x to-y width height from-x from-y* **&rest** *args*

Arguments

to-port	A graphics port.
from-port	A graphics port.
to-x	A real number.
to-y	A real number.
width	A real number.
height	A real number.
from-x	A real number.
from-y	A real number.
args	**graphics-state** parameters passed as keyword arguments.

Description The function **copy-area** copies a rectangular area from one port to another, taking account of transformations.

In *drawing-mode* **:compatible** (old drawing mode), **copy-area** does exactly the same as **copy-pixels**.

In *drawing-mode* **:quality** (the default) it copies a rectangular area from one port to another. The *transform*, *mask*, *mask-transform*, *compositing-mode* and *shape-mode* of *to-port*'s **graphics-state** are used. The *to-port* and *from-port* need not be the same depth. They can be the same object. The *from-x* and *from-y* values are interpreted as pixel positions in the window coordinates of *from-port*, that is, they are not transformed by *from-port*'s transform.

Notes The main difference between **copy-area** and **copy-pixels** in *drawing-mode* **:quality** is when copying from a displayed window.

copy-area always copies using the right transformation of the target, but it means that it may copy from an obscured part of the window and hence copy the wrong thing. **copy-pixels** generates an exposure event on the target port instead of copying obscure areas, but to do that it has to ignore the transformation.

Examples **examples/capi/graphics/compositing-mode.lisp**

See also **copy-pixels**
graphics-state

copy-external-image *Function*

Summary Returns a copy of an external image.

Package **graphics-ports**

Signature **copy-external-image** *external-image*
&key *new-color-table* **=>** *new-external-image*

Arguments *external-image* An external image.

new-color-table A color table.

Values *new-external-image*
An external image.

Description The **copy-external-image** function returns a copy of the *external-image*, optionally supplying a *new-color-table*. An error is signalled if this is a different size from the existing color-table.

copy-pixels *Function*

Summary Copies a rectangular area from one port to another.

Package **graphics-ports**

Signature **copy-pixels** *to-port from-port to-x to-y width height from-x from-y* **&rest** *args*

Arguments

to-port	A graphics port.
from-port	A graphics port.
to-x	A real number.
to-y	A real number.
width	A real number.
height	A real number.
from-x	A real number.
from-y	A real number.
args	**graphics-state** parameters passed as keyword arguments.

Description The **copy-pixels** function copies a rectangular area from one port to another. The *transform*, *mask*, *mask-transform*, *compositing-mode* and *shape-mode* from *to-port*'s **graphics-state** are used.

The (*to-x to-y*) is transformed according to *to-port*'s transform. When *to-port*'s *drawing-mode* is **:quality** the target is generally fully transformed, except that when it copies from a visible window it may generate expose events when copying from an obscured part, and in *drawing-mode* **:quality** it ignores the transformation in this case.

If *to-port*'s *drawing-mode* is **:compatible** then the image is not scaled or rotated. For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

The *to-port* and *from-port* need not be the same depth and can be the same object. The *from-x* and *from-y* values are interpreted as pixel positions in the window coordinates of *from-port*, that is, they are not transformed by *from-port*'s transform.

Notes

copy-pixels can be used to draw to an **output-pane** inside the *display-callback* of that pane, but it cannot be used to copy from the **output-pane** inside its *display-callback* (the result of such an operation is not defined).

See also

copy-area
output-pane

copy-transform *Function (inline)*

Summary

Returns a copy of a transform.

Package

graphics-ports

Signature

copy-transform *transform* **=>** *result*

Arguments

transform A transform.

Values

result A transform.

Description

The **copy-transform** function returns a copy of *transform*.

create-pixmap-port *Function*

Summary

Creates a pixmap port and its window system representation.

Package

graphics-ports

Signature

create-pixmap-port *pane width height* **&key** *background collect relative clear drawing-mode* **=>** *pixmap-port*

Arguments

pane	A graphics port for a window.
width	An integer.
height	An integer.
background	A color designator.
collect	A boolean.
relative	A boolean.
clear	A list or **t**.
drawing-mode	One of the keywords **:compatible** and **:quality**.

Values

pixmap-port	A pixmap graphics port.

Description

The **create-pixmap-port** function creates a pixmap-port and its window system representation. The *pane* argument specifies the color-user, used for color conversions, and its representation may also be used by the library to match the pixmap port properties. The value of *background* is used to initialize the **graphics-state-background**.

If *clear* is **t**, the pixmap is cleared to its background color, otherwise the initial pixel values will be non-deterministic. If *clear* is a list of the form (*x y width height*), only that part of the pixmap is cleared initially. The default value is **nil**.

If *relative* is non-**nil**, the pixmap graphics port collects pixel coordinates corresponding to the left, top, right, and bottom extremes of the drawing operations taking place within the body forms, and if these extend beyond the edges of the pixmap (into negative coordinates for example) the entire drawing is offset by an amount which ensures it remains within the port. It is as if the port moves its relative origin in

order to accommodate the drawing. If the drawing size is greater than the screen size, then some of it is lost. The default value is **nil**.

If *collect* is non-**nil**, this causes the drawing extremes to be collected but without having the pixmap shift to accommodate the drawing, as *relative* does. The extreme values can be read using the **get-bounds** function, and **make-image-from-port**.

See also **with-pixmap-graphics-port**

default-image-translation-table *Variable*

Summary The default image translation table.

Package **graphics-ports**

Description The ***default-image-translation-table*** variable contains the default image translation table. It is used if no image translation table is specified in calls to image translation table functions.

See also **load-image**

define-font-alias *Function*

Summary Defines an alias for a font.

Package **graphics-ports**

Signature **define-font-alias** *keyword font*

Arguments

keyword	A keyword.
font	A font.

Description The function **`define-font-alias`** defines *keyword* as an alias for *font*.

destroy-pixmap-port *Function*

Summary Destroys a pixmap port, thereby freeing any window system resources it used.

Package **`graphics-ports`**

Signature **`destroy-pixmap-port`** *pixmap-port*

Arguments *pixmap-port* A pixmap port.

Description The **`destroy-pixmap-port`** function destroys a pixmap-port, freeing any window system resources.

dither-color-spec *Function*

Summary Returns **`t`** if the color specification for a given pixel should result in a pixel that is on in a 1 bit dithered bitmap.

Package **`graphics-ports`**

Signature **`dither-color-spec`** *rgb-color-spec y x*

Arguments *rgb-color-spec* An RGB specification.
y An integer.
x An integer.

Values *result* A boolean.

Description The **dither-color-spec** returns **t** if *rgb-color-spec* should result in a pixel that is on in a 1-bit dithered bitmap. The current set of dithers is used in the decision.

Notes Dithers do not affect drawing or the anti-aliasing that occurs when drawing in Cocoa.

See also **initialize-dithers**
make-dither
with-dither

draw-arc *Function*

Summary Draws an arc.

Package **graphics-ports**

Signature **draw-arc** *port x y width height start-angle sweep-angle* **&rest** *args* **&key** *filled*

Arguments

port	A graphics port.
x	A real number.
y	A real number.
width	A real number.
height	A real number.
start-angle	A real number.
sweep-angle	A real number.
args	**graphics-state** parameters passed as keyword arguments.
filled	A boolean.

Description

The **draw-arc** function draws an arc contained in the rectangle from (*x y*) to (*x+width y+height*) from *start-angle* to *start-angle+sweep-angle*. Both angles are specified in radians. Currently, arcs are parts of ellipses whose major and minor axes are parallel to the screen axes. When *port*'s *drawing-mode* is **:quality** the arc is transformed properly, but if *drawing-mode* is **:compatible** and *port* has rotation in its transform, the enclosing rectangle is modified to be the external enclosing orthogonal rectangle of the rotated rectangle. The start angle is rotated. The *transform, foreground, background, operation, thickness, scale-thickness*, *mask*, *shape-mode* and *compositing-mode* from the *port*'s **graphics-state** are all used, unless overridden in *args*. Additionally on Unix only, *stipple* and *pattern* are used. When *filled* is non-**nil**, a sector is drawn.

See also

draw-arcs
make-graphics-state

draw-arcs *Function*

Summary

Draws several arcs.

Package

graphics-ports

Signature

draw-arcs *port description* **&rest** *args* **&key** *filled*

Arguments

port	A graphics port.
description	A description sequence.
filled	A boolean.
args	**graphics-state** parameters passed as keyword arguments.

Description The **draw-arcs** function draws several arcs as specified by the *description* sequence. This is usually more efficient than making several calls to **draw-arc**. The *description* argument is a sequence of values of the form *x y width height start-angle sweep-angle*. See **draw-arc** for more information.

See also **draw-arc**

draw-character *Function*

Summary Draws a character in a given graphics port.

Package **graphics-ports**

Signature **draw-character** *port character x y* **&rest** *args* **&key** *block*

Arguments

port	A graphics port.
character	A character.
x	A real number.
y	A real number.
block	A boolean.
args	**graphics-state** parameters passed as keyword arguments.

Description The **draw-character** function draws the character *character* at (*x y*) on the port. The *transform*, *foreground*, *background*, *operation*, *stipple*, *pattern*, *mask*, *mask-transform*, *font*, *text-mode* and *compositing-mode* from the *port*'s **graphics-state** are all used, unless overridden in *args*.

(*x y)* specifies the leftmost point of the character's baseline.

block, if non-**nil**, causes the character to be drawn in a character cell filled with the port's **graphics-state** *background*.

Notes — The **graphics-state** parameter *operation* is not supported for drawing text on Windows.

draw-circle *Function*

Summary — Draws a circle.

Package — **graphics-ports**

Signature — **draw-circle** *port x y radius* **&rest** *args* **&key** *filled*

Arguments

port	A graphics port.
x	A real number.
y	A real number.
radius	A real number.
args	**graphics-state** parameters passed as keyword arguments.
filled	A boolean.

Description — The **draw-circle** function draws a circle of the given radius centered on (*x y*). The *transform*, *foreground*, *background*, *operation*, *thickness*, *scale-thickness*, *mask*, *shape-mode* and *compositing-mode* from the port's **graphics-state** are all used, unless overridden in *args*. When *filled* is non-**nil**, the circle is filled with the foreground color.

Notes — **draw-circle** does not work properly under a rotation transform (see **make-transform**). A workaround is to use a many-sided polygon drawn by **draw-polygon** which will be rotated correctly.

Example

```
(gp:draw-circle port 100 100 20)
```

```
(gp:draw-circle port 100 100 50
                        :filled t
                        :foreground :green)
```

See also **graphics-state**

draw-ellipse *Function*

Summary Draws an ellipse.

Package **graphics-ports**

Signature **draw-ellipse** *port x y x-radius y-radius* **&rest** *args* **&key** *filled*

Arguments

port	A graphics port.
x	A real number.
y	A real number.
x-radius	A real number.
y-radius	A real number.
radius	A real number.
args	**graphics-state** parameters passed as keyword arguments.
filled	A boolean.

Description The **draw-ellipse** function draws an ellipse of the given radii centered on (*x y*). The *transform*, *foreground*, *background*, *operation*, *thickness*, *scale-thickness*, *mask*, *shape-mode* and *compositing-mode* from the port's **graphics-state** are all used, unless overridden in *args*. When *filled* is non-**nil**, the ellipse is filled with the foreground color.

Notes

draw-ellipse does not work properly under a rotation transform when *port*'s *drawing-mode* is **:compatible**. A workaround is to use a many-sided polygon drawn by **draw-polygon** which will be rotated correctly.

draw-ellipse does work properly under any transform when *port*'s *drawing-mode* is **:quality**.

See **make-transform** for information about rotation transforms.

For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

Example

```
(gp:draw-ellipse port 100 100 20 40)

(gp:draw-ellipse port 100 100 50 10
                         :filled t
                         :foreground :green)
```

See also

graphics-state

draw-image *Function*

Summary

Displays an image on a graphics port at a given position.

Package

graphics-ports

Signature

draw-image *port image to-x to-y* **&rest** *args* **&key** *from-x from-y to-width to-height from-width from-height global-alpha*

Arguments

port	A graphics port.
image	An image.
to-x	A real number.
to-y	A real number.
args	**graphics-state** parameters passed as keyword arguments.

from-x	A real number.
from-y	A real number.
to-width	A real number.
to-height	A real number.
from-width	A real number.
from-height	A real number.
global-alpha	A real number in the inclusive range [0,1], or **nil**.

Description

The **draw-image** function displays *image* on the port at *to-x* *to-y*.

The default value of *from-x* and *from-y* is 0. The *width* and *height* arguments default to the size of the image.

When *port*'s *drawing-mode* is **:compatible**, graphics state translation is guaranteed to be supported but support for scaling and rotation are library dependent. Specifically, scaling is supported in the Windows, Cocoa and GTK+ implementations, but not on X11/Motif.

When *port*'s *drawing-mode* is **:quality**, the target coordinates are fully transformed according to the transformation in the **graphics-state**.

For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

global-alpha, if non-**nil**, is a blending factor that applies to the whole image, in the Windows and Cocoa implementations, but not on X11/Motif or GTK+. The value 0 means use only the target (that is, do not draw anything) and the value 1 means use only the source (that is, normal drawing). Intermediate real values mean use proportions of both the target and source. The value **nil** also means normal drawing, and this is the default value.

Notes

On Microsoft Windows, if the image was loaded from a .ico file then **draw-image** ignores *from-x*, *from-y*, *from-width*, *from-height* and the **graphics-state** *operation* when drawing the image, and also *global-alpha* is ignored.

draw-line *Function*

Summary

Draws a line between two given points.

Package

graphics-ports

Signature

draw-line *port from-x from-y to-x to-y* **&rest** *args*

Arguments

port	A graphics port.
from-x	A real number.
from-y	A real number.
to-x	A real number.
to-y	A real number.
args	**graphics-state** parameters passed as keyword arguments.

Description

The **draw-line** function draws a line from (*from-x from-y*) to (*to-x to-y*).

The **graphics-state** parameters *transform*, *foreground*, *background*, *operation*, *thickness*, *scale-thickness*, *dashed*, *dash*, *line-end-style*, *mask*, *shape-mode* and *compositing-mode* are used. Additionally on Unix only, *stipple* and *pattern* are used.

See also

draw-lines
graphics-state

draw-lines *Function*

Summary — Draws several lines between pairs of two given points.

Package — **graphics-ports**

Signature — **draw-lines** *port description* **&rest** *args*

Arguments

port	A graphics port.
description	A description sequence.
args	**graphics-state** parameters passed as keyword arguments.

Description — The **draw-lines** function draws several lines as specified by the *description* sequence. This is usually more efficient than making several calls to **draw-line**. The *description* argument is a sequence of values of the form *x1 y1 x2 y2*. See **draw-line** for more information.

See also — **draw-line**

draw-path *Function*

Summary — Draws a path at a given point, optionally closing it or filling it.

Package — **graphics-ports**

Signature — **draw-path** *port path x y* **&rest** *args* **&key** *closed filled fill-rule*

Arguments

port	A graphics port.
path	A path specification.
x	A real number.
y	A real number.

closed	A boolean.
filled	A boolean.
fill-rule	One of the keywords **:even-odd** and **:winding**.
args	**graphics-state** parameters passed as keyword arguments.

Description

The function **draw-path** draws the path *path* at (*x y*) in *port*.

When *closed* is non-nil, a line is drawn from the last point in the path to the start of the last figure in the path. When *filled* is non-nil, the path is filled, otherwise its outline is drawn; the *closed* argument is ignored if *filled* is non-nil. *transform*, *foreground*, *background*, *thickness*, *scale-thickness*, *dashed*, *dash*, *line-end-style*, *line-joint-style* and *mask* from *port*'s graphics state (see **graphics-state**) are all used. *fill-rule* specifies how overlapping regions are filled. Possible values for *fill-rule* are **:even-odd** and **:winding**.

path is a path specification, which consists of path elements that describe a number of disconnected figures. The origin of the path is (*x y*), so all other coordinates within the path are translated relative to that point.

The following formats of path specification are supported:

- A sequence of lists, each of which is a path element as described below.
- A function designator to generate the path elements. Graphics ports calls the function when it wants to obtain the path elements. The function takes a single argument, which is a function that should be called with each path elements as its arguments.

The following path elements can be used:

:close	Closes the current figure by adding a straight line from the current point to the start point.

:move *x y* Closes the current figure and starts a new one at (*x y*).

:line *x y* Adds a straight line to the current figure, from the current point to (*x y*) and makes (*x y*) be the current point.

:arc *x y width height start-angle sweep* **&optional** *movep*
Adds an elliptical arc to the current figure, contained in the rectangle from (*x y*) to (*x+width y+width*) from *start-angle* to *start-angle+sweep-angle*. Both angles are specified in radians and positive values mean anti-clockwise. If *movep* is **nil** (the default), then a straight line is also added from the current point to the start of the arc, otherwise a new figure is started from the start of the arc. The end of the arc becomes the new current point.

:bezier *cx1 cy1 cx2 cy2 x y*
Adds a cubic Bézier curve to the current figure, from the current point to (*x y*) using control points (*cx1 cy1*) and (*cx2 cy2*).

:rectangle *x y width height*
Adds a self contained figure, a rectangle from (*x y*) to (*x+width y+width*).

:ellipse *x y x-radius y-radius*
Adds a self contained figure, an ellipse of the given radii centered on (*x y*).

:scale *sx sy elements*
Adds the path elements *elements*, scaling them by *sx* and *sy*.

:rotate *theta elements*
Adds the path elements *elements*, rotating them *theta* radians about the origin. If *theta* is positive, then the rotation is clockwise.

:translate *dx dy elements*

Adds the path elements *elements*, translating them by *dx* and *dy*.

:transform *transform elements*

Adds the path elements *elements*, transformed by *transform*.

