Indigo Magic™ Desktop Integration Guide

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About This Guide

This book explains how to integrate applications into the Indigo Magic™ Desktop environment. This book assumes that your applications run on Silicon Graphics® workstations.

What This Guide Contains

This book is divided into two sections:

- Part One explains how to achieve the Silicon Graphics look and feel for your application. (Guidelines for look and feel are provided in the *Indigo Magic User Interface Guidelines*.)
- Part Two explains how to create Desktop icons for your application and install them in the Icon Catalog.

How to Use This Guide

This book is a companion to the *Indigo Magic User Interface Guidelines*. Silicon Graphics recommends that you read through the *Indigo Magic User Interface Guidelines* first, then use the *Indigo Magic Desktop Integration Guide* to help you implement the style guidelines.

What You Should Know Before Reading This Guide

This guide assumes that you are familiar with the material contained in the *OSF/Motif Style Guide* and the *Indigo Magic User Interface Guidelines* manual. It assumes also that you have some knowledge of programming in IRIS® IM™ and Xt (or Xlib).

Silicon Graphics provides both these manuals online. You can view them from the IRIS InSight™ viewer. To use the IRIS InSight viewer, select "On-line Books" from the Help toolchest.

Suggested Reading

Here are some books that provide information on some of the topics covered in this guide:

- *IRIS IM Programming Guide*. (This book is included online with the Silicon Graphics IRIS Development Option (IDO).)
- *IRIS ViewKit Programmer's Guide*. (This book is included online with the Silicon Graphics C++ option)
- Open Software Foundation. *OSF/Motif Programmer's Guide, Revision 1.2*. Englewood Cliffs: Prentice-Hall, Inc., 1992. (This book is included online with the Silicon Graphics IDO.)
- Open Software Foundation. *OSF/Motif Style Guide, Revision 1.2*. Englewood Cliffs: Prentice-Hall, Inc., 1992. (This book is included online with the Silicon Graphics IDO.)
- Nye, Adrian and O'Reilly, Tim. *The X Window System, Volume 4: X Toolkit Intrinsics Programming Manual, OSF/Motif 1.2 Edition for X11, Release 5*. Sebastopol: O'Reilly & Associates, Inc., 1992. (This book is included online with the Silicon Graphics IDO.)
- Nye, Adrian. *The X Window System, Volume 1: Xlib Programming Manual for Version 11 of the X Window System*. Sebastopol: O'Reilly & Associates, Inc., 1992. (This book is included online with the Silicon Graphics IDO.)
- Young, Doug. *The X Window System, Programming and Applications with Xt*, *OSF/Motif Edition*, Second Edition. Englewood Cliffs: Prentice Hall, Inc., 1994.
- Assente & Swick. *The X Toolkit*.
- Scheifler, Robert and Gettys, Jim. *X Window System*, *Third Edition*. Digital Press, ISBN 1-55558-088-2.
- X/Open Company, Ltd. *X/Open Portability Guide* (set of 7 volumes). Englewood Cliffs: Prentice Hall Publishing Company, ISBN 0-13-685819-8

Font Conventions in This Guide

These style conventions are used in this guide:

- **Boldfaced text** indicates that a term is an option flag, a data type, a keyword, a function, or an X resource.
- *Italics* indicates that a term is a filename, a button name, a variable, an IRIX command, a document title, or an image or subsystem name.
- "Quoted text" indicates menu items.
- `Screen type` is used for code examples and screen displays.
- **`Bold screen type`** is used for user input and nonprinting keyboard keys.
- Regular text is used for menu and window names, and for X properties.

Integrating an Application Into the Indigo Magic Desktop Environment: An Introduction

This book describes how to integrate your application into the Indigo Magic Desktop environment. It assumes that your application already runs on Silicon Graphics workstations. This is strictly a how-to guide—refer to the *Indigo Magic User Interface Guidelines* for style guidelines.

This introduction contains these sections:

- "About the Indigo Magic Desktop Environment" provides a brief overview of the Indigo Magic Desktop and explains why it's important to integrate your application into the Desktop environment.
- "Integrating an Application" offers a brief, general list of the basic steps for integration.

About the Indigo Magic Desktop Environment

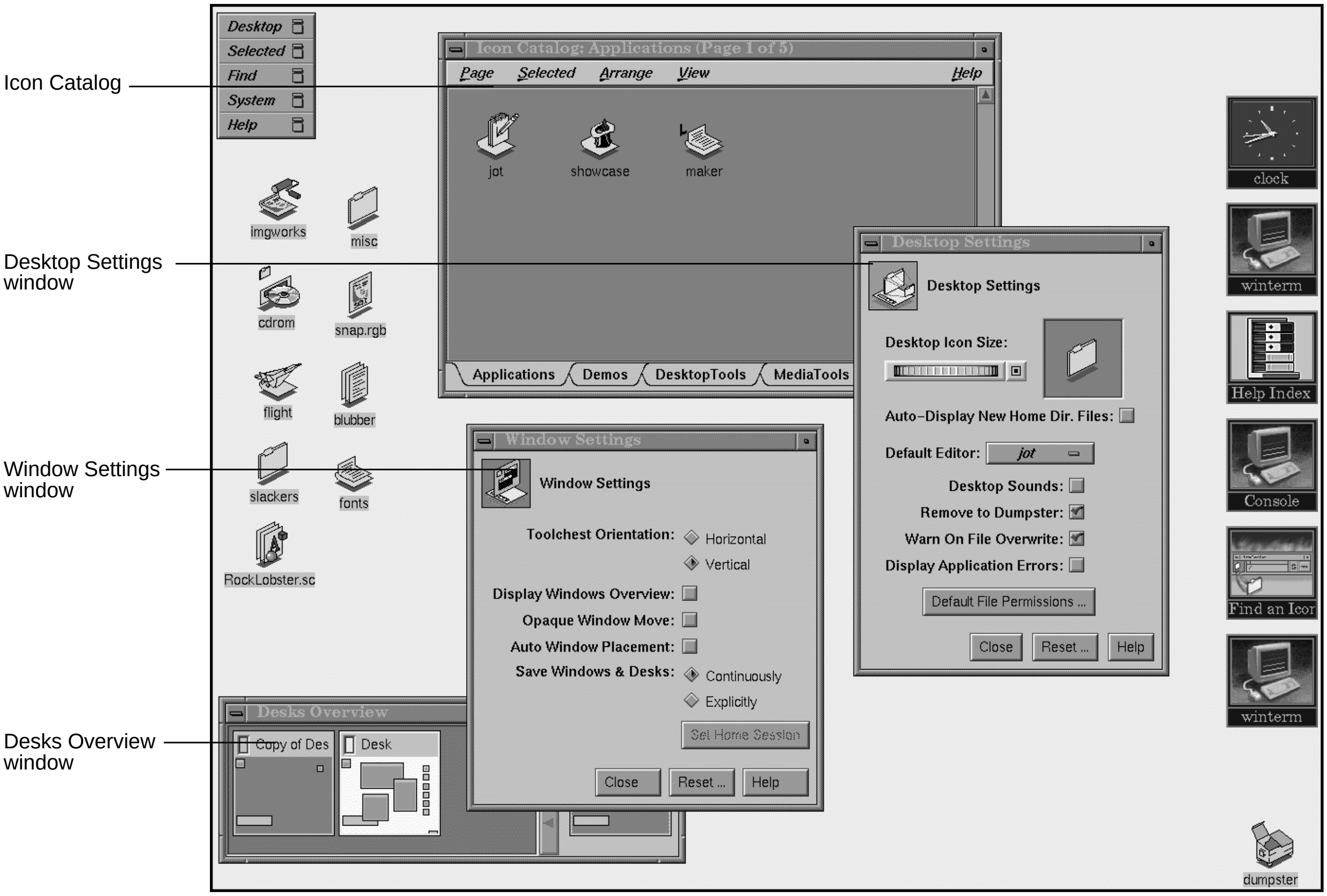
The Indigo Magic Desktop environment provides a graphical user interface (GUI) to the IRIX filesystem and operating system. This interface allows users to interact with the workstation using a point-and-click interface, based on icons and windows. The Desktop provides tools and services for the users' convenience, many of which are accessible directly from the Desktop's toolchests.

Integrating your application into the Desktop environment is an important step in creating your product. Since users are already familiar with the Desktop, they have certain expectations about how applications should look and behave in the Desktop environment. By integrating your application into the Desktop, you insure that these expectations are met—thus helping your users get the most out of your application.

Figure i shows an example of the Indigo Magic Desktop. Take note of several tools that are running:

- The Desks Overview window. With the Desks Overview window, users can switch from one "desk," or group of applications, to another. When your application appears in a desk other than the one currently in use, it's in a state similar to the minimized state. You need to be careful about what processes your application runs while in a minimized state.
- The Window Settings window. From the Window Settings window, users can change aspects of window and session management. You need to set up your application so that it works as users expect when they change these settings.
- The Desktop Settings window. From this window, users can resize Desktop icons and select a default text editor. You need to design your icons so that they look reasonable in the maximum and minimum sizes, and set up your application to use the user's default editor where appropriate.
- The Icon Catalog. Users can access icons from the different pages in the Icon Catalog. The standard pages are: Applications, Demos, Desktop Tools, and Media Tools. Since the Icon Catalog is one of the first places users look when they need to find an application, you should add your products icons to this catalog.

These are just a few examples of the kinds of things you'll need to consider to integrate your application into the Desktop Environment. This book provides complete and detailed instructions for integration, while the *Indigo Magic User Interface Guidelines* gives you style guidelines. For the best results, use both books together.



Desktop Settings

Desktop Icon Size:

Auto-Display New Home Dir. Files: □

Default Editor: jot

Desktop Sounds: □

Remove to Dumpster: ☑

Warn On File Overwrite: ☑

Display Application Errors: □

Default File Permissions ...

Close | Reset ... | Help

Window Settings

Toolchest Orientation: ○ Horizontal ● Vertical

Display Windows Overview: □

Opaque Window Move: □

Auto Window Placement: □

Save Windows & Desks: ● Continuously ○ Explicitly

Set Home Session

Close | Reset ... | Help

Figure i The Indigo Magic Desktop

Integrating an Application

This section lists the basic steps for integrating an existing application into the Indigo Magic Desktop environment. The steps are listed in a very general way, to give you a brief overview of the process.

If you're writing a new application, here are a few tips:

- If possible, use IRIS ViewKit™. Refer to the *IRIS ViewKit Programmer's Guide* for instructions.

  Note: IRIS ViewKit isn't part of the IRIS Developer's Option, it is bundled with the C++ Development Option. In the United States and Canada, call SGI Direct at 800-800-SGI1 (7441) for more information about how to order the C++ Development Option; outside the United States and Canada, please contact your local sales office or distributor.

- Don't use IRIS GL™. Use OpenGL™ or Open Inventor™ instead.

  Note: Open Inventor isn't part of the IRIS Developer's Option, it is a separate option. In the United States and Canada, call SGI Direct at 800-800-SGI1 (7441) for more information about how to order the Open Inventor Option; outside the United States and Canada, please contact your local sales office or distributor.

To integrate your application into the Indigo Magic Desktop, follow these steps:

1. If your application uses IRIS GL, port to OpenGL if possible. If it's impractical for you to port to OpenGL at this time, at least switch to mixed-model IRIS GL programming, if you haven't already done so. (Mixed-model programs use Xt for event and window management).

   For information on porting from IRIS GL to OpenGL and for switching your program to mixed-model, refer to the *OpenGL Porting Guide*. This manual is included online in the IRIS Developer's Option (IDO). View it using the IRIS InSight Viewer.

2. Set up your application to comply with the Indigo Magic look and feel:

   - use the Enhanced IRIS IM™ look
   - use Schemes
   - use the new and enhanced IRIS IM widgets where appropriate
   - set up your application for correct window, session, and desks management

- customize the minimize window image for your application (optional)
- use the extensions provided in the Selection Library and the File Alteration Monitor (optional)

These topics, as well as information on fonts, are covered in Part 1 of this manual.

3. Create Desktop icons for your application and add them to the Icon Catalog. You'll need an icon for the application itself as well as icons for any unusual data formats. See Part 2 of this manual for instructions.
4. Use *swpkg* to package your application so that your users can install it easily. See the *Software Packager User's Guide* for information for instructions on using *swpkg*.

PART ONE

Getting the Right Look and Feel

Chapter 1

Getting the Right Look and Feel: An Overview

This chapter provides a checklist of the steps you need to follow for your application to have the Indigo Magic look and feel.

Chapter 1

Getting the Right Look and Feel: An Overview

This chapter contains these sections:

- "About the Indigo Magic Look and Feel" briefly explains the basics of the Indigo Magic look and feel and tells you where to find more detailed information.
- "Getting the Right Look and Feel: The Basic Steps" briefly lists the basic steps for getting the right look and feel and tells you which chapter covers each step.

About the Indigo Magic Look and Feel

One of the most important things you can do to integrate your application into the Indigo Magic Desktop environment is to get the right look and feel. This look and feel is largely based on IRIS IM, the Silicon Graphics port of the industry-standard OSF/Motif™ toolkit. In particular, the look and feel is based on an enhanced version of IRIS IM and on the *4Dwm* window manager (the Silicon Graphics *mwm*-based window manager). The *Indigo Magic User Interface Guidelines* explains the differences between the Indigo Magic look and feel and the OSF/Motif look and feel.

Users have certain expectations of how applications appear and behave in the Indigo Magic Desktop environment, and by meeting these expectations, you make your application much easier and more pleasant to use. The chapters in this part of the manual explain how to set up your application to provide the Indigo Magic look and feel.

Getting the Right Look and Feel: The Basic Steps

Here are the basic steps for providing the right look and feel for your application:

1. **Recompile with IRIS IM version 1.2.** If your application uses an earlier version of IRIS IM, recompile to make sure that it runs correctly with version 1.2. Refer to the *IRIS IM 1.2 Release Notes* for information on the differences between version 1.2 and earlier versions of IRIS IM.
2. **Use the Indigo Magic enhanced appearance.** Turn on the *Indigo Magic "look,"* which enhances the appearance of standard IRIS IM widgets and gadgets. See Chapter 2, "Getting the Indigo Magic Look," for instructions.
3. **Use schemes.** The schemes mechanism is a simple method for providing user-selectable default colors and fonts for your application. For more information on Schemes, see Chapter 3, "Using Schemes."
4. **Use the new and extended widgets (optional).** Silicon Graphics provides some new IRIS IM widgets, extensions of some existing widgets, and some mixed-model programming widgets (for use with IRIS GL and OpenGL). For more information, see Chapter 4, "Using the New and Enhanced Widgets."
5. **Set resources for correct window, session, and desks management.** By setting a few important resources, you insure that your application includes the windowing, session management, and desks features that users expect. For instructions, refer to Chapter 5, "Window, Session, and Desk Management."
6. **Customize minimize icons.** Silicon Graphics provides tools that allow you to easily provide your own look for minimize icons (icons for minimized windows). The tools for creating minimized windows are discussed in Chapter 6, "Customizing Your Application's Minimized Windows."
7. **Implement interapplication data exchange.** Interapplication data exchange lets users cut and paste information between you application and other applications. For more information, see Chapter 7, "Interapplication Data Exchange.".

8. **Monitor changes to the filesystem (optional).** Silicon Graphics provides a File Alteration Monitor (FAM) that your application can use to monitor the filesystem. Chapter 8, “Monitoring Changes to Files and Directories,” explains how to use FAM.

9. **Provide online help.** Silicon Graphics provides an online help system for integrating help with your application. Chapter 9, “Providing Online Help With SGIHelp,” describes how to use the online help system.

Chapter 2

Getting the Indigo Magic Look

This chapter describes how to turn on the Indigo Magic "look," which enhances the appearnce of standard IRIS IM widgets and gadgets.

Chapter 2

Getting the Indigo Magic Look

The simplest step in integrating your application with the Desktop environment is to turn on the *Indigo Magic "look,"* which enhances the appearance of standard IRIS IM widgets and gadgets. "The Indigo Magic Look: Graphic Features and Schemes" in Chapter 3 of the *Indigo Magic User Interface Guidelines* describes the enhancements.

To turn on the Indigo Magic look for an application, simply set the application's **sgiMode** resource to "TRUE." Typically, you should add this line to the */usr/lib/X11/app-defaults* file for your application:

```
appName*sgiMode:    TRUE
```

where *appName* is the name of your application.

The standard IRIS IM library supports the Indigo Magic look. You don't need to link with a separate library or call a special function to enable the Indigo Magic look. If you don't turn on the Indigo Magic look, your application's widgets and gadgets have the standard IRIS IM appearance.

If your application uses the Indigo Magic look, it should also use *schemes*, which are described in Chapter 3, "Using Schemes." Silicon Graphics designed its color and font schemes to work well with the Indigo Magic look.

Chapter 3

Using Schemes

Schemes allow you to provide default colors and fonts for your application, while also ensuring that users can easily select other color and font collections according to their individual needs and preferences. This chapter explains why and how you should use schemes in your application.

Chapter 3

Using Schemes

Schemes provide an easy way to apply a collection of resources to your application. The scheme mechanism allows your users to select from pre-packaged collections of colors and fonts that are designed to integrate visually with the Indigo Magic Desktop and other applications. “Schemes for Colors and Fonts” in Chapter 3 in *Indigo Magic User Interface Guidelines* describes the guidelines for using schemes in the Indigo Magic environment.

This chapter contains the following sections:

“Schemes Overview” on page 15 provides an overview to schemes.

“Using Schemes in Your Application” on page 17 describes what you need to do to use schemes in your application.

“Testing Your Application with Schemes” on page 26 provides tips for testing how your application responds to different schemes.

“Creating New Schemes” on page 26 describes how to create new schemes.

“Hard-Coding a Scheme for an Application” on page 27 describes how to force your application to use one specific scheme.

Schemes Overview

Schemes allow you to provide default colors and fonts for your application, while also ensuring that users can easily select other color and font collections according to their individual needs and preferences. Silicon Graphics includes some standard system schemes with the X execution environment, but end users can modify existing schemes or create new ones, and you can create new schemes for use with your application.

This section provides an overview of schemes and explains why you should use schemes in your application.

Why You Should Use Schemes

As a developer, it is impossible for you to choose colors and fonts for your application that satisfy all users. Aside from the consideration of individual taste, display characteristics vary and some users have various degrees of colorblindness. Schemes allow users to select colors and fonts according to their preferences and needs.

Although users can already use the X resource mechanism to customize colors and fonts, it is very difficult and time-consuming for most end users to do so, because the task requires knowledge of the internal structure of the program. On the other hand, if your application supports schemes, users can use the graphical Schemes Browser, *schemebr* (available from the “Colors” option of the Customize menu in Desktop toolchest), to change colors and fonts.

Using schemes also reduces the time and effort required to develop your application. Instead of choosing your own colors and fonts and coding them into your application, you can simply set a resource value to activate schemes and get the distinctive Indigo Magic appearance.

Basic Scheme Concepts

A scheme simply maps specific colors and fonts to abstract resource names according to the functions they serve in an application. So instead of using specific colors like “blue” or “#123456” and specific fonts like “-*-screen-medium-r-normal--13-*-*-*-*-*-iso8859-1,” your application can use symbolic values like TextForeground, TextSelectedColor, and FixedWidthFont. The exact definition of these symbolic values depends on the scheme the user chooses to apply to your application. As long as your application uses the symbolic color and font names for the purposes for which they were intended, users or graphic designers can design a new palette (a binding of the symbolic values to specific colors) and the result should look good with your application.

Often, you don’t even need to deal with the symbolic colors and fonts yourself. The schemes mechanism includes a map file that automatically binds the symbolic values to the various IRIS IM widgets and widget resources. One case where you might need to set a color or font explicitly is if you need to highlight a component (for example, in a chart). The schemes mechanism defines special symbolic values such as HighlightColor1 through HighlightColor8 for these purposes. (See “Directly Accessing Colors and Fonts” on page 20 for more information on the symbolic values.)

Using Schemes in Your Application

This section describes how to write your application for use with schemes.

Turning on Schemes for Your Application

Silicon Graphics incorporates schemes in its implementation of Xt, so you don’t need to link to a separate schemes library or call a special function to use schemes. All you need to do to enable schemes is to include in your application’s *app-defaults* file (in the */usr/lib/X11/app-defaults* directory) the line:

```
AppClass*useSchemes:     all
```

where *AppClass* is your application’s class name. This activates all aspects of schemes.

Note: To ensure that users don’t accidently override your settings, be sure to prefix the **useSchemes** resource with your application’s class name.

To deactivate schemes, you can set:

```
AppClass*useSchemes: none
```

If you wish to activate schemes without using an *app-defaults* file, or if you want to guarantee that the schemes setting can’t be changed by users, call the function **SgiUsesScheme()**:

```
void SgiUsesScheme(char *value)
```

value can be either “all” or “none”. This function requires that you include the header file <*X11/SGIScheme.h*>.

Special Considerations for Programming with Schemes

The schemes map file automatically handles applying colors and fonts to most IRIS IM widgets based on the widgets’ class names. Unfortunately, IRIS IM doesn’t have unique class names for menu bars, menu panes, and option menus. To allow schemes to be applied to these elements, your application must follow some simple naming conventions for these widgets. Schemes expect applications to name all menu bars “menuBar,” all option menus “optionMenu,” and the pane of all option menus “optionPane.” Schemes also recognize some other variations of these names, including “menu_bar,” “menubar,” “menu_Bar,” and so on.

If you need to set a color or a font in your application, use the procedures described in “Assigning Non-Default Colors and Fonts to Widgets” on page 19 and “Directly Accessing Colors and Fonts” on page 20. Don’t hard code colors or fonts in your application because they might not work with the scheme that a user selects. For example, if you programmatically set a text color to black and a user chooses a scheme that has a very dark background, your text is unreadable. Also avoid setting colors that IRIS IM normally computes. For example, if you hard code the top or bottom shadow colors used by IRIS IM controls, these colors might not be correct if a user changes the scheme.

There are obviously some cases for which this recommendation doesn’t apply. The most common are windows in which you are rendering images. For example, if your application uses OpenGL or some other library to render an image in a window, the colors used in this window aren’t derived from schemes.

Fonts are usually less critical than colors, although the best visual effects will be produced if you use only the fonts defined in the schemes. You should be aware that on low-resolution screens, the sizes of the fonts defined by schemes can change. Therefore, you should design the layout of your application to handle variable-sized fonts. This means you shouldn’t hard-code *x*, *y* locations or fixed widths or heights for widgets in your application. Instead use IRIS IM manager widgets such as the Form to achieve a flexible layout that can respond to changes in font sizes.

Assigning Non-Default Colors and Fonts to Widgets

Sometimes, you might want to override the default color or font assigned to a widget by a scheme. For example, all labels are set by default to use a bold font (BoldLabelFont); however you might decide that a regular font (PlainLabelFont) is more appropriate for some of your application's labels.

To assign a non-default font or color to a widget, include a line in your application's *app-defaults* file mapping a different symbolic scheme resource to that widget. For example, the following line assigns a regular label font (rather than the default bold font) to a label in your application named "simpleLabel":

```
YourApp*simpleLabel*fontList: SGI_DYNAMIC PlainLabelFont
```

The symbol SGI_DYNAMIC identifies this resource as a dynamically changeable scheme resource. The actual font assigned to PlainLabelFont could potentially be different in each scheme. As the user changes schemes, the correct resource is applied to your program.

Note: Remember to prefix the widget hierarchy with your application's class name to prevent users from accidentally overriding your setting.

You can use the same technique with colors. For example, suppose you have two types of label widgets positioned on an IRIS IM XmDrawingArea widget and you want to use color to give some significance to different labels. Perhaps the application is some type of a flowchart and some of the labels represent tasks in progress, while other represent tasks that have been completed. The schemes map file already maps the symbolic scheme resource DrawingAreaColor to the XmDrawingArea widget. The scheme palette also provides colors that both provide a nice contrast against the DrawingAreaColor and allow the current TextForeground color to be readable. These colors are DrawingAreaContrast1, DrawingAreaContrast2, DrawingAreaContrast3, and DrawingAreaContrast4. To specify the colors of each label widget in your application, you could set the following resources:

```
YourApp*label1*background: SGI_DYNAMIC DrawingAreaContrast1
YourApp*label2*background: SGI_DYNAMIC DrawingAreaContrast1
YourApp*label3*background: SGI_DYNAMIC DrawingAreaContrast2
...
```

Each scheme also contains a set of basic colors that you can use for simple graphics, icons, and so on. These colors maintain their basic characteristics, but change slightly from scheme to scheme to blend with the general flavor of the scheme. For example, you could set a label widget to be "red" as follows:

```
YourApp*label*background: SGI_DYNAMIC RedColor
```

The exact shade of red will change from scheme to scheme, but will always be "reddish" and always fit with the other colors in the scheme.

If necessary, you can also use non-scheme colors and fonts, although Silicon Graphics strongly recommends that you don't do this. In particular, if you hard-code a color, the user might select a scheme in which that color doesn't provide the contrast you desire. The color could even be "lost" among the other scheme colors. Non-scheme fonts are less likely to cause problems, but your application will still have an inconsistent appearance if it uses them.

You use the same methods to assign a non-scheme color or font that you normally would in an X program. For example, you could set a font for a label named "simpleLabel" in your *app-defaults* file as follows:

```
YourApp*simpleLabel*fontList: 6x12
```

Directly Accessing Colors and Fonts

When your application uses widgets only, the schemes map file automatically retrieves all colors and fonts from the current scheme and assigns them to your application's widgets. However, you might need to access some of the scheme's colors or fonts directly from within a program. For example, you might want to draw a bar chart or other display using colors that look good no matter what scheme the user has selected.

Example 3-1 shows an example of a function that retrieves a color value given a widget, the color resource name, and the color resource class.

Example 3-1 Retrieving a Scheme Color Value

```
Pixel getColorResource(Widget w, char *name, char *classname)
{

    XtResource request_resources;
    Display *dpy  = XtDisplay ( w );
    int      scr  = DefaultScreen ( dpy );
    Colormap cmap = DefaultColormap ( dpy, scr );
    XColor   color, ignore;
    char    *colorname;

    request_resources.resource_name   = (char *) name;
    request_resources.resource_class  = (char *) className;
    request_resources.resource_type   = XmRString;
    request_resources.resource_size   = sizeof (char *);
    request_resources.default_type    = XmRImmediate;
    request_resources.resource_offset = 0;
    request_resources.default_addr    = (XtPointer) NULL;

    XtGetSubresources(w,
                      (XtPointer) &colorname,
                      NULL, NULL,
                      &requested_resources,
                      1, NULL, 0);

    if ( colorname &&
         XAllocNamedColor ( dpy, cmap, colorname, &color,
                                 &ignore ) )
        return ( color.pixel );
    else
        return ( BlackPixel ( dpy, scr ) );
}
```

You could then retrieve the color defined by the scheme resource **drawingAreaContrastColor1** using **getColorResource()** as follows:

```
color1 = getColorResource(barChartWidget,
                          "drawingAreaContrastColor1",
                          XmCForeground);
```

where *barChartWidget* is the widget that you'll use the color in.

Tip: There is a far simpler method for retrieving a resource value if you're using the IRIS ViewKit toolkit. Instead of writing the **getColorResource()** function listed in Example 3-1, you could simply call:

```
Pixel color1 = (Pixel) VkGetResource( barChartWidget,
                            "drawingAreaContrastColor1",
                             XmCForeground, XmRPixel,
                            "Black" );
```

You must handle some resources programmatically. For example, the Indigo Magic User Interface Guidelines suggests that your application use a different color for text fields that are not editable than it uses for editable text fields. The IRIS IM text widget currently does not change colors automatically when set to read only mode, so your application must handle this itself. The correct color is provided by schemes as the symbolic name ReadOnlyColor, and can be retrieved by the resource **readOnlyColor**. Assuming that you've created the **getColorResource()** function listed in Example 3-1, the following code illustrates this process:

```
ro = getColorResource( textw,  "readOnlyColor",
                       XmCForeground);
XtVaSetValues( textw, XmNeditable, FALSE,
               XmNbackgroundColor, ro,
               NULL);
```

Tip: The equivalent IRIS ViewKit code would be:

```
Pixel ro = (Pixel) VkGetResource( textw, "readOnlyColor",
                                  XmCForeground, XmRPixel,
                                  "White" );
XtVaSetValues( textw, XmNeditable, FALSE,
               XmNbackgroundColor, ro,
               NULL);
```

Pre-Defined Scheme Resources and Symbolic Values

Table 3-1 lists the pre-defined scheme resources and symbolic values. You can use the resources to retrieve color and font values from within your application as described in "Directly Accessing Colors and Fonts" on page 20. You can use the symbolic values to assign colors and fonts to widgets in resource files as explained "Assigning Non-Default Colors and Fonts to Widgets" on page 19.

Table 3-1 Pre-Defined Scheme Resources and Symbolic Values

Resource	Symbolic Value	Intended Use
basicBackground	BasicBackground	Background of application
textForeground	TextForeground	Color of text characters

Table 3-1 (continued) Pre-Defined Scheme Resources and Symbolic Values

Resource	Symbolic Value	Intended Use
textBackground	TextBackground	Background of multi-line text widgets
textFieldBackground	TextFieldBackground	Background of single-line text field widgets
readOnlyBackground	ReadOnlyBackground	Background of read-only text and text field widgets
textSelectedBackground	TextSelectedBackground	Background when text is selected with the mouse
textSelectedForeground	TextSelectedForeground	Color of text characters when text is selected with the mouse
disabledTextForeground	DisabledTextForeground	For future use, this color will indicate disabled text instead of stippling.
scrolledListBackground	ScrolledListBackground	Background of scrolled list widgets
scrollBarTroughColor	ScrollBarTroughColor	Trough of scrollbar
scrollBarControlBackground	ScrollBarControlBackground	Scrollbar controls (thumb, searchbutton)
buttonBackground	ButtonBackground	Background of push buttons
selectFillColor	SelectFillColor	Fill color for standard IRIS IM radio and toggle buttons
selectColor	SelectFillColor	IRIS IM toggle and check fill color
checkColor	CheckColor	Indigo Magic toggle check mark color
radioColor	RadioColor	Indigo Magic radio pip color
indicatorBackground	IndicatorBackground	Indigo Magic background color for toggles and radios

Table 3-1 (continued) Pre-Defined Scheme Resources and Symbolic Values

Resource	Symbolic Value	Intended Use
warningColor	WarningColor	Background color for icons in warning dialogs
errorColor	ErrorColor	Background color for icons in error dialogs
informationColor	InformationColor	Background color for icons in information dialogs
wMBackground	WMBackground	Window manager colors. Note that *4Dwm* currently doesn't pick up foreground. "Active" colors are used for window manager borders with mouse focus.
wMActiveBackground	WMActiveBackground	
wMForeground	WMForeground	
wMActiveForeground	WMActiveForeground	
alternateBackground1	AlternateBackground1	Can be used as background color for widgets or text areas. Guaranteed to be different from one another, contrast with basic background and text background, and can have text drawn on them.
alternateBackground2	AlternateBackground2	
alternateBackground3	AlternateBackground3	
alternateBackground4	AlternateBackground4	
alternateBackground5	AlternateBackground5	
alternateBackground6	AlternateBackground6	
drawingAreaBackground	DrawingAreaBackground	Background of drawing area widgets (typically used for graphs)
drawingAreaContrastColor1	DrawingAreaContrastColor1	Contrast colors for drawing areas (typically used for graphs and trees). These colors are guaranteed to be different from one another, different from the drawing area background, and can have text drawn on them
drawingAreaContrastColor2	DrawingAreaContrastColor2	
drawingAreaContrastColor3	DrawingAreaContrastColor3	
drawingAreaContrastColor4	DrawingAreaContrastColor4	

Table 3-1 (continued) Pre-Defined Scheme Resources and Symbolic Values

Resource	Symbolic Value	Intended Use
highlightColor1	HighlightColor1	Bright highlights suitable for small color spots. The first four are supposed to be in the same hue family as the corresponding DrawingAreaContrast colors so that the pair may be used for doing highlights in an annotated scrollbar.
highlightColor2	HighlightColor2	
highlightColor3	HighlightColor3	
highlightColor4	HighlightColor4	
highlightColor5	HighlightColor5	These colors are typically used for outlining and drawing graphs, wherever a small amount of color needs to be highly visible.
highlightColor6	HighlightColor6	
highlightColor7	HighlightColor7	
highlightColor8	HighlightColor8	
redColor	RedColor	Colors that can be used for various graphics purposes. These colors will always approximate their names, but may be slightly adjusted to blend with each scheme. Typically used in graphs and charts.
orangeColor	OrangeColor	
yellowColor	YellowColor	
greenColor	GreenColor	
blueColor	BlueColor	
brownColor	BrownColor	
purpleColor	PurpleColor	
boldLabelFont	BoldLabelFont	Bold labels, such as column headings
smallBoldLabelFont	SmallBoldLabelFont	Labels for tight packing situations
tinyBoldLabelFont	TinyBoldLabelFont	Labels where space is at a premium
plainLabelFont	PlainLabelFont	Button labels, also can be used for values in “Name: Value” pairs
smallPlainLabelFont	SmallPlainLabelFont	Small buttons
obliqueLabelFont	ObliqueLabelFont	Menus

Table 3-1 (continued) Pre-Defined Scheme Resources and Symbolic Values

Resource	Symbolic Value	Intended Use
smallObliqueLabelFont	SmallObliqueLabelFont	Small menus
fixedWidthFont	FixedWidthFont	Text areas where fixed width is mandatory, for example where it's important that columns line up
smallFixedWidthFont	SmallFixedWidthFont	Text where a fixed-width font is appropriate but space is at a premium

Testing Your Application with Schemes

For best results, you should be sure to test your application against all available schemes, and watch for any anomalies. As an added precaution, you might try using the Scheme Browser, *schemebr*, (available from the "Colors" option of the Customize menu in Desktop toolchest) to create some variations on existing schemes and see how your program will react. If you have not added any resources and are not setting any colors or fonts in your program or *app-defaults* files, any scheme should be reasonable. If you have set colors directly in your application, you should watch carefully to see how your application reacts as colors change. It is always possible to use the scheme editor to create a very bad scheme, but if your program seems more sensitive than others to changes, you should think more carefully about your use of color.

Creating New Schemes

You can also include your own new schemes in your software distribution, but there are several things to be aware of. First, the largest benefit of schemes is the users' ability to change to schemes of their choice, so even if you create a scheme that you prefer for your application, you should still make sure your program looks good with the existing schemes. Second, if you install your scheme on a user's system, the user might apply that scheme to other applications. If you attempt to design a new scheme, you should attempt to make sure the scheme works reasonably with other applications on the desktop.

The easiest way to design a new scheme is to use the Scheme Browser, *schemebr*, available from the “Colors” option of the Customize menu in Desktop toolchest. For best results, you should base your scheme on an existing scheme, preferably one of the standard ones supported by Silicon Graphics. Making only minor changes will reduce the chances that the new scheme will not work with other programs. Once you have created and saved your new scheme, you can retrieve the files from your *$HOME/.desktop-<hostname>/scheme* directory, where *<hostname>* is the name of your system. You can install your scheme in */usr/local/schemes/<SchemeName>*, where *<SchemeName>* is the name you have chosen for your scheme. Once installed, this scheme will appear in the Scheme Browser as a local scheme. You can also include this scheme with your software distribution.

Hard-Coding a Scheme for an Application

In some rare situations, you might want your application to use one particular scheme, not the one that the user selects. Silicon Graphics strongly recommends that you not use this approach, but if your application has special needs, the process is simple to do. Specify the value of the **scheme** resource in your application’s *app-defaults* file using a complete path name. For example:

```
YourApp*scheme: /usr/lib/X11/schemes/Milan
```

Chapter 4

Using the New and Enhanced Widgets

This chapter discusses the new and enhanced IRIS IM widgets, as well as the mixed-model programming widgets for using OpenGL in an IRIS IM application.

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Using the New and Enhanced Widgets

This chapter discusses the new and enhanced IRIS IM widgets, as well as the mixed-model programming widgets for using OpenGL in an IRIS IM application. This chapter contains these sections:

- "Using the New and Enhanced Widgets" explains how your application can access the new and enhanced widgets.
- "Using the Widget Demos" explains how to use the provided demos to experiment with some of the new and enhanced widgets.
- "The New Widgets" lists and discusses each of the new widgets.
- "The Enhanced Widgets" lists and discusses each of the enhanced widgets.
- "The Mixed-Model Programming Widgets" discusses the mixed-model programming widgets that Silicon Graphics provides for use with your OpenGL or IRIS GL application.

Using the New and Enhanced Widgets

To use a new or enhanced widget, first switch on the Indigo Magic enhanced look and schemes, as described in Chapter 2, "Getting the Indigo Magic Look," and Chapter 3, "Using Schemes," respectively.

Using the Widget Demos

Silicon Graphics provides demos for some of the new and enhanced widgets. These demos let you experiment with the different resources for each widget.

The widget demos are in */usr/src/X11/motif/Sgm*. The demos are part of the *motif_dev.sw.demoSgi* subsystem—if you can't find them on your system, check to make sure this subsystem is installed.

Instructions for Building the Widget Demos

The demo tree is shipped with X11 Imakefiles, not Makefiles. To build the demos:

1. Change to the IRIS IM demos build tree location.
   ```
   % cd /usr/src/X11/motif/Sgm
   ```
2. Build the initial Makefile.
   ```
   % ../mmkmf
   ```
3. Verify that the Makefile is OK.
   ```
   % make Makefile
   ```
4. Update the rest of your Makefiles.
   ```
   % make Makefiles
   ```
5. Clean the directory. If you don't and this isn't your first installation, obsolete binaries might remain, giving unexpected results.
   ```
   % make clean
   ```
6. Update Makefile dependencies. This is also a good confidence test that everything is installed properly.
   ```
   % make depend
   ```
7. Build the demos.
   ```
   % make all
   ```

The Enhanced Widgets

Silicon Graphics provides enhanced versions of these existing IRIS IM widgets:

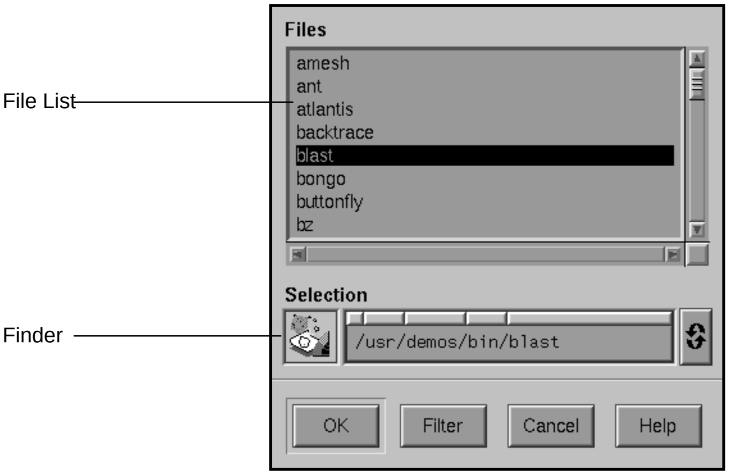
- File Selection Box
- Scale (Percent Done Indicator)
- Text and Text Field

This section describes how to use the enhancements to these widgets. For guidelines on when to use these widgets, refer to the *Indigo Magic User Interface Guidelines*.

The File Selection Box Widget

The FileSelectionBox widget (**SgFileSelectionBox**), shown in Figure 4-1, is an enhanced version of the existing IRIS IM FileSelectionBox widget (**XmFileSelectionBox**). The API is consistent with the IRIS IM version of the widget, but the presentation is different.

Note: To get the enhanced FileSelectionBox, you need to set the **SgNuseEnhancedFSB** resource to true (in addition to linking with **-lSgm**). Typically, you should do this in your application's *app-defaults* file.



amesh
ant
atlantis
backtrace
blast
bongo
buttonfly
bz

/usr/demos/bin/blast

Figure 4-1 The File Selection Box Widget

The FileSelectionBox traverses directories, shows files and subdirectories, and selects files. It has three main areas:

File list — The scrollable list in the enhanced FileSelectionBox contains both files and directories.

Finder widget

The text field displays the name and the DropPocket displays the icon of the current directory or file. The user can select a file or directory by typing its name in the text field or dropping its icon on the DropPocket. The user can also recall a previously-selected directory from the DynaMenu. "The Finder Widget" on page 49 discusses the Finder widget in more detail.

Command panel

The *OK*, *Cancel*, and *Help* buttons operate the same in the enhanced FileSelectionBox as they do in the regular version. The *Filter* button pops up a Filter Dialog, which allows the user to enter a shell-style filename expression as filter pattern. The enhanced FileSelectionBox displays only those files in the current directory that match the given pattern. (The FileSelectionBox continues to display any subdirectories in the current directory.)

The programmatic interface to the enhanced FileSelectionBox differs from the regular version in the following points:

- You can retrieve the Finder child of the FileSelectionBox using the standard **XmFileSelectionBoxGetChild**(3X) by providing the defined constant SgDIALOG_FINDER as the child. You should check the returned widget for validity; it is NULL if the FileSelectionBox is not enhanced.
- **XmNdirMask** is not guaranteed to be exactly the same as the regular version of the FileSelectionBox in all situations. It does conform to the definition in the **XmFileSelectionBox**(3X) reference page. Specifically, the directory portion **XmNdirMask** may not be present in the enhanced FileSelectionBox's representation.
- **XmNfileTypeMask** behavior is different because there is no separate directory list. In the enhanced FileSelectionBox
  - XmFILE_REGULAR and XmFILE_ANY_TYPE show both files and directories in the file list
  - XmFILE_DIRECTORY shows only directories

For information about standard **XmFileSelectionBox** resources, behavior, and callbacks, see the **XmFileSelectionBox**(3X) reference page. For detailed information on the FileSelectionBox widget, refer to the **SgFileSelectionBox**(3X) reference page. For an example program using the FileSelectionBox widget, see "Example Program for File Selection Box" on page 260. See Chapter 10, "Dialogs," in the *Indigo Magic User Interface Guidelines* for guidelines on using dialogs in your application.

The Scale (Percent Done Indicator) Widget

The Scale widget (**SgScale**), is an enhanced version of the IRIS IM Scale widget (**XmScale**). (The enhanced Scale widget is also referred to as the Percent Done Indicator widget.) In addition to the standard **XmScale** resources, the enhanced Scale widget provides the following new resources:

sliderVisual The visual representation of the slider. The default value, XmETCHED_LINE, displays a single etched line across the center of the slider and displays shadows on the edges of the slider. The value XmSHADOWED doesn't display the etched line, but does display the shadows. The value XmFLAT_FOREGROUND displays a "flat" slider with no line and no shadows.

slidingMode When set to the default value, XmSLIDER, the slider can move back and forth within the trough as in a regular Scale widget. When set to XmTHERMOMETER, one end of the slider is "anchored" to one end of the trough and the slider grows and shrinks as the value changes. The XmTHERMOMETER setting is useful for creating a "percent done" indicator or other similar display.

editable If FALSE, the slider is insensitive to user input but does not appeared "grayed out." This is useful in conjunction with the "percent done" mode to simply display a value. The default value is TRUE, allowing the user to move the slider.

For more information on the enhanced Scale widget, refer to the **SgScale**(3X) widget reference page. For more information on the unenhanced version of the widget, refer to the **XmScale**(3X) reference page. See "Scales" in Chapter 9 of the *Indigo Magic User Interface Guidelines* for guidelines on using scales in your application.

The Text and Text Field Widgets

The Text and TextField widgets (**SgText** and **SgTextField**) are enhanced versions of the IRIS IM Text and TextField widgets (**XmText** and **XmTextField**). In addition to the standard **XmText** and **XmTextField** resources, these widgets provide the following new resources:

selectionBackground
The background color for selected text.

selectionForeground
The foreground color for selected text.

errorBackground
The background color for text that you select with an "error status" by using the **SgTextSetErrorSelection()** or **SgTextFieldSetErrorSelection()** function (depending on whether the widget is a **SgText** or **SgTextField** widget).

cursorVisibleOnFocus
If TRUE (the default), the widget displays the text cursor only when the widget has focus. If FALSE, the cursor is always visible even when the widget doesn't have keyboard focus.

The **SgTextSetErrorSelection()** and **SgTextFieldSetErrorSelection()** functions operate almost identically to the **XmTextSetSelection()** and **XmTextFieldSetSelection()** functions. You use them to select a range of text as the primary selection. The only difference is that the selected text is drawn with the background color specified by the **errorBackground** resource instead of that specified by the **selectionBackground** resource.

For a detailed description of the new resources for the enhanced versions of these widgets, refer to the **SgText**(3X) and **SgTextField**(3X) reference pages. For information on the unenhanced versions of these widgets, refer to the **XmText**(3X) and **XmTextField**(3X) reference pages. See "Text fields" in Chapter 9 of the *Indigo Magic User Interface Guidelines* for guidelines on using text fields in your application.

The Mixed-Model Programming Widgets

Silicon Graphics provides two sets of mixed-model programming widgets: one set for use with OpenGL and one set for use with IRIS GL.

A mixed-model program, briefly, is an X program that creates one or more subwindows that use OpenGL or IRIS GL for rendering. Such a program uses Xlib or Xt calls for windowing, event handling, color maps, fonts, and so on. A "pure" IRIS GL application, on the other hand, uses IRIS GL calls for windowing, event handling, color maps, and fonts. (For a more detailed discussion of mixed-model programming, refer to the *OpenGL Porting Guide*.)

If you plan to port your IRIS GL application to OpenGL, a good first step is to port it to mixed-model. The switch to OpenGL is then much easier. The IRIS GL mixed-model widgets make it much easier to port pure IRIS GL applications to mixed-model.

If you're writing a new application, just start with OpenGL and the OpenGL versions of the mixed-model widgets (or use Open Inventor™ instead of OpenGL—Open Inventor handles all this for you).

The mixed-model widgets are:

IRIS GL	OpenGL
GlxDraw	GLwDrawingArea
GlxMDraw	GLwMDrawingArea

The GlxDraw and GLwDrawingArea widgets are suitable for use with any widget set. The GlxMDraw and GLwMDrawingArea widgets are designed especially for use with IRIS IM.

This manual does not tell you how to create a mixed-model program. For instructions on mixed-model programming, refer to the *OpenGL Porting Guide*. (The *OpenGL Porting Guide* contains mixed-model programming information that's relevant for both IRIS GL and OpenGL programmers.)

You can find examples of many mixed-model programs for both OpenGL and IRIS GL in the *4Dgifts* directories. If you have trouble finding the relevant directories, refer to the *README* file in */usr/people/4Dgifts*. This

README file explains the contents and organization of the 4Dgifts directories.

