
Loops Image Objects

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Interlisp IMAGEOBJS are "objects" that know how to display themselves on IMAGESTREAMs. IMAGEOBJS are most often used to insert non-character items into a TEdit document. Standard Interlisp IMAGEOBJS are available for displaying bitmaps, graphs, and horizontal bars.

Interlisp IMAGEOBJS are not objects in the sense of Loops: there is no provision for specialization of existing IMAGEOBJS and no default behavior is provided. Creation of a new type of IMAGEOBJS requires some effort. Functions must be specified for printing, reading, displaying, and handling button events for the new IMAGEOBJ type.

Loops image objects are Loops objects that can be used as Interlisp IMAGEOBJS. They let the programmer use the full power of the Loops environment in the creation of new IMAGEOBJS.

The LoopsImageObjects file defines a number of classes that can be used to create Interlisp IMAGEOBJS, and an interface that makes it easy to insert these Loops image objects into a TEdit

document. Section

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 describes how to insert Loops image objects into a TEdit

document; section

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 describes how to create Loops image object

classes; sections

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 and

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 describe the Loops image object

image object protocol, for people wishing to define their own Loops image objects.

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Inserting Loops image objects into a TEdit document is easy.

(LIO)

[Function]

The standard way to insert IMAGEOBJS into a TEdit file is via the CONTROL-O character. Hitting CONTROL-O lets you type in a LISP form, and the value of this form is an IMAGEOBJ that will be inserted into the document at the current location. (LIO) will present you with a menu of all known Loops image object classes. If you select a class from this menu, (LIO) will return the IMAGEOBJ that points to a new Loops image object of the specified class. If the instance has IVs that can be edited, you will be given a chance to edit the instance first.

LIOInsertCharCodes

[Variable]

When the Loops image object package is loaded, it redefines the interpretation in TEdit of the characters specified by the variable LIOInsertCharCodes. Hitting one of these characters is equivalent to hitting CONTROL-O and then typing in the form (LIO). The default value of LIOInsertCharCodes is (the value of) (LIST (CHARCODE #W) (CHARCODE #w)). This is an INITVAR, so you override the default before you load the package.

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These objects display themselves as text. This can be confusing for the user, who can easily mistake the object for a sequence of characters. To avoid this possibility for confusion, these objects appear boxed when displayed in a TEdit window. The box will not appear in a printed document.

The character looks of these objects can be set from TEdit in the same way that normal characters can have their looks set: select the object and use TEdit's Character Looks Menu, or the Looks item on the title bar pop-up menu. Note that the object can have only a single character looks--all the characters in the object will be displayed with the same looks. There is no way to change the looks of single characters displayed by a Loops image object.

These objects often violate the principle of WYSIWYG (What You See Is What You Get) in that they display more text in a TEdit window than they do when printed. They let you know what text will appear in print by displaying all non-printing text inverted. Thus, the object that displays in a TEdit


window as **Index: IndexEntry** will show up as the string "IndexEntry" when printed. (Note the interaction of this inversion with the boxing mentioned in the previous paragraph: the inversion is performed after the boxing, so that the entire object will still appear boxed if displayed inverted (as in TEdit's highlighting to indicate pending-delete).)

These objects respond to a button event by presenting a menu of options to the user. The items in the menu depend on the class of the object. All objects include a menu item for storing the Loops instance in (SavedValue), and for inspecting the instance. If the instance has IVs that can be set by the user, the menu will include an "Edit" item. The "Edit" item will bring up the standard Loops instance editor on the object. If the instance has a textual IV, the menu will include an option to edit the value of this IV in a new TEdit window.

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Many people include in a TEdit file the time the file was last edited, or the name of the file that holds the document. The following classes can be used to automate this process.

WhenLastSaved [Class]

A WhenLastSaved image object will display a time stamp indicating the time the TEdit document was last saved. For example, a WhenLastSaved instance in this document might produce the image  (but would appear without the box when hardcopied).

If the document has not been saved since the WhenLastSaved object was inserted, the WhenLastSaved object will display the string "NotYetSaved" instead of the time stamp.

WhereLastSaved [Class]

A WhereLastSaved image object is much like a WhenLastSaved object, except that it displays the name of the file that the TEdit document was last saved in, instead of the time last saved.

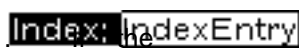

WhenLastSaved and WhereLastSaved objects are used in the running footers in this document.

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Using image objects, it is easy to build an index table for a TEdit document.

IndexEntry [Class]

An IndexEntry object associates a string with a page number for inclusion in an index. The IV text of an IndexEntry will be added to the accumulated index, together with the number of the page containing the object. If the IV displayText? is non-NIL (the default), then the text string will also appear in the document, otherwise the object will be invisible in the final hardcopy. For example, an IndexEntry that adds a reference to the string "IndexEntry" appears in a TEdit window as

 `displayText?` IV were NIL, it would appear as  it window, but would be invisible when printed.

`InitIndex` [Class]

An `InitIndex` object must appear in a TEdit document before any `IndexEntry` object. The `InitIndex` object initializes the collection of the index table. It will be invisible when printed.

`CollectIndex` [Class]

A `CollectIndex` object should appear after all the `IndexEntry` objects that appear in a TEdit document. It will sort the index and print the index information into a new TEdit window (you will be prompted for the window). You can then format the text, save it away, print it, or discard it. The IVs `looks`, `paraLooks`, `firstPageFormat`, `rectoPageFormat`, and `versoPageFormat` determine the initial formatting of the index. See the TEdit documentation for a discussion of the definition of these fields. The `CollectIndex` object will not be visible in the printed document.


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Automatic chapter and section numbering, and generation of a table of contents, is provided by the following classes.

`SectionHeading` [Class]

`SectionHeading` objects have three IVs: `level`, `text`, and `displayText?`. The `level` IV determines the subsection nesting of the object. Each `SectionHeading` object in the document increments the current section number at the given level. Smaller level numbers will not be affected. Larger level numbers are reset to zero. For example, a sequence of `SectionHeading` objects with `level` IVs of 1, 2, 1, 2, 2, 3, 2, and 1 will produce final section numbers of 1., 1.1., 2., 2.1., 2.2., 2.2.1., 2.3., and 3.

The `text` IV determines the section title for inclusion in the table of contents. If the `displayText?` is non-NIL (the default), the `text` will also be displayed in the document.

As an example, when first displayed in a TEdit window the `SectionHeading` for this subsection looked like  `displayText?` IV were NIL, the text would have been inverted to indicate that it will not be present in the final hardcopy:



hardcopied, the object displayed the section number used at hardcopy time instead of the placeholder "n.n.". (Due to a "bug", you have to redisplay the window to see the updated section numbers.)

InitTOC [Class]

An InitTOC object must appear in a TEdit document before any SectionHeading object. The InitTOC object initializes the collection of the table of contents. The IV initialSectionNumbers can be used to initialize the first section numbers to values other than 1. For example, if the initialSectionNumbers IV is (2 1 3), and the first SectionHeading object has a level IV of 3, it will be given the subsection number "2.1.4.". The InitTOC object will be invisible when printed.

CollectTOC [Class]

A CollectTOC object should be placed at the end of a document, after all SectionHeading objects, to collect the table of contents information into a new TEdit stream. When the document is hardcopied, a new TEdit stream will be opened containing the accumulated table of contents. You can then format this TEdit document as you wish. CollectTOC uses the same IVs as does the CollectIndex to determine the initial formatting of the table of contents. The CollectTOC object not be visible in the final hardcopy.

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The following classes provide a somewhat clumsy way of having page and section references included an a document. Because there is no lookahead in the TEdit page formatting, documents containing these objects must be hardcopied twice. The first time will compute the correct page and section numbers, the second time will incorporate them into the document.

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PageNote [Class]

At hardcopy time, a PageNote object remembers the current page number, associating it with the value of its tag IV. See the PageReference class, below.

PageReference [Class]

At hardcopy time, a PageReference object looks up the value of its tag IV to see if a PageNote object has noted a page number for that tag. If there is page number stored, the PageReference object will display the number, otherwise it will display the string "nn". If the PageNote occurs before

the `PageReference` object in the document, this reference will be found the first time the document is printed. If the `PageNote` occurs after the `PageReference` object, a second hardcopy must be generated.