Examples

Draws two lines from (40 30) to (140 30) and from (140 30) to (140 130):

```
(draw-path port '((:line 100 0) (:line 100 100)) 40 30)
```

Draws an outline triangle with vertices (40 30), (140 30) and (140 130):

```
(draw-path port '((:line 100 0) (:line 100 100))
          40 30 :closed t)
```

Draws a filled triangle with vertices (40 30), (140 30) and (140 130):

```
(draw-path port '((:line 100 0) (:line 100 100))
          40 30 :filled t)
```

Draws a filled triangle exactly as in the previous example but using a function to generate the path elements:

```
(flet ((generate (fn)
          (funcall fn :line 100 0)
          (funcall fn :line 100 100)))
  (draw-path port #'generate 40 30 :filled t))
```

Draws 6 copies of a shape consisting of two lines and an arc:

```
(labels ((generate-1 (fn)
           (funcall fn :line 50 0)
           (funcall fn :line 50 50)
           (funcall fn :arc 0 -50 100 100
                    (/ pi -2) (/ pi -2)))
         (generate-6 (fn)
           (dotimes (x 6)
             (funcall fn :rotate (* 2 pi (/ x 6))
                      #'generate-1))))
  (draw-path port #'generate-6 80 80))
```

There are more examples in

examples/capi/graphics/paths.lisp

See also

draw-polygon
draw-line
draw-arc
draw-ellipse
graphics-state

draw-point *Function*

Summary

Draws a pixel or unit square at a given point.

Package

graphics-ports

Signature

draw-point *port x y* **&rest** *args*

Arguments

port	A graphics port.
x	A real number.
y	A real number.
args	**graphics-state** parameters passed as keyword arguments.

Description

The **draw-point** function draws a single-pixel point at *(x y)*. The *transform, foreground, background, operation*, *mask*, *shape-mode* and *compositing-mode* **graphics-state** parameters are used. Additionally on Unix only, *stipple* and *pattern* are used.

When *drawing-mode* is **:compatible** the output is a single pixel. Note that its position is transformed in the normal way.

When *drawing-mode* is **:quality** this draws a unit square as if by **draw-rectangle**, transformed in the normal way.

See also

draw-points
graphics-state

draw-points *Function*

Summary — Draws pixels or unit squares at given points.

Package — **graphics-ports**

Signature — **draw-points** *port description* **&rest** *args*

Arguments

port	A graphics port.
description	A description sequence.
args	**graphics-state** parameters passed as keyword arguments.

Description — The **draw-points** function draws several points (as if by **draw-point**) as specified by the *description* argument, which is a sequence of *x y* pairs. It is usually faster than several calls to **draw-point**. See **draw-point** for more information.

See also — **draw-point**

draw-polygon *Function*

Summary — Draws a polygon.

Package — **graphics-ports**

Signature — **draw-polygon** *port points* **&rest** *args* **&key** *filled closed fill-rule*

Arguments

port	A graphics port.
points	A description sequence.
filled	A boolean.
closed	A boolean.
fill-rule	A keyword.

	args	**graphics-state** parameters passed as keyword arguments.

Description

The **draw-polygon** function draws a polygon using alternating *x* and *y* values in the *points* argument as the vertices. When *closed* is non-**nil** the edge from the last vertex to the first to be drawn. When *filled* is non-**nil** a filled, closed polygon is drawn; the *closed* argument is ignored if *filled* is non-**nil**.

transform, *foreground*, *background*, *operation*, *thickness*, *scale-thickness*, *dashed*, *dash*, *line-end-style*, *line-joint-style*, *mask*, *shape-mode* and *compositing-mode* from *port*'s **graphics-state** are all used, unless overridden in *args*. Additionally on Unix only, *stipple* and *pattern* are used.

fill-rule specifies how overlapping regions are filled. Possible values are **:even-odd** and **:winding**.

See also

draw-polygons
graphics-state

draw-polygons *Function*

Summary

Draws several polygons.

Package

graphics-ports

Signature

draw-polygons *port description* **&rest** *args* **&key** *filled closed fill-rule*

Arguments

port	A graphics port.
description	A sequence of sequences of real numbers.
filled	A boolean.
closed	A boolean.
fill-rule	A keyword.

args **graphics-state** parameters passed as keyword arguments.

Description The **draw-polygons** function draws several polygons. The *description* argument should be a sequence containing sequences with alternating *x* and *y* values representing the vertices. The *description* arguments consists of groups of *points* as in **draw-polygon**.

When *closed* is non-**nil** the edge from the last vertex to the first to be drawn.

When *filled* is non-**nil** a filled, closed polygons are drawn; the *closed* argument is ignored if *filled* is non-**nil**.

transform, *foreground*, *background*, *operation*, *thickness*, *scale-thickness*, *dashed*, *dash*, *line-end-style*, *line-joint-style*, *mask*, *shape-mode* and *compositing-mode* from the *port*'s **graphics-state** are all used, unless overridden in *args*. Additionally on Unix only, *stipple* and *pattern* are used.

fill-rule specifies how overlapping regions are filled. Possible values are **:even-odd** and **:winding**.

Example This draws two hexagons, one inside the other:

```
(gp:draw-polygons oo
                  '((150 100 200 100 235 150 200
                     200 150 200  115 150)
                    (140 90  210 90  250 150
                     210 210  140 210  100 150))
                  :closed t)
```

See also **draw-polygon**

draw-rectangle *Function*

Summary Draws a rectangle.

Package **graphics-ports**

Signature **draw-rectangle** *port x y width height* **&rest** *args* **&key** *filled*

Arguments

port	A graphics port.
x	A real number.
y	A real number.
width	A real number.
height	A real number.
filled	A boolean.
args	**graphics-state** parameters passed as keyword arguments.

Description The **draw-rectangle** function draws a rectangle whose corners are (*x y*), (*x+width y*), (*x+width y+height*) and (*x y+height*).

filled, if non-**nil**, causes a filled rectangle to be drawn. While the exact results are host-specific, it is intended that a filled rectangle does not include the lines (x = *x+width)* and (y = *y+height*) while a non-filled rectangle does. This function works correctly if the *port*'s transform includes rotation.

The **graphics-state** parameters *transform, foreground, background, operation, thickness, scale-thickness, dashed, dash, line-joint-style, mask, shape-mode* and *compositing-mode* are used. Additionally on Unix only, *stipple* and *pattern* are used.

See also **draw-rectangles**
graphics-state

draw-rectangles *Function*

Summary Draws several rectangles.

Package **graphics-ports**

Signature **draw-rectangles** *port description* **&rest** *args* **&key** *filled*

Arguments

port	A graphics port.
description	A description sequence.
filled	A boolean.
args	**graphics-state** parameters passed as keyword arguments.

Description

The **draw-rectangles** function draws several rectangles as specified in *description* which consists of a group of values given as *x y width height*.

filled, if non-**nil**, causes filled rectangles to be drawn. While the exact results are host-specific, it is intended that a filled rectangle does not include the lines (x = *x+width)* and (y = *y+height*) while a non-filled rectangle does. This function works correctly if the *port*'s transform includes rotation.

The **graphics-state** parameters *transform, foreground, background, operation, thickness, scale-thickness, dashed, dash, line-joint-style, mask, shape-mode* and *compositing-mode* are used. Additionally on Unix only, *stipple* and *pattern* are used.

See also

draw-rectangle

draw-string *Function*

Summary

Draws a string with the baseline positioned at a given point.

Package

graphics-ports

Signature

draw-string *port string x y* **&rest** *args* **&key** *start end block*

Arguments

port	A graphics port.
string	A string.
x	A real number.
y	A real number.

start	A real number.
end	A real number.
block	A boolean.
args	**graphics-state** parameters passed as keyword arguments.

Description

Draws the string with the baseline starting at (*x y*). The *transform*, *foreground*, *background*, *operation*, *stipple*, *pattern*, *mask*, *mask-transform*, *font*, *text-mode* and *compositing-mode* from *port*'s **graphics-state** are all used, unless overridden in *args*.

start and *end* specify which elements of the *string* to draw. The default value of *start* is 0.

block, if non-**nil**, causes each character to be drawn in a character cell filled with the *background* of *port*'s **graphics-state**.

You can draw with the system highlight by setting **graphics-state** parameter *foreground* **:color_highlighttext** and *background* **:color_highlight**.

Notes

The **graphics-state** parameter *operation* is not supported for drawing text on Microsoft Windows.

Example

```
(let ((op (capi:contain
           (make-instance 'capi:output-pane
                          :background :red))))
  (gp:draw-string op "highlighted"
                  10 10
                  :graphics-args
                  (list :foreground
                        :color_highlighttext)))
```

See also

graphics-state

ensure-gdiplus *Function*

Summary Ensures GDI+ is present and running, or shuts it down. Needed only when writing FLI graphics code on Windows.

Package **graphics-ports**

Signature **ensure-gdiplus &key** *event-func force shutdown* **=>** *result*

Arguments

event-func	A function, or **nil**.
force	A boolean.
shutdown	A boolean.

Values

result	A boolean.

Description The function **ensure-gdiplus** checks that the GDI+ module **gdiplus.dll** is loaded and that **GdiplusStartup** has been called, or shuts down GDI+.

Most users will not need to call **ensure-gdiplus**. This is because when LispWorks itself uses GDI+, for instance via **read-external-image**, it calls **ensure-gdiplus** automatically, and never shuts GDI+ down.

However, if your code uses GDI+ directly (by calling it through the Foreign Language Interface), then you should call **ensure-gdiplus** instead of using **GdiplusStartup** directly. Then, LispWorks will know that GDI+ has already started. This is the only circumstance in which you need to call **ensure-gdiplus**.

Note: **ensure-gdiplus** is implemented only in LispWorks for Windows.

If *shutdown* is **nil**, **ensure-gdiplus** ensures GDI+ is started, by the following steps:

1. Load the GDI+ module **gdiplus.dll**, if it is not already loaded.

2. If
   a) GDI+ was already started by a previous call to **ensure-gdiplus**, and
   b) *force* is **nil**, and
   c) *event-func* was either not passed or is **eq** to the value that was passed for point a)

   then **ensure-gdiplus** simply returns **nil**.
3. If GDI+ was already started, shut it down.
4. Start GDI+, and return the result of **GdiplusStartup**. This is 0 for success. For he meaning of other values, see the documentation of **gpStatus** in the MSDN.

If *shutdown* is true, then if GDI+ was started **ensure-gdiplus** shuts it down, and returns **t**, otherwise **ensure-gdiplus** returns **nil**. The default value of *shutdown* is **nil**.

The default value of both *event-func* and *force* is **nil**.

See also **read-external-image**

external-image *Class*

Summary A class representing a color image.

Package **graphics-ports**

Description The class **external-image** provides a representation of a color image that is subject to **write-external-image**, **read-external-image** and **convert-external-image** operations.

See also **convert-external-image**
read-external-image
write-external-image

external-image-color-table *Function*

Summary Returns a vector containing RGB color specifications of an external image.

Package **graphics-ports**

Signature **external-image-color-table** *external-image* **=>** *color-table*

Arguments *external-image* An external image.

Values *color-table* A color table.

Description The **external-image-color-table** function returns a vector containing RGB color specifications representing the color table as specified in the external image. If the result is **nil**, the external image is a 24-bit DIB, with the colors defined in each pixel instead of through a table.

external-image-color-table *Setf Expander*

Summary Replaces the color table in an external image.

Package **graphics-ports**

Signature **(setf external-image-color-table)** *replacement-color-table external-image*

Arguments *external-image* An external image.

replacement-color-table
A color table.

Description **(setf external-image-color-table)** replaces the color table in *external-image*. The color table specified by *replacement-color-table* must be the same length as the external image's original color table. It is a vector of RGB color-specifications.

externalize-and-write-image *Function*

Summary Externalizes and writes an image to file.

Package **graphics-ports**

Signature **externalize-and-write-image** *gp image filename* **&key** *type if-exists errorp x-hot y-hot quality* **&allow-other-keys =>** *result*

Arguments

gp	A CAPI pane.
image	An **image** object.
filename	A file namestring or a pathname.
type	One of the keywords **:bmp**, **:jpg**, **:jpeg**, **:png** and **:tiff**. Other keywords may be supported, depending on the platform.
if-exists	One of the keywords **:error**, **:new-version**, **:rename**, **:rename-and-delete**, **:overwrite**, **:append** and **:supersede**, or **nil**.
errorp	A boolean.
x-hot	A non-negative integer.
y-hot	A non-negative integer.
quality	An integer in the range [0,100].

Values

result	A filename or **nil**.

Description

The function **externalize-and-write-image** externalizes and writes an **image** object to file.

The output image type can be specified by the argument *type*. If *type* is not supplied then the output image type is determined by the file type in the *filename*.

If *type* is supplied, it must be a keyword which specifies a known type, as returned by **list-known-image-formats** with *for-writing-too* **t**. The types **:bmp**, **:jpg**, **:png** and **:tiff** are known on all platforms (except Motif). Additionally, **:jpeg** is an as alias for **:jpg**.

If *type* is not supplied, then the file extension of the filename is used to "guess" the type. In general it is the extension uppercased and interned in the keyword package. It also recognizes some special cases:

File extension	Image type
"TIF"	**:tiff**
"DIB"	**:bmp**
"JPE"	**:jpg**
"JPEG"	**:jpg**
"JFIF"	**:jpg**
"JP2"	**:jpg2000**

Table 2.1 Image type from file extension: special cases

Note: Image type **:jpg2000** is implemented on Cocoa only.

errorp controls what happens if **externalize-and-write-image** does not recognize the type. If *errorp* is non-nil, it calls **error**, otherwise it returns **nil**. The default value of *errorp* is **t**.

if-exists controls what to do if the filename already exists, in the same way as the *if-exists* argument to **open**. However, unlike **open**, the default value of *if-exists* is **:supersede**.

x-hot and *y-hot* are used only when generating a CUR file, which is currently implemented on GTK+ only. They specify the hotspot coordinates when the image is used as a cursor (in a LispWorks application by **load-cursor** and **(setf capi:simple-pane-cursor)**, or in other applications). Their values must be integers within the width/height of the image. The default value of both *x-hot* and *y-hot* is 0.

quality is used for writing a JPG image on GTK+. It must be an integer in the inclusive range [0,100]. High values generate better images and larger files.

result is *filename* on success, or **nil** for an unknown type when *errorp* is **nil**. It signals an error in other cases (for example, failure to open the file because of permissions).

Examples There is a simple example in:

examples/capi/graphics/images-with-alpha.lisp

See also **list-known-image-formats**

externalize-image *Function*

Summary Returns an external image containing color information from an image.

Package **graphics-ports**

Signature **externalize-image** *gp image* **&key** *maximum-colors important-colors* **&allow-other-keys => *external-image***

Arguments *gp* A CAPI pane.

	image	An image.
	maximum-colors	An integer or **nil**. The default is **nil**.
	important-colors	An integer or **nil**
Values	*external-image*	An external image.

Description

The **externalize-image** function returns an **external-image** containing color information from *image*.

If *maximum-colors* is **nil** or if the screen has no palette, an **external-image** using all the colors in *image* is created.

If *maximum-colors* is an integer, the **external-image** containing image will be created using no more than that number of colors. If the image contains more than *maximum-colors* colors, the *maximum-colors* most frequently used colors will be accurately stored; the remainder will be approximated by nearest colors out of the accurate ones, using internal Color System parameters as the weighting factors for the color distance.

The value of *important-color* is recorded in the *external-image* for later use, and specifies the number of colors required to draw a good likeness of the image. The default value is the number of colors in the image.

See also

make-image-from-port
write-external-image

f2pi *Constant*

Summary

(* 2 pi) as a **single-float**.

Package

graphics-ports

Description

The constant **f2pi** is the result of **(float (* 2.0 cl:pi) 1.0)**. It is a **cl:single-float**.

See also **fpi**
fpi-by-2

find-best-font *Function*

Summary Returns the best font for a CAPI pane.

Package **graphics-ports**

Signature **find-best-font** *pane fdesc* **=>** *font*

Arguments
pane A graphic port.
fdesc A font description.

Values
font A font.

Description The function **find-best-font** returns the best font for *pane* which matches *fdesc*. When there alternative fonts available the choice of best font is operating system dependent.

When *fdesc* contains the attribute **:stock** with value **:system-font** or **:system-fixed-font**, the lookup will always find a stock font.

By default **find-best-font** looks only for Truetype fonts in LispWorks 6.1 and later.

Notes With the default *drawing-mode* **:quality** only Truetype fonts are supported. Non-Truetype fonts are supported only when using *drawing-mode* **:compatible**.

Compatibility note To get the LispWorks 6.0 behavior where non-Truetype fonts are also found, pass **:type :wild** to **make-font-description**.

Examples **examples/capi/graphics/catherine-wheel.lisp**

See also **find-matching-fonts**
make-font-description
prompt-for-font

find-matching-fonts *Function*

Summary Returns a list of the font objects available for a pane.

Package **graphics-ports**

Signature **find-matching-fonts** *pane fdesc* **=>** *fonts*

Arguments
pane A CAPI pane.
fdesc A font description.

Values
fonts A list of fonts.

Description The **find-matching-fonts** function returns a list of the font objects available for *pane* which match the attributes in *fdesc*. **nil** is returned if none match.

When *fdesc* contains the attribute **:stock** with value **:system-font** or **:system-fixed-font**, the lookup will always find a stock font.

See also **find-best-font**
list-all-font-names
make-font-description

font *Type*

Summary An object corresponding to a font in the native system.

Description **font** objects are returned by **find-best-font** and **find-matching-fonts**.

font objects are used to specify fonts for drawing, either in the **graphics-state** of the port or in the drawing functions themselves. **font** objects can also be used for querying the actual attributes of the font (ascent, descent, etc) and the dimensions of character and strings.

Notes

font objects are not externalizable objects.

See also

font-description
find-best-font
find-matching-fonts
graphics-state
get-font-ascent
get-font-descent
get-font-width
get-font-height
get-font-average-width
get-char-width
get-char-ascent
get-char-descent
get-character-extent
get-string-extent
compute-char-extents
font-single-width-p
font-fixed-width-p
font-description

font-description *Type*

Summary

An object used in CAPI to describe a font.

Description

Objects of type **font-description** contain a description of a font. The description can be partial, with only some attributes given values. **font-description** objects are the normal way of specifying fonts in CAPI.

font-description objects are created or returned by **make-font-description**, **convert-to-font-description**, **font-description**, **merge-font-descriptions** and **augment-font-description**.

font-description objects are used as the font specification for CAPI panes (see **simple-pane**). They can also be used directly in calls to **find-best-font** and **find-matching-fonts**.

Notes

1. **font-description** objects do not contain native system dependent values, and are externalizable objects.
2. A **font-description** cannot be used directly as an argument to **draw-string** or **draw-character**, or as the value of the graphics state parameter *font* in a **graphics-state**. These require the result of **find-best-font** or **find-matching-fonts**.

See also

make-font-description
convert-to-font-description
font-description
merge-font-descriptions
augment-font-description
font-description-attributes

font-description *Function*

Summary Returns a font description object for a given font.

Package **graphics-ports**

Signature **font-description** *font* **=>** *fdesc*

Arguments *font* A font.

Values *fdesc* A font description.

Description The **font-description** function returns a font description object for *font*. Using this font description in a later call to **find-matching-fonts** or **find-best-font** on the original pane is expected to return a similar font.

See also **convert-to-font-description**
make-font-description

font-description-attributes *Function*

Summary Returns the attributes of a given font description.

Package **graphics-ports**

Signature **font-description-attributes** *fdesc* **=>** *font-attributes*

Arguments *fdesc* A font description.

Values *font-attributes* A list of font attributes.

Description The **font-description-attributes** function returns the attributes of the *fdesc*. The list should not be destructively modified.

font-description-attribute-value *Function*

Summary Returns the values of a given font attribute in a font description.

Package **graphics-ports**

Signature **font-description-attribute-value** *fdesc font-attribute* **=>** *value*

Arguments *fdesc* A font description.

	font-attribute	A font attribute.
Values	*value*	A font attribute value.

Description The **font-description-attribute-value** function returns the value of *font-attribute* in *fdesc*, or **:wild** if *font-attribute* is not specified in *fdesc*.

font-dual-width-p *Function*

Summary The predicate for dual-width fonts.

Signature **font-dual-width-p** *port* **&optional** *font* **=>** *result*

Arguments	*port*	A graphics port.
	font	A **font** or a **font-description** object.
Values	*result*	A boolean.

Description The function **font-dual-width-p** returns **t** when the font is fixed-width and contains double width characters. Such a font is dual-width.

See also **font-fixed-width-p**
font-single-width-p

font-fixed-width-p *Function*

Summary The predicate for fixed-width fonts.

Package **graphics-ports**

Signature **font-fixed-width-p** *port* **&optional** *font* **=>** *result*

Arguments *port* A graphics port.

font A **font** or a **font-description** object.

Values *result* A boolean.

Description The function **font-fixed-width-p** returns **t** if the optionally specified *font*, or otherwise the font associated with *port*, is fixed-width.

fixed-width is not exactly the same as single-width. A fixed-width font with double width characters is dual-width; other fixed-width fonts are single-width.

Notes **editor-pane** supports variable width fonts on Microsoft Windows, GTK+ and Motif.

See also **font-description**
font-single-width-p

font-single-width-p *Function*

Summary The predicate for single-width fonts.

Signature **font-single-width-p** *port* **&optional** *font* **=>** *result*

Arguments *font* A **font** or a **font-description** object.

Values *result* A boolean.

Description The function **font-single-width-p** returns **t** when all characters in the font specified by *font* are of the same width.

A single-width font is fixed-width.

See also **font-fixed-width-p**
font-description

fpi *Constant*

Summary **pi** as a **single-float**.

Package **graphics-ports**

Description The constant **fpi** is the result of **(float cl:pi 1.0)**. It is a **cl:single-float**.

See also **2pi**
f2pi
fpi-by-2

fpi-by-2 *Constant*

Summary **(/ pi 2)** as a **single-float**

Package **graphics-ports**

Description The constant **fpi-by-2** is the result of **(float (* 0.5 cl:pi) 1.0)**. It is a **cl:single-float**

See also **fpi**
f2pi

free-image *Function*

Summary Frees the library resources allocated with an image.

Package **graphics-ports**

Signature **free-image** *port image*

Arguments

port	A CAPI pane.
image	An image.

Description The **free-image** function frees the library resources associated with *image*. This should be done when an image is no longer needed.

free-image-access *Function*

Summary Frees an Image Access object.

Package **graphics-ports**

Signature **free-image-access** *image-access*

Arguments *image-access* An Image Access object

Description The function **free-image-access** discards *image-access*, which should be an Image Access object returned by **make-image-access**.

See also **image-access-transfer-from-image**
image-access-transfer-to-image
image-access-pixel
make-image-access

get-bounds *Function*

Summary Returns the four values of the currently collected drawing extremes.

Package **graphics-ports**

Signature **get-bounds** *pixmap-port* **=>** *left*, *top*, *right*, *bottom*

Arguments *pixmap-port* A graphics port.

Values *left* An integer.

	top	An integer.
	right	An integer.
	bottom	An integer.

Description The **get-bounds** functions returns the four values *left*, *top*, *right*, *bottom* of the currently collected drawing extremes. The values can be used to get an image from the port.

Example

```
(with-pixmap-graphics-port (p1 pane width height
                                :relative t)
  (with-graphics-rotation (p1 0.123)
  (draw-rectangle p1 100 100 200 120 :filled t
                  :foreground :red)
  (get-bounds p1)))
```

produces the following output:

```
72
112
285
255
```

See also **make-image-from-port**

get-character-extent *Function*

Summary Returns the extent of a character in pixels.

Package **graphics-ports**

Signature **get-character-extent** *port character* **&optional** *font* **=>** *left, top, right, bottom*

Arguments		
	port	A CAPI pane.
	character	A character.
	font	A font.

Values	*left*	An integer.
	top	An integer.
	right	An integer.
	bottom	An integer.

Description The **`get-character-extent`** function returns the extent in pixels of the *character* in the font associated with *port*, or the *font* given.

get-char-ascent *Function*

Summary Returns the ascent of a character in pixels.

Package **`graphics-ports`**

Signature **`get-char-ascent`** ***port character font*** **`=>`** ***ascent***

Arguments	*port*	A CAPI pane.
	character	A character.
	font	A font.
Values	*ascent*	An integer.

Description The **`get-character-ascent`** function returns the *ascent* in pixels of the *character* in the font associated with *port*, or the *font* given.

get-char-descent *Function*

Summary Returns the descent of a character in pixels.

Package **`graphics-ports`**

Signature	**get-char-descent** *port character font* **=>** *descent*	
Arguments	*port*	A CAPI pane.
	character	A character.
	font	A font.
Values	*descent*	An integer.
Description	The **get-char-descent** function returns the *descent* in pixels of the *character* in the font associated with *port*, or the *font* given.	

get-char-width *Function*

Summary	Returns the width of a character in pixels.	
Package	**graphics-ports**	
Signature	**get-char-width** *port character font* **=>** *width*	
Arguments	*port*	A CAPI pane.
	character	A character.
	font	A font.
Values	*width*	An integer.
Description	The **get-char-width** function returns the *width* in pixels of the *character* in the font associated with *port*, or the *font* given.	

get-enclosing-rectangle *Function*

Summary	Returns the smallest rectangle enclosing the given points.

Package **graphics-ports**

Signature **get-enclosing-rectangle &rest** *points* **=>** *left*, *top*, *right*, *bottom*

Arguments

points	Real numbers.

Values

left	A real number.
top	A real number.
right	A real number.
bottom	A real number.

Description The **get-enclosing-rectangle** function returns four values, describing the rectangle which exactly encloses the input points.The *points* argument must be a (possibly empty) list of alternating *x* and *y* values. If no *points* are given the function returns the null (unspecified) rectangle, which is four **nil**s.

get-font-ascent *Function*

Summary Returns the ascent of a font.

Package **graphics-ports**

Signature **get-font-ascent** *port* **&optional** *font* **=>** *ascent*

Arguments

port	A CAPI pane.
font	A font.

Values

ascent	An integer.

Description The **get-font-ascent** function returns the *ascent* in pixels of the font associated with *port*, or the *font* given.

get-font-average-width *Function*

Summary Returns the average width of a font in pixels.

Package **graphics-ports**

Signature **get-font-average-width** *port* **&optional** *font* **=>** *average-width*

Arguments
- *port* A CAPI pane.
- *font* A font.

Values
- *average-width* An integer.

Description The **get-font-average-width** function returns the *average-width* in pixels of the font associated with *port*, or the *font* given.

get-font-descent *Function*

Summary Returns the descent in pixels of a font.

Package **graphics-ports**

Signature **get-font-descent** *port* **&optional** *font* **=>** *descent*

Arguments
- *port* A CAPI pane.
- *font* A font.

Values
- *descent* An integer.

Description The **get-font-descent** function returns the *descent* in pixels of the font associated with *port*, or the *font* given.

get-font-height *Function*

Summary Returns the height of a font.

Package **graphics-ports**

Signature **get-font-height** *port* **&optional** *font* **=>** *height*

Arguments
port	A CAPI pane.
font	A font.

Values
height	An integer.

Description The **get-font-height** function returns the *height* in pixels of the font associated with *port*, or the *font* given.

get-font-width *Function*

Summary Returns the width of a font.

Package **graphics-ports**

Signature **get-font-width** *port* **&optional** *font* **=>** *width*

Arguments
port	A graphics port.
font	A font.

Values
width	An integer.

Description The function **get-font-width** returns the *width* in pixels of the font associated with *port*, or the *font* given.

get-graphics-state *Function*

Summary Returns the **graphics-state** object for a graphics port. **get-graphics-state** is deprecated. Use **port-graphics-state** instead.

Package **graphics-ports**

Signature **get-graphics-state** *port* **=>** *state*

Arguments
port A graphics port.

Values
state A **graphics-state** object.

Description **get-graphics-state** is deprecated. Use **port-graphics-state** instead.

See also **port-graphics-state**

get-origin *Function*

Summary Returns the coordinate origin of a pixmap graphics port.

Package **graphics-ports**

Signature **get-origin** *pixmap-port* **=>** *x y*

Arguments
pixmap-port A graphics port.

Values
x An integer.
y An integer.

Description This returns two values being the coordinate origin of the pixmap graphics port. Normally this is (0 0) but after a series of drawing function calls with **:relative t**, the drawing

may have been shifted. The **get-origin** values tell you by how much. The values are *not* needed when making images from the port's drawing.

Example

```
(with-pixmap-graphics-port (p1 pane width height
:relative t)
    (with-graphics-rotation (p1 0.123)
      (draw-rectangle p1 0 0 200 120 :filled t
                                     :foreground :red)
      (get-origin p1)))
```

produces:

```
-15
0
```

get-string-extent *Function*

Summary Returns the extent in pixels of a string.

Package **graphics-ports**

Signature **get-string-extent** *port string* **&optional** *font* **=>** *left, top, right, bottom*

Arguments

port	A CAPI pane.
string	A string.

Values

left	An integer.
top	An integer.
right	An integer.
bottom	An integer.

Description The **get-string-extent** function returns the extent in pixels of the *string* in the font associated with *port*, or the *font* given.

Note: To compute the horizontal extents of each successive character in a string for a given port or font, use **`compute-char-extents`**.

See also **`compute-char-extents`**

get-transform-scale *Function*

Summary Returns the overall scaling factor of a transform.

Package **`graphics-ports`**

Signature **`get-transform-scale`** *transform* **`=>`** *result*

Arguments *transform* A **`transform`** object.

Values *result* A real number.

Description The **`get-transform-scale`** function returns a single number representing the overall scaling factor present in the *transform*.

graphics-port-background
graphics-port-font
graphics-port-foreground
graphics-port-transform *Functions*

Summary Accesses the *background*, *font*, *foreground* or *transform* in the graphics state of a graphics port.

Package **`graphics-ports`**

Signature **`graphics-port-background`** *port* **`=>`** *color-spec*

`graphics-port-font` *port* **`=>`** *font*

graphics-port-foreground *port* **=>** *color-spec*

graphics-port-transform *port* **=>** *transform*

(setf graphics-port-background) *color-spec port* **=>** *color-spec*

(setf graphics-port-font) *font port* **=>** *font*

(setf graphics-port-foreground) *color-spec port* **=>** *color-spec*

(setf graphics-port-transform) *transform port* **=>** *transform*

Arguments

port	A graphics port.

Values

color-spec	A color specification, or **nil**.
font	A **font** object, or **nil**.
transform	A **transform** object.

Description

The functions **graphics-port-background**, **graphics-port-font**, **graphics-port-foreground** and **graphics-port-tranform** access the *background*, *font*, *foreground* or *transform* in the **graphics-state** associated with *port*. This can be used to set the value by **setf**.

See the **graphics-state** entry for the types and acceptable values of the specific slots.

See also

graphics-state
port-graphics-state
set-graphics-state
transform
with-graphics-state

graphics-state *Function*

Summary

The graphics state object, holding default parameters for drawing operations on an associated *port*.

Package

graphics-ports

Slots

transform — A **`transform`** object which determines the coordinate transformation applying to the graphics port. The default value is the unit transform which leaves the port coordinates unchanged from those used by the host window system — origin at top left, X increasing to the right and Y increasing down the screen. Allowed values are anything returned by the transform functions , described in section "Graphics state transforms" of the *CAPI User Guide*.

foreground — Determines the foreground color used in drawing functions. The value can be a pixel value, a color name symbol, a color name string or a color spec object. Using pixel values results in better performance. The default value is **`:black`**. The value **`:color_highlighttext`** is useful for drawing text with the system highlighting.

background — Determines the background color used in drawing functions which use a stipple. Valid values are the same as for *foreground*. The default value is **`:white`**. The value **`:color_highlight`** is useful for drawing text with the system highlighting.

operation — Determines the color combination used in the drawing primitives when the *port*'s *drawing-mode* is **`:compatible`**. Valid values are 0 to 15, being the same logical values as the *op* arg to the Common Lisp function **`boole`**. The default value is **`boole-1`**. The section "Graphics state operation" in the *CAPI User Guide* shows how to use *operation*.

stipple — A 1-bit pixmap ("bitmap") or **`nil`** (which is the default value). The bitmap is used in conjunction with the *fill-style* when drawing. Here, **`nil`** means that all pixels are drawn in the *foreground* color. A stipple is not transformed by the *transform* parameter. Its origin is assumed to coincide with the origin of the port. The *stipple* is tiled across the drawing. *stipple* is ignored if a *pattern* is given. If no *fill-style* is given, or it is specified as **`:solid`**, when a *stipple* is given, then *fill-style* defaults to **`:opaque-stippled`**.

fill-style — Determines how the drawing is done. The value should be one of **`:solid`**, **`:opaque-stippled`**, **`:stippled`** or **`:tiled`**. The default value **`:solid`** means that the *foreground* is used everywhere. **`:opaque-stippled`** means that the *stipple* bitmap is used with stipple 1s giving the *foreground* and 0s the *background*. **`:stippled`** means that the *stipple* bitmap is used with *foreground* where there are 1s and where the are 0s, no drawing is done. If you specify a stipple but no *fill-style*, or a *fill-style* of **`:solid`**, it defaults to **`:opaque-stipple`**.

pattern — An image the same depth as the *port*, or **`nil`**. If non-nil, *pattern* is used as the source of color for drawing instead of the *foreground* and *background* parameters. A pattern is not transformed by the *transform* parameter. The *pattern* is tiled across the drawing. When *pattern* is specified, the *stipple* value is ignored.The default value of *pattern* is **`nil`**.

See "Working with images" in the *CAPI User Guide* for information on creating an image.

thickness	A number (defaulting to 1) specifying the thickness of lines drawn. If *scale-thickness* is non-nil, the value *thickness* is in *port* (transformed) coordinates, otherwise *thickness* is in pixels.
scale-thickness	A boolean, defaulting to **`t`** which means interpret the *thickness* parameter in transformed port coordinates. If *scale-thickness* is nil, *thickness* is interpreted in pixels.
dashed	A boolean, defaulting to **`nil`**. If *dashed* is **`t`** then lines are drawn as a dashed line using *dash* as the mark-space specifier.
dash	A list of two or more integer, or **`nil`**. A list of integers specifies the alternate mark and space sizes for dashed lines. These mark and space values are interpreted in pixels only. The default value of *dash* is **`(4 4)`**.
line-end-style	The value should be one of **`:butt`**, **`:round`** or **`:projecting`** and specifies how to draw the ends of lines. The default value is **`:butt`**.
line-joint-style	The value should be one of **`:bevel`**, **`:miter`** or **`:round`** and specifies how to draw the areas where the edges of polygons meet. The default value is **`:miter`**.
mask	**`nil`**, or a list specifying a shape inside which the drawing is done.

mask-x An integer specifying in window coordinates where in the port the X coordinate of the mask origin is to be considered to be. The default value is 0.

The *mask-x* parameter works only when the *drawing-mode* is **:compatible** and the platform is GTK+ or X11/Motif.

mask-x is deprecated.

mask-y An integer specifying in window coordinates where in the port the Y coordinate of the mask origin is to be considered to be. The default value is 0.

The *mask-y* parameter works only when the *drawing-mode* is **:compatible** and the platform is GTK+ or X11/Motif.

mask-y is deprecated.

mask-transform A **transform** object which determines the coordinate transformation use for the mask in *drawing-mode* **:quality**.

font Either **nil** or a **font** object to be used by the **draw-character** and **draw-string** functions. The default value is **nil**.

Note that *font* cannot be a **font-description**. Use **find-best-font** to convert a **font-description** to a **font**.

text-mode A keyword controlling the mode of rendering text, most importantly anti-aliasing.

shape-mode A keyword controlling the mode of drawing shapes (that is, anything except text).

compositing-mode

A keyword controlling the combining of new drawing with existing drawing.