The New Widgets

Silicon Graphics provides these new widgets:

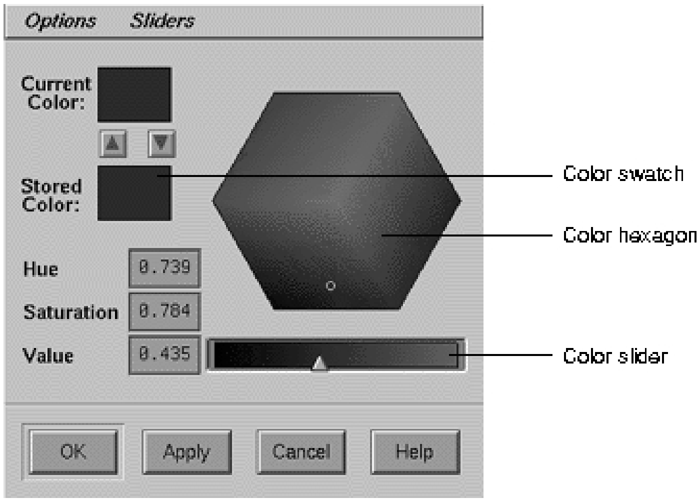
- Color Chooser
- Dial
- Finder
- Graph
- Grid
- Springbox
- Thumbwheel

For guidelines on when to use the different widgets (for example, when to use a Thumbwheel or a Dial) refer to the *Indigo Magic User Interface Guidelines*.

This section describes each important new IRIS IM widget. It doesn't discuss new widgets that are part of composite widgets, unless they are generally useful.

The Color Chooser Widget

The ColorChooser widget (**SgColorChooser**) allows users to select colors in RGB or HSV color spaces. Figure 4-2 shows the ColorChooser's default configuration.



Hue 0.739

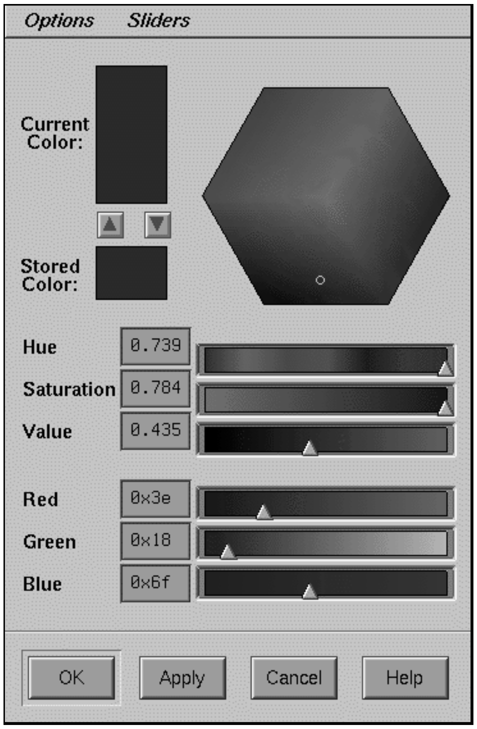
Saturation 0.784

Value 0.435

Figure 4-2 The Color Chooser Widget

The ColorChooser includes these components:

- Menus for setting options and sliders for the color chooser.
- A color hexagon that provides visual selection of the hue and saturation components of a color in an HSV color space.
- Color sliders for each of the hue, saturation, value, red, green, and blue color components. To make the color sliders visible, the user can select items from the Sliders menu. (Figure 4-3 shows the ColorChooser with all the sliders visible.) You can also display the color sliders programmatically. Text fields show the exact value of each current color component and allow users to set these values numerically.
- Two color swatches: one for showing the current selected color and one for enabling the user to store a second color for reference.
- Three or four buttons. The default button labels are *OK*, *Cancel*, *Help*, and *Apply*. If the parent of the ColorChooser widget is a DialogShell, then the *Apply* button is managed; otherwise it is unmanaged.



Hue 0.739
Saturation 0.784
Value 0.435
Red 0x3e
Green 0x18
Blue 0x6f

Figure 4-3 The Color Chooser Widget With HSV and RGB Sliders

Users can select a color by manipulating the color hexagon and any of the six sliders, or by changing the values in any of the text fields.

You must include the header file <*Sgm/ColorC.h*> in any source file that uses a ColorChooser widget.

For more detailed information about the ColorChooser widget, refer to the **SgColorChooser**(3X) reference page. For an example program using the ColorChooser widget, see "Example Program for Color Chooser" on page 247. You can also examine, compile, and experiment with the *colorc* demonstration program in the directory */usr/src/X11/motif/Sgm/colorc*. See "The Indigo Magic Color Chooser—A Standard Support Window" in Chapter 6 of the *Indigo Magic User Interface Guidelines* for guidelines on using the ColorChooser widget in your application.

Controlling the Color Chooser Interface

By default, the ColorChooser widget uses GL's Gouraud shading to display the colors in the hexagon and sliders. You can force the ColorChooser widget not to use GL by setting the value of the **SgNuseGl** resource to FALSE. When **SgNuseGl** is FALSE, the ColorChooser widget uses only X function calls. In this case, it does not draw a color hexagon and it uses XmScale widgets instead of the special color sliders.

When using GL, the ColorChooser normally shades the color hexagon and color sliders so that each point is a true representation of the color that would be selected if the user were to move the hexagon pointer or color slider to that point. However, if the value of the **SgNwysiwyg** resource is FALSE then the ColorChooser always displays the hexagon colors with a Value (intensity) of 1 (maximum intensity), and the RGB sliders with a color range of black to the maximum RGB color component value.

For example, if the current selected color RGB value is (100, 200, 50), then the Red color slider displays the colors (0, 200, 50) through (255, 200, 50) if **SgNwysiwyg** is TRUE, and (0, 0, 0) through (233, 0, 0) if **SgNwysiwyg** is FALSE. (Note that the user can also toggle the value of **SgNwysiwyg** by selecting the "WYSIWYG" option from the ColorChooser's Options menu.)

The **SgNshowSliders** resource determines which of the color sliders are visible. Possible values are:

SgValue Show only the slider for the color Value (the default)

SgRGB_and_Value
Show the Value and RGB sliders

SgRGB_and_HSV
Show all six sliders, the HSV and RGB sliders

The default labels (in the C locale) for the ColorChooser buttons are "OK," "Apply," "Cancel," and "Help." You can change these by setting the values of **SgNokLabelString**, **SgNapplyLabelString**, **SgNcancelLabelString**, and **SgNhelpLabelString** respectively.

You can add additional children to the ColorChooser after creation—they're laid out in the following manner:

- The first child is used as a work area. The work area is placed just below the menu bar.
- Buttons—All **XmPushButton** widgets or gadgets, and their subclasses are placed after the *OK* button, in the order of their creation.
- The layout of additional children that are not in the above categories is undefined.

Getting and Setting the Color Chooser's Colors

In ColorChooser callback functions, the RGB color values are provided as the *r*, *g*, and *b* parameters of the SgColorChooserCallbackStruct structure passed to the functions. "Handling User Interaction With the Color Chooser" describes the ColorChooser callbacks.

ColorChooser also provides several convenience routines for getting and setting both the current color values and setting the stored color value.

SgColorChooserSetColor() sets both the current and the stored color values to the same color:

```
void SgColorChooserSetColor(Widget w, short r, short g,
                            short b);
```

SgColorChooserGetColor() retrieves the current color values:

```
void SgColorChooserGetColor(Widget w, short *r, short *g,
                            short *b);
```

SgColorChooserSetCurrentColor() sets the current color but not the stored color:

```
void SgColorChooserSetCurrentColor(Widget w, short r,
                                   short g, short b);
```

SgColorChooserSetStoredColor() sets the stored color but not the current color:

```
void SgColorChooserSetStoredColor(Widget w, short r,
                                  short g, short b);
```

For each function, *w* is the ColorChooser widget and *r*, *g*, and *b* are the red, green, and blue values, respectively.

Handling User Interaction With the Color Chooser

The ColorChooser widget defines the following callback resources:

SgNapplyCallback
Invoked when the user activates the *Apply* button. The callback reason is SgCR_APPLY.

SgNcancelCallback
Invoked when the user activates the *Cancel* button. The callback reason is SgCR_CANCEL.

SgNokCallback
Invoked when the user activates the *OK* button. The callback reason is SgCR_OK.

SgNvalueChangedCallback
Invoked when the user selects a color. The callback reason is XmCR_VALUE_CHANGED. A color is selected when the user changes the value of a color component with the color hexagon, one of the color sliders, or one of the color components text widgets.

SgNdragCallback
Specifies the list of callbacks called when the user drags the mouse over the color hexagon or one of the color sliders to select a color. The callback reason is XmCR_DRAG.

A pointer to a SgColorChooserCallbackStruct structure is passed to each ColorChooser callback function:

```
typedef struct {
    int reason;
    XEvent *event;
    short r, g, b;
} SgColorChooserCallbackStruct;
```

reason Indicates why the callback was invoked.

event Points to the XEvent that triggered the callback.

r Indicates the red color component of the currently selected color.

g Indicates the green color component of the currently selected color.

b Indicates the blue color component of the currently selected color.

The Dial Widget

The Dial widget (**SgDial**), shown in Figure 4-4, is a new widget that allows users to input or modify a value from within a range of values. Figure 4-4 shows two forms of the Dial widget, one with the input control in the shape of a knob and the other in the shape of a pointer. The user can modify the Dial's value by spinning the knob or pointer. The Dial is usually surrounded by tick marks (marked divisions around the perimeter of the Dial).

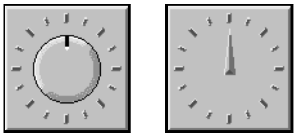


Figure 4-4 The Dial Widget in Knob and Pointer Form

You must include the header file <*Sgm/Dial.h*> in any source file that uses a Dial widget.

For more detailed information about the Dial widget, refer to the **SgDial**(3X) reference page. For an example program using the Dial widget, see "Example Program for Dial" on page 250. You can also examine, compile, and experiment with the *dial* demonstration program in the directory */usr/src/X11/motif/Sgm/dial*. See "Dials" in Chapter 9 of the *Indigo Magic User Interface Guidelines* for guidelines on using the Dial widget in your application.

Controlling the Dial Interface

You control the display characteristics of a Dial through widget resources.

The **SgNdialVisual** resource determines whether the Dial uses a knob or a pointer. The default value, SgKNOB, specifies a knob and SgPOINTER specifies a pointer. If you use a pointer, you can also specify the color of the small “indicator” at the center of the pointer using the **SgNindicatorColor** resource; the default color is red.

You specify the position of the lowest value on the Dial with the **SgNstartAngle** resource. The value, which must be between 0 and 360 inclusive, specifies the number of degrees clockwise from the top of the Dial. The default value of 0 corresponds to the top of the Dial.

The **SgNangleRange** resource determines the range of the Dial in degrees. The value, which must be between 0 and 360 inclusive, specifies the number of degrees clockwise from the start angle of the Dial. The default value of 360 allows the Dial to rotate completely.

The Dial widget displays evenly spaced “tick marks” along the perimeter of the Dial’s angle range. You control the number of tick marks with the **SgNdialMarkers** resource; the default number is 16. The length of the tick marks in pixels is determined by the **SgNmarkerLength** resource; the default length is 8 pixels. The **SgNdialForeground** resource determines the color of the tick marks; the default is red.

The resources **XmNminimum** and **XmNmaximum** determine the minimum and maximum values of the Dial. The Dial takes on the minimum value at the position specified by **SgNstartAngle** and takes on the maximum value at the position **SgNangleRange** degrees clockwise from **SgNstartAngle**. The value of **XmNmaximum** must be greater than or equal to the value of **XmNminimum**. The default value of **XmNminimum** is 0 and the default value of **XmNmaximum** is 360.

Getting and Setting the Dial’s Value

The **XmNvalue** resource, which must be a value between **XmNminimum** and **XmNmaximum** inclusive, contains the current position of the Dial. You can set or get the value of a Dial widget at any time by respectively setting or getting its **XmNvalue** resource.

In Dial callback functions, the Dial value is provided as the *position* parameter of the SgDialCallbackStruct structure passed to the functions. “Detecting Changes in the Dial’s Value” describes the Dial callbacks.

Dial also provides a convenience routine, **SgDialSetValue()**, for setting the value of **XmNvalue**:

```
void SgDialSetValue(Widget w, int value);
```

w is the Dial widget whose value you want to set and *value* is the new value.

You can get the current value of a Dial widget at any time by retrieving the value of its **XmNvalue** resource. Dial also provides a convenience routine, **SgDialGetValue()**, for getting the value of **XmNvalue**:

```
void SgDialGetValue(Widget w, int *value);
```

w is the Dial widget whose value you want to get. Upon returning, *value* contains the Dial's value.

Detecting Changes in the Dial's Value

The Dial widget defines two callback list resources, **XmNvalueChangedCallback** and **XmNdragCallback**. A Dial widget invokes **XmNvalueChangedCallback** whenever its value changes either programmatically (for example, by calling **SgDialSetValue()**) or through user interaction. A Dial widget invokes **XmNdragCallback** whenever the user clicks and drags, or "spins," the Dial's knob or pointer.

A pointer to a SgDialCallbackStruct structure is passed to each Dial callback function:

```
typedef struct {
    int reason;
    XEvent *event;
    int position;
} SgDialCallbackStruct;
```

The SgDialCallbackStruct parameters are:

reason — The reason the callback was invoked. This value is XmCR_VALUE_CHANGED in the event of a **XmNvalueChangedCallback** and XmCR_DRAG in the event of a **XmNdragCallback**.

event — A pointer to the XEvent that triggered the callback

position — The new Dial value

The Thumbwheel Widget

The ThumbWheel widget (**SgThumbWheel**), shown in Figure 4-5, is a new widget that allows users to input or modify a value, either from within a range of values or from an unbounded (infinite) range.

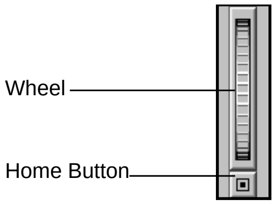


Figure 4-5 The Thumbwheel Widget

A ThumbWheel has an elongated rectangular region within which a wheel graphic is displayed. Users can modify the ThumbWheel's value by spinning the wheel. A ThumbWheel can also include a home button, located outside the wheel region. This button allows users to set the ThumbWheel's value to a known position.

You must include the header file <*Sgm/ThumbWheel.h*> in any source file that uses a Thumbwheel widget.

For detailed information on the ThumbWheel widget, refer to the **SgThumbWheel**(3X) reference page. For an example program using the ThumbWheel widget, see "Example Program for Thumbwheel" on page 258. You can also examine, compile, and experiment with the *thumbwheel* demonstration program in the directory */usr/src/X11/motif/Sgm/thumbwheel*. See "Thumbwheels" in Chapter 9 of the *Indigo Magic User Interface Guidelines* for guidelines on using the ThumbWheel widget in your application.

Controlling the ThumbWheel Interface

You control the display characteristics of a ThumbWheel through widget resources.

The resources **XmNminimum** and **XmNmaximum** determine the minimum and maximum values of the ThumbWheel. Setting **XmNmaximum** equal to

XmNminimum indicates an infinite range. The default value of **XmNminimum** is 0 and the default value of **XmNmaximum** is 100.

The **SgNangleRange** resource specifies the angular range, in degrees, through which the ThumbWheel is allowed to rotate. The default of 150 represents roughly the visible amount of the wheel. Thus clicking at one end of the wheel and dragging the mouse to the other end would give roughly the entire range from **XmNminimum** to **XmNmaximum**.

In conjunction with **XmNmaximum** and **XmNminimum**, the **SgNangleRange** resource controls the fineness or coarseness of the wheel control when it is not infinite. If this value is 0, the ThumbWheel has an infinite range. If the range of the ThumbWheel is infinite, you can use the **SgNunitsPerRotation** resource to specify the change in the ThumbWheel's value for each full rotation of the wheel.

If the value of **SgNshowHomeButton** is TRUE, the default, the ThumbWheel displays a home button by the slider. The user can click on the home button to set the value of the ThumbWheel to a known value, which is specified by the **SgNhomePosition** resource. The default value of **SgNhomePosition** is 50.

The **XmNorientation** resource determines whether the orientation of the ThumbWheel is vertical, indicated by a value of XmVERTICAL, or horizontal, indicated by a value of XmHORIZONTAL. The default value is XmVERTICAL.

Getting and Setting the ThumbWheel's Value

The **XmNvalue** resource contains the current position of the ThumbWheel. **XmNvalue** must be a value between **XmNminimum** and **XmNmaximum** if the ThumbWheel is not "infinite." You can set or get the value of a ThumbWheel widget at any time by respectively setting or getting its **XmNvalue** resource.

In ThumbWheel callback functions, the ThumbWheel value is provided as the *value* parameter of the SgThumbWheelCallbackStruct structure passed to the functions. "Detecting Changes in the ThumbWheel's Value" describes the ThumbWheel callbacks.

Detecting Changes in the ThumbWheel's Value

The ThumbWheel widget defines two callback list resources, **XmNvalueChangedCallback** and **XmNdragCallback**. A ThumbWheel widget invokes **XmNvalueChangedCallback** whenever its value changes either programmatically (that is, by setting the value of **XmNvalue**) or through user interaction. A ThumbWheel widget invokes **XmNdragCallback** whenever the user clicks and drags, or "spins," the ThumbWheel's wheel.

A pointer to a SgThumbWheelCallbackStruct structure is passed to each ThumbWheel callback function:

```
typedef struct { int reason;
                 XEvent * event;
                 int value;
               } SgThumbWheelCallbackStruct;
```

The SgThumbWheelCallbackStruct parameters are:

reason The reason the callback was invoked. This value is XmCR_VALUE_CHANGED in the event of a **XmNvalueChangedCallback** and XmCR_DRAG in the event of a **XmNdragCallback**.

event A pointer to the XEvent that triggered the callback.

position The new ThumbWheel value.

The Finder Widget

The Finder widget (**SgFinder**), shown in Figure 4-6, is a new widget that accelerates text selection of long objects such as filenames. (A good way to experiment with a Finder widget is to select "An Icon" from the Find toolchest.)

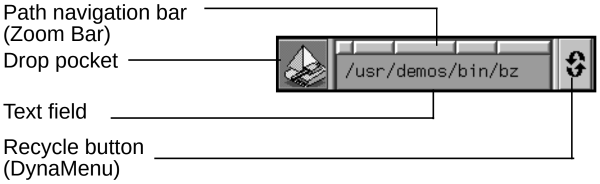


Figure 4-6 The Finder Widget

The Finder widget is customizable for various applications (it's not just for looking at directories; see the **SgFinder**(3X) reference page for customization details). The Finder widget includes four components:

Text field Displays the name of a file or directory.

Path navigation bar
Contains buttons representing each directory in the pathname. When the user clicks on a path bar button, the Finder sets the current directory to the directory listed underneath that button. The path bar is created with an **SgZoomBar**(3X) widget.

Recycle button When users click on the Recycle button, the recycle list appears listing the directories that the user has selected during the current Finder session. Selecting an item from the recycle list changes the current directory to the selected directory. The recycle button is created with an **SgDynaMenu**(3X) widget.

Drop pocket Displays the Desktop file icon for the file listed in the text field. The user can drop Desktop file icons into the drop pocket to find the pathname for the file and drag icons out of the drop pocket and put them on the Desktop. The recycle button is created with an **SgDropPocket**(3X) widget.

You must include the header file <*Sgm/Finder.h*> in any source file that uses a Finder widget.

For more detailed information on the Finder widget, refer to the **SgFinder**(3X), **SgDropPocket**(3X), and **SgDynaMenu**(3X) reference pages. For an example using the Finder widget, see "Example Program for Finder" on page 255. You can also examine, compile, and experiment with the *finderTest* demonstration program in the directory */usr/src/X11/motif/Sgm/finder*. See "File Finder" in Chapter 9 of the *Indigo Magic User Interface Guidelines* for guidelines on using the Finder widget in your application.

Controlling the Finder Interface

If you don't need the drop pocket feature of the Finder widget, you can set the value of the resource **SgNuseDropPocket** to FALSE when you create the widget. This bypasses the costs of setting up drag and drop and loading the file icon libraries. Note that you can't set this resource using **XtSetValues()**; if you don't originally create a Finder widget with a drop pocket, you can't add one afterwards.

Similarly, if you don't need the Recycle button, you can set the value of the resource **SgNuseHistoryMenu** to FALSE. Note that you can't set this resource using **XtSetValues()**; if you don't originally create a Finder widget with a Recycle button, you can't add one afterwards.

You can customize the appearance of the Recycle button by setting the value of the **SgNhistoryPixmap** resource to the pixmap you want to display.

By default, the Finder widget determines where to place the buttons on the path navigation bar by the location of the forward slash (/) character in the text field. You can specify a different separator character by providing it as the value of the **SgNseparator** resource. This feature is useful if you want to use the Finder widget to display something other than filenames.

Getting and Setting Finder Values

You can retrieve the current value of the Finder's text field with **SgFinderGetTextString()**:

```
char *SgFinderGetTextString(Widget w);
```

You can set the value of the text field with **SgFinderSetTextString()**:

```
void SgFinderSetTextString(Widget w, char *value);
```

You can add an item to the "history list" of the Recycle button with **SgFinderAddHistoryItem()**:

```
void SgFinderAddHistoryItem(Widget w, char *str);
```

You can clear the Recycle button's history list with **SgFinderClearHistory()**:

```
void SgFinderClearHistory(Widget w);
```

You can access a widget component within a finder using **SgFinderGetChild()**:

```
Widget SgFinderGetChild(Widget w, int child);
```

child specifies the component and can take any of the following values:

SgFINDER_DROP_POCKET
The drop pocket

SgFINDER_TEXT
The text field

SgFINDER_ZOOM_BAR
The path navigation bar

SgFINDER_HISTORY_MENUBAR
The Recycle button

Handling User Interaction With the Finder

When the user clicks a button in the path navigation bar, the default action of the Finder is to set the current directory to the directory listed underneath that button. You can change this behavior by setting the **SgNsetTextSectionFunc** resource to the handler you want to use. The handler function must be of type SgSetTextFunc, which is defined in <*Sg/Finder.h*>:

```
typedef void (*SgSetTextFunc)(Widget finder, int section);
```

The first argument is the Finder widget and the second is an integer corresponding to the button pressed. Buttons are numbered sequentially from the left, starting with 0. You can perform whatever operations you want in this function, but typically you include a call to **SgFinderSetTextString()** to set the value of the text field after the user clicks a button.

Additionally, the Finder widget defines two callback list resources:

XmNactivateCallback

Invoked when the user clicks a path navigation bar button, when the text field generates an activateCallback (for example, the user presses the **<Return>** key in the text field), or when you set the text string by calling **SgFinderSetTextString()**. A pointer to an XmAnyCallbackStruct structure is passed to each callback function. The reason sent by the callback is XmCR_ACTIVATE.

XmNvalueChangedCallback

Invoked when text is deleted from or inserted into the text field. A pointer to an XmAnyCallbackStruct structure is passed to each callback function. The reason sent by the callback is XmCR_VALUE_CHANGED.

The Graph Widget

The Graph widget (**SgGraph**) allows you to display any group of widgets as a graph, with each widget representing a node. Figure 4-7 shows an example of a Graph widget.

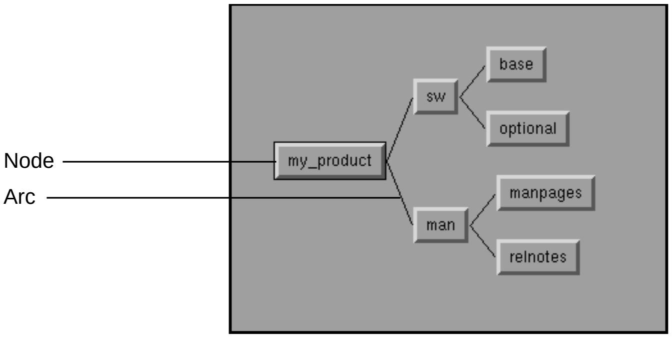


Figure 4-7 The Graph Widget

The arcs used to connect the nodes are instances of an Arc widget (**SgArc**), developed specifically for use with the Graph widget.

The Graph widget allows you to display any group of widgets as a graph, with each widget representing a node. The graph can be disconnected and can contain cycles. The arcs used to connect the nodes are instances of an Arc widget (**SgArc**), developed specifically for use with the Graph widget. Arcs may be undirected, directed, or bidirected. Note that the Graph widget does not understand the semantics of arc direction; in other words, for layout and editing purposes, an Arc will always have a parent and a child regardless of its direction.

The Graph widget has the ability to arrange all nodes either horizontally or vertically according to an internal layout algorithm, and supports an edit mode in which arcs and nodes may be interactively repositioned as well as created. There is also a read-only mode in which all events are passed directly to the children of the Graph widget. In edit mode, the Graph takes over all device events for editing commands.

The Graph is a complex widget, and a full discuss of its resources, utility functions, and capabilities is beyond the scope of this document. For detailed information about the Graph and Arc widgets, refer to the **SgGraph**(3X) and **SgArc**(3X) reference pages.

You must include the header file <*Sgm/Graph.h*> in any source file that uses a Graph widget. You must include the header files <*Sgm/Graph.h*> and <*Sgm/Arc.h*> in any source file that uses an Arc widget.

The Springbox Widget

The SpringBox widget (**SgSpringBox**) is a new container widget that arranges its children in a single row or column based on a set of spring constraints assigned to each child. You can use the SpringBox widget to create layouts similar to those supported by the **XmForm** widget, but the SpringBox widget is usually easier to set up.

The value of the SpringBox widget’s **XmNorientation** resource determines its orientation. The default value, XmHORIZONTAL, specifies a horizontal SpringBox and the value XmVERTICAL specifies a vertical SpringBox.

To use the SpringBox, you set constraint resources on each child of the widget to specify the “springiness” for both the widget’s size and position relative to its siblings.

You control the springiness of a widget's size by setting the values of its **XmNverticalSpring** and **XmNhorizontalSpring** resources. A value of zero means the child cannot be resized in that direction. For non-zero values, the values are compared to the values of other springs in the overall system to determine the proportional effects of any resizing. For example, a widget with a springiness of 200 would stretch twice as much as a widget with a springiness of 100. The default value of both resources is zero.

The values of the resources **XmNleftSpring**, **XmNrightSpring**, **XmNtopSpring**, and **XmNbottomSpring** control the springiness of a widget's position in relation to its neighboring boundaries. By default, the value of each of these springs is 50. A value of zero means that the SpringBox widget cannot add additional space adjacent to that part of a widget. Larger values are considered in relation to all other spring values in the system.

You must include the header file <*Sgm/SpringBox.h*> in any source file that uses a SpringBox widget. For more detailed information on the SpringBox widget, refer to the **SgSpringBox**(3X) reference page.

The Grid Widget

The Grid widget (**SgGrid**) is a new container widget that arranges its children in a two-dimensional grid of arbitrary size. You can separately designate each row and column of the grid as having a fixed size or as having some degree of stretchability. You can also resize each child in either or both directions, or force a child to a fixed size.

You must include the header file <*Sgm/Grid.h*> in any source file that uses a Grid widget. For detailed information on the Grid widget, refer to the **SgGrid**(3X) reference page.

Setting Grid Characteristics

You specify the number of rows and columns in a Grid by setting the values of its **XmNnumRows** and **XmNnumColumns** resources, respectively. The default value for each is 1. Note that you can set the size of a Grid only when you create it; you can't use **XtSetValues()** to change the number of rows or columns in a Grid.

The **XmNautoLayout** resource determines the layout policy for a Grid. If its value is TRUE (the default), all rows and columns that have a non-zero resizability factor (described below) are sized according to the desired natural size of the widgets in that row or column.

If **XmNautoLayout** is FALSE, all widgets in resizable rows or columns are sized according to the resizability factor for that row or column. By default, the resizability factor is "1" for all rows and columns, which results in each cell in the grid having an equal size. You can change the resizability factor for a row or column by calling **SgGridSetRowMargin()** or **SgGridSetColumnMargin()** respectively:

```
SgGridSetRowResizability(Widget widget, int row, int factor);

SgGridSetColumnResizability(Widget widget, int column,
                            int factor);
```

widget is the Grid widget. The second argument specifies the row or column. Rows are numbered sequentially from the top starting at 0; columns are numbered sequentially from the left starting with 0. *factor* is the resizability factor for the row or column. Setting this value to 0 establishes the specified row or column as not resizable, regardless of the setting of **XmNautoLayout**. Other values are taken relative to all other rows. For example, if a Grid has three rows whose resizability factors are set to 100, 100, and 200, the first and second rows will occupy one quarter of the space (100/(100+100+200)), while the third row will occupy one half of the available space.

The **XmNdefaultSpacing** resource default spacing between rows and columns. The default value is 4 pixels. You can override the value on a per row/column basis using **SgGridSetColumnMargin()** or **SgGridSetRowMargin()** respectively:

```
SgGridSetRowMargin(Widget widget, int row, Dimension margin);

SgGridSetColumnMargin(Widget widget, int column,
                      Dimension margin);
```

widget is the Grid widget. The second argument specifies the row or column. *margin* specifies the margin in pixels between the row or column's edges and the widgets it contains. The margin is added to both sides of each row or column, so adding a 1 pixel margin increases the relevant dimension of the affected row or column by 2 pixels.

You can display the boundaries of a Grid by setting the value of its **XmNshowGrid** resource to TRUE. You might find this useful for debugging resize specifications. The default value is FALSE.

Setting Constraints on the Child Widget of a Grid

The **XmNrow** and **XmNcolumn** resources of a Grid's child widget specify the row and column in which the Grid places the child. If you don't specify these values, the Grid widget places the child in a randomly selected unoccupied cell.

The **XmNresizeVertical** and **XmNresizeHorizontal** resources determine whether the Grid can resize the child to fill the cell in the vertical and horizontal directions. The default value of TRUE allows the Grid to resize the child.

If a child is a fixed size, and smaller than the cell that contains it, the child's position within the cell is determined by an **XmNgravity** resource. Gravity may be any of the gravity values defined by Xlib except StaticGravity and ForgetGravity. The default is NorthWestGravity. Note that gravity has no effect if both **XmNresizeVertical** and **XmNresizeHorizontal** are TRUE.

Examples of Using the Grid Widget

Example 4-1 creates a grid of four buttons that all size (and resize) equally to fill one quarter of their parent.

Example 4-1 An Example of Using the Grid Widget

```
createGrid(Widget parent)
{
    int n;
    Arg args[10];
    Widget grid, child1, child2, child3, child4;

    n = 0;
    XtSetArg(args[n], XmNnumRows, 2); n++;
    XtSetArg(args[n], XmNnumColumns, 2); n++;
    grid = SgCreateGrid(parent, "grid", args, n);

    child1 = XtVaCreateManagedWidget("child1",
                                     xmPushButtonWidgetClass,
                                     grid,
                                     XmNrow, 0,
                                     XmNcolumn, 0,
                                     NULL);
    child2 = XtVaCreateManagedWidget("child2",
                                     xmPushButtonWidgetClass,
                                     grid,
                                     XmNrow, 0,
                                     XmNcolumn, 1,
                                     NULL);
    child3 = XtVaCreateManagedWidget("child3",
                                     xmPushButtonWidgetClass
                                     grid,
                                     XmNrow, 1,
                                     XmNcolumn, 0,
                                     NULL);
    child4 = XtVaCreateManagedWidget("child4",
                                     xmPushButtonWidgetClass
                                     grid,
                                     XmNrow, 1,
                                     XmNcolumn, 1,
                                     NULL);
    XtManageChild(grid);
}
```

Example 4-2 creates four buttons. The top row has a fixed vertical size, while the bottom row is resizable. The left column has a fixed size, but the right column can be resized. The button in the lower right can be resized, but the others cannot. The button in the lower left cell, which can be resized vertically, floats in the middle of its cell. The button in the upper right stays to the left of its cell.

Example 4-2 Another Example of Using the Grid Widget

```
createGrid(Widget parent) {
    int n;
    Arg args[10];
    Widget grid, chidl1, child2, child3, child4;

    n = 0;
    XtSetArg(args[n], XmNnumRows, 2); n++;
    XtSetArg(args[n], XmNnumColumns, 2); n++;
    grid = SgCreateGrid( parent, "grid", args, n );

    SgGridSetColumnResizability(grid, 0, 0);
    SgGridSetRowResizability(grid, 0, 0);

    child1 = XtVaCreateManagedWidget("child1",
                                 xmPushButtonWidgetClass,
                                 grid,
                                 XmNrow, 0,
                                 XmNcolumn, 0,
                                 NULL);
    child2 = XtVaCreateManagedWidget("child2",
                                 xmPushButtonWidgetClass,
                                 grid,
                                 XmNrow, 0,
                                 XmNcolumn, 1,
                                 XmNresizeHorizontal, FALSE,
                                 XmNgravity, WestGravity,
                                 NULL);
    child3 = XtVaCreateManagedWidget("child3",
                                 xmPushButtonWidgetClass,
                                 grid,
                                 XmNrow, 1,
                                 XmNcolumn, 0,
                                 XmNresizeVertical, FALSE,
                                 XmNgravity, CenterGravity,
                                 NULL);
    child4 = XtVaCreateManagedWidget("child4",
                                 xmPushButtonWidgetClass,
                                 grid,
                                 XmNrow, 1,
                                 XmNcolumn, 1,
                                 NULL);
    XtManageChild(grid);
}
```

Chapter 5

Window, Session, and Desk Management

Users expect applications to interact with the window manager in a consistent manner. This chapter describes how to implment an appropriate application model and interact with the window and session manager.

Chapter 5

Window, Session, and Desk Management

This chapter contains these sections:

- "Window, Session, and Desk Management Overview" on page 63 briefly discusses window, session, and desk management on Silicon Graphics systems.
- "Implementing an Application Model" on page 66 describes how to structure your application to follow one of the four application models.
- "Interacting With the Window and Session Manager" on page 68 describes how to create windows and interact with the window and session manager.

Window, Session, and Desk Management Overview

This section briefly discusses features of window, session, and desk management on Silicon Graphics systems. It also provides a list of references for further reading on window and session management.

Window Management

4Dwm, which is based on *mwm* (the Motif™ Window Manager), is the window manager typically used on Silicon Graphics workstations. It provides functions that allow both users and programmers to control elements of window states such as: placement, size, icon/normal display, and input-focus ownership. In addition to window management, *4Dwm* provides session and desks management.

Chapter 3, "Windows in the Indigo Magic Environment," of the *Indigo Magic User Interface Guidelines* discusses the interactions and behaviors that your application's windows should support. "Interacting With the Window and

Session Manager" on page 68 describes how to comply with the style guidelines.

See *IRIS Essentials* for more information about the features *4Dwm* provides for your users. See the *mwm*(1X) and *4Dwm*(1X) reference pages for more information about the features *4Dwm* provides.

Session Management

Session management allows users to log out and have any running applications automatically restart when they log back in. In *4Dwm*, users have the option of turning session management on (the default) or off.

For your application to be restarted via the *4Dwm* session manager, your application must register its initial state with the session manager and make sure the current state is registered at all times.

Additionally, your application should restart in the same state it was in when the user logged out (for example, the same windows open, the same files open, and so on). To support this, you need to design your application so that when the *4Dwm* session manager restarts it, it can redisplay any of its co-primary or support windows that were open when the user logged out, reopen any data files that were open, and so on. You can support this either by providing command line options to your application or other mechanisms such as a state file that your application reads when it is launched.

"Handling the Window Manager Save Yourself Protocol" on page 78 describes what your application needs to do to support session management. "Session Management" in Chapter 3 of the *Indigo Magic User Interface Guidelines* provides further guidelines for handling session management.

Desk Management

Users can use "desks" to create multiple virtual screens.[1] They can assign any primary or support window to any desk, causing that window to appear in the thumbnail sketch in the Desks Overview window.

"Desks" in Chapter 3 of the *Indigo Magic User Interface Guidelines* discusses the important development concerns issues relating to desks. The key points to keep in mind are:

- Transient windows appear on every desk and are not shown in the Desks overview window—so choose your transient windows carefully.
- Application windows that are on a desk other than the current one are in a state similar to the minimized state—processing continues although the window is no longer mapped to the screen display. Keep this in mind when selecting which operations should continue to be processed when your application is in a minimized state.
- Users can select different backgrounds for different desks, so your application should not create its own screen background.

Further Reading on Window and Session Management

For more information on window and session management with *4Dwm*, refer to the *mwm*(1X) and *4Dwm*(1X) reference pages. You might also want to look at *IRIS Essentials*, since this book explains important window and session management features to your users.

For more information on window and session management with Xt, refer to the chapters on Interclient Communication in these manuals:

- *The X Window Systems Programming and Applications with Xt, OSF/Motif Edition*, Second Edition, by Doug Young

[1] Because of a software patent dispute instituted by Xerox Corporation, the desks and Desks Overview features of this version of the IRIX operating system are now optional and may or may not be available to users after May 15, 1995. On this date, these features will be disabled unless users have entered a license code obtained from Silicon Graphics. See the Desktop Execution Environment (*desktop_eoe*) Release Notes for more information on this subject.

- O’Reilly Volume Four, *X Toolkit Intrinsics Programming Manual*, OSF/Motif Edition, by Adrian Nye and Tim O’Reilly

For more information on window and session management with Xlib, refer to the chapters on Inter-Client Communication in O’Reilly Volume One, *Xlib Programming Manual*, by Adrian Nye. For more detailed information, refer to the *Inter-Client Communications Conventions Manual* (ICCCM). (The ICCCM is reprinted as an appendix of O’Reilly Volume Zero, *X Protocol Reference Manual*.)

More detailed information on window properties is available in the *OSF/Motif Programmer’s Guide*, in the chapter on “Inter-Client Communication Conventions.”

Implementing an Application Model

“Application Models” in Chapter 6 of the *Indigo Magic User Interface Guidelines* describes four application models based on four different window categories: main primary windows, co-primary windows, support windows, and dialogs. It also describes how to select a model appropriate for your application. This section provides suggestions for implementing each application model, including recommended shell types for your primary windows. “Interacting With the Window and Session Manager” on page 68 describes how to create the windows and get them to look and behave in the manner described in “Application Window Categories and Characteristics” in Chapter 3 of the *Indigo Magic User Interface Guidelines*.

Implementing the “Single Document, One Primary” Model

This model is the simplest to implement. You can use the ApplicationShell returned by **XtAppInitialize()** as your application’s main window. This model requires no special treatment to handle schemes or for window or session management.

Implementing the “Single Document, Multiple Primaries” Model

The simplest way to implement this model is to use the ApplicationShell returned by **XtAppInitialize()** as your application’s main window. You can create co-primary windows as popup children of the main window using TopLevelShells. This approach requires no special treatment to handle schemes or for window or session management.

You can also choose the implement this model using the techniques described in “Implementing the “Multiple Document, No Visible Main” Model,” although this requires more work.

Caution: Don’t use **XtAppCreateShell()** to create co-primary windows. If you do, the windows don’t pick up the resources specified in schemes.

Implementing the “Multiple Document, Visible Main” Model

Once again, the simplest way to implement this model is to use the ApplicationShell returned by **XtAppInitialize()** as your application’s main window. You can create co-primary windows as popup children of the main window using TopLevelShells. This approach requires no special treatment to handle schemes or for window or session management.

You can also choose the implement this model using the techniques described in “Implementing the “Multiple Document, No Visible Main” Model,” although this requires more work.

Caution: Don’t use **XtAppCreateShell()** to create co-primary windows. If you do, the windows don’t pick up the resources specified in schemes.

Implementing the “Multiple Document, No Visible Main” Model

This model requires more careful consideration than the other models. Presumably, the visible windows can be created and destroyed in any order;

therefore it is very difficult to use one as a main window and have the others be children of it.

Instead, the best solution in this case is to leave the ApplicationShell returned by **XtAppInitialize()** unrealized. You can then create the visible co-primary windows as popup children of this invisible shell.

Session management requires a realized ApplicationShell widget so that your application can store restart information in its **XmNargv** and **XmNargc** resources. Because your application's visible windows can be created and destroyed dynamically, you should use ApplicationShells rather than TopLevelShells for your visible windows. Then you can set the **XmNargv** and **XmNargc** resources on any of them. (Another option would be to use TopLevelShells for the visible windows and then explicitly create and set WM_COMMAND and WM_MACHINE properties on the windows.)

One complication when using ApplicationShells is that by default, IRIS IM automatically quits an application when it destroys an ApplicationShell. To avoid this, you must set each window's **XmNdeleteResponse** resource to XmDO_NOTHING, and then explicitly handle the window manager's WM_DELETE_WINDOW protocol for each window. "Handling the Window Manager Delete Window Protocol" on page 76 describes how to implement these handlers.

Another complication is that the initial values of the **XmNargv** and **XmNargc** resources are stored in the application's invisible main window rather than a visible window. This is also true for the **XmNgeometry** resource if specified by the user. To avoid this, you should copy these values from the invisible main window to your application's first visible window.

Caution: Don't use **XtAppCreateShell()** to create co-primary windows. If you do, the windows don't pick up the resources specified in schemes.

Interacting With the Window and Session Manager

Most communication between an application and a window manager takes place through properties on an application's top-level windows. The window manager can also generate events that are available to the application. You can use Xlib functions to set properties and handle window manager events.

In IRIS IM, shell widgets simplify communications with the window manager. The application can set most window properties by setting shell resources. Shells also select for and handle most events from the window manager.

Because this guide assumes that you are programming in IRIS IM rather than Xlib, this chapter describes the IRIS IM mechanisms for creating windows and interacting with the window and session manager.

For detailed information about setting window properties using shell resources, consult Chapter 11, “Interclient Communication,” in O’Reilly’s *X Toolkit Intrinsics Programming Manual* and Chapter 16, “Interclient Communication,” in the *OSF/Motif Programmer’s Guide*. For detailed information about window properties and setting them using Xlib routines, consult Chapter 12, “Interclient Communication,” in O’Reilly’s *Xlib Programming Manual*.

Creating Windows and Setting Decorations

Chapter 6, “Application Windows,” in the *Indigo Magic User Interface Guidelines* describes several application models based on four different window categories: main primary windows, co-primary windows, support windows, and dialogs. This section describes how to implement these window categories with proper window decorations and window menu entries.

To properly integrate with the Indigo Magic Desktop, you need to use the appropriate shell widget for each widow category. This section describes which shell widget to use for each window category. Then you need to properly set the shell’s **XmNmwmFunctions** resource to control which entries appear in the window menu and the **XmNmwmDecorations** resource to remove the window’s resize handles, if appropriate.

Creating a Main Primary Window

Your application's main primary window must be an ApplicationShell. Typically, you use the ApplicationShell widget returned by **XtAppInitialize()** as your application's main primary window.

You should set the main primary window's **XmNmwmFunctions** resource to remove the "Close" option from the window menu. Also, if you don't want the user to be able to resize the window, you should set **XmNmwmFunctions** to remove the "Size" and "Maximize" options and set **XmNmwmDecorations** to remove the resize handles. Example 5-1 shows how you can create a main primary window and set the resource values appropriately.

"Main and Co-Primary Windows" in Chapter 6 of the *Indigo Magic User Interface Guidelines* provides guidelines for using main primary windows.

Example 5-1 Creating a Main Primary Window

```
#include <Xm/Xm.h>           /* Required by all Motif applications */
#include <Xm/MwmUtil.h>      /* Required to set window menu and decorations */
#include <X11/Shell.h>       /* Shell definitions */

void main ( int argc, char **argv )
{
    Widget       mainWindow; /* Main window shell widget */
    XtAppContext app;        /* An application context, needed by Xt */
    Arg          args[10];   /* Argument list */
    int          n;          /* Argument count */

    /*
     * Initialize resource value flags to include all window menu options and
     * all decorations.
     */

    long functions = MWM_FUNC_ALL;
    long handleMask = MWM_DECOR_ALL;

    n = 0;

    /*
     * The following lines REMOVE items from the window manager menu.
     */
    functions  |= MWM_FUNC_CLOSE;        /* Remove "Close" menu option */

    /* Include the following two lines only if the window is *not* resizable */

    functions  |= MWM_FUNC_RESIZE;       /* Remove "Size" menu option */
    functions  |= MWM_FUNC_MAXIMIZE;     /* Remove "Maximize" menu option */

    XtSetArg(args[n], XmNmwmFunctions, functions); n++;

    /* Include the following two lines only if the window is *not* resizable */

    handleMask |= MWM_DECOR_RESIZEH;     /* Remove resize handles */

    XtSetArg(args[n], XmNmwmDecorations, handleMask); n++

    /*
     * Initialize Xt and create shell
     */

    mainWindow = XtAppInitialize ( &app, "WindowTest", NULL, 0,
                                   &argc, argv, NULL, args, n );

    /* ... */

}
```

Creating a Co-Primary Window

Your application's co-primary windows should be ApplicationShells or TopLevelShells. "Implementing an Application Model" on page 66 describes which to choose depending on your application model. The easiest way to implement these windows are as pop-up children of the shell widget returned by **XtAppInitialize()** (which is typically your application's main primary window).

If the user can't quit the application from a co-primary window, you should set the window's **XmNmwmFunctions** resource to remove the "Exit" option from the window menu. Also, if you don't want the user to be able to resize the window, you should set **XmNmwmFunctions** to remove the "Size" and "Maximize" options and set **XmNmwmDecorations** to remove the resize handles. Example 5-2 shows how you can create a co-primary window and set the resource values appropriately.

Note: The default action when IRIS IM destroys an ApplicationShell is to quit your application. To avoid this if you are using ApplicationShells for your co-primary windows, you must set each window's **XmNdeleteResponse** resource to XmDO_NOTHING, and then explicitly handle the window manager's WM_DELETE_WINDOW protocol for each window. You might want to follow this approach even if you use TopLevelShells for co-primary windows so that you can simply popdown the window instead of deleting it. This can save time if you might redisplay the window later. "Handling the Window Manager Delete Window Protocol" on page 76 describes how to implement these handlers.

"Main and Co-Primary Windows" in Chapter 6 of the *Indigo Magic User Interface Guidelines* provides guidelines for using co-primary windows.

Example 5-2 Creating a Co-Primary Window

```
#include <Xm/Xm.h>       /* Required by all Motif applications */
#include <Xm/MwmUtil.h>  /* Required to set window menu and decorations */
#include <X11/Shell.h>   /* Shell definitions */

Widget       mainWindow; /* Main window shell widget */
Widget       coPrimary;  /* Co-primary window shell widget */
Arg          args[10];   /* Argument list */
int          n;          /* Argument count */

/*
 * Initialize resource value flags to include all window menu options and
 * all decorations.
 */

long functions = MWM_FUNC_ALL;
long handleMask = MWM_DECOR_ALL;

/* ... */

n = 0;

/*
 * The following lines REMOVE items from the  window manager menu.
 */

/* Remove the "Exit" window menu option if users can *not* quit from this window */

functions  |= MWM_FUNC_QUIT;
```

```
/* Include the following two lines only if the window is *not* resizable */

functions  |= MWM_FUNC_RESIZE;       /* Remove "Size" menu option */
functions  |= MWM_FUNC_MAXIMIZE;     /* Remove "Maximize" menu option */

XtSetArg(args, XmNmwmFunctions, functions); n++;

/* Include the following two lines only if the window is *not* resizable */

handleMask |= MWM_DECOR_RESIZEH;     /* Remove resize handles */

XtSetArg(args, XmNmwmDecorations, handleMask); n++;

/* You need the following line only if you use an ApplicationShell for the window */

XtSetArg(args, XmNdeleteResponse, XmDO_NOTHING); n++;

/*
 * Assume that the application has already created a main window and assigned its widget
 * to the variable mainWindow
 */

coPrimary = XtCreatePopupShell( "coPrimary", applicationShellWidgetClass,
                                mainWindow, args, n );

/* ... */
```

Creating a Support Window

Support windows are essentially custom dialogs. The easiest way to create a support window is to use **XmCreateBulletinBoardDialog()** to create a DialogShell containing a BulletinBoard widget, or use **XmCreateFormDialog()** to create a DialogShell containing a Form widget. You can then add appropriate controls and displays as children of the BulletinBoard or Form.

Another advantage to using a DialogShell for support windows is that they automatically have the proper window menu options and decorations. If you don’t want the user to be able to resize the window—and you implemented the support window as a customized dialog—you should set **XmNnoResize** to “TRUE” to remove the “Size” and “Maximize” options and to remove the resize handles. Example 5-3 shows how you can create a support window and set the resource values appropriately.

“Support Windows” in Chapter 6 of the *Indigo Magic User Interface Guidelines* provides guidelines for using support windows.

Example 5-3 Creating a Support Window

```
#include <Xm/Xm.h>          /* Required by all Motif applications */
#include <Xm/MwmUtil.h>     /* Required to set window menu and decorations */
#include <X11/Form.h>       /* Form definitions */

Widget       parentWindow;  /* Parent window of support window */
Widget       supportWindow; /* Support window */
Arg          args[10];      /* Argument list */
int          n;             /* Argument count */

/* ... */

n = 0;

/* Include the following line only if the window is *not* resizable */

XtSetArg(args, XmNnoResize, TRUE); n++

supportWindow = XmCreateFormDialog( parentWindow, "supportWindow", args, n );

/* Create the window interface... */
```

Creating a Dialog

The easiest way to create dialogs is to use the IRIS IM convenience functions such as **XmCreateMessageDialog()** and **XmCreatePromptDialog()**. These functions automatically set most of the window characteristics required for the Indigo Magic environment.

Dialogs automatically have the proper window menu options and decorations. If you don’t want the user to be able to resize the dialog, you should set **XmNnoResize** to “TRUE” to remove the “Size” and “Maximize” options and to remove the resize handles. Example 5-4 shows an example of creating a WarningDialog and setting the resource values appropriately.

Chapter 10, “Dialogs,” in the *Indigo Magic User Interface Guidelines* provides guidelines for using dialogs.

Example 5-4 Creating a Dialog

```
#include <Xm/Xm.h>          /* Required by all Motif applications */
#include <Xm/MwmUtil.h>     /* Required to set window menu and decorations */
#include <Xm/MessageB.h>    /* Warning dialog definitions */

Widget       parentWindow;  /* Parent window of dialog */
Widget       dialog;        /* Dialog */
Arg          args[10];      /* Argument list */
int          n;             /* Argument count */

/* ... */

n = 0;

/* Include the following line only if the window is *not* resizable */

XtSetArg(args, XmNnoResize, TRUE); n++

dialog = XmCreateWarningDialog ( parentWindow, "warningDialog", args, n );
```

Handling Window Manager Protocols

This section describes how to handle window manager *protocols,* which allow the window manager to send messages to your application. The window manager sends these messages only if your application registers callback function to handle the corresponding protocols.

Handling the Window Manager Quit Protocol

When a user selects the “Exit” option from a window menu, the window manager sends a Quit message to your application. You should install a callback routine to handle this event. Example 5-5 demonstrates installing such a callback for the window specified by *mainWindow.*

Example 5-5 Handling the Window Manager Quit Protocol

```
Atom WM_QUIT_APP = XmInternAtom( XtDisplay(mainWindow),
                                 "_WM_QUIT_APP",
                                 FALSE );
```

```
XmAddWMProtocolCallback( mainWindow, WM_QUIT_APP,
                         quitCallback, NULL );

/* ... */

quitCallback( Widget w, XtPointer clientData,
              XmAnyCallbackStruct cbs )
{
    /* Quit application */
}
```

Note: You must install the quit callback for each window that contains an "Exit" option in its window menu. Often the only such window is your application's main primary window.

The operations performed by the callback function should be the same as those that occur when the user quits from within your application (for example, by selecting an "Exit" option from a File menu). Your application can prompt the user to save any files that are open, to perform any other cleanup, or even to abort the quit.

Handling the Window Manager Delete Window Protocol

When a user selects the "Close" option from a window menu, the window manager sends a Delete Window message to your application. How to handle this message depends on whether the window is a co-primary window, a dialog, or support window. (A main primary window should not have a "Close" option on its window menu.)

To handle the Delete Window message with a co-primary window, you should make sure to set the window's **XmNdeleteResponse** resource to XmDO_NOTHING. Otherwise, IRIS automatically deletes the window and, if the window uses an ApplicationShell, quits the application.

The callback you install can ask for user confirmation and can decide to comply or not comply with the request. If it decides to comply, your application can either pop down or destroy the window. If you think that the user might want to redisplay the window later, popping down the window is usually the better choice because your application doesn't have to re-create it later. Example 5-6 shows an example of installing a callback to handle the Delete Window message.

Example 5-6 Handling the Window Manager Delete Window Protocol in Co-Primary Windows

```
Atom WM_DELETE_WINDOW = XmInternAtom( XtDisplay(window),
                                      "WM_DELETE_WINDOW",
                                      FALSE);
XmAddWMProtocolCallback( window, WM_DELETE_WINDOW,
                         closeCallback, NULL );

/* ... */

closeCallback( Widget w, XtPointer clientData,
               XmAnyCallbackStruct cbs )
{
    /* Delete or pop down window */
}
```

For support windows and dialogs, you typically want to dismiss the window when the user selects “Close.” Therefore, the default value of **XmNdeleteResponse**, XmDESTROY, is appropriate. Additionally, you should perform whatever other actions are appropriate for when that support window or dialog is dismissed. Typically, you can accomplish this by invoking the callback associated with the *Cancel* button, if it exists. Example 5-7 shows an example of this.

Example 5-7 Handling the Window Manager Delete Window Protocol in Support Windows and Dialogs

```
Atom WM_DELETE_WINDOW = XmInternAtom( XtDisplay(dialog),
                                      "WM_DELETE_WINDOW",
                                      FALSE);
XmAddWMProtocolCallback( dialog, WM_DELETE_WINDOW,
                         cancelCallback, NULL );

/* ... */

cancelCallback( Widget w, XtPointer clientData,
                XmAnyCallbackStruct cbs )
{
    /* Perform cancel operations */
}
```

Handling the Window Manager Save Yourself Protocol

The “Save Yourself” protocol is part of the session management mechanism. The session manager sends a Save Yourself message to allow your application to update the command needed to restart itself in its current state. Currently, the session manager sends Save Yourself messages before ending a session (that is, logging out) and periodically while a session is active.

Your application doesn’t need to subscribe to the Save Yourself protocol. Instead, your application can simply update the **XmNargv** and **XmNargc** resources on one of its ApplicationShells whenever it changes state, for example, when it opens or closes a file. The session manager re-saves its state information whenever your application changes these resources. (Actually, the session manager monitors the WM_COMMAND and WM_MACHINE properties, which are set by the ApplicationShell whenever you change its **XmNargv** and **XmNargc** resources.)

If you decide to use Save Yourself for session management, you can handle the protocol on any realized ApplicationShell. Don’t use Save Yourself with the unrealized main window of the “Multiple Document, No Visible Main” application model. When the window manager sends a Save Yourself message to your application, your application should update the value of the **XmNargv** and **XmNargc** resources to specify the command needed to restart the application in its current state. Once you’ve updated the **XmNargv** and **XmNargc** resources, the session manager assumes that it can safely kill your application. Example 5-8 shows how to handle Save Yourself messages.

Note: Your application shouldn’t prompt the user for input when it receives a Save Yourself message.

Example 5-8 Handling the Window Manager “Save Yourself” Protocol

```
Atom WM_SAVE_YOURSELF = XmInternAtom( XtDisplay(mainWindow),
                                      "WM_SAVE_YOURSELF",
                                      FALSE);
XmAddProtocols( mainWindow, &WM_SAVE_YOURSELF, 1);
XmAddWMProtocolCallback( mainWindow, WM_SAVE_YOURSELF,
                         saveYourselfCallback, NULL );

/* ... */
```

```
saveYourselfCallback( Widget w, XtPointer clientData,
                      XmAnyCallbackStruct cbs )
{
    /* Update this window’s XmNargv and XmNargc resources */
}
```

Your application might not be able to fully specify its state using command line options. In that case, you can design your application to create a state file to save its state and to read the state file when it restarts.

Setting the Window Title

To set the title of a main primary window or co-primary window in your application, set the window’s **title** resource. If the title you specify uses a non-default encoding, remember to also set the value of the **titleEncoding** resource appropriately. For support windows and dialogs, set the value of the **XmNdialogTitle** resource.

Choose the title according to the guidelines in the section “Window Title Bar” in Chapter 3 of the *Indigo Magic User Interface Guidelines*. Update the label so that it always reflects the current information. For example, if the label reflects the name of the file the user is working on, you should update the label when the user opens a different file.

Controlling Window Placement and Size

Users have the option of specifying window placement and size, either through the **-geometry** option interactively using the mouse, or having applications automatically place their windows on the screen. To support automatic window placement, your application should provide default placement information for its main primary and co-primary windows. (Support windows and dialogs appear centered over their parent widget if the value of their **XmNdefaultPosition** resources are TRUE, which is the default.) You can also specify a default window size, minimum and maximum window sizes, minimum and maximum aspect ratios, and resizing increments for your windows. Typically, you should set these resources in your application’s *app-default* file.

Controlling Window Placement

You should provide initial values for the window shell's **x** and **y** resources before mapping the window to specify its default location. The window manager ignores these values if the user requests interactive window placement or specifies a location using the **-geometry** option when invoking your application. You should not use the window's **XmNgeometry** resource to control initial window placement, either in your application's source code or its *app-default* file.

"Window Placement" in Chapter 3 of the *Indigo Magic User Interface Guidelines* provides guidelines for controlling window placement.

Controlling Window Size

If the user doesn't specify a window size and you don't explicitly set the window size in your application, the initial size of the window is determined by geometry management negotiations of the shell widget's descendents. Typically, the resulting size is just large enough for all of the descendent widget to fit "comfortably." Optionally, you can specify a default initial size for a window by providing initial values for the window's **width** and **height** resources before mapping the window. You should not use the window's **XmNgeometry** resource to control initial window size, either in your application's source code or its *app-default* file.

You can also set several shell resources to specify minimum and maximum window sizes, minimum and maximum aspect ratios, and resizing increments for a window:

minHeight and **minWidth**
The desired minimum height and width for the window.

maxHeight and **maxWidth**
The desired maximum height and width for the window.

minAspectX and **minAspectY**
The desired minimum aspect ratio (X/Y) for the window.

maxAspectX and **maxAspectY**
The desired maximum aspect ratio (X/Y) for the window.

baseHeight and **baseWidth**

The base for a progression of preferred heights and widths for the window. The preferred heights are **baseHeight** plus integral multiples of **heightInc**, and the preferred widths are **baseWidth** plus integral multiples of **widthInc**. The window can't be resized smaller or larger than the values of the **min*** and **max*** resources.

heightInc and **widthInc**

The desired increments for resizing the window.

"Window Size" in Chapter 3 of the *Indigo Magic User Interface Guidelines* provides guidelines for controlling window size.

Chapter 6

Customizing Your Application's Minimized Windows

A unique design helps users to identify your application's windows easily when they are minimized. This chapter describes how to create images and labels for your application's minimized windows.

Chapter 6

Customizing Your Application's Minimized Windows

Users can minimize (stow) your application's window on the Desktop, by clicking the minimize button in the top right corner of the window frame or by selecting "Minimize" from the Window Menu. When a window is minimized, it is replaced by a 100 x 100 pixel representation with an identifying label of 13 characters or less. This is referred to as the *minimized window*. (It is also commonly called an icon, but this document uses the term minimized window to prevent confusing it with the Desktop icon.)

This chapter explains how to put the image of your choice on a minimized window. It contains these sections:

- "Some Different Sources for Minimized Window Images" discusses different sources from which you can generate a minimize icon picture.
- "Creating a Minimized Window Image: The Basic Steps" gives a step-by-step explanation of how to customize your minimize icon.
- "Setting the Minimized Window Label" on page 89 describes how to set the label of your minimized window.
- "Changing the Minimized Window Image" on page 89 mentions some special considerations if you want to change the image in your minimized window while your application is running.

Some Different Sources for Minimized Window Images

You can make a minimized window image out of any image that you can display on your workstation monitor. This means that you can create a picture using *showcase* or the drawing/painting tool of your choice, or you can scan in a picture, or you can take a *snapshot* of some portion of your application. You can even have an artist design your stow icons for you. "Choosing an Image for Your Minimized Window" in Chapter 3 of the *Indigo*

Magic User Interface Guidelines provides some guidelines for designing minimized window images.

Figure 6-1 shows some different minimized window images that were created in different ways. From left to right: the top row shows a scanned-in photograph, a *snapshot* of the application itself, a scanned-in photograph that was altered with *imp*, and scanned-in line art; the bottom row shows a drawing representing the application, scanned-in line art, and two artist-designed images.

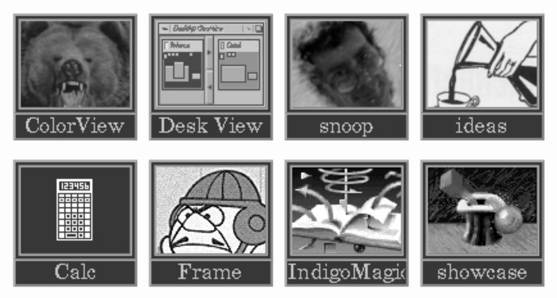


Figure 6-1 Minimized Window Image Examples

Creating a Minimized Window Image: The Basic Steps

It’s important for users to be able to easily identify your application’s windows when they are minimized, so you should define a specific image and label for each primary and support window in your application. For guidelines on selecting minimize images, see “Choosing an Image for Your Minimized Window” in Chapter 3 of the *Indigo Magic User Interface Guidelines*.

To make a minimized window image for your application:

1. Create an RGB image. If your image is already in RGB format, then all you have to do is resize the image to an appropriate size (look at the setting of the **iconImageMaximum** resource in *4Dwm* to see the

maximum size of the stow icon, currently 85x67). See “Resizing the RGB Image Using imgworks” on page 88 for instructions on resizing the image.

If your image is not in RGB format, you need to convert it to RGB. One way to do this is to take a *snapshot* of your image. See “Using snapshot to Get an RGB Format Image” on page 87 for instructions.

2. Scale the image to the correct size. See “Resizing the RGB Image Using imgworks” on page 88 for instructions.
3. Name the image file. The filename should consist of two parts: first, the application name (technically,. the *res_name* field of the WM_CLASS property); and second, the *.icon* suffix. This gives you a name of the form *res_name.icon*. For example, if your application’s name is “chocolate,” the name of your image file should be:

   ```
   chocolate.icon
   ```
4. Put the file in the */usr/lib/images* directory.

Using *snapshot* to Get an RGB Format Image

You can use the *snapshot* tool to capture an image on your screen for use in your image. To bring up *snapshot*, enter:

```
% snapshot
```

The *snapshot* tool, shown in Figure 6-2, appears.

Figure 6-2 The *snapshot* Tool

To use *snapshot*, follow these steps:

1. Bring up the desired image on your monitor.
2. Position the cursor over the *snapshot* tool. The cursor turns into a small red camera.
3. While the cursor is still positioned over the *snapshot* tool, hold down the **`<Shift>`** key. Don’t release it.

4. Continuing to hold down the **`<Shift>`** key, move the cursor over to a corner of the image you want to snap and, holding down the left mouse button, drag the mouse to the opposite corner of the image. A red box is formed around the image as you drag the cursor. Release the mouse button when the box reaches the desired size.
5. After releasing the mouse button, you can adjust the red box from the corners or the sides by holding the left mouse button down again and resizing just as you would a window.

   Everything in this red box is saved in the *snapshot*, so make sure you don't include any unwanted window borders or screen background. If you have trouble telling what's included in the box and what isn't, bring up the *xmag* tool by entering:

   ```
   % xmag
   ```

   The *xmag* window shows you a magnified view of the area around the cursor.
6. When the red box is positioned exactly around the correct area of the image, release the left mouse button and move the cursor back over the *snapshot* tool.
7. Keeping the cursor positioned over the *snapshot* tool, release the **`<Shift>`** key.
8. Press down the right mouse button to see the *snapshot* menu and select "Save as snap.rgb" from the menu. The cursor turns into an hourglass while *snapshot* saves your image.
9. To see the image you've snapped, enter:

   ```
   % ipaste snap.rgb
   ```

   If the image looks good, then you're ready to resize it. See "Resizing the RGB Image Using imgworks" on page 88 for instructions.

See the *snapshot*(1) reference page for more information about using *snapshot*.

Resizing the RGB Image Using *imgworks*

You can use *imgworks* to resize your RGB image to the appropriate size for a minimized window image. The maximum size is determined by the value of the **iconImageMaximum** resource in *4Dwm*, which is currently 85x67.

To find the *imgworks* icon, select "An Icon" from the Find toolchest. When the Find an Icon window appears, type

```
imgworks
```

into the text field. The *imgworks* icon appears in the drop pocket. Drag the icon to the Desktop and drop it. Then run *imgworks* by double-clicking the icon.

To resize your image using *imgworks*, follow these steps:

1. Open your image file by selecting "Open" from the File menu and selecting your file from the Image Works: Open Image… window. Your image appears in the main window.
2. To scale the image, select "Scale…" from the Transformations menu. The Image Works: Scale window appears.
3. Scale the image by typing in an appropriate scale factor. The dimensions of the new image (in pixels) are listed in the Scale window.
4. When you're happy with the dimensions listed in the Scale window, click the *Apply* button. The resized image appears in the main window. Save it by selecting "Save" from the File menu.

Refer to the *imgworks*(1) reference page for more information on *imgworks*.

Setting the Minimized Window Label

By default, the *4Dwm* window manager reuses the title bar label for the minimized window label. To explicitly set the label of the minimized window, you simply need to change the value of the window's **XmNiconName** resource. See "Labeling a Minimized Window" in Chapter 3 for guidelines for choosing a label.

Changing the Minimized Window Image

Your application can also change its minimized window's image while it is running (for example, to indicate application status) by setting the window's **XmNiconWindow** resource. However, it can be very difficult to handle color images without causing visual and colormap conflicts. If you decide to change the image, the image you install should: 1) use the default visual; and 2) use the existing colormap without creating any new colors (preferably, your image should use only the first 16 colors in the colormap). This potentially implies dithering or color quantization of your image.

Note: The *4Dwm* window manager automatically handles your application's initial minimized window image (that is, the image automatically loaded from the */usr/lib/images* directory at application start-up). If you don't want to change this image while your application is running, your application doesn't need to do anything to support displaying the image properly.

Chapter 7

Interapplication Data Exchange

Users expect to be able to exchange data between applications using the standard X mechanisms. This chapter explains to how to support data exchange in your application.

Chapter 7

Interapplication Data Exchange

This chapter describes how to implement the recommended data exchange mechanisms in your applications. It contains these sections:

- "Data Exchange Overview" on page 93 provides a brief description of how the Primary and Clipboard Transfer Models should work in your application. You should implement both.
- "Implementing the Primary Transfer Model" on page 97 describes how to implement the Primary Transfer Model in your application.
- "Implementing the Clipboard Transfer Model" on page 100 describes how to implement the Primary Transfer Model in your application.
- "Supported Target Formats" on page 103 provides a table listing the atom names of supported data formats, along with brief descriptions of what each format is used for.

Data Exchange Overview

As detailed in Chapter 5, "Data Exchange on the Indigo Magic Desktop," in the *Indigo Magic User Interface Guidelines*, Silicon Graphics recommends that your application support both the Primary and Clipboard Transfer Models. The Primary Transfer Model allows users to copy data using mouse buttons, whereas the Clipboard Transfer model allows users to use the "Cut," "Copy," and "Paste" options from the Edit menu (or the corresponding keyboard accelerators) to transfer data.

The data exchange model recommended by Silicon Graphics is based on the standard mechanisms provided by the X and Xt. You can consult the O'Reilly & Associates book *The X Window System, Volume 4: X Toolkit Intrinsics Programming Manual* by Adrian Nye for more information on the standard Xt data exchange methods.

Note: Silicon Graphics recommends that you not use the IRIS IM clipboard routines for handling data exchange.

Primary Transfer Model Overview

When the user selects some data in an application, the application should highlight that data and assert ownership of the PRIMARY selection. Until the application loses the PRIMARY selection, it should then be prepared to respond to requests for the selected data in various target formats. "Supported Target Formats" on page 103 describes the standard target formats.

When the user selects data in another application, your application loses ownership of the PRIMARY selection. In general, when your application loses the primary selection, it should keep its current selection highlighted. When a user has selections highlighted in more than one window at a time, the most recent selection is always the primary selection. This is consistent with the *persistent always selection* discussed in Section 4.2, "Selection Actions," in the *OSF/Motif Style Guide, Release 1.2*. There is an exception to this guideline: those applications that use selection only for primary transfer, for example, the *winterm* shell window. The only reason for users to select text in a shell window is to transfer that text using the primary transfer mechanism. In this case, when the *winterm* window loses the primary selection, the highlighting is removed. This is referred to as *nonpersistent selection* in Section 4.2, "Selection Actions," in the *OSF/Motif Style Guide, Release 1.2*.

The *persistent always selection* mechanism allows the user to have data selected in different applications. The user can still manipulate selected data using application controls. Furthermore, the user can reassert the selected data as the PRIMARY selection by pressing **`<Alt-Insert>`**.

When the user clicks the middle mouse button (*BTransfer*) in your application, your application should attempt to copy the primary selection to the current location of the mouse pointer. First, your application should request a list of target formats supported by the primary selection owner. Then your application should select the most appropriate target format and request the primary selection in that format.

"Supporting the Primary Transfer Model" in Chapter 5 of the *Indigo Magic User Interface Guidelines* further discusses use of the Primary Transfer Model.

Clipboard Transfer Model Overview

When the user selects the "Copy" option from your application's Edit menu (or uses the keyboard accelerator), your application should assert ownership of the CLIPBOARD selection. Until the application loses the CLIPBOARD selection, it should then be prepared to respond to requests for the data selected at the time your application took ownership of the CLIPBOARD selection. (In other words, your application must somehow store the value of the selection when the user performs the copy action; the application can then provide this value even if the user subsequently changes the application's selection.)

When the user selects the "Cut" option for your application's Edit menu (or uses the keyboard accelerator), your application should assert ownership of the CLIPBOARD selection. Your application must cut the selected data, but it should store the data and be prepared to respond to requests for the data until it loses ownership of the CLIPBOARD selection.

When the user selects the "Paste" option for your application's Edit menu (or uses the keyboard accelerator), your application should attempt to copy the clipboard selection to the current location of the location cursor. First, your application should request a list of target formats supported by the clipboard selection owner. Then your application should select the most appropriate target format and request the clipboard selection in that format.

"Supporting the Clipboard Transfer Model" in Chapter 5 of the *Indigo Magic User Interface Guidelines* further discusses use of the Clipboard Transfer Model.

Interaction Between the Primary and Clipboard Transfer Models

Silicon Graphics recommends that you implement the Primary and Clipboard Transfer Models so that they operate separately. The only complication is maintaining data in the PRIMARY selection when the user performs a cut action. Consider the following example:

1. The user selects data in an application. The application asserts ownership of the PRIMARY selection.
2. The user performs a cut action. The application asserts ownership of the CLIPBOARD selection and removes the selected data from the display.
3. The user goes to another application that already has data selected.
4. The user cuts the data selected in the second application. The second application asserts ownership of the CLIPBOARD selection and removes the selected data from the display.

The clipboard actions described above should not affect the PRIMARY selection. In this example, the first application should retain ownership of the PRIMARY selection and continue to be prepared to respond to requests for the value of the PRIMARY selection. To support this, the application should somehow store the value of the PRIMARY selection until it no longer owns the PRIMARY selection.

To properly handle the situation described above, your application should implement the following:

1. In the function that handles the Clipboard Transfer Model's cut action, test to see whether the application owns the PRIMARY selection. If it does, you should preserve the selected data. If selections in your application are typically small (for example, ASCII text), you might simply copy the data to a buffer. If selections in your application are typically large (for example, sound or movie clips), you might remove the data from the display but retain pointers to it.
2. In the function that handles losing the PRIMARY selection, test to see whether you have data preserved from a cut action. If so, and the application currently doesn't own the CLIPBOARD selection, you should free that data or reset the pointers to it.

Implementing the Primary Transfer Model

This section describes how to implement support for the Primary Transfer Model in your application.

Note: Silicon Graphics recommends that you don't use the IRIS IM clipboard routines, because they are not as flexible as the Xt selection routines.

Data Selection

When the user selects data in a window of your application, it should call **XtOwnSelection(3Xt)** to assert ownership of the PRIMARY selection and highlight the selected data.

The code fragment in Example 7-1 shows a simple example of asserting ownership of the PRIMARY selection. For clarity, this example omits code for manipulating the selection itself (for example, setting up pointers to the selection).

"Selection" in Chapter 7 of the *Indigo Magic User Interface Guidelines* discusses guidelines for allowing users to select data and for hightlighting selected data.

Example 7-1 Asserting Ownership of PRIMARY Selection

```
Boolean ownPrimary;

/*
   w is window in which selection occurred
   event is pointer to event that caused selection
*/

void dataSelected(Widget w, XButtonEvent *event)
{
...
  /*
     Assert ownership of PRIMARY selection.

     XA_PRIMARY is the slection.
     event->time is timestamp of the event.
     primaryRequestCallback is the function called
```

```
           whenever another application requests the
           value of the PRIMARY selection.
        lostPrimaryCallback is the function called whenever
           the application loses the selection.
     */

     ownPrimary = XtOwnSelection(w, XA_PRIMARY, event->time,
                                 primaryRequestCallback,
                                 lostPrimaryCallback,
                                 NULL);

     /*
        If we successfully obtained ownership, highlight
        the data; otherwise, clean up
     */

     if (ownPrimary)
       highlightSelection();
     else
       lostPrimaryCallback(w, XA_PRIMARY);
  ...
  }
```

Requests for the Primary Selection

When you assert ownership of the PRIMARY selection, one of the parameters you pass to **XtOwnSelection()** is a callback function to handle requests for the value of the PRIMARY selection. When another application requests the value of the PRIMARY selection, the Xt selection mechanism invokes your application's callback function.

The requesting application indicates a desired target format. Typically, a requestor first asks for the special target format TARGETS. Your application should respond with a list of target formats it supports. The requestor then chooses an appropriate target format and requests the selection value in that format. "Supported Target Formats" on page 103 describes some of the common target formats your application should support.

Loss of the Primary Selection

When your application loses the PRIMARY selection and your application follows the *persistent always selection* model discussed in "Primary Transfer Model Overview" on page 94, don't remove the highlight from any selected data. The user should still be able to cut or copy any selected data using the Clipboard Transfer Model. If your application follows the *nonpersistent selection* model as discussed in "Primary Transfer Model Overview," you should remove the highlight.

Your application should also test to see whether you have data preserved from a cut action (see "Cut Actions" on page 100). If so, and your application currently doesn't own the CLIPBOARD selection, you should free that data or reset the pointers to it. "Interaction Between the Primary and Clipboard Transfer Models" on page 95 describes the rationale for this procedure.

Note: To comply with the *Indigo Magic User Interface Guidelines*, if the user presses **`<Alt-Insert>`** in your application, you should reassert ownership of PRIMARY for your application.

Inserting the Primary Selection

When the user clicks the middle mouse button in your application, it should perform the steps described below.

1. Your application should ask the owner of the PRIMARY selection for a list of its TARGETS, using **XtGetSelectionValue()** with selection PRIMARY and target TARGETS.
2. Your application should look through the list of supported targets, select the one that is appropriate for your application, and call **XtGetSelectionValue()** again with that new target.
3. If the selection owner does not support TARGETS, then your application should ask for the target STRING, if it can support that target.

   Silicon Graphics recommends that you support STRING, even if your application doesn't support text. For instance, a movie player could get the selection as a string and try to parse it as a filename. That way users could select a filename in a terminal emulator window and paste it into another application.

Implementing the Clipboard Transfer Model

This section describes how to implement support for the Clipboard Transfer Model in your application.

Cut Actions

When the user performs a cut action, your application should:

1. Call **XtOwnSelection(3Xt)** to assert ownership of the CLIPBOARD selection.
2. Remove the selected data from the display. Retain the selected data until your application loses ownership of the CLIPBOARD selection.
3. Test to see whether the application owns the PRIMARY selection. If it does, you should preserve the selected data, even after losing ownership of the CLIPBOARD selection. You should retain the data until your application also loses ownership of the PRIMARY selection.

   If selections in your application are typically small (for example, ASCII text), you might simply copy the data to a buffer. If selections in your application are typically large (for example, sound or movie clips), you might remove the data from the display but retain pointers to it.

The code fragment in Example 7-2 shows a simple example of handling a cut action and asserting ownership of the CLIPBOARD selection. For clarity, this example omits code for manipulating the selection itself (for example, setting up pointers to the selection).

Example 7-2 Handling Cut Actions in the Clipboard Transfer Model

```
Boolean ownPrimary;
Boolean primaryPreserved;

/*
   w is window in which selection occurred
   event is pointer to event that caused selection
  */

void selectionCut(Widget w, XButtonEvent *event)
{
...
```

```
  /*
     Assert ownership of CLIPBOARD selection.

     XA_CLIPBOARD is the selection.
     event->time is timestamp of the event.
     clipboardRequestCallback is the function called
         whenever another application requests the
         value of the CLIPBOARD selection.
     lostClipboardCallback is the function called whenever
         the application loses the selection.
  */

  ownClipboard = XtOwnSelection(w, XA_CLIPBOARD, event->time,
                                clipboardRequestCallback,
                                lostClipboardCallback,
                                NULL);

  if (ownClipboard)
  {
    /*
       Retain the selected data until the application loses
       ownership of the CLIPBOARD selection.
    */

    preserveClipboardSelection();

    /*
       If we also own the PRIMARY selection, we need to
       preserve the selected data separately so that we can
       continue to satisfy requests for the PRIMARY selection
       even if we lose the CLIPBOARD selection.
    */

    if (ownPrimary)
      primaryPreserved = preservePrimarySelection();
  }
...
}
```

Copy Actions

When the user performs a copy action, your application should call **XtOwnSelection(3Xt)** to assert ownership of the CLIPBOARD selection. No other actions are required.

Requests for the Clipboard Selection

When you assert ownership of the CLIPBOARD selection, one of the parameters you pass to **XtOwnSelection()** is a callback function to handle requests for the value of the CLIPBOARD selection. When another application requests the value of the CLIPBOARD selection, the Xt selection mechanism invokes your application's callback function.

The requesting application indicates a desired target format. Typically, a requestor first asks for the special target format TARGETS. Your application should respond with a list of target formats it supports. The requestor then chooses an appropriate target format and requests the selection value in that format. "Supported Target Formats" on page 103 describes some of the common target formats your application should support.

Paste Actions

When the user selects "Paste" from the File menu, your application should:

1. Ask the owner of the CLIPBOARD selection for a list of its TARGETS, using **XtGetSelectionValue()** with selection CLIPBOARD and target TARGETS.
2. Look through the list of supported targets, select the one that is appropriate for your application, and call **XtGetSelectionValue()** again with that new target.
3. If the selection owner does not support TARGETS, then your application should ask for the target STRING, if it can support that target.

Silicon Graphics recommends that you support STRING, even if your application doesn’t support text. For instance, a movie player could get the selection as a string and try to parse it as a filename. That way users could select a filename in a terminal emulator window and paste it into another application.

Loss of the Clipboard Selection

When your application loses the Clipboard selection, don’t remove the highlight from any selected data. The user should still be able to cut or copy any selected data. Your application can discard any data it had retained as a result of a cut operation (see “Cut Actions” on page 100).

Supported Target Formats

Every application should support the TARGETS, TIMESTAMP, MULTIPLE, and STRING targets. The Xt selection functions support the MULTIPLE targets for you. **XmuConvertStandardSelection()** supports the TIMESTAMP target. (Silicon Graphics recommends that applications use **XmuConvertStandardSelection()** because it also supports HOSTNAME, NAME, CLIENT_WINDOW, and a variety of other useful targets.) Your application must support the TARGETS and STRING targets itself.

In addition, Silicon Graphics has defined other targets for data types used by Silicon Graphics applications and libraries. Table 7-1 lists the atom names for these Silicon Graphics data types.

Table 7-1 Additional Data Types Supported by Silicon Graphics

Name of Atom/Target	Description
INVENTOR	Data appropriate for inventor widgets. (This is already defined by Inventor and described in Inventor documentation.)
_SGI_RGB_IMAGE_FILENAME	The name of a file that contains a Silicon Graphics format image file. This is an rgb file. The file is the responsibility of the receiver, once the selection owner has generated it.

Table 7-1 (continued) Additional Data Types Supported by Silicon Graphics

Name of Atom/Target	Description
_SGI_AUDIO_FILENAME	The name of a file that contains Silicon Graphics format sound data, that can be read using libaudiofile. The file is the responsibility of the receiver, once the selection owner has generated it.
_SGI_MOVIE_FILENAME	The name of a file that contains a Silicon Graphics format movie. This file can be viewed with the Silicon Graphics movie library or the movie widget. The file is the responsibility of the receiver, once the selection owner has generated it.

Caution: Xt implements a timeout when transferring data using the selection mechanism. The default is five seconds. Often, this is inadequate for applications transferring audio, image, or movie data. Therefore, if your application supports receiving such selections, you should call **XtAppSetSelectionTimeout()** to change the timeout to a larger value; 60 to 120 seconds is usually sufficient.

Chapter 8

Monitoring Changes to Files and Directories

Typically, if applications need to monitor the status of a file or directory they must periodically poll the filesystem. The *File Alteration Monitor (FAM)* provides a more efficient and convenient method.

Chapter 8

Monitoring Changes to Files and Directories

The File Alteration Monitor (FAM) monitors changes to files and directories in the filesystem and notifies interested applications of these changes. Your application can use FAM to get an up-to-date view of the filesystem rather than having to poll the filesystem.

This chapter contains these sections:

- "FAM Overview" on page 107 provides an overview to FAM including the libraries and header files needed to use FAM in your application.
- "The FAM Interface" on page 109 describes the FAM API.
- "Using FAM" on page 115 provides a simple example demonstrating FAM.

FAM Overview

Typically, if applications need to monitor the status of a file or directory, they must periodically poll the filesystem. FAM provides a more efficient and convenient method.

FAM consists of the FAM daemon, *fam*, and a library for interacting with this daemon. An application can request *fam* to monitor any files or directories in the filesystem. When *fam* detects changes to these files, it notifies the application.

This chapter describes the required libraries and provides a basic list of steps for using FAM. For more detailed information, refer to the *fam*(1M) and *FAM*(3X) reference pages.

Theory of Operation

FAM uses *imon*, a pseudo device, to monitor filesystem activity on your system on a file-by-file basis. You can refer to the *imon*(7) reference page for more information on its operation, but you should not attempt to access *imon* directly.

When you provide FAM with the name of a file or directory to monitor, FAM passes the request to *imon*, which begins monitoring the inode corresponding to the pathname. When *imon* detects a change to an inode that it is monitoring, it notifies FAM, which matches the inode to a corresponding filename. FAM then generates a FAM event on a socket. Your application can either monitor the socket or periodically poll FAM to detect FAM events.

This difference between FAM and *imon* can produce some unexpected results. For example, if a user moves a file, FAM reports that the file is deleted. The reason is that FAM monitors files by name and not inode, so it doesn't know that the file still exists.

As another example, consider the case where FAM is monitoring a file. If the user deletes the file, FAM correctly reports that fact. However, if the user then creates a new file with the same name, FAM doesn't detect the new file. This is because the new file doesn't have the same inode (in most cases); *imon* notifies FAM of the new file by inode, but FAM has no record of that inode and so can't match it to the filename. To prevent this from happening, you should cancel monitoring on a file when FAM detects that it's deleted. If you need to detect the creation of a given file by name, you should monitor the directory in which it will be created and watch for FAM events notifying the creation of a file by that name in the directory.

FAM Libraries and Include Files

The FAM interface routines are in the *libfam* library. *libfam* depends on the *libC* library. Be sure to specify **-lfam** before **-lC** in the compilation or linking command.

You must include <*fam.h*> in any source file that uses FAM. You must also include <*sys/select.h*> to use the socket routines to communicate with FAM.

The FAM Interface

This section describes the functions you use to access FAM from your application.

Opening and Closing a FAM Connection

The function **FAMOpen()** opens a connection to *fam*:

```
int FAMOpen(FAMConnection* fc)
```

FAMOpen() returns 0 if successful and -1 if unsuccessful. **FAMOpen()** initializes the FAMConnection structure passed to it, which you must use in all subsequent FAM procedure calls in your application.

An element of the FAMConnection structure is the file descriptor associated with the socket that FAM uses to communicate with your application. You need this file descriptor to perform **select()** operations on the socket. You can obtain the file descriptor using the **FAMCONNECTION_GETFD()** macro:

```
FAMCONNECTION_GETFD(fc)
```

Additionally, you should set a character string variable named *appName* to the name of your application before calling **FAMOpen()**.

The function **FAMClose()** closes a connection to *fam*:

```
int FAMClose(FAMConnection* fc)
```

FAMClose() returns 0 if successful and -1 if unsuccessful.

Monitoring a File or Directory

FAMMonitorDirectory() and **FAMMonitorFile()** tell FAM to start monitoring a directory or file respectively:

```
int FAMMonitorDirectory(FAMConnection *fc,
                        char *filename,
                        FAMRequest* fr,
                        void* userData)

int FAMMonitorFile(FAMConnection *fc,
                char *filename,
                FAMRequest* fr,
                void* userData)
```

FAMMonitorDirectory() monitors not only changes that happens to the contents of the specified directory file, but also to the files in the directory. If the directory contains subdirectories, **FAMMonitorDirectory()** monitors changes to the subdirectory files, but not the contents of those subdirectories. **FAMMonitorFile()** monitors only what happens to the specified file. Both functions return 0 if successful and -1 otherwise.

The first argument to these functions is the FAMConnection structure initialized by **FAMOpen()**. The second argument is the full pathname of the directory or file to monitor. Note that you can't use relative pathnames.

The third argument is a FAMRequest structure that these functions initialize. You can pass this structure to **FAMSuspendMonitor()**, **FAMResumeMonitor()**, or **FAMCancelMonitor()** to respectively suspend, resume, or cancel the monitoring of the file or directory. "Suspending, Resuming, and Canceling Monitoring" on page 111 further describes these functions.

The fourth argument is a pointer to any arbitrary user data that you want included in the FAMEvent structure returned by **FAMNextEvent()** when this file or directory changes.

FAM then generates *FAM events* whenever it detects changes in monitored files or directories. "Detecting Changes to Files and Directories" on page 112 describes how to detect and interpret these events.

NFS-Mounted Files and Directories

FAM can monitor files and directories that are NFS-mounted, including automounted files and directories. However, because *imon* doesn't monitor remote files and directories, FAM monitors NFS-mounted files and directories by polling. The polling interval is determined by the **-t** argument to the FAM daemon, *fam*, which is invoked by *inetd*(1M). The default system configuration is to poll every six seconds, but system administrators can change this value by editing */etc/inet.conf*.

Note: Unlike local files and directories, FAM monitors NFS-mounted files and directories by name rather than by inode.

Symbolic Links

If you specify the pathname of a symbolic link to **FAMMonitorDirectory()** or **FAMMonitorFile()**, FAM monitors only the symbolic link itself, not the target of the link. Although it might seem logical to automatically monitor the target of a symbolic link, consider that if the target is on an automounted filesystem, monitoring the target triggers and holds an automount.

There is no general solution for monitoring targets of symbolic links. You might decide that it's appropriate for your application to monitor a target even if it's automounted.

On the other hand, to avoid triggering and holding an automount, you can manually follow symbolic links until you reach either a local target, which you can then monitor, or a non-existent filesystem, in which case you might decide not to monitor the target. Another option is to test the target once to see if it is local, which triggers an automount only once if the target is automounted.

Suspending, Resuming, and Canceling Monitoring

Once you've begun monitoring a file or directory, you can cancel monitoring or temporarily suspend and later resume monitoring.

FAMSuspendMonitor() temporarily suspends monitoring a file or directory. **FAMResumeMonitor()** resumes monitoring the file or directory. Suspending file monitoring can be useful when your application does not need to display information about a file (for example, when your application is iconified).

Note: FAM queues any changes that occur to the file or directory while monitoring is suspended. When your application resumes monitoring, FAM notifies it of any changes that occurred.

The syntax for these functions is:

```
int FAMSuspendMonitor(FAMConnection *fc, FAMRequest *fr);

int FAMResumeMonitor(FAMConnection *fc, FAMRequest *fr);
```

fc is the FAMConnection returned by **FAMOpen()**, and *fr* is the FAMRequest returned by either **FAMMonitorFile()** or **FAMMonitorDirectory()**. Both functions return 0 if successful and -1 otherwise.

When your application is finished monitoring a file or directory, it should call **FAMCancelMonitor()**:

```
int FAMCancelMonitor(FAMConnection *fc, FAMRequest *fr)
```

FAMCancelMonitor() instructs FAM to no longer monitor the file or directory specified by *fr*. It returns 0 if successful and -1 otherwise.

Detecting Changes to Files and Directories

Whenever FAM detects changes in files or directories that it is monitoring, it generates a *FAM event*. Your application can receive FAM events in one of two ways:

The Select approach

Your application performs a **select**(2) on the file descriptor in the FAMConnection structure returned by **FAMOpen()**. When this file descriptor becomes active, the application calls **FAMNextEvent()** to retrieve the pending FAM event.

The Polling approach

Your application periodically calls **FAMPending()** (typically when the system is waiting for input). When **FAMPending()** returns with a positive return value, your application calls **FAMNextEvent()** to retrieve the pending FAM events.

FAMPending() has the following syntax:

```
int FAMPending(FAMConnection *fc)
```

It returns 1 if there is a FAM event queued, 0 if there is no queued event, and -1 if there is an error. **FAMPending()** returns immediately (that is, it does not wait for an event).

Once you have determined that there is a FAM event queued, whether by using the select or polling approach, call **FAMNextEvent()** to retrieve it:

```
int FAMNextEvent(FAMConnection *fc, FAMEvent *fe)
```

FAMNextEvent() returns 0 if successful and -1 if there is an error. The first argument to **FAMNextEvent()** is the FAMConnection structure initialized by **FAMOpen()**. The second argument is a pointer to a FAMEvent structure, which **FAMNextEvent()** fills in with information about the FAM event. The format of the FAMEvent structure is:

```
typedef struct {
    FAMConnection* fc;
    FAMRequest fr;
    char *hostname;
    char *filename;
    void *userdata;
    FAMCodes code;
    } FAMEvent;
```

fc is the FAMConnection structure initialized by **FAMOpen()**.

fr is the FAMRequest structure returned by either **FAMMonitorFile()** or **FAMMonitorDirectory()** when you requested that FAM monitor the file or directory that changed.

hostname is an obsolete field. Don’t use it in your applications.

filename is the full pathname of the file or directory that changed.

userdata is the arbitrary data pointer that you provided when you called either **FAMMonitorFile()** or **FAMMonitorDirectory()** to monitor this file or directory.

code is an enumerated value of type FAMCodes that describes the change that occurred. It can take any of the following values:

FAMChanged	Some value of the file or directory that can be obtained with **fstat**(1) changed.

FAMDeleted A file or directory being monitored was deleted.

Caution: Whenever your application receives a FAMDeleted event for a file or directory, it should cancel monitoring of that file or directory. Otherwise, FAM can generate spurious events.

FAMStartExecuting
An monitored, executable file started executing. This event occurs every time the file is run, even if older processes are still running.

FAMStopExecuting
An monitored, executable file that was running finished. If multiple processes from an executable are running, this event is generated only when the last one finishes.

FAMCreated A file was created in a directory being monitored.

Note: This event is generated only for files created in a directory being monitored.

FAMAcknowledge
FAM generates a FAMAcknowledge event in response to a call to **FAMCancelMonitor()**.

Note: Currently, **FAMNextEvent()** might not initialize the *filename* field in a FAMAcknowledge event. You should use the request number to find the file or directory these events reference.

FAMExists When the application requests that a file be monitored, FAM generates a FAMExists event for that file (if it exists). When the application requests that a directory be monitored, FAM generates a FAMExists event for that directory (if it exists) and every file contained in that directory.

FAMEndExist When the application requests a file or directory be monitored, FAM generates a FAMEndExist event after the last FAMExists event. (Therefore if you monitor a file, FAM generates a single FAMExists event followed by a FAMEndExist event.)

Note: Currently, **FAMNextEvent()** might not initialize the *filename* field in a FAMEndExist event. You should use the request number to find the file or directory these events reference.

Using FAM

As noted in "Detecting Changes to Files and Directories" on page 112, there are two ways that your application can check for changes in files in directories that it monitors: 1) using **select()** to wait until the FAM socket is active, indicating a change; or 2) using **FAMPending()** to periodically poll FAM. This section describes how to use both approaches.

Waiting for File Changes

Follow these steps to use FAM in your application, using the select approach to detect changes:

1. Call **FAMOpen()** to create a connection to *fam*. This routine returns a FAMConnection structure used in all FAM procedures.
2. Call **FAMMonitorFile()** and **FAMMonitorDirectory()** to tell *fam* which files and directories to monitor.
3. Select on the *fam* socket file descriptor and call **FAMNextEvent()** when the *fam* socket is active.
4. When the application is finished monitoring a file or directory, call **FAMCancelMonitor()**. If you want to temporarily suspend monitoring of a file or directory, call **FAMSuspendMonitor()**. When you're ready to start monitoring again, call **FAMResumeMonitor()**.
5. When the application no longer needs to monitor files and directories, call **FAMClose()** to release resources associated with files still being monitored and to close the connection to *fam*. This step is optional if you simply exit your application.

Example 8-1 demonstrates this process in a simple program.

