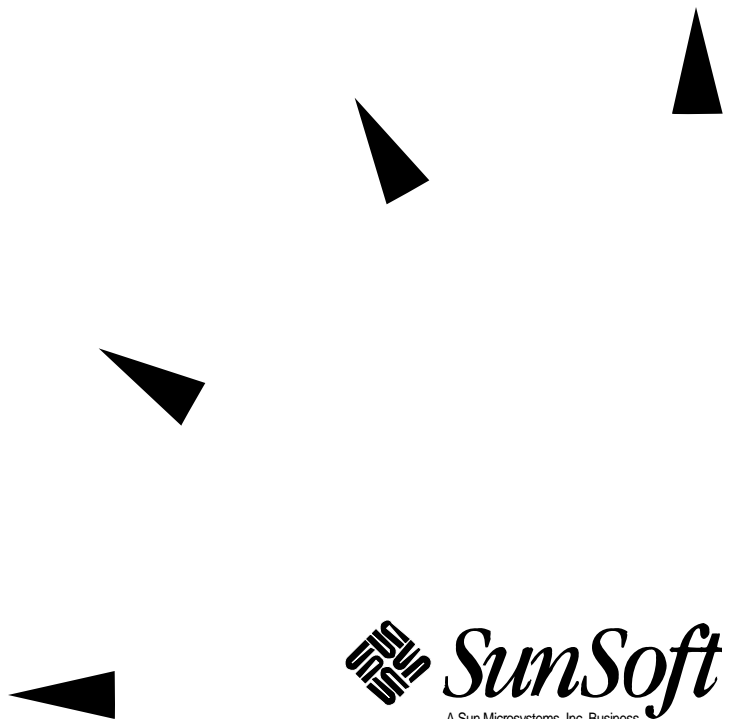


Solaris Common Desktop Environment: Motif Transition Guide

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Preface

Solaris Common Desktop Environment: Motif Transition Guide addresses:

- Issues of concern to Sun Motif® developers
- How to run existing OPEN LOOK® and Motif applications on the OpenWindows™ 3.5 and Solaris Common Desktop Environment (CDE) 1.0 desktops
- Porting OPEN LOOK and Motif applications to the Solaris CDE environment

This manual assumes you are familiar with OPEN LOOK or Motif programming. Use it in conjunction with Motif and OPEN LOOK manuals to enable your application to run on the latest Sun desktops.

Note – Solaris 2.5 Motif and CDE 1.0 Motif are the same. This book uses the terminology CDE Motif for this toolkit.

Note – The OpenWindows 3.4 desktop is the default desktop for the Solaris 2.4 environment. The OpenWindows 3.5 desktop is the default desktop for the Solaris 2.5 environment.

Who Should Use This Book

Read *Solaris Common Desktop Environment: Motif Transition Guide* if you are:

- A Motif programmer interested in developing CDE Motif applications for the OpenWindows 3.5 or Solaris CDE 1.0 desktop
- An OPEN LOOK or Motif programmer, and you want your existing applications to run on the OpenWindows 3.5 or Solaris CDE 1.0 desktop with little or no code modification
- Interested in porting your OPEN LOOK or Motif application to the Solaris CDE 1.0 desktop

This manual assumes that you are proficient in OPEN LOOK (XView™ or OLIT) or Motif application development on UNIX® platforms. If you are an OPEN LOOK developer, it assumes you are familiar with Motif, as well.

Before You Read This Book

If you are considering porting your application to the Solaris CDE 1.0 desktop, and you are not familiar with CDE, you should first read:

- *CDE Programmer's Overview*

CDE Programmer's Overview provides a high level view of the CDE development environment components. It also includes an architectural overview of the entire CDE system, including both the run-time (end user) and development environments.

- *CDE User's Guide*

CDE User's Guide provides an in-depth description of the CDE run-time environment.

See Appendix D, "Recommended Reading" for a listing of all the CDE documentation.

How This Book Is Organized

This manual consists of these chapters and appendixes:

Chapter 1, “Moving to Motif and CDE,” provides a roadmap to using this manual, depending on what types of tasks you want to perform on your application.

Chapter 2, “Motif Environment,” contains information for developers writing CDE Motif applications for either the OpenWindows or CDE environment.

Chapter 3, “CDE and Solaris Motif Toolkits,” describes the Solaris 2.4 and CDE Motif toolkits, and identifies the non-standard parts of the Solaris 2.3 (IXI) Motif toolkit.

Chapter 4, “Development Environment Transition Issues,” compares and contrasts the OpenWindows and CDE development environments.

Chapter 5, “Toolkit Transition Issues,” discusses transitioning your application from an OPEN LOOK graphical user interface (GUI) to CDE Motif.

Chapter 6, “Porting Issues and Ideas,” provides information to consider for porting your OPEN LOOK application to CDE.

Chapter 7, “Porting Example: OPEN LOOK to CDE Motif,” presents a simple porting example.

Appendix A, “CDE Motif Packaging,” describes the contents of the CDE Motif run-time and developer packages.

Appendix B, “Internationalization and CDE,” describes the things you must do differently from the OpenWindows environment to internationalize an application for the CDE desktop.

Appendix C, “Solaris 2.5 Motif Window Manager,” discusses the Motif Window Manager, which is available in the Solaris 2.5 release but not in the Solaris CDE 1.0 release.

Appendix D, “Recommended Reading,” lists books and articles on issues related to OPEN LOOK, Motif, and CDE application development.

Related Books

For a list of the CDE documentation and reading material of interest to OPEN LOOK and Motif developers, see Appendix D, “Recommended Reading.”

What Typographic Changes and Symbols Mean

The following table describes the type changes and symbols used in this book.

Table P-1 Typographic Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files.
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	To delete a file, type <code>rm filename</code> .
AaBbCc123	Book titles, new words or terms, or words to be emphasized	Read Chapter 6 in <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be root to do this.

Code samples are included in boxes and may display the following:

%	UNIX C shell prompt	system%
\$	UNIX Bourne and Korn shell prompt	system\$
#	Superuser prompt, all shells	system#

Moving to Motif and CDE

This chapter discusses the different types of Motif available to Solaris CDE developers, and provides the paths through this manual for the different tasks you may want to perform in relation to them.

<i>Which Motif?</i>	<i>1</i>
<i>Running Existing Motif Applications on the OpenWindows Desktop</i>	<i>3</i>
<i>Developing CDE Motif Applications for the OpenWindows Desktop</i>	<i>4</i>
<i>Running Existing Applications on the Solaris CDE Desktop</i>	<i>5</i>
<i>Porting OpenWindows Applications to the Solaris CDE Desktop</i>	<i>5</i>
<i>Porting Motif Applications to the Solaris CDE Desktop</i>	<i>5</i>
<i>Developing CDE Motif Applications for the Solaris CDE Desktop</i>	<i>6</i>

Which Motif?

The Motif toolkits shipped with various versions of the Solaris environment provided a migration to the CDE 1.0 Motif toolkit. The list below provides a brief description of these toolkits. See Chapter 3, “CDE and Solaris Motif Toolkits,” for more detailed information.

- CDE 1.0 Motif, which is the Solaris 2.5 Motif toolkit, adds functionality to the Motif 1.2.3 toolkit while maintaining backward binary compatibility. It consists of the Motif 1.2.3 widget library with bug fixes and enhancements to existing functionality.

Motif 1.2.3 is a patch of Motif 1.2. APIs for Motif 1.2 and Motif 1.2.3 are the same. The Motif 1.2.3 libraries in the Solaris and CDE environments are described in Chapter 2, “Motif Environment.”

Note – When running CDE Motif in the Solaris CDE environment, you gain access to additional widgets (such as a menu button widget and a terminal emulator widget and library). See Chapter 3, “CDE and Solaris Motif Toolkits,” for more details.

- The Solaris 2.4 Motif toolkit is an early release of the CDE Motif toolkit. It has the same major functionality as CDE Motif but includes fewer bug fixes to Motif 1.2.3.
- The Solaris 2.3 Motif toolkit is IXI 1.2.2 Motif (an extension of Motif 1.2.2).

Caution – If you install CDE on a Solaris 2.4 system, the Motif toolkit is upgraded to the latest version of CDE Motif. If you want your application to run on the OpenWindows 3.4 (non-CDE) desktop, make sure to build your application on Solaris 2.4, not CDE.

Summary of Motif Toolkits

This section summarizes the differences between the Motif toolkits supported by the Solaris environment.

Table 1-1 Solaris and CDE Motif Toolkits

Motif Toolkit	Contents	Location	Develop for This Desktop
Solaris 2.3	IXI Motif, an extension of Motif 1.2.2	<code>/opt/SUNWmotif</code>	OpenWindows
Solaris 2.4	Early release of CDE 1.0 Motif	<code>/usr/dt</code>	OpenWindows
Solaris 2.5	CDE 1.0 Motif	<code>/usr/dt</code>	OpenWindows
CDE 1.0	Motif 1.2.3, with bug fixes and enhancements	<code>/usr/dt</code>	CDE (developer has access to CDE DtSpinBox, DtComboBox, DtMenuButton, DtEditor, DtTerm widgets)

Moving to Motif

The main programming or porting tasks you probably want to perform in relation to Motif are:

- Running existing Motif applications on the OpenWindows 3.5 desktop
- Developing CDE Motif applications for the OpenWindows 3.5 desktop

Running Existing Motif Applications on the OpenWindows Desktop

Any standard Motif 1.2 or Solaris Motif application will run on the OpenWindows 3.5 desktop. Also, any Motif application that is dynamically linked to Motif libraries besides the Solaris 2.4 or CDE Motif libraries can run on the OpenWindows 3.5 desktop if you package with the application the Motif libraries you used for application development.

Developing CDE Motif Applications for the OpenWindows Desktop

If you are familiar with Motif and want to develop a CDE Motif application for the OpenWindows 3.5 desktop, read:

- Chapter 2, “Motif Environment,”
- Appendix A, “CDE Motif Packaging,”
- Appendix C, “Solaris 2.5 Motif Window Manager”

You might also want to read Chapter 3, “CDE and Solaris Motif Toolkits,” which compares the Motif toolkits that the Solaris environment supports.

If you are an OPEN LOOK developer and want to develop a CDE Motif application for the OpenWindows 3.5 desktop, you should read the chapters and appendixes just mentioned in this section. In addition, read:

- Chapter 5, “Toolkit Transition Issues,” for a comparison of the OPEN LOOK and Motif graphical user interface (GUI) and widgets.
- Chapter 6, “Porting Issues and Ideas,” particularly those parts pertaining to GUI transitions.
- “Motif 1.2.3 Documentation” on page 77 and “Motif Programming” on page 79 for lists of books that will familiarize you with Motif programming.

Moving to Solaris CDE

You do not need to port your OPEN LOOK or Motif application to the Solaris CDE environment for it to run on the Solaris CDE desktop. However, if you decide to port, refer to the CDE documentation and read the chapters mentioned below. See “CDE Documentation” on page 76 for a list of the available CDE documentation.

The main programming or porting tasks you probably want to perform in relation to Solaris CDE are:

- Running existing OLIT, XView, or Motif applications on the Solaris CDE desktop
- Porting OpenWindows applications to the Solaris CDE desktop
- Porting Motif applications to the Solaris CDE desktop
- Developing CDE Motif applications for the Solaris CDE desktop

Running Existing Applications on the Solaris CDE Desktop

Existing OLIT, XView, or Motif applications will run on the Solaris CDE desktop. Note that any Motif application that is dynamically linked to Motif libraries besides those in Solaris 2.4 or CDE Motif can run on the CDE desktop if you package with the application the Motif libraries you used for application development.