Accessors

graphics-state-transform
graphics-state-foreground
graphics-state-background
graphics-state-operation
graphics-state-stipple
graphics-state-pattern
graphics-state-thickness
graphics-state-scale-thickness
graphics-state-dashed
graphics-state-dash
graphics-state-fill-style
graphics-state-line-end-style
graphics-state-line-joint-style
graphics-state-mask
graphics-state-mask-x
graphics-state-mask-y
graphics-state-mask-transform
graphics-state-font
graphics-state-text-mode
graphics-state-shape-mode
graphics-state-compositing-mode

Description

Each graphics port has a **graphics-state** object associated with it, providing the default values of graphics parameters for drawing operations. The drawing operations such as **draw-ellipse**, **draw-rectangle** and **draw-string** can override specific parameters by passing them as keyword arguments.

graphics-state objects are used in the **with-graphics-state** macro and modified using the accessor functions listed above. See "Setting the graphics state" in the *CAPI User Guide* for examples.

mask should be **nil** (the default), a list of the form (*x y width height*), defining a rectangle inside which the drawing is done or a list of the form (**:path** *path* **:fill-rule** *fill-rule*) specifying a path inside which the drawing is done. The mask is not tiled.

In the latter case *path* should be a path specification (see **draw-path**). The *fill-rule* specifies how overlapping regions are filled. Possible values are **:even-odd** and **:winding**. The *mask* will be transformed by the *mask-transform* parameter.

There some examples of path masks in **examples/capi/graphics/paths.lisp**.

mask-transform is used only in *drawing-mode* **:quality**. It is ignored in *drawing-mode* **:compatible**. The default value is the unit transform, which can also be specified as **nil**. Other allowed values include anything returned by the transform functions, described in the section "Graphics state transforms" of the *CAPI User Guide*. The other allowed value of *mask-transform* is the keyword **:dynamic** which is replaced by the current value of the *transform* graphics state parameter when the drawing operation uses the mask.

Each of *text-mode* and *shape-mode* can be one of:

:plain	No anti-aliasing.
:antialias	With anti-aliasing.
:fastest	Fastest rendering. The same as **:plain** except on Windows
:best	Best display.
:default	The system default (which is **:antialias**).

Additionally *text-mode* can be **:compatible**, which causes text to be drawn the way it would be drawn if *drawing-mode* was **:compatible**. This makes a difference only on Microsoft Windows, because on other platforms the default *text-mode* draws like the **:compatible** one.

The default of both *text-mode* and *shape-mode* is **:default**.

compositing-mode is a keyword or an integer controlling the compositing mode, that is the way that a new drawing is combined with the existing value in the target of the drawing to generate the result.

Two values of *compositing-mode* are supported on all platforms other than Motif:

:over Draw over the existing values. If the source is a solid color, then the result is simply the source. If the source has alpha value *alpha*, then it is blended with the destination, with the destination multiplied by the remainder of the alpha, that is (- 1 *alpha*).

:copy The source is written to the destination ignoring the existing values. If the source has alpha and the target does not, that has the effect of converting semi-transparent source to solid.

The default value of *compositing-mode* is **:over**.

The **:copy** value of *compositing-mode* is especially useful for creating a transparent or semi-transparent **pixmap-port**, which can be displayed directly or converted to an image by **make-image-from-port**.

On Cocoa 10.5 and later and GTK+ 2.8 or later, these additional keyword values of *compositing-mode* are supported: **:clear**, **:over**, **:in**, **:out**, **:atop**, **:dest-over**, **:dest-in**, **:dest-out**, **:dest-atop**, **:xor** and **:add**. These correspond to the **CAIRO_OPERATOR_*** operators in Cairo, which are documented in **cairographics.org/operators** and the **CGBlendMode** values which are documented in the CGContext Reference at **developer.apple.com**.

Note: on GTK+, the "unbounded" operators (**:in**, **:out**, **:dest-in** and **:dest-atop**) do not work properly for shape drawings. They can only be used for image drawing and copying operations.

Both Cocoa and GTK+ also allow *compositing-mode* to be an integer, which is simply passed through to the underlying system. This allows using modes that are not available via keywords, but it is not portable. For Cocoa, it is a **CGBlend-**

Mode as documented in the CGContext Reference. For GTK+ it is **cairo_operator_t**, as documented in the entry for **cairo_t** in the Gnome documentation for Cairo.

Note: For drawing images on Cocoa, only values that corresponding to available keywords work properly.

Notes

1. *operation* is not supported for drawing text on Microsoft Windows.
2. *stipple* and *fill-style* are supported only on X11/Motif.
3. *mask-x* and *mask-y* are supported only on GTK+ and X11/Motif, and only when the *drawing-mode* is **:compatible**.
4. *pattern* is supported only on Microsoft Windows, GTK+ and X11/Motif.
5. *operation* is not supported by Cocoa/Core Graphics so this slot or argument is ignored on Cocoa.
6. *operation* is ignored when the port's *drawing-mode* is **:quality**.
7. *text-mode* and *shape-mode* are supported only on Cocoa, Cairo and GDI+, which are used on Macintosh, GTK and Windows respectively when the *drawing-mode* is **:quality**. For more information about *drawing-mode*, see "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

Examples

examples/capi/graphics/compositing-mode-simple.lisp

examples/capi/graphics/compositing-mode.lisp

See also

make-graphics-state
set-graphics-state
with-graphics-state

image *Class*

Summary An abstract image object. An image can be drawn via **draw-image**.

Package **graphics-ports**

Accessors **image-height**
image-width

Description The **image** class is the abstract image object class. An image can be drawn using **draw-image**.

image-height and **image-width** return the image size in pixels.

Notes On Cocoa and GTK+ you can drag and drop images. See **set-drop-object-supported-formats** for more information.

See also **convert-external-image**
draw-image
load-image
make-image-from-port
make-sub-image
read-and-convert-external-image

image-access-height
image-access-width *Functions*

Summary Return the dimensions of the underlying image in an Image Access object.

Package **graphics-ports**

Signature **image-access-height** *image-access* **=>** *height*

image-access-width *image-access* **=>** *width*

Arguments
image-access An Image Access object

Values
height An integer.
width An integer.

Description
The functions **image-access-height** and **image-access-width** return the height and width of the underlying image in *image-access*.

image-access must be an Image Access object returned by **make-image-access**.

Notes
It is an error to call **image-access-height** or **image-access-width** on an Image Access object that has been freed by **free-image-access**.

Example
See these example files:

examples/capi/graphics/image-access.lisp

examples/capi/graphics/image-access-alpha.lisp

See also
free-image-access
make-image-access

image-access-pixel *Function*

Summary
Gets and sets the pixels in an Image Access object.

Package
graphics-ports

Signature
image-access-pixel *image-access x y* **=>** *color-rep*

(setf image-access-pixel) *color-rep image-access x y* **=>** *color-rep*

Arguments
image-access An Image Access object

	x	An integer.
	y	An integer.
Values	*color-rep*	A color reference.

Description

The function **image-access-pixel** returns the pixel value at position *x*, *y* in the Image Access object *image-access*.

The pixel value *color-rep* is a color representation like that returned by **convert-color**. If needed, *color-rep* can be converted to an RGB value using **unconvert-color**. *color-rep* can contain an alpha value, for images with an alpha channel.

The function **(setf image-access-pixel)** sets the value of the pixel at position *x*, *y* in the Image Access object *image-access*.

image-access must be an Image Access object returned by **make-image-access**.

Example

See these example files:

examples/capi/graphics/image-access.lisp

examples/capi/graphics/image-access-alpha.lisp

See also

image-access-pixels-from-bgra
image-access-pixels-to-bgra
image-access-transfer-to-image
image-access-transfer-from-image
free-image-access
make-image-access

image-access-pixels-from-bgra *Function*

Summary

Copies a vector of pixel values into an Image Access object.

Package

graphics-ports

Signature **image-access-pixels-from-bgra** *image-access vector*

Arguments

image-access	An Image Access object.
vector	A vector.

Description The function **image-access-pixels-from-bgra** copies all the pixels to the Image Access object *image-access* from the vector *vector*. *vector* should contain a sequence of integer values in the range 0-255 for blue, green, red and alpha of each pixel. This function is optimized for the case where *vector* has element type **(unsigned-byte 8)**.

An error is signalled if *vector* is not of the correct length for the Image Access object, that is **(* 4** *width height***)** where *width* and *height* represent the size of *image-access*.

Note: **image-access-pixels-to-bgra** must be called after this function (similarly to **(setf image-access-pixel)**).

image-access must be an Image Access object returned by **make-image-access**.

Example See the file **examples/capi/graphics/image-access-bgra.lisp**.

See also **image-access-pixel**
image-access-pixels-to-bgra

image-access-pixels-to-bgra *Function*

Summary Copies pixel values from an Image Access object into a vector.

Package **graphics-ports**

Signature **image-access-pixels-to-bgra** *image-access vector*

Arguments
image-access An Image Access object.
vector A vector.

Description
The function **image-access-pixels-to-bgra** copies all the pixels in the Image Access object *image-access* into the vector *vector* as a sequence of integer values in the range 0-255 for the blue, green, red and alpha components of each pixel. This function is optimized for the case where *vector* has element type **(unsigned-byte 8)**.

An error is signalled if *vector* is not of the correct length for the Image Access object, that is **(* 4** *width height***)** where *width* and *height* represent the size of *image-access*.

Note: **image-access-pixels-from-bgra** must be called before this function (similarly to **image-access-pixel**).

image-access must be an Image Access object returned by **make-image-access**.

Example
See the file **examples/capi/graphics/image-access-bgra.lisp**.

See also
image-access-pixel
image-access-pixels-from-bgra

image-access-transfer-from-image *Function*

Summary
Gets the pixel values from an **image**.

Package
graphics-ports

Signature
image-access-transfer-from-image *image-access*

Arguments
image-access An Image Access object

Description The function **image-access-transfer-from-image** gets the pixel values from an **image** object, making them accessible via a corresponding Image Access object *image-access*.

image-access must be an Image Access object returned by **make-image-access**.

Notionally **image-access-transfer-from-image** transfers the pixel data from the window system into *image-access*, though it might do nothing on platforms where the window system allows direct access to the pixel data.

The pixel data can be accessed using **image-access-pixel**.

Example See the file **examples/capi/graphics/image-access.lisp**.

See also **image-access-transfer-to-image**
image-access-pixel
free-image-access
make-image-access

image-access-transfer-to-image *Function*

Summary Sets the pixel values in an **image**.

Package **graphics-ports**

Signature **image-access-transfer-to-image** *image-access*

Arguments *image-access* An Image Access object

Description The function **image-access-transfer-to-image** sets the pixel values in an **image** object from the values in a corresponding Image Access object *image-access*.

image-access must be an Image Access object returned by **make-image-access**.

Notionally **image-access-transfer-to-image** transfers the pixel data from *image-access to* the window system, though it might do nothing on platforms where the window system allows direct access to the pixel data.

Example — See the file **examples/capi/graphics/image-access.lisp**.

See also — **free-image-access**
image-access-transfer-from-image
image-access-pixel
make-image-access

image-freed-p *Function*

Summary — Determines whether an image has been freed.

Package — **graphics-ports**

Signature — **image-freed-p** *image* **=>** *bool*

Arguments — *image* An image object.

Values — *bool* A boolean.

Description — The **image-freed-p** function returns non-**nil** if the image has been freed, and **nil** otherwise.

image-loader *Function*

Summary — Returns the image load function.

Package — **graphics-ports**

Signature — **image-loader** *image-id* **&key** *image-translation-table* **=>** *loader*

Arguments *image-id* An image identifier.

image-translation-table
An image translation table.

Values *loader* An image load function.

Description The **image-loader** function returns the image load function that would be called to load the image associated with *image-id* in *image-translation-table*. If the *image-id* is not registered with a load function, the default image load function is returned. The default value of *image-translation-table* is ***default-image-translation-table***.

See also **register-image-load-function**
register-image-translation

image-translation *Function*

Summary Returns the translation for an image registered in its image translation table.

Package **graphics-ports**

Signature **image-translation** *image-id* **&key** *image-translation-table* **=>** *translation*

Arguments *image-id* An image identifier.

image-translation-table
An image translation table.

Values *translation* A translation.

Description The **image-translation** function returns the translation for *image-id* registered in *image-translation-table*. The default value of *image-translation-table* is ***default-image-translation-table***.

See also **register-image-load-function**
register-image-translation

initialize-dithers *Function*

Summary Initialize dither objects up to a given order.

Package **graphics-ports**

Signature **initialize-dithers &optional** *order*

Arguments *order* An integer.

Description The **initialize-dithers** function initializes dither objects up to the given *order* (size = 2 ^ *order*). By default, order is 3.

Note: dithers do not affect drawing or the anti-aliasing that occurs when drawing in Cocoa.

See also **dither-color-spec**
make-dither
with-dither

inset-rectangle *Function (inline)*

Summary Moves the corners of a rectangle inwards by a given amount.

Package **graphics-ports**

Signature **inset-rectangle** *rectangle dx dy* **&optional** *dx-right dy-bottom*

Arguments	*rectangle*	A list of integers.
	dx	An integer.
	dy	An integer.
	dx-right	An integer.
	dy-bottom	An integer.

Description The **`inset-rectangle`** function moves the *left*, *top*, *right* and *bottom* elements of *rectangle* inwards towards the center by the distances *dx*, *dy*, *dx-right* and *dy-bottom* respectively.

By default, *dx-right* is *dx*, and *dy-bottom* is *dy*.

inside-rectangle *Function*

Summary Determines if a point lies inside a rectangle.

Package **`graphics-ports`**

Signature **`inside-rectangle`** *rectangle x y* **`=>`** *result*

Arguments	*rectangle*	A list of integers.
	x	An integer.
	y	An integer.
Values	*result*	A boolean.

Description The **`inside-rectangle`** function returns **`t`** if the point (*x y*) is inside *rectangle*. The *rectangle* is expected to be ordered; if the rectangle is specified by (*left top right bottom*), then *left* must be less than *right*, and *bottom* must be less than *top*. The lines **`y = bottom`** and **`x = right`** are not considered to be inside the rectangle.

invalidate-rectangle *Generic Function*

Summary Invalidates the rectangle associated with the object, which causes it to be redisplayed.

Package **graphics-ports**

Signature **invalidate-rectangle** *object* **&optional** *x y width height* **=>** *result*

Arguments

object	An instance of a subclass of **graphics-ports-mixin** or a subclass of **pinboard-object**.
x	A real number.
y	A real number.
width	A real number.
height	A real number.

Values

result	A boolean.

Description By default, the generic function **invalidate-rectangle** invalidates the whole rectangle, but this can be limited by passing the optional arguments.

The effect of invalidating an area is to cause the area to be redrawn. It has no effect on **pixmap-port**. When the pane has a supplied *display-callback*, this callback is called with an area containing the area specified by the argument to **invalidate-rectangle**. However, the call to *display-callback* is asynchronous, and the system coalesces areas from calls to **invalidate-rectangle** and actual expose events, so there is not a one-to-one relation between calls to **invalidate-rectangle** and invocations of *display-callback*.

In general, **invalidate-rectangle** should not be called inside the *display-callback*. If it is called, it must be conditional, otherwise this will cause repeated redisplay.

Notes

With *drawing-mode* **:quality**, drawings are done with anti-aliasing, which means that they affect pixels which are not obviously part of the drawing. For example, drawing a rectangle with $x = 10$ may affect the pixel at $x = 9$. This needs to be taken into account when computing the arguments to **invalidate-rectangle**.

For pinboard objects the recommended way of forcing redraw is **redraw-pinboard-object**, which takes anti-aliasing into account.

See also

validate-rectangle

invert-transform *Function*

Summary

Constructs the inverse of a transform.

Package

graphics-ports

Signature

invert-transform *transform* **&optional** *into* **=>** *inverse*

Arguments

transform A **transform** object.

into A **transform** object or **nil**.

Values

inverse A **transform** object.

Description

This function constructs the inverse of *transform*. If T is *transform* and T' is its inverse, then $TT' = I$. If *into* is non-**nil** it is modified to contain T' and returned, otherwise a new transform is constructed and returned.

list-all-font-names *Function*

Summary

Finds the names of the available fonts.

Package **graphics-ports**

Signature **list-all-font-names** *pane* **=>** *fdescs*

Arguments *pane* A graphics port.

Values *fdescs* A list of font description objects.

Description The function **list-all-font-names** returns a list of partially-specified font description objects which contain the "name" attributes for each known font that is available for *pane*.

On Microsoft Windows and Cocoa the "name" attributes are just the **:family** attribute.

On X11 the "name" attributes are **:foundry** and **:family**.

See also **font-description-attributes**
find-matching-fonts

list-known-image-formats *Function*

Summary Returns the known image formats.

Package **graphics-ports**

Signature **list-known-image-formats** *screen-spec* **&optional** *for-writing-too* **=>** *formats*

Arguments *screen-spec* A CAPI object, a plist, or **nil**.

for-writing-too A generalized boolean.

Values *formats* A list of keywords.

Description The function **list-known-image-formats** returns a list of keywords which specify known image formats.

screen-spec is an object that **convert-to-screen** can recognize, typically a pane or simply **nil**.

If *for-writing-too* is not supplied or is **nil**, then *formats* is a list of formats that can be loaded. All the formats in the list can be loaded, but on Cocoa and Windows the list is not exhaustive, and it may be possible to load formats that are not listed.

If *for-writing-too* is supplied as non-nil, then formats is a list of types that **externalize-and-write-image** can write. In this case the list is exhaustive on all platforms, and **externalize-and-write-image** can write a format if and only if it appears in the list.

All platforms (except Motif) can read and write **:bmp**, **:jpg**, **:png** and **:tiff** images, and also recognize **:jpeg** as an alias for **:jpg**, so the list will always include all of these keywords.

See also **convert-to-screen**
externalize-and-write-image

load-icon-image *Function*

Summary Loads a Windows icon image, and returns the image object.

