

Advanced Linux Programming and Administration

Learn to program and administer Linux systems, covering processes, signals, pthreads, inter-process communication and time management.

4 Days

8 HOURS A DAY

6

MODULES

37

TOPICS

10

HANDS-ON LABS

COURSE OVERVIEW

This advanced course is tailored for developers and IT professionals looking to deepen their Linux knowledge. It focuses on programming in Linux, managing processes, inter-process communication (IPC), threading, and signal handling. The course includes hands-on labs to develop, debug, and optimize programs in a Linux environment.

WHO THIS COURSE IS FOR

Target Audience:

Developers, DevOps engineers, advanced system administrators, and IT professionals interested in Linux programming and advanced system management

PREREQUISITES

- Familiarity with basic Linux commands and experience with a programming language (such as C, Python, or shell scripting)

TOOLS AND REQUIREMENTS

Lab Requirement:

- Koenig DC

LEARNING OBJECTIVES

- Apply text editors and basic administration commands
- Configure Bash startup files, aliases and reusable functions
- Connect to remote servers using SSH and FTP
- Manage processes with fork, exec, wait and zombie handling
- Implement signal handlers including real-time signals
- Develop multithreaded programs with POSIX threads
- Apply synchronisation using mutexes, semaphores and condition variables
- Implement IPC mechanisms such as pipes, queues and shared memory

6 Modules, 37 Topics

01

Lab

Lab

Lab

Text Editors and Basic Administration

INTRODUCTION TO TEXT EDITORS

- 'