

X WINDOW SYSTEM AND MOTIF PROGRAMMING

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Duration: 4 days	
<i>Pre-requisites</i>	
Mandatory	Preferable
A firm understanding and (preferably) some experience programming in the 'C' programming language on UNIX.	User-level UNIX knowledge.
<i>Below is the Outline TOC (Table Of Contents) document: it presents the Day-wise Coverage with topic names only.</i>	

Day 1

Module 1 Introduction to the X Window system

What is a GUI?
 Advantages of GUIs
 Brief note on the Evolution of X Window system
 Architecture
 X Goals and philosophy
 Available programmer Interface to X-Xlib , X Toolkit,
 Motif & the uil
 Client / Server Model
 X Protocol
 Client and display server
 Request buffering-output and input

Module 2 Basics of GUI window concepts

The event-driven paradigm
 Resources
 Colour overview
 X events and their working
 Exposure Handling
 Event Propagation
 X window managers
 Motif Window manager decorations

 Note on (extracts from Schiefler, Gettys & Newman)
 The X Windows System Architecture
 The X Window System Design Principles

Module 3 Xlib Layer Programming basics

The Xlib programming model
 Display management
 Access to display attributes by means of macros

Writing an X program
Exposure processing & text output
Creating Windows

Lab Assignments

Day 2

Module 3 Xlib Layer Programming basics (contd.)

Geometry management
Window manager properties
Window manager sensitivity
Synchronous mode programming
A note on debugging X applications with printf's
Sending hints to the WM
Overriding the window manager
Using the event detail structures
Mouse processing
Using the GC for line drawing
Multiple windows - event loop implications

Lab Assignments

Module 4 The X Toolkit Abstraction

The X toolkit - an object oriented approach to UI design
Widgets as user-interface objects
Subclassing
Widget Class tree
Widget Instance tree
Widget Resources - Tailoring widgets to suit our needs
Resource Database - sources and syntax

Module 5 Toolkit Programming Basics

Essential Intrinsics
Toolkit Initialization
Creating the widget instance tree
Creating & managing widgets
Realizing the hierarchy
The Event Loop
Setting Widget resources - understanding the Arg array
Toolkit program
Querying and modifying a widget's resources
Mapping and Unmapping widgets
Application callback routines - setting up and handling
Complete sample toolkit program

*Lab Assignments***Day 3***Case study 1:*

*Case study based on the toolkit intrinsics will be discussed and designed.
Participants will implement the same.*

Module 6 Motif Primitive Widgets

Motif programmer's reference manual extract
How to read it

From the MOTIF Manual:

XmPrimitive widget class subtree-motif primitive widgets
XmArrowButton, XmLabel, XmPushButton
XmSeparator, XmToggleButton, XmList
XmScrollbar

Using the Xm*CallbackStruct s in your programs
Xt / Motif programs using primitive widgets

Sample programs code walk-through.

*Lab assignments : Case study 1 will be implemented
Other assignments to be implemented.*

Case study 2 :

*Case study based on the toolkit / motif will be discussed and designed.
Participants will design and implement the same.*

Day 4**Module 7 Motif Manager Widgets**

What manager widgets do

From the MOTIF Manual:

XmManager widget class subtree
XmBulletinBoard, XmRowColumn,
XmMainWindow, XmMessageBox, XmFrame,
XmScale, XmSelectionBox, XmFileSelectionBox.

Using the Xm*CallbackStruct s in your programs
Xt/Motif programs using manager Widgets

Sample programs code walk-through

Module 8 UIL / MRM

What is the UIL / MRM ?
Advantages of using the UIL
Structure of a UIL specification
Example UIL file
Motif resource manager interface
MRM API
Sample UIL / MRM program

*Lab session for the day : Case study 2 will be implemented.
UIL / MRM program.*

Module 9 Useful topics in Motif

Menu Systems
 Design – Instance Tree
 Implementation using the Xt/MOTIF API

Handling raw events at the toolkit level
A note on Gadgets
Dialogs - properties and usage
Using the XmForm manager
File selection with the XmFileSelectionBox

Advanced Topics
 Creating multiple top-level windows in an application
 Passing multiple client data to callback handlers
 Xlib and Motif colour allocation program
 Advanced Dialog Programming - using workprocs
 Sample implementation

Detailed walk-through and exercises on advanced aspects of MOTIF programming using source code from "The MOTIF Programmers Guide, Vol 6A" O'Reilly & Associates. This includes:

- Using a pixmap on a label widget
- Drawing within MOTIF - exposure callback issues, etc
- WM advanced interaction - dealing with the Close button
- Command box widget
- The "application box" UI program
 - Covers advanced issues of signal handling and fork() in the X Window System.

A note on GUI design principles.

*Lab session for the day : above case studies will be implemented.
Test (optional).*