If you want your application to appear integrated with the Solaris CDE desktop but do not want to modify your application code, you can perform basic integration. This first level of Solaris CDE integration is described in “Basic Integration” on page 46.

Porting OpenWindows Applications to the Solaris CDE Desktop

Existing OpenWindows applications can run unmodified on the Solaris CDE desktop. If you want to move your applications to the Solaris CDE environment and to begin using its broader set of standard services, read this book to help you understand the differences between the OPEN LOOK and Motif toolkits, and the OpenWindows and Solaris CDE desktops.

Porting Motif Applications to the Solaris CDE Desktop

If your application is Motif 1.2 or Motif 1.2.3 style guide-compliant, you are well on your way to it being CDE style guide-compliant. CDE Motif is based on the Motif 1.2.3 toolkit and the CDE style guide is based on the Motif 1.2 style guide. Still, you may have to make some GUI changes to port your application to CDE Motif.

To help port your Motif application to the Solaris CDE desktop, read:

- Chapter 3, “CDE and Solaris Motif Toolkits,” to find out about the enhancements in CDE Motif and the CDE widgets available to you
- Chapter 4, “Development Environment Transition Issues,” which compares and contrasts the OpenWindows and Solaris CDE development environments

Refer to the checklist in the *CDE Style Guide and Certification Checklist* to see how the CDE style guidelines are similar to and differ from those for Motif 1.2.

Developing CDE Motif Applications for the Solaris CDE Desktop

If you are familiar with Motif and want to develop a CDE Motif application for the Solaris CDE desktop, refer to the CDE documentation.

If you are an OPEN LOOK developer and want to develop a CDE Motif application for the Solaris CDE desktop, read this book and refer to the CDE documentation.

In either case, see Appendix D, “Recommended Reading,” for a list of the CDE documentation as well as other books to help you with Motif programming.

This chapter contains information for developers writing CDE Motif applications for either the OpenWindows or Solaris CDE environment.

<i>Motif Packaging in the Solaris 2.5 and Solaris CDE 1.0 Software</i>	7
<i>Compiling and Linking Motif Programs</i>	8
<i>Shared Library Policy</i>	9
<i>Future Motif Compatibility</i>	9

Motif Packaging in the Solaris 2.5 and Solaris CDE 1.0 Software

Motif support in the Solaris 2.5 software is packaged as it was in the Solaris 2.4 software. This packaging provides run-time support in the run-time product and developer support in the developer's environment.

Appendix A, "CDE Motif Packaging," describes the packaging scheme and briefly describes the contents of all the Motif packages in the Solaris CDE 1.0 release.

The Motif run-time support in the Solaris 2.5 and Solaris CDE 1.0 software includes the following:

- Shared libraries
- Header files
- Key bindings

The Motif developer support in the Solaris 2.5 and Solaris CDE 1.0 software includes the following:

- Debug libraries
- uil compiler
- Man pages
- Demos and sample source

The Motif Window Manager (`mwm`) is available in the Solaris 2.5 software, but not in the Solaris CDE 1.0 software. See Appendix C, “Solaris 2.5 Motif Window Manager,” for information on `mwm`.

The Motif header files required for application development are located in `/usr/dt/include`. The Motif libraries are located in `/usr/dt/lib`.

Note – Motif applications built on the Solaris 2.4 or Solaris 2.5 version (`libXm.so.3`) of the Motif run-time package will not work when used with the Motif shared libraries delivered in the Solaris 2.3 version (`libXm.so.2`).

Compiling and Linking Motif Programs

When you compile Motif programs, include the following compiler syntax to enable the compiler to find the Motif and X Window System™ header files:

```
-I/usr/dt/include -I/usr/openwin/include
```

Use the following compiler syntax to direct the linker to the correct shared libraries as shown in the following:

```
-R/usr/dt/lib -R/usr/openwin/lib -L/usr/dt/lib -L/usr/openwin/lib
```

The following is an example of a compile-and-link line for a Motif application:

```
cc -o myprog -I/usr/dt/include -I/usr/openwin/include myprog.c -R/usr/dt/lib \  
-R/usr/openwin/lib -L/usr/dt/lib -lXm -L/usr/openwin/lib -lXt -lX11
```

Shared Library Policy

SunSoft™ will increment the major version number of each shared Motif library whenever there are binary-incompatible differences from the previous release. SunSoft will make available (either on the Motif distribution or through some other channel) all prior versions of each library. This will ensure that your applications linked with a particular release can continue to run, even after a new Motif release has been installed.

Future Motif Compatibility

Developers who used Motif 1.2 to subclass widgets need to be aware of potential binary compatibility problems with future releases. Internal Motif widget data structures may be changed, breaking any subclass that relies on the position of fields in these data structures.

Motif provides a mechanism that developers can use to avoid such problems. Refer to the *Motif Programmer's Reference* manual. A demonstration of this mechanism is provided in the `/usr/dt/examples/motif/dogs` directory.

The Solaris 2.3, Solaris 2.4, and Solaris 2.5 releases and the CDE 1.0 release provide versions of the Motif toolkit. This chapter discusses these toolkits.

<i>CDE Motif Toolkit</i>	<i>11</i>
<i>Widgets Available for CDE Application Development</i>	<i>15</i>
<i>Solaris Motif Toolkits</i>	<i>20</i>

For a summary of the differences between these toolkits, see Table 1-1 on page 3.

CDE Motif Toolkit

CDE Motif, the Motif toolkit that is provided with the CDE 1.0 release, adds functionality to the Motif 1.2.3 toolkit while maintaining backward binary compatibility. It is source and binary compatible with Motif 1.2 applications. Existing Motif 1.2 applications will compile using CDE Motif. Existing Motif 1.2 binaries will run without modification using CDE Motif.

The CDE Motif Toolkit consists of the Motif 1.2.3 widget library with enhancements to existing functionality and bug fixes, as well as some new features. Motif 1.2.3 is a patch of Motif 1.2. The APIs and look and feel for Motif 1.2 and Motif 1.2.3 are the same.

In addition, the CDE library `libDtwidget` provides control widgets for graphical user interface objects not found in Motif 1.2.3. For more information on these widgets, see “CDE Motif Control Widgets” on page 15 and *CDE Programmer’s Guide*.

Features Added to Motif 1.2.3

CDE provides the following added features to Motif 1.2.3 to support desktop applications:

- Complete localization of toolkit error messages
- `XmGetPixmap()` and `XmGetPixmapByDepth()` use the environment variable `XMICONSEARCHPATH` or `XMICONBMSEARCHPATH` as the icon search path. If neither of these variables is set, then they use `XBLANGPATH`, which is the Motif 1.2 behavior. See the corresponding CDE Motif man pages for more information.

Enhancements to Existing Motif 1.2.3 Functionality

The Solaris CDE Motif library contains minor enhancements to Motif 1.2.3 usability to emulate certain OPEN LOOK user interface and Microsoft® Windows features. The usability enhancements include:

- Optionally allowing mouse button 2 on a three-button mouse to be used to extend the current selection. This is equivalent to the OPEN LOOK Adjust function.
- Allowing Tab to be used to move through a group of `PushButton` widgets and gadgets, `ArrowButton` widgets and gadgets, and `DrawnButton` widgets.
- Allowing mouse button 3 to activate a `CascadeButton` menu (for OPEN LOOK compatibility).
- Providing three new resources (`pathMode`, `fileFilterStyle`, and `dirTextLabelString`) for the `XmFileSelectionBox` widget, which give the File Selection Dialog Box GUI an improved look and feel.
- Ability to re-map keybindings to be consistent with those for OPEN LOOK or Microsoft Windows applications.
- Providing visual enhancements to the standard Motif look (see the next section, “Visual Enhancements”).

Each of the preceding enhancements can be controlled by a resource: either a widget resource (for `XmFileSelectionBox`) or an application-wide resource (all other cases). The default values for this resource provide behavior and APIs that are identical to that of Motif 1.2. For information on these enhancements and resources, see the `XmDisplay(3x)` and `XmFileSelectionBox(3x)` man pages.

Visual Enhancements

CDE changes the Motif 1.2.3 look in the following ways:

- `RadioBox` fill color was changed to show state more clearly
- `RadioBox` shape was changed from diamond to circular
- A check mark was added to the `CheckBox` to show its state more clearly
- `CascadeButtons` and menu items were changed to have an etched-in border when active
- Thumb was removed from the read-only `Scale` to distinguish it from the interactive `Scale`
- Default shadow thickness was changed to 1 pixel
- Default highlight thickness was changed to 1 pixel
- Default `PushButton` visual was added that highlights the button inside its default shadow

For information on these enhancements, see the `XmDisplay(3)`, `XmPushButton(3)`, `XmPushButtonGadget(3)`, `XmToggleButton(3)`, `XmToggleButtonGadget(3)`, and `XmScale(3)` man pages.

CDE Motif Libraries

Use CDE Motif and X11R5 libraries to develop a CDE Motif-compliant application for the X Window System.

CDE Motif Library (`libXm`)

Solaris CDE provides all the Motif 1.2.3 header files. The CDE Motif libraries are the Motif 1.2.3 libraries with bug fixes and enhancements.

CDE Motif UIL library (libUil)

The Motif user interface language (UIL) is a specification language for describing the initial state of a Motif application's user interface. The CDE version of the Motif UIL library is essentially unchanged from the Motif 1.2.3 version.

Include the `UilDef.h` header file (found in the `/usr/dt/include/uil` directory) to access UIL.

CDE Motif Resource Manager Library (libMrm)

The Motif resource manager (MRM) is responsible for creating widgets based on definitions contained in user interface definition (UID) files created by the UIL compiler. MRM interprets the output of the UIL compiler and generates the appropriate argument lists for widget creation functions. Use `libMrm` to access the Motif resource manager. The CDE version is essentially unchanged from the Motif version.

Include the `Mrm/MrmPublic.h` header files to access `libMrm` in your application.

Demo Programs

You can find Motif 1.2 demos in `/usr/dt/examples/motif`. These demos do not include any of the CDE Motif enhancements or widgets.

Related Documentation

See the *OSF/Motif Programmer's Reference* for information on UIL, the UIL compiler, UID, and Mrm.

Widgets Available for CDE Application Development

This section discusses the widgets available for Solaris CDE application development, as an extension to CDE Motif.

CDE Motif Control Widgets

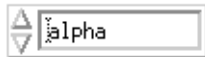
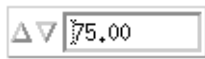
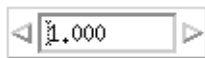
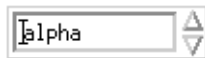
The CDE Motif control widgets are designed to ease porting OPEN LOOK applications to the Solaris CDE desktop by providing equivalent functionality in CDE Motif. These widgets are not considered to be part of CDE Motif, but rather an extension to CDE Motif. The `libDtWidget` library contains widgets and functions that are used to provide common functionality across all CDE applications. The widgets provided include:

Table 3-1 CDE Control Widgets

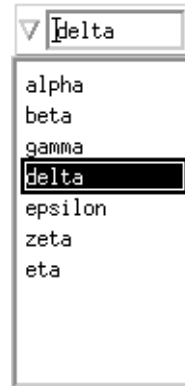
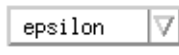
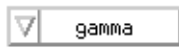
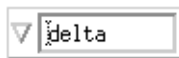
Widget Name	Description
<code>DtSpinBox</code>	<code>TextField</code> widget with additional controls for incrementing and decrementing numeric values, or browsing through and selecting from a list of text strings. Can be read-only. <code>DtSpinBox</code> is functionally similar to the OPEN LOOK numeric text field.
<code>DtComboBox</code>	Combination of <code>TextField</code> and pop-up list widgets that provides a list of valid choices for the <code>TextField</code> . Can be read-only.
<code>DtMenuButton</code>	Command widget that provides the menu cascading functionality of an <code>XmCascadeButton</code> widget outside of a menu bar, or a menu pane. <code>DtMenuButton</code> is functionally equivalent to the OPEN LOOK menu button.

