Softwaves Consultancy Bangalore Pvt Ltd

Linux Internals

Abstract

This course teaches attendees to acquaint developers with the fundamental subsystems, data structures, and API of the Linux kernel.

Target Audience

The course is designed for software engineers who are familiar with Linux from the user and application development level, who wish to gain understanding of how the Linux kernel works internally.

Additional, assumed prerequisite knowledge is experience in configuring and installing Linux kernels.

Highlights

- Linux Kernel Overview
- Processes
- Interrupt Context
- Signals
- IPCs
- Threads
- Synchronization
- Memory Management
- Virtual Filesystem's
- Networking

Duration

3 Days

Course Materials

The workshop materials include a comprehensive student workbook.
The workbook contains all of the slides used in the course as well as hands-on lab exercises.

Course Workshop and Set-up

The workshop makes use of standard PC's with a desktop Linux distribution for development.

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Day1:

- **Linux Kernel Overview**
  - ✓ Diagram of Linux subsystems
  - ✓ Role of the kernel
- **Processes**
  - ✓ Process data structures
  - ✓ Scheduling
  - ✓ Process context
  - ✓ Process creation
- **Interrupt Context**
  - ✓ Interrupt handlers
  - ✓ Deferring work
  - ✓ Timers
- **Signals**
  - ✓ Signal Handling
  - ✓ Signal related Functions & Usages
  - ✓ Timers using Signals
  - ✓ Program termination & Exit Codes

Day2:

- **IPCs**
  - ✓ Pipe
  - ✓ FIFO
  - ✓ Shared Memory

- ✓ Semaphore

- **Threads in Linux**
  - ✓ POSIX Threads & their Internals
  - ✓ Threads Creation, Operations & Usages
- **Synchronization**
  - ✓ Synchronization Overview
  - ✓ Mutex
  - ✓ Priority Inversion & Deadlock
  - ✓ Conditional Variables
  - ✓ Read/Write Locks
  - ✓ Spin Locks
  - ✓ Barriers
  - ✓ Semaphores

Day3:

- **Memory Management**
  - ✓ Memory allocation
  - ✓ Address spaces
  - ✓ Memory Partitioning & Fragmentation
  - ✓ Paging & Segmentation
- **Virtual Filesystem's/Block Devices**
  - ✓ VFS data structures
  - ✓ Adding a file system
  - ✓ File system caches
  - ✓ Block devices

- ✓ Paging
- ✓ Proc filesystem

- **Networking**
  - ✓ Sockets
  - ✓ Network Management Overview
  - ✓ Network Daemons & Configurations
  - ✓ Network Applications
  - ✓ Introduction to Sockets
  - ✓ Basic Socket Programming
  - ✓ I/O Multiplexing using select()