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`SectionNote` [Class]

At hardcopy time, a `SectionNote` object remembers the current section number, associating it with the value of its tag IV. See the `SectionReference` class, below.

`SectionReference` [Class]

At hardcopy time, a `SectionReference` object looks up the value of its tag IV to see if a `SectionNote` object has noted a section number for that tag. If there is section number stored, the `SectionReference` object will display the number, otherwise it will display the string "n.". If the `SectionNote` occurs before the `SectionReference` object in the document, this reference will be found the first time the document is printed. If the `SectionNote` occurs after the `SectionReference` object, a second hardcopy must be generated.

`SectionReferences` are used in this document in the last paragraph of the first section.

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The following class illustrates the possibility of nesting image objects inside of other image objects.

`BoxedImageObject` [Class]

IVs: `boxShade` (the shade of the box: either a shade or a form that will be evaluated to a shade; e.g. `GRAYSHADE`), `boxWhiteSpace` (blank space between the boxed object and the box), `boxWidth` (the width of the box), `boxedObject` (a `LoopsImageObject`).

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A common document form consists of a table of text entries. These are easy to build in TEdit when each entry fits within its row without having to occupy multiple lines.

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Example: BoxedImageObjects and TableTextObjects

The following class takes care of the case where the table entries are too large to fit on a single line.

TableTextObject [Class]

describes a (possibly multiple line) table entry. The class `TableTextObject` defines five important IVs.

`text` [IV of TableTextObject]

contains the text that will be displayed in the table entry.

`widthInWs` [IV of TableTextObject]

defines the width of the table entry. This width is measured in "W"s, in the current font. If the `text` is too long, it will be broken at word boundaries and displayed in multiple lines. The default value is 10.

`nLines` [IV of TableTextObject]

defines the maximum number of lines to be used to print the text. If `nLines` is `NIL` (the default), the object will be as tall as it needs to be to display the entire `text` subject to the width constraint specified by the `widthInWs` IV.

`justify` [IV of TableTextObject]

determines the horizontal justification of the individual lines within the table entry. Possible values are `left` (for left-justify), `center` (for centered text), and `right` (for right-justify). The default is `left`.

`verticalJustify` [IV of TableTextObject]

determines the vertical justification of the lines within the table entry. Possible values are `top` (the first line will be flush with the top of the table entry), `center` (the text will be centered vertically), and `bottom` (the last line of text will be at the bottom of the entry). The default is `bottom`. Note that this IV only has an effect if the IV `nLines` is specified.

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Image objects can be used to include prettyprinted forms in a document.

PPIImageObject [Class]

prettyprints a form in the image stream. The relevant IVs of PPIImageObject are:

form [IV of PPIImageObject]

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minWidth [IV of PPIImageObject]

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maxWidth [IV of PPIImageObject]

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Due to an unfortunate bug in Interlisp, PPIImageObject work correctly on display devices .

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Example: PPIImageObject

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Loops objects that are wrapped around an Interlisp IMAGEOBJ. The IMAGEOBJ in turn points back to the Lops image object. When Interlisp "sends a message" to the underlying IMAGEOBJ (more correctly, applies one of the IMAGEOBJ's IMAGEFNS to the IMAGEOBJ), the IMAGEOBJ forwards this message on to the Loops image object. The translation from Interlisp IMAGEOBJ protocol to Loops image object protocol is accomplished by a special set of IMAGEFNS and the LoopsImageObject class.

LoopsImageObject [AbstractClass]

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The following methods implement the `IMAGEFNS` for the Loops image object. These message are not intended to be sent by the user; they are sent automatically by TEdit and other packages.

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```
(_ self ImageBox imageStream currentX  
    rightMargin)
```

 [Method of `LoopsImageObject`]

returns an instance of the record `IMAGEBOX` with fields `XSIZE`, `YSIZE`, `XKERN`, and `YDESC`. This is used by TEdit to determine the size of the object for formatting purposes. Specializations of `LoopsImageObject` should override this method.

