Concepts Systems Educational Services
602-603, The Pentagon, Shahu College Road,
Next to Pune-Satara Road, Near Panchami Hotel
Parvati. Pune - 411009.

Contact No. +91 20 2421 6888, +91-99606 38738

Windows Device Driver

Course Objective

This course provides the knowledge and practice necessary to begin writing Windows device drivers for Windows XP, Windows 2000. This course provides a thorough grounding for Windows device driver development. Through lecture, class discussions and hands on lab work, the student will develop an immediately useful knowledge of how to write a device driver that will interface hardware to the system and to application programs.

Course Contents

Windows Architecture Overview

Operating System Architecture
Kernel, HAL and executive
Object Manager
Objects and handles
Memory manager
I/O manager
Introduction to Windows Driver Model
Layered Drivers
WDM Overview

First Program

Writing a hello world driver
Debug support routines
User mode debugger and Kernel mode debugger
Using Kernel Debugger to view debug messages
Service Control Manager
System Calls
System Call Hooking
Request Flow from Ring 3 to Ring 0

Driver Data Structures

Device/ Driver Object, IRP etc.
Device Objects and Device Stack
Device Extensions
Life Cycle of an IRP

Driver Basics - I

IRQ Levels
Driver Threads
Multiprocessing, preemptive multithreading, interrupts, and their requirements for synchronization;
Primitives for accomplishing synchronization
Communication with Device Driver
Handling Application Requests
Input/Output Request Packets (IRP)
Completing IRPs

Driver Basics - II

Driver Dispatch Routines
DeviceIoControl Interface
Handling Read requests
Handling Write requests
Application to driver data transfer mechanisms:
Buffered, Direct & Neither I/O
Layered model of drivers
IRP stack locations

Synchronization Techniques

Mutex
Spin locks
Semaphores
Timers & Events

Filter Driver

Device Stack
I/O Stack Locations
I/O Completion routines
Synchronous/ Asynchronous I/O
Multiple ways to attach to device stack

Interrupts and DPCs

Interrupt Fundamentals
Interrupt Object
Registering / Writing ISR
DPCs
Synchronization

Concepts Systems Educational Services
602-603, The Pentagon, Shahu College Road,
Next to Pune-Satara Road, Near Panchami Hotel
Parvati. Pune - 411009.

Contact No. +91 20 2421 6888, +91-99606 38738

Debugging

Driver Testing
System Crashes
Reasons for System Crash
The Blue Screen of Death
Reading Crash Screens
Crash Dump Files, Analyzing a Crash Dump,
Using Driver Verifier Tool
Using Kernel Debugger to debug drivers

Driver Installation overview

INF Files
Different Sections inside INF file
Driver Programming Techniques
Driver Design Assignments
Case studies

Reference:

- Windows 2000 Device Driver book
Art Baker
Jerry Lozano

- Programming Microsoft Windows Driver Model
Walter Oney

- File System Internals
Rajeev Nagar

Prerequisite:

Fluent C Programming
Algorithms & Data Structures
Basic understanding of Windows Internals