Package **graphics-ports**

Signature **load-icon-image** *port id* **&key** *width height* **=>** *image*

Arguments

port	A graphics port or CAPI object.
id	A keyword, string or pathname.
width	The desired width in pixels, or **nil**.
height	The desired height in pixels, or **nil**.

Values

image	An **image** object.

Description

The **load-icon-image** function loads an icon specified by *id* which should be either a keyword describing a standard icon, or a string or a pathname naming a Windows format icon (**.ico**) file.

The following keyword values of *id* are recognized:

:sample	A rectangle
:hand	A cross in a circle
:ques	A question mark in a bubble
:bang	An exclamation mark in a triangle
:note	An 'I' in a bubble
:winlogo	The Windows logo
:warning	Same as **:bang**
:error	Same as **:hand**
:information	Same as **:note**

load-icon-image returns an **image** object which can be drawn to *port* using **draw-image** and which must be freed using **free-image** when no longer needed.

When *id* specifies a file and *width* and *height* are specified, then the most appropriate image is chosen from the icon file and is scaled accordingly. If *width* and *height* are **nil** the first image in the file is used at its natural size. *width* defaults to **nil** and *height* defaults to *width*.

Note: **load-icon-image** is defined only in LispWorks for Windows.

See also

draw-image
free-image
load-image

load-image *Function*

Summary Loads an image and returns the image object.

Package **graphics-ports**

Signature **load-image** *gp id* **&key** *cache type editable image-translation-table* **=>** *image*

Arguments

gp	A graphics port.
id	An image identifier, a file, an **external-image**, or an **image**.
cache	A boolean.
type	A keyword, or **nil**.
editable	One of the keywords **:with-alpha** and **:without-alpha**, or a boolean.
image-translation-table	An image translation table.

Values

image	An image object.

Description The **load-image** function loads an image identified by *id* via the *image-translation-table* using the image load function registered with it. It returns an **image** object with the representation slot initialized. The *gp* argument specifies a graphics port used to identify the library. It also specifies the resource in which colors are defined and if necessary allocated for the image. If *id* is in the table but the translation is not an external image, and the image loader returns an external image as the second value, that external image replaces the translation in the table. The default value of *image-translation-table* is ***default-image-translation-table***.

id can be an **image**, which is just associated with the port *gp* and returned if it is a Plain Image or if *editable* is **nil**. Otherwise a new Plain Image object is returned, as described below.

id can also be a string or pathname denoting a file, and in this case the image is loaded according to *type*, as described below.

The *cache* argument controls whether the image translation is cached. See the **convert-external-image** function for more details.

type tells **load-image** that the image is in a particular graphics format. Currently the only recognised value is **:bmp**, which means the image is a Bitmap. Other values of *type* cause **load-image** to load the image according to the file type of *id*, if *id* denotes a file, as described for **read-external-image**. See the Graphics Ports chapter in the *CAPI User Guide* for a discussion of image handling. The default value of *type* is **nil**.

editable controls whether the image *image* is a Plain Image suitable for use with the Image Access API. The values of *editable* have the following effects:

nil The image is not editable.

:without-alpha
The image is editable, but does not have an alpha channel.

t The image is editable, but does not have an alpha channel if the source of the image has an alpha channel (for example, a TIFF file with alpha channel).

:with-alpha The image is editable and has an alpha channel. It will be fully opaque when loading files without an alpha channel.

Given an **image** *my-image*, call

(load-image *port my-image* **:editable t)**

to create an **image** guaranteed to work with **make-image-access**. The default value of *editable* is **nil**.

Normally the image is freed automatically, when *gp* is destroyed. However there are circumstances where you need to explicitly free an image, for example when you want it to go away before the port. If the image is not freed, a memory leak occurs.

Note: *gp* must already be created at the time **load-image** is called. If you need to delay loading the image, for example if you are computing the image dynamically, then you can call **load-image** in the *create-callback* of the port or even in its first *display-callback*.

Compatibility note

In LispWorks 4.4 there is a keyword argument **:force-plain** with the same effect as **:editable**. **:force-plain** is still accepted in LispWorks 6.1 for backwards compatibility, but you should now use **:editable** instead.

See also

convert-external-image
default-image-translation-table
load-icon-image
make-image
make-image-access

make-dither *Function*

Summary

Makes a dither matrix of a given size.

Package

graphics-ports

Signature

make-dither *size* **=>** *matrix*

Arguments

size An integer.

Values *matrix* A dither matrix.

Description The **make-dither** function makes a dither matrix of the given *size*.

Note: dithers do not affect drawing or the anti-aliasing that occurs when drawing in Cocoa.

See also **dither-color-spec**
initialize-dithers
with-dither

make-font-description *Function*

Summary Returns a new font description object containing given font attributes.

Package **graphics-ports**

Signature **make-font-description &rest** *font-attribute** **=>** *fdesc*

Arguments *font-attribute* A font attribute.

Values *fdesc* A font description object.

Description The **make-font-description** function returns a new font description object containing the given font attributes. There is no error checking of the attributes at this point.

The **:stock** attribute is handled specially: it is omitted from *fdesc*, unless it is the only attribute specified.

See also **augment-font-description**
convert-to-font-description
find-best-font

find-matching-fonts
font-description
merge-font-descriptions

make-graphics-state *Function*

Summary Creates a **graphics-state** object.

Package **graphics-ports**

Signature **make-graphics-state &key** *transform foreground background operation thickness scale-thickness dashed dash line-end-style line-joint-style mask fill-style stipple pattern mask-x mask-y font text-mode shape-mode compositing-mode mask-transform* **=>** *state*

Arguments See **graphics-state** for interpretation of the arguments.

Values *state* A **graphics-state** object.

Description The **make-graphics-state** function creates a **graphics-state** object. Each graphics port has a graphics state associated with it, but you may want to create your own individual graphics states for use in specialized drawing operations. Graphics state objects do not consume local resources beyond dynamic memory for the structure (so you can be relaxed about creating them in some number if you really need to).

See also **graphics-state**
set-graphics-state

make-image *Function*

Summary Makes a new, empty, **image** object.

Package **graphics-ports**

Signature **make-image** *port width height* **&key** *alpha* **=>** *image*

Arguments

port	A graphics port.
width	A positive integer.
height	A positive integer.
alpha	A generalized boolean.

Values

image	An **image** object.

Description The function **make-image** makes a new blank, editable **image** object associated with *port* and of the given *width* and *height*.

On Windows and Cocoa, if *alpha* is true, then the image will have an alpha channel.

The initial pixels in *image* are undefined. *image* is editable, that is, it is suitable for use with the Image Access API. To set the pixels, see **make-image-access**.

See also **load-image**
make-image-access

make-image-access *Generic Function*

Summary Creates an Image Access object.

Package **graphics-ports**

Signature **make-image-access** *port image* **=>** *image-access*

Arguments

port	A graphics port.
image	An **image** object.

Values

image-access	An Image Access object.

Description The generic function **make-image-access** returns an Image Access object for the given **image** image.

image can be any **image** object returned by **make-image-from-port**. An **image** object returned by **load-image** is also suitable, but only if it is a Plain Image (see below).

image-access is used when reading and writing the pixel values of the image. For an overview of using Image Access objects, see the Graphics Ports chapter in the *CAPI User Guide*.

Note: on some platforms (currently Windows) not every **image** object is a Plain Image. If needed, forcibly create a Plain Image suitable for passing to **make-image-access** as described in **load-image**.

Note: ensure that you eventually discard *image-access*, using **free-image-access**.

Example See the file **examples/capi/graphics/image-access.lisp**.

See also **free-image-access**
image-access-transfer-from-image
image-access-transfer-to-image
image-access-height
image-access-pixel
load-image
make-image

make-image-from-port *Function*

Summary Makes an image out of a specified rectangle of a graphics port's contents.

Package **graphics-ports**

Signature **make-image-from-port** *port* **&optional** *x y width height* **=>** *image*

Arguments

port	A graphics port.
x	An integer.
y	An integer.
width	An integer.
height	An integer.

Values

image	An image.

Description The **make-image-from-port** function makes an **image** out of the specified rectangle of the port's contents. The default is the whole port, but a region can be specified using *x*, *y*, *width*, and *height*. The default value of *x* and *y* is 0.

Normally the image is freed automatically, when *port* is destroyed. However there are circumstances where you need to explicitly free an image, for example when you want it to go away before the port. If the image is not freed, a memory leak occurs.

See also **externalize-image**

make-sub-image *Function*

Summary Makes a new image from part of an image.

Package **graphics-ports**

Signature **make-sub-image** *port image* **&optional** *x y width height* **=>** *sub-image*

Arguments

port	A graphics port.
image	An **image**.

	x	An integer.
	y	An integer.
	width	An integer.
	height	An integer.
Values	*sub-image*	An **image**.

Description The function **make-sub-image** makes a new **image** object from the rectangular region of the supplied *image* specified by *x*, *y*, *width* and *height*.

The default values of *x* and *y* are 0.

The default value of *width* is the *width* of *image*.

The default value of *height* is the *height* of *image*.

See also **image**

make-transform *Function*

Summary Returns a new transform object initialized according to a set of optional arguments.

Package **graphics-ports**

Signature **make-transform &optional** *a b c d e f* **=>** *transform*

Arguments		
	a	A real number.
	b	A real number.
	c	A real number.
	d	A real number.
	e	A real number.
	f	A real number.

Values *transform* A **transform** object.

Description The **make-transform** function returns a new transform object initialized according to the optional args. The default args make the unit transform.

Default values are as follows: *a* and *d* are 1; *b*, *c*, *e*, and *f* are 0. The transform matrix is

```
a  b  0
c  d  0
e  f  1
```

for generalized two dimensional points of the form **(x y 1)**.

Example This transform will cause rotation by pi/4 radians:

```
(let ((s (sin (/ pi 4)))
      (c (cos (/ pi 4))))
  (gp:make-transform  c  s (- s) c 0 0))
```

merge-font-descriptions *Function*

Summary Returns a font description containing the attributes of two specified font descriptions.

Package **graphics-ports**

Signature **merge-font-descriptions** *fdesc1 fdesc2* **=>** *fdesc*

Arguments *fdesc1* A font description.

fdesc2 A font description.

Values *fdesc* A font description.

Description The **merge-font-description** function returns a font description containing all the attributes of *fdesc1* and *fdesc2*. If an attribute appears in both *fdesc1* and *fdesc2*, the value in

fdesc1 is used. The **:stock** attribute is handled specially: it is omitted from *fdesc*, unless it is the only attribute in *fdesc1* and *fdesc2*.

The contents of *fdesc1* and *fdesc2* are not modified.

See also **make-font-description**

offset-rectangle *Function (inline)*

Summary Offsets a rectangle by a given distance.

Package **graphics-ports**

Signature **offset-rectangle** *rectangle dx dy*

Arguments

rectangle	A list of integers.
dx	A real number.
dy	A real number.

Description The **offset-rectangle** function offsets the *rectangle* by the distance (*dx dy*).

rectangle is a list (*left top right bottom*).

ordered-rectangle-union *Function*

Summary Returns the union of two rectangles.

Package **graphics-ports**

Signature **ordered-rectangle-union** *left-1 top-1 right-1 bottom-1 left-2 top-2 right-2 bottom-2* **=>** *left, top, right, bottom*

Arguments

left-1	A real number.

	top-1	A real number.
	right-1	A real number.
	bottom-1	A real number.
	left-2	A real number.
	top-2	A real number.
	right-2	A real number.
	bottom-2	A real number.
Values	*left*	A real number.
	top	A real number.
	right	A real number.
	bottom	A real number.

Description The **`ordered-rectangle-union`** function returns four values: the *left*, *top*, *right* and *bottom* of the union of the two rectangles specified in the arguments. The caller guarantees that each input rectangle is ordered, that is, the left values must be smaller or equal to the right values, and the top values must be greater than or equal to the bottom ones.

See also **`rectangle-union`**

pi-by-2 *Constant*

Summary **`(/ pi 2)`** as a **`double-float`**.

Package **`graphics-ports`**

Description The constant **`pi-by-2`** is the result of **`(/ cl:pi 2)`**. It is a **`cl:double-float`**.

See also **2pi**
fpi

pixblt *Function*

Summary Copies one area of a graphics port to another area of a different graphics port.

pixblt is deprecated.

Package **graphics-ports**

Signature **pixblt** *to-port operation from-port to-x to-y width height from-x from-y*

Arguments

to-port	A graphics port.
operation	A graphics state operation.
from-port	A graphics port.
to-x	A real number.
to-y	A real number.
width	A real number.
height	A real number.
from-x	A real number.
from-y	A real number.

Description The **pixblt** function copies one area of *from-port* to another area of *to-port* using the specified *operation* and *mask*. Both ports should be the same depth. The graphics port transforms are not used.

operation is ignored when the *drawing-mode* is **:quality** (the default). See the "Graphics state" section in the *CAPI User Guide* for valid values for *operation*.

pixblt is deprecated, because the **:quality** *drawing-mode* does not support *operation*, and because it ignores the transformations, which means it does not always work as expected. In particular, it can draw at the wrong place inside the *display-callback* of **output-pane**.

Use instead **copy-area**, which does take account of the transform. See also **graphics-state** parameter *compositing-mode* for a way to control how **copy-area** blends the source and the target.

See also **copy-area**
graphics-state

pixmap-port *Class*

Summary The class of pixmap graphics port objects.

Package **graphics-ports**

Description The **pixmap-port** class is the class of pixmap graphics port objects which can be used for drawing operations.

See also **create-pixmap-port**
destroy-pixmap-port
with-pixmap-graphics-port

port-drawing-mode-quality-p *Generic Function*

Summary Tests whether a port does quality drawing.

Package **graphics-ports**

Signature **port-drawing-mode-quality-p** *port* **=>** *result*

Arguments	*port*	A graphics port.
Value	*result*	A boolean.

Description The generic function **`port-drawing-mode-quality-p`** returns true if the graphics port *port* does quality drawing.

A port does quality drawing if both

1. it was not made with *drawing-mode* **`:compatible`**, and

2. the underlying library supports quality drawing.

Microsoft Windows and Cocoa always support quality drawing, GTK+ supports it from version 2.8 and greater, but Motif never supports it.

Examples
```
(example-file "capi/graphics/images-with-alpha")
```

See also Section "Drawing mode and anti-aliasing" in the *CAPI User Guide*.

port-graphics-state *Function*

Summary Returns the **`graphics-state`** object for a graphics port.

Package **`graphics-ports`**

Signature **`port-graphics-state`** *port* **`=>`** *state*

Arguments	*port*	A graphics port.
Values	*state*	A **`graphics-state`** object.

Description The function **`port-graphics-state`** returns the **`graphics-state`** object for *port*. The individual slots can be accessed using the accessor functions documented for **`graphics-state`**.

See also **graphics-state**

port-height *Function*

Summary Returns the pixel height of a port.

Package **graphics-ports**

Signature **port-height** *port* **=>** *result*

Arguments *port* A graphics port.

Values *result* An integer.

Description The function **port-height** returns the pixel height of *port*.

port-string-height *Function*

Summary Returns the height of a string drawn to a given port in pixels.

Package **graphics-ports**

Signature **port-string-height** *port string* **=>** *height*

Arguments *port* A graphics port.

string A string.

Values *height* An integer.

Description The **port-string-height** function returns the *height* in pixels of *string* when drawn to *port*. The font used is the *font* currently in the port's **graphics-state**.

port-string-width *Function*

Summary Returns the width of a string drawn to a given port in pixels.

Package **graphics-ports**

Signature **port-string-width** *port string* **=>** *width*

Arguments

port	A graphics port.
string	A string.

Values

width	An integer.

Description The **port-string-width** function returns the *width* in pixels of *string* when drawn to *port*. The font used is the *font* currently in the port's **graphics-state**.

Notes To compute the horizontal extents of each successive character in a string for a given port or font, use **compute-char-extents**.

See also **compute-char-extents**

port-width *Function*

Summary Returns the pixel width of a port.

Package **graphics-ports**

Signature **port-width** *port* **=>** *width*

Arguments

port	A graphics port.

Values

width	An integer.

Description The function **port-width** returns the pixel width of *port*.

postmultiply-transforms *Function*

Summary Postmultiplies two transforms.

Package **graphics-ports**

Signature **postmultiply-transforms** *transform1 transform2*

Arguments
transform1 A **transform** object.
transfrom2 A **transform** object.

Description The **postmultiply-transforms** function postmultiplies the partial 3 x 3 matrix represented by *transform1* by the partial 3 x 3 matrix represented by *transform2*, storing the result in *transform1*. In the result, the translation, scaling and rotation operations contained in *transform2* are effectively performed *after* those in *transform1*.

```
transform1 = transform1 . transform2
```

premultiply-transforms *Function*

Summary Premultiplies two transforms.

Package **graphics-ports**

Signature **premultiply-transforms** *transform1 transform2*

Arguments
transform1 A **transform** object.
transform2 A **transform** object.

Description The **premultiply-transforms** function premultiplies the partial 3 x 3 matrix represented by *transform1* by the partial 3 x 3 matrix represented by *transform2*, storing the result in

transform1. In the result, the translation, scaling and rotation operations contained in *transform2* are effectively performed *before* those in *transform1*.

```
transform1 = transform2 . transform1
```

read-and-convert-external-image *Function*

Summary Returns an image converted from an external image read from a file.

Package **graphics-ports**

Signature **read-and-convert-external-image** *gp file* **&key** *transparent-color-index* **=>** *image, external-image*

Arguments

gp	A CAPI pane.
file	A pathname designator.
transparent-color-index	An integer or **nil**.

Values

image	An image.
external-image	An external image.

Description Returns an image converted from an external image read from *file*. The external image is returned as a second value.

transparent-color-index is interpreted as described for **read-external-image**.

See also **convert-external-image**
external-image
read-external-image

read-external-image *Function*

Summary Returns an external image read from a file.

Package **graphics-ports**

Signature **read-external-image** *file* **&key** *transparent-color-index type* **=>** *image*

Arguments
- *file* — A pathname designator.
- *transparent-color-index* — An integer or **nil**.
- *type* — A keyword, or **nil**.