Examples of each type of widget follow:

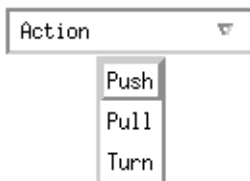
- Text field and arrow button widget (DtSpinBox)



- Text field and list box widget (DtComboBox)



- Menu button widget (DtMenuButton)



Note – The Solaris CDE software supports all Motif 1.2 widgets.

Compatibility with Motif 2.0

The APIs of the `DtSpinBox` and `DtComboBox` widgets are similar to the Motif 2.0 release of `XmSpinBox` and `XmComboBox` widgets. The APIs are designed so an application can easily switch to the Motif 2.0 version of these widgets. The main thing you need to do to switch is to change the `Dt` names for the class, types, and creation routines to `Xm`.

This information is supplied in case you choose to port your application to Motif 2.0 but this is *not* a recommendation that you do so.

Note – The Solaris CDE software does *not* guarantee strict API or binary compatibility between its widgets and the Motif 2.0 widgets.

Library and Header Files

The library `libDtWidget` provides access to the `DtSpinBox`, `DtComboBox`, and `DtMenuButton` widgets. The `libDtWidget` header files for these widgets are:

- `Dt/SpinBox.h`
- `Dt/ComboBox.h`
- `Dt/MenuButton.h`

Demo Programs

You can find the CDE Motif control widgets demos in `/usr/dt/examples/dtwidget`. Read the `README` file for detailed information on the demos.

Related Documentation

For more information on CDE Motif control widgets, see the relevant man pages and *CDE Programmer's Guide*.

CDE Terminal Widget

The `DtTerm` widget is part of the Solaris CDE development environment. It provides the functionality required to emulate an ANSI X3.64-1979-style terminal (specifically a DEC[®] VT220-like terminal with extensions). The Terminal widget library, `libDtTerm`, provides the `DtTerm` widget for adding a terminal window to a GUI. If you include a terminal in your application, use CDE Motif widgets to add display enhancements to it such as pop-up menus and scrollbars.

The Solaris CDE Terminal application, which is a part of the run-time environment, is a window that behaves as a terminal, enabling access to traditional terminal-based applications from within the desktop. The `DtTerm` widget is the foundation for the desktop run-time terminal.

The `libDtTerm` library includes a set of convenience functions to create, access, and support the `DtTerm` widget.

Library and Header Files

The `libDtTerm` library provides a set of widgets based on Motif for designing a terminal or for adding a terminal window to a GUI.

Include the `Dt/Term.h` header file to access `libDtTerm` APIs in your application.

Demo Programs

You can find the `DtTerm` demos in `/usr/dt/examples/dtterm`. See the `README` file for detailed information on the demos.

Related Documentation

For more information on the `DtTerm` widget, see the relevant man pages.

For more information on the desktop terminal application, see the terminal help volume, the relevant man pages, or *CDE User's Guide*.

Text Editor Widget

The CDE text editing system consists of two components:

- The Text Editor application, which provides editing services through graphical, action, and ToolTalk interfaces
- The editor widget, `DtEditor`, which provides a programmatic interface for the following editing services:
 - Cut and paste
 - Search and replace
 - Simple formatting
 - Spell checking (for 8-bit locales)
 - Undo previous edit
 - Enhanced I/O handling capabilities that support input and output of ASCII text, multibyte text, and buffers of data
 - Support for reading and writing files directly

Although the Motif text widget also provides a programmatic interface, applications that want to assure a system-wide uniform editor should use the `DtEditor` widget. The CDE Text Editor and Mailer applications use the editor widget. Use this widget in the following circumstances:

- You need the functionality, such as spell checking, undo, and find/change, that is provided by the `DtEditor` widget.
- You want users to be able to read and write data to and from a file.
- When your program does not need to edit the text while the widget has control of the text.

Library and Header Files

The `DtEditor` widget is in the `libDtWidget` library. The header file is `Dt/Editor.h`.

Demo Programs

A demo containing an example of the `DtEditor` widget (`editor.c`) is in `/usr/dt/examples/dtwidget` directory. Read the `README` file for detailed information on the demo.

Related Documentation

For more information on the Text Editor widget, see the relevant man pages and *CDE Programmer's Guide*.

Solaris Motif Toolkits

As mentioned previously, the Solaris 2.5 Motif toolkit is the CDE 1.0 Motif toolkit. The Solaris 2.4 Motif toolkit is an early release of the CDE 1.0 Motif toolkit. (It has the same major functionality as CDE Motif, only it includes fewer bug fixes to Motif 1.2.3.) The Solaris 2.3 Motif toolkit is IXI 1.2.2 Motif, which is an extension of Motif 1.2.2.

The directory hierarchy of the Solaris 2.4 and Solaris 2.5 Motif software is different from that of Motif 1.2.2 and of other Motif products. The distribution has a similar structure to the Solaris CDE hierarchy for consistency and to ease migration for future Solaris CDE users.

Note – The CDE Motif control widgets, the CDE Text Editor widget, and the CDE Terminal widget, which are discussed in “Widgets Available for CDE Application Development,” are part of the Solaris CDE development environment, not the CDE Motif toolkit. If you develop a Motif application for the OpenWindows 3.5 desktop, you do not have access to these widgets (or any of the other non-Motif Solaris CDE functionality).

IXI Motif 1.2.2 Toolkit

The IXI Motif 1.2.2 toolkit contains some incompatibilities with standard OSF/Motif 1.2.2. These features are not part of the OSF/Motif 1.2 specification, and are not present in the Solaris 2.4 or CDE Motif toolkits.

XmList convenience functions

The following are the non-standard functions in IXI Motif. Remove them from your application code if you have used them:

- `XmListRecolorItem`
- `XmListRecolorPos`
- `XmListSetClientDataPos`
- `XmListSetClientDataPos`

XmForm widget

The `XmForm` widget implementation in IXI Motif and OSF/Motif 1.2.2 are different, although the APIs are identical. Hence, applications linked with IXI Motif can exhibit minor behavioral or visual differences in the `XmForm` widget when they are re-linked with OSF/Motif.

The Solaris 2.4 and CDE Motif toolkits use the OSF/Motif 1.2.3 `XmForm` widget implementation, which is binary compatible with the OSF/Motif 1.2.2, but not the IXI Motif, `XmForm` widget.

Directory hierarchy

The IXI Motif directory hierarchy is different from that of the CDE and Solaris 2.4 hierarchies. IXI Motif typically installs into `/opt/SUNWmotif`.

Note – IXI 1.2.2 supported conversion of XPM format files for some resources with bitmap semantics. This feature is not available in the Solaris 2.4 release, but is available in the CDE (Solaris 2.5) release of the Motif toolkit.

Development Environment Transition Issues

If you want to port an OPEN LOOK or Motif application to the Solaris CDE desktop, you need to consider the development environment transition as well as the graphical user interface (GUI) transition. The OpenWindows and Solaris CDE development environments are different in many ways but similar in others. This chapter compares and contrasts the two development environments..

<i>Features Exclusive to CDE</i>	<i>23</i>
<i>OpenWindows Versus Solaris CDE Development Environments</i>	<i>24</i>

The Solaris CDE desktop is based on the same X server as is part of the OpenWindows environment. For example, you can access Display PostScript™ (DPS), and the XIL™, and XGL™ libraries from Solaris CDE.

However, the X server is considered part of the OpenWindows development environment whereas it is *not* part of the CDE development environment. For a high-level understanding of the CDE development environment, read *CDE Programmer's Overview*.

Features Exclusive to CDE

This section briefly describes the features of the CDE development environment that do not appear in the OpenWindows environment in any analogous form.

- Desktop Korn shell: Provides a way to engage in graphic user interaction through shell scripts. See *CDE Desktop KornShell User's Guide* for detailed information on desktop Korn shell.
- Workspace Manager: Provides support for multiple workspaces. Each workspace is a *virtual screen*. Most desktop applications can run as expected without knowledge of the Workspace Manager. See *CDE Programmer's Overview* and *CDE Programmer's Guide* for more information on the Workspace Manager.

OpenWindows Versus Solaris CDE Development Environments

This section contrasts some of the functionality that OpenWindows and Solaris CDE development environments have in common, but that might be implemented differently.

GUI Application Builders

Both the OpenWindows and CDE development environments contain GUI application builders.

- The OpenWindows Developer's Guide (Devguide) is a tool that helps produce the GUI for OPEN LOOK applications. Devguide has code generators that produced XView and OLIT source code. The Devguide Motif Conversion Utilities product, which was first shipped with the Solaris 2.3 release, produces Motif code from Devguide GIL files.
- CDE Application Builder (App Builder) produces CDE Motif code. It also enables you to integrate some of the desktop services into your application; for example, drag and drop, ToolTalk messaging, sessioning, help, and internationalization. If you used Devguide to create your application, you can use App Builder's GIL-to-BIL converter to create BIL files, which is the format the App Builder uses.

If you have used Devguide to build an application, the CDE Application Builder will feel very familiar to you. The palette is visually similar. Much of the Devguide functionality is retained, such as the Build and Test feature and the ability to build projects.

See *CDE Programmer's Overview* and *CDE Application Builder User's Guide* for more information on App Builder.

Drag and Drop

The underlying basic functionality of OpenWindows drag and drop and CDE drag and drop are similar. Both versions of drag and drop contain general purpose APIs that provide the same outcome from a user's perspective.

However, CDE drag and drop also provides a *convenience* API that serves two purposes:

- It is easier to use than the APIs that Motif 1.2.3 provides
- It defines and implements data transfer policies

The OpenWindows environment has conventions for drag and drop policies, but it is up to the developer to implement the policies. If you use drag and drop in your OPEN LOOK application, much of the data transfer code you wrote can be condensed by using the CDE convenience APIs.

See *CDE Programmer's Overview* and *CDE Programmer's Guide* for more information on CDE drag and drop.

ToolTalk Messaging

OpenWindows ToolTalk messaging is upwardly compatible with the CDE ToolTalk Messaging Service. In addition, the ToolTalk Messaging Service provides:

- Two standard ToolTalk protocols known as *message sets*
- `ttsnoop`

The `ttsnoop` utility is a debugging tool that helps monitor messages that are sent between your application and other applications.

- `tttrace`

The `tttrace` utility is a debugging tool that helps monitor ToolTalk API calls.

See *CDE Programmer's Overview*, *CDE ToolTalk Messaging Overview*, and the `ttsnoop(1)` and `tttrace(1)` man pages for more information on the CDE extensions of ToolTalk.

Typing

The OpenWindows *classing engine* identifies the characteristics, or attributes, of files. The classing engine specifies attributes such as print method, icons, and open commands for specific file types. The classing engine consists of two parts:

- A database that stores file type names and attributes
- A collection of routines that query the database

The Solaris CDE *data typing* and *actions* form the analog of the classing engine. The data-typing mechanism consists of two tables (DATA_ATTRIBUTES and DATA_CRITERIA) that specify attributes such as icons, actions, and commands for specific file types. DATA_CRITERIA corresponds to the classing engine's File name space. DATA_ATTRIBUTES corresponds to the classing engine's Type name space. The actions field in the DATA_ATTRIBUTES table corresponds to the former print and open methods in the classing engine. In the Solaris CDE development environment, it acts as a reference to another table called ACTION, and is greatly enhanced over the former classing engine methods.