Example 8-1 Using the Select Method With FAM to Detect Changes to Files and Directories

```
/*
 *   monitor.c -- monitor arbitrary file or directory
 *                using fam
 */

#include <fam.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/stat.h>
#include <sys/select.h>

/* event_name() - return printable name of fam event code */

const char *event_name(int code)
{
    static const char *famevent[] = {
        "",
        "FAMChanged",
        "FAMDeleted",
        "FAMStartExecuting",
        "FAMStopExecuting",
        "FAMCreated",
        "FAMMoved",
        "FAMAcknowledge",
        "FAMExists",
        "FAMEndExist"
    };
    static char unknown_event[10];

    if (code < FAMChanged || code > FAMEndExist)
    {
        sprintf(unknown_event, "unknown (%d)", code);
        return unknown_event;
    }
    return famevent[code];
}

void main(int argc, char *argv[])
{
    int i, nmon, rc, fam_fd;
```

```
FAMConnection fc;
FAMRequest *frp;
struct stat status;
FAMEvent fe;
fd_set readfds;

/* Allocate storage for requests */

frp = malloc(argc * sizeof *frp);
if (!frp)
{
    perror("malloc");
    exit(1);
}

/* Open fam connection */

if ((FAMOpen(&fc)) < 0)
{
    perror("fam");
    exit(1);
}

/* Request monitoring for each program argument */

for (nmon = 0, i = 1; i < argc; i++)
{
    if (stat(argv[i], &status) < 0)
    {
        perror(argv[i]);
        status.st_mode = 0;
    }
    if ((status.st_mode & S_IFMT) == S_IFDIR)
        rc = FAMMonitorDirectory(&fc, argv[i], frp + i,
                                 NULL);
    else
        rc = FAMMonitorFile(&fc, argv[i], frp + i, NULL);
    if (rc < 0)
    {
        perror("FAMMonitor failed");
        continue;
    }
    nmon++;
}
if (!nmon)
```

```
    {
        fprintf(stderr, "Nothing monitored.\n");
        exit(1);
    }

    /* Initialize FAM socket data structures */

    fam_fd = FAMCONNECTION_GETfd(&fc);
    FD_ZERO(&readfds);
    FD_SET(fam_fd, &readfds);

    /* Loop forever. */

    while(1)
    {
        if (select(fam_fd + 1, &readfds,
                   NULL, NULL, NULL) < 0)
        {
             perror("select failed");
             exit(1);
        }
        if (FD_ISSET(fam_fd, &readfds))
        {
            if (FAMNextEvent(&fc, &fe) < 0)
            {
                perror("FAMNextEvent");
                exit(1);
            }
            printf("%-24s %s\n", fe.filename,
                   event_name(fe.code));
        }
    }
}
```

Polling for File Changes

Follow these steps to use FAM in your application, using the polling approach to detect changes:

1. Call **FAMOpen()** to create a connection to *fam*. This routine returns a FAMConnection structure used in all FAM procedures.
2. Call **FAMMonitorFile()** and **FAMMonitorDirectory()** to tell *fam* which files and directories to monitor.

3. Call **FAMPending()** to determine when there is a pending FAM event and then call **FAMNextEvent()** when an event is detected.
4. When the application is finished monitoring a file or directory, call **FAMCancelMonitor()**. If you want to temporarily suspend monitoring of a file or directory, call **FAMSuspendMonitor()**. When you're ready to start monitoring again, call **FAMResumeMonitor()**.
5. When the application no longer needs to monitor files and directories, call **FAMClose()** to free resources associated with files still being monitored and to close the connection to *fam*. This step is optional if you simply exit your application.

For example, you could use the polling approach in the *monitor.c* program listed in Example 8-1 by deleting the code pertaining to the FAM socket and replacing the `while` loop with the code shown in Example 8-2.

Example 8-2 demonstrates this process in a simple program.

Example 8-2 Using the Polling Method With FAM to Detect Changes to Files and Directories

```
while(1)
{
    rc = FAMPending(&fc);
    if (rc == 0)
        break;
    else if (rc == -1)
        perror("FAMPending");
    if (FAMNextEvent(&fc, &fe) < 0)
    {
        perror("FAMNextEvent");
        exit(1);
    }
    printf("%-24s %s\n", fe.filename,
           event_name(fe.code));
}
```

This is a particularly useful approach if you want to poll for changes from within an Xt work procedure. Example 8-3 shows the skeleton code for such a work procedure.

Example 8-3 Polling FAM Within an Xt Work Procedure

```
Boolean monitorFiles(XtPointer clientData)
{
    int rc = FAMPending(&fc);

    if (rc == 0)
        return(FALSE);
    else if (rc == -1)
        XtAppError(app_context, "FAMPending error");

    if (FAMNextEvent(&fc, &fe) < 0)
    {
        XtAppError(app_context, "FAMNextEvent error");
    }

    handleFileChange(fe);
    return(FALSE);
}
```

Chapter 9

Providing Online Help With SGIHelp

This chapter describes how to use Silicon Graphics' online help system, SGIHelp, to deliver the online help for your product.

Chapter 9

Providing Online Help With SGIHelp

This chapter describes how to use the Silicon Graphics online help system, SGIHelp, to deliver the online help for your product. It describes how to prepare the help and integrate it into your application. It contains the following sections:

- "Overview of SGIHelp" on page 123 provides an overview of the help system.
- "The SGIHelp Interface" on page 126 describes the SGIHelp API.
- "Implementing Help in an Application" on page 130 provides some examples of implementing online help in an application.
- "Application Helpmap Files" on page 135 describes the format and use of application helpmap files.
- "Writing the Online Help" on page 140 describes how to write the source files containing your application's online help.
- "Producing the Final Product" on page 145 describes how to compile your help files into viewable form and package them for installation on your users' systems.
- "Bibliography of SGML References" on page 147 is a bibliography for further reading.

The section "Online Help" in Chapter 4 of the *Indigo Magic User Interface Guidelines* provides interface and content guidelines for adding online help to your application.

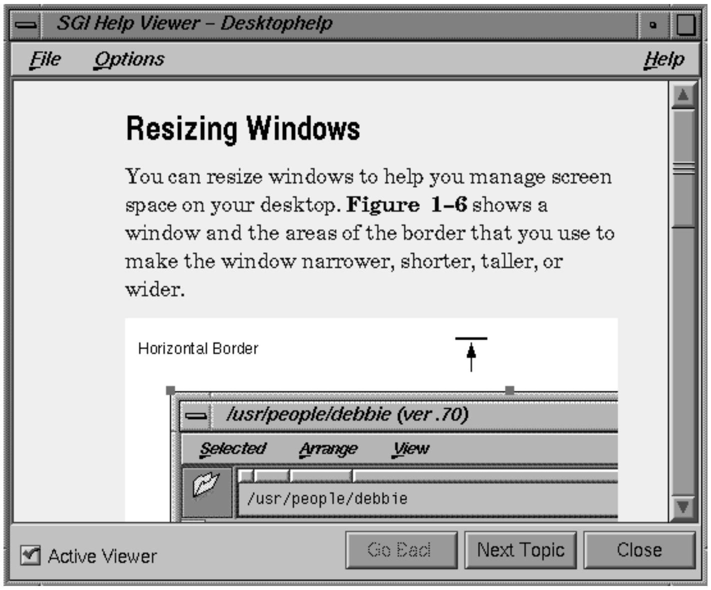
Overview of SGIHelp

The SGIHelp system consists of a help viewer, a help library and include file, help document files, and optional application helpmap files.

Note: To develop online help for your application, you must install the *insight_dev* product, which contains the SGIHelp library and include file, help generation tools, examples, and templates.

The Help Viewer

The SGIHelp viewer, *sgihelp*(1), also referred to as the *help server*, displays help text in easy-to-use browsing windows. Figure 9-1 shows an example of a help window.

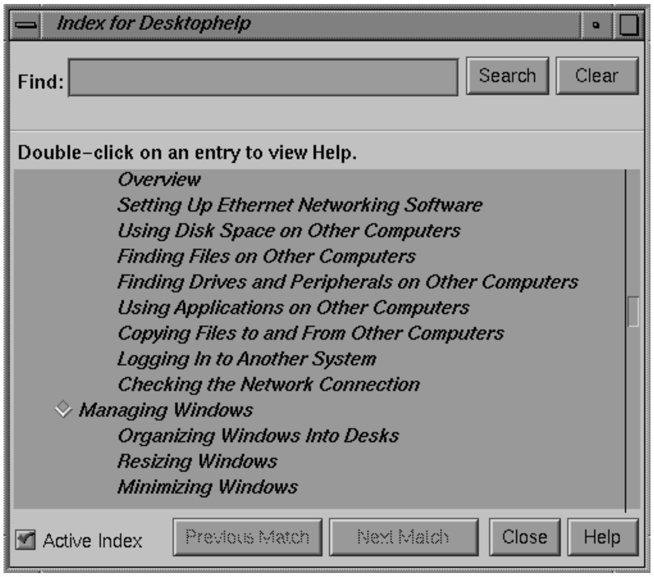


Resizing Windows

You can resize windows to help you manage screen space on your desktop. **Figure 1–6** shows a window and the areas of the border that you use to make the window narrower, shorter, taller, or wider.

Figure 9-1 The Help Viewer

sgihelp can also display an index of all help topics available in a help document and allow the user to select a particular topic from the list. Figure 9-2 shows an example of a help index.



Double–click on an entry to view Help.

Overview
Setting Up Ethernet Networking Software
Using Disk Space on Other Computers
Finding Files on Other Computers
Finding Drives and Peripherals on Other Computers
Using Applications on Other Computers
Copying Files to and From Other Computers
Logging In to Another System
Checking the Network Connection
◇ Managing Windows
Organizing Windows Into Desks
Resizing Windows
Minimizing Windows

Figure 9-2 The Help Index Window

sgihelp is a separate application that gets started automatically whenever an application makes a help request. Neither users nor your application should ever need to explicitly start *sgihelp*. After the user closes all help windows, *sgihelp* remains running in the background for a few minutes. If it receives no other help requests within that time, it automatically exits.

The SGIHelp Library and Include File

The Silicon Graphics help library, *libhelpmsg*, handles communication with the help server. *libhelpmsg* depends on the *libX11* library. Be sure to specify **-lhelpmsg** before **-lX11** in the compilation or linking command.

For example, to compile a file *hellohelp.c++* to produce the executable *hellohelp*, you would enter:

```
CC -o hellohelp hellohelp.c++ -lhelpmsg -lX11
```

You must include <*helpapi/HelpBroker.h*> in any source file that accesses online help. Both the library and include file were developed in C, and can be used with either the C or C++ programming languages.

Help Document Files

Help document files contain the actual help text in Standard Generalized Markup Language (SGML) format. In addition to text, help documents can contain graphics and hypertext links to other help topics.

Application Helpmap Files

Application helpmap files are optional; an application can request specific help topics directly. Applications helpmap files provide a level of indirection that allows you to structure your help presentation independently of your application code. The SGIHelp library also uses helpmaps to make it easier for you to implement context-sensitive help in your application.

Note: You must provide a helpmap for your application if you want a help index.

The SGIHelp Interface

This section describes the functions you use to access the help server from your application.

Initializing the Help Session

Before calling any other help functions, your application must first call **SGIHelpInit()**:

```
int SGIHelpInit (Display *display, char *appClass, char *separator);
```

display The application's Display structure.

appClass The application's class name. Use the same name as you provide to **XtAppInitialize()**.

separator The separator character used by the application to separate the widget hierarchy when a context-sensitive help request is made. At this time, you must use the period (.).

SGIHelpInit() does not start or communicate with the help server process; it simply initializes data structures for the other SGIHelp functions. **SGIHelpInit()** returns 1 on success, and 0 on failure.

Example 9-1 shows an example of how to use **SGIHelpInit()**.

Example 9-1 Initializing a Help Session Using **SGIHelpInit()**

```
#include <Xm/Xm.h>
#include <helpapi/HelpBroker.h>

void main ( int argc, char **argv )
{
    Widget       mainWindow; /* Main window shell widget */
    XtAppContext app;        /* An application context,
                              * needed by Xt
                              */
    int          status;     /* Return status */

    /* ... */

    mainWindow = XtAppInitialize ( &app, "MyApp", NULL, 0,
                                   &argc, argv, NULL,
                                   NULL, 0 );

    /* Initialize the help session */

    status = SGIHelpInit( XtDisplay(mainWindow),
                          "MyApp", "." );

    /* ... */
}
```

Displaying a Help Topic

To request display of a help topic from within your application, call **SGIHelpMsg()**:

```
int SGIHelpMsg (char *key, char *book, char *userData);
```

key Specifies either 1) the ID of a particular help topic in a help document, or 2) a widget hierarchy.

If you provide a help ID, the help server displays the help topic identified in the help document specified by the *book* argument. You must provide a help book name in this case. See “Writing the Online Help” on page 140 for an explanation of help IDs.

If you provide a widget hierarchy, the help server looks in the application’s helpmap file to find a mapping. If it doesn’t find an exact match, it uses a fallback algorithm to determine which is the “closest” hierarchy found. Typically you use this technique to provide context-sensitive help. See “Application Helpmap Files” on page 135 for more information about the helpmap file.

book Gives the *short name* of the help document containing the application’s help information. See “Writing the Online Help” for a description of help document short names.

If you set this to NULL or asterisk (*), the help server looks in the application’s helpmap file for the book name. In this case, a helpmap file must exist. See “Application Helpmap Files” for more information about the helpmap file.

userData Reserved for future use. You should always set this field to NULL.

If a copy of the help server is not already running, **SGIHelpMsg()** automatically starts the server. **SGIHelpMsg()** returns 1 on success, and 0 on failure.

Example 9-2 shows an example of using **SGIHelpMsg()** to display the help topic identified by the help ID “help_save_button” in the help document with the short name “MyAppHelp.”

Example 9-2 Requesting a Specific Help Topic Using **SGIHelpMsg()**

```
#include <helpapi/HelpBroker.h>

/* Assume initialization of help session is complete */

/*
 * This call displays the help topic with a key of
 * "help_save_button" (found in the "HelpId=" field).
 * It will look for this section in the help document
 * "MyAppHelp".
 */

status = SGIHelpMsg( "help_save_button", "MyAppHelp", NULL );
```

Example 9-3 shows an example of using **SGIHelpMsg()** to request help given a widget hierarchy. In this case, the application must have a helpmap file, and the help file must contain an entry mapping the given hierarchy to a help topic for this call to succeed.

Example 9-3 Requesting a Help Topic for a Widget Using **SGIHelpMsg()**

```
#include <helpapi/HelpBroker.h>

/* Assume initialization of help session is complete */

/*
 * This call displays the help topic specified by the
 * mapping for the widget hierarchy
 * "MyApp.mainWindow.controlPane.searchButton"
 * as given in the application's helpmap file.
 */

status = SGIHelpMsg( "MyApp.mainWindow.controlPane",
                     NULL, NULL );
```

Displaying the Help Index

The **SGIHelpIndexMsg()** call causes the help server to look for the application's helpmap file and to display the Help Index window:

`int SGIHelpIndexMsg (char *`*key*`, char *`*book*`);`

key You should always set this field to NULL or "index."

book Reserved for future use. You should always set this field to NULL.

The index displays all the help topics in the helpmap file in the order they appear in the file. You must have a helpmap file for this call to work properly.

See “Application Helpmap Files” on page 135 for more information about the helpmap file. **SGIHelpIndexMsg()** returns 1 on success, and 0 on failure.

Example 9-4 shows an example of how to use **SGIHelpIndexMsg()**.

Example 9-4 Displaying a Help Index Using **SGIHelpIndexMsg()**

```
/* Assume initialization of help session is complete */

/*
 * This call will look in the application’s helpmap
 * file for a list of topics to display to the user in
 * sgihelp’s index window.
 */

status = SGIHelpIndexMsg( "index", NULL );
```

Implementing Help in an Application

The section “Supplying Online Help Information” in Chapter 4 of the *Indigo Magic User Interface Guidelines* describes the user interfaces to online help that your application should provide. In summary, these services are:

- Help menus in all application windows with menu bars
- *Help* buttons in all applications without menu bars
- Context-sensitive help available through both the help menus and the **`<Shift+F1>`** keyboard accelerator.

This section contains specific suggestions for implementing these help interfaces to your application.

Constructing a Help Menu

For those windows in your application with a menu bar, you should provide a Help menu. “Providing Help Menu Entries” in Chapter 4 of the *Indigo Magic User Interface Guidelines* recommends that the following entries appear in the Help menu:

“Click for Help”

Provides context-sensitive help. This option should also use the **`<Shift+F1>`** keyboard accelerator. When a user selects “Click for Help,” the cursor should turn into a question mark (?). The user can then move the cursor over an item or area of interest and click. Your application should then display a help topic describing the purpose of the item or area.

“Providing Context-Sensitive Help” on page 133 provides detailed instructions for implementing context-sensitive help.

“Overview”

Displays overview information. The main primary window should provide an overview of the application. For other windows, this option should appear as “Overview for <*window name*>” and provide an overview of the current window only.

A separator

A list of topics and tasks

This section should contain a list of topics and tasks that the user can perform in your application. When the user selects one of the options, your application should display a help topic for that item. To reduce the size of this section, you can move some of the tasks to submenus.

You can hard code the entries in this section or, if you have a helpmap file for your application, you can parse the helpmap and dynamically create the task and subtask entries.

A separator

“Index”

Displays Help Index window for the application. You must have an application helpmap file to support this option.

“Keys & Shortcuts”

Displays the application’s accelerator keys, keyboard shortcuts, and other actions in the application.

A separator

"Product Information"
: Displays a dialog box showing the name, version, and any copyright information or other related data for your application. Typically, you should present this information using an IRIS IM dialog rather than using online help.

See the program listing in Example C-4 for an example of creating a Help menu.

Implementing a Help Button

For those windows in your application that don't contain a menu bar, you should provide a *Help* button. Example 9-5 shows how you can use the SGIHelp API to communicate with the help server from a pushbutton within your application. "Providing Help through the Help Button" in Chapter 4 of the *Indigo Magic User Interface Guidelines* provides guidelines for when to implement a *Help* button.

Example 9-5 Providing a *Help* Button

```
/* required include file for direct communication with help server */
#include <helpapi/HelpBroker.h>
#include <Xm/Xm.h>

/* ... */

/* initialize help server information */
SGIHelpInit(display, "MyWindowApp", ".");

...

/* create help pushbutton for your window */
Widget helpB = XmCreatePushButton(parent, "helpB", NULL, 0);
XtManageChild(helpB);

  XtAddCallback(helpB, XmNactivateCallback,
                (XtCallbackProc)helpCB, (XtPointer)NULL);
/* ... */

/* help callback */
void helpCB(Widget w, XtPointer clientData, XtPointer callData)
{
```

```
                /*
                 * communicate with the help server; developer
                 * may wish to pass the "key" in as part of the
                 * callback’s callData parameter...
                 */
                SGIHelpMsg("key", "book", NULL);
}
```

Providing Context-Sensitive Help

To provide context-sensitive help from within your application, you need to write code that tracks the cursor and interrogates the widget hierarchy. Additionally, you need to make a mapping between what the user has clicked, and the help card that’s displayed.

The best way to provide the mapping is with the application helpmap file. The SGIHelp library provides a fallback algorithm for finding help topics that simplifies the process mapping widgets to topics. If the help system can’t find an exact match to the widget string in the helpmap file, it drops the last widget from the string and tries again. The help system reiterates this process until it finds a match in the helpmap file. This eliminates the need to explicitly map a help topic for every widget in your application. Instead you can map a help topic to a higher-level manager widget and have that topic mapped to all of its descendent widgets as well.

For more information on the structure of application helpmap files, see “Application Helpmap Files” on page 135.

Example 9-6 shows the code used to implement context-sensitive help in the example program listed in Example C-4, which simply installs **clickForHelpCB()** as the callback function for the “Click for Help” option of the Help menu. As long as you create a helpmap file for your application, you can use this routine as listed in your application as well.

Example 9-6 Implementing Context-Sensitive Help

```
void clickForHelpCB(Widget wid, XtPointer clientData, XtPointer callData)
{
     static Cursor cursor = NULL;
     static char path[512], tmp[512];
     Widget shell, result, w;
     strcpy(path, "");
     strcpy(tmp,  "");

/*
 * create a question-mark cursor
 */
     if(!cursor)
         cursor = XCreateFontCursor(XtDisplay(wid), XC_question_arrow);

     XmUpdateDisplay(_mainWindow);

/*
 * get the top-level shell for the window
 */
     shell = _mainWindow;
     while (shell && !XtIsShell(shell)) {
            shell = XtParent(shell);
     }

/*
 * modal interface for selection of a component;
 * returns the widget or gadget that contains the pointer
 */
     result = XmTrackingLocate(shell, cursor, FALSE);

     if( result ) {
         w = result;

/*
 * get the widget hierarchy; separate with a '.';
 * this also puts them in top-down vs. bottom-up order.
 */
         do {
              if( XtName(w) ) {
                  strcpy(path, XtName(w));

                  if( strlen(tmp) > 0 ) {
                      strcat(path, ".");
                      strcat(path, tmp);
                  }

                  strcpy(tmp, path);
              }

              w = XtParent(w);
            } while (w != NULL && w != shell);

            /*
             * send msg to the help server-widget hierarchy;
             *        OR
             * provide a mapping to produce the key to be used
             *
             * In this case, we'll let the sgihelp process do
             * the mapping for us, with the use of a helpmap file
             *
             * Note that parameter 2, the book name, can be found
             * from the helpmap file as well. The developer need
             * not hard-code it, if a helpmap file is present for
             * the application.
             *
             */
             if( strlen(path) > 0 ) {
                   SGIHelpMsg(path, NULL, NULL);
             }
        }
}
```

Application Helpmap Files

Application helpmap files provide a level of indirection that allows you to structure your help presentation independently of your application code. You don't have to create a helpmap for your application, but doing so gives you the following benefits:

- Your application can display a Help Index window, allowing the user to select a particular topic directly from the list.
- You can write the code that generates your application's Help menu to create the "list of topics and tasks" options dynamically from the helpmap. You can then add and restructure your task help without recompiling your application. See "Constructing a Help Menu" on page 130 for details on the Help menu's list of topics.
- You can provide context-sensitive without hard-coding in your source code a help topic to each widget. The SGIHelp library provides a fallback algorithm for finding help topics that simplifies the process mapping widgets to topics. If the help system can't find an exact match to the widget string in the helpmap file, it drops the last widget from

the string and tries again. The help system reiterates this process until it finds a match in the helpmap file. This eliminates the need to explicitly map a help topic for every widget in your application. Instead you can map a help topic to a higher-level manager widget and have that topic mapped to all of its descendent widgets as well. See “Providing Context-Sensitive Help” on page 133 for information on implementing context-sensitive help in your application.

Helpmap File Conventions

Helpmap files are ASCII text files. The name of your application helpmap file must be *“appClass*.helpmap”, where *appClass* is your application’s class name as provided in your application’s call to **SGIHelpInit()**. See “Initializing the Help Session” on page 126 for more information on **SGIHelpInit()**.

If you create a helpmap file for your application, you must create a subdirectory named *help* in the directory containing your help document and put all of your document’s figures in that subdirectory. See “Preparing to Build the Online Help” on page 142 for more information.

Helpmap File Format

Each entry, or *help topic*, in a helpmap consists of a single line containing at least six fields, each field separated by semicolons:

type ; *book* ; *title* ; *level* ; *helpID* ; *widget-hierarchy* [; *widget-hierarchy* ...]

All fields are required for each entry. Their purpose is as follows:

type The type of help topic. Its value can be:

0	A context-sensitive topic.
1	The overview topic.
2	A task-oriented entry that could show up in the “list of topics and tasks” area of the Help menu. See “Constructing a Help Menu” on page 130 for details on the Help menu’s list of topics.
3	The Keys and Shortcuts topic.

book The name of the help document that contains this help topic. Help topics can reside in different books. Each individual help topic can point to only one help book.

title The title of the help topic. This appears in the Help Index window. If your application parses the helpmap file to generate the "list of topics and tasks" area of the Help menu, you can use this as the label for the menu option.

level A number determining the topic level. A value of 0 indicates a main topic, a value of 1 a sub-topic, a value of 2 a sub-sub-topic, and so forth. This produces an expandable/collapsible outline of topics for the Help Index window.

If your application parses the helpmap file to generate the "list of topics and tasks" area of the Help menu, you can also use these values to construct "roll-over" submenus as part of a Help menu.

helpID The unique ID, as specified by the "HelpID" attribute, of the specific help topic in the help document.

widget-hierarchy
One or more fully-qualified widget specifications for use with context-sensitive help. You can provide multiple specifications, delimited by semicolons, to associate different areas with the same topics.

For example, the following entry in *Swpkg.helpmap* specifies the overview topic:

```
1;IndigoMagic_IG;Overview;0;Overview;Swpkg.swpkg.overview
```

The following entries from *Swpkg.helpmap* specify several context-sensitive help topics. In this case, the first entry appears as a main topic in the Help Index window and the next three appear as sub-topics:

```
0;Swpkg_UG;Using the swpkg Menus;0;menu.bar;Swpkg.swpkg.menuBar
0;Swpkg_UG;The File Menu;1;menu.bar.file;Swpkg.swpkg.menuBar.File
0;Swpkg_UG;The View menu;1;menu.bar.view;Swpkg.swpkg.menuBar.View
0;Swpkg_UG;The Help menu;1;menu.bar.help;Swpkg.swpkg.menuBar.helpMenu
```

The following shows a more complex hierarchy from *Swpkg.helpmap*:

```
2;Swpkg_UG;Tagging Files;0;tag.files.worksheet;Swpkg.swpkg
2;Swpkg_UG;Selecting Product Files;1;file.browser;Swpkg.swpkg.view.viewPanedWindow.viewForm.\
 leftForm.filesBody.addBody.FileListAdd.selectionGrid
0;Swpkg_UG;Setting the Browsing Directory;2;file.browser.dirfield;Swpkg.swpkg.view.\
 viewPanedWindow.viewForm.leftForm.filesBody.addBody.FileListAdd.directoryLabel;Swpkg.swpkg.\
 view.viewPanedWindow.viewForm.leftForm.filesBody.addBody.FileListAdd.directoryTextField
0;Swpkg_UG;Selecting Files From the File List;2;file.browser.filelist;Swpkg.swpkg.view.\
 viewPanedWindow.viewForm.leftForm.filesBody.addBody.FileListAdd.scrolledWindow.filesList;\
 Swpkg.swpkg.view.viewPanedWindow.viewForm.leftForm.filesBody.addBody.FileListAdd.\
 scrolledWindow.VertScrollBar
```

Note: The backslashes (\) indicate linewraps; they do not actually appear in the helpmap file. Each helpmap entry must be a single line.

In the example above, the first entry is a task-oriented topic (2 in the *type* field). *swpkg* parses the helpmap file to create its Help menu, so “Tagging Files” appears as a selection. The second entry is also a task-oriented topic. It’s a sub-topic of the first entry and appears in a submenu off the “Tagging Files” selection. The last two entries are marked as context-sensitive only (0 in the *type* field). These entries don’t appear anywhere in the application’s Help menu, but they do appear as sub-sub-topics in the Help Index window. Also note that the last two entries have two widget specifications, providing context-sensitive help for two different widgets.

Note: The order of the entries in the application helpmap file determines the order in which help topics appear in the Help Index window.

Widget Hierarchies in the Helpmap File

At least one widget hierarchy must accompany every point in the application helpmap file. That one (default) point should be set to “*application_classname.top-level_shell*”.

Note that the application class name must always be the first component of a widget hierarchy string. All widget ID’s within the string must be delimited by a period (.).

Widget hierarchies can be as fine-grained as you wish to make them. A fall-back algorithm is in place (to go to the closest available entry) when the user clicks a widget in context-sensitive help mode. For example, suppose your application includes a row or set of buttons. When the user asks for help on a button, you pass that widget string to SGIHelp. If the widget string is not found in the mappings, the last widget is dropped off the string (in this case, the widget ID for the button itself). The new string is compared to all available mappings. This loop continues until something is found. At the very least, you should fall back to an "Overview" card.

To get a sample widget hierarchy (help message) from an application, you can run the SGIHelp help server process in debug mode. Before doing this, you need to add the SGIHelp API call, **SGIHelpMsg()**, to your application and implement context-sensitive help. Make sure that you send a widget hierarchy string for the "key" parameter in the **SGIHelpMsg()** call. (See "Providing Context-Sensitive Help within an Application" and "Understanding Available Calls" for details on this call.)

To get a sample widget hierarchy from an application that implements context-sensitive help, follow these steps:

1. Bring up a shell.
2. Make sure the help server process isn't running. Type:

   ```
   % /etc/killall sgihelp
   ```
3. Type the following to make the help server process run in the foreground in debug mode:

   ```
   % /usr/sbin/sgihelp -f -debug
   ```
4. Run your application, and then choose "Click for Help" from the help menu. The cursor should change into a question mark (?), or whatever cursor you've implemented for context sensitive help.
5. Click a widget or an area of the application.
6. Check the shell from which SGIHelp is being run. You should see a line such as:

```
REQUEST= client="Overview" command="view" book=""
   keyvalue="DesksOverview.MainView.Frame.viewport.Bboard"
   separator="." user_data=""
```

   The "keyvalue" field contains the widget hierarchy that you can add to the helpmap file. Remember to add the application class name to the front of the string. For the example above, the full widget hierarchy string would be:

   ```
   Overview.DesksOverview.MainView.Frame.viewport.Bboard
   ```

Writing the Online Help

This section describes how you prepare the online help document. It provides an explanation of the standard format you must use, as well as the steps you take to actually prepare the file.

For guidelines on structuring and writing your online help text, see “Writing Online Help Content for SGIHelp” in Chapter 4 of the *Indigo Magic User Interface Guidelines*.

Overview of Help Document Files

Help document files contain the actual help text in *Standard Generalized Markup Language* (SGML) format. When you write the online help for your product, you need to embed SGML tags to describe the structure of your document.

The file */usr/share/Insight/XHELP/samples/sampleDoc/sample.sgm* is an example of a file with embedded SGML tags. (Example C-1 also lists this file.) Notice the tags surrounded by angle brackets (<>). These tags describe how each item fits into the structure of the overall document. For example, a paragraph might be tagged as a list item, and a word within that paragraph may be tagged as a command.

The *Document Type Definition* (DTD) outlines the tagging rules for your online documentation. In other words, it specifies which SGML tags are allowed, and in what combination or sequence. The file */usr/share/Insight/XHELP/dtd/XHELP.dtd* lists the legal structure for your online help.

A DTD can be difficult to read, so you might instead want to look at the file */usr/share/Insight/XHELP/samples/XHELP_elements/XHELP_elements.sgm*, which lists the legal elements in a help document and describes when to use them in your documents. (Example C-2 also lists this file.)

For a more complete understanding of SGML, refer to the bibliography in “Bibliography of SGML References” on page 147. It lists several of the many books on SGML.

Viewing the Sample Help Document Files

Before beginning to write your own help documents, you might find it helpful to examine the source of the sample help documents and then view resulting online versions. You can compile and view the help documents in Insight. To do so, follow these steps:

1. Go to a directory in which you want to build the sample help book.
2. Copy the necessary directories and files by entering:
   ```
   % cp -r /usr/share/Insight/XHELP/samples .
   ```
3. Enter:
   ```
   % cd samples/sampleDoc
   ```
4. Build the file *sample.sgm* by entering:
   ```
   % make help
   ```
5. To view this file, enter:
   ```
   % iiv -b . -v sample
   ```
6. Change to the *exampleApp* directory by entering:
   ```
   % cd ../exampleApp
   ```
7. Build the file *exampleAppXmHelp.sgm* by entering:
   ```
   % make help
   ```
8. To view this file, enter:
   ```
   % iiv -b . -v exampleAppXmHelp
   ```

Creating a Help Document File

To create the help document file for your application:

1. Create a new directory for the online help, then go to this directory.
2. Create a text file and name the file “*title*.sgm”, where *title* is one word that identifies the online help.
3. Write the online help.

You can include figures as described in the example help documents. If your document contains figures, create a subdirectory named either *figures* or *online* in your help document directory and put all of your document's figures in that subdirectory.

Preparing to Build the Online Help

After writing your online help you must *build* it, similarly to the way you compile a program. When you build the online help, you transform the raw SGML file into a viewable, online document. To get started, you need to create two files: a Makefile and a spec file. The Makefile specifies:

- the name of file that contains the online help
- the name you want to assign to the help book
- the version number of the product

The spec file specifies:

- the title of your product
- the official release and version numbers
- other information that is used when you create the final, installable images

To create these files, follow these steps:

1. Go to the directory that contains the online help file.
2. Copy */usr/share/Insight/XHELP/templates/Makefile_xhelp* by typing:

```
cp /usr/share/Insight/XHELP/templates/Makefile_xhelp Makefile
```

3. Copy */usr/share/Insight/XHELP/templates/spec_xhelp* by typing:

```
cp /usr/share/Insight/XHELP/templates/spec_xhelp spec
```

4. Edit the Makefile:
   - Next to the label TITLE, type the name of the file that contains the online help.
   - Next to the label FULL_TITLE, type the name you want to assign to the help book. This name can contain several words, and is used only if you decide to display the help as a "book" on the Insight bookshelf.

- Next to the label VERSION, type the version number for the product.
- Next to the label HIDDEN, remove the comment character (#) if you want the online help to appear as a book on an Insight bookshelf. Change this if you want users to be able to browse the help information using Insight, and not just from within your application.

5. Edit the spec file:
   - Replace the string ${RELEASE} with the release number for the product. This should match what you've entered in the Makefile for the VERSION.
   - Replace the string <ProductName> with a one-word name for the product.
   - Replace the string <Shortname> with the TITLE you specified in the Makefile.
   - Replace the string <SHORTNAME> with the TITLE you specified in the Makefile. Capitalize all letters.
   - Replace the string <SHORTNAME_HELP> with the TITLE followed by "_HELP".
   - Replace the string <Book title> with the FULL_TITLE you specified in the Makefile.

Once you have edited these files, the directory containing your help document should contain:

- your help document
- the *Makefile*
- the *spec* file
- if you included figures in your help document, a subdirectory named either *figures* or *online* containing all of the figures
- if you created a helpmap file for you application, a subdirectory named *help* containing the helpmap file

Building the Online Help

Once you have written the online help and done the preparation described in "Preparing to Build the Online Help" on page 142, you can build and view the online help. To do so, follow these steps:

1. Go to the directory that contains the online help files.
2. Enter:

   ```
   % make help
   ```

   If the help is formatted properly, the online help will build. You should see a file called *booklist.txt* and a directory called *books*.

   If the SGML file contains errors, you will see them displayed in the shell window. See "Finding and Correcting Build Errors" for details.
3. View the book by typing

   ```
   % iiv -b . -v title
   ```

   Where *title* is the value of TITLE from the Makefile.

Finding and Correcting Build Errors

The SGML tags come in pairs. Each pair contains an opening tag and a closing tag, and the tag applies to everything between the opening tag and the closing tag. If you use these tags incorrectly, you'll get error messages when you build the help file. The most common errors are the result of misspelled tag names, mismatched end tags, or tags used out of sequence.

Some examples of common error messages are:

```
mkhelperror: not authorized to add tag 'PAR', ignoring content.
```

This error appears if you specify an invalid tag. In this case, the invalid tag is "PAR." The valid tag name is "PARA."

```
mkhelperror: Start-tag for 'HELPLABEL' is not valid in this context.
mkhelp  Location:  Line       37 of entity '#DOCUMENT'
Context:   'hor point for the link
syntax.</>&#RS;</HelpTopic>&#RS;&#RS;<Helplabel>'...
             '<Anchor Id="AI003">Using Notes, Warnings or Tips Within a P'
     FQGI:      DOCHELP
```

This error message occurs when the parser sees a tag it isn’t expecting. In this case it found a HELPLABEL that was not preceded by a HELPTOPIC start tag. The error message specifies the line number of the error (37), the context in the file, and the Fully Qualified Generic Identifier (FQGI) of the context. You can probably ignore the FQGI; it describes where the error occurs within the SGML structure.

```
mkhelperror: No ’WARNING’ is open, so an end-tag for it is not valid.
The last one was closed at line 46.
mkhelp  Location:  Line       46 of entity ’#DOCUMENT’
Context:   ’<warning>Missing open para. This is a
warning.</></warning>’...
             ’&#RS;<note><para>For your information, this is a note.</></note’
   FQGI:      DOCHELP,DESCRIPTION,PARA,PARA
```

This message can occur if you close items with the generic end tag, </>. In this case, the </> closes the <warning> because the start tag for <para> is missing. This may occur if you leave out a start tag or accidentally spell it incorrectly.

If you want additional information about the errors, use the command *make verify*. It produces a more detailed error log.

Producing the Final Product

This section describes how to package your online help as a subsystem that users can install using Software Manager (*swmgr*), the Silicon Graphics software installation utility.

Creating the Installable Subsystem

After you’ve finished writing and building your online help, you need to package it so that users can install it with the rest of your product. To do so:

1. Go to the directory that contains the online help.
2. Enter:

   ```
   % make images
   ```

This produces a directory called *images*. This directory contains all of the files you need to let users install the online help using Software Manager.

Incorporating the Help Subsystem into an Installable Product

If you use the Software Packager utility (*swpkg*) to package your product so that users can install it using Software Manager, you need to merge the online help subsystem with the rest of your product. Consult the *Software Packager User's Guide* for detailed instructions for using *swpkg*.

You don't need to use *swpkg* to create spec or IDB files for your online help subsystem. By following the instructions in "Preparing to Build the Online Help" on page 142, you created the spec file. The process of building your online help, described in "Building the Online Help" on page 144 automatically created an IDB file and tagged the files; set the permissions and destinations; and assigned the necessary attributes. The online help build tools use "/" as the Source and Destination Tree Root directories when generating the IDB file. (The *Software Packager User's Guide* defines all of these terms.)

If you've not already created the spec and IDB files for the rest of your product using *swpkg*, you can use *swpkg* to open the existing help subsystem spec and IDB files, and expand them as needed to handle the rest of your product. Consult the *Software Packager User's Guide* for instructions.

If you've already created the spec and IDB files for your product, you can merge the help subsystem with the existing files as described in "Combining Existing Products Into a Single Product" in Chapter 7 of the *Software Packager User's Guide*.

Incorporating the Help Subsystem into a Product With a Custom Installation Script

If you don't use *swpkg* to package your product for installation with Software Manager, do one of the following.

- If users install your product using the *tar* command, have them use *tar* to copy the online help images as well. After copying the images, the user needs to type:

  ```
  # inst -af <inst_product>
  ```

  where *inst_product* is the location of the images.

- If you've created a script, enhance the script so that it extracts all of the help images onto disk, and then invokes the command:

  ```
  # inst -af <inst_product>
  ```

  where *inst_product* is the location of the images.

Bibliography of SGML References

1. *SoftQuad, Inc. *The SGML Primer. SoftQuad's Quick Reference Guide to the Essentials of the Standard: The SGML Needed for Reading a DTD and Marked-Up Documents and Discussing Them Reasonably*. Version 2.0. Toronto: SoftQuad Inc., May 1991. 36 pages. Available from SoftQuad Inc.; 56 Aberfoyle Crescent, Suite 810; Toronto, Ontario; Canada M8X 2W4; TEL: +1 (416) 239-4801; FAX: +1 (416) 239-7105.

2. Bryan, Martin. *SGML: An Author's Guide to the Standard Generalized Markup Language*. Wokingham/Reading/New York: Addison-Wesley, 1988. ISBN: 0-201-17535-5 (pbk); LC CALL NO: QA76.73.S44 B79 1988. 380 pages. A highly detailed and useful manual explaining and illustrating features of ISO 8879. The book: (1) shows how to analyze the inherent structure of a document; (2) illustrates a wide variety of markup tags; (3) shows how to design your own tag set; (4) is copiously illustrated with practical examples; (5) covers the full range of SGML features. Technical and non-technical authors, publishers, typesetters and users of desktop publishing systems will find this book a valuable tutorial on the use of SGML and a comprehensive reference to the standard. It assumes no prior knowledge of computing or typography on the part of its readers.

3. Goldfarb, Charles F. *The SGML Handbook*. Edited and with a foreword by Yuri Rubinsky. Oxford: Oxford University Press, 1990. ISBN: 0-19-853737-1. 688 pages. This volume contains the full annotated text of ISO 8879 (with amendments), authored by IBM Senior Systems Analyst and acknowledged "father of SGML," Charles Goldfarb. The book was itself produced from SGML input using a DTD which is a

variation of the "ISO.general" sample DTD included in the annexes to ISO 8879. The SGML Handbook includes: (1) the up-to-date amended full text of ISO 8879, extensively annotated, cross-referenced, and indexed; (2) a detailed structured overview of SGML, covering every concept; (3) additional tutorial and reference material; and (4) a unique "push- button access system" that provides paper hypertext links between the standard, annotations, overview, and tutorials.

4. Herwijnen, Eric van. *Practical SGML*. Dordrecht/Hingham, MA: Wolters Kluwer Academic Publishers. 200 pages. ISBN: 0-7923- 0635-X. The book is designed as a "practical SGML survival-kit for SGML users (especially authors) rather than developers," and itself constitutes an experiment in SGML publishing. The book provides a practical and painless introduction to the essentials of SGML, and an overview of some SGML applications. See the reviews by (1) Carol Van Ess-Dykema in Computational Linguistics 17/1 (March 1991) 110-116, and (2) Deborah A. Lapeyre in <*TAG*> 16 (October 1990) 12-14.

5. Smith, Joan M.; Stutely, Robert S. *SGML: The Users' Guide to ISO 8879*. Chichester/New York: Ellis Horwood/Halsted, 1988. 173 pages. ISBN: 0-7458-0221-4 (Ellis Horwood) and ISBN: 0-470-21126-1 (Halsted). LC CALL NO: QA76.73.S44 S44 1988. The book (1) supplies a list of some 200 syntax productions, in numerical and alphabetical sequence; (2) gives a combined abbreviation list; (3) includes highly useful subject indices to ISO 8879 and its annexes; (4) supplies graphic representations for the ISO 8879 character entities; and (5) lists SGML keywords and reserved names. An overview of the book may be found in the SGML Users' Group Newsletter 9 (August 1988).

6. ISO 8879:1986. *Information Processing—Text and Office System—Standard Generalized Markup Language (SGML)*. International Organization for Standardization. Ref. No. ISO 8879:1986 (E). Geneva/New York, 1986. A subset of SGML became a US FIPS (Federal Information Processing Standard) in 1988. The British Standards Institution adopted SGML as a national standard (BS 6868) in 1987, and in 1989 SGML was adopted by the CEN/CENELEC Standards Committees as a European standard, #28879. Australia has dual numbered versions of ISO 8879 SGML and ISO 9069 SDIF (AS 3514—SGML 1987; AS 3649—1990 SDIF).

7. ISO 8879:1986 / A1:1988 (E). *Information Processing—Text and Office Systems—Standard Generalized Markup Language (SGML), Amendment 1*. Published 1988-07-01. Geneva: International Organization for Standardization, 1988.

Chapter 10

Handling Users' System Preferences

Users can set several prefences for system operation in the Indigo Magic Desktop. This chapter describes how to use these preference settings.

Chapter 10

Handling Users’ System Preferences

This chapter describes how your application can recognize and use various system preferences that users can set through Desktop control panels. Whenever possible, your application should follow these preferences to provide a consistent interface for your users. In particular, this chapter contains:

“Handling the Mouse Double-Click Speed Setting” describes how to recognize the preferred mouse double-click speed.

“Using the Preferred Text Editor” describes how to use the preferred visual text editor whenever your application needs to let users edit text.

Handling the Mouse Double-Click Speed Setting

The Mouse Settings control panel (available from the “Customize” submenu of the Desktop toolchest) allows users to set various parameters that affect the operation of the mouse. The setting of importance to applications is “Click Speed,” which determines the maximum interval between double-clicks. “Click Speed” sets the ***multiClickTime** X resource.

In most cases, you don’t need to do anything to handle this setting. IRIS IM widgets automatically use the **multiClickTime** value as appropriate. Only if your application needs to handle double-clicks explicitly (for example, to select a word in a word processing application) does it need to call **XtGetMultiClickTime()** to determine the double-click time. See the XtGetMultiClickTime(3Xt) reference page for more information on **XtGetMultiClickTime()**.

Note: Don’t call **XtSetMultiClickTime()**, which sets the double-click time for the entire display.

Using the Preferred Text Editor

The Desktop Settings control panel (available from the “Customize” submenu of the Desktop toolchest) contains a “Default Editor” setting, which allows users to select a preferred visual editor for editing ASCII text. This sets the value of the WINEDITOR environment variable.

Whenever your application needs to let users edit text, you should:

1. Call **getenv()** to check whether the WINEDITOR environment variable is set. See the getenv(3c) reference page for more information on **getenv()**.
2. If WINEDITOR is set, save the text to edit in a temporary file. Typically, you should check the value of the environment variable TMPDIR and, if it is set, put the temporary file in that directory.
3. Execute the editor, providing it the new of the temporary file as an argument.
4. When the user quits the editor, read the temporary file and delete it.

PART TWO

Creating Desktop Icons

Chapter 11

Creating Desktop Icons: An Overview

This chapter provides a checklist of the steps you need to follow to create Desktop icons for your application.

Chapter 11

Creating Desktop Icons: An Overview

This chapter offers an overview of the basic steps for creating Indigo Magic Desktop icons and adding them to the Icon Catalog. If you don't feel you need much background information, you can skip to the brief list of instructions provided in "Checklist for Creating an Icon" on page 158.

This chapter contains these sections:

- "About Indigo Magic Desktop Icons" on page 157 briefly discusses the Indigo Magic Desktop and lists what kinds of icons you'll need to provide for your application.
- "Checklist for Creating an Icon" on page 158 lists the basic steps for drawing, programming, compiling, and installing an icon.
- "Creating an Icon: The Basic Steps Explained in Detail" on page 160 explains each of the basic icon creation steps in more detail.

Note: Minimized windows, which represent running applications, aren't Desktop icons. To learn how to customize the image on a minimized window, refer to Chapter 6, "Customizing Your Application's Minimized Windows."

About Indigo Magic Desktop Icons

Files on the Desktop are represented by icons. Users can manipulate these icons to run applications, print documents, and perform other actions. "How Users Interact with Desktop Icons" in Chapter 1 of the *Indigo Magic User Interface Guidelines* describes some of the common user interactions.

The Desktop displays different icons to represent the different types of files. For example, the default icon for binary executables is the "magic carpet," and the default icon for plain text files is a stack of pages.

When you create your own application, by default the Desktop uses an appropriate “generic” icon to represent the application and its associated data files (for example, the magic carpet icon for the executable and the stack of pages icon for text files). You can also design your own custom icons to promote product identity and to indicate associated files.

Another advantage of creating custom icons is that you can *program* them to perform certain actions when users interact with them on the Desktop. For example, you can program a custom data file icon so that when a user opens it, the Desktop launches your application and opens the data file.

The Desktop determines which icon to display for a particular file by finding a matching *file type*. A file type consists of a set of *File Typing Rules* (FTRs) that describe which files belong to the file type and how that type’s icon looks and acts on the Desktop.

The Desktop reads FTRs from compiled versions of special text files called *FTR files*. An FTR file is a file in which one or more file types are defined (typically, you define more than one file type in a single file). FTR files can also contain *print conversion rules*, which define any special filters needed to print given file types. Chapter 13, “File Typing Rules,” discusses the syntax of FTRs, and Chapter 14, “Printing From the Desktop,” discusses print conversion rules.

Checklist for Creating an Icon

To provide a comprehensive Desktop icon interface for your application:

1. **Tag your application.** You need to tag the application with its own unique identification number so that the Desktop has a way of matching the application with the corresponding FTRs. See “Step One: Tagging Your Application” on page 160 for instructions.
2. **Draw a picture of your icon**. Create a distinctive Desktop icon to help users distinguish your application from other applications on the Desktop. Optionally, create an icon for the data files associated with your application. Use the *IconSmith* application to draw your icons. IconSmith allows you to draw an icon and then convert it into the icon description language used by the Desktop. IconSmith is the only tool

you can use to create an icon picture. For guidelines on designing icons, see the *Indigo Magic User Interface Guidelines*. For information on how to use IconSmith, see Chapter 12, “Using IconSmith.”