Values
- *image* — An external image.

Description The **read-external-image** function returns an external image read from *file*.

transparent-color-index specifies the index of the transparent color in the color map. *transparent-color-index* works only for images with a color map, that is, those with 256 colors or less. The default value is **nil**, meaning that there is no transparent color.

type tells **read-external-image** that the image is in a particular graphics format. Currently the only recognised value is **:bmp**, which means the image is read as a Bitmap. Other values of *type* cause **read-external-image** to read the image according to the file type of *file*. **"bmp"** or **"dib"** mean that the image is read as a Bitmap. Other file types are handled in Operating System-specific ways. See the Graphics Ports chapter in the *CAPI User Guide* for details. The default value of *type* is **nil**.

Example To see the effect of *transparent-color-index*, edit **examples/capi/graphics/images.lisp**.

Specify a non-white **:background** for the *viewer* pane. Use an image editing tool to find the transparent color index (183 in this image) and change the call to **read-external-image** like this:

```
(gp:read-external-image file :transparent-color-index
183)
```

Then compile and run the example, click the **Change...** button and select the **Setup.bmp** file.

See also **external-image**

rectangle-bind *Macro*

Summary Binds four variables to the corners of a rectangle across a body of code.

Package **graphics-ports**

Signature **rectangle-bind ((***a b c d***)** *rectangle***) &body** *body* **=>** *result*

Arguments

a	A variable.
b	A variable.
c	A variable.
d	A variable.
rectangles	A rectangle.
body	A body of code.

Values

result	The return value of the last form in *body*.

Description The **rectangle-bind** macro binds the variables *a b c d* to *left top right bottom* of *rectangle* for the *body* of the macro.

rectangle-bottom *Macro*

Summary Get and sets the *bottom* element of a rectangle.

Package **graphics-ports**

Signature **rectangle-bottom** *rectangle* **=>** *bottom*

Signature **(setf rectangle-bottom)** *bottom rectangle* **=>** *bottom*

Arguments *rectangle* A rectangle.

Values *bottom* A real number.

Description Returns and via **setf** sets the *bottom* element of *rectangle*.

rectangle is a list of numbers (*left top right bottom*).

rectangle-height *Macro*

Summary Returns the *height* element of a rectangle.

Package **graphics-ports**

Signature **rectangle-height** *rectangle* **=>** *height*

Arguments *rectangle* A rectangle.

Values *height* A real number.

Description The **rectangle-height** macro returns the difference between the *bottom* and *top* elements of *rectangle*.

rectangle is a list of numbers (*left top right bottom*).

rectangle-left *Macro*

Summary Gets and set the *left* element of a rectangle.

Package **graphics-ports**

Signature **rectangle-left** *rectangle* **=>** *left*

Signature **(setf rectangle-left)** *left rectangle* **=>** *left*

Arguments *rectangle* A rectangle.

Values *left* A real number.

Description The **rectangle-left** macro returns and via **setf** sets the *left* element of *rectangle*.

rectangle is a list of numbers (*left top right bottom*).

rectangle-right *Macro*

Summary Gets aand sets the *right* element of a rectangle.

Package **graphics-ports**

Signature **rectangle-right** *rectangle* **=>** *right*

Signature **(setf rectangle-right)** *right rectangle* **=>** *right*

Arguments *rectangle* A rectangle.

Values *right* A real number.

Description The **rectangle-right** macro returns and via **setf** sets the *right* element of *rectangle*.

rectangle is a list of numbers (*left top right bottom*).

rectangle-top *Macro*

Summary Gets and sets the *top* element of a rectangle.

Package **graphics-ports**

Signature **rectangle-top** *rectangle* **=>** *top*

Signature **(setf rectangle-top)** *top rectangle* **=>** *top*

Arguments *rectangle* A rectangle.

Values *top* A real number.

Description The **rectangle-top** macro returns and via **setf** sets the *top* element of *rectangle*.

rectangle is a list of numbers (*left top right bottom*).

rectangle-union *Function*

Summary Returns the four values representing a union of two rectangles.

Package **graphics-ports**

Signature **rectangle-union** *left-1 top-1 right-1 bottom-1*
left-2 top-2 right-2 bottom-2
=> *left, top, right, bottom*

Arguments *left-1* A real number.

top-1 A real number.

right-1 A real number.

bottom-1 A real number.

left-2 A real number.

	top-2	A real number.
	right-2	A real number.
	bottom-2	A real number.
Values	*left*	A real number.
	top	A real number.
	right	A real number.
	bottom	A real number.

Description The **`rectangle-union`** function returns four values: the *left*, *top*, *right* and *bottom* of the union of the two rectangles specified in the arguments. The values input for the two rectangles are ordered by this function before it uses them.

See also **`ordered-rectangle-union`**

rectangle-width *Macro*

Summary Returns the difference between the *left* and *right* elements of a rectangle.

Package **`graphics-ports`**

Signature **`rectangle-width`** *rectangle* **`=>`** *width*

Arguments	*rectangle*	A rectangle
Values	*width*	A real number

Description The **`rectangle-width`** macro returns the difference between *right* and *left* elements of *rectangle*.

rectangle is a list of numbers (*left top right bottom*).

rect-bind *Macro*

Summary — Binds four variables to the elements of a rectangle across a body of code.

Package — **graphics-ports**

Signature — **rect-bind ((***x y width height***) *rectangle*) &body *body* => *result***

Arguments

x	A variable.
y	A variable.
width	A variable.
height	A variable.
rectangle	A rectangle.
body	A body of Lisp code.

Values

result	The return value of the last form in *body*.

Description — The **rect-bind** macro binds *x y width height* to the appropriate values from *rectangle* and executes the *body* forms. The *rectangle* is a list of the form (*left top right bottom*).

register-image-load-function *Function*

Summary — Registers one or more image identifiers with an image loading function.

Package — **graphics-ports**

Signature — **register-image-load-function** *image-id image-load-function* **&key** *image-translation-table*

Arguments

image-id	An image identifier or a list of image identifiers.

image-load-function

A function.

image-translation-table

An image translation table.

Description

The **register-image-load-function** function registers one or more *image-ids* with an *image-load-function* in the *image-translation-table*. If *image-load-function* is **nil** it causes the default loader to be used in subsequent calls to **load-image**. The *image-id* argument can be a list of identifiers or a single identifier. The default value of *image-translation-table* is ***default-image-translation-table***.

See also

default-image-translation-table
load-image

register-image-translation *Function*

Summary

Registers an image identifier and image loading function with a translation in an image translation table.

Package

graphics-ports

Signature

register-image-translation *image-id translation* **&key** *image-translation-table image-load-fn*

Arguments

image-id An image identifier.

translation An image translation.

image-translation-table

An image translation table.

image-load-fn An image loading function.

Description The **register-image-translation** function registers *image-id* and *image-load-fn* with the *translation* in the *image-translation-table*. When **load-image** is called with second argument *image-id*, the *image-load-fn* is called with *translation* as its second argument. If *image-load-fn* is **nil**, the image translation table's default image loader is used; this converts an external image object or file to an image. If *translation* is **nil** the identifier is deregistered. Returns the *image-id* and the *image-load-fn*. The default value of *image-translation-table* is ***default-image-translation-table***.

See also ***default-image-translation-table***
load-image
reset-image-translation-table

reset-image-translation-table *Function*

Summary Clears the image translation table hash tables.

Package **graphics-ports**

Signature **reset-image-translation-table &key** *image-translation-table*

Arguments *image-translation-table*

An image translation table.

Description The **reset-image-translation-table** function clears the image translation table hash tables and set the default *image-load-fn* to **read-and-convert-external-image**. The default value of *image-translation-table* is ***default-image-translation-table***.

See also ***default-image-translation-table***
read-and-convert-external-image
register-image-translation

separation *Function*

Summary Returns the distance between two points.

Package **graphics-ports**

Signature **separation** *x1 y1 x2 y2* **=>** *dist*

Arguments

x1	An integer.
y1	An integer.
x2	An integer.
y2	An integer.

Values

dist	A real number.

Description The **separation** function returns the distance between points (*x1 y1*) and (*x2 y2*).

set-default-image-load-function *Function*

Summary Sets the default image load function of an image translation table.

Package **graphics-ports**

Signature **set-default-image-load-function** *image-load-function*
&key *image-translation-table*

Arguments

image-load-function

An image load function.

image-translation-table

An image translation function.

Description The **set-default-image-load-function** function sets the default image load function of *image-translation-table*. The default image load function is **read-and-convert-external-image**. The default value of *image-translation-table* is ***default-image-translation-table***.

set-graphics-port-coordinates *Function*

Summary Modifies the transform of a port such that the edges of the port correspond to the arguments given.

Package **graphics-ports**

Signature **set-graphics-port-coordinates** *port* **&key** *left top right bottom*

Arguments

port	A graphics port.
left	A real number.
top	A real number.
right	A real number
bottom	A real number.

Description The generic function **set-graphics-port-coordinates** modifies the transform of the graphics port *port* permanently such that the edges of *port* correspond to the values of the other arguments.

Example The following code

```
(set-graphics-port-coordinates port :left -1.0
                                    :top 1.0
                                    :right 1.0
                                    :bottom -1.0)
```

changes the coordinates of the port so that the point (0 0) is in the exact center of the port and the edges are a unit distance away, with a right-handed coordinate system.

By default, *left* and *top* are 1.

set-graphics-state *Function*

Summary Directly alters the **graphics-state** of a graphics port according to the keyword arguments supplied.

Package **graphics-ports**

Signature **set-graphics-state** *port* **&rest** *args* **&key** *transform foreground background operation stipple pattern fill-style thickness scale-thickness dashed dash line-end-style line-joint-style mask mask-x mask-y font shape-mode text-mode compositing-mode mask-transform*

Arguments *port* A graphics port.

Description The function **set-graphics-state** directly alters the graphics state of *port* according to the values of the keyword arguments *args*. Unspecified keywords leave the associated slots unchanged.

See **graphics-state** for valid values for *args*.

See also **graphics-state**
with-graphics-state

transform *Type*

Summary The transform type, defined for transform objects.

Package **graphics-ports**

Description The **transform** type is the type defined for transform objects, which are six-element lists of numbers.

See also **graphics-port-transform**

transform-area *Function*

Summary Transforms a set of points and returns the resulting rectangle.

Package **graphics-ports**

Signature **transform-area** *transform x y width height* **=>** *rectangle*

Arguments

transform	A transform.
x	A real number.
y	A real number.
width	A real number.
height	A real number.

Values

rectangle	A rectangle.

Description The **transform-area** function transforms the points (*x y*) and (*x+width y+height*) and returns the transformed rectangle as (*x y width height*) values.

transform-distance *Function*

Summary Transforms a distance vector by the rotation and scale of a transform.

Package **graphics-ports**

Signature **transform-distance** *transform dx dy* **=>** *dx2, dy2*

Arguments	*transform*	A transform.
	dx	A real number.
	dy	A real number.
Values	*dx2*	A real number.
	dy2	A real number.

Description The **`transform-distance`** function transforms the distance (*dx dy*) by the rotation and scale in the *transform*. The translation in the transform is ignored. Transformed (*dx dy*) is returned as two values.

transform-distances *Function*

Summary Transforms a list of alternating distance vectors by a given transform.

Package **`graphics-ports`**

Signature **`transform-distances`** ***transform distances*** **`=>`** ***result***

Arguments	*transform*	A transform.
	distances	A list of pairs of real numbers.
Values	*result*	A list of pairs of real numbers.

Description The **`transform-distances`** function transforms a list of alternating (*dx dy*) pairs in *distances* by the *transform*. Transformed values are returned as a new list.

transform-is-rotated *Function*

Summary Returns **`t`** if a given transform contains a rotation.

Package **graphics-ports**

Signature **transform-is-rotated** *transform* **=>** *bool*

Arguments
- *transform* — A transform.

Values
- *bool* — A boolean.

Description The **transform-is-rotated** function returns **t** if *transform* contains any rotation.

transform-point *Function*

Summary Transforms a point by multiplying it by a transform.

Package **graphics-ports**

Signature **transform-point** *transform x y* **=>** *xnew ynew*

Arguments
- *transform* — A transform.
- *x* — A real number.
- *y* — A real number.

Values
- *xnew* — A real number.
- *ynew* — A real number.

Description The **transform-point** function transforms the point (*x y)* by multiplying it by *transform*. The transformed (*x y*) is returned as two values.

transform-points *Function*

Summary Transforms a list of points by a transform.

Package **graphics-ports**

Signature **transform-points** *transform points* **&optional** *into* **=>** *result*

Arguments

transform	A transform.
points	A list of pairs of real numbers.
into	A list.

Values

result	A list of pairs of real numbers.

Description The **transform-points** function transforms a list of alternating (*x y*) pairs in *points* by the *transform*. If *into* is supplied it is modified to contain the result and must be a list the same length as *points*. If *into* is not supplied, a new list is returned.

transform-rect *Function*

Summary Returns the transform of two points representing the top-left and bottom-right of a rectangle.

Package **graphics-ports**

Signature **transform-rect** *transform left top right bottom* **=>** *left2 top2 right2 bottom2*

Arguments

transform	A transform.
left	A real number.
top	A real number.
right	A real number.
bottom	A real number.

Values

left2	A real number.
top2	A real number.

	right2	A real number.
	bottom2	A real number.

Description The **`transform-rect`** function transforms the rectangle represented by the two points (*left top*) and (*right bottom*) by *transform*.

undefine-font-alias *Function*

Summary Removes a font alias.

Package **`graphics-ports`**

Signature **`undefine-font-alias`** *keyword*

Arguments		
	keyword	A keyword.

Description The **`undefine-font-alias`** function removes the font alias named by *keyword*.

union-rectangle *Macro*

Summary Modifies a rectangle to be a union of itself and another rectangle.

Package **`graphics-ports`**

Signature **`union-rectangle`** *rectangle left top right bottom* **`=>`** *rectangle*

Arguments		
	rectangle	A rectangle.
	left	A real number.
	right	A real number.
	top	A real number.

	bottom	A real number.
Values	*rectangle*	A rectangle.

Description The **`union-rectangle`** macro modifies the *rectangle* to be the union of *rectangle* and **`(`***left top right bottom***`)`**.

unit-transform *Variable*

Summary The list **`(1 0 0 1 0 0)`**.

Package **`graphics-ports`**

Signature **`*unit-transform*`**

Description The **`*unit-transform*`** variable holds the list **`(1 0 0 1 0 0)`** which is the unit transform I, such that X = XI, where X is a 3-vector. Graphics ports are initialized with the unit transform in their **`graphics-state`**. This means that port coordinate axes are initially the same as the window axes.

unit-transform-p *Function*

Summary Returns **`t`** if a given transform is a unit transform.

Package **`graphics-ports`**

Signature **`unit-transform-p`** ***transform*** **`=>`** ***bool***

Arguments	*transform*	A transform.
Values	*bool*	A boolean.

Description The **`unit-transform-p`** returns **`t`** if *transform* is the unit transform.

unless-empty-rect-bind *Macro*

Summary Binds the elements of a rectangle to four variables, and if the rectangle has a non-zero area, executes a body of code.

Package **graphics-ports**

Signature **unless-empty-rect-bind ((*x y width height*) *rectangle*) &body *body* => *result***

Arguments

x	A variable.
y	A variable.
width	A variable.
height	A variable.
rectangle	A rectangle.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description The **unless-empty-rect-bind** macro binds *x*, *y*, *width*, and *height* to the appropriate values from *rectangle* and if the *width* and *height* are both positive, executes the *body* forms.

untransform-distance *Function*

Summary Transforms a distance by the rotation and scale of the inverse of a given transform.

Package **graphics-ports**

Signature **untransform-distance** *transform dx dy* **=>** *x, y*

Arguments

transform	A transform.

	dx	A real number.
	dy	A real number.
Values	*x*	A real number.
	y	A real number.

Description The **untransform-distance** function transform the distance (*dx dy*) by the rotation and scale of the effective inverse of *transform*. The translation in the inverse transform is ignored. The transformed distance (*dx dy*) is returned as two values.

untransform-distances *Function*

Summary Transforms a list of integer pairs representing distances by the inverse of a transform.

Package **graphics-ports**

Signature **untransform-distances** *transform distances* **=>** *result*

Arguments	*transform*	A transform.
	distances	A list of pairs of real numbers.
Values	*result*	A list of pairs of real numbers.

Description The **untransform-distances** function transforms a list of alternating (*dx dy*) pairs in *distances* by the effective inverse of *transform*. Transformed values are returned as a new list.

untransform-point *Function*

Summary Transforms a point by multiplying it by the inverse of a given transform.

Package **graphics-ports**

Signature **untransform-point** *transform x y* **=>** *x2, y2*

Arguments

transform	A transform.
x	A real number.
y	A real number.

Values

x2	A real number.
y2	A real number.

Description The **untransform-point** function transform the point (*x y*) by effectively multiplying it by the inverse of *transform*. The transformed (*x y*) is returned as two values.

untransform-points *Function*

Summary Transforms a list of points by the inverse of a given transform.

Package **graphics-ports**

Signature **untransform-points** *transform points* **&optional** *into* **=>** *result*

Arguments

transform	A transform.
points	A list of pairs of real numbers.
into	A list.

Values

result	A list of pairs of real numbers.

Description The **untransform-points** function transforms a list of alternating (*x y*) pairs in *points* by the effective inverse of *transform*. If *into* is supplied it must be a list the same length as *points*. If *into* is not supplied, a new list is returned.

validate-rectangle *Generic Function*

Summary — Validates the rectangle associated with the object, marks it as already drawn.

Package — **graphics-ports**

Signature — **validate-rectangle** *object* **&optional** *x y width height* => *result*

Arguments

object	An instance of a subclass of **graphics-ports-mixin** or a subclass of **pinboard-object**.
x	A real number.
y	A real number.
width	A real number.
height	A real number.

Values

result	A boolean.