See *CDE Programmer's Overview* and *CDE Programmer's Guide* for more information on data typing and actions.

Help

CDE help differs from OpenWindows help in three areas:

- User model
- Programming tasks
- Richness of help system

See *CDE Programmer's Overview* and *CDE Help System Author's and Programmer's Guide* for more information on the CDE help system.

User Model

The OpenWindows user model is very simple. The user places the pointer over the portion of the application he wants help on, and presses the Help key.

The CDE user model is similar but slightly different. The user receives help from that portion of the application that has input focus. That is, the user must select a portion of the application and then press the Help key to receive help on that portion.

CDE help provides *on item* help for those objects that cannot get input focus. You must provide an On Item selection in your application's Help menu so users can access help for those items.

Programming Tasks

Writing OLIT and XView help is very similar. In either case, your application provides the text appropriate for a widget or object, respectively. The OpenWindows window manager determines which application is responsible when the user presses the Help key, and dispatches an event to that application.

OLIT has a specialized Help widget, and XView has a Help frame, that puts the right information into the Help dialog display area and makes the dialog appear on the screen. You either have to include a function call to `OLRegisterHelp()` in OLIT, or set an object attribute in XView, to enable help on a widget (object).

To provide CDE help with your application, you must:

1. Establish help callbacks on all relevant widgets.

These callbacks must be able to provide the help information for the associated widgets.

2. Create and manage the help dialogs.

CDE provides `DtHelpDialog` and `DtHelpQuickDialog` widgets to create help dialog boxes and quick help dialogs. CDE has one shared help dialog that displays help.

3. Implement on item help.

CDE Help System Author's and Programmer's Guide provides source code to do this.

Richness of Help System

OpenWindows help has a single help dialog in which you can place text only. CDE help is much richer. CDE provides both quick and full help. You can also include much more than just text in your help dialogs; for example, color graphics and hyperlinks. The user can print help and also use navigation facilities to stack and traverse help attached to different widgets.

Internationalization

You can internationalize an OpenWindows, as well as a CDE, application. The steps to internationalize an OpenWindows application that are different in CDE than in the OpenWindows environment are documented in Appendix B, “Internationalization and CDE.”

See *CDE Programmer's Overview* and *CDE Internationalization Programmer's Guide* for more information on internationalizing a CDE application.

Fonts

In the OpenWindows environment, the default font type is Lucida. The same is true for the CDE desktop, so the CDE user will see no font style differences from the OpenWindows desktop.

Fonts in the OpenWindows environment have proprietary font names, whereas CDE is open. All CDE font names start with `-dt-` and are common across all CDE platforms. Both CDE and OpenWindows fonts follow the X11 XLFD font specifications.

In both the OpenWindows and CDE environments, your application should not override the system font defaults. This enables the user to customize his desktop. In the OpenWindows environment, the user can choose font type and style through the Workspace Properties desktop application. In CDE, the user can choose font size through the Style Manager.

In the OpenWindows environment, you have to specify fonts for any locale in which you want your application to run. By using the CDE Interface fonts, your application will run the same across all locales and desktops. If you use Application fonts, you must still specify fonts for Asian locales.

The CDE font aliases are in `/usr/dt/config/xfonts/<locale>`, where `<locale>` is the directory corresponding to the locale in which you are interested. The default font resources that the Style Manager uses are in `/usr/dt/config/<locale>/sys.fonts`.

See *CDE Programmer's Overview* and *CDE Programmer's Guide* for more information on CDE fonts.

This chapter describes toolkit terminology, common widgets, CDE exclusive widgets, and high-level widgets, and provides information about the different libraries.

<i>OPEN LOOK Versus CDE Motif Toolkits</i>	<i>31</i>
<i>XView Libraries Versus CDE Motif Libraries</i>	<i>35</i>
<i>OLIT Libraries Versus CDE Motif Libraries</i>	<i>39</i>

Note – Everything said in this chapter that refers to the CDE Motif toolkit also applies to the Solaris 2.4 Motif toolkit.

OPEN LOOK Versus CDE Motif Toolkits

When you compare an OPEN LOOK application with its CDE Motif counterpart, a few contrasting visual elements are immediately apparent. For example, the OPEN LOOK buttons are round whereas the CDE Motif buttons are square. The shading applied to buttons and other objects for a three-dimensional appearance are also different. Although such cosmetic elements do not affect a program's behavior, and can often be disregarded when porting, your application will not be CDE style-guide compliant if you deviate from the CDE look.

Several differences are often significant in a conversion effort. The most critical of these features and other GUI elements are summarized in three sections:

- Aspects of the OPEN LOOK user interface that are missing from CDE Motif
- Aspects of CDE Motif that do not appear in the OPEN LOOK user interface
- Features or other elements that appear in both specifications but are implemented differently

See the Preface for a list of style guides and other references that describe the OPEN LOOK and CDE Motif GUIs.

Features Only in the OPEN LOOK User Interface

The following features are found in the OPEN LOOK user interface and are implemented in XView or OLIT (or both) but do not appear in CDE Motif:

- Split window control
- Scrollbar anchors
- Defaults of the menu
 - Automatic default; shortcut method for selecting the default
 - Default menu item indicated by a *ring*
- Font chooser widget
- Pointer warping in notices
- Can drop onto minimized windows (icons)

Features Only in the CDE Motif User Interface

The following features are found in CDE Motif and not in the OPEN LOOK user interface:

- Front Panel
- Tools for producing and registering help volumes with hypertext capabilities
- Additional user interface objects (*widgets*) available for applications and specified in the CDE Style Guide

Notable Implementation Differences Between Toolkits

Many features are roughly equivalent in the OPEN LOOK user interface and CDE Motif but have significant implementation differences. The following are the most important differences:

- Tear off Menus
- Input focus indicators
- Widget classes (sliders and gauges versus scales, for example)
- Secondary text selections

Other significant differences include the following:

- Keyboard bindings
- The window manager controls associated with each window
- Internalization
- Mouse button behavior

The remainder of this section provides information on some of these features.

Tear-off Menus

In CDE Motif, tear-off menus replace the *pinned menus* of the OPEN LOOK user interface. Selecting the dashed line on the top of the menu “tears-off” the menu.

Secondary Text Selection

The OPEN LOOK secondary text selection is roughly analogous to the Motif quick transfer mechanism.

Window Controls

One of the most critical implementation differences involves window controls. When the Motif user presses the Window menu button in the upper left corner of the title bar, or the OPEN LOOK user presses the MENU button anywhere on the window background (including the header), a menu is displayed. The options offered under the two GUIs introduce a key contrast.

The Motif *Window menu* offers a choice of Restore, Move, Size, Minimize, Maximize, Lower, and Close. The OPEN LOOK *base Window menu* offers Close, Full Size, Properties, Back, Refresh, and Quit. The two lists are fundamentally the same, but have very different effects.

In the OPEN LOOK user interface, the Close option minimizes (iconifies) the window, and Quit terminates the application.

In Motif, the Minimize option minimizes the window, and the Close option terminates the application. Many users familiar with the OPEN LOOK user interface have found themselves exiting a Motif program when their intent was to close its window to an icon.

Mouse Button Behavior

The structure of the mouse buttons is very similar in both specifications; however, the difference is significant enough to cause some confusion.

Table 5-1 shows the default left-to-right mapping of the three OPEN LOOK mouse buttons.

Table 5-1 OPEN LOOK Mouse Buttons

BUTTON	Description
SELECT	Specifies an object or manipulates objects and controls, drag
ADJUST	Extends or reduces the number of selected objects
MENU	Displays a menu associated with the pointer location or specified object

The three Motif mouse button assignments, described in Table 5-2, also start by default with the left mouse button.

Table 5-2 Motif Mouse Buttons

Button	Description
BSelect	Selects, activates, and sets the location cursor, drag
BTransfer	Moves and copies elements, drag and drop transfer. Can be customized to be the OPEN LOOK Adjust button.
BMenu	Displays menus

XView Libraries Versus CDE Motif Libraries

This section compares the XView and CDE Motif libraries.

Terminology

The XView toolkit and the Xt (OLIT and Motif) toolkits use the following terminology:

XView	Xt (OLIT and Motif)
Package	Widget
Attribute	Resources
Frame	Shell

XView is based directly on Xlib, whereas Motif is based on the Intrinsics (Xt) toolkit and the Intrinsics toolkit is based on Xlib.

XView	OLIT	Motif
XLib	Xt	Xt
	XLib	XLib

Because of this fundamental difference, the basic library functions to initialize the environment and create, modify and destroy graphical objects, are different, as shown in the following examples:

XView	Motif/Xt
<code>xv_init()</code>	<code>XtAppInitialize()</code>
<code>xv_create()</code>	<code>XtCreateWidget()</code>
<code>xv_set()</code>	<code>XtSetValues()</code>
<code>xv_destroy()</code>	<code>XtDestroyWidget()</code>

Functions that deal with event handling callbacks, and internationalization features, for example, get more complicated. For these features, simple one-to-one correspondence does not exist.

OPEN LOOK Versus Motif Toolkit Architecture

OLIT and Motif have very similar architectures whereas XView and Motif do not. When migrating from XView to Motif, you should note these toolkit differences.

The XView toolkit implements both the user interface objects, called *packages*, and the routines and processes that hold the interface together (creation routines, event processing, and so on), while Motif and OLIT implement basically just the user interface object, *widgets*, leaving the routines and processes to the Intrinsics library. For example, `xv_init()` is a function that is in the XView library. The corresponding function to use for OLIT or Motif programming, `XtAppInitialize()`, is in the Xt Intrinsics library.

The three toolkits represent two different GUIs. The appearance of the XView and OLIT toolkits are similar, whereas the appearance of CDE Motif is noticeably different. Although there is a rough one-to-one correspondence between the function calls in the libraries, the *behavior* of parallel programs is different. That is, even after an OLIT (or XView) program has been converted to use the CDE Motif library, it still to some degree has an OPEN LOOK appearance. A program in such a state does not adhere to either style completely.

Programming Model

Although the APIs are different, both XView and Motif are based on the same object-oriented methodology for programming a user interface:

- Initialize the toolkit
- Instantiate user interface objects
- Register callbacks on the user interface objects
- Enter event loop, waiting for user to generate events on the user interface objects

The overall structure of a program being ported from XView to Motif can remain intact even though all the function calls must be converted from one API to the other.

Common Types of User Interface Objects

Both XView and Motif are user interface toolkits that support some common types of user interface objects. However, XView implements many of these objects at a higher level that requires more than one Motif widget to produce the equivalent of a single XView object.

Table 5-3 lists the basic mapping of common objects for XView and its equivalent CDE Motif widget:

Table 5-3 Basic Mapping of Common Objects.

XView Package	Equivalent CDE Motif Widget
Base Frame	XmTopLevelShell + XmMainWindow
Command Frame	XmDialogShell + XmBulletinBoard
Notice	XmDialogShell + XmMessageBox (MessageDialog)
Canvas	XmScrolledWindow + XmDrawingArea
Panel	XmBulletinBoard or XmForm
Panel Button	XmPushButton
Menu Button	DtMenuButton (not accessible in OpenWindows environment)
Abbrev Menu Button	XmRowColumn (Option Menu)
Checkbox	XmRowColumn + XmToggleButton (CheckBox)
Exclusive Choice	XmRowColumn + XmToggleButton (Radio Box)
Scrolling List	XmScrolledWindow + XmList
Message	XmLabel
Slider	XmScale
Text Field	XmTextField
Numeric Text Field	DtSpinBox (not accessible in OpenWindows environment)
Text SubWindow	XmScrolledWindow + XmText (ScrolledText)
TTY SubWindow	XmScrolledWindow + XmTermPane; DtTerm (not accessible in OpenWindows environment)

Table 5-3 Basic Mapping of Common Objects. (Continued)

XView Package	Equivalent CDE Motif Widget
Scrollbar	XmScrollBar
Popup Menu	XmMenuShell + XmRowColumn (Popup Menu)
Pulldown Menu	XmMenuShell + XmRowColumn (Pulldown Menu)
Pullright Menu	XmMenuShell + XmRowColumn (Pulldown Menu)
File Chooser	XmDialogShell + XmFileSelectionBox

Differences Between XView and CDE Motif

XView abstracts a number of other X11 functions that Motif (Xt) does not. In order to get equivalent functionality in Motif, these must be re-coded with direct Xlib calls.