3. **Program your icon.** Create the FTRs to define your icons’ Desktop interaction. Chapter 13, “File Typing Rules,” describes FTRs in detail. Before programming your icon, think about what users expect from the application and, with that in mind, decide how you want the icon to behave within the Desktop. Before you make these decisions, read the icon programming guidelines in “Defining the Behavior of Icons with FTRs” in Chapter 2 of the *Indigo Magic User Interface Guidelines*. In particular:

   - Program your Desktop icon to run your application with the most useful options. Include instructions for launching your application when the user opens the icon; opens the icon while holding down the **<Alt>** key; and drags and drops other icons on the application icon.
   - If there are several useful combinations of options that users might want to use when invoking your application, you can incorporate them into a Desktop menu. (These Desktop menu items appear only when the icon is selected.) Users can then select the menu item that corresponds to the behavior they want—without having to memorize a lot of option flags.
   - Where appropriate, provide *print conversion rules* that describe how to convert a data file for printing into a type recognized by the Desktop. To print output, users can then just select the appropriate data file icon and choose “Print” from the Desktop menu rather than having to remember specialized filter information. Chapter 14, “Printing From the Desktop,” describes print conversion rules.

4. **Compile the source files.** Compile the *.otr* files, which contain the compiled source for all existing FTRs. For more information on *.otr* files, see “Step Four: Compiling the Source Files” on page 166.

5. **Add your application to the Icon Catalog.** This makes it easier for your users to locate your icon in the Icon Catalog and helps maintain a consistent look for your application in the Desktop. Chapter 15, “Adding Your Application’s Icon to the Icon Catalog,” explains how to do this.

6. **Restart the Desktop.** You can view your changes after you restart the Desktop. “Step Six: Restarting the Desktop” on page 167 explains how to restart the Desktop.
7. **Update your installation process.** If you want to install your application on other Silicon Graphics workstations, include in your installation all of the files that you created in the preceding steps. Silicon Graphics recommends you use *swpkg* to package your files for installation. See the *Software Packager User's Guide* for information for instructions on using *swpkg*. See “Step Seven: Updating Your Installation Process” on page 167 for guidelines.

Note: You cannot create your own device, host, or people icons. These are special icons used by the Desktop and can currently be created only by Silicon Graphics.

Creating an Icon: The Basic Steps Explained in Detail

This section describes in detail each of the basic steps listed in “Checklist for Creating an Icon” on page 158.

Step One: Tagging Your Application

The first step is to tag the application with its own unique identification number so that the Desktop has a way of matching the application with the corresponding FTRs. The easiest way to tag your application is to use the *tag* command. In order to use *tag*, your application must be an executable or a shell script, and you must have write and execute permissions for the file.

Note: You do not tag data or configuration files used by your application. Instead, you provide rules as described in “Matching Files Without the tag Command” on page 207 to identify these files.

If your application does meet the criteria for using the *tag* command, then select a tag number from your block of registered tag numbers. If you do not have a block of registered tag numbers, get one by sending an e-mail request to Silicon Graphics at this mail address:

```
workspacetags@sgi.com
```

After Silicon Graphics sends you a block of registered tag numbers, use the *tag*(1) command to assign one to your application. To do this, change to the directory containing your application and enter:

```
% tag tagnumber filename
```

where *tagnumber* is the number you're assigning to the application and *filename* is the name of the application. For more detailed information on the *tag* command, see the *tag*(1) reference page.

Step Two: Drawing a Picture of Your Icon

The next step is to create the picture for your icon. An icon picture generally consists of a unique *badge* plus a generic component (for example, the "magic carpet" designating executables). The badge is the part of the icon picture that appears in front of the generic component and that uniquely identifies your application. The generic components are pre-drawn and installed by default when you install the Indigo Magic Desktop environment.

"Designing the Appearance of Icons" in Chapter 2 of the *Indigo Magic User Interface Guidelines* provides guidelines for drawing your icon images. If possible, consult with a designer or graphics artist to produce an attractive, descriptive icon. Chapter 12, "Using IconSmith," describes exactly how to draw such an icon. Save the badge in a file called <<*IconName*>>*.fti*, where *IconName* is any name you choose. Choose a meaningful name (such as the name of the application or data format). If you have separate pictures representing the open and closed states of the icon, it's a good idea to name them <<*IconName*>>*.open.fti* and <<*IconName*>>*.closed.fti*, respectively.

After drawing your badge with IconSmith (described in Chapter 12*)* save the picture—the filename should end in *.fti*—and put the saved file in the correct directory. The appropriate directory depends on where you put your FTR files:

- If you put your FTR (*.ftr*) files in the */usr/lib/filetype/install* directory (where you typically should install your FTR files), then put your badge (*.fti*) files in the */usr/lib/filetype/install/iconlib* directory.
- If you put your FTR files in one of the other directories listed in Appendix F, then put your badge file in a subdirectory of that directory. Name the subdirectory *iconlib* if the subdirectory doesn't already exist.

Step Three: Programming Your Icon

Programming an icon means creating a file type. Each file type consists of a set of file typing rules, each of which defines some aspect of the look or behavior of the icon. Your file type includes rules that name the file type, tell the Desktop where to find the associated icon files, what to do when users double-click the icon, and so on. Chapter 13, “File Typing Rules,” describes how to create the FTR file that defines your file type. “Defining the Behavior of Icons with FTRs” in Chapter 2 of the *Indigo Magic User Interface Guidelines* describes the types of behaviors your icons should support.

(This section assumes that you are writing your FTRs completely from scratch. You might prefer instead to modify an existing file type. To learn how to find the FTRs for an existing icon, see “Add the FTRs: An Alternate Method” on page 164.)

Where to Put FTR Files

Most FTR files that are not created at Silicon Graphics belong in the */usr/lib/filetype/install* directory. There are also specific FTR directories set aside for site administration. For a list of all FTR directories, see Appendix F, “FTR File Directories.”

If you want to have a look at some existing FTR files, check out the */usr/lib/filetype/install* directory.

Naming FTR Files

If you have an existing FTR file, you can add the new file type to this file. Otherwise, you need to create a new FTR file, which you should name according to the standard naming convention for application vendors’ FTR files. The convention is:

```
vendor-name[.application-name].ftr
```

where *vendor-name* is the name of your company and *application-name* is the name of your application.

Name the File Type

Each file type must have a unique name. To help insure that your file type name is unique, base it as closely as possible on your application name.

As an extra check, you can search for your file type name in the */usr/lib/filetype* directory, to make sure that the name is not already in use:

1. Change to the */usr/lib/filetype* directory:

   ```
   % cd /usr/lib/filetype
   ```

2. Search for the file type name:

   ```
   % grep "your_name_here" */*.ftr
   ```

   where *your_name_here* is the name you've selected for your file type.

If you find another file type of the name you have chosen, pick a new name.

Add the FTRs

To create a file type, either add the file type definition to an existing FTR file or create a new FTR file. You can define all the necessary file types for your application in a single FTR file.

Each file type definition *must* include:

- the TYPE rule, to tell the Desktop that you are declaring and naming a new type (the TYPE rule must go on the first line of the FTRs)—a type is a unique type of icon, such as an email icon
- the LEGEND rule, to provide a text description when users view icons as a list
- the MATCH rule, to allow the Desktop to match files with the corresponding file type
- the ICON rule, to tell the Desktop how to draw the icon to use for this file type

In addition to these basic components, you can add other FTRs as necessary.

Add the FTRs: An Alternate Method

If you don’t want to write the file type from scratch, you can modify an existing file type.

The first step is to choose a file type that produces icon behavior similar to what you want from your new file type (that is, does the same thing when you double-click the icon, acts the same way when you drop the icon on another icon, and so on.)

To find the set of FTRs that define the file type for the an icon, first locate the icon on the Desktop. If the icon isn’t already on the Desktop select “An Icon” from the Find toolchest and use the Find an Icon window to find the icon. (When the icon appears in the drop pocket, drag it onto the Desktop.

Select the icon by clicking the left mouse button on it, then hold down the right mouse button to get the Desktop menu. When the menu appears, select the “Get Info” menu item. A window appears. In the window, look at the line labeled, “Type.”

For example, if you’d selected the *jot* icon, the line would read:

```
Type: jot text editor
```

The string “jot text editor” is produced by the LEGEND rule; you can use this string to find the FTRs that define the *jot* file type. To do this, open a shell and follow these steps:

1. Change to the */usr/lib/filetype* directory

   ```
   % cd /usr/lib/filetype
   ```

2. Search for “jot text editor”

   ```
   % grep "jot text editor" */*.ftr
   ```

The system responds with this line:

```
system/sgiutil.ftr    LEGEND   jot text editor
```

This tells you that the *jot* FTRs are in the */usr/lib/filetype/system* directory in a file named *sgiutil.ftr.* Now you can open the *sgiutil.ftr* file using the text editor of your choice, and search for the “jot text editor” string again. This tells you exactly where the *jot* FTRs are in the *sgiutil.ftr* file.

Note: If *jot* file type did not have its own icon, this search would not give you the filename.

Now you can go to the file with the *jot* FTRs and copy them into the FTR file for your new file type. Then rename and modify these copied FTRs to fit your new file type, as described in "Step Three: Programming Your Icon" on page 162.

An Example File Type

Here is an example of a simple file type definition:

```
TYPE scrimshaw
    MATCH        tag  == 0x00001005;
    LEGEND       the scrimshaw drawing program
    SUPERTYPE    Executable
    CMD OPEN     $LEADER
    CMD ALTOPEN  launch -c $LEADER
    ICON {
           if (opened) {
               include("../iconlib/generic.exec.open.fti");
            } else {
               include("../iconlib/generic.exec.closed.fti");
         }
         include("/iconlib/scrimshaw.fti");
    }
```

Here's a brief description of what each of these lines does:

- The first line contains the TYPE rule, which you use to name the file type. In this case, the file type is named, *scrimshaw.* Always place the TYPE rule on the first line of your FTRs. The TYPE rule is described in "Naming File Types: The TYPE Rule" on page 203.
- The second line contains the MATCH rule. Use the MATCH rule to tell the Desktop which files belong to this file type. In this example, we are just writing in the identification (tag) number that we have already assigned to the application. The MATCH rule is described in "Matching File Types With Applications: The MATCH Rule" on page 205.
- The third line contains the LEGEND rule. Use this rule to provide a brief descriptive phrase for the file type. This phrase appears when users view a directory in list form. It also appears when users select the "Get File Info" item from the Desktop pop-up menu. In this case, the

descriptive phrase is “the scrimshaw drawing program.” The LEGEND rule is described in “Adding a Descriptive Phrase: The LEGEND Rule” on page 212.

- The fourth line contains the SUPERTYPE rule. Use this rule to name a file type superset for your FTRs. In this example, the SUPERSET is “Executable.” The SUPERTYPE rule is described in “Categorizing File Types: The SUPERTYPE Rule” on page 204.
- The fifth line contains the CMD OPEN rule. This rule tells the Desktop what to do when users double-click the icon. In this example, double-clicking the icon opens the scrimshaw application. The $LEADER variable is a Desktop environment variable. The Desktop environment variables are listed and defined in Appendix B, “Desktop Environment Variables.” The CMD OPEN rule is described in “Programming Open Behavior: The CMD OPEN Rule” on page 214.
- The sixth line contains the CMD ALTOPEN rule. This rule tells the Desktop what to do when users double-click the icon while holding down the **`<Alt>`** key. In this example, the Desktop runs *launch*(1), which brings up a text edit window so that users can type in command-line arguments to the scrimshaw executable. Again, $LEADER is a Desktop environment variable. These are listed in Appendix A. For more information on the *launch* command, see the *launch*(1) reference page. The CMD ALTOPEN rule is described in “Programming Alt-Open Behavior: The CMD ALTOPEN Rule” on page 215.
- The final lines contain the ICON rule. These lines tell the Desktop where to find the generic component of the open and closed versions of the “scrimshaw” icon. Note that this rule combines the generic component for open and closed executables with the unique “scrimshaw” badge that identifies it as a distinctive application. The ICON rule is described in “Getting the Icon Picture: The ICON Rule” on page 220.

Step Four: Compiling the Source Files

The Desktop compiles FTR source files into files called *.otr* (and *.ctr*) files. These files are kept in the */usr/lib/filetype* directory.

Any time you add or change FTRs (or print conversion rules) you must recompile the *.otr* and *.ctr* files by following these steps:

1. Change to the */usr/lib/filetype* directory:

   ```
   % cd /usr/lib/filetype
   ```

2. Become superuser:

   ```
   % su
   ```

3. Recompile the files:

   ```
   # make -u
   ```

(If you don’t use the **-u** option when you make the files, some of your changes might not take effect.)

To activate the new FTRs, quit and restart the Desktop. For instructions on restarting the Desktop, see “Step Six: Restarting the Desktop” on page 167.

Step Five: Installing Your Application in the Icon Catalog

Add your icon to the Icon Catalog, using the *iconbookedit* command. See Chapter 15 for instructions on using the *iconbookedit* command. “Making Application Icons Accessible” in Chapter 2 of the *Indigo Magic User Interface Guidelines* describes the Icon Catalog and how to select the appropriate page of the Icon Catalog for your application.

Step Six: Restarting the Desktop

In order to view your changes and additions, you must restart the Desktop. To restart the Desktop, first kill it by typing:

```
% /usr/lib/desktop/telldesktop quit
```

Then, restart the Desktop by selecting “Home Directory” from the Desktop toolchest.

Step Seven: Updating Your Installation Process

Silicon Graphics recommends you use *swpkg* to package your files for installation. Refer to the *Software Packager User’s Guide* for information on how to package your application for installation.

Your installation process must:

- Tag the executables it produces (“Step One: Tagging Your Application” on page 160 explains how to tag executables). With *swpkg*, you can do this using the exitop attribute from the Add Attributes worksheet. Set up the exitop attribute to run the *tag* command (assuming you’re using the *tag* command to tag your executable). See Chapter 6, “Adding Attributes,” in the *Software Packager User’s Guide* for instructions.
- Copy *.fti* and *.ftr* files to the appropriate directories (“Where to Put FTR Files” on page 162 and “Where to Put Your Completed Icon” on page 173 explain which directories these files belong in). With *swpkg*, you can do this by setting the appropriate destination directory and destination filename for each file, using the Edit Permissions and Destinations worksheet. See Chapter 5, “Editing Permissions and Destinations,” in the *Software Packager User’s Guide* for instructions.
- Invoke *make* in */usr/lib/filetype* to update the Desktop's database (“Step Four: Compiling the Source Files” on page 166 explains how to update the database). With *swpkg*, you can do this using the exitop attribute from the Add Attributes worksheet. Set up the exitop attribute to run the *make* command. See Chapter 6, “Adding Attributes,” in the *Software Packager User’s Guide* for instructions.
- Add your icon to the Icon Catalog, using the *iconbookedit* command. See Chapter 15 for instructions on using the *iconbookedit* command.

See the *make*(1), *sh*(1), and *tag*(1) reference pages for more information on these commands.

Chapter 12

Using IconSmith

This chapter explains how to use the IconSmith tool to draw a Desktop icon for your application.

Chapter 12

Using IconSmith

This chapter explains how to use the IconSmith tool to draw an icon for your application. This chapter contains these sections:

- "About IconSmith" on page 172 briefly describes the IconSmith tool.
- "Where to Put Your Completed Icon" on page 173 explains where to put your icon file, after you've finished drawing your icon.
- "Some Definitions" on page 173 defines some terms you'll need to use IconSmith.
- "Starting IconSmith" on page 174 explains how to start the IconSmith tool.
- "IconSmith Menus" on page 174 discusses IconSmith's main menus: the IconSmith menu and the Preview menu.
- "IconSmith Windows" on page 175 describes IconSmith's windows: the main window, the Palette window, the Constraints window, and the Import Icon (Set Template) window.
- "Drawing With IconSmith" on page 178 describes IconSmith's drawing tools.
- "Selecting" on page 182 describes IconSmith's selection features.
- "Transformations" on page 184 describes IconSmith's transformation features.
- "Concave Polygons" on page 185 explains how to construct concave polygons in IconSmith.
- "Constraints: Gravity (Object) Snap and Grid Snap" on page 186 explains how to use IconSmith's gravity snap and grid snap features to guide your drawing.

- “Icon Design and Composition Conventions” on page 188 explains how to make sure that your icon complies with the basic icon design and composition conventions described in “Designing the Appearance of Icons” in Chapter 2 of the *Indigo Magic User Interface Guidelines*.
- “Advanced IconSmith Techniques” on page 190 describes some advanced techniques, such as drawing circles and ovals in IconSmith.

About IconSmith

IconSmith is a program for drawing Desktop icons. Icons drawn with IconSmith are saved in an *icon description language*. The icon description language is described in Appendix D, “The Icon Description Language.”

Designed for the specific requirements of the Desktop, Iconsmith produces icons that draw quickly and display properly on the Desktop on all Silicon Graphics workstations.

An icon picture generally consists of a unique *badge* plus a generic component (for example, the “magic carpet” designating executables). The badge is the part of the icon picture that appears in front of the generic component and that uniquely identifies your application. The generic components are pre-drawn and installed by default when you install the Indigo Magic Desktop environment.

You don’t need to draw the generic components of your icons. When using IconSmith to draw your icon badge, you can import the generic component as a template as described in “Importing Generic Icon Components (Magic Carpet)” on page 188.

Note: Iconsmith is not a general-use drawing application. Use it only to draw Desktop icons.

Where to Put Your Completed Icon

After drawing your badge with IconSmith, save the badge—the filename should end in *.fti*—and put the saved file in the correct directory:

- If you put your FTR (*.ftr*) files in the */usr/lib/filetype/install* directory (where you typically should install your FTR files), then put your icon (*.fti*) files in the */usr/lib/filetype/install/iconlib* directory.
- If you put your FTR files in one of the other directories listed in Appendix F, then put your badge in a subdirectory of that directory. Name the subdirectory *iconlib* if the subdirectory doesn't already exist.

Some Definitions

IconSmith uses some terms that may not be familiar to you. This section defines some terms used in the rest of this chapter.

Caret

The *caret* is a small red and blue cross. The caret always shows the location of the last mouse click—when you click the left mouse button, the caret appears where the cursor is pointed. Unlike the cursor, the caret shows the effects of grids and gravity (described in "Constraints: Gravity (Object) Snap and Grid Snap" on page 186).

Transformation Pin

The *Transformation Pin* indicates the point from which an object is scaled or sheared and around which an object is rotated. It is a blue and white cross, larger than the caret. It can be dropped anywhere to affect a transform.

Vertex

A *vertex* is a selectable point, created when the mouse is clicked in the IconSmith window while the **`<Ctrl>`** key is held down.

Path

A *path* is one or more line segments between vertices. Paths can be open or closed, filled or unfilled.

Starting IconSmith

To start IconSmith from the Desktop, double-click the IconSmith icon, shown in Figure 12-1.

Figure 12-1 The IconSmith Icon

To start IconSmith from the command line, type:

```
% /usr/sbin/iconsmith
```

IconSmith Menus

The IconSmith main window, shown in Figure 12-2, provides two menus, the IconSmith menu and the Preview menu:

- Access the IconSmith menu by holding down the right mouse button anywhere in the drawing area.
- Access the Preview menu by holding the right mouse button down within the blue preview square located in the lower left-hand corner of the IconSmith main window.

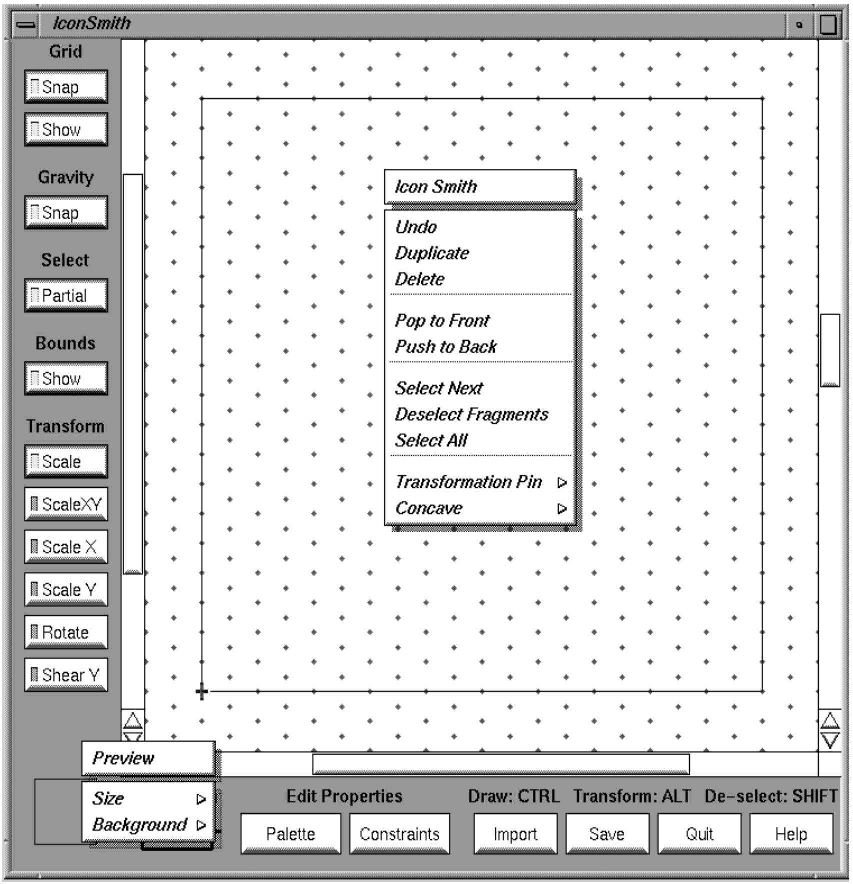
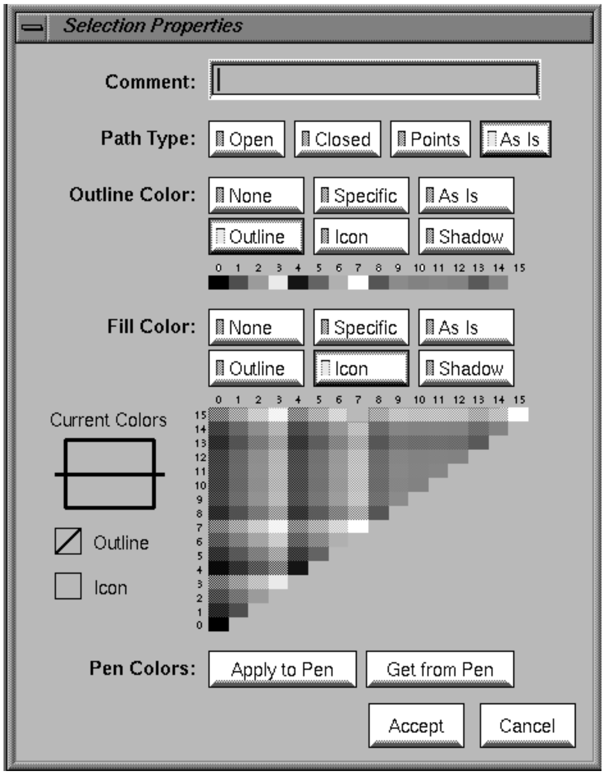


Figure 12-2 The Main IconSmith Window With Popup Menus

IconSmith Windows

Besides the main window, IconSmith provides three other primary windows: the *Palette* (Selection Properties) window, the *Constraints* window, and the *Import Icon or Set Template* window.

Clicking the *Palette* button displays the Palette window, shown in Figure 12-3.



Path Type: As Is

Outline Color: Outline

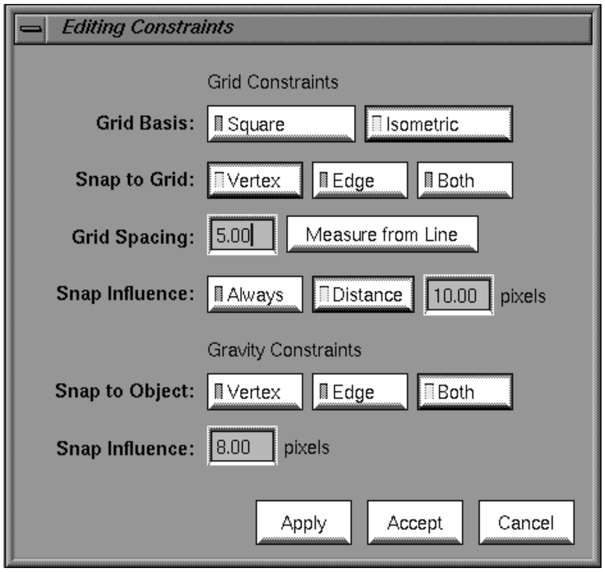
Fill Color: Icon

☒ Outline

□ Icon

Figure 12-3 The Palette (Selection Properties) Window

Clicking the *Constraints* button displays the Constraints window, shown in Figure 12-4.



Grid Basis: Square Isometric

Snap to Grid: Vertex Edge Both

Grid Spacing: 5.00 Measure from Line

Snap Influence: Always Distance 10.00 pixels

Snap to Object: Vertex Edge Both

Snap Influence: 8.00 pixels

Figure 12-4 The Constraints Window

Clicking the *Import Icon* button displays the Import Icon or Set Template window, shown in Figure 12-5

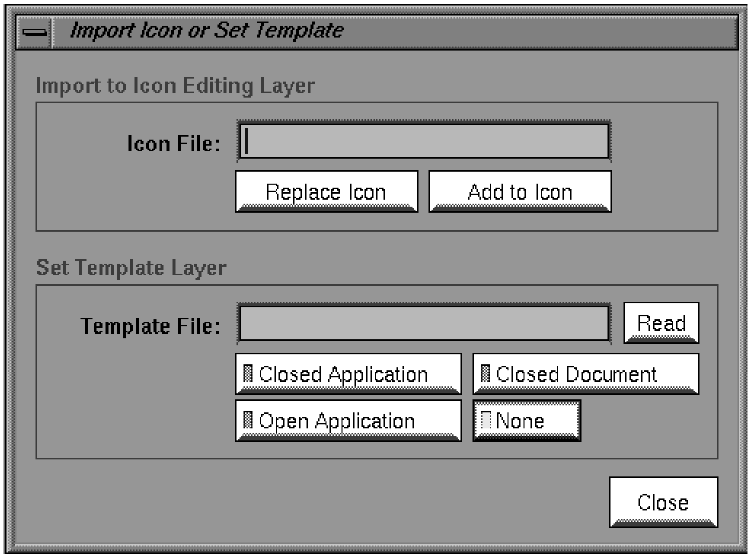


Figure 12-5 The Import Icon or Set Template Window

Drawing With IconSmith

IconSmith provides tools for drawing paths, selecting colors, importing design elements from other icons, drawing shapes, and using template images.

When drawing in IconSmith, it is easy to select the wrong object. One technique that you can use is to draw adjacent icon components separately to prevent confusion when selecting and editing an object. When you have finished working with the parts, you can move them together.

There is an "Undo" option in the IconSmith popup menu. To bring up the IconSmith popup menu, hold down the right mouse button. You can undo up to nine operations using the **`<F1>`** key. To redo something you have undone, hold the **`<Shift>`** key and press the **`<F1>`** key.

No single polygon can contain more than 255 vertices.

Drawing Paths

To draw a path with IconSmith:

1. Select a starting point by clicking the left mouse button.
2. Move the mouse to a new position.
3. Hold down the **`<Control>`** key and click the left mouse button.

This process creates a line segment. To add more line segments connected to the first, repeat steps 2 and 3 as many times as necessary. To create a disconnected line segment, repeat from step 1.

Drawing Filled Shapes

In IconSmith, you can fill a closed path (one in which the beginning and end points meet) with a color. To draw a filled shape, make sure that you have selected a fill color from the Palette menu, and proceed to draw. When you finish creating the closed path, the shape is filled with the current fill color. You can change the fill color of a path by selecting the path and then selecting a new fill color.

Fill does not work properly with concave closed paths, nor with paths in which the beginning point does not meet the end point. See "Concave Polygons" on page 185.

Deleting

To delete any path or vertex, select it and press the **`<Back Space>`** key, or use "Delete" in the IconSmith popup menu.

Keeping the 3-D Look

Icons created by Silicon Graphics are drawn in the same *isometric view*, which provides an illusion of 3-D, even though the polygons composing the icons are 2-D. If you draw icons facing the screen at right angles, they look 2-D. To generate a 3-D effect, draw "horizontal" lines so that they move up 1 unit in the y-axis for every 2 units they extend along the true x-axis. See Figure 12-6.

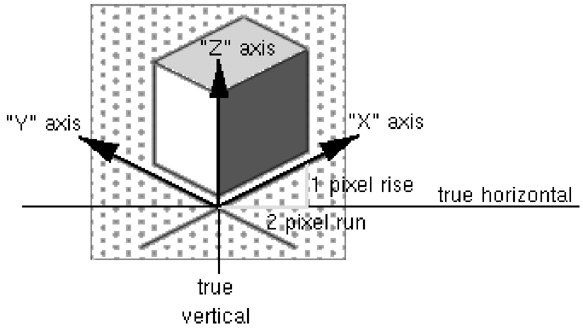


Figure 12-6 3-D Icon Axes

Use the same projection that the original icon set uses. Icons tilted in the wrong direction look off-balance, and destroy the 3-D appearance. For your convenience, IconSmith provides an isometric grid. By following the diagonals of this grid, as shown, you can create an icon that fits in exactly with other isometric icons in the Desktop. You can count along these diagonal grid dots, to help measure, align, or center pieces of your icon.

Drawing for All Scales

Desktop icons can be displayed in many sizes. It is easier to draw an icon that looks good small, but you might consider the details that appear when a user enlarges your icon.

IconSmith includes two features useful in designing your icon for display at all sizes, the Preview box and the slider on the right side of the drawing area.

The Preview Box

You can use the *Preview box* to see your icon design in common sizes and background colors. The Preview box is the blue box in the lower left corner of the main IconSmith window. By default, the Preview box shows your drawing at the default Desktop icon display size and no background color. You can change the icon size and background color in this window using the Preview box popup menu.

Changing Drawing Size

You can change the size of your design in the IconSmith drawing area using the slider on the right side of the drawing area. Use the *slider* to look at your design at all sizes. At particularly small sizes, some features may not be visible. At large sizes, design imperfections may appear.

Sharing Design Elements

You can import design elements such as circles into your badge. Importing elements where possible saves you work and makes it easy to include common design elements in all the icons for one application.

To import an existing icon or icon element, click the *Import* button. This brings up the Import Icon or Set Template window. Use the "Import to Icon Editing Layer" area to specify the icon file you want.

Generic and sample material can be found in the */usr/lib/filetype/iconlib directory.* For example, to import a sample circle, type in the filename:

/usr/lib/filetype/iconlib/sample.circle.fti

Other icons can be found in:

- */usr/lib/filetype/default/iconlib*
- */usr/lib/filetype/system/iconlib*
- */usr/lib/filetype/vadmin/iconlib*

All icons are potential sources for design elements. However, if you are designing a unique set of executable or document badges, you should make use of templates as described in "Templates" on page 181 and "Icon Design and Composition Conventions" on page 188.

Templates

You can use templates for tracing or to help you design your icons. You can import a template so that you can see it in the IconSmith drawing window, without saving or displaying as part of the design. This is most useful for getting position information while you are designing a unique badge to use in conjunction with the generic executable and document icons.

You cannot move or change an icon template in IconSmith.

To display a template, click the *Import* button. In the Import Icon or Set Template window, type the name of the template icon file you want in the area labeled "Set Template Layer." Note that three template images are available from buttons in this window. These template images are the most often used, and they are discussed in "Icon Design and Composition Conventions" on page 188.

Selecting

Before you edit, move, delete, or change the color of an object or vertex, you have to tell IconSmith which object you want. This can be difficult in a complex composition. Here are some tips that can make the task easier:

- To select an object or vertex, move the cursor on top of the object and click the left mouse button. The vertices highlight blue and white when the object is selected. To move the vertex or object, double-click, hold down the left mouse button and move with the mouse. The vertices highlight green and yellow when you can move the object.
- You can select more than one object or vertex by holding down the **`<Shift>`** key during the selection process. To move the objects or vertices, move only one and the rest will follow.
- You can select all vertices in an area with your mouse. Hold down the left mouse button and sweep the cursor across the vertices you want. The area you select is indicated by a box. When you let go of the left mouse button, all vertices are selected.
- You can deselect a vertex by holding down the **`<Shift>`** key and clicking the vertex.

Partial

When you use the mouse to select an area with objects in it, you might include only some vertices of some objects. When you toggle *Partial* on, objects partially selected are highlighted. When you toggle *Partial* off, partially selected objects are ignored.

Deselect Part Paths

In compositions with many objects, you can use “Deselect Part Paths” to make selection easier. When selecting the objects in the drawing area, you can also select adjacent objects, then deselect what you don’t want. Hold the **`<Shift>`** key down and click one vertex of each object you don’t want. This deselects the vertex, which makes the object partially selected. Then you can use “Deselect Part Paths” from the IconSmith popup menu to deselect the entire object.

Select Next

“Select Next” allows you to select a vertex that is covered by another vertex. When two or more trajectories each have a vertex at a common location, such as two triangles with a coincident edge, the “Select Next” operator is useful for selecting a trajectory other than the top one. “Select Next” is also useful in images with tiled parts, where most vertices share a location.

Select a shared vertex by clicking its location. That vertex is highlighted in yellow and green (and the red and blue caret appears at that spot). The other vertices of the trajectory selected are highlighted in white to indicate the trajectory to which the selected vertex belongs. Now each time you choose “Select Next” from the IconSmith menu, you step through all the other vertices of all the other trajectories which have a vertex at that point.

Select All

You can select all vertices in the main IconSmith window drawing area using the “Select All” option in the IconSmith popup menu. You can select all vertices in an area by holding down the left mouse button and sweeping out a box to surround the desired area.

Transformations

The Transform buttons let you shrink, enlarge, stretch, and rotate portions of your icon design. These features can make drawing easier and more precise.

To use any Transform button, follow this procedure.

1. Choose the Transform option you want.
2. Choose a point in the main IconSmith window drawing area as a reference point for the transformation by positioning the cursor and clicking the left mouse button.
3. Bring up the IconSmith popup menu and select "Push Pin" from the Transform Pin rollover menu.
4. To select an entire object for transformation, hold down the **`<Alt>`** key and double-click the object you want to transform. Otherwise, you may select individual vertices by holding down the **`<Alt>`** and **`<Shift>`** keys while clicking each desired vertex. Do not release the **`<Alt>`** key when you have finished selecting vertices.
5. While still holding down the **`<Alt>`** key, position the cursor inside the object you want to transform. Press and hold down the left mouse button and move the mouse to transform the object.

For example, here is how you enlarge a circle:

1. Choose "Scale" from the Transform menu.
2. Choose a point on the perimeter of the circle.
3. Bring up the IconSmith popup menu and select "Move to Caret" from the "Transform Pin" rollover menu.
4. Hold down the **`<Alt>`** key and double-click the circle. All vertices on the circle are now highlighted in green and yellow.
5. Continue to hold down the **`<Alt>`** key. Position the cursor on a vertex of the circle. Press and continue to hold down the left mouse button while you sweep the mouse out of the circle. The circle perimeter follows the cursor, enlarging the circle.
6. Release the left mouse button and **`<Alt>`** key when the circle is the size you want.

Scale

The *Scale* button changes the size of an object without changing its shape.

Scale X and Y

The buttons marked *Scale X* and *Scale Y* limit scaling transformations to either horizontal or vertical, respectively. Unlike the *Scale* button, the *Scale XY* button allows you to stretch your object both horizontally and vertically.

Rotate

Using the *Rotate* button, you can rotate a selected object around the Transform Pin.

Shear Y

The *Shear Y* transformation transforms rectangles into parallelograms with one pair of sides parallel to the y axis. The *Shear Y* button is useful for transforming art that is drawn in a face-on view to an isometric view.

Note that strictly speaking, the *Shear Y* transformation performs two transformations: shear in y and scale in x.

Concave Polygons

Do not use concave polygons when designing your icons; the Desktop does not display concave polygons properly. If your icon does not display as you designed it, check for concave polygons. You must break any such polygons into two or more convex polygons. One method for creating concave polygons is to draw the polygon with no fill color to serve as an outline, and then draw several separate convex polygons to fill the outline, as shown in Figure 12-7.

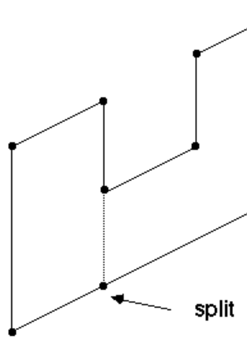


Figure 12-7 Splitting a Concave Polygon

By default, IconSmith, like the Desktop, does not fill concave polygons properly. If you would prefer to have concave polygons filled properly while drawing your icon design, you can tell IconSmith to draw concave polygons. Bring up the IconSmith popup menu with the right mouse button. Select "Concave" and pull out the rollover menu. Select "No GL Check" from the rollover menu. IconSmith will not check for concave polygons until you select "GL Check" from the Concave menu.

Constraints: Gravity (Object) Snap and Grid Snap

You can use *gravity snap* and *grid snap* to guide your drawing in IconSmith, allowing you to align and compose objects perfectly. This makes drawing easier and more precise. Grid snap causes the caret to "snap" to vertices or to the edges of the grid pattern displayed behind the objects you are editing. Gravity snap causes the caret to snap to vertices and the edges of objects you have already drawn. It is a good idea to make use of these features to ensure that your icon looks clean and precise at all sizes.

Gravity snap and grid snap features are controlled by the Constraints window. When using the Constraints window, remember to click either the *Apply* or *Accept* button to implement your changes. The *Accept* button implements your changes and closes the Constraints window, and the *Apply* button leaves the window on your screen.

Controlling the Grid

To change the grid behavior, use the buttons in the "Grid Constraints" portion of the Constraints window. In the main IconSmith window, the *Snap* button under the heading "Grid" lets you turn on or off the grid setting you've made using the Constraints window. The *Show* button lets you display or hide the grid.

The following setting choices are available for the grid in the Constraints window:

- *Grid Basis* buttons control the shape of the grids. IconSmith includes two types of grids. The isometric grid provides guidance in the perspective described in "Keeping the 3-D Look" on page 179. IconSmith also provides a traditional square grid. To change the type of grid you are using, select a Grid Basis button, and then click the *Apply* button.
- *Snap to Grid* buttons change the grid into lines or lines and vertices. These changes are reflected in the appearance of the grid after you click the *Apply* button.
- *Grid Spacing* controls the distance between points in the grid. You can type in the number of pixels you want, or base the distance on a selected line in your icon design. When you copy an object using "Duplicate," the copy is placed one grid space down and to the right from the original (or the previous copy). You can use Grid Spacing to control where IconSmith places duplicate objects.
- *Snap Influence* allows you to adjust the area influenced by the "magnetic field" of the grid.

Controlling Gravity

The controls in the "Gravity Constraints" portion of the Constraints window control how gravity snap behaves. In the main IconSmith window, the *Snap* button under the "Gravity" heading lets you turn on or off the influence of gravity on objects.

- *Snap to Object* allows you assemble objects in your design smoothly. The object's edge, vertex, or both attract other objects when they are moved within range of gravity.

- *Snap Influence* allows you to determine the range, in pixels, of the gravity influence of objects in your design.

Icon Design and Composition Conventions

The standard set of Desktop icons has been designed to establish a clear, predictable visual language for end users. As you extend the Desktop by adding your own application-specific icons, it is important to make sure that your extensions fit the overall look of the Desktop and operate in a manner consistent with the rest of the Desktop. “Designing the Appearance of Icons” in Chapter 2 of the *Indigo Magic User Interface Guidelines* contains extensive guidelines for designing the look of your icon.

Importing Generic Icon Components (Magic Carpet)

Many icons share common components. One example is the “magic carpet” component used as a background component by most executable files; individual applications can add unique badges.

Rather than redrawing the common “generic” component in each individual icon, you can instead draw only the unique badges, and then use the ICON directive in the FTR file to combine the badge with the generic component. “Getting the Icon Picture: The ICON Rule” in Chapter 13 describes how to do this. An advantage to this approach is that you don’t have to create separate icons to identify open or closed states. You can simply create the unique badge and then set up the FTR file to include either the generic open component or the generic closed component as appropriate.

While designing your icon, you can import the appropriate generic component as a template using the “Set Template Layer” of the “Import or Set Template” window; this helps you achieve the correct icon placement and perspective. When you import a component into the template layer, the component is displayed in the drawing area, but not saved as part of the icon. When you are finished, you can save your icon in a *.fti* file, and combine it with the generic component in the FTR file.

If you import a generic component using the “Icon Editing Layer” section of the “Import or Set Template” window, the component becomes part of your icon. In general, you shouldn't do this. Instead, you should draw only the badge. Then in your FTR file, you use the ICON rule to display the appropriate generic component before displaying your badge. (See "Getting the Icon Picture: The ICON Rule" on page 220 for information on the ICON rule.)

Icon Size

The blue boundary box in the IconSmith drawing area indicates the area of your design that draws in the Desktop and is sensitive to mouse input. You must confine your icon to the area within this boundary. You can display or hide the box by using the *Show* button under Bounds in the main IconSmith window.

Selecting Colors

You can select or change the color of any outlined or filled object by using the features in the Selection Properties window. To bring up this window, click the *Palette* button. The currently selected outline and fill colors are displayed under the "Current Colors" heading.

There are two palettes in the Selection Properties window: one for the outline color, and another for the fill color. The outline color palette consists of the first 16 entries in the IRIS color map. The fill color palette gives you 128 colors created by dithering between the color values of the first 16 colormap entries.

In addition to the colors on these palette, there are three special colors available that you should use extensively when drawing your icon. The Desktop changes these colors to provide visual feedback when users select, locate, drag, and otherwise interact with your icon. Theese colors and their uses are:

Icon Color	Use extensively for drawing the main icon body
Outline Color	Use for outlining and line work in your icon
Shadow Color	Use for contrasting drop shadows below your icon

Select outline and fill colors displayed in the palettes by clicking them. If you want subsequent objects to use your color selections, click “Apply to Pen.” If you current objects to be updated with colors already in your pen, click an existing object with the left mouse button, and then select “Get from Pen” from the Selection Properties window. The object will get the outline and fill colors currently assigned to the pen.

For more information on the use of color in designing icons, refer to “Icon Colors” in Chapter 2 of the *Indigo Magic User Interface Guidelines*.

Advanced IconSmith Techniques

This section contains hints that make common IconSmith operations easier. This section also provides a step-by-step example of creating an icon.

Drawing a Circle

Here is a trick for drawing a circle using lines:

1. Draw a path the length of the radius of the circle you want. Figure 12-8 shows an example.

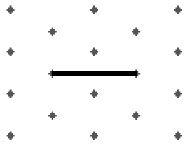


Figure 12-8 A Path

2. Select “Grid Spacing” of 0 pixels in the Constraints window.
3. Duplicate the line 12 times. Because grid spacing is set to 0, the duplicate lines stack.
4. Select one vertex, bring up the IconSmith popup menu, and select “Push Pin” from the Transform Pin rollover menu.
5. Click the *Rotate* button from the Transform menu.

6. Hold down the **`<Alt>`** key and select the other vertex of the stack of paths.
7. Sweep out each path until the figure resembles a wheel, as shown in Figure 12-9.

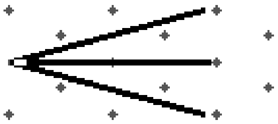


Figure 12-9 Wheel Spokes

8. Connect the outside vertices, as shown in Figure 12-10.

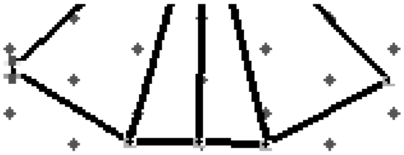


Figure 12-10 Connected Spokes

9. Delete the inside "spoke" paths, to get a circle like the one in Figure 12-11.

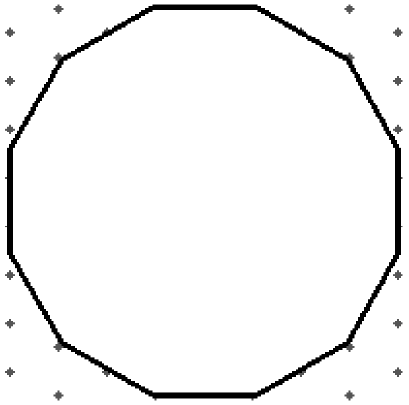


Figure 12-11 Finished 2-D Circle

Circles and other shapes can be time-consuming to create. Another way of adding circles to your icon is to import a circle from another icon or from the icon parts library. See “Sharing Design Elements” on page 181 for more information.

Drawing an Oval

To create an oval, stretch the circle you have already drawn.

1. Double-click a circle.
2. Bring up the IconSmith menu, and select “Move to Caret” from the Transform Pin menu.
3. Place the pin directly above the circle.
4. Select *Scale Y* from the Transform menu.
5. Hold down the **`<Alt>`** key and use the mouse to stretch the circle to the oval shape you want. Figure 12-12 shows an example.

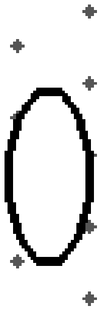


Figure 12-12 An Oval

You can now assemble the parts to make a simple icon, as shown in Figure 12-13.

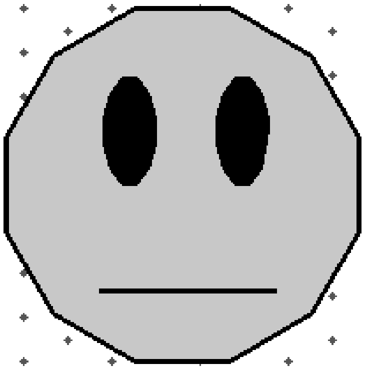


Figure 12-13 A Simple, Circular 2-D Icon

Isometric Circles

The circular icon created above is not a good central icon design because it is not isometric. The circle looks awkward in the context of isometric icons. Here are two ways to make the same design in isometric space.

Isometric Transformation

You can use the *Shear Y* button with an isometric grid to make any object seem 3-D.

1. Duplicate your circle.
2. Click *Shear Y* in the Transform menu.
3. Bring up the IconSmith menu, and select “Push Pin” from the Transform Pin menu.
4. Place the pin on one of the vertices at the bottom of the circle.
5. Hold down the **`<Alt>`** key and align the bottom line of the circle using the grid.

Import Existing Object

If another icon contains the shape you need, recycle it.

1. Click the *Import* button.
2. Import the icon file */usr/lib/filetype/iconlib/sample.big.3circles.fti*. You should now have the design shown in Figure 12-14 in your IconSmith drawing area.

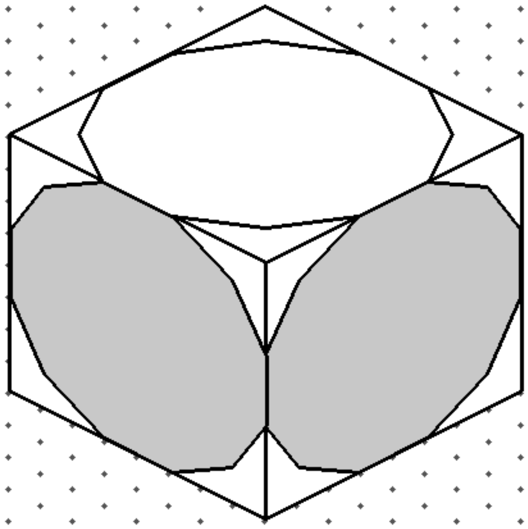


Figure 12-14 Imported Circles

3. Delete all parts of this icon except the lower right circle.

Using either method, you can create an isometric circle, shown in Figure 12-15. Starting with the isometric circle, you can easily create isometric ovals, using the procedure in "Drawing an Oval" on page 192.