```
(_ self Display imageStream)
```

 [Method of `LoopsImageObject`]

should actually display the object on the `imageStream`. Specializations of `LoopsImageObject` should override this method.

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GETFN: `LoopsImageObjectGetFn`

```
(_ self ButtonEventIn windowStream selection  
    relX relY window textStream button)
```

 [Method of `LoopsImageObject`]

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```
(_ self CopyButtonEventIn windowStream)
```

 [Method of `LoopsImageObject`]

~mumble~

Unknown IMAGEOBJ
GETFN: `LoopsImageObjectGetFn`

```
(_ self Copy)
```

 [Method of `LoopsImageObject`]

~mumble~

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GETFN: `LoopsImageObjectGetFn`

Due to restrictions imposed by IMAGEOBJets, LoopsImageObjects cannot duplicate the full generality of saving and retoring Loops objects. Specialized subclasses of LoopsImageObjects cannot change how they are stored or read back in. However, the following methods do give the user some control over what extra information is dumped out when a LoopsImageObjects is stored.

(*_ self BeforePutToFile stream*) [Method of LoopsImageObject]

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(*_ self AfterPutToFile fileStream*) [Method of LoopsImageObject]

~mumble~

(*_ self AfterGetFromFile textStream*) [Method of LoopsImageObject]

~mumble~

(*_ self PrePrint*) [Method of LoopsImageObject]

~mumble~

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(*_ self WhenCopied targetWindowStream
sourceTextStream targetTextStream*) [Method of LoopsImageObject]

~mumble~

(*_ self WhenDeleted targetWindowStream
sourceTextStream targetTextStream*) [Method of LoopsImageObject]

~mumble~

(*_ self WhenInserted targetWindowStream
sourceTextStream targetTextStream*) [Method of LoopsImageObject]

~mumble~

(*_ self WhenMoved targetWindowStream
sourceTextStream targetTextStream*) [Method of LoopsImageObject]

~mumble~

```
(_ self WhenOperatedOn windowStream howOperatedOn
    selection textStream)
```

[Method of LoopsImageObject]

~mumble~

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GETFN: LoopsImageObjectGetFn

The class `LoopsImageObject` provides a number of other methods that can be used by specializations of the above methods.

```
(_ self CachedImageBox imageStream)
```

[Method of LoopsImageObject]

returns the image box computed by the last `ImageBox` method. This is often used inside the `Display` method to avoid resending the `ImageBox` message.

```
(_ self DisplayImageStream? imageStream)
```

[Method of LoopsImageObject]

returns `NIL` unless the image stream is a display image stream.

```
(_ self PrintText imageStream text font)
```

[Method of LoopsImageObject]

prints the string `text` in the font `font`, centered in the object's `CachedImageBox`.

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Certain subclasses of `LoopsImageObject` capture some commonly desired functionality. These may be useful to anyone interested in building their own Loops image objects.

`TEditImageObject` [AbstractClass]

The class `TEditImageObject` contains a few methods that are only applicable when the object is being displayed in a `TEdit` stream.

```
(_ self CurrentFont imageStream)
```

[Method of TEditImageObject]

returns the font of the image object in the current `TEdit` stream.

(*_ self* TextStream *imageStream*) [Method of TEditImageObject]

returns the text stream that is being displayed in *imageStream*.

(*_ self* TEditIV *ivName* *textStream*) [Method of TEditImageObject]

edits the text stored in the IV *ivName* of *self* in a new TEdit window. The image object should be part of the TEdit stream *textStream*. The *textStream* argument is used to update the display when the IV has been edited.

(*_ self* AllObjects *textStream*) [Method of TEditImageObject]

returns a list of all imageobjects contained in *textStream*, in order.

WhenSavedImageObject [AbstractClass]

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HardcopySideEffectObject [AbstractClass]

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LabelImageMixin [AbstractClass]

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EditableImageObjectMixin [AbstractClass]

~mumble~

TEditableImageObjectMixin [AbstractClass]

~mumble~

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On occasion, it may be useful to wrap a Loops image object around an existing Interlisp IMAGEOBJ, say to wrap a BoxedImageObject around it.

ImageObjectWrapper [Class]

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