The XView packages with no Motif equivalents are:

- Icon
- Server Image
- Colormap Segment (CMS)
- Cursor
- Fullscreen
- Server
- Font

Additionally, *no* CDE Motif equivalent exists for the OPEN LOOK user interface functionality that splits windows into different views. To implement this function, you must subclass one of the Motif Manager widgets.

Some XView functions can be coded with the Motif/Xt API; however, these APIs are significantly different, and require complete redesign and recoding. These functions are:

XView API	Motif/Xt
Selection service	Xt selection API
Drop target package	Motif drag-and-drop API ¹
Notifier	Xt event management API

1. If you are porting to CDE, use the CDE drag-and-drop API. It is an extension of the Motif 1.2 drag-and-drop API and is easier to use.

X Resources

The X resources that control the behavior and appearance of XView and Motif applications are different. XView objects may not necessarily have instance names attached to them, unlike Motif/Xt objects. XView resources are independent of instance names. For example, `Window.Foreground.Color` affects all relevant XView objects.

Motif/Xt resources contain either class or instance names, for example, `mainframe.control_panel.button1.foreground`. To make Xt resources affect more than one object, use wildcards and class names.

External Files

XView reads in several files at start-up time ranging from message files to application specific default files containing X resources. The content and location of some of these files are different from Motif. (For example, Motif/Xt does not read in a message domain file (.mo file) under `$OPENWINHOME`.) The internationalization messaging scheme is completely different for Motif.

OLIT Libraries Versus CDE Motif Libraries

Solaris CDE Motif and OLIT support a number of convenience routines that are useful in manipulating objects in the user interface.

Routines Only in OLIT Library

These features are unique to the OLIT library.

- Error-Handling Routines

OLIT provides a range of routines to enable the application to customize error handling.

- Dynamic Resources

OLIT provides support for the user to dynamically change the value of certain resources (such as colors or fonts) after an application has been invoked.

Routines Only in CDE Motif Libraries

These features are unique to the CDE Motif libraries.

- **UIL Support**

CDE Motif supports the engine for using UIL definitions for the user interface layout. This separation allows the user interface to be modified without recompiling the program's executables. OLIT's Devguide solution (`golit`) provides similar functionality by allowing the user interface to be defined in GIL file format; however, the application must be recompiled when the user interface changes.

- **Clipboard Routines**

CDE Motif provides a library for managing the clipboard and its selections.

- **Widget-Creation Routines**

CDE Motif provides a complete set of routines that create a particular type of widget or group of widgets.

- **Compound String Support**

CDE Motif requires the user of compound strings for most text. To support these special string formats, CDE Motif includes a number of routines to create and manipulate compound strings.

Widgets

Both the OLIT and CDE Motif toolkits support a number of common widgets and gadgets with similar functionality, and each supports a number of more exclusive widgets. If a widget is implemented in one toolkit but not in the other, you can often build an equivalent object using multiple widgets in the other toolkit.

Table 5-4 matches the common widget name to the actual class name of the widget in each toolkit.

Table 5-4 Common Widget Mapping

OLIT Class Name	CDE Motif Class Name
BulletinBoard	XmBulletinBoard
DrawArea	XmDrawingArea
ExclusiveChoice + RectButtons	XmRowColumn + XmToggleButton (Radio Box)
Form	XmForm
Manager	XmManager
MenuButton	DtMenuButton (not accessible in OpenWindows environment)
NoticeShell	XmDialogShell + XmMessageBox
AbbrevMenuButton	XmRowColumn (Option Menu)
PopupWindowShell	XmDialogShell
NonExclusiveRectButton	XmRowColumn + XmToggleButton (Check Box)
PopupMenuShell	XmMenuShell
Primitive	XmPrimitive
OblongButton	XmPushButton
ControlArea	XmRowColumn
Scrollbar	XmScrollBar
ScrollingList	XmList + XmScrolledWindow
ScrolledWindow	XmScrolledWindow
Slider	XmScale
StaticText	XmLabel
TextEdit	XmText
TextField	XmTextField
RectButton	XmToggleButton

Widgets Exclusive to CDE Motif

This section briefly describes the widgets that are exclusive to CDE Motif.

Note – These widgets are also available for Motif development in the OpenWindows environment, except for the `DtTerm`, `DtEditor`, `DtComboBox`, `DtSpinBox`, and `DtMenuButton` widgets.

- `DtTerm`

This widget provides the functionality required to emulate an ANSI X3.64-1979-style terminal emulator (specifically a DEC VT220-like terminal with extensions).

- `DtEditor`

This widget provides a programmatic interface for editing services such as cut and paste.

- `DtComboBox`

This widget is a combination of a text field and a list widget that provides a list of valid choices for the text field. Selecting an item from this list automatically fills the text field with that list item.

- `DtSpinBox`

This widget is a convenient user interface control that increments and decrements an arbitrary `TextField`.

- `DtMenuButton`

This widget is a command widget that complements the menu cascading functionality of an `XmCascadeButton` widget. (OLIT has its own menu button widget, with equivalent functionality to `DtMenuButton`.)

- `XmArrowButton`

This button is a primitive push button widget that displays an arrow label.

- `XmCommand`

This is a manager widget that builds a command box and manages the user-selected commands and command history.

- `XmDrawnButton`

This button is a primitive push button whose label can be drawn by the program.

- `XmFrame`

This manager widget is used to parent a single child and enclose that child with a frame or border.

- `XmLabelGadget`

This gadget is a low-overhead object for read-only text.

- `XmMainWindow`

This manager widget supports a menu bar, command area, and work area.

- `XmPanedWindow`

This manager widget implements resizeable panes within a window.

- `XmSelectionBox`

This widget box allows you to select one item from a list in a general dialog box.

- `FileSelectionBox`

This widget provides a standard way to select a file (typically for the application to read or write).

The `libDtWidget` library, which contains the `DtComboBox`, `DtSpinBox`, `DtMenuButton` and `DtEditor` widgets, depends directly on the following libraries:

- `Xm` library for the Motif superclass support
- `Xt` library for creation and manipulation of widgets
- `X` library for the base X Window System

Widgets Exclusive to OLIT

This section briefly describes the widgets that are exclusive to OLIT.

- DropTarget

This primitive widget implements both the source and destination ends of drag-and-drop operations.

- FlatWidget

These special widgets manage any number of subobjects within the context of a single widget. When implementing menus or choice objects that contain many subitems, they provide a significant memory savings.

- FooterPanel

This manager widget automatically supports a window with a floating footer area.

- RubberTile

This manager widget allows relative-sizing constraints to be placed on its children.

- Stub

This primitive widget enables you to customize its behavior without subclassing.

Porting Issues and Ideas

This chapter discusses porting OPEN LOOK applications to CDE Motif on the Solaris CDE desktop. Much of the information presented is generic enough to encompass porting from OPEN LOOK to Motif running on the OpenWindows desktop.

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Elements of Migrating

Migrating from the OPEN LOOK user interface to Motif is complex. It generally will not amount to a widget-for-widget swap. Do not expect it to be as straightforward as a line-by-line code translation. Depending on your application, the migration can range from a major architectural impact down to subtle widget differences.

Besides migrating from the OPEN LOOK user interface to Motif, porting to the Solaris CDE desktop means that you have the Solaris CDE development environment infrastructure available to your application. See Chapter 4, “Development Environment Transition Issues,” for a summary of some of these features. See *CDE Programmer’s Overview* for a more detailed description of the development environment components and documentation.

Do You Need to Port?

First you should decide whether you really have to port your application. As mentioned in “Running Existing Applications on the Solaris CDE Desktop” on page 5, OPEN LOOK and Motif applications run “as is” on the Solaris CDE desktop. So you do not *need* to port your existing applications to Motif or CDE to have them run on the Solaris CDE desktop.

This provides you with flexibility about when and under what circumstances you decide to port your application. For example, you may decide to wait until a major release of your product before porting your application to the Solaris CDE desktop.

Basic Integration

Basic application integration is a set of highly recommended tasks you should perform to integrate your application into the Solaris CDE desktop. These tasks *do not* require modification of the source code for your application. (Some types of print integration—enabling printing in your application—require slight code modification, but these are optional to basic integration.)

Basic integration does not involve extensive use of the desktop application program interface (API). Therefore, it does not provide other interaction with the desktop, such as drag-and-drop capabilities.

A lot can be done to integrate your application into the Solaris CDE desktop without modifying any code. You can:

- Define actions for your application
- Write a help volume and have it available from the top level of the Help Manager
- Integrate your application with the Front Panel and Application Manager
- Enable printing

The Solaris CDE desktop provides interoperability between your application and other desktop applications. You can add new services (see “Recommended Integration” and “Optional Integration” below) if you want to use them and are willing to modify your code.

See *CDE Programmer’s Guide* for details on how to enable printing in your application, and for a list of the steps that comprise basic integration. See the “Registering an Application” chapter of *CDE Advanced User’s and System Administrator’s Guide* for detailed instructions on how to implement the basic integration steps.

If You Decide to Port

If you decide that you definitely want to port, think of the process as an art and not as a science. There is no magic tool that will perform the port for you. There is no foolproof algorithm to follow that works every time. What you really need to do is learn Motif and CDE, and understand the CDE style guidelines. This takes time and patience.

Benefits of Porting

Benefits of porting to the CDE desktop include:

- Taking advantage of new features offered by CDE
- Providing easy portability on a wide variety of platforms
- Enabling better “ease of use” by ensuring that your application behaves according to the CDE style guidelines

- Providing interoperability with other Solaris CDE applications in areas where the Solaris CDE and OpenWindows environments differ, for example:
 - Window manager interaction
 - Drag and drop
 - Session management

Integrating into the Solaris CDE Environment

Recommended and optional integration require changes to your code to implement the functionality within these categories. Your application will be even more integrated with the desktop the more CDE functionality you adopt.

Recommended Integration

The Solaris CDE development environment contains components and guidelines so that your application will integrate well with other applications on the desktop:

- Help system
- ToolTalk messaging system
- Session Manager
- Drag and drop
- Internationalization
- Standard font names
- Error message guidelines
- User customization issues

Optional Integration

The following Solaris CDE components enable you to leverage services provided by the desktop for achieving specialized tasks:

- CDE Motif control widgets
- Data typing
- Action invocation
- Workspace Manager
- Terminal widget
- Text editor widget
- Calendar API
- Desktop Korn shell

Start Small

If you plan to port your application to the Solaris CDE desktop, or if you want to practice porting, start with a small example and work your way up.

Convert and Clean Up

With small applications that have simple GUIs, you can practice porting by using a two-step process:

- Convert the GUI object-by-object from the OPEN LOOK user interface to Motif. (See “Use Application Builder” below.)
- Clean up the resulting GUI so that it adheres to the CDE style guidelines. Take advantage of this opportunity to review the GUI for ease-of-use and customer-specific issues. You might decide to change the interface, even if the object-by-object conversion is style-guide compliant.

Chapter 7, “Porting Example: OPEN LOOK to CDE Motif,” takes a simple OPEN LOOK application and illustrates this process.