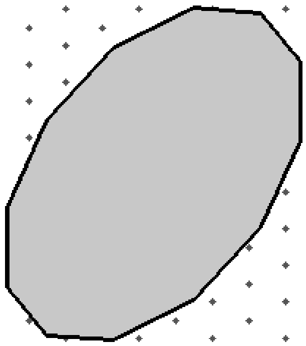


Figure 12-15 Finished Isometric Circle

The final, isometric version of the icon is shown in Figure 12-16.

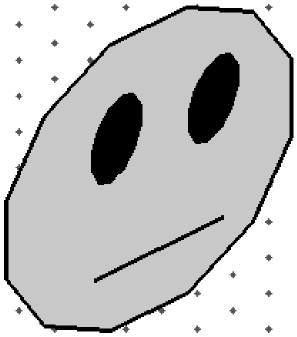


Figure 12-16 Simple, Isometric 2-D Icon

Finishing Your Icon

A finished application icon is actually three or four *.fti* files: one or two badges, plus generic components for the open (running) and closed (not running) icon states. You need to badges rather than one if you want to animate your icon by changing its appearance which the user double-clicks it. Figure 12-18 shows a possible open version for the example icon created in the previous section. When the icon appears on the Desktop, the generic executable icon component appears if you correctly define the ICON rule in the FTR file, as discussed in “Getting the Icon Picture: The ICON Rule” on page 220.

To see how your finished application icon will appeat on the Destop:

1. Import the generic closed executable component using the *Import* button. In the “Import” dialogue box, under “Set Template Layer”, press the *Closed Application* button. The generic icon component appears under your closed badge design.
2. Center your design on the generic component template you have imported, as shown in the example illustrated in Figure 12-17.

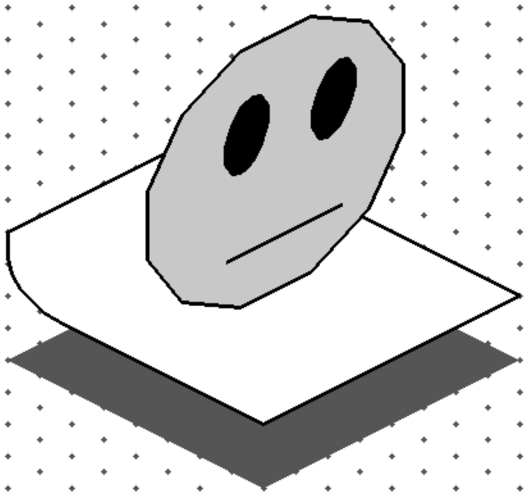


Figure 12-17 Icon Centered on Generic Component

3. (Optional, but recommended.) Follow the same two steps to create an open badge. You might want to give the appearance of animation by changing your design slightly and saving the changed version as an open badge.

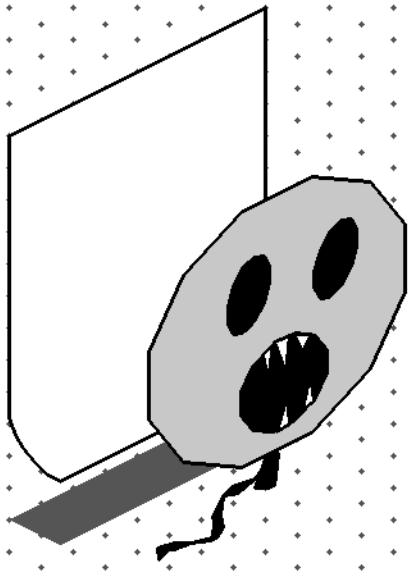


Figure 12-18 Open Icon

4. Save your icon designs to files with the suffix *.fti*.

For a discussion of icon file installation, see “Where to Put Your Completed Icon” on page 173. To learn how to integrate your icon into an FTR file, see “Getting the Icon Picture: The ICON Rule” on page 220.

Chapter 13

File Typing Rules

The Desktop uses *file typing rules (FTRs)* to evaluate all files that are presented within the Desktop. This chapter describes each of the file typing rules in detail, and offers suggestions for good file typing style and strategies.

Chapter 13

File Typing Rules

The Desktop uses file typing rules (FTRs) to evaluate all files that are presented within the Desktop. This chapter describes each of the file typing rules in detail, and offers suggestions for good file typing style and strategies. "Defining the Behavior of Icons with FTRs" in Chapter 2 in *Indigo Magic User Interface Guidelines* describes the behaviors your icon should support.

This chapter contains these sections:

- "A Table of the FTRs With Descriptions" on page 202 provides a reference table listing the FTRs along with brief descriptions.
- "Naming File Types: The TYPE Rule" on page 203 describes the TYPE rule, used to name a file type.
- "Categorizing File Types: The SUPERTYPE Rule" on page 204 describes the SUPERTYPE rule, used to categorize file types.
- "Matching File Types With Applications: The MATCH Rule" on page 205 describes the MATCH rule, used to match the application with the corresponding file type.
- "Matching Non-Plain Files: The SPECIALFILE Rule" on page 212 describes the SPECIALFILE rule, used to match non-plain files.
- "Adding a Descriptive Phrase: The LEGEND Rule" on page 212 describes the LEGEND rule, used to provide a brief phrase describing the application or data file.
- "Setting FTR Variables: The SETVAR Rule" on page 213 describes how to set variables that affect the way your icon behaves.
- "Programming Open Behavior: The CMD OPEN Rule" on page 214 describes the CMD OPEN rule, used to define what happens when users open the icon.
- "Programming Alt-Open Behavior: The CMD ALTOPEN Rule" on page 215 describes the CMD ALTOPEN rule, used to define what

happens when users double-click your icon while pressing the **`<Alt>`** key.

- "Programming Drag and Drop Behavior: The CMD DROP and DROPIF Rules" on page 216 describes the CMD DROP rule, used to define what happens when a user drags another icon and drops it on top of your application's icon
- "Programming Print Behavior: The CMD PRINT Rule" on page 218 describes the CMD PRINT rule, used to tell the Desktop what to do when a user selects your icon, then selects "Print" from the Desktop popup menu.
- "Adding Menu Items: The MENUCMD Rule" on page 218 describes the MENUCMD rule, used to add menu items to the Desktop menu
- "Getting the Icon Picture: The ICON Rule" on page 220 describes how to tell the Desktop where to find the file(s) containing the picture(s) of the icon for a file type
- "Creating a File Type: An Example" on page 222 provides a detailed example of how to program an icon.

A Table of the FTRs With Descriptions

Table 13-1 lists the file typing rules along with brief descriptions.

Table 13-1 File Typing Rules

File Typing Rules	Function
TYPE	Declares a new type.
SUPERTYPE	Tells the Desktop to treat the file as a subset of another type under certain circumstances.
MATCH	Lets the Desktop determine if a file is of the declared type.
SPECIALFILE	Tells the Desktop to use the file typing rule only on non-plain files.
LEGEND	Provides a text description of the file type.
SETVAR	Sets variables that affect operation of your icon.

Table 13-1 (continued) File Typing Rules

File Typing Rules	Function
CMD OPEN	Defines a series of actions that occur when a user double-clicks the mouse on an icon or selects "open" from the main menu.
CMD ALTOPEN	Defines a series of actions that occur when a user alt-double-clicks the mouse on an icon.
CMD DROP	Defines a series of actions that occur when a user "drops" one icon on top of another.
DROPIF	Defines a set of file types that the icon will allow to be dropped on it.
CMD PRINT	Defines a series of actions that occur when a user chooses "Print" from the Desktop or Directory View menus.
MENUCMD	Defines menu entries that appear in the Desktop menu and the Selected toolchest when an icon is selected.
ICON	Defines the appearance (geometry) of the file type's icon.

All file types must begin with a TYPE rule. Aside from that, the rules can appear in any order; however, the most efficient order for parsing is to include the MATCH rule second and the ICON rule last.

Naming File Types: The TYPE Rule

It is important that your file type have a unique name so that it doesn't collide with Silicon Graphics types or types added by other developers. A good way to generate a unique file type name is to base your file type name on your application name (which is presumably unique). Another method is to include your company's initials or stock symbol in the file type name. You can also use the *grep*(1) command to search through existing *.ftr* files:

```
% grep name /usr/lib/filetype/*/*.ftr
```

Substitute your proposed new type name for the words *name*. If *grep* doesn't find your name, then go ahead and use it.

You name a file type by using the TYPE rule. You can define more than one file type in a single file, as long as each new file type begins with the TYPE rule. The TYPE rule always goes on the first line of the file type definition. Here is the syntax and description for the TYPE rule:

Syntax: TYPE *type-name*

Description: *type-name* is a one-word ASCII string. You can use an legal C language variable as a type name. Choose a name that is in some way descriptive of the file type it represents. All rules that follow a TYPE declaration apply to that type, until the next TYPE declaration is encountered in the FTR file. Each TYPE declaration must have a unique type name.

Example:

```
TYPE GenericExecutable
```

Categorizing File Types: The SUPERTYPE Rule

Use the SUPERTYPE rule to tell other file types that your file type should be treated as a "subset" of a larger type such as executables or directories. For example, you can create an executable with a custom icon, then use the SUPERTYPE rule to tell other Desktop file types that the icon represents an executable.

Note: In general, file types don't "inherit" icons, rules, or any other behavior from SUPERTYPEs. Directories are a special case. The Desktop automatically handles the DROP, OPEN, and ALTOPEN behavior for all directories marked as "SUPERTYPE Directory." You can't override the DROP, OPEN, or ALTOPEN behavior if you include "SUPERTYPE Directory."

You can use any existing file type as a SUPERTYPE. Appendix E, "Predefined File Types," lists some of the file types defined by Silicon Graphics. You can generate a complete list of file types installed on your system using the *grep*(1) command:

```
% grep TYPE /usr/lib/filetype/*/*.ftr
```

Note: The list of file types generated by the above command is very long and unsorted.

Here is the syntax and description for the SUPERTYPE rule:

Syntax: SUPERTYPE *type-name* [*type-name* …]

Description: *type-name* is the TYPE name of any valid file type. Use SUPERTYPE to identify the file type as a "subset" of one or more other file types. This information can be accessed by other file types by calling *isSuper*(1) from within their CMD rules (OPEN, ALTOPEN, and so on). A file type can have multiple SUPERTYPEs. (For example, the Script file type has both Ascii and SourceFile SUPERTYPES.) See the *isSuper*(1) reference page for more information.

Example: `SUPERTYPE Executable`

A common use for SUPERTYPEs is to allow users to drag data files onto other application icons to open and manipulate them. For example, if your application uses ASCII data files but you create a custom data type for those files, you can include in the file type declaration:

```
SUPERTYPE Ascii
```

This allows users to drag your application's data files onto any text editor to open and view them. If your application creates images files, you could make a similar declaration to allow users to drag data file icons to appropriate image viewers such as *ipaste*(1).

Matching File Types With Applications: The MATCH Rule

The Desktop needs some way to figure out which FTRs pair up with which files. Your FTRs *will not work* if they don't include some way for the Desktop to match them with the appropriate files. To do this, include the MATCH rule in your file type definition. This section explains how to use the MATCH rule to identify your files. The method you use depends on the kind of file you are matching and on the file permissions. First, here's the MATCH rule syntax and description:

Syntax: MATCH *match-expression*;

Description: *match-expression* is a logical expression that should evaluate to true if, and only if, a file is of the type declared by TYPE. The match-expression must consist only of valid MATCH functions, as described later in this section. The match-expression can use multiple lines, but must terminate with a semicolon (;). Multiple match-expressions are not permitted for a given type. The MATCH rule is employed each time a file is encountered by the Desktop, to assign a type to that file.

Example:

```
MATCH tag == 0x00001005;
```

Matching Tagged Files

The easiest way to match your application with its FTRs is to use the *tag*(1) command to assign a unique number to the application itself. You can then label the associated FTRs with this same unique number, using the MATCH rule, as shown in the example above.

There are a few situations in which you cannot use *tag* to label your files. You cannot use *tag* if

- your file is neither an executable nor a shell script
- you don't have the necessary permissions to change the file

For more information on matching your files without using the *tag* command, see "Matching Files Without the tag Command" on page 207.

To tag your application and its associated FTRs using the *tag* command, follow these steps:

1. The *tag* command attaches an identification number to your application. Before you tag your application, select a number that is not already in use. Silicon Graphics assigns each company (or individual developer) a block of ID numbers for tagging files. If your company doesn't already have an assigned block of numbers, just send a request to Silicon Graphics. The best way is to e-mail your request to this address:

   ```
   workspacetags@sgi.com
   ```

2. Once you have your block of numbers, you can select a number from the block of numbers assigned to your company. Make sure that you select a number that no one else in your company is using.
3. After you select a unique tag number for your application, go to the directory that contains your application and tag it using the *tag* command. This is the syntax:

   ```
   % tag number filename
   ```

   Replace the word *number* with the number that you are assigning to the application and *filename* with the name of your application. For more information on the *tag* command, see the *tag*(1) reference page.
4. After tagging the application itself, include the tag in your application's FTRs, using the MATCH rule. Just include a line like this in your FTR file:

   ```
   MATCH tag == number;
   ```

   where *number* is the unique tag number assigned to your application.

You can also use the *tag* command to automatically assign a tag number for a predefined file type. Silicon Graphics provides a set of generic types, called predefined types, that you can use for utilities that do not require a personalized look. These predefined file types come complete with icons, FTRs, and tag numbers. Use the appropriate *tag* command arguments to get the desired file type features. For more information on *tag* arguments, see the *tag*(1) reference page. The predefined file types are listed in Appendix E, "Predefined File Types."

Matching Files Without the *tag* Command

If you cannot use the *tag* command to match your application with the corresponding FTRs, you need to write a sequence of expressions that check files for distinguishing characteristics. Once you have written a sequence of expressions that adequately defines your application file, include that sequence in your FTR file, using the MATCH rule. For example, you can use this MATCH rule to match a C source file:

```
MATCH glob("*.c") && ascii;
```

The **glob** function returns TRUE if the filename matches the string within the quotes. The **ascii** function returns TRUE if the first 512 bytes of the file are all printable ASCII characters. (Table 13-3 lists all of the available match-expression functions.) The && conditional operator tells the Desktop that the functions on either side of it must *both* return TRUE for a valid match. See “Valid Match-Expressions” on page 208 for a list of all of the operators, constants, and numerical representations that you can use in your match-expressions.

Writing Effective Match Expressions

The most effective way to order match-expressions in a single MATCH rule is to choose a set of expressions, each of which tests for a single characteristic, and conjoin them all using “and” conditionals (&&).

The order in which you list the expressions in a MATCH rule is important. Order the expressions so that the maximum number of files are “weeded out” by the first expressions. This is advised because the conditional operator, &&, stops evaluation as soon as one side of the conditional is found to be false. Therefore, the more likely an expression is to be false, the further to the left of the MATCH rule you should place it.

For instance, in the previous MATCH expression example, it is more efficient to place the **glob**("*.c") expression first because there are many more ASCII text files than there are files that end in *.c*.

Since the Desktop scans FTR files sequentially, you must make sure that your match rule is specific enough not to “catch” any unwanted files. For example, suppose you define a type named “myDataFile” using this MATCH rule:

```
MATCH ascii;
```

Now every text file in your system will be defined as a file of type “myDataFile.”

Valid Match-Expressions

This section describes the syntax and function of valid match-expressions. You can use these C language operators in a match-expression:

+	-
*	/

& |

^   !

%   ( )

You can use these C language conditional operators in a match-expression:

&& | |

==   !=

<   >

<=   >=

The ‘**==**’ operator works for string comparisons in addition to numerical comparisons.

You can use these constants in a match-expression:

`true false`

You can represent numbers in match-expressions in decimal, octal, or hexadecimal notation. See Table 13-2.

Table 13-2 Numerical Representations in Match-Expressions

Representation	Syntax
decimal	*num*
octal	0*num*
hexadecimal	0x*num*

Functions

Table 13-3 lists the valid match-expression functions.

Table 13-3 Match-Expression Functions

Function Syntax	Definition
ascii	Returns TRUE if the first 512 bytes of the file are all printable ASCII characters.
char(*n*)	Returns the *n*th byte in the file as a signed character; range is -128 to 127.
dircontains("*string*")	Returns TRUE if the file is a directory and contains the file named by *string* (see below for more information).
glob("*string*")	Returns TRUE if the file's name matches *string*; allows use of the following expansions in *string* for pattern matching: **{ } [ ] * ?** and backslash (see *sh*(1) filename expansion).
linkcount	Returns the number of hard links to the file.
long(*n*)	Returns the *n*th byte in the file as a signed long integer; range is -2^{31} to 2^{31} - 1.
mode	Returns the mode bits of the file (see *chmod*(1)).
print(*expr or* "*string*")	Prints the value of the expression *expr* or *string* to *stdout* each time the rule is evaluated; used for debugging. Always returns true.
short(*n*)	Returns the *n*th byte of the file as a signed short integer; range is -32768 to 32767.
size	Returns the size of the file in bytes.
string(*n*,*m*)	Returns a string from the file that is *m* bytes (characters) long, beginning at the *n*th byte of the file.
uchar (*n*)	Returns the *n*th byte of the file as an unsigned character; range is 0 to 255.

Table 13-3 (continued) Match-Expression Functions

Function Syntax	Definition
tag	Returns the specific Desktop application tag injected into an executable file by the tag injection tool (see *the tag*(1) reference page.) Returns -1 if the file is not a tagged file.
ushort(*n*)	Returns the *n*th byte of the file as an unsigned short integer; range is 0 to 65535.

Using dircontains()

In order to use the **dircontains()** function, you need to include these two lines in your FTR file:

```
SUPERTYPE SpecialFile
SPECIALFILE
```

You can declare more than one SUPERTYPE in a file type, so the following would be a legal FTR file:

```
TYPE scrimshawToolsDir
    MATCH        dircontains(".toolsPref");
    LEGEND       Scrimshaw drawing tools directory
    SUPERTYPE    Directory
    SUPERTYPE    SpecialFile
    SPECIALFILE
    ICON {
           if (opened) {
               include("../iconlib/generic.folder.open.fti");
           } else {
               include("../iconlib/generic.folder.closed.fti");
         }
         include("iconlib/scrimshaw.tools.dir.fti");
    }
```

Predefined File Types

For some applications, you may not want to create a unique file type and icon. Several predefined file types exist and you can use them as necessary. If you use a predefined file type for your application, *tag* can automatically assign it a tag number. Just use the appropriate command line arguments as described in the *tag*(1) reference page. The predefined file types and their tag numbers are listed in Appendix E.

Matching Non-Plain Files: The SPECIALFILE Rule

SPECIALFILE is used to distinguish a file typing rule used for matching non-plain files. Device files and other non-plain files can cause damage to physical devices if they are matched using standard file typing rules (which might alter the device state by opening and reading the first block of the file).

Syntax: SPECIALFILE

Description: Special files are matched using only rules containing SPECIALFILE, which are written so as not to interfere with actual physical devices. Similarly, plain files are not matched using rules containing a SPECIALFILE rule.

Example: `SPECIALFILE`

Note: When you include the SPECIALFILE rule in your file type, you should also include the line:

```
SUPERTYPE SpecialFile
```

The SUPERTYPE declaration allows applications to use *isSuper*(1) to test whether your file type is a SPECIALFILE.

Adding a Descriptive Phrase: The LEGEND Rule

Use the LEGEND rule to provide the Desktop with a short phrase that describes the file type. This phrase appears when users view your icon's directory as a list. It also appears when a user selects your icon, then selects the "Get File Info" item from the Desktop menu. Make your legend simple and informative and keep it to 25 characters or less.

Here is the syntax and description for the LEGEND rule:

Syntax: LEGEND *text-string*

Description: *text-string* is a string that describes the file type in plain language that a user can understand. Legends that are longer than 25 characters might be truncated in some circumstances.

Example: `LEGEND C program source file`

You might also see a LEGEND rule that is prepended with a number between two colons—something like this:

```
LEGEND :290:image in RGB format
```

The colons and the number between them are used for internationalization. For more information, refer to "Internationalizing File Typing Rule Strings" in Chapter 4 of the *Topics in IRIX Programming*.

Setting FTR Variables: The SETVAR Rule

The SETVAR rule allows you to set variables that affect operation of your icon.

Syntax: SETVAR *variable value*

Description: *variable* is a FTR variable and *value* is the value to assign to the variable. Currently, there are two FTR variable supported: *noLaunchEffect* and *noLaunchSound*. Set *noLaunchEffect* to True to turn off the visual launch effect when the user opens your icon. Set *noLaunchSound* to True to turn off the launch sound effect when the user opens your icon.

Example: `SETVAR noLaunchEffect True`

Programming Open Behavior: The CMD OPEN Rule

Use the CMD OPEN rule to tell the Desktop what to do when a user opens your icon. Users can open an icon in any of these ways:

- double-clicking it
- selecting it and then choosing the "Open" item from the Desktop popup menu (the Desktop menu is the menu that appears when you hold down the right mouse button while the cursor is over the Desktop background)
- selecting it and then choosing the "Open Icon" selection in the Selected tool chest.

Note: Directories are a special case. The Desktop automatically handles the OPEN behavior for all files marked as "SUPERTYPE Directory." You can't override the OPEN behavior if you include "SUPERTYPE Directory."

Here is the syntax and description for the CMD OPEN rule:

Syntax: CMD OPEN *sh-expression*[; *sh-expression*; … ; *sh-expression*]

Description: The OPEN rule should reflect the most frequently used function that would be applied to a file of the given type. *sh-expression* can be any valid Bourne shell expression. Any expression can use multiple lines. Any number of expressions can be used, and must be separated by semicolons (;). The final expression should not end with a semicolon. Variables can be defined and used as in a Bourne shell script, including environment variables. See Appendix B for a list of special environment variables set by the Desktop. These environment variables can be used to refer to the currently selected icons within the Desktop or Directory View.

Example: `CMD OPEN $WINEDITOR $SELECTED`

The CMD OPEN rule for the "Makefile" file type is a more complex example:

```
TYPE Makefile
...
CMD OPEN echo "make -f $LEADER |& tee $LEADER.log; rm $LEADER.run" \
         > $LEADER.run; winterm -H -t make -c csh -f $LEADER.run
```

Programming Alt-Open Behavior: The CMD ALTOPEN Rule

By using the CMD ALTOPEN rule, you can tell the Desktop what to do when users double-click your icon while pressing the **`<Alt>`** key.

Note: Directories are a special case. The Desktop automatically handles the ALTOPEN behavior for all files marked as "SUPERTYPE Directory." You can't override the ALTOPEN behavior if you include "SUPERTYPE Directory."

Here is the syntax and description for the CMD ALTOPEN rule:

Syntax: CMD ALTOPEN *sh-expression*[; *sh-expression*; … ; *sh-expression*]

Description: The ALTOPEN rule provides added functionality for power users. Typically, you set ALTOPEN to pop up a launch window to let the user edit arguments. *sh-expression* can be any valid Bourne shell expression. Any expression can use multiple lines. Any number of expressions can be used, and must be separated by semicolons (;). The final expression should not end with a semicolon. Variables can be defined and used as in a Bourne shell script, including environment variables. See Appendix B for a list of special environment variables set by the Desktop. These environment variables can be used to refer to the currently selected icons within the Desktop or Directory View.

Example: `CMD ALTOPEN launch -c $LEADER $REST`

The CMD ALTOPEN rule for the "SGIImage" file type is a more complex example:

```
TYPE SGIImage
CMD OPEN if test -x /usr/sbin/imgview
          then
              imgview $LEADER $REST
          else
              ipaste $LEADER $REST
          fi
```

Programming Drag and Drop Behavior: The CMD DROP and DROPIF Rules

Users can perform certain functions by dragging an icon and dropping it on top of another icon. For example, users can move a file from one directory to another by dragging the icon representing the file and dropping it onto the icon representing the new directory. You use the CMD DROP rule to tell the Desktop what to do when a user drags another icon and drops it on top of your application's icon.

Note: Directories are a special case. The Desktop automatically handles the DROP behavior for all files marked as "SUPERTYPE Directory." You can't override the DROP behavior if you include "SUPERTYPE Directory."

Here is the syntax and description for the CMP DROP rule:

Syntax: CMD DROP *sh-expression*[; *sh-expression*; … ; *sh-expression*]

Description: The DROP rule is invoked whenever a selected (file) icon is "dropped" onto another icon in the Desktop or Directory View windows. When this happens, the Desktop checks to see if the file type being dropped upon has a DROP rule to handle the files being dropped. In this way, you can write rules that allow one icon to process the contents of other icons. Simply drag the selected icons that you want processed and put them on top of the target icon (that is, the one with the DROP rule).

Example: `CMD DROP $TARGET $SELECTED`

By default, the CMD DROP rule handles all icons dropped on the target icon. However, if you include a DROPIF rule in your file type, only those icons whose file types are listed in the DROPIF rule are accepted as drop candidates; the Desktop doesn't allow the user to drop other types of icons on the target icon. Here is the syntax and description for the DROPIF rule:

Syntax: DROPIF *file-type* [; *file-type*; … ; *file-type*]

Description: Specifies the allowable file types that a user can drop on the icon.

Example: `DROPIF` MailFile

Using the DROPIF rule in conjunction with the CMD DROP rule is a good practice to follow the ensure that the file types of selected icons are compatible with the selected icon. You can also use the environment variables set by the Desktop, listed in Appendix B, to determine other attributes of the selected icons.

For example, the following CMD DROP and DROPIF rules accept only a single icon with the type “MyAppDataFile”:

```
DROPIF MyAppDataFile
CMD DROP    if [ $ARGC -gt 1 ]
                inform "Only one data file allowed."
            else
                $TARGET $SELECTED
```

In the example above, the DROPIF rule prevents users from dropping any file on the target icon except those with the type “MyAppDataFile.” The CMD DROP rule is invoked only after a successful drop. It checks the value of the environment variable ARGC to see how many icons were dropped on the target icon. If more than one icon were dropped, it displays an error message; if only one was dropped, it invokes the application with the dropped file as an argument.

Note: The DROPIF rule doesn’t “follow” SUPERTYPES. If you specify a file type in a DROPIF rule, only files of that type are accepted, not files that have that type as a SUPERTYPE.

If you want to handle all files with a given SUPERTYPE, you must use *isSuper*(1) to test for that SUPERTYPE in the CMD DROP rule. The following CMD DROP definition demonstrates this by accepting one or more files with an “Ascii” SUPERTYPE:

```
CMD DROP    okfile='true'
            for i in $SELECTEDTYPELIST
            do
                if isSuper Ascii $i > /dev/null
                    okfile='true'
                else
                    okfile='false'
                fi
            done
            if [ $okfile = 'true' ]
                $TARGET $SELECTED
            else
                xconfirm "$TARGET accepts only ASCII files."
            fi
```

Programming Print Behavior: The CMD PRINT Rule

Use the CMD PRINT rule to tell the Desktop what to do when a user selects your icon, then selects “Print” from the Desktop popup menu. Here is the syntax and description for the CMD PRINT rule; see also Chapter 14, “Printing From the Desktop,” for information on writing rules to convert your new file type into one of the printable types.

Syntax: CMD PRINT *sh-expression*[; *sh-expression*; *…* ; *sh-expression*]

Description: *sh-expression* can be any valid Bourne shell expression. Any expression can use multiple lines. Any number of expressions can be used, and must be separated by semicolons (;). The final expression should not end with a semicolon. Variables can be defined and used as in a Bourne shell script, including environment variables. See Appendix B for a list of special environment variables set by the Desktop. These environment variables can be used to refer to the currently selected icons within the Desktop or Directory View. The recommended method of implementing the PRINT rule is to use *routeprint*, the Desktop’s print-job routing utility, as in the example below. *routeprint* uses print conversion rules to automatically convert the selected files into formats accepted by the system’s printers. See the *routeprint*(1) reference page for details on its syntax. See Chapter 14 for information on setting up print conversion rules.

Example:

```
CMD PRINT routeprint $LEADER $REST
```

Adding Menu Items: The MENUCMD Rule

Use the MENUCMD rule to add items to both the Desktop menu and the Selected toolchest menu. The Desktop menu is the menu that appears when you hold down the right mouse button while the cursor is positioned on the Desktop. The Selected toolchest menu is the menu that appears when you hold down the right mouse button while the cursor is positioned over the Selected toolchest.

Menu items added to the Desktop menu and the Selected toolchest menu appear only when the icon is selected (highlighted in yellow) on the Desktop.

You can add as many menu items as you like by adding multiple MENUCMD rules to your file type. Any menu items added using the MENUCMD rule are added both to the Desktop menu and the Selected toolchest menu—you can't add menu items to just one of these menus.

Here is the syntax and description for the MENUCMD rule:

Syntax: MENUCMD "*string*" *sh-expression*[; *sh-expression*; … ; *sh-expression*]

Description: MENUCMD inserts the menu entry *string* into the Desktop or Directory View menu if a single file of the appropriate type is selected, or if a group of all of the same, appropriate type is selected. If the menu entry is chosen, the actions described by the *sh-expressions* are performed on each of the selected files.

Example: `MENUCMD "Empty Dumpster" compress $LEADER $REST`

You might also see a MENUCMD rule that is prepended with a number between two colons—something like this:

```
MENUCMD :472:"make install" winterm -H -t ’make install’ \
                            -c make -f $LEADER install
```

The colons and the number between them are used for internationalization. For more information, refer to “Internationalizing File Typing Rule Strings” in Chapter 4 of the *Topics in IRIX Programming*.

To add more than one menu item to the Desktop popup menu, just add a MENUCMD rule for each item. For example, the “Makefile” file type includes all of the following MENUCMD rules:

```
MENUCMD "make install" winterm -H -t ’make install’ \
                       -c make -f $LEADER install
MENUCMD "make clean" winterm -H -t ’make clean’ \
                     -c make -f $LEADER clean
MENUCMD "make clobber" winterm -H -t ’make clobber’ \
                       -c make -f $LEADER clobber
MENUCMD "Edit" $WINEDITOR $LEADER $REST
```

Getting the Icon Picture: The ICON Rule

Use the ICON rule, described in this section, to tell the Desktop where to find the file(s) containing the picture(s) of the icon for a file type. The simplest way to do this is to provide the full IRIX pathname. For example, if the *.fti* file is in the directory called */usr/lib/filetype/install/iconlib*, you would simply write that pathname directly into your FTR file.

If you prefer not to use the absolute pathname in your FTR, you can use a relative pathname, as long as the icon file resides anywhere within the */usr/lib/filetype* directory structure. To make use of relative pathnames, list the pathname relative to the directory containing the FTR file that contains the ICON rule. If you choose to do this, take care to keep path names used in FTR files synchronized with icon locations.

The Desktop sets Boolean status variables to indicate the state of an icon. You can use conditional statements that test these variables to alter the appearance of an icon based on its state. The state variables are: opened, which is True when the icon is opened; and selected, which is True when the icon is selected.

As described in “Importing Generic Icon Components (Magic Carpet)” in Chapter 12, a common technique is to draw a unique badge to identify an application and then combine that badge with a generic icon component. This works well if you also use conditional statements to change the appearance of an icon depending on its state. You can then combine the unique badge with a generic icon component appropriate to the icon’s state. The example shown below demonstrates this technique.

Use the basic format from the example below to tell the Desktop where to find your icon files (the files that you created using IconSmith). Here is the syntax and description for the ICON rule:

Syntax: ICON *icon-description-routine*

Description: *icon-description-routine* is a routine written using the icon description language, detailed below. The routine can continue for any number of lines. The ICON rule is invoked any time a file of the specified type needs to be displayed in the Desktop or Directory View. The rule is evaluated each time the icon is painted by the application that needs it.

Example:

```
ICON {

if (opened) {
  include("../iconlib/generic.exec.open.fti");
  } else {
  include("../iconlib/generic.exec.closed.fti");
  }
  include("iconlib/ack.fti");
}
```

The example above shows you exactly how to write the standard ICON rule. The first line invokes the ICON rule. The next two lines tell the Desktop where to find the parts of the icon representing the open and closed "magic carpet" that makes up the generic executable icons. The unique badge is in a file named *ack.fti.*

Note: You must include your badge *after* including the generic component so that it appears over the generic components when displayed on the Desktop.

If you had two separate badges, one for the open and one for the closed state, your ICON rule would appear as:

```
ICON {
    if (opened) {
        include("../iconlib/generic.exec.open.fti");
        include("iconlib/ack.open.fti");
    } else {
        include("../iconlib/generic.exec.closed.fti");
        include("iconlib/ack.closed.fti");
    }
}
```

Notice that this example gives the pathname of the icon files (*.fti* files) *relative* to the directory in which the FTR file is located. You can use the full pathname if you prefer. Your icon description routine would then look like this, assuming that *ack.fti* was placed in */usr/lib/filetype/install/iconlib*:

```
ICON {
    if (opened) {
        include("/usr/lib/filetype/iconlib/genericexec.open..fti");
    else {
        include("/usr/lib/filetype/iconlib/generic.exec.close.fti");
    }
```

```
        include("/usr/lib/filetype/install/iconlib/ack.fti");
    }
```

Creating a File Type: An Example

This section provides an example that demonstrates how to write a file type. In this example, assume we're writing a file type for a simple text editor called *scribble* and that we've decided on these behaviors for the *scribble* icon:

- When a user double-clicks the *scribble* icon, the Desktop runs the application.
- When a user drops another icon onto the *scribble* icon, the Desktop brings up the *scribble* application with the file represented by the dropped icon. Users can then use the *scribble* application to edit this file.

  Note: We're making no provision for rejecting icons that represent files unsuitable for editing. You could enhance the *scribble* file type by including a line that tells the Desktop to notify users when they drop an icon of the wrong type onto the *scribble* icon.

(This section assumes that we're writing the file type completely from scratch. You might prefer instead to modify an existing file type. To learn how to find the FTRs for an existing icon, see "Add the FTRs: An Alternate Method" on page 164.)

Open an FTR File for *scribble*

For the purposes of this example, assume we're creating a new FTR file, rather than adding to an existing one. We just open a new file using any editor we choose, then type in whatever file typing rules we decide to use.

Add the FTRs to the *scribble* FTR File

Now that we've opened a file for the FTRs, we just type in the FTRs we need to program the icon. The file type has to begin with the TYPE rule on the first line. The TYPE rule names the file type. This section discusses each line we use to create the file type.

Line 1: Name the File Type

Each file type has to have a unique name. Since our application is called *scribble*, assume that we decide to name the new file type "scribbleExecutable." By basing the file type name on the application name, we help insure a unique file type name.

Before using the name, *scribbleExecutable*, we search for it in the */usr/lib/filetype* directory, to make sure that the name is not already in use:

1. Change to the */usr/lib/filetype* directory:

   ```
   % cd /usr/lib/filetype
   ```

2. Search for the name scribbleExecutable:

   ```
   % grep "scribbleExecutable" */*.ftr
   ```

Assume that we do not find an existing file type with the name "scribbleExecutable," so that's what we name the new file type.

Now we use the TYPE rule to name the file type by typing this line into our FTR file:

```
TYPE scribbleExecutable
```

For more information on the TYPE rule, see "Naming File Types: The TYPE Rule" on page 203.

Line 2: Classify the Icon

Next we use the SUPERTYPE rule to tell the Desktop what type of file the icon represents. Since *scribble* is an executable, we add this line to the FTRs:

```
SUPERTYPE Executable
```

For more information on the SUPERTYPE rule, see "Categorizing File Types: The SUPERTYPE Rule" on page 204.

Line 3: Match the File Type

Now we add the scribble executable's tag number to the file type definition by adding this line to the FTRs:

```
MATCH   tag == 0x00001001;
```

This step assumes that we've already tagged the executable itself, as described in "Step One: Tagging Your Application" on page 160.

(Since *scribble* is an executable, we're able to use the *tag* command to tag it. If we were unable to use the *tag* command to assign an identification number to the application itself, we would need a slightly more complicated MATCH rule to match the application with its FTRs. For more information, see "Matching File Types With Applications: The MATCH Rule" on page 205 and "Matching Non-Plain Files: The SPECIALFILE Rule" on page 212.)

Line 4: Provide a Descriptive Phrase

Next we use the LEGEND rule to provide a *legend* for the file type. The legend is a brief descriptive phrase that appears when users view a directory as a list or select "Get File Info" from the Desktop menu. It should be simple, informative, and 25 characters or less. To add the legend for *scribble*, add this line to the FTRs:

```
LEGEND scribble text editor
```

For more information on using the LEGEND rule, see "Adding a Descriptive Phrase: The LEGEND Rule" on page 212.

Line 5: Define Icon-Opening Behavior

We use the CMD OPEN rule to tell the Desktop what to do when users open the *scribble* icon. In this example we want the Desktop to run the *scribble application* when the icon is opened, so we include this line in the FTRs:

```
CMD OPEN $LEADER $REST
```

$LEADER refers to the opened application, in this case *scribble*. The Desktop uses $LEADER to open $REST. In this case, $REST means any other selected icons in the same window. $LEADER and $REST are Desktop environmental variables. These variables are listed and described in Appendix B, "Desktop Environment Variables."

For more information on using the CMD OPEN rule, see "Programming Open Behavior: The CMD OPEN Rule" on page 214.

Line 6: Define Drag and Drop Behavior

We use the CMD DROP rule to tell the Desktop what to do when users drop another icon onto the *scribble* icon. In this example we want the Desktop to open the *scribble application* with the contents of the dropped file, so we include this line in the FTRs:

```
CMD DROP $TARGET $SELECTED
```

$TARGET refers to the icon that the user dropped another icon on, in this case *scribble*; $SELECTED refers to the icon that the user dropped onto the *scribble* icon. $TARGET and $SELECTED are Desktop environmental variables. These variables are listed and described in Appendix B.

For more information on the CMD DROP rule, see “Programming Drag and Drop Behavior: The CMD DROP and DROPIF Rules” on page 216.

Line 7: Define Alt-Open Behavior

We use the ALTOPEN rule to tell the Desktop what to do when users open the *scribble* icon while holding down the **`<Alt>`** key. In this example, we want the Desktop to run the *launch*(1) program, so we include this line in the FTRs:

```
CMD ALTOPEN launch -c $LEADER $REST
```

Again, $LEADER refers to the opened application, *scribble* and $REST refers to any other selected icons in the same window. *launch* runs the *launch* program, and **`-c`** is a command line argument to *launch*.

For more information on the CMD ALTOPEN rule, see “Programming Alt-Open Behavior: The CMD ALTOPEN Rule” on page 215. See the *launch*(1) reference page for more information about using the *launch* command.

Line 8: Add the Icon Picture

We use the ICON rule to tell the Desktop where to find the picture for the *scribble* icon. Assume we have an icon picture in the file */usr/local/lib/install/iconlib/scribble.fti*. In this example, we add these lines to the FTRs:

```
ICON{
if (opened) {
   include("../iconlib/generic.open.fti");
} else {
   include("../iconlib/generic.closed.fti");
}
include("iconlib/scribble.fti");
}
```

These lines tell the Desktop how to find pictures for the *scribble* icon in the opened and closed states.The pathname of the icon (*.fti*) files is listed relative to the location of the FTR file containing the ICON rule. Relative pathnames work as long as the icon files are located within the */usr/lib/filetype* directory structure. Alternatively, you can use the absolute pathnames to the files:

- */usr/local/lib/iconlib/generic.open.fti*
- */usr/local/lib/iconlib/generic.closed.fti*
- */usr/local/lib/iconlib/scribble.fti*

For more information on the ICON rule, see “Getting the Icon Picture: The ICON Rule” on page 220.

Name the *scribble* FTR File and Put It in the Appropriate Directory

Assume the name of our company is Shakespeare. Then according to the naming conventions in “Naming FTR Files” on page 162, we should name our FTR file *Shakespeare.scribble.ftr*. We put the file in the */usr/lib/filetype/install* directory.

The *scribble* FTRs

Here is the set of FTRs that we created to define the file type called “scribbleExecutable.”

```
TYPE scribbleExecutable
   SUPERTYPE Executable
   MATCH tag == 0x00001001;
   LEGEND scribble text editor
   CMD OPEN $LEADER $REST
   CMD ALTOPEN launch -c $LEADER $REST
   CMD DROP $TARGET $SELECTED
   ICON {
   if (opened) {
      include("../iconlib/generic.open.fti");
    } else {
      include("../iconlib/generic.closed.fti");
   }
   include("iconlib/scribble.fti"):
}
```

Chapter 14

Printing From the Desktop

This chapter describes how to create print conversion rules so that users can print your application’s data files from the desktop.

Chapter 14

Printing From the Desktop

This chapter contains these sections:

- "About routeprint" on page 231 discusses the *routeprint* command, which converts files into printable form.
- "Converting a File for Printing" on page 232 explains how the Desktop converts a file for printing.
- "The Print Conversion Rules" on page 235 explains the print conversion rules.
- "The Current Printer" on page 238 discusses the Desktop's concept of the current, or default, printer and the Desktop environment variable *$CURRENTPRINTER*.

About *routeprint*

To print a file, the Desktop invokes the *routeprint*(1) command. *routeprint* knows how to convert most files into printable form, even if the conversion requires several steps.

You can show *routeprint* how to convert your application's data files into printable format by adding one or more CONVERT rules to your application's FTR file.

This chapter explains the process *routeprint* uses to convert data files into a printable format, what file types *routeprint* already recognizes, and how to write your own print CONVERT rule to allow your application to tap into *routeprint*'s powerful printing capabilities.

Converting a File for Printing

The Desktop already has rules for printing many types of files, such as ASCII, PostScript®, and RGB image files. The easiest method for printing a file of arbitrary format is to break down the printing process into small, modular steps.

For example, instead of writing dozens of specialized rules to print reference pages directly for each kind of printer, you can instead convert reference pages to *nroff* format and then convert the *nroff* format to the format required for the current printer.

The diagram shown in Figure 14-1 illustrates the steps by which some of the supported Desktop file types are converted for printing. Each box represents one or more file types; the arrows between them indicate the steps by which the file types are converted. The values associated with the arrows represent the cost of the conversion. This concept is talked about more in “Print Costs” on page 234 later in this chapter.

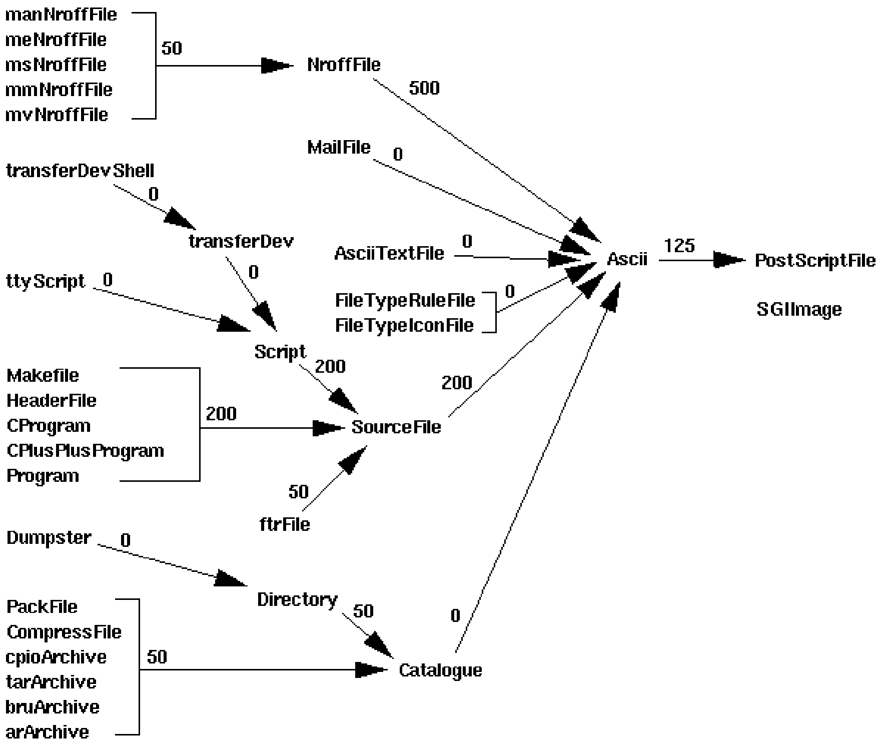


Figure 14-1 File Conversions for Printing Standard Desktop Files

This modular approach to printing has two major advantages:

- **The modular steps are reusable**. Because you can reuse each modular printing step, you write fewer rules.
- ***routeprint* can pick the most efficient route for printing.** There is often more than one sequence of conversion steps to print a file. *routeprint* chooses the sequence of steps that provides the best possible image quality.

This modular, multi-step conversion to printable form is called the *print conversion pipeline*, a series of IRIX commands that process a copy of the file's data in modular increments. The print conversion rules are designed to take advantage of this method of processing printable files.

In addition, applications or software packages can add new arcs to the CONVERT rule database whenever they define new types or have a better way of converting existing types. For example, Impressario includes a filter to go directly from NroffFile to PostScriptFile—this new filter has a lower cost than the default conversion, which goes from NroffFile to Ascii to PostScriptFile.

The Desktop already has rules for printing a large number of file types. You can use *grep* to list all of these print conversions definitions by typing:

```
% grep -i convert /usr/lib/filetype/*/*.ftr
```

Note: The list of print conversion definitions generated by the above command is long and unsorted.

Print Costs

Frequently, there is more than one set of steps that *routeprint* can use to print your file. To compare different ways of printing a file of a particular type, *routeprint* associates cost numbers with each conversion, then chooses the series of conversions with the lowest total cost. The cost of a conversion represents image degradation and processing cost, and is specified by a number between 0 and 1000 inclusive. The higher the cost of a conversion, the more *routeprint* attempts to avoid that conversion method if it has alternative methods.

The conventions for determining the cost assigned to a given conversion are described in Table 14-1.

Table 14-1 Conversion Costs for Print Conversion Rules

Cost	Reason
0	Equivalent filetypes, or a SETVAR rule (described in “The Print Conversion Rules”)
50	Default conversion cost
125	Trivial data loss, or conversion is expensive
200	Minor data loss, but conversion is not expensive
300	Noticeable data loss and conversion is expensive
500	Obvious data loss (for example, color to monochrome)

The Print Conversion Rules

There are three parts to a complete print conversion rule:

- the CONVERT rule
- the COST rule
- the FILTER rule

The CONVERT Rule

Syntax: CONVERT *source-type-name destination-type-name*

Description: *source-type-name* is the file type you are converting from. *destination-type-name* is the file type you are converting to.

Example: `CONVERT NroffFile PostScriptFile`

Do not use the convert rule to convert directly to a new printer type; convert to a standard Desktop file type instead. Silicon Graphics reserves the right to alter printer types, so converting to a standard file type (for example, PostScriptFile) is a more portable solution. Appendix E, “Predefined File Types,” lists some of the file types defined by Silicon Graphics. You can generate a complete list of file types installed on your system using the *grep*(1) command:

```
% grep TYPE /usr/lib/filetype/*/*.ftr
```

Note: The list of file types generated by the above command is very long and unsorted.

