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CU030 - Advanced UNIX Programming

Length: 5 Days

Description

This course is designed for system and application programmers, system analysts, and engineers responsible for supporting a UNIX operating system and/or for system and application software development. The course provides detailed discussions and hands-on examination of the structure of a UNIX system, the physical and logical file system implementation, process control mechanisms, I/O subsystem, kernel operations, memory management, interrupt handling, and interprocess communications. Throughout the course the information presented is related to the attendee through: 1) the execution of common UNIX user/administrator commands; and, 2) writing, compiling, and executing example 'C' language programs which examine and display internal system data structures on a live UNIX system.

Course Objectives

Upon completion of this seminar the attendee will be able to:

1. state the architecture of the UNIX operating system;
2. describe how a UNIX system is initialized and identify the various run levels;
3. use selected UNIX software development tools for program development and maintenance;
4. describe the logical and physical file system;
5. perform UNIX system commands which manipulate files and directories and control processes;
6. define processes and state how they are controlled;
7. describe the I/O subsystem to include block and character device and streams implementation;
8. describe the interprocess communications facilities;
9. write, compile, and execute C language programs which examine UNIX internal data structures and display information about processes, the file system, and kernel operations; and,
10. write and execute programs which illustrate the use of the UNIX pipe, messages, semaphores, shared memory, and signals interprocess communications facilities.

Course Materials

1. Advanced UNIX Programming Student Guide and course notes.
2. Diskette containing sample C programs used in class.

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Prerequisites

1. CU001 - Fundamentals of UNIX or equivalent experience using UNIX.
2. CU002 - Bourne Shell Programming or CU003 - Korn Shell Programming or equivalent experience using the UNIX shell.
3. CU004 - Introduction to C Programming or equivalent experience using the C programming language.

Course Content

I TECHNICAL Description OF THE UNIX OPERATING SYSTEM

- A History Of UNIX
- B Major UNIX Features
- C System Architecture
 1. Kernel
 2. Shell
 3. File System
 4. Application Program Relationship
 5. C Language Interface
- D Hardware Considerations
- E UNIX System Documentation
- F POSIX Standardization

II UNIX SYSTEM STARTUP

- A System Initialization Sequence
- B Startup Programs and Scripts
- C Startup Control Files
- D Run Levels
- E Modifying System Startup

III UNIX SOFTWARE DEVELOPMENT TOOLS OVERVIEW

- A make
- B sccs
- C sdb
- D lint
- E ar

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IV THE UNIX FILE SYSTEM

- A Physical File System
 - 1. File System Format
 - 2. Super Block
 - 3. Inodes
 - 4. Structure of a Regular File
 - 5. Structure of a Directory
 - 6. Structure of Other File Types
 - 7. Creation/Deletion of a Physical File
 - 8. Mountable File Systems
- B Logical File System
 - 1. File Concept
 - 2. Types Of Files
 - 3. Hierarchal File System
 - 4. Directories
 - 5. Path Names
 - 6. File Attributes
 - 7. File Access Permissions
 - 8. File Manipulation Commands
 - 9. Directory Manipulation Commands
 - 10. Special Files
 - 11. Efficient Use Of File Systems

V UNIX PROCESSES

- A Process Definition
- B Process Creation and Termination
- C Process States and Transitions
- D Process Control
- E Process Scheduling and Timing
- F Process Priorities
- G Daemon Processes
- H Process Performance Limitations

VI I/O SUBSYSTEM

- A I/O Devices
 - 1. Block (Disk) Device Drivers
 - 2. Character (Terminal) Device Drivers
- B Driver Interfaces
- C Streams
- D I/O Error Handling

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VII INTERPROCESS COMMUNICATIONS

- A Overview of UNIX IPC Facilities
- B Pipes
- C Messages
- D Semaphores
- E Shared Memory
- F Signals

VIII SYSTEM PERFORMANCE, MANAGEMENT AND SECURITY

- A Shells and User Environment
- B System Configuration, Tuning, Generation
- C System Performance Analysis
- D System Accounting
- E Security
- F System Error Logging
- G Analyzing and Correcting System Errors

IX COURSE CONCLUSION