Note – This is *not* the recommended way to port large, real-life applications.

Use Application Builder

Use Application Builder (App Builder) to build the new Motif GUI for the application. You need flexibility to experiment and make changes when you port using the two-step process described in “Convert and Clean Up.” If you manually code in a particular GUI, it is difficult and time consuming to make modifications. App Builder provides flexibility by enabling you to drag and drop objects to easily create prototype GUIs. It generally requires *less* time to use App Builder to lay out a new Motif interface than it does trying to port the GUI by hand.

In fact, whatever porting process you use and no matter how large your application, you should consider using App Builder. App Builder produces all the GUI and application framework code, which frees your time to focus on application code.

Architectural Impact

Resist the urge to dive right in and start transforming your code to CDE Motif. Begin the process of porting your application to Motif and CDE by examining your application's architecture.

The more architecture your application has, the more important it is to re-architect the application correctly up front. In these situations the complexity of the porting process increases dramatically if you use the "convert and clean up" strategy.

GUI and Internals

For programs in which important functions are insulated from the surrounding GUI, the impact of the difference in the OPEN LOOK user interface and Motif can be negligible. However, if the code is tightly linked to the user's actions or relies on a specific OPEN LOOK feature, producing a CDE Motif equivalent may be difficult.

If you can draw a line through your code modules and completely isolate those that constitute the user interface from those that make up the remainder of your application, then you can focus your migration efforts on the process of replacing the user interface modules with equivalent ones developed for Motif. Many application developers follow software development methods that require this kind of clean separation and, in some cases, even formally specify the program boundaries between user interface and application internals.

Alternatively, if your software is more monolithic and has application-specific abilities embedded within functions that also provide the user interface, then you may have to spend extra time separating the two types of functions, thereby complicating your migration. In an extreme case, you must choose between violating the style guide or redesigning part of the program.

The amount of time involved in taking full advantage of the Solaris CDE software significantly depends on how your application is laid out. Applications that are well designed are easier to port and to properly break down for maintenance and readability.

Static Versus Dynamic Layout

As mentioned previously, porting your application to Motif is not an object-for-object swap. Such swapping concentrates on the static aspects of your application user interface. Complex applications in particular contain many objects that manage the application infrastructure and make it work in dynamic situations. (Dynamic aspects of your application include, but are not limited to, resizing windows, localization, and font changes.) These *manager widgets* that handle the dynamic geometry in your application are different in the OPEN LOOK and Motif toolkits. Your application will not display the dynamism you want if you try an object-for-object swap of manager widgets. Introducing an appropriate design to handle the dynamic aspects of your application typically increases the complexity of its architecture.

XView does not provide much variety for dynamic layout. It primarily fixes objects at (x, y) positions, which can cause difficulties if an application font is changed or the application is localized. Motif and OLIT provide a variety of geometry manager widgets; however, they have significant differences.

Table 6-1 OLIT and Motif Geometry Manager Widgets

OLIT	Motif	Comments
BulletinBoard	XmBulletinBoard	Basically equivalent; provide static x,y pixel-based positioning for children
Caption	(none)	OLIT <code>Caption</code> widget provides a way to automatically place a label on one of the four sides of a control widget. To get this functionality in Motif, create a separate <code>XmRowColumn</code> widget that contains two children: the label and the control
ControlArea	XmRowColumn	Both widgets provide a way to lay out children in rows and columns. The OLIT <code>ControlArea</code> widget supports aligning <code>Caption</code> widget children vertically by colon, which the Motif <code>XmRowColumn</code> widget does not. ¹ The Motif <code>XmRowColumn</code> widget enforces certain size policies on children (usually forces children in a particular row or column to be the same size), but the OLIT <code>ControlArea</code> widget does not.
FooterPanel	(none)	OLIT <code>FooterPanel</code> widget provides a way to lay out a window with a floating footer child at the bottom. The Motif <code>XmMainWindow</code> widget can be configured for this layout by setting the “message area child” to be a widget that can be used as a footer (such as an <code>XmForm</code> or <code>XmRowColumn</code> widget).

Table 6-1 OLIT and Motif Geometry Manager Widgets

OLIT	Motif	Comments
Form	XmForm	<p>Both widgets provide a means for attaching their children relative to each other and relative to the Form itself, however each takes a different view of these “attachments.”</p> <p>The OLIT Form widget provides attachment resources for the x and y dimensions, while the Motif XmForm widget provides separate attachments for all four sides (top, bottom, left, right). You can convert OLIT Form widget attachments to equivalent XmForm widget attachments if both attachment paradigms are well understood.</p> <p>The Motif XmForm widget also provides a special type of attachment called “Position.” Children can be attached to dynamic positions in the Form widget which change as the Form widget's size changes. This enables children to be configured to always occupy a certain percentage of the Form widget's real estate.</p>
RubberTile	(none)	<p>OLIT RubberTile widget enables children to be configured to take up a percentage of the RubberTile widget's height (if vertically oriented) or width (if horizontally oriented).</p> <p>In Motif you can achieve similar functionality by using the Position-based attachment resources in the XmForm widget.</p>
ScrolledWindow	XmScrolledWindow	<p>Both widgets provide a way to encompass a child widget into a scrollable view port.</p>
(none)	XmMainWindow	<p>Motif XmMainWindow widget provides a manager that lays out its children into specific areas of the window. These areas include the menu bar area, command area, work area, and message area.</p> <p>OLIT has no equivalent widget.</p>
(none)	XmPanedWindow	<p>Motif XmPanedWindow widget provides a way to lay out its children in vertically oriented panes. Each of the panes has a sash that can vertically resize the pane.</p> <p>OLIT has no equivalent widget.</p>

1. CDE App Builder provides a geometry manager abstraction called a *group* that enables widgets to be automatically positioned in common layouts, including being vertically aligned by colon. App Builder generates all the code to implement this functionality.

Study the Target Environment

The CDE desktop is quite different from the OpenWindows desktop, although it contains many of the same types of tools. The most obvious difference is that it is a Motif desktop. Read the “Architectural Overview” chapter of *CDE Programmer's Overview* for a discussion of the end user and development

environment architectural structure. Also read about:

- Motif: See “Motif 1.2.3 Documentation” on page 77 and “Motif Programming” on page 79 for a listing of Motif documentation.
- CDE Look and Feel: Refer to *CDE Style Guide and Certification Checklist* for details. To be style-guide compliant, your application must pass the checklist at the end of the book.
- CDE Run-time and Development Environments: See “CDE Documentation” on page 76 for a listing of all CDE documentation that SunSoft provides. In addition, the desktop applications each have online help volumes.

GUI Development Tools

If you used an application builder to create the GUI for your application, your migration to the Solaris CDE desktop will probably be easier. In most cases, the use of a builder implies that you have some degree of separation between user interface functions and application internals, the advantages of which were previously discussed.

Also, builders typically use generalized internal storage formats or are capable of generating interchange files, each of which may be post-processed to automate some of the conversion process. Contact your builder vendor to see what migration tools they are currently offering.

Other less tangible tools that you might have used and that could ease your transition include development approaches that produced functional requirements documents or high-level designs. These representations may describe your application in terms less specific to the OPEN LOOK user interface that are more amenable to being mapped to CDE and CDE Motif than your source code.

Use Transition Tools

No one tool on the market will do everything you need for transitioning your application to the Solaris CDE desktop. Nonetheless, depending on different aspects of your application, you may find tools to solve some of your problems. These specialized tools can make the transition easier.

As you research the tools available to you, ask yourself if any are a good match for your application transition and what you are trying to do.

Tools to Transition to Motif

Many third-party tools are offered to transition to Motif. For example, Integrated Computer Solutions (ICS) offers two converters: one translates XView source code to GIL files and one translates GIL files to Motif source code.

SunSoft's Devguide offers Motif Conversion Utilities as a way of helping customers make the transition. Devguide's front end is still in the OPEN LOOK user interface, and it has the same OPEN LOOK palette, but you can use the Motif Conversion Utilities to transform GIL files into UIL files or Motif and C code. Use the Motif Conversion Utilities (`guil` and `gmf`) in the Solaris 2.4 Software Developer's Kit to convert GIL files to UIL and Motif C code. UIL files can be imported into Motif GUI builders to generate Motif-based GUIs.

Note that using transition tools for GUI migration results in a GUI that you will probably need to refine to be CDE style-guide compliant. You may need less time to re-layout the GUI if you use a GUI builder tool.

Tools to Transition to the Solaris CDE Desktop

If you used Devguide to create your application, you can use App Builder's GIL-to-BIL converter to create BIL files, which is the format the App Builder uses. BIL file format is similar to GIL file format. However, BIL files contain CDE-specific information and produce a CDE Motif GUI. The GIL-to-BIL converter makes some educated conversion guesses based on heuristics, which might not give you the result you want. For best results, take the BIL files that the converter produces, load them into App Builder, and modify the user interface as needed.

App Builder is a tool in the Solaris CDE environment that is very similar to Devguide, which is used in the OpenWindows environment. Transitioning to CDE in this manner solves a significant number of conversion problems. Because App Builder generates files for you, these files are easier to manipulate than C code you would have to write yourself. App Builder preserves application stubs files, so your application-specific code is unchanged. It also uses the same file-naming conventions as Devguide.

If you did not use Devguide, there are currently no third-party tools to use for converting OPEN LOOK applications to CDE. Try a Motif conversation tool such as is discussed in "Tools to Transition to Motif" above.

Use Existing Code

This section discusses the ways in which the Solaris CDE software provides code for you to either use or learn from to develop Solaris CDE applications.

Application Builder

Use App Builder to build a simple Solaris CDE application. Then generate code from it to see what the code looks like. This is a good way to learn how to use CDE Motif and some of the CDE functionality.

The more features in App Builder you use, the more coverage you get in generated code of Solaris CDE features. Try App Builder to, for example, alter object attributes, create connections, and use the Applications Framework Editor. Then generate code and examine it. Cycle through this process to generate variations of code to look at and learn from.

Demo Code

The Solaris CDE development environment contains demo source code that can considerably ease your application porting tasks.

Each development environment component has a demo directory in `/usr/dt/examples`. The demo directory contains an example program that uses the component's APIs. Read the demo code to learn how to incorporate the component behavior into your application. In some cases you can copy and paste code from the demo into your application.

The `/usr/dt/examples/template` directory contains a demo program that integrates most of the Solaris CDE components that comprise basic and recommended integration functionality. This template demo illustrates how to write a simple application that is well integrated with the Solaris CDE desktop.

Tips

Here are some tips about writing applications for the CDE desktop.

Floating Menus

To ensure that your application works properly on the CDE desktop, any functionality you put into floating menus should also be provided by some pulldown menu. This will enable your application to work with both two-button and three-button mouse devices.

Colormap Behavior

Colormap installation is handled differently under CDE than it was in the OpenWindows environment. This difference is most visible for applications that specify a list of subwindows that use colormaps other than the default colormap. This list of subwindows is specified in the `WM_COLORMAP_WINDOWS` property.

In the OpenWindows environment, applications need only to specify a list of subwindows in this property. As the user moves the pointer around the screen, the OpenWindows window manager (`o1wm`) installs the appropriate colormap for whatever window is under the pointer.

The CDE window manager, `dtwm`, does not provide this behavior. Applications that relied on `o1wm`'s pointer-based colormap installation will likely not display in their proper colors when run under CDE. There are several things that you can do to avoid this problem:

- Avoid using the `WM_COLORMAP_WINDOWS` property entirely, and update the colormap attribute of the top-level window (the window of the shell widget) with whatever colormap is appropriate. This colormap will be installed whenever the window is given the input focus.
- The `WM_COLORMAP_WINDOWS` property is an ordered list of windows, and typically only the first window in this list will have its colormap installed and will appear in its proper colors. The other subwindows will most likely appear with incorrect colors. If it is important for a particular subwindow to appear with its correct colors, it should be placed first in the list.