Description — The given area of *object* is marked as not needing to be displayed. This can be useful if you want to draw that area immediately and avoid it being drawn again by the window system. By default it validates the whole rectangle, but this can be limited by passing the **&optional** arguments.

The *result* is non-**nil** if the function succeeds and **nil** if it fails (doing nothing).

Notes — **validate-rectangle** is not fully implemented on all platforms.

On Windows, it succeeds for all valid values of *x*, *y*, *width* and *height*.

On Cocoa, it fails if *x*, *y*, *width* and *height* are passed.

On Motif, it fails in all cases.

See also **invalidate-rectangle**

with-dither *Macro*

Summary Specifies a dither for use within a specified body of code.

Package **graphics-ports**

Signature **with-dither (***dither-or-size***) &body** ***body*** **=>** ***result***

Arguments

dither-or-size	See Description.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description The **with-dither** function specifies a dither for use within *body*. The *dither-or-size* argument can be a dither mask object from **make-dither** or a size, in which case a dither of that size is created.

Note: dithers do not affect drawing or the anti-aliasing that occurs when drawing in Cocoa.

See also **dither-color-spec**
make-dither
initialize-dithers

with-graphics-mask *Macro*

Summary Binds the *mask* slot of a port's graphics state across the execution of a body of code.

Package **graphics-ports**

Signature **with-graphics-mask** (*port mask* **&key** *mask-x mask-y mask-transform*) **&body** *body* **=>** *result*

Arguments

port	A graphics port.
mask	**nil** or a list specifying a shape.
mask-x	An integer. This argument is deprecated.
mask-y	An integer. This argument is deprecated.
mask-transform	**nil**, **t**, the keyword **:dynamic**, or a transform.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description

The macro **with-graphics-mask** binds the *mask* slot of *port*'s **graphics-state** while evaluating *body*. The mask can be a rectangular area specified by a list of the form (*x y width height*) or a path specified by a list of the form (**:path** *path* **:fill-rule** *fill-rule*).

mask-x and *mask-y* are deprecated. They work only when the *drawing-mode* is **:compatible** and the platform is GTK+ or X11/Motif. By default, *mask-x* and *mask-y* are both 0.

The *mask-transform* argument is used to set the *mask-transform* graphics state parameter. If *mask-transform* is **nil**, then the *mask* is not transformed. If *mask-transform* is **t**, then the *mask* is transformed by the current graphics state transform at the time that **with-graphics-mask** is used. If *mask-transform* is **:dynamic**, then the *mask* is transformed by the graphics state transform that is in effect when the drawing operation uses the mask. Otherwise *mask-transform* should be a transform object. The default value of the *mask-transform* argument is **nil**.

Examples This example file demonstrates the use of *mask-transform*:

examples/capi/graphics/paths.lisp

See also **graphics-state**

with-graphics-post-translation *Macro*

Summary Like **with-graphics-translation** except that the translation is done after applying all existing transforms.

Signature **with-graphics-post-translation (*port dx dy*) &body *body* => *result***

Arguments

port	A graphics port.
dx	A real number.
dy	A real number.
body	Lisp forms.

Values

result	The value returned by the last form of *body*.

Description The macro **with-graphics-post-translation** is the same as **with-graphics-translation**, but the translation is done after applying all existing transforms. That means that the translation is "absolute", not transformed. In contrast, when using **with-graphics-translation** the translation is transformed by any existing transform(s).

Examples This form draws a 40x40 rectangle at (100,100), because the scale is applied to the coordinates of the rectangle, but not to the translation.

```
(gp:with-graphics-scale (port 2 2)
  (gp:with-graphics-post-translation (port 100 100)
    (gp:draw-rectangle port 0 0 20 20)))
```

Compare with this form, using **with-graphics-translation** instead, which draws a 40x40 rectangle at (200,200), because the scale applies to the translation too:

```
(gp:with-graphics-scale (port 2 2)
  (gp:with-graphics-translation (port 100 100)
    (gp:draw-rectangle port 0 0 20 20)))
```

See also **with-graphics-transform-reset**
with-graphics-translation

with-graphics-rotation *Macro*

Summary Performs a call to **apply-rotation** with a given angle for the duration of the macro's body.

Package **graphics-ports**

Signature **with-graphics-rotation (***port angle***) &body** *body* **=>** *result*

Arguments

port	A graphics port.
angle	A real number.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description The **with-graphics-rotation** macro performs a call to

(apply-rotation *transform angle***)**

on the port's transform for the duration of the body of the macro.

angle is in radians. If *angle* is positive, then the rotation is clockwise.

Examples **examples/capi/graphics/catherine-wheel.lisp**

See also **apply-rotation**

with-graphics-scale *Macro*

Summary Performs a call to **apply-scale** with a given scale for the duration of the macro's body.

Package **graphics-ports**

Signature **with-graphics-scale (***port sx sy***) &body** *body* **=>** *result*

Arguments

port	A graphics port.
sx	A real number.
sy	A real number.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description The **with-graphics-scale** macro performs a call to

(apply-scale *transform sx sy***)**

on the port's transform for the duration of the body of the macro.

See also **apply-scale**

with-graphics-state *Macro*

Summary Binds the graphics state values of a port to a list of arguments and executes a body of code.

Package **graphics-ports**

Signature

with-graphics-state (*port* **&rest** *args* **&key** *transform foreground background operation thickness scale-thickness dashed dash line-end-style line-joint-style mask font state fill-style stipple pattern mask-x mask-y shape-mode text-mode compositing-mode mask-transform*) *body* **=>** *result*

Arguments

port	A graphics port.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description

The **with-graphics-state** macro binds the graphics state values for the specified port to the values specified in the *args* list. The keyword arguments *args* correspond to the slots in the graphics state, as described in **graphics-state**.

For example:

```
(with-graphics-state (port :thickness 12
                           :foreground my-color) ...)
```

Arguments that are not supplied default to the current state of that slot in the **graphics-state**. The arguments *fill-style* and *stipple* are used only on Unix.

mask-x and *mask-y* are deprecated. They work only when the *drawing-mode* is **:compatible** and the platform is GTK+ or X11/Motif.

An extra keyword argument **:state** can be used. The value must be a **graphics-state** object created by a call to **make-graphics-state**. The contents of the **graphics-state** object passed are used instead of the *port*'s state.

Example

```
(setf gstate (make-graphics-state))

(setf (graphics-state-foreground gstate) my-color)

(with-graphics-state (port :state gstate)
  (draw-rectangle port image-1 100 100))
```

See also
graphics-state
set-graphics-state
with-graphics-translation
with-graphics-post-translation
with-graphics-scale
with-graphics-rotation
with-graphics-transform
with-graphics-transform-reset
with-graphics-mask

with-graphics-transform *Macro*

Summary
Combines a given transform with the transform of a port for the duration of the macro.

Package
graphics-ports

Signature
with-graphics-transform (*port transform***) &body** *body*
=> *result*

Arguments

port	A graphics port.
transform	A transform.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description
The **with-graphics-transform** macro combines the transform associated with the graphics port *port* with *transform* during the body of the macro. The port is given a new transform obtained by pre-multiplying its current transform with *transform*. This has the effect of *preceding* any translation, scaling and rotation operations specified in the body of the macro by those operations embodied in *transform*.

Examples **examples/capi/graphics/metafile-rotation.lisp**

with-graphics-transform-reset *Macro*

Summary Like **with-graphics-transform** except that it ignores existing transforms.

Signature **with-graphics-transform-reset (***port* **&optional** *transform***) &body** *body* **=>** *result*

Arguments

port	A graphics port.
transform	A transform.
body	Lisp forms.

Values

result	The value returned by the last form of *body*.

Description The macro **with-graphics-transform-reset** works the same as **with-graphics-transform** except that it ignores existing transforms.

If the argument *transform* is **nil**, the *body* is applied without transform (that is, with the unit transform).

Examples This form ignores the translation, and applies only the explicit transform (which is really just scale), so that the overall effect is to draw a 30x20 rectangle at (0,0).

```
(gp:with-graphics-translation (port 100 100)
  (gp:with-graphics-transform-reset (port (gp:make-
transform 3 0 0 2 0 0 ))
    (gp:draw-rectangle port 0 0 10 10)))
```

Compare with using **with-graphics-transform**, which applies both the translation and the explict transform, so that the overall effect is to draw a rectangle 30x20 at (100,100).

```
(gp:with-graphics-translation (port 100 100)
  (gp:with-graphics-transform (port (gp:make-transform
3 0 0 2 0 0 ))
    (gp:draw-rectangle port 0 0 10 10)))
```

See also **with-graphics-post-translation**
with-graphics-transform

with-graphics-translation *Macro*

Summary Applies a translation to a given port for the duration of the macro.

Package **graphics-ports**

Signature **with-graphics-translation (***port dx dy***) &body** *body* **=>** *result*

Arguments

port	A graphics port.
dx	A real number.
dy	A real number.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description The **with-graphics-translation** macro performs a call to

(apply-translation *transform dx dy***)**

on the port's transform for the duration of body of the macro.

Examples **examples/capi/graphics/catherine-wheel.lisp**

with-inverse-graphics *Macro*

Summary — Executes all drawing function calls to a given port within the body of the macro with *foreground* and *background* colors swapped.

Package — **graphics-ports**

Signature — **with-inverse-graphics (***port***) &body** *body* **=>** *result*

Arguments

port	A graphics port.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description — The macro **with-inverse-graphics** ensures that all drawing function calls to *port* within the body of the macro are executed with the *foreground* and *background* slots of the **graphics-state** of *port* swapped.

without-relative-drawing *Macro*

Summary — Evaluates a body of Lisp code with the *relative* and *collect* internal variables of the port set to **nil**.

Package — **graphics-ports**

Signature — **without-relative-drawing (***port***) &body** *body* **=>** *result*

Arguments

port	A graphic port.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description The **with-relative-drawing** macro evaluates the code in *body* with the *relative* and *collect* internal variables of the pixmap graphics port *port* set to **nil** to turn off the port's collecting of drawing bounds and automatic shifting of its origins. Use this macro only within a **with-pixmap-graphics-port** macro.

with-pixmap-graphics-port *Macro*

Summary Binds a port to a new pixmap graphics port for the duration of the macro's code body.

Package **graphics-ports**

Signature **with-pixmap-graphics-port (***port pane width height* **&key** *background collect relative clear drawing-mode***) &body** *body***) => ***result*

Arguments

port	A graphics port.
pane	An output pane.
width	An integer.
height	An integer.
background	A color keyword.
collect	A boolean.
relative	A boolean.
clear	A list or **t**.
drawing-mode	One of the keywords **:compatible** and **:quality**.
body	A body of Lisp code.

Values

result	The return value of the last form executed in *body*.

Description The **with-pixmap-graphics-port** macro binds *port* to a new pixmap graphics-port. *pane* and the other arguments are passed to **create-pixmap-port**. The *body* is then evaluated. The port is destroyed when *body* returns.

The *background* and *foreground* default to the values in the graphics state of *pane*.

Example In the code below the background in *p2* inherits from *p1*, so it draws two green rectangles.

```
(let ((op (capi:contain
           (make-instance 'capi:output-pane
                          :background :red))))
  (sleep 0.1)
  (gp:with-pixmap-graphics-port (p1 op 20 30
                                    :background :green
                                    :clear t)
    (gp:with-pixmap-graphics-port (p2 p1 20 30 :clear t)
      (gp:copy-pixels op p1 10 10 20 30 0 0)
      (gp:copy-pixels op p2 10 60 20 30 0 0))))
```

with-transformed-area *Macro*

Summary Transforms a rectangle using a port's transform, and binds the resulting values to a variable across the evaluation of the macro's body.

Package **graphics-ports**

Signature **with-transformed-area** (*points port left top right bottom*) **&body** *body*

Arguments

points	A variable.
port	A graphics port.
left	A real number.
top	A real number.
right	A real number.

	bottom	A real number.
	body	A body of Lisp code.
Values	*result*	The return value of the last form executed in *body*.

Description The **`with-transformed-area`** macro transforms a rectangle, binding the resulting four corner points to *points* for the duration of *body*. The *left top right bottom values* represent a rectangular area bounded by four points. The four points are transformed by the *port*'s transform and the list of eight values (alternating *x* and *y* values for four points) bound to the *points* variable for the duration of the macro body.

with-transformed-point *Macro*

Summary Binds a point transformed by a given ports transform to two variables across the body of the macro.

Package **`graphics-ports`**

Signature **`with-transformed-point (`*new-x new-y port x y*`) &body` *body* **`=>`** *result*

Arguments	*new-x*	A variable.
	new-y	A variable.
	port	A graphics port.
	x	A real number.
	y	A real number.
	body	A body of Lisp code.
Values	*result*	The return value of the last form executed in *body*.

Description The **with-transformed-point** macro transforms the point given by (*x y*) using the *port*'s transform and the resulting values are bound to the *new-x* and *new-y* variables. The *body* of the macro is then evaluated with this binding.

with-transformed-points *Macro*

Summary Binds a list of transformed points in a port to a list across the execution of the macro's body.

Package **graphics-ports**

Signature **with-transformed-points (***points port***) &body** *body* **=>** *result*

Arguments

points	A list of real numbers.
port	A graphics port.

Values

result	The return value of the last form executed in *body*.

Description The **with-transformed-points** macro binds *points* to a new list of *x* and *y* values obtained by post-multiplying them by the current transform of *port*, and then evaluates *body*. The *points* symbol must be bound to a list of alternating *x* and *y* values representing coordinate points in the *port*.

with-transformed-rect *Macro*

Summary Transforms the coordinates of a rectangle and binds them to four variables for the duration of the macro's body.

Package **graphics-ports**

Signature **with-transformed-rect (***nx1 ny1 nx2 ny2 port x1 y1 x2 y2***) &body** *body* **=>** *result*

Arguments	*nx1*	A variable.
	ny1	A variable.
	nx2	A variable.
	ny2	A variable.
	port	A graphics port.
	x1	A real number.
	y1	A real number.
	x2	A real number.
	y2	A real number.
	body	A body of Lisp code.
Values	*result*	The return value of the last form executed in *body*.

Description During the evaluation of the **`with-transformed-rect`** macro *body*, the two points (*x1, y1*) and (*x2, y2*) are transformed by the port's current transform and the resulting values bound to the variables named by the *nx1 ny1 nx2 ny2* args.

write-external-image *Function*

Summary Writes external image data to a file.

Package **`graphics-ports`**

Signature **`write-external-image`** *external-image file* **`&key`** *if-exists*

Arguments	*external-image*	An **`external-image`**.
	file	A file.
	if-exists	A keyword.

Description

The **write-external-image** function writes an external image to a file *file*. It writes the image data byte-for-byte without attempting any conversion of the image format.

if-exists is passed to **open** when opening *file*. The default value of *if-exists* is **:error**.

See also

externalize-image

3

COLOR Reference Entries

This chapter describes symbols available in the **color** package.

apropos-color-alias-names *Function*

Summary	Returns color aliases containing a given string.	
Package	**color**	
Signature	**apropos-color-alias-names** *substring* **=>** *list*	
Arguments	*substring*	A string.
Values	*list*	A list of symbols.
Description	Returns a list of symbols whose symbol-names contain *substring* and which are defined as aliases in the color-database defining color aliases. By convention these are in the keyword package.	

Example

In this example, a color alias is defined for the color **indianred1**. **apropos-color-alias-names** only returns this alias, rather than both the alias and the original color, despite the similarity in the names.

```
COLOR 8 > (define-color-alias :myindianred1
                              :indianred1)
(#S(COLOR-ALIAS COLOR :INDIANRED1))

COLOR 9 > (apropos-color-names "INDIANRED1")
(:INDIANRED1 :MYINDIANRED1)

COLOR 10 > (apropos-color-alias-names "INDIANRED1")
(:MYINDIANRED1)

COLOR 11 >
```

See also

apropos-color-names
apropos-color-spec-names
get-all-color-names

apropos-color-names *Function*

Summary

Returns colors and color aliases containing a given string.

Package

color

Signature

apropos-color-names *substring* **=>** *list*

Arguments

substring A string.

Values

list A list of symbols.

Description

Returns a list of symbols whose symbol-names contain *substring* and which are present in the color-database defining color aliases. By convention these are in the keyword package.

Example

```
COLOR-4> (color:apropos-color-names "RED")
 (:ORANGERED3 :ORANGERED1 :INDIANRED3 :INDIANRED1
  :PALEVIOLETRED :RED :INDIANRED :INDIANRED2
  :INDIANRED4 :ORANGERED :MEDIUMVIOLETRED
  :VIOLETRED :ORANGERED2 :ORANGERED4 :RED1 :RED2 :RED3
  :RED4 :PALEVIOLETRED1 :PALEVIOLETRED2 :PALEVIOLETRED3
  :PALEVIOLETRED4 :VIOLETRED3 :VIOLETRED1 :VIOLETRED2
  :VIOLETRED4)
```

See also

apropos-color-alias-names
apropos-color-spec-names
get-all-color-names

apropos-color-spec-names *Function*

Summary

Returns colors containing a given string.

Package

color

Signature

apropos-color-spec-names *substring* **=>** *list*

Arguments

substring A string.

Values

list A list of symbols.

Description

Returns a list of symbols whose symbol-names contain *substring* and which are defined as original entries in the color-database defining color aliases. By convention these are in the keyword package.

Example

```
COLOR 14 > (define-color-alias :mygray100 :gray100)
(#S(COLOR-ALIAS COLOR :GRAY100))

COLOR 15 > (apropos-color-names "GRAY100")
(:MYGRAY100 :GRAY100)

COLOR 16 > (ap]ropos-color-spec-names "GRAY100")
(:GRAY100)

COLOR 17 >
```

See also **apropos-color-alias-names**
apropos-color-names
get-all-color-names

color-alpha *Function*

Summary Returns the alpha component of a color specification.

Package **color**

Signature **color-alpha** *color-spec* **&optional** *default* **=>** *alpha*

Arguments
color-spec	A color specification.
default	A number between 0 and 1.