The COST Rule

Syntax: COST *non-negative-integer*

Description: *non-negative-integer* represents the *arc cost*, or incremental cost of the conversion. This cost is used to reflect processing complexity or can also be used inversely to reflect the output quality. When *routeprint* selects a conversion sequence, it takes the arc costs into account, choosing the print conversion sequence with the least total cost. The COST rule is required; if you omit it, *routeprint* assumes the cost of the conversion is zero, which may result in an inappropriate choice of printers. The default cost is 50.

Example: `COST 50`

The FILTER Rule

Syntax: FILTER *filter-expression*

Description: The FILTER rule represents part of an IRIX pipeline that prepares a file for printing. *filter-expression* can be any single IRIX command line expression, and generally takes the form of one or more piped commands. In the general case, the first command within a single FILTER rule receives input from *stdin*; the last command in the rule sends its output to *stdout*. *routeprint* concatenates all the FILTER rules in the print conversion pipeline to form one continuous command that sends the selected file to its destination printer.

There are three special cases in creating FILTER rules:

- "first" case
- "last" case
- "setvar" case

In a "first" case rule, the FILTER rule is the very first rule in the print conversion pipeline. In this case, *routeprint* passes the list of selected files to the first command in the FILTER rule as arguments. If a first case FILTER rule begins with a command that does not accept the files in this fashion, prepend the *cat* command to your rule:

```
FILTER cat | tbl - | psroff -t
```

The files will then be piped to the next command's *stdin*.

In a "last" case rule, the FILTER rule is the very last rule in the print conversion pipeline. This rule contains a command that sends output directly to a printer (such as *lp*). Last-case rules are already provided for many file types. To ensure compatibility between your application and future printing software releases, you should refrain from writing your own last-case rules. Instead, write rules that convert from your file type to any of the existing file types, and let the built-in print conversion rules do the rest.

In a "setvar" case rule, the FILTER rule is used to set an environment variable used later in the print conversion pipeline. The first CONVERT rule in the example below sets a variable that defines an *nroff* macro used in the second rule. In all setvar cases, *stdin* is passed to *stdout* transparently. Thus, you can include setvar as part of the pipeline in a single FILTER rule.

```
CONVERT mmNroffFile NroffFIle
COST 1
FILTER setvar MACRO=mm

CONVERT NroffFile PostScriptFile
COST 50
FILTER eqn | tbl | psroff -$MACRO -t
```

The Current Printer

The current printer is the system default printer that the user sets with the Print Manager or, alternatively, the printer specified by the **-p** option to *routeprint*. If no default is set and **-p** is not used, an error message is returned by *routeprint* to either *stdout* or a notifier window (if the **-g** option to *routeprint* was set). The Desktop environment variable *$CURRENTPRINTER* is set to the currently selected default printer.

Chapter 15

Adding Your Application's Icon to the Icon Catalog

The Icon Catalog (or Icon Book) contains pages that store desktop icons. By adding your application's icon to the Icon Catalog, it increases your application's visibility and makes it easier for users to invoke your application.

Chapter 15

Adding Your Application's Icon to the Icon Catalog

This chapter explains how to add your Desktop icon to the Desktop's Icon Catalog. This chapter contains these sections:

- "About the Icon Catalog" on page 241 describes the Icon Catalog and explains how to open it.
- "Adding an Icon to the Icon Catalog" on page 242 explains how to add your icon to the Icon Catalog.
- "Updating Your Installation Process" on page 243 explains how to update your installation process so that your icon is installed in the Icon Catalog on your users' workstations.

About the Icon Catalog

The Icon Catalog (or Icon Book) contains named pages that store icons. The pages are named according to type. For example, some current page names are Applications, Demos, and Control Panels. Users can create their own custom pages containing collections of icons.

To open the Icon Catalog, choose an item from the Icon Catalog menu on the Find toolchest. Figure 15-1 shows the DesktopTools page of the Icon Catalog.

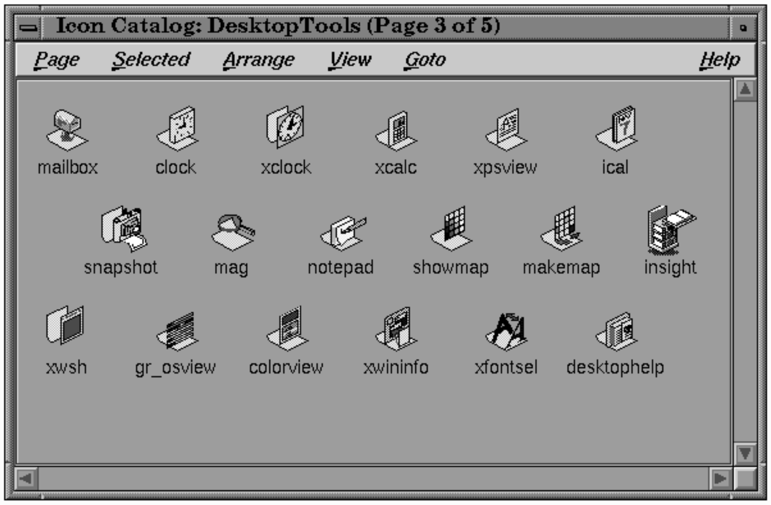


Figure 15-1 The Icon Catalog Window

Adding an Icon to the Icon Catalog

Before you can add an icon to the Icon Catalog, you must create the icon using IconSmith and the appropriate FTR rules, as described earlier in this guide. Once you've done this, use the *iconbookedit* command to add or remove icons from the Icon Catalog. The *iconbookedit* command accepts a file that contains a layout for the Icon Catalog window. This layout file declares which icons should be in the window. To add your application's icon to the Icon Catalog, enter:

```
% iconbookedit -add "Category:File Name:myApplication" -syspage whichPage
```

where *myApplication* is your application name and path and *whichPage* is a particular page in the Icon Catalog. For example, suppose your application is called *pastry* and it's in */usr/sbin*. To add the *pastry* application to the Applications page of the Icon Catalog (assuming you've already created the icon), you would enter:

```
% iconbookedit -add "Category:File Name:/usr/sbin/pastry" -syspage Applications
```

Similarly, you can remove an icon using the *-remove* flag.

For more information on the Icon Catalog and how to edit it, see the *iconbook*(1M) and *iconbookedit*(1M) reference pages. To determine which Icon Catalog page is appropriate for your application, see "Putting Icons into the Icon Catalog" in Chapter 2 of the *Indigo Magic User Interface Guidelines*.

Updating Your Installation Process

Set up your installation process to execute the *iconbookedit* command, as described above, so that your icon appears in the Icon Catalog on your users' workstations when they install your application.

To do this (assuming you're using *swpkg* to package your product for installation), select the exitop attribute on the Add Attributes worksheet and specify the *iconbookedit* command described earlier:

```
iconbookedit -add "Category:File Name:myApplication" -syspage whichPage
```

where *myApplication* is your application name and path and *whichPage* is a particular page in the Icon Catalog.

See Chapter 6, "Adding Attributes," in the *Software Packager User's Guide* for instructions for more information on setting the exitop attribute in *swpkg*.

Appendix A

Example Programs For New and Enhanced Widgets

This appendix contains example programs for some of the new and extended IRIS IM widgets.

Appendix A

Example Programs for New and Enhanced Widgets

This appendix contains example programs for some of the new and extended IRIS IM widgets.

Makefiles are provided for some of these examples, but to use these examples, you need to:

- Link with **-lXm** and **-lSgm**, making sure to put the **-lSgm** before **-lXm**. (To replace an unenhanced widget with the enhanced version of that widget in an existing program, you need to re-link.)

  ```
  LLDLIBS = -lSgm -lXm -lXt -lX11 -lPW
  ```

  You must include **-lSgm** to get the enhanced look and the new widgets. If you do not include -lfileicon, you will get a runtime error, since the runtime loader won't be able to find needed symbols. The **-lXm** represents the enhanced version of *libXm* (IRIS IM).

- Run the program with these resources:

  ```
  *sgiMode:        true
  *useSchemes:     all
  *scheme:         Base
  ```

  (Set them in your *.Xdefaults* file or create a file for your application in */usr/lib/X11/app-defaults*.)

Example Program for Color Chooser

```
/*
 * colortest.c --
 * demonstration of quick-and-easy use of the color
 * chooser widget.
 */

#include <stdio.h>
```

```
#include <Xm/Xm.h>

#include <Xm/Label.h>
#include <Xm/Form.h>
#include <Sgm/ColorC.h>

static void ColorCallback();
Widget label, colorc;
XtAppContext app;

#if 0

int sgidladd()
{
  return 1;
}
#endif

main (argc, argv)
int argc;
char *argv[];
{
  Widget toplevel, form;
  Arg args[25];
  int ac = 0;

  toplevel = XtVaAppInitialize(&app, argv[0], NULL, 0, &argc, argv, NULL, NULL);
  if (toplevel == (Widget)NULL) {
    printf("AppInitialize failed!\n");
    exit(1);
  }

  colorc = SgCreateColorChooserDialog(toplevel, "colorc", NULL, 0);
  XtAddCallback(colorc, XmNapplyCallback, ColorCallback, (XtPointer)NULL);
  XtManageChild(colorc);

  form = XmCreateForm(toplevel, "Form", NULL, 0);
  XtManageChild(form);

  label = XmCreateLabel(form, "I am a color!", NULL, 0);
  XtManageChild(label);
  ac = 0;

  XtRealizeWidget(toplevel);
  XtAppMainLoop(app);
}

void ColorCallback(w, client_data, call_data)
Widget w;
XtPointer client_data, call_data;
{
  Pixel white;  /* fallback */
  SgColorChooserCallbackStruct *cbs =(SgColorChooserCallbackStruct *)call_data;
  Display *dpy = XtDisplay(label);
  Screen *scr = XtScreen(label);
  /*
   * If we were willing to use private structure members,
   * we could be sure to get the correct colormap by using
   * label->core.colormap.  For this demo, however,
   * the default colormap will suffice in most cases.
   */
  Colormap colormap = XDefaultColormapOfScreen(scr);
  XColor mycolor;
  Arg args[1];

  white = WhitePixelOfScreen(scr);

  mycolor.red = (unsigned short)(cbs->r<<8);
  mycolor.green = (unsigned short)(cbs->g<<8);
  mycolor.blue = (unsigned short)(cbs->b<<8);
  mycolor.flags = (DoRed | DoGreen | DoBlue);

  if (XAllocColor(dpy, colormap, &mycolor)) {
    XtSetArg(args[0], XmNbackground, mycolor.pixel);
  }
  else {
    fprintf(stderr, "No more colors!\n"); fflush(stderr);
    XtSetArg(args[0], XmNbackground, white);
  }

  XtSetValues(label, args, 1);
}
```

Makefile for colortest.c

```
ROOT = /
MYLIBS =
XLIBS = -lSgw -lSgm -lXm -lXt -lX11 -lgl
SYSLIBS = -lPW -lm -ll -ly
INCLUDES = -I. -I$(ROOT)usr/include

LDFLAGS = -L -L. -L$(ROOT)usr/lib $(MYLIBS) $(XLIBS) $(SYSLIBS)

all: colortest

colortest: colortest.o
        cc -o colortest colortest.o $(LDFLAGS)

colortest.o: colortest.c
        cc -g $(INCLUDES) -DDEBUG -D_NO_PROTO -c colortest.c
```

Example Program for Dial

```
/*
 * Mytest.c --
 * create and manage a dial widget.
 * Test its resource settings through menu/button actions.
 */

#include <stdio.h>
#include <Xm/Xm.h>
#include <Xm/Form.h>
#include <Xm/DialogS.h>
#include <Xm/Label.h>
#include <Sgm/Dial.h>

/*
 * Test framework procedures and globals.
 */

#ifdef _NO_PROTO
static void DragCallback();
#else
static void DragCallback(Widget w, void *client_data, void *call_data);
#endif /* _NO_PROTO */
```

```
XtAppContext app;

main (argc, argv)
int argc;
char *argv[];
{
  Widget toplevel, form, dial, label;
  Arg args[25];
  int ac = 0;

  /*
   * Create and realize our top level window,
   * with all the menus and buttons for user input.
   */
  toplevel = XtVaAppInitialize(&app, "Dialtest", NULL, 0, &argc, argv, NULL, NULL);
  if (toplevel == (Widget)NULL) {
    printf("AppInitialize failed!\n");
    exit(1);
  }

  form = XmCreateForm(toplevel, "Form", NULL, 0);

  /* Set up arguments for our widget. */
  ac = 0;
  XtSetArg(args[ac], XmNleftAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNrightAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNtopAttachment, XmATTACH_FORM); ac++;

  /*
   * We use all-default settings.
   * Do not set any of the dial-specific resources.
   */
  dial = SgCreateDial(form, "dial", args, ac);
  XtManageChild(dial);

  ac = 0;
  XtSetArg(args[ac], XmNleftAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNrightAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNtopAttachment, XmATTACH_WIDGET); ac++;
  XtSetArg(args[ac], XmNtopWidget, dial); ac++;
  XtSetArg(args[ac], XmNbottomAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNlabelString, XmStringCreateSimple("0")); ac++;
  label = XmCreateLabel(form, "valueLabel", args, ac);
  XtManageChild(label);
  /*
   * Set up callback for the dial.
   */
  XtAddCallback(dial, XmNdragCallback, DragCallback, label);

  XtManageChild(form);
  XtRealizeWidget(toplevel);
  XtAppMainLoop(app);
}

void DragCallback(w, client_data, call_data)
Widget w;
XtPointer client_data, call_data;
{
  SgDialCallbackStruct *cbs = (SgDialCallbackStruct *) call_data;
  Widget label = (Widget)client_data;
  static char new_label[256];
  Arg args[2];
  int ac = 0;

  if ((cbs != NULL) && (label != (Widget)NULL)) {
    sprintf(new_label, "%d", cbs->position);
    XtSetArg(args[ac], XmNlabelString, XmStringCreateSimple(new_label)); ac++;
    XtSetValues(label, args, ac);
  }
}
```

Example Program for Drop Pocket

```
/*
 *  Demonstrate the use of the DropPocket
 */

#include <Xm/Form.h>
#include <Xm/PushB.h>
#include <Sgm/DropPocket.h>

static void droppedCB(Widget w, XtPointer clientData, XtPointer cbs ) {
  SgDropPocketCallbackStruct * dcbs = (SgDropPocketCallbackStruct *)cbs;
  char * name;

  if (dcbs->iconName)
    if (!XmStringGetLtoR( dcbs->iconName, XmFONTLIST_DEFAULT_TAG, &name))
```

```
      name = NULL;

  printf("Dropped file: %s\nFull Data: %s\n", name, dcbs->iconData );
  XtFree( name );
}

main( int argc, char * argv[] ) {
  Widget toplevel, exitB, dp, topRC;
  XtAppContext app;

  XtSetLanguageProc(NULL, (XtLanguageProc)NULL, NULL);
  toplevel = XtVaAppInitialize( &app, "DropPocket", NULL, 0, &argc, argv, NULL, NULL);
  topRC = XtVaCreateManagedWidget( "topRC", xmFormWidgetClass, toplevel, NULL);
  dp = XtVaCreateManagedWidget("dp",
                               sgDropPocketWidgetClass, topRC,
                               XmNtopAttachment, XmATTACH_FORM,
                               XmNbottomAttachment, XmATTACH_FORM,
                               XmNleftAttachment, XmATTACH_FORM,
                               XmNrightAttachment, XmATTACH_FORM,
                               XmNheight, 100,
                               XmNwidth, 100,
                               NULL);
  XtAddCallback( dp, SgNiconUpdateCallback, droppedCB, NULL);
  XtRealizeWidget( toplevel );
  XtAppMainLoop( app );
}
```

Makefile for Drop Pocket Example

```
#!smake
#
include /usr/include/make/commondefs

HFILES = \\p         DropPocketP.h \\p         DropPocket.h

CFILES = \\p         DropPocket.c


TARGETS = dpt

CVERSION = -xansi
MALLOC = /d2/stuff/lib/Malloc
CVERSION = -xansi
OPTIMIZER = -g
```

```
#-I$(MALLOC) -wlint,-pf -woff 813,826,828

LLDLIBS = -lSgm -lXm -lXt -lX11 -lPW
#LLDLIBS = -u malloc -u XtRealloc -u XtMalloc -u XtCalloc -L /d2/stuff/lib
           -ldbmalloc -lSgm -lXm -lXt -lX11

LCDEFS = -DFUNCPROTO -DDEBUG

targets: $(TARGETS)

include $(COMMONRULES)

#dpt: dpTest.o $(OBJECTS)
#       $(CC) -o $@ dpTest.o $(OBJECTS) $(LDFLAGS)

dpt: dpTest.o
        $(CC) -o $@ dpTest.o $(LDFLAGS)

#dpt2: dpTest2.o $(OBJECTS)
#       $(CC) -o $@ dpTest2.o $(OBJECTS) $(LDFLAGS)

dpt2: dpTest2.o
        $(CC) -o $@ dpTest2.o $(LDFLAGS)

#dpt3: dpTest3.o $(OBJECTS)
#       $(CC) -o $@ dpTest3.o $(OBJECTS) $(LDFLAGS)

dpt3: dpTest3.o
        $(CC) -o $@ dpTest3.o $(LDFLAGS)

#tdt: tdt.o $(OBJECTS)
#       $(CC) -o $@ tdt.o $(OBJECTS) $(LDFLAGS)

tdt: tdt.o
        $(CC) -o $@ tdt.o $(LDFLAGS)

depend:
        makedepend -- $(CFLAGS) -- $(HFILES) $(CFILES)
```

Example Program for Finder

```
/*
 * Finder.c demonstrates the use of the SgFinder widget
 */
#include <stdlib.h>
#include <stdio.h>
#include <Xm/RowColumn.h>
#include <Xm/Label.h>
#include <Sgm/Finder.h>
#include <Sgm/DynaMenu.h>

static char * items[] = { "Archer’s favorite songs:",
                            "Draft dodger rag",
                            "Le Roi Renaud",
                            "/usr/sbin",
                            "/lib/libc.so.1",
                            "Calvinist Headgear Expressway",
                          };

static void valueChangeCB( Widget w, XtPointer clientData, XmAnyCallbackStruct * cbs) {
  printf("App value change callback\n");
}

static void activateCB( Widget w, XtPointer clientData, XmAnyCallbackStruct * cbs) {
  printf("App activate callback\n");
}
main( int argc, char * argv[] ) {
  Widget toplevel, rc, label, finder, history;
  XtAppContext app;
  XmString * list;
  int listSize, i;

  XtSetLanguageProc(NULL, (XtLanguageProc)NULL, NULL);
  toplevel = XtVaAppInitialize( &app, "Finder", NULL, 0, &argc, argv, NULL, NULL);
  rc = XtVaCreateWidget( "rc",
                        xmRowColumnWidgetClass, toplevel,
                        XmNresizeWidth, False,
                        XmNresizeHeight, True,
                        NULL);

  /* create the original list for the historyMenu */
  listSize = XtNumber( items );
  list = (XmString *)XtMalloc( sizeof(XmString) * listSize);
  for (i = 0; i < listSize; i++)
```

```
    list[ i ] = XmStringCreateLocalized( items[ i ] );

  label = XtVaCreateManagedWidget( "Things:",
                                xmLabelWidgetClass, rc,
                                NULL);
  finder = XtVaCreateManagedWidget("finder", sgFinderWidgetClass, rc, NULL);
  history = SgFinderGetChild( finder, SgFINDER_HISTORY_MENUBAR );
  if (history && SgIsDynaMenu( history )) {
    XtVaSetValues( history,
                  SgNhistoryListItems, list,
                  SgNhistoryListItemCount, listSize,
                  NULL);
  }

  for (i = 0; i < listSize; i++)
    if (list[ i ])
      XmStringFree(list[ i ]);
  if (list)
    XtFree( (char *)list );

  XtAddCallback( finder, XmNvalueChangedCallback, (XtCallbackProc)valueChangeCB, finder);
  XtAddCallback( finder, XmNactivateCallback, (XtCallbackProc)activateCB, finder);

  XtManageChild( rc );
  XtRealizeWidget( toplevel );
  XtAppMainLoop( app );
}
```

Example Program for History Button (Dynamenu)

```
#include <Sgm/DynaMenu.h>
#include <Xm/RowColumn.h>

static char * items[] = { "illegal smile", "/usr/people/stone",
                          "Fish and whistle", "help I’m trapped in the
                           machine", "9th & Hennepin" };

static void dynaPushCB( Widget w, XtPointer clientData, XtPointer cbd ) {
  SgDynaMenuCallbackStruct * cbs = (SgDynaMenuCallbackStruct *) cbd;
  int num = cbs->button_number;
  printf("Selected item number %d\n", num);
}

main( int argc, char * argv[] ) {
  XtAppContext app = NULL;
  Widget toplevel, rc, dynaMenu;
  XmString * list;
  int listSize, i;

  toplevel = XtVaAppInitialize( &app, "DynaMenu", NULL, 0, &argc,argv, NULL, NULL);
  rc = XtVaCreateManagedWidget( "rc", xmRowColumnWidgetClass, toplevel, NULL);

  /* create the original list for the dynaMenu */
  listSize = XtNumber( items );
  list = (XmString *)XtMalloc( sizeof(XmString) * (unsigned int)listSize);
  for (i = 0; i < listSize; i++)
    list[ i ] = XmStringCreateLocalized( items[ i ] );

  dynaMenu = XtVaCreateManagedWidget("dynaMenu",
                                     sgDynaMenuWidgetClass, rc,
                                     SgNhistoryListItems, list,
                                     SgNhistoryListItemCount, listSize,
                                     NULL);
  XtAddCallback( dynaMenu, SgNdynaPushCallback, dynaPushCB, NULL);

  for (i = 0; i < listSize; i++)
    XmStringFree( list[ i ] );
  XtFree( (char *)list );

  XtRealizeWidget( toplevel );
  XtAppMainLoop( app );
}
```

Example Program for Thumbwheel

```
/*
 * Thumbwheel.c --
 * create and manage a thumbwheel.
 */

#include <stdio.h>
#include <Xm/Xm.h>
#include <Xm/Form.h>
#include <Xm/DialogS.h>
#include <Xm/Label.h>
#include <Sgm/ThumbWheel.h>

/*
 * Test framework procedures and globals.
 */

#ifdef _NO_PROTO
static void DragCallback();
#else
static void DragCallback(Widget w, void *client_data, void *call_data);
#endif /* _NO_PROTO */

XtAppContext app;

main (argc, argv)
int argc;
char *argv[];
{
  Widget toplevel, form, thumbwheel, label;
  Arg args[25];
  int ac = 0;

  /*
   * Create and realize our top level window,
   * with all the menus and buttons for user input.
   */
  toplevel = XtVaAppInitialize( &app, "Thumbwheeltest", NULL, 0, &argc, argv, NULL, NULL);
  if (toplevel == (Widget)NULL) {
    printf("AppInitialize failed!\n");
    exit(1);
  }

  form = XmCreateForm(toplevel, "Form", NULL, 0);
  /* Set up arguments for our widget. */
  ac = 0;
  XtSetArg(args[ac], XmNleftAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNrightAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNtopAttachment, XmATTACH_FORM); ac++;

  /*
   * We use all-default settings, with the exception of orientation.
   * Do not set any other thumbwheel-specific resources.
   */
  ac = 0;
  XtSetArg(args[ac], XmNorientation, XmHORIZONTAL); ac++;
  thumbwheel = SgCreateThumbWheel(form, "thumbwheel", args, ac);
  XtManageChild(thumbwheel);

  ac = 0;
  XtSetArg(args[ac], XmNleftAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNrightAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNtopAttachment, XmATTACH_WIDGET); ac++;
  XtSetArg(args[ac], XmNtopWidget, thumbwheel); ac++;
  XtSetArg(args[ac], XmNbottomAttachment, XmATTACH_FORM); ac++;
  XtSetArg(args[ac], XmNlabelString, XmStringCreateSimple("0")); ac++;
  label = XmCreateLabel(form, "valueLabel", args, ac);
  XtManageChild(label);

  /*
   * Set up callback for the thumbwheel.
   */
  XtAddCallback(thumbwheel, XmNdragCallback, DragCallback, label);

  XtManageChild(form);
  XtRealizeWidget(toplevel);
  XtAppMainLoop(app);
}

void DragCallback(w, client_data, call_data)
Widget w;
XtPointer client_data, call_data;
{
  SgThumbWheelCallbackStruct *cbs = (SgThumbWheelCallbackStruct *) call_data;
  Widget label = (Widget)client_data;
  static char new_label[256];
  Arg args[2];
  int ac = 0;
  if ((cbs != NULL) && (label != (Widget)NULL)) {
    sprintf(new_label, "%d", cbs->value);
    XtSetArg(args[ac], XmNlabelString, XmStringCreateSimple(new_label)); ac++;
    XtSetValues(label, args, ac);
  }
}
```

Example Program for File Selection Box

To run this program, add these lines to your *.Xdefaults* file:

```
fsb*sgiMode: true
fsb*useSchemes: all
```

then type:

```
xrdb -load
```

Here’s the sample program:

```
/*-------  fsb.c  -------*/
#include <Xm/RowColumn.h>
#include <Xm/Form.h>
#include <Xm/PushB.h>
#include <stdlib.h>
#include <stdio.h>
#include <Xm/FileSB.h>


void printDirF( Widget w, XtPointer clientData, XmFileSelectionBoxCallbackStruct * cbs) {

  char * filename = NULL, * dirname = NULL;

  XmStringGetLtoR( cbs->value, XmFONTLIST_DEFAULT_TAG, &filename);

  XmStringGetLtoR( cbs->dir, XmFONTLIST_DEFAULT_TAG, &dirname);

  printf(“Filename selected: %s\n”, filename);

  if (filename)
    XtFree( filename );
  if (dirname)
    XtFree( dirname );
```

```
}

static void showDialog( Widget w, XtPointer clientData, XtPointer callData) {

  Widget dialog = (Widget) clientData;
  XtManageChild( dialog );

}

main (int argc, char *argv[]) {
  Widget toplevel, fsb, b1, b2, rc;
  XtAppContext app;
  XmString textStr;

  XtSetLanguageProc( NULL, (XtLanguageProc)NULL, NULL);

  toplevel = XtVaAppInitialize( &app, “Fsb”, NULL, 0, &argc, argv, NULL, NULL);

  rc = XtVaCreateManagedWidget( “rc”, xmFormWidgetClass, toplevel, NULL);

  /* Set up a dialog */
  if (argc > 1) {

    b1 = XtVaCreateManagedWidget( “FSB”,
                                  xmPushButtonWidgetClass,
                                  rc,
                                  XmNtopAttachment,
                                  XmATTACH_FORM,
                                  XmNbottomAttachment,
                                  XmATTACH_FORM,
                                  XmNleftAttachment,
                                  XmATTACH_FORM,
                                  XmNrightAttachment,
                                  XmATTACH_FORM,
                                  NULL);

    fsb = XmCreateFileSelectionDialog( b1, “FSB Dialog”, NULL, 0);

    XtAddCallback( b1, XmNactivateCallback, showDialog, fsb);

  } else {
    fsb = XmCreateFileSelectionBox( rc, “Select A File”, NULL, 0);
    XtVaSetValues( fsb,
                   XmNtopAttachment, XmATTACH_FORM,
                   XmNbottomAttachment, XmATTACH_FORM,
                   XmNleftAttachment, XmATTACH_FORM,
                   XmNrightAttachment, XmATTACH_FORM,
                   NULL);
    XtManageChild( fsb );

  }

  XtAddCallback( fsb, XmNokCallback, (XtCallbackProc)printDirF, fsb);
  XtAddCallback( fsb, XmNcancelCallback, (XtCallbackProc)exit, NULL);

  XtRealizeWidget( toplevel );
  XtAppMainLoop( app );

}
```

Makefile for File Selection Box Example Program

```
#!smake
#
include /usr/include/make/commondefs

CFILES =  fsb.c

TARGETS = fsb

CVERSION = -xansi
OPTIMIZER = -g

LLDLIBS =  -lSgm  -lXm -lXt -lX11 -lPW

LCDEFS = -DFUNCPROTO -DDEBUG

LCINCS = -I. -I$(MOTIF_HEADERS)

targets: $(TARGETS)

include $(COMMONRULES)

fsb: $(OBJECTS)
$(CC) -o $@ $(OBJECTS) $(LDFLAGS)
```

Appendix B

Desktop Environment Variables

This chapter lists the various environment variables used by the desktop.

Appendix B

Desktop Environment Variables

Here is a list of environment variables used by the Desktop. You can use any of these variables as part of the OPEN, ALTOPEN, or PRINT file typing rules, or as part of the FILTER print conversion rule.

$LEADER

If one or more icons are currently selected from the Desktop, *LEADER* is set to the icon whose text field is highlighted. If no icons are selected, it is set to null.

$REST

If more than one icon is currently selected from the Desktop, *REST* contains the list of names of all selected icons *except* the highlighted icon (see *LEADER* above). Otherwise, it is set to null.

$LEADERTYPE

If one or more icons are currently selected from the Desktop, *LEADERTYPE* is set to the *TYPE* of the icon whose text field is highlighted. If no icons are selected, it is set to null.

$RESTTYPE

When more than one icon is currently selected from the Desktop, *RESTTYPE* contains the *TYPE* for all selected icons *except* the highlighted icon, if the remainder of the selected icons are all of the same *TYPE*. If they are not the same *TYPE*, or only one icon is selected, *RESTTYPE* is set to null.

$RESTTYPELIST

Contains the list of *TYPE*s corresponding to the arguments in *REST*. If only one icon is selected, *RESTTYPELIST* is set to null.

$ARGC

Contains the number of selected icons.

$TARGET

Set only for the CMD DROP rule, *TARGET* contains the name of the icon being dropped upon; otherwise it is set to null.

$TARGETTYPE

Set only for the CMD DROP rule, *TARGETTYPE* contains the *TYPE* of the icon being dropped upon; otherwise it is set to null.

$SELECTED

Contains the names of the icons being dropped on *TARGET*, or null, if none are being dropped.

$SELECTEDTYPE

If all of the icons named in *SELECTED* are of the same *TYPE*, *SELECTEDTYPE* contains that *TYPE*; otherwise it is set to null.

$SELECTEDTYPELIST

Contains a list of *TYPE*s corresponding to the *TYPE*s of the selected icons named in *SELECTED*. If only one icon is selected, it is set to null.

$WINEDITOR

Contains the name for the text editor invoked from the Desktop. The default editor is *jot*. To use an editor that does not generate its own window by default, you must set *WINEDITOR* to the appropriate *winterm* command line sequence. Thus, for *vi*, you would set *WINEDITOR* by typing:

```
setenv WINEDITOR 'winterm -c vi'
```

$WINTERM

Contains the name of the window terminal invoked from the Desktop using *winterm*(1). Currently supported window terminals are *wsh* and *xterm*. The default window terminal is *wsh*.

Appendix C

Online Help Examples

This appendix contains listings of several online help document files. It also lists the source of an example program that implements many online help features, along with its accompanying help document and helpmap file.

Appendix C

Online Help Examples

This appendix contains listings of several online help document files. It also lists the source of an example program that implements many online help features, along with its accompanying help document and helpmap file. All of these files are available online. Their locations are given before each listing.

Note: To view these examples on your system, you must install the *insight_dev* product, which contains the SGIHelp library and include file, help generation tools, examples, and templates.

A Simple Help Document

Example C-1 lists a simple help document. It's intended as a primer for writing online help documents. You can find this file online at */usr/share/Insight/XHELP/samples/sampleDoc/sample.sgm*.

Example C-1 An Example of a Help Source File

```
<dochelp>

<!--
  ==================================================================
  This block denotes a SGML-style comment.

  For those that are unfamiliar with SGML, this sample file
  will try to cover the usage of a variety of the tags that
  are used in the XHELP DTD. The examples shown in this sample
  should be sufficient for a writer to produce a very high-quality,
  functional help document for use with an application.

  It is best to view this sample once it has been published,
  and then compare what you see in the viewing software to
  the actual tags displayed in this file.
  Each HelpTopic block written below displays how to use the
  DTD to implement specific elements/constructs. It should be
  fairly self-explanatory.

  A couple of things to look for when constructing/editing
  your SGML file:

        o Make sure a starting element tag has an associated
          end tag! If not, then the file will not compile
          properly. This is analagous to missing a bracket
          or paranthesis in a C program!

        o SGML is NOT case sensitive! "HELPTOPIC" is the same
          as "helptopic", which is the same as "HelpTopic", etc.
  ==================================================================
-->

<HelpTopic HelpID="intro">
<Helplabel>SGI Sample SGML File</Helplabel>
<Description>
<para>This file contains examples using many of the constructs used
in the XHELP DTD.</para>
<para>Notice that the general outline used for putting together
a help "card" is defined by this particular SGML block. The preceding tag
defines the title that will be displayed for this card. The area you
are currently reading is a description for the feature or function you
are documenting. It is not necessary to use each of these tags, although
the "HelpTopic" tag is required.</para>

<para>A writer of help information may also wish to include a glossary
of terms. In that way, the documenter can tag terms within the text,
and have them display a specified definition from within the viewer.
A sample of this is: <glossterm>sgihelp</glossterm>.</para>
<para>The actual definition for the term is found at the end of this
SGML sample.</para>
</Description>
</HelpTopic>



<!--
  ==================================================================
  It's important to point out that the "HelpID" is the glue that
  binds the help text to the application, through the use of the
  provided Help API (library, header file).
  ==================================================================
-->

<HelpTopic HelpID="helpid_info">
<Helplabel>What is a HelpID?</Helplabel>
<Description>
<para>The HelpID attribute is used to by your application to
instruct the help server which help "card" to display. In this
case, sending the help server an ID of "helpid_info" would bring up
this particular block (or "card").</para>
<para>The other "ID" is often used as an anchor point
(and should be used within an "ANCHOR" tag) for hypertext
links within your text. If you wish to refer to a particular card
one simply uses the ID as the anchor point for the link syntax.</para>
</Description>
</HelpTopic>



<!--
  ==================================================================
  This section illustrates the simple usage of specifying a note,
  warning, tip, or caution within your help document.
  ==================================================================
-->

<HelpTopic HelpID="note_example">
<Helplabel><Anchor Id="AI003">Using Notes, Warnings or Tips Within a Paragraph</Helplabel>
<Description>
<para>Within the paragraph tag, there are a variety of text marking
mechanisms. Each of these delineations must appear as part of the
paragraph ("para") element.</para>
<para>This area shows the documentor how a warning, note or "tip"
can be used within a persons's help text.</para>

<para>
<warning><para>Be Careful. This is a warning.</para></warning>
<note><para>For your information, this is a note.</para></note>
<tip><para>When you prepare your help file, you may wish to include a tip.</para>
</tip>
<caution><para>Use a caution tag when you wish to have the user use caution!</para>
</caution>
</para>
</Description>
</HelpTopic>
```

```
<!--
  ==================================================================
  This next section illustrates how to display computer output,
  program listings, etc. within your help document.
  ==================================================================
-->

<HelpTopic HelpID="literal_example">
<Helplabel>Using Literals or Examples Within a Paragraph</Helplabel>
<Description>
<para>
This area shows the documentor how to implement specific examples within
their help text. It also describes how to the "literal" tag.</para>
<para>
When used within a paragraph, the LiteralLayout tag
tells the viewing software to take this next block "as is",
with all accompanying new-lines and spacing left intact.</para>
<Example>
<Title>Various Examples: ComputerOutput, LiteralLayout, ProgramListing</Title>

<para>
What follows is a computer output listing from when a
user typed <userInput>ls</userInput> :
<ComputerOutput>
% ls -l
total 6777
-rwxr-xr-x  1 guest  guest   29452 Mar  8 19:12 menu*
-rw-r--r--  1 guest  guest    2375 Mar  8 19:11 menu.c++
%
</ComputerOutput>
</para>

<para>
Each of the subsequent three entries should be indented and on their
own line:
<LiteralLayout>
    Here is line one.
    This is line two.
    This is line three.
</LiteralLayout>
</para>
```

```
<para>
The following is a listing from a "C" program:
<ProgramListing>
    #include "X11/Xlib.h"
    #include "helpapi/HelpBroker.h"

    void main(int, char**)
    {
         /* default to the value of the DISPLAY env var */
         Display *display = XOpenDisplay(NULL);

         if( display ) {
               /* initialize the help server */
               SGIHelpInit(display, "MyApp", ".");
         }
         ...
    }
</ProgramListing>
</para>
</Example>

</Description>
</HelpTopic>



<!--
  ==================================================================
  This next section illustrates how to incorporate graphics within
  your help text.
  ==================================================================
-->

<HelpTopic HelpID="graphic_example">
<Helplabel>Using Graphics or Figures Within Your Help Text</Helplabel>
<Description>
<para>
This area displays how a graphics or figure can be used within the flow of
your information. The following figure is in the "GIF" format:
</para>

<Figure ID="figure_01" Float="Yes">
    <title>A GIF Raster Image</title>
    <Graphic fileref="sample1.gif" format="GIF"></Graphic>
</Figure>
```

```
<para>
Currently, support is provided for <emphasis>raster</emphasis> graphics in
the GIF and TIF formats. Support is provided for <emphasis>vector</emphasis>
graphics utilizing the CGM format.
</para>
<para>
This next figure in the CGM (Computer Graphics Metafile) format:
</para>

<Figure ID="figure_02">
    <title>A CGM Vector Image</title>
    <Graphic fileref="sample2.cgm" format="CGM"></Graphic>
</Figure>

<para>
A special note that all equations are treated as inline images, as shown
here:
<equation>
    <Graphic fileref="matrix.gif" format="GIF"></Graphic>
</equation>
</para>

</Description>
</HelpTopic>



<!--
  ==================================================================
  Hyperlinks can be a very powerful navigation mechanism!
  Liberal usage is encouraged.
  ==================================================================
-->

<HelpTopic HelpID="link_example">
<Helplabel>Using HyperLinks</Helplabel>
<Description>
<para>One of the most powerful capabilities of the sgihelp viewer
is the use of hyperlinks to associate like pieces of information.
Constructing these links in SGML is trivial.</para>
<para>Notice that the "Link" element requires an attribute called
"Linkend". This defines the area (anchor) to link to. The "Linkend"
attribute points to the ID of some SGML element. In composing
help text, it is probably best to assign an ID to each "HelpTopic"
```

```
element, and use those same ID's when specifying a Link.</para>
<para>A link is defined below:</para>
<para>For more information about using Notes, refer to the area
entitled <Link Linkend="AI003">"Using Notes, Warnings or Tips
Within a Paragraph"</Link></para>
<para>Note that the "Anchor" tag can also be used within a
document to point to any level of granularity the author
wishes to link to.</para>
</Description>
</HelpTopic>



<!--
  ==================================================================
  Note that there are *many* ways to specify lists. This example
  shows some commonly-used permutations.
  ==================================================================
-->

<HelpTopic HelpID="list_example">
<Helplabel>Using Lists Within Your Help Text</Helplabel>
<Description>
<para>This area displays how a person can author
various types of lists within their help text.</para>

<para>Here is an itemized list that uses a dash to preface each item:</para>
<ItemizedList Mark="dash">
<ListItem><para>First Entry</para></ListItem>
<ListItem><para>Second Entry</para></ListItem>
<ListItem><para>Third Entry</para></ListItem>
</ItemizedList>

<para>Here is an itemized list that uses a bullet to preface each item:</para>
<ItemizedList Mark="bullet">
<ListItem><para>First Entry</para></ListItem>
<ListItem><para>Second Entry</para></ListItem>
</ItemizedList>

<para>Here is an ordered list, using standard enumeration:</para>
<OrderedList>
<ListItem><para>First Entry</para></ListItem>
<ListItem><para>Second Entry</para></ListItem>
<ListItem><para>Third Entry</para></ListItem>
</OrderedList>
```

```
<para>Here is another ordered list, using upper-case Roman enumeration,
showing nesting (sub-items) within the list (outline format):</para>
<OrderedList Numeration="Upperroman">
<ListItem><para>First Entry</para></ListItem>
<ListItem><para>Second Entry
    <OrderedList Numeration="Upperalpha" InheritNum="Inherit">
        <ListItem><para>First SubItem</para></ListItem>
        <ListItem><para>Second SubItem</para></ListItem>
        <ListItem><para>Third SubItem</para></ListItem>
        <ListItem><para>Fourth SubItem</para></ListItem>
    </OrderedList>
</para></ListItem>
<ListItem><para>Third Entry</para></ListItem>
</OrderedList>

<para>Here is a variable list of terms:</para>
<VariableList>
<VarListEntry>
<term>SGI</term>
<ListItem><para>Silicon Graphics, Inc.</para></ListItem>
</VarListEntry>
<VarListEntry>
<term>SGML</term>
<ListItem><para>A Meta-language for defining documents.</para></ListItem>
</VarListEntry>
</VariableList>

</Description>
</HelpTopic>



<!--
  ==================================================================
  Some final examples...
  ==================================================================
-->

<HelpTopic HelpID="misc_example">
<Helplabel>Other Miscellaneous Textual Attributes</Helplabel>
<Description>
<para>This area displays some miscellaneous tags that can be used
within the context of your help document.</para>
```

```
<para>
<Comment>This is a comment that is not to be confused
with the SGML-style comment! Instead, this comment will be
parsed and carried into the text of your document. Usually it's
used in production, for specifying to someone an area of concern,
an area that needs editing, etc.
</Comment>
</para>

<para>Within your text, you may wish to denote a footnote.
<Footnote id="foot1"><para>This block is a footnote!</para></Footnote>
The XHELP DTD will allow you to do that.
</para>

<para>
You may wish to add a copyright symbol to your text, such as:
Silicon Graphics, Inc.<trademark Class="Copyright"></trademark>
</para>
</Description>
</HelpTopic>



<!--
  ==================================================================
  If you wish to use/have a glossary of terms within your help text,
  it is advised to put it at the end of your help "book", as shown
  here. NOTE: CR or other characters (#PCDATA) is NOT allowed
  between the <Glossary> and <Title> tags! (mixed content model)
  ==================================================================
-->

<Glossary>
<Title>Glossary</Title>
<GlossEntry>
<GlossTerm>help</GlossTerm>
<GlossDef>
<para>To give assistance to; to get (oneself) out of a difficulty;
a source of aid.</para>
</GlossDef>
</GlossEntry>
<GlossEntry>
<GlossTerm>sgihelp</GlossTerm>
<GlossDef>
<para>This is Silicon Graphics, Inc. version of a "Xhelp" compatible
```

```
server. Through the use of an available API, and a help text
compiler, books can be constructed that can be used to render
help information for the given application.</para>
</GlossDef>
</GlossEntry></Glossary>


<!--
  =================================================================
  Don't forget the very last ending tag...!!!
  =================================================================
-->

</dochelp>
```

Allowable Elements in a Help Document

Example C-2 lists a help document that describes the legal structures defined by the help DTD. You can find this file online at */usr/share/Insight/XHELP/samples/XHELP_elements/XHELP_elements.sgm*.