- If the ID of the top-level window does not appear in the list, it is implicitly assumed to appear first. To get a subwindow to display with its correct colors, the ID of the top-level window should appear in the list somewhere after the ID of the subwindow.
- Applications can update the `WM_COLORMAP_WINDOWS` property at any time. If the application's state changes such that a different subwindow should now have its colormap installed, the application should update the property so that the new subwindow appears first.

The user can also modify the key bindings of `dtwm` to bind the `f.next_cmap` and `f.prev_cmap` functions to keyboard keys. These functions will step forward and backward through the `WM_COLORMAP_WINDOWS` list and install a different colormap each time the user presses the appropriate keys.

Summary: Things to Keep in Mind

Here is a list of things to keep in mind as you think about porting your application to the Solaris CDE desktop:

- OPEN LOOK to Motif migration is a complex and wide-ranging issue
It generally does not amount to an object-for-object swap. Do you really need to port? If so, think of it as an art and not as a science.
- What is your schedule?
When must you ship? What resources do you have available to you? Can you tie the port in with the next major release?
- How did you build your application?
Did you use a builder? Were any other tools involved in producing your application? If so, go to your vendor and ask for CDE support.
- Is your application GUI separate from internals?
Did you use C++ objects to encapsulate the GUI? If so it will be easier to port your application.
- Are you starting from XView or OLIT?
OLIT applications are generally easier to port because they rely on the Xt intrinsics, as does Motif.

- Are there any customer issues?

Do you have to be concerned about interoperability with other systems? Are there transition and training issues for the customer? Is a mixed desktop acceptable for now?

Porting Example: OPEN LOOK to CDE Motif

This chapter presents an example of porting an OPEN LOOK application with a simple graphical user interface (GUI) to CDE Motif. It illustrates the two-step process of porting: first translating the OPEN LOOK user interface objects one-by-one to Motif objects, then cleaning up the interface and making sure it conforms to the CDE style guide.

<i>OpenWindows 3.4 Snapshot Application</i>	<i>60</i>
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<i>Clean Up</i>	<i>62</i>

Of course, your goal in porting from the OPEN LOOK user interface to CDE Motif should be to convert the GUI and clean up at the same time. The more familiar you become with the CDE style guide, the easier this will be. Also, as you learn more about Motif, learning the correlation between OPEN LOOK objects and Motif widgets will become easier.

When porting your application, take the opportunity to examine its user interface. Think about whether it could be streamlined or made more user-friendly. In going from the OPEN LOOK user interface to Motif, the application's look will change anyway. This is a good time to re-examine design decisions you made in the past.

OpenWindows 3.4 Snapshot Application

Figure 7-1 is an illustration of the OpenWindows 3.4 Snapshot application. It is running on the Solaris CDE desktop using the Motif Window Manager, so it has a Motif title bar.

The Snapshot GUI is fairly simple. It contains:

- Load..., Save..., Snap, and View... buttons
- Print menu button
- Snap Type and Snap Delay exclusive settings
- Beep and Hide check box settings
- Drop target

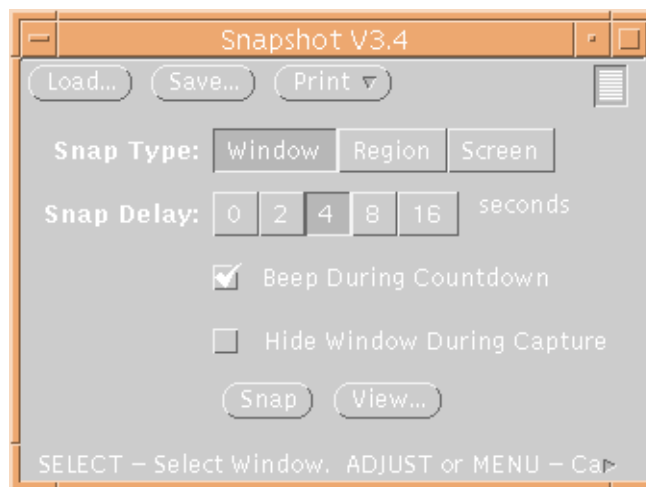


Figure 7-1 OpenWindows 3.4 Snapshot Application GUI

Convert

Using App Builder, the Snapshot GUI translates object-for-object into the GUI shown in Figure 7-2:

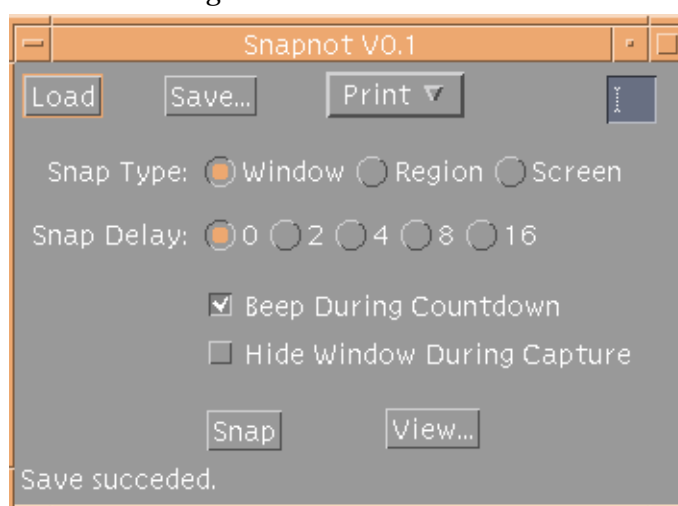


Figure 7-2 Motif Port of Snapshot GUI (Direct Translation)

You can see that the pieces of the interface and the general layout are very similar to the OPEN LOOK version. The buttons remain, except that they are square now instead of round. The check boxes look the same. The OPEN LOOK exclusive settings have changed to Motif radio buttons (which also offer mutually exclusive choices). A small text field with no label replaces the drop target.

Clean Up

If you want, you can consider yourself finished with this application port. No functionality has been lost, and the GUI now appears in Motif. However, you should ask yourself two questions:

- Is the resulting application style-guide compliant?
- Can the GUI be redesigned to make the application more user friendly?

Consider CDE Style Guidelines

CDE Style Guide and Certification Checklist highly recommends placing menu bars in applications. In addition, it considers File, Options, and Help menus as standard, to be placed in order from left to right. (Other menus are also considered standard but do not apply to the Snapshot application.)

The cleaned-up version places the Load, Save, and Print buttons under the File menu. These are typical file operations. “Beep During Countdown” and “Hide Window During Capture” are options that users have available to them, and are therefore put under the Options menu. This design decision also makes the interface less cluttered, since the text for these check boxes takes up a lot of screen space. A Help menu is added to comply with the style guidelines.

CDE Style Guide and Certification Checklist calls for a footer message at the bottom of an application whenever status is displayed there. This is added to the Snapshot GUI.

Motif does not support a drop site object. CDE supports a drag source object, which appears in the final GUI as a labelled camera icon. If you want drop support, the CDE style guidelines indicate that you must provide code to enable objects to be dropped anywhere in the application’s main window.

Finally, the Snap button at the bottom is highlighted, indicating that it is the default value (between Snap and View) if the user presses Return instead of pressing a button.

Other Design Considerations

The radio buttons take up a lot of screen space in the Snapshot GUI. CDE provides a widget called a `DtComboBox` that takes up less screen space and provides the same functionality. The Snap Type and Snap Delay radio buttons are replaced by `DtComboBox` widgets. The most typically used values appear as `DtComboBox` defaults.

You cannot use the `DtComboBox` widget if you are developing your application for the OpenWindows desktop. This widget is part of the CDE development environment, not the OpenWindows development environment. Even if you do have access to the `ComboBox`, however, you may want to retain the radio boxes, depending on issues such as ergonomics, customer needs, and consistency.

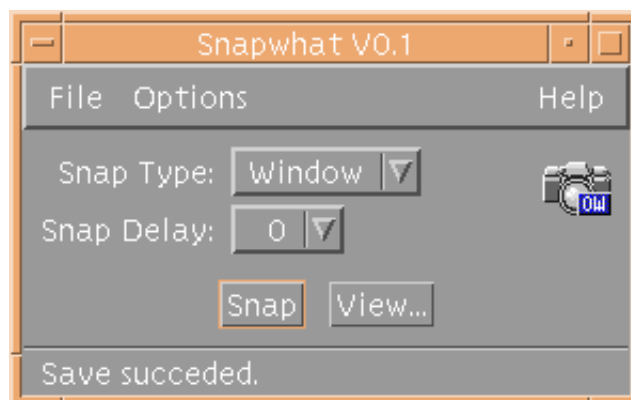


Figure 7-3 Motif Port of Snapshot GUI (Final Port)

CDE Motif Packaging



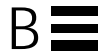
The CDE 1.0 release contains CDE Motif run-time and developer support as described in Table A-1. The first and second packages are the run-time product and CDE Motif Window Manager, respectively, and are available in the end-user package installation. Those that follow are the developers packages, which are available in the developer package installation.

Table A-1 CDE Motif Packages

Name	Default Location	Description
SUNWmfrun	/usr/dt	Contains the Motif dynamic libraries, their header files, and an executable, <code>xmbind</code> and its man page.
SUNWdtwm	/usr/dt	CDE Motif Window Manager (<code>dtwm</code>)
SUNWmfdev	/usr/dt	Contains the Motif dynamic debug libraries and the <code>uil</code> compiler
SUNWmfman	/usr/dt/man	Contains the Motif man pages.
SUNWmfdm	/usr/dt/examples/motif	Contains the Motif demos.



Internationalization and CDE



This is a guide for software developers writing internationalized Solaris CDE applications. It presents the differences between OpenWindows and CDE internationalization. Any steps that must be performed to internationalize a Solaris CDE application that are not mentioned in this appendix remain unchanged from the OpenWindows guidelines.

This appendix assumes familiarity with Xt and Motif programming.

<i>Ensure Correct CDE NLS Environment</i>	<i>68</i>
<i>Message Catalog Functions</i>	<i>68</i>
<i>Locale Announcement</i>	<i>68</i>
<i>Character Strings and XmStrings</i>	<i>68</i>
<i>Include app-defaults File</i>	<i>69</i>
<i>Localize Motif Resources</i>	<i>69</i>
<i>Deliver Message Catalog</i>	<i>70</i>
<i>Fonts</i>	<i>70</i>

Ensure Correct CDE NLS Environment

You must make sure that the `NLSPATH` environment variable is set properly. This ensures that your application will find message catalogs.

If your application calls `DtInitialize()` before `catopen()`, then `NLSPATH` is set. Otherwise, make sure that it understands the `NLSPATH` variable. For example, you can set it explicitly in your code.

Message Catalog Functions

Solaris CDE applications must use the `catopen()`, `catclose()`, and `catgets()` family of messaging functions (instead of `gettext()` and so on). See the man pages for information on how to use these functions.

Also, if the system on which you are writing your application does not define `NL_CAT_LOCALE` in a header file, you must define it in your application. This ensures that the application is portable to other UNIX XPG4-compliant platforms.

Locale Announcement

So that your application knows what locale it is running in, use:

- `XtSetLanguageProc()`—If your application is Motif/Xt GUI-based
- `setlocale()`—If your application is not GUI-based

Character Strings and XmStrings

This section describes how to convert between character strings and `XmStrings`.

To Convert from Character String to `XmString`

In Motif, you must make an explicit call to convert a string to `XmString`, an internal representation of the string. If you internationalize your application, use `XmStringCreateLocalized()` to perform this conversion.