Values
alpha	The alpha component of *color-spec*.

Description *color-spec* is a color specification in any model.

color-alpha returns the alpha component of *color-spec*. If *color-spec* does not have an alpha component, then *default* is returned.

The default value of *default* is 1.0.

See also **make-hsv**
make-rgb
make-gray

color-<*component*> *Function*

Summary Returns the associated component of a color specification.

Package **color**

Signature

```
color-red color-spec => color-component
color-green color-spec => color-component
color-blue color-spec => color-component
color-hue color-spec => color-component
color-saturation color-spec => color-component
color-value color-spec => color-component
```

Arguments

color-spec A color specification.

Values

color-component A color component from the appropriate color model.

Description

If *color-spec* is not from the appropriate color model (**:rgb** in the case of **color-red**, **color-green** and **color-blue**, and **:hsv** in the case of **color-hue**, **color-saturation** and **color-value**) then the component is calculated.

Example

```
COLOR 31 > (color:make-rgb 1.0s0 0.0s0 0.0s0)
#(:RGB 1.0S0 0.0S0 0.0S0)

COLOR 32 > (color-red *)
1.0S0

COLOR 33 > (color-green **)
0.0S0

COLOR 34 > (color-value ***)
1.0S0

COLOR 35 >
```

See also

make-hsv
make-rgb
make-gray
color-model
color-level

color-database *Variable*

Summary

The current color-database.

Package **color**

Description This should contain definitions for all the colors used in the environment when you start it. Those colors are determinable from the file **config/colors.db**.

Example To replace the current color database with a new one, do the following:

```
(setf color:*color-database* (color:make-color-db))
```

See also **delete-color-translation**
read-color-db
load-color-database

color-level *Function*

Summary Returns the gray level of a color specification.

Package **color**

Signature **color-level** *color-spec* **=>** *gray-level*

Arguments *color-spec* A color specification.

Values *gray-level* Color component from the **:gray** model.

Description Return the gray level of *color-spec*. If *color-spec* is not from the **:GRAY** model, the component is calculated.

Example

```
COLOR 2 > (color:make-gray 0.66667s0)
#(:GRAY 0.66667S0)

COLOR 3 > (color-level *)
0.66667S0

COLOR 4 >
```

See also **make-hsv**
make-rgb
make-gray
color-model
color-<component>

color-model *Function*

Summary Returns the color-model for a color-spec.

Package **color**

Signature **color-model** *color-spec* **=>** *color-model*

Arguments *color-spec* A color specification.

Values color-model **:gray**, **:rgb**, or **:hsv**.

Example
```
COLOR 29 > (color:make-gray 0.66667s0)
#(:GRAY 0.66667S0)

COLOR 30 > (color-model *)
:GRAY

COLOR 31 >
```

See also **make-hsv**
make-rgb
make-gray
color-<component>
color-level

color-with-alpha *Function*

Summary Adds a specified alpha component to a color.

Package **graphics-ports**

Signature **color-with-alpha** *color alpha* **=>** *color-spec*

Arguments *color* A color specification.

alpha A real in the inclusive range [0,1].

Values *color-spec* A color specification, or **nil**.

Description The function **color-with-alpha** returns a color like the argument *color* but with alpha component *alpha*.

color needs to be a color specification, either a keyword naming a color (a member of the result of calling **get-all-color-names**), or a color-spec (for example the result of **make-rgb**).

alpha must be a real in the inclusive range [0,1], otherwise an error is signaled. *alpha* = 0 means *color-spec* is transparent, *alpha* = 1 means it is solid.

color-with-alpha returns a color-spec, or **nil** if *color* is not recognized.

See also **get-all-color-names**
make-rgb

colors= *Function*

Summary Tests to see if two colors are equal.

Package **color**

Signature **colors=** *color1 color2* **&optional** *tolerance* **=>** *bool*

Arguments *color1* A color specification.

color2 A color specification.

	tolerance	A tolerance level within which *color1* and *color2* may vary. The default value is **`0.001s0`**.
Values	*bool*	**`t`** if the two colors are equal within the given tolerance, **`nil`** otherwise.

Description Return **`t`** if the two colors are equal to the given tolerance.

See also **`ensure-<command>`**
`convert-color`

convert-color *Function*

Summary Return the representation of a color specification on a given graphics port.

Package **`color`**

Signature **`convert-color`** *port color* **`&key`** *errorp* **`=>`** *color-rep*

Arguments	*port*	A graphics port.
	color	A color specification.
	errorp	If **`t`**, check for errors. By default, this is **`t`**.
Values	*color-rep*	Representation of *color* on *port*.

Description Return the representation of *color* on the given graphics port *port*. In CLX, this is the "pixel" value, which corresponds to an index into the default colormap. It is more efficient to use the result of **`convert-color`** in place of its argument in drawing function calls, but the penalty is the risk of erroneous colors being displayed should the colormap or the colormap entry be changed.

See also **colors=**
ensure-<command>
unconvert-color

define-color-alias *Function*

Summary Lets you define an alias for a color specification or alias.

Package **color**

Signature **define-color-alias** *name color* **&optional** *if-exists* **=>** *alias*

Arguments

name	The name of the new alias.
color	A color specification for the new alias.
if-exists	This can be one of the following: **:replace** — Replace any existing alias. **:error** — Raise an error if alias is already defined. **:ignore** — Ignore redefinition of an alias. By default, it is **:replace**.

Values

alias	The color alias.

Description Define *name* to be a color alias for *color*, which may be another color alias or a color-spec.

Example 1

```
COLOR 16 > (define-color-alias :mygray :darkslategray)
(#S(COLOR-ALIAS COLOR :DARKSLATEGRAY))

COLOR 17 > (define-color-alias :mygray :darkslategray
                               :error)
```

```
Error: :MYGRAY names an existing alias for #(:RGB
0.1843133S0 0.309803S0 0.309803S0)
  1 (continue) Replace :MYGRAY with the alias
:DARKSLATEGRAY
  2 Continue, without redefining alias :MYGRAY
  3 Try a new name for the alias, instead of :MYGRAY
  4 (abort) Return to level 0.
  5 Return to top loop level 0.
  6 Destroy process.

Type :c followed by a number to proceed or type :? for
other options

COLOR 18 : 1 >
```

Example 2

```
COLOR 19 > (define-color-alias :lispworks-blue
                (make-rgb 0.70s0 0.90s0 0.99s0))
(#S(COLOR-ALIAS COLOR #(:RGB 0.699999S0 0.9S0 0.99S0)))

COLOR 20 >
```

See also **get-color-alias-translation**
get-color-spec

define-color-models *Macro*

Summary Defines *all* the color models.

Package **color**

Signature **define-color-models** *model-descriptors* **=>** *color-models*

Arguments *model-descriptors* A list, each element being a model-descriptor.

Values *color-models* The color models defined.

Description A model descriptor has the syntax:

(*model-name component-descr****)**

A *component-descr* is a list:

(*component-name lowest-value highest-value*)

The default color models are defined by the following form:

```
(define-color-models ((:rgb (red 0.0 1.0)
                            (green 0.0 1.0)
                            (blue 0.0 1.0))
                      (:hsv (hue 0.0 5.99999)
                            (saturation 0.0 1.0)
                            (value 0.0 1.0))
                      (:gray (level 0.0 1.0))))
```

If you want to keep existing color models, add your new ones to this list: only one **define-color-models** form is recognized. The form should be compiled.

Example

To replace the HSV color model with a CMYK model, while retaining the other color models:

```
(define-color-models ((:rgb (red 0.0 1.0)
                            (green 0.0 1.0)
                            (blue 0.0 1.0))
                      (:cmyk (cyan 0.0 1.0)
                             (magenta 0.0 1.0)
                             (yellow 0.0 1.0)
                             (black 0.0 1.0)
                      (:gray (level 0.0 1.0))))
```

delete-color-translation *Function*

Summary

Removes an entry from the color-database.

Package

color

Signature

delete-color-translation *color-name* **=> <no values>**

Arguments

color-name A defined color spec or alias.

Values

None.

Description

Both original entries and aliases can be removed.

See also **load-color-database**
color-database
read-color-db

ensure-<*command*> *Function*

Summary Return a color specification for a given model. The model depends on the particular function called

Package **color**

Signature
ensure-rgb *color-spec* **=>** *result*
ensure-hsv *color-spec* **=>** *result*
ensure-gray *color-spec* **=>** *result*
ensure-model-color *color-spec model* **=>** *result*
ensure-color *color-spec match-color-spec* **=>** *result*

Arguments For all functions:

color-spec A color specification.

match-color-spec A color specification.

model A color-model (**:rgb**, **:hsv** or **:gray**).

Values *result* A color specification.

Description These functions all return a color specification, given (at least) a color specification as argument.

ensure-rgb, **ensure-hsv** and **ensure-gray** all return a color specification in the appropriate model. If *color-spec* is in the same model, it is just returned. Otherwise a new color specification for that model is calculated. Thus, **ensure-rgb** returns a color specification in the RGB color model, whatever color model is used in *color-spec*.

If *color-spec* has an alpha component, then *result* has that same alpha component.

ensure-model-color is similar to the above three functions, except that a color-model *model* is explicitly passed as an argument to the function. The color-spec returned is in the color-model specified by *model*.

ensure-color returns a color specification for *color-spec*, in the color model specified by *match-color-spec*. Thus, color specifications may be converted from one model to another with having to explicitly state the color model.

Example

```
COLOR 36 > (ensure-hsv (make-rgb 0.70s0 0.90s0 0.99s0))
#(:HSV 4.31033S0 0.707069S0 0.99S0)

COLOR 37 > (ensure-gray (make-rgb 0.70s0 0.90s0
0.99s0))
#(:GRAY 0.863331S0)

COLOR 39 > (ensure-model-color (make-rgb 0.70s0 0.90s0
0.99s0) :hsv)
#(:HSV 4.31033S0 0.707069S0 0.99S0)

COLOR 43 > (ensure-color (make-hsv 0.70s0 0.90s0
0.99s0) (make-rgb 0.70s0 0.90s0 0.99s0))
#(:RGB 0.99S0 0.890999S0 0.92069924)
```

See also

convert-color
colors=

get-all-color-names *Function*

Summary Returns a list of all color-names in the color database.

Package **color**

Signature **get-all-color-names &optional** *sort* **=>** *color-names*

Arguments

sort	If **t**, sort list of color names alphanumerically. By default, this is **nil**.

Values color-names A list of all color names in the color database.

Description Returns a list of all color-names in the color database. By convention these are symbols in the keyword package. The returned list is alphanumerically sorted on the symbol-names if the optional argument is non-**nil**.

See also **apropos-color-names**
apropos-color-spec-names
apropos-color-alias-names

get-color-alias-translation *Function*

Summary Return the ultimate color name associated with *color-alias*.

Package **color**

Signature **get-color-alias-translation** *color-alias* **=> color-name**

Arguments *color-alias* A defined color alias.

Values *color-name* The color name associated with *color-alias*.

Example
```
COLOR 23 > (color:define-color-alias :lispworks-blue
                (color:make-rgb 0.70s0 0.90s0 0.99s0))
(#S(COLOR-ALIAS COLOR #(:RGB 0.699999S0 0.9S0 0.99S0)))

COLOR 24 > (color:define-color-alias
                :color-background :lispworks-blue)
(#S(COLOR-ALIAS COLOR :LISPWORKS-BLUE))

COLOR 25 > (color:define-color-alias
                :listener-background :color-background)
(#S(COLOR-ALIAS COLOR :COLOR-BACKGROUND))

COLOR 26 > (get-color-alias-translation
                    :listener-background)
:LISPWORKS-BLUE
```

```
COLOR 27 > (color:get-color-alias-translation
                  :color-background)
:LISPWORKS-BLUE

COLOR 28 >
```

See also **define-color-alias**
get-color-spec

get-color-spec *Function*

Summary Returns the color-spec for a color.

Package **color**

Signature **get-color-spec** *color* **=>** *color-spec*

Arguments
color A defined color specification, color alias, or an original color name.

Values
color-spec A color specification.

Description Returns the color-spec for *color*, which can be a color-spec, a color-alias, or an original color name.

Example

```
COLOR 28 > (color:define-color-alias :lispworks-blue
              (color:make-rgb 0.70s0 0.90s0 0.99s0))
(#S(COLOR-ALIAS COLOR #(:RGB 0.699999S0 0.9S0 0.99S0)))

COLOR 29 > (color:define-color-alias
              :color-background :lispworks-blue)
(#S(COLOR-ALIAS COLOR :LISPWORKS-BLUE))

COLOR 30 > (color:define-color-alias
              :listener-background :color-background)
(#S(COLOR-ALIAS COLOR :COLOR-BACKGROUND))

COLOR 31 > (get-color-spec :listener-background)
#(:RGB 0.699999S0 0.9S0 0.99S0)

COLOR 32 > (get-color-spec :color-background)
#(:RGB 0.699999S0 0.9S0 0.99S0)
```

```
COLOR 33 > (get-color-spec :lispworks-blue)
#(:RGB 0.699999S0 0.9S0 0.99S0)

COLOR 34 > (get-color-spec
             #(:RGB 0.70s0 0.90s0 0.99s0))
#(:RGB 0.699999S0 0.9S0 0.99S0)

COLOR 35 >
```

See also **define-color-alias**
get-color-alias-translation

load-color-database *Function*

Summary Loads a color database.

Package **color**

Signature **load-color-database** *data* **=> <no values>**

Arguments *data* A description of a color database.

Values None.

Description This loads the color database with color definitions contained in *data*, which should have been obtained via the functions **color:read-color-db**. The colors thus defined may not be replaced by color aliases.

See also ***color-database***
delete-color-translation
read-color-db

make-gray *Function*

Summary Returns a color specification in the gray model.

Package **color**

Signature **make-gray** *level* **&optional** *alpha* **=>** *color-spec*

Arguments

level	A color component used to define the gray level required.
alpha	A number between 0 and 1, or **nil**.

Values

color-spec	A color specification.

Description Return a color-spec in the **:GRAY** model with component *level*.

Note that short-floats are used for the component; this results in the most efficient color conversion process. However, any floating point number type can be used.

alpha indicates the alpha value of the color. 0 means it is transparent, 1 means it is solid. If *alpha* is **nil** or not specified then the color does not have an alpha component and it is assumed to be solid.

Example

```
COLOR 25 > (color:make-gray 0.66667s0)
#(:GRAY 0.66667S0)
```

See also **make-hsv**, **make-rgb**, **color-model**, **color-<component>**, **color-level**, **color-alpha**

make-hsv *Function*

Summary Returns a color specification in the hue-saturation-value model.

Package **color**

Signature **make-hsv** *hue saturation value* **&optional** *alpha* **=>** *color-spec*

Arguments

hue	A hue component.
saturation	A saturation component.
value	A value component.
alpha	A number between 0 and 1, or **nil**.

Values

color-spec	A color specification.

Description Return a color-spec in the **:HSV** model with components *hue*, *saturation* and *value*.

Note that short-floats are used for each component; this results in the most efficient color conversion process. However, any floating-point number type can be used.

alpha indicates the alpha value of the color. 0 means it is transparent, 1 means it is solid. If *alpha* is **nil** or not specified then the color does not have an alpha component and it is assumed to be solid.

Example

```
COLOR 27 > (color:make-hsv 1.2s0 0.5s0 0.9s0)
#(:HSV 1.2S0 0.5S0 0.9S0)
```

See also **make-rgb**
make-gray
color-model
color-<component>
color-level
color-alpha

make-rgb *Function*

Summary Returns a color specification in the red-green-blue model.

Package **color**

Signature **make-rgb** *red green blue* **&optional** *alpha* **=>** *color-spec*

Arguments

red	A red component.
green	A green component.
blue	A blue component.
alpha	A number between 0 and 1, or **nil**.

Values

color-spec	A color specification.

Description Return a color-spec in the **:RGB** model with components *red*, *green* and *blue*.

Note that short floats are used for each component; this results in the most efficient color conversion process. However, any floating point number type can be used.

alpha indicates the alpha value of the color. 0 means it is transparent, 1 means it is solid. If *alpha* is **nil** or not specified then the color does not have an alpha component and it is assumed to be solid.

Example The object returned by the following call defines the color red in the RGB model:

```
COLOR 25 > (color:make-rgb 1.0s0 0.0s0 0.0s0)
#(:RGB 1.0S0 0.0S0 0.0S0)
```

See also **make-hsv**
make-gray
color-model
color-<component>
color-level
color-alpha

read-color-db *Function*

Summary Reads the color definitions contained in a file.

Package **color**

Signature **read-color-db &optional** *file* **=>** *color-database*

Arguments

file — A filename or pathname containing the color definitions to be read. If *file* is not given, **read-color-db** uses the default color definitions file in the LispWorks library.

Values

color-database — A database definition.

Description

This reads color definitions from the given *file* (a filename or pathname). The returned data structure can be passed to **color:load-color-database**. The format of the file is:

```
#(:RGB 1.0s0 0.980391s0 0.980391s0)     snow
#(:RGB 0.972548s0 0.972548s0 1.0s0)     GhostWhite
...
```

Each line contains a color definition which consists of a color-spec and a name. The names are converted to uppercase and interned in the keyword package. Whitespace in names is preserved.

See also

load-color-database
color-database
delete-color-translation

unconvert-color *Function*

Summary

Returns a color specification for a color representation.

Package **color**

Signature **unconvert-color** *port color-rep* **=>** *color*

Arguments

port — A graphics port.

	color-rep	A color representation on *port*.
Values	*color*	A color specification.

Description

The function **`unconvert-color`** returns a color specification corresponding to the color representation *color-rep* on the Graphics Port *port*.

If *color-rep* is a color specification, a symbol or a color alias, then it is simply returned since the color system can interpret these directly.

Otherwise *color-rep* is asumed to be a color representation on *port*, like those returned by **`convert-color`** and **`image-access-pixel`**, and a corresponding RGB value is returned.

See also

`convert-color`
`image-access-pixel`

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