Example C-2 A Description of the Elements Defined by the Help DTD

```
<DOCHELP>
<HELPTOPIC HelpID="">
<HELPLABEL>The Elements Alphabetized</HELPLABEL>
<DESCRIPTION>
<PARA>Emphasized entries indicate block-oriented elements.</PARA>
</DESCRIPTION></HELPTOPIC>

<HELPTOPIC HelpID="">
<HELPLABEL>Common Attributes </HELPLABEL>
<DESCRIPTION>
<PARA>Common attributes include ID.</PARA>

<PARA>ID is an identifier, which must be a
string that is unique at least within the document and
which must begin with a letter.</PARA>
</DESCRIPTION></HELPTOPIC>

<HELPTOPIC HelpID="">
<HELPLABEL>Other Attributes</HELPLABEL>
<DESCRIPTION>
```

```
<PARA>Certain other attributes occur regularly.  PageNum is
the number of the page on which a given element begins
or occurs in a printed book.  Label holds some text
associated with its element that is to be output when
the document is rendered.
Type is used with links,
as it is clear that different types of links may be
required; it duplicates the function of Role.</PARA>

<PARA>The Class attribute has been introduced in an attempt to
control the number of computer-specific in-line elements.
The elements that bear the Class attribute, such as
Interface, have general
meanings that can be made more specific
by providing a value for Class from the delimited list
for that element.  For example, for the Interface element
one may specify Menu, or Button; for the MediaLabel
element one may specify CDRom or Tape.  Each element
has its own list of permissible values for Class, and
no default is set, so you can ignore this attribute
if you wish.</PARA>

<PARA>An attribute that has the keyword IMPLIED bears no
processing expections if it is absent or its
value is null.  Application designers might wish to
supply plausible defaults, but none is specified here.</PARA>
</DESCRIPTION></HELPTOPIC>

<HELPTOPIC HelpID="">
<HELPLABEL>cptrphrase.gp</HELPLABEL>
<DESCRIPTION>

<PARA>This parameter entity has been introduced to provide
some structure for in-line elements related to computers.
Its contents are:  plain text,
Anchor, Comment, Link, ComputerOutput, and UserInput.</PARA>

<PARA>Many of these elements now have attributes
with delimited value lists; some former in-line elements now appear as
values for those attributes.</PARA>
</DESCRIPTION></HELPTOPIC>

<HELPTOPIC HelpID="">
<HELPLABEL>"In-line" vs. "In flow"</HELPLABEL>
<DESCRIPTION>
```

```
<PARA>In this document, "in-line" means "occuring within a line
of text, like a character or character string, not causing
a line break."  This term is sometimes used to
refer to objects such as an illustration around which
something like a paragraph is wrapped; here that circumstance
will be called "in flow."  There is no provision yet
for indicating that an object is in flow, but one could
make creative use of the Role attribute to do so.</PARA>

<PARA>A related point:  formal objects have titles; informal
objects do not.  That an object is informal does not mean
that it is in-line:  these are two different
characteristics.</PARA>
</DESCRIPTION></HELPTOPIC>

<HELPTOPIC HelpID="">
<HELPLABEL>List of Elements</HELPLABEL>
<DESCRIPTION>

<VARIABLELIST>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Actions</EMPHASIS></TERM>
<LISTITEM>

<PARA>A set of entries, usually in a list form, that comprise
the appropriate set of functions or steps to perform a corrective
action for a situation that is described as part of a help card.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>Anchor</TERM>
<LISTITEM>

<PARA>Marks a target for a Link.
Anchor may appear almost anywhere, and has no content.
Anchor has ID, Pagenum, Remap, Role, and XRefLabel attributes;
the ID is required.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Caution</EMPHASIS></TERM>
```

```
<LISTITEM>

<PARA>An admonition set off from the text;
Tip, Warning, Important, and Note all share its model.
Its contents may include paragraphs, lists, and so forth,
but not another admonition.
Caution and its sisters have common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Comment</EMPHASIS></TERM>
<LISTITEM>

<PARA>A remark made within the document file that
is intended for use during interim stages of production.
A Comment should not be displayed to the reader of the
finished, published work.  It may appear almost anywhere,
and may contain almost anything
below the Section level.  Note that,
unlike an SGML comment, unless you take steps
to suppress it, the Comment element
will be output by an SGML parser
or application.  You may wish to do this to display Comments
along with text during the editorial process.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>ComputerOutput</TERM>
<LISTITEM>

<PARA>Data presented to the user by
a computer.
It may contain elements from cptrphrase.gp,
and has common and
MoreInfo attributes  For the MoreInfo attribute
see <EMPHASIS>Application.</EMPHASIS></PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Copyright</EMPHASIS></TERM>
<LISTITEM>

<PARA>Copyright information about
```

```
a document.  It consists of one or
more Years followed by any number of Holders.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>Date</TERM>
<LISTITEM>

<PARA>Date of publication or revision.
It contains plain text.  (No provision
has been made for representing eras; you could include this
information along with the date data.)</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Description</EMPHASIS></TERM>
<LISTITEM>

<PARA>A part of a HelpTopic element.
Description may contain in-line elements.
The body may be comprised of paragraphs.
It is used to contain the body of text that
is used as a help card.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>DocHelp</EMPHASIS></TERM>
<LISTITEM>

<PARA>A collection of help document components.
A DocHelp entry may have a series of HelpTopic(s).
All back matter is optional, and at this time includes
a Glossary.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>DocInfo</EMPHASIS></TERM>
<LISTITEM>

<PARA>Metainformation for a book
component, in which it may appear.  Only Title and AuthorGroup
are required.  DocInfo may contain, in order:
```

```
the required Title, optional TitleAbbrev and
Subtitle, followed by one or more
AuthorGroups, any number of
Abstracts, an optional RevHistory, and any number of
LegalNotices.  DocInfo has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>Emphasis</TERM>
<LISTITEM>

<PARA>Provided for use where you would
traditionally use italics
or bold type to emphasize a word or phrase.
It contains plain text and
has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Equation</EMPHASIS></TERM>
<LISTITEM>

<PARA>A titled mathematical equation displayed
on a line by itself, rather than in-line.  It has an optional
Title and TitleAbbrev, followed by either
an InformalEquation or a Graphic (see
<EMPHASIS>Graphic</EMPHASIS>).
Equation has common and Label attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Example</EMPHASIS></TERM>
<LISTITEM>

<PARA>Intended for sections of program source code
that are provided as examples in the text.
It contains a required Title and an
optional TitleAbbrev, followed by one or more block-oriented
elements in any combination.  It has common and Label
attributes.  A simple Example might contain a Title
and a ProgramListing.</PARA>
</LISTITEM></VARLISTENTRY>
```

```
<VARLISTENTRY>
<TERM>
<EMPHASIS>Figure</EMPHASIS></TERM>
<LISTITEM>

<PARA>An illustration.
It must have a Title, and may have a
TitleAbbrev, followed by one or more of
BlockQuote,
InformalEquation, Graphic,
InformalTable, Link, LiteralLayout,
OLink, ProgramListing, Screen, Synopsis, and ULink,
in any order.  Figure has common,
Label, and Float attributes; Float indicates
whether the Figure is supposed to be rendered
where convenient (yes) or at
the place it occurs in the text (no, the default). To
reference an external file containing graphical
content use the Graphic element within Figure.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Footnote</EMPHASIS></TERM>
<LISTITEM>

<PARA>The contents of a footnote, when
the note occurs outside the block-oriented element in
which the FootnoteRef occurs.
(Compare <EMPHASIS>InlineNote.</EMPHASIS>)
The point in the text where the mark for a specific
footnote goes is indicated by FootnoteRef.
Footnote may contain Para, SimPara, BlockQuote, InformalEquation, InformalTable,
Graphic, Synopsis, LiteralLayout, ProgramListing,
Screen, and any kind of list.
It has ID, Label, Lang, Remap, Role, and XRefLabel
attributes; the ID attribute is required, as
a FootnoteRef must point to it.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Glossary</EMPHASIS></TERM>
<LISTITEM>
```

```
<PARA>A glossary of terms.  Glossary
may occur within a Chapter, Appendix, or Preface,
or may be a book component in its own right.
It contains in order an optional DocInfo, optional
Title, and optional TitleAbbrev, followed by
any number of block-oriented elements, followed by
one or more GlossEntries or one or more GlossDivs.
It has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>GlossDef</EMPHASIS></TERM>
<LISTITEM>

<PARA>The definition attached to a GlossTerm
in a GlossEntry.  It may contain Comments, GlossSeeAlsos,
paragraphs, and other block-oriented elements, in
any order; it has common and Subject attributes.  The Subject
attribute may hold a list of subject areas (e.g., DCE RPC
General) as keywords.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>GlossEntry</EMPHASIS></TERM>
<LISTITEM>

<PARA>An entry in a Glossary.
It contains, in order, a required
GlossTerm, an optional Acronym,
an optional Abbrev, and either a
GlossSee or any number of GlossDefs.
It has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>GlossTerm</TERM>
<LISTITEM>

<PARA>A term in the text of a Chapter (for example) that is
glossed in a Glossary; also used for those terms in GlossEntries, in the
Glossary itself.  As you may not want to tag all occurrences
of these words outside of Glossaries, you might consider
GlossTerm, when used outside of Glossaries, to be similar
```

```
to FirstTerm, except that GlossTerm may contain other
in-line elements.  GlossTerm contains in-line elements
and has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>Graphic</TERM>
<LISTITEM>

<PARA>Encloses graphical data or
points via an attribute to an external file containing such data,
and is to be rendered as an object, not in-line.
It has Format,
Fileref, Entityref, and ID attributes.
The format attribute may have the value of
any of the formats defined at the head of the DTD,
including CGM-CHAR, CGM-CLEAR, DITROFF, DVI, EPS,
EQN, FAX, FAXTILE, GIF, IGES, PIC, PS, TBL, TEX,
TIFF.</PARA>

<PARA>The value of Fileref should be a filename, qualified by
a pathname if desired; the value of Entityref should be that of an
external data entity.  If data is given as the
content of Graphic, both Entityref and Fileref,
if present at all, should
be ignored, but a Format value should be supplied.
if no data is given as the content of
Graphic and a value for Entityref
is given, Fileref, if present, should be ignored
but no Format value should be supplied.
Finally, if there is no content for Graphic and
Entityref is absent or null, Fileref must be
given the appropriate value, and again no
Format value should be supplied.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>HelpTopic</EMPHASIS></TERM>
<LISTITEM>

<PARA>A part of a DocHelp document.
HelpTopic contains a HelpLabel, followed in order by
a Description, and optionally an Actions area.
HelpTopic has common and HelpId attributes.</PARA>
```

```
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>HelpLabel</EMPHASIS></TERM>
<LISTITEM>

<PARA>The text of a heading or the title of the HelpTopic
block-oriented element.  HelpLabel may contain
in-line elements, and has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>
<VARLISTENTRY>
<TERM>InlineEquation</TERM>
<LISTITEM>

<PARA>An untitled mathematical equation
occurring in-line or as the content of an Equation.
It contains a Graphic, and has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>InlineGraphic</TERM>
<LISTITEM>

<PARA>Encloses graphical data or
points via an attribute to an external file containing such data,
and is to be rendered in-line.
InlineGraphic has Format, Fileref, Entityref, and ID attributes.
The format attribute may have the value of
any of the formats defined at the head of the DTD, under "Notations."
If it is desired to point to an external file, a filename may
be supplied as the value of the Fileref attribute, or an
external entity name may be supplied as the value of the
Entityref attribute.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>ItemizedList</EMPHASIS></TERM>
<LISTITEM>

<PARA>A list in which each item is marked with
a bullet, dash, or other dingbat (or no mark at all).
It consists of one or more ListItems.  A ListItem in an
ItemizedList contains paragraphs and other
```

```
block-oriented elements, which
may in turn contain other lists; an ItemizedList may be
nested within other lists, too.  It has common attributes and
a Mark attribute.  Your application might supply the mark to be used
for an ItemizedList, but you can use this attribute to
indicate the mark you desire to be used; there
is no fixed list of these.hfill\break <EMPHASIS>Usage Note:</EMPHASIS>
You might want to use one of the ISO text entities
that designates an appropriate dingbat.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>Link</TERM>
<LISTITEM>

<PARA>A hypertext link.  At present, all
the link types represented in the DTD are
provisional.  Link is less provisional than the
others, however.  In HyTime parlance, Link is a
clink.  It may contain in-line elements
and has Endterm, Linkend, and Type attributes.  The required
Linkend attribute specifies the target of the link,
and the optional Endterm attribute specifies
text that is to be fetched from elsewhere in the document
to appear in the Link.  You can also supply this text directly as
the content of the Link, <EMPHASIS>in which case the
Endterm attribute is to be ignored (new and tentative
rule for this version, comments invited)</EMPHASIS>.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>ListItem</EMPHASIS></TERM>
<LISTITEM>

<PARA>A wrapper for the elements of
items in an ItemizedList or OrderedList; it also
occurs within VarListEntry in VariableList.
It may contain just about anything except Sects and book components.
It has common attributes and an Override attribute, which
may have any of the values of ItemizedList's
Mark attribute; use Override to override the mark
set at the ItemizedList level, when you desire to create
ItemizedLists with varying marks.</PARA>
</LISTITEM></VARLISTENTRY>
```

```
<VARLISTENTRY>
<TERM>
<EMPHASIS>LiteralLayout</EMPHASIS></TERM>
<LISTITEM>

<PARA>The wrapper for lines set off from
the main text that are not tagged as Screens, Examples,
or ProgramListing, in which line breaks and leading
white space are to be regarded as significant.
It contains in-line elements, and has common
and Width attributes, for specifying a number representing
the maximum width of the contents.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Note</EMPHASIS></TERM>
<LISTITEM>

<PARA>A message to the user, set off from the text.
See <EMPHASIS>Caution.</EMPHASIS></PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>OrderedList</EMPHASIS></TERM>
<LISTITEM>

<PARA>A numbered or lettered list, consisting of
ListItems.  A ListItem in an
OrderedList contains paragraphs and other
block-oriented elements, which
may in turn contain other lists; an OrderedList may be
nested within other lists, too.
OrderedList has common attributes, along with
a Numeration attribute, which
may have the value Arabic, Upperalpha, Loweralpha,
Upperroman, or Lowerroman.  The default is Arabic (1, 2, 3, . . .).
It has an InheritNum attribute, for which the value Inherit specifies for a
nested list that the numbering of ListItems should include the
number of the item within which they are nested (2a, 2b, etc.,
rather than a, b, etc.); the default value is Ignore.
It has a Continuation attribute, with values
Continues or Restarts (the default), which may be used to
```

```
indicate whether the numbering of a list begins afresh (default)
or continues that of the immediately preceding list (Continues).
You need supply the Continuation attribute only
if your list continues the numbering of the preceding list.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Para</EMPHASIS></TERM>
<LISTITEM>

<PARA>A paragraph.  A Para may not
have a Title:  to attach a Title to a Para use FormalPara.  Para
may contain any in-line element and almost
any block-oriented element.  Abstract, AuthorBlurb, Caution,
Important, Note, and Warning are excluded, as are Sects and higher-level
elements.  Para has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>ProgramListing</EMPHASIS></TERM>
<LISTITEM>

<PARA>A listing of a program.
Line breaks and leading
white space are significant in a ProgramListing, which
may contain in-line elements, including LineAnnotations.
(LineAnnotations are a document author's
comments on the code, not the comments written
into the code itself by the code's author.)
ProgramListing has common and Width attributes, the
latter for specifying a number representing the maximum
width of the contents.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>Term</TERM>
<LISTITEM>

<PARA>The hanging term attached to a ListItem
within a VarListEntry in a
VariableList; visually, a VariableList
is a set of Terms with attached items such as paragraphs.  Each
ListItem may be associated with a set of Terms.  Term may contain
```

```
in-line elements. It has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Tip</EMPHASIS></TERM>
<LISTITEM>

<PARA>A suggestion to the user, set off from
the text. See <EMPHASIS>Caution.</EMPHASIS></PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Title</EMPHASIS></TERM>
<LISTITEM>

<PARA>The text of a heading or the title of a
block-oriented element.  Title may contain
in-line elements, and has common and PageNum attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>Trademark</TERM>
<LISTITEM>

<PARA>A trademark.  It may contain members of cptrphrase.gp,
and has common and Class attributes.
Class may have the values Service, Trade, Registered,
or Copyright; the default is Trade.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>UserInput</TERM>
<LISTITEM>

<PARA>Data entered by the user.
It may contain elements from cptrphrase.gp,
and has common and MoreInfo attributes.  For the MoreInfo attribute
see <EMPHASIS>Application.</EMPHASIS></PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>VariableList</EMPHASIS></TERM>
```

```
<LISTITEM>

<PARA>An optionally
titled list of VarListEntries, which are
composed of sets of one or more Terms with associated
ListItems; ListItems contain paragraphs and other block-oriented
elements in any order.  Inclusions
are as for OrderedList (see <EMPHASIS>OrderedList</EMPHASIS>).
VariableList has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>VarListEntry</EMPHASIS></TERM>
<LISTITEM>

<PARA>A component of VariableList (see
<EMPHASIS>VariableList</EMPHASIS>).  It has common attributes.</PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>
<EMPHASIS>Warning</EMPHASIS></TERM>
<LISTITEM>

<PARA>An admonition set off from the text.
See <EMPHASIS>Caution.</EMPHASIS></PARA>
</LISTITEM></VARLISTENTRY>

<VARLISTENTRY>
<TERM>XRef</TERM>
<LISTITEM>

<PARA>Cross reference link to another part of the document.
It has Linkend and Endterm attributes, just like Link,
but like Anchor, it may have no content.
XRef must have a Linkend, but the Endterm is optional.
If it is used, the content of the element it points
to is displayed as the text of the cross reference;
if it is absent, the XRefLabel of the cross-referenced
object is displayed.  To include in the cross reference
generated text associated with the object referred to,
use your application's style sheet.  See <EMPHASIS>Link.</EMPHASIS></PARA>
</LISTITEM></VARLISTENTRY>
```

```
</VARIABLELIST>
</DESCRIPTION></HELPTOPIC>
</DOCHELP>
```

An Example of Implementing Help in an Application

This section provides a complete example of help integrated with an application.

Example C-3 lists a C program that implements a Help menu, a *Help* button, and context-sensitive help. You can find this file online at */usr/share/Insight/XHELP/samples/exampleApp/exampleAppXm.c*.

Example C-4 lists the help document for *exampleAppXm*. You can find it online at */usr/share/Insight/XHELP/samples/exampleApp/exampleAppXm.sgm*.

Example C-5 lists the helpmap file for *exampleAppXm*. You can find it online at */usr/share/Insight/XHELP/samples/exampleApp/help/exampleAppXm.helpmap*.

Example C-3 An Example of Integrating SGIHelp With an Application

```
/*____________________________________________________________________________
 *
 * File:         exampleAppXm.c
 *
 * Date:         3/25/94
 *
 * Compile with: cc -o exampleAppXm exampleAppXm.c -lhelpmsg -lXm -lXt -lX11
 *
 * Purpose:      An simple example program that shows how to use the SGI
 *               Help system from a Motif application.
 *
 *               This program displays a few buttons on a bulletin board
 *               alongwith a help menu. The use of context sensitive help
 *               is also demonstrated.
 *____________________________________________________________________________
 */

/*
 * standard include files
 */
```

```
#include <stdio.h>
#include <unistd.h>
#include <fcntl.h>
#include <X11/cursorfont.h>
#include <Xm/Xm.h>
#include <Xm/Label.h>
#include <Xm/PushB.h>
#include <Xm/Form.h>
#include <Xm/MessageB.h>
#include <Xm/MainW.h>
#include <Xm/RowColumn.h>
#include <Xm/CascadeB.h>
#include <Xm/Separator.h>

/*
 * include for for calling/using SGIHelp
 */

#include <helpapi/HelpBroker.h>


/*
 * forward declarations of functions
 */

Widget initMotif(int          *argcP,            /* Initializes motif and    */
                 char         *argv[],           /* and returns the top level*/
                 XtAppContext *app_contextP,     /* shell.                   */
                 Display      **displayP);

void createInterface(Widget parent);             /*creates the main window,  */
                                                 /*menus, and the buttons    */
                                                 /*on the main window        */

void clickForHelpCB();                           /*callbacks for each of     */
void overviewCB();                               /*the help menu's           */
void taskCB();
void indexCB();
void keysAndShortcutsCB();
void productInfoCB();

void infoDialogCB();


Widget _mainWindow, _infoDialog=NULL;
```

```
/*_____________________________________________________________________________
 *
 * main()
 *_____________________________________________________________________________
 */

main(int argc, char *argv[])
{
    Display      *display;
    XtAppContext app_context;
    Widget       toplevel;

    toplevel = initMotif (&argc,argv,&app_context,&display);

    createInterface(toplevel);

    XtRealizeWidget(toplevel);

    XtAppMainLoop(app_context);
}

/*_____________________________________________________________________________
 *
 * Function: initMotif()
 *
 * Purpose:  Initializes Motif and creates a top level shell.
 *           Returns the toplevel shell.
 *
 *           Makes the call to initialize variables for the SGIHelp
 *           interface...note that it does not *start* the sgihelp
 *           process. That is done when a request for help is made,
 *           if and only if the sgihelp process is not already
 *           running.
 *
 *_____________________________________________________________________________
 */
Widget initMotif(int *argcP,char *argv[],XtAppContext *app_contextP,
                 Display **displayP)
{
    Widget toplevel;

    XtToolkitInitialize();
    *app_contextP = XtCreateApplicationContext();
    *displayP     = XtOpenDisplay(*app_contextP,NULL,"exampleAppXm",
                                  "exampleAppXmClass",NULL,
                                  0,argcP, argv);

    if (*displayP == NULL) {
        fprintf (stderr,"Could not open display.\n");
        fprintf (stderr,"Check your DISPLAY environment variable.\n");
        fprintf (stderr,"Exiting...\n");
        exit(-1);
    }

    toplevel = XtAppCreateShell("exampleAppXm", NULL,
                                applicationShellWidgetClass,
                                *displayP, NULL,0);

/*
 * initialize variables for SGIHelp
 */
    SGIHelpInit(*displayP, "exampleAppXm", ".");

    return (toplevel);
}


/*_____________________________________________________________________________
 *
 * Function:   createInterface()
 *_____________________________________________________________________________
 */
void createInterface(Widget parent)
{
    Arg    args[10];
    int    i;
    Widget baseForm;
    Widget menuBar;
    Widget demoLabel, demoButton;
    Widget pulldown1,pulldown2, cascade1, cascade2;
    Widget menuButtons[6];   /*we will create at max 6 buttons on a menu*/
    XmString xmStr;

/*
 * mainWindow is an XmMainWindow
 * on which the whole interface is built
 */
```

```
    i=0;
    _mainWindow = XmCreateMainWindow(parent,"mainWindow",args,i);
    XtManageChild(_mainWindow);

/*
 * baseForm is the workArea for the
 * mainWindow above.
 */
    i=0;
    XtSetArg (args[i],XmNwidth,400);i++;
    XtSetArg (args[i],XmNheight,300);i++;
    XtSetArg (args[i],XmNverticalSpacing,40);i++;
    baseForm = XmCreateForm(_mainWindow,"baseForm",args,i);
    XtManageChild(baseForm);

/*
 * On this bulletin board, put a label and a button
 * for demonstrating callbacks and context sensitive
 * help.
 */
    i=0;
    xmStr = XmStringCreateSimple("SGI Help!");
    XtSetArg (args[i],XmNlabelString,xmStr);i++;
    XtSetArg (args[i],XmNtopAttachment,XmATTACH_FORM);i++;
    XtSetArg (args[i],XmNrightAttachment,XmATTACH_FORM);i++;
    XtSetArg (args[i],XmNleftAttachment,XmATTACH_FORM);i++;
    XtSetArg (args[i],XmNalignment,XmALIGNMENT_CENTER);i++;
    demoLabel = XmCreateLabel(baseForm,"sgiHelpLabel",args,i);
    XtManageChild(demoLabel);
    XmStringFree(xmStr);

    i=0;
    xmStr = XmStringCreateSimple("Click Here For Help");
    XtSetArg (args[i],XmNlabelString,xmStr);i++;
    XtSetArg (args[i],XmNrightAttachment,XmATTACH_FORM);i++;
    XtSetArg (args[i],XmNbottomAttachment,XmATTACH_FORM);i++;
    demoButton = XmCreatePushButton(baseForm,"sgiHelpPushButton",args,i);
    XtManageChild(demoButton);
    XmStringFree(xmStr);
    XtAddCallback(demoButton,XmNactivateCallback,taskCB,NULL);

/*
 * build a pulldown menu system, including the "help" menu
 */
    menuBar   = XmCreateMenuBar(_mainWindow,"menuBar",NULL,0);
    XtManageChild(menuBar);

    pulldown1 = XmCreatePulldownMenu(menuBar,"pulldown1",NULL,0);
    pulldown2 = XmCreatePulldownMenu(menuBar,"pulldown2",NULL,0);

    i=0;
    XtSetArg (args[i],XmNsubMenuId,pulldown1);i++;
    cascade1 = XmCreateCascadeButton(menuBar,"File",args,i);
    XtManageChild(cascade1);

    i=0;
    XtSetArg (args[i],XmNsubMenuId,pulldown2);i++;
    cascade2 = XmCreateCascadeButton(menuBar,"Help",args,i);
    XtManageChild(cascade2);

/*
 * Declare this to be the Help menu
 */
    i=0;
    XtSetArg (args[i],XmNmenuHelpWidget,cascade2);i++;
    XtSetValues(menuBar,args,i);

    menuButtons[0] = XmCreatePushButton(pulldown1,"Exit",NULL,0);
    XtManageChildren(menuButtons,1);
    XtAddCallback(menuButtons[0],XmNactivateCallback,(XtCallbackProc)exit,0);

    menuButtons[0] = XmCreatePushButton(pulldown2,"Click for Help",NULL,0);
    menuButtons[1] = XmCreatePushButton(pulldown2,"Overview",NULL,0);
    XtManageChild( XmCreateSeparator(pulldown2, "separator1",NULL,0) );
    menuButtons[2] = XmCreatePushButton(pulldown2,"Sample Help Task",NULL,0);
    XtManageChild( XmCreateSeparator(pulldown2, "separator2",NULL,0) );
    menuButtons[3] = XmCreatePushButton(pulldown2,"Index",NULL,0);
    menuButtons[4] = XmCreatePushButton(pulldown2,"Keys and Shortcuts",NULL,0);
    XtManageChild( XmCreateSeparator(pulldown2, "separator3",NULL,0) );
    menuButtons[5] = XmCreatePushButton(pulldown2,"Product Information",NULL,0);

    XtManageChildren(menuButtons,6);

/*
 * add callbacks to each of the help menu buttons
 */
    XtAddCallback(menuButtons[0],XmNactivateCallback,clickForHelpCB,NULL);
    XtAddCallback(menuButtons[1],XmNactivateCallback,overviewCB,NULL);
    XtAddCallback(menuButtons[2],XmNactivateCallback,taskCB,NULL);
    XtAddCallback(menuButtons[3],XmNactivateCallback,indexCB,NULL);
    XtAddCallback(menuButtons[4],XmNactivateCallback,keysAndShortcutsCB,NULL);
    XtAddCallback(menuButtons[5],XmNactivateCallback,productInfoCB,NULL);

/*
 * set the bulletin board and menubar into
 * the main Window.
 */
    XmMainWindowSetAreas(_mainWindow,menuBar,NULL,NULL,NULL,baseForm);
}


/*_____________________________________________________________________________
 *
 * void clickForHelpCB()
 *
 * Purpose:  Provides context-sensitivity within an application;
 *           makes a request to the sgihelp process.
 *
 *_____________________________________________________________________________
 */

void clickForHelpCB(Widget wid, XtPointer clientData, XtPointer callData)
{
     static Cursor cursor = NULL;
     static char path[512], tmp[512];
     Widget shell, result, w;

     strcpy(path, "");
     strcpy(tmp,  "");

/*
 * create a question-mark cursor
 */
     if(!cursor)
         cursor = XCreateFontCursor(XtDisplay(wid), XC_question_arrow);

     XmUpdateDisplay(_mainWindow);

/*
 * get the top-level shell for the window
 */
     shell = _mainWindow;
     while (shell && !XtIsShell(shell)) {
            shell = XtParent(shell);
     }
```

```
/*
 * modal interface for selection of a component;
 * returns the widget or gadget that contains the pointer
 */
     result = XmTrackingLocate(shell, cursor, FALSE);

     if( result ) {
         w = result;

/*
 * get the widget hierarchy; separate with a '.';
 * this also puts them in top-down vs. bottom-up order.
 */
         do {
              if( XtName(w) ) {
                  strcpy(path, XtName(w));

                  if( strlen(tmp) > 0 ) {
                      strcat(path, ".");
                      strcat(path, tmp);
                  }

                  strcpy(tmp, path);
              }

              w = XtParent(w);
         } while (w != NULL && w != shell);

         /*
          * send msg to the help server-widget hierarchy;
          *      OR
          * provide a mapping to produce the key to be used
          *
          * In this case, we'll let the sgihelp process do
          * the mapping for us, with the use of a helpmap file
          *
          * Note that parameter 2, the book name, can be found
          * from the helpmap file as well. The developer need
          * not hard-code it, if a helpmap file is present for
          * the application.
          *
          */
          if( strlen(path) > 0 ) {
                SGIHelpMsg(path, NULL, NULL);
          }
     }
}


/*____________________________________________________________________________
 *
 * void overviewCB()
 *____________________________________________________________________________
 */
void overviewCB()
{

/*
 * Using the mapping file allows us to specify
 * a "Overview" help card for each window in
 * our application. In this case, we will point
 * to a specific one. Note that the book name is
 * specified, but not necessary if a helpmap file
 * exists for this application.
 */
        SGIHelpMsg("overview", "exampleAppXmHelp", NULL);
}


/*____________________________________________________________________________
 *
 * void indexCB()
 *____________________________________________________________________________
 */
void indexCB()
{

/*
 * For the index window to work for this application,
 * a helpmap file MUST be present!
 */
        SGIHelpIndexMsg("index", NULL);
}


/*____________________________________________________________________________
 *
 * void taskCB()
 *____________________________________________________________________________
 */
void taskCB()
{

/*
 * For the task found in the help menu or a pushbutton, we
 * use a specific key/book combination.
 */
        SGIHelpMsg("help_task", "exampleAppXmHelp", NULL);
}


/*_____________________________________________________________________________
 *
 * void keysAndShortcutsCB()
 *_____________________________________________________________________________
 */
void keysAndShortcutsCB()
{

/*
 * This would point to the help card that contains
 * information about the use of keys/accelerators, etc.
 * for your application.
 */
        SGIHelpMsg("keys", "exampleAppXmHelp", NULL);
}


/*_____________________________________________________________________________
 *
 * void productInfoCB()
 *_____________________________________________________________________________
 */
void productInfoCB()
{

/*
 * Pops up a dialog showing product version information.
 *
 * This area has nothing to do with SGIHelp, but is included
 * for completeness.
 */

  void     buildInfoDialog();
  XmString xmStr;
  Arg      args[10];
  int      i;

    if( _infoDialog == NULL ) {
        buildInfoDialog();
        XtRealizeWidget( _infoDialog );
    }

    xmStr=XmStringCreateSimple("Example Motif App Using SGIHelp version 1.0");
    i=0;
    XtSetArg (args[i],XmNmessageString,xmStr);i++;
    XtSetValues(_infoDialog, args, i);
    XmStringFree(xmStr);

    XtManageChild(_infoDialog);
}


void buildInfoDialog()
{
  Arg    args[10];
  int    i;

/*
 * Build the informational dialog to display the version info
 */
    i=0;
    XtSetArg (args[i],XmNautoUnmanage,True);i++;
    XtSetArg (args[i],XmNdialogType,XmDIALOG_WORKING);i++;
    XtSetArg (args[i],XmNdialogStyle,XmDIALOG_APPLICATION_MODAL);i++;
    _infoDialog = XmCreateInformationDialog(_mainWindow,"infoDialog",args,i);

    XtAddCallback(_infoDialog, XmNokCallback, infoDialogCB, NULL);

    XtUnmanageChild(XmMessageBoxGetChild(_infoDialog, XmDIALOG_CANCEL_BUTTON));
    XtUnmanageChild(XmMessageBoxGetChild(_infoDialog, XmDIALOG_HELP_BUTTON));
}


void infoDialogCB()
{
    if ( _infoDialog ) {
         XtUnmanageChild(_infoDialog);
         /* Explicitly set the input focus */
         XSetInputFocus(XtDisplay(_mainWindow), PointerRoot,
                        RevertToParent, CurrentTime);
    }
}
```

Example C-4 Help Source File for Example Program

```
<dochelp>

<HelpTopic HelpID="overview">
<Helplabel>Example Motif Application Using SGIHelp</Helplabel>
<Description>
<para>
This application is intended to show the developer how
the <glossterm>SGIHelp</glossterm> system can work for you.
It displays (in the included
sample code, exampleAppXm.c) usage of various widgets, a sample
help menu, full-context-sensitivity, and calls to
the <glossterm>SGIHelp</glossterm> server process via the API.
</para>

<Figure ID="figure_01">
    <title>exampleAppXm Main Window</title>
    <Graphic fileref="mainwnd.gif" format="GIF"></Graphic>
</Figure>

<para>
The application itself is very simple, composed of
a <Link Linkend="ID002">File menu,</Link>
a <Link Linkend="ID003">Help menu,</Link>
a <Link Linkend="ID005">Pushbutton,</Link>
and a <Link Linkend="ID004">Label</Link>.
The user can choose items from the
<Link Linkend="ID003">Help menu</Link> to
contact the <glossterm>SGIHelp</glossterm> server process to
cause different help cards to be rendered.
</para>
<para>To quit the application, use the "Exit" command
found under the <Link Linkend="ID002">File menu</Link>.
</para>
</Description>
</HelpTopic>
```

```
<HelpTopic HelpID="file_menu">
<Helplabel><Anchor Id="ID002">The File Menu</Helplabel>
<Description>
<para>The following items (and their functions) are part of
the File menu:</para>
<VariableList>
<VarListEntry>
<term>Exit</term>
<ListItem><para>Used to quit the exampleAppXm application.</para></listitem>
</VarListEntry>
</VariableList>
</Description>
</HelpTopic>


<HelpTopic HelpID="help_menu">
<Helplabel><Anchor Id="ID003">The Help Menu</Helplabel>
<Description>
<para>The following items (and their functions) are part of
the Help menu:</para>
<VariableList>
<VarListEntry>
<term>Click for Help</term>
<ListItem><para>Used to put the application in context sensitive mode.
Will cause the cursor to turn into a "?" at which point the user can
click on any entry in the application's window to obtain help.</para></listitem>
</VarListEntry>
<VarListEntry>
<term>Overview</term>
<ListItem><para>Used to display a help overview card for the current
window.</para></listitem>
</VarListEntry>
<VarListEntry>
<term>Index</term>
<ListItem><para>Used to display from SGIHelp an Index of help topics for
the given application.</para></listitem>
</VarListEntry>
<VarListEntry>
<term>Keys & Shortcuts</term>
<ListItem><para>Used to display a help card that describes any special
key combinations this application uses.</para></listitem>
</VarListEntry>
<VarListEntry>
<term>Product Info</term>
```

```
<ListItem><para>Pops up a dialog that displays to the user any version or
copyright information for this application.</para></listitem>
</VarListEntry>
</VariableList>
<para>To access any menu items, click on the menu item
that is a part of the menubar. When the menu pops-up,
highlight the desired item, and release the mouse button.
</para>
</Description>
</HelpTopic>


<HelpTopic HelpID="help_label">
<Helplabel><Anchor Id="ID004">A Label</Helplabel>
<Description>
<para>You have clicked on a Label. It simply displays information
to the user and serves no other useful pourpose.</para>
<tip><para>Basically, a label is useless. For information only.</para></tip>
</Description>
</HelpTopic>


<HelpTopic HelpID="help_button">
<Helplabel><Anchor Id="ID005">A Pushbutton</Helplabel>
<Description>
<para>You have clicked on a Pushbutton. A pushbutton, when
clicked, will activate some type of command within the application.</para>
</Description>
</HelpTopic>


<HelpTopic HelpID="keys">
<Helplabel><Anchor Id="ID006">Keys and Shortcuts</Helplabel>
<Description>
<para>This card displays all known keys and shortcuts for this
application.</para>
<warning><para>This application has no shortcuts.</para></warning>
</Description>
</HelpTopic>


<HelpTopic HelpID="help_task">
<Helplabel><Anchor Id="ID007">A Sample Help Task</Helplabel>
<Description>
<para>
```

```
When creating your application and help text, you may wish
to highlight certain common tasks. This help card was
displayed from either a menu item or a pushbutton.
</para>
<para>
To perform such an operation within your code, the
associated callback that contacts the <glossterm>SGIHelp</glossterm> server
can be constructed as shown below.</para>
<Example>
<Title>Sample Help Task Callback</Title>

<para>
The following is a listing derived from a "C" program:
<ProgramListing>
    /* create menu items, pushbuttons, etc. */

    void taskCB()
    {

    /*
     * For the task found in the help menu,
     * we'll use a specific key/book
     * combination.
     */
        SGIHelpMsg("key", "myBook", NULL);
    }
</ProgramListing>
</para>
</Example>
<para>It's relatively simple process to integrate help
into your application. In fact, the <glossterm>SGIHelp</glossterm>
process only requires <emphasis>two</emphasis> function calls.
</para>
</Description>
</HelpTopic>


<Glossary>
<Title>Glossary</Title>

<GlossEntry>
<GlossTerm>SGIHelp</GlossTerm>
<GlossDef>
<para>This is Silicon Graphics, Inc. version of a "Xhelp" compatible
server. Through the use of an available API, and a help text
```

```
compiler, books can be constructed that can be used to render
help information for the given application.</para>
</GlossDef>
</GlossEntry>

</Glossary>


</dochelp>
```

Example C-5 Helpmap for Example Program

```
1;exampleAppXmHelp;Example Motif App
Overview;0;overview;exampleAppXm.overview;exampleAppXm.mainWindow.baseForm;exampleAppXm.mainW
indow.menuBar;exampleAppXm.mainWindow
2;exampleAppXmHelp;File Menu;1;file_menu;exampleAppXm.mainWindow.menuBar.File
2;exampleAppXmHelp;Help Menu;1;help_menu;exampleAppXm.mainWindow.menuBar.Help
2;exampleAppXmHelp;A Label Entry;1;help_label;exampleAppXm.mainWindow.baseForm.sgiHelpLabel
2;exampleAppXmHelp;A Pushbutton
Entry;1;help_button;exampleAppXm.mainWindow.baseForm.sgiHelpPushButton
2;exampleAppXmHelp;Keys and Shortcuts;0;keys;exampleAppXm.keys
2;exampleAppXmHelp;A Sample Help Task;0;help_task;exampleAppXm.exampleAppXm
```

Appendix D

The Icon Description Language

This appendix describes the icon description language that IconSmith uses to write the ICON rule. This information is provided for completeness. Don’t try to write the ICON rule directly in the icon description language.

Appendix D

The Icon Description Language

Use IconSmith to draw your icons. To learn how to use IconSmith, see Chapter 12, “Using IconSmith.” After you draw your icon, include it in the FTR file using the ICON rule described in Chapter 13, “File Typing Rules.” IconSmith writes the ICON rule for you using the *icon description language*. This appendix describes the icon description language that IconSmith uses to write the ICON rule. This information is provided for completeness. Do not try to write the ICON rule directly in the icon description language.

The icon description language is a restricted subset of the C programming language. It includes line and polygon drawing routines from the IRIS Graphics Library™ (GL), as well as some additional routines that are not in the GL. The description routine for a given icon is similar in structure to a C subroutine without the subroutine and variable declarations. The valid symbols and functions in the icon description language are described below.

Operators

You can use these C language operators in an icon description routine:

```
+
-
*
/
&
|
^
!
%
=
( )
{ }
```

You can use these C language conditional operators in an icon description routine:

```
&&
||
==
!=
<
>
<=
>=
```

Constants

You can use these logical constants in an icon description routine:

```
true false
```

Variables

The following icon status variables are set by the Desktop. You can use them in an icon description routine:

```
opened located selected current disabled
```

These variables have values of either **true** or **false**. You can use them in a conditional statement to alter the appearance of an icon when it has been manipulated in various ways from the Desktop.

You can use other legal C variables in an icon description routine, without a declaration; all variables are represented as type **float**. Any variable name is acceptable, provided it does not collide with any of the predefined constants, variables, or function names in the icon description language.

Functions

The icon description functions comprise, for the most part, a very restricted subset of the C language version of the IRIS Graphics Library, modified for 2-D drawing. See Table D-1 for a list of all the icon description functions.

Table D-1 Icon Description Functions

Function	Definition
arc(*x, y, r, startang, endang*)	Draw an arc starting at icon coordinates *x, y*; with radius *r*; starting at angle *startang*; ending at angle *endang*. Angle measures are in tenths of degrees.
arcf(*x, y, r, startang, endang*)	Like arc, but filled with the current pen color.
bclos(*color*)	Like pclos, but uses *color* for the border (outline) color of the polygon.
bgnclosedline()	Begin drawing a closed, unfilled figure drawn in the current pen color. Used in conjunction with vertex and endclosedline.
bgnline()	Like bgnclosedline, except the figure is not closed. Used in conjunction with vertex and endline.
bgnoutlinepolygon	Begin drawing a polygon filled with the current pen color. The polygon is outlined with a color specified by endoutlinepolygon. Also used in conjunction with vertex.
bgnpoint()	Begin drawing a series of unconnected points defined using calls to vertex. Used in conjunction with vertex and endpoint.
bgnpolygon()	Like bgnoutlinepolygon except the polygon is not outlined. Used in conjunction with vertex and endpolygon.
color(*n*)	Set current pen color to color index *n*.
draw*(x, y*)	Draw a line in the current color from the current pen location to *x, y.*
endclosedline()	Finish a closed, unfilled figure started with bgnclosedline.

Table D-1 (continued) Icon Description Functions

Function	Definition
endline()	Finish an open, unfilled figure started with bgnline.
endoutlinepolygon(*color*)	Finish a filled polygon started with bgnoutlinepolygon and outline it with *color.*
endpoint()	Finish a series of points started with bgnpoint.
endpolygon()	Finish a filled, unoutlined polygon started with bgnpolygon.
for (*expr*; *expr*; *expr*) *expr*	Note that shorthand operators such as ++ and -- are not part of the icon description language, so longer hand expressions must be used.
if (*expr*) *expr* [else *expr*]	Standard C language if-statement.
include("*path*")	Tell the Desktop to find the icon geometry in the file with pathname *path*.
move(*x, y*)	Move current pen location to *x, y.*
pclos()	Draw a line in the current pen color that closes the current polygon, and fill the polygon with the current color.
pdr(*x, y*)	Draw the side of a filled polygon in the current pen color, from the current pen location to *x, y.*
pmv(*x, y*)	Begin a filled polygon at location *x, y.*
print(*expr or* "*string*")	Print the value of the expression *expr* or *string* to *stdout*; used for debugging.
vertex(*x*,*y*)	Specify a coordinate used for drawing points, lines and polygons by bgnpoint, bgnline, bgnpolygon, and so forth.

Appendix E

Predefined File Types

This appendix lists the predefined file types and their associated tag numbers that are available for your use. You can use these predefined file type for utilities that do not need a unique, personalized look.

Appendix E

Predefined File Types

This appendix lists the predefined file types and their associated tag numbers that are available for your use. You can use these predefined file types for utilities that do not need a unique, personalized look. You might also want to use these file types as SUPERTYPEs for your own custom file types.

Naming Conventions for Predefined File Types

The file types listed in this appendix are named according to the conventions listed in Table E-1.

Table E-1 Predefined File Type Naming Conventions

If the file type name includes:	Then
1-Narg	it requires at least one argument
1arg	it requires exactly one argument
2arg	it requires exactly two arguments
3arg	it requires exactly three arguments

In all cases, if the expected number of arguments is not received, *launch* is run so that users can type in the desired options. For more information on the *launch* command, see the *launch*(1) reference page.

The Predefined File Types and What They Do

In this section, file types that are essentially the same, except for the number of arguments they require, are grouped together by the “base” file type name, meaning the file type name without the argument codes described in "Naming Conventions for Predefined File Types" on page 317.

For example, to find the file type named "ttyLaunchOut1argExecutable," look under "ttyLaunchOutExecutable." These two file types are identical, except that "ttyLaunchOut1argExecutable" requires exactly one argument.

SpecialFile

"SpecialFile" is a predefined SUPERTYPE, not an actual file type. When you include the SPECIALFILE rule in your file type, you should also declare the "SpecialFile" SUPERTYPE. This allows applications to use *isSuper*(1) to test whether your file type is a SPECIALFILE.

Directory

```
TYPE Directory
MATCH (mode & 0170000) == 040000;
```

The "Directory" type. Any custom file types you define for directories should include "Directory" as a SUPERTYPE. "Directory" is defined in */usr/lib/filetype/default/sgidefault.ftr*.

Ascii

```
TYPE Ascii
```

"Ascii" is a psuedotype defined to support *routeprint* conversions. Actual ASCII text files have the type "AsciiTestFile":

```
TYPE AsciiTextFile
MATCH ascii;
```

"Ascii" is defined in */usr/lib/filetype/system/sgisystem.converts.ftr* and "AsciiTextFile" is defined in */usr/lib/filetype/default/sgidefault.ftr*.

Source Files

```
TYPE SourceFile
```

“SourceFile” is a psuedotype defined to support *routeprint* conversions. Actual source files have more specific types such as:

```
TYPE Makefile
MATCH (glob("[mM]akefile") || glob("*.mk")) && ascii;
```

```
TYPE HeaderFile
MATCH glob("*.h") && ascii;
```

```
TYPE CPlusPlusProgram
MATCH glob("*.c++") && ascii;
```

```
TYPE CProgram
MATCH glob("*.c") && ascii;
```

```
TYPE Program
MATCH (glob("*.[pfrasly]") || glob("*.pl[i1]")) && ascii;
```

“SourceFile” is defined in */usr/lib/filetype/system/sgisystem.converts.ftr* and the specific types shown above are defined in */usr/lib/filetype/system/sgisystem.ftr*.

Binary

“Binary” is a predefined SUPERTYPE, not an actual file type. You can create custom file types using “Binary” as a SUPERTYPE.

ImageFile

```
TYPE ImageFile
```

“ImageFile” is a top-level image psuedotype. You can create custom file types using ImageFile as a SUPERTYPE, or you can use a more specific file type such as:

```
TYPE SGIImage
MATCH short(0) == 000732 ||
# normal SGI image
short(0) == 0155001;
#byte-swapped SGI image
```

```
TYPE TIFFImage
MATCH long(0) == 0x49492a00 || long(0) == 0x4d4d002a;
# TIFF image
```

```
TYPE FITImage
MATCH string(0,2) == "IT";
# FIT image

TYPE PCDimage
MATCH string(2048,7) == "PCD_IPI";
# Kodak Photo CD image pack

TYPE PCDOimage
MATCH string(0,7) == "PCD_OPA";
# Kodak Photo CD overview pack

TYPE GIF87Image
MATCH string(0,6) == "GIF87a";
# GIF image (GIF87a format)

TYPE GIF89Image
MATCH string(0,6) == "GIF89a";
# GIF image (GIF89a format)
```

These file types are defined in */usr/lib/filetype/system/sgiimage.ftr*.

Executable

"Exectuable" is a predefined SUPERTYPE, not an actual file type. You can create custom file types using "Executable" as a SUPERTYPE.

Scripts

```
TYPE Script
MATCH (mode & 0111) && ascii;
```

This is the file type for shell scripts, defined in */usr/lib/filetype/default/sgidefault.ftr*.

GenericWindowedExecutable

```
TYPE GenericWindowedExecutable
MATCH   tag == 0x00000000;

TYPE Generic1-NargExecutable
MATCH   tag == 0x00000020;
```

```
TYPE Generic1argExecutable
MATCH   tag == 0x00000001;
```

```
TYPE Generic2argExecutable
MATCH   tag == 0x00000002;
```

```
TYPE Generic3argExecutable
MATCH   tag == 0x00000003;
```

Simply runs the command. No output or terminal emulation windows are used. These file types are defined in */usr/lib/filetype/system/sgicmds.ftr*.

LaunchExecutable

```
TYPE LaunchExecutable
MATCH   tag == 0x00000100;
```

```
TYPE Launch1-NargExecutable
MATCH   tag == 0x00000120;
```

```
TYPE Launch1argExecutable
MATCH   tag == 0x00000101;
```

```
TYPE Launch2argExecutable
MATCH   tag == 0x00000102;
```

Same as "GenericWindowedExecutable," except that it runs *launch* to allow user to enter options prior to running the command. These file types are defined in */usr/lib/filetype/system/sgicmds.ftr*.

ttyExecutable

```
TYPE ttyExecutable
MATCH   (tag == 0x00000400) || (tag == 0x00000410);
```

```
TYPE tty1-NargExecutable
MATCH   tag == 0x00000420;
```

```
TYPE tty2argExecutable
MATCH   tag == 0x00000402;
```

Runs the command in a window that allows terminal I/O. The output window (which is where the terminal emulation is being done) exits immediately upon termination of the command. These file types are defined in */usr/lib/filetype/system/sgicmds.ftr*.

ttyLaunchExecutable

```
TYPE ttyLaunchExecutable
MATCH   tag == 0x00000500;

TYPE ttyLaunch1-NargExecutable
MATCH   tag == 0x00000520;

TYPE ttyLaunch1argExecutable
MATCH   tag == 0x00000501;
```

Same as “ttyExecutable,” except that it runs *launch* to allow user to enter options before running the command. These file types are defined in */usr/lib/filetype/system/sgicmds.ftr*.

ttyOutExecutable

```
TYPE ttyOutExecutable
MATCH   (tag == 0x00000600) || (tag == 0x00000610);

TYPE ttyOut1-NargExecutable
MATCH   tag == 0x00000620;

TYPE ttyOut1argExecutable
MATCH   tag == 0x00000601;

TYPE ttyOut2argExecutable
MATCH   tag == 0x00000602;
```

Same as “ttyExecutable,” except that the output window persists until the user explicitly dismisses it. These file types are defined in */usr/lib/filetype/system/sgicmds.ftr*.

ttyLaunchOutExecutable

```
TYPE ttyLaunchOutExecutable
MATCH   (tag == 0x00000700) || (tag == 0x00000710);

TYPE ttyLaunchOut1-NargExecutable
MATCH   tag == 0x00000720;

TYPE ttyLaunchOut1argExecutable
MATCH   tag == 0x00000701;

TYPE ttyLaunchOut2argExecutable
MATCH   tag == 0x00000702;
```

```
TYPE ttyLaunchOut3argExecutable
MATCH   tag == 0x00000703
```

Same as “ttyOutExecutable,” except that it runs *launch* to allow user to enter options before running the command. These file types are defined in */usr/lib/filetype/system/sgicmds.ftr*.

Appendix F

FTR File Directories

This appendix describes where FTR files are stored on your system.

Appendix F

FTR File Directories

There are four possible files in which Desktop file types are defined. They are listed here in the order the Desktop scans them:

1. */usr/lib/filetype/local*
2. */usr/lib/filetype/install*
3. */usr/lib/filetype/system*
4. */usr/lib/filetype/default*

These files are listed in order of precedence. For example, a file type defined in the */usr/lib/filetype/install* directory overrides a file type of the same name in the */usr/lib/filetype/system* and */usr/lib/filetype/default* directories.

In particular, Silicon Graphics uses the */usr/lib/filetype/system* and */usr/lib/filetype/default* directories to define and maintain system standards. Be especially careful not to override important defaults set in these directories.

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