In CDE Motif—unlike in Motif 1.2.3—`XmStringCreateLocalized()` recognizes `\n` as a line separator, so a string can have multiple lines.

To Convert from XmString to Character String

To convert from XmString to a character string, you must traverse the compound string and retrieve each segment individually. See section 19.3.3 of the *Motif Programming Manual*, Volume 6A, which contains a code sample that performs this conversion.

Do not use `XmStringGetLtoR()` to convert from XmString to a character string. This function assumes the text is oriented left-to-right.

Include app-defaults File

If your application uses resources, make sure to include an `app-defaults` file. Refer to the *X Toolkit Intrinsic Programming Manual* (Volume 4, Section 2.3.3) for details on setting up an `app-defaults` file.

Localize Motif Resources

Localize any Motif resource that represents something that must be customized for a particular locale by putting the resource in your `app-defaults` file. These include, but are not limited to:

- `XmNmnemonic`
- `XmNfontList`
- `XmNcolumns`
- `XmNinputMethod`
- `XmNpreeditType`

Deliver Message Catalog

Every SVR4 UNIX platform contains the `gencat` utility. Run `gencat` on the translated message catalog file to produce a binary form of the message catalog. The resulting file is a formatted message database.

CDE and `gencat`

Each platform has its own implementation of `gencat`. Follow these rules for message catalogs to ensure that each message catalog's format does not cause different `gencat` utilities to break:

1. Use a `$quote` directive if you have trailing spaces (see the `gencat` man page).
2. Do not put more than one space between the message id and the message string.
3. Insert a space between `$` and the comments.
4. Message IDs need to be sorted in ascending order.

.msg Files

A `.msg` file is a message catalog containing translatable text that appears in your application code. It is the file that you give to a translator for translation. See the `gencat` man page for its format. Use `gencat` to turn a translated message catalog to a message database.

.cat Files

A `.cat` file is a message catalog that results when you run `gencat` on a `.msg` file. This is a binary file.

Fonts

In the OpenWindows environment, font alias names differ depending on the application locale. In Solaris CDE, the font alias names are independent of locale. Refer to *CDE Internationalization Programmer's Guide* or *CDE Programmer's Guide* for information on CDE font names.

Solaris 2.5 Motif Window Manager



This appendix describes how to set up your environment to use the Solaris 2.5 Motif Window Manager (`mwm`) and how to access it from the OpenWindows desktop. You can run Motif clients with the OPEN LOOK Window Manager (`olwm`) without making further changes.

<i>Setting Motif Window Manager as the Default</i>	<i>72</i>
<i>Setting Motif Window Manager as the Default</i>	<i>72</i>
<i>Enabling Quit on the Workspace Menu</i>	<i>73</i>
<i>Enabling Drag and Drop for the Motif Window Manager</i>	<i>73</i>

Note – The Motif Window Manager provided with the Solaris 2.4 and Solaris 2.5 developer’s environment is *not* supported by SunSoft as a run-time user product and must not be distributed to users. `mwm` is *only* included in the developer’s environment for development purposes. You should use the default `olwm` window manager for developing applications for the OpenWindows desktop. You should use the CDE window manager `dtwm` for developing applications for the Solaris CDE desktop. `dtwm` is an upwardly compatible version of `mwm` specifically enhanced for CDE.

Setting Up the Motif Environment

To set up the environment to support Motif development, set the following variables in the initialization file for your shell (for example `.profile` for the Bourne or Korn shell or `.login` for the C shell).

1. If `SUNWmfwm` is installed, add `/opt/SUNWmfwm/bin` to your `PATH`.
2. Include the value `/usr/dt/lib/%T/%N%S` in your `XFILESEARCHPATH` environment variable.
3. Set the `XMBINDDIR` environment variable to `/usr/dt/lib/bindings`.
4. Both developers and users need to add `/usr/dt/man` to their `MANPATH`. If developers have installed the optional `SUNWmfwm`, they need to add `/opt/SUNWmfwm/man` to their `MANPATH`.
5. Source the initialization file by typing `.profile` for the Bourne or Korn shell, or `source .cshrc` for the C shell. Alternatively, you can log out and log in again so that the changes are recognized in your complete environment.

Setting Motif Window Manager as the Default

The `openwin` script indirectly starts the OPEN LOOK Window Manager (`olwm`). If you want the script to start the Motif Window Manager, set the `OW_WINDOW_MANAGER` environment variable:

```
% setenv OW_WINDOW_MANAGER mwm
```

Alternatively, you can add this to your `.profile` or `.login` file if you want to save this setting.

Note - `mwm` is only available if the Solaris 2.5 `SUNWmfwm` package is installed. This package is not available in the CDE 1.0 release.

Enabling Quit on the Workspace Menu

The Motif Window Manager does not have an option to exit `mwm`. Use the following steps to enable Quit on the Workspace menu.

1. Type `cp /opt/SUNWmfwlib/system.mwmrc $HOME/.mwmrc` and press Return.
2. Edit the `$HOME/.mwmrc` file and remove the leading exclamation mark (!) from the following line:

```
!"Quit..."    f.quit_mwm
```

Enabling Drag and Drop for the Motif Window Manager

To ensure the OpenWindows drag-and-drop option runs correctly with `mwm`, modify the `openwin-sys` script in `/usr/openwin/lib` (`/usr/openwin/lib`).

1. Become superuser. Edit the `/usr/openwin/lib/openwin-sys` script. Remove the # from the following line (uncomment it):

```
#dsdm &
```

2. Save the changes and quit the file.
3. Exit the window system and restart it.

This change initiates the drop-site database manager and restarts the window system.

Recommended Reading



This appendix lists books and articles on issues related to OPEN LOOK, Motif, and CDE application development. The books are available through Sun Express or through your local bookstore.

<i>CDE Documentation</i>	76
<i>ToolTalk Documentation</i>	76
<i>Motif 1.2.3 Documentation</i>	77
<i>OPEN LOOK to CDE Motif Transition</i>	78
<i>Graphical User Interfaces</i>	78
<i>Motif Programming</i>	79
<i>OPEN LOOK Programming</i>	79
<i>Xt/XLib Programming</i>	80

CDE Documentation

The Common Desktop Environment documentation set contains documents that will help you in your transition to Solaris CDE. These books will be published soon by Addison-Wesley.

Development Environment

- *Common Desktop Environment: Programmer's Overview*
- *Common Desktop Environment: Style Guide and Certification Checklist*
- *Common Desktop Environment: Application Builder User's Guide*
- *Common Desktop Environment: Programmer's Guide*
- *Common Desktop Environment: Help System Author's and Programmer's Guide*
- *Common Desktop Environment: ToolTalk Messaging Overview*
- *Common Desktop Environment: Internationalization Programmer's Guide*
- *Common Desktop Environment: Desktop KornShell User's Guide*
- *Common Desktop Environment: Product Glossary*

Online man pages are available for all development environment components.

Run-time Environment

- *Common Desktop Environment: User's Guide*
- *Common Desktop Environment: Advanced User's and System Administrator's Guide*

Online help volumes are available for most of the run-time environment components.

ToolTalk Documentation

- *The ToolTalk Service: An Inter-Operability Solution*, published by SunSoft Press and PTR Prentice Hall, Englewood Cliffs, NJ 07632, ISBN 0-13-088717-X
- *ToolTalk and Open Protocols: Inter-Application Communication*, by Astrid Julienne and Brian Holtz, published by SunSoft Press and PTR Prentice Hall, Englewood Cliffs, NJ 07632, ISBN 013-031055-7

The Solaris 2.5 Software Developer AnswerBook set contains:

- *ToolTalk Reference Manual*
- *ToolTalk User's Guide*

Motif 1.2.3 Documentation

The documentation listed in this section describes Motif 1.2 interfaces. Motif 1.2.3 is a patch release of 1.2 and the same specifications apply. You can purchase these books at your local bookstore.

- *OSF Application Environment Specification (AES) User Environment Volume, Revision C*, PTR Prentice Hall, 1993.

Describes the Motif Application Environment Specification. Information on these specifications can also be found in the *Motif 1.2 Programmer's Reference Manual*.

- *Motif 1.2 User's Guide 801-5363-10*

This user's guide describes how to interact with Motif-based applications, including how to use and customize the Motif Window Manager, how to use the Motif widgets, and how to customize your interaction with Motif applications.

- *Motif 1.2 Programmer's Reference Manual 801-5364-10*

This programmer's reference manual provides reference information for the Motif commands and functions in UNIX-style manual pages. The reference information covers the toolkit (library functions, widget documentation, and resources), the window manager, UI language commands, and the library functions.

- *Motif 1.2 Programmer's Guide 801-5365-10*

This programmer's guide describes how to use the Motif API to create Motif applications. Also describes the architecture of the Motif widget set and the features of the toolkit. It is useful for new Motif programmers. A number of the example programs from this volume is available in source form in the `share/src` directory.

- *Motif 1.2 Style Guide 801-5366-10*

This style guide provides a description of the framework of behavior specifications (the Motif appearance) to guide developers in the design and implementation of products with Motif-style UI. The guide is split into sections applicable to four audiences: application designers, widget designers, user interface system designers, and window manager designers.

The appendixes describe how the Motif widgets correspond to the components in the guide and provide a checklist of requirements for OSF/Motif application-level certification.

OPEN LOOK to CDE Motif Transition

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Moore, Michael. "The CDE Libraries." *UNIX Review*. March 1994; 12(3) 53-57.

Keefe, Sarah. "Migrating Your Sun Workstation To Motif." *The X Journal*, July-August 1993.

Graphical User Interfaces

OPEN LOOK to Motif GUI Transition Guide 801,6567-10, SunSoft, October, 1993.

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OPEN LOOK Intrinsic Toolkit Widget Set Programmer's Guide, AT&T, 1990.

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OLIT & Motif: A Technical Comparison, Amy Moore, M. Goyal, SunSoft, September, 1992.

Motif Programming

Motif Programming in the X Window System Environment, William A. Parrette, McGraw-Hill, 1993.

Motif Programming: The Essentials—and More, Marshall Brain, Digital Press, 1992.

Motif Programming Manual, Dan Heller, O'Reilly & Associates, 1992.

Motif Reference Manual, Paula Ferguson, O'Reilly & Associates, 1992.

The X Window System Programming and Applications with Xt, OSF/Motif Edition, Douglas Young, Prentice Hall, 1990.

OPEN LOOK Programming

An OPEN LOOK at Unix: A Developer's Guide to X. John David Miller, M&T Books, 1990.

The X Window System Programming and Applications with Xt, OPEN LOOK Edition, Douglas Young and John A. Pew, Prentice Hall, 1992.

XView Programming Manual, Dan Heller, O'Reilly & Associates, Inc., 1991.

XView Reference Manual, Thomas Van Raalte (ed.), O'Reilly & Associates, Inc., 1991.

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Programmer's Supplement for Release 5 of the X Window System, Version 11, David Flanagan, O'Reilly & Associates, Inc., 1991.

X Toolkit Intrinsic Programming Manual, Adrian Nye and Tim O'Reilly, O'Reilly & Associates, Inc., 1990.

X Window System Toolkit, Paul J. Asente and Ralph R. Swick, Digital Press, 1990.

X Window System, X Version 11 Release 5, Third Edition, Digital Press, 1992.

X Toolkit Intrinsic Reference Manual, O'Reilly & Associates, Inc., 1991.

Xlib: C Language X Interface, James Gettys, Robert W. Scheifler, Ron Newman, Silicon Press, 1989.

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Xlib Reference Manual, Adrian Nye (ed.), O'Reilly & Associates, Inc., 1990.

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