THE DEFINITIVE GUIDES TO THE
X WINDOW SYSTEM

VOLUME SIX A

Motif Programming Manual

for Motif 2.1

Open Source Edition

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Motif Programming Manual, Open Source Edition

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Xt provides an object-oriented framework for creating reusable, configurable user-interface components called *widgets*. Motif provides widgets for such common user-interface elements as labels, buttons, menus, dialog boxes, scrollbars, and text-entry or display areas. In addition, there are widgets called managers, whose only job is to control the layout of other widgets, so the application doesn't have to worry about details of widget placement when the application is moved or resized.

A widget operates independently of the application, except through prearranged interactions. For example, a button widget knows how to draw itself, how to highlight itself when it is clicked on with the mouse, and how to respond to that mouse click.

The general behavior of a widget, such as a PushButton, is defined as part of the Motif library. Xt defines certain base classes of widgets, whose behavior can be inherited and augmented or modified by other widget classes (subclasses). The base widget classes provide a common foundation for all Xt-based widget sets. A *widget set*, such as Motif's Xm library, defines a complete set of widget classes, sufficient for most user-interface needs. Xt also supports mechanisms for creating new widgets or for modifying existing ones.

Xt also supports lighter-weight objects called *gadgets*, which for the most part look and act just like widgets, but their behavior is actually provided by the manager widget that contains them. For example, a pulldown menu pane can be made up of button gadgets rather than button widgets, with the menu pane doing much of the work that would normally be done by the button widgets.

Most widgets and gadgets inherit characteristics from objects above them in the class hierarchy. For example, the Motif PushButton class inherits the ability to display a label from the Label widget class, which in turn inherits even more basic widget behavior from its own superclasses. See Volume 4, *X Toolkit Intrinsics Programming Manual*, for a complete discussion of Xt's classing mechanisms; see Chapter 3, *Overview of the Motif Toolkit*, for details about the Motif widget class hierarchy.

The object-oriented approach of Xt completely insulates the application programmer from the code inside of widgets. As a programmer, you only have access to functions that create, manage, and destroy widgets, plus certain public widget variables known as *resources*. As a result, the internal implementation of a widget can change without requiring changes to the API. A further benefit of the object-oriented approach is that it forces you to think about an application in a more abstract and generalized fashion, which leads to fewer bugs in the short run and to a better design in the long run.

Creating a widget is referred to as instantiating it. You ask the toolkit for an *instance* of a particular widgetclass, which can be customized by setting its resources. All Motif PushButton widgets have the ability to display a label; an instance of the PushButton widget class actually has a label that can be set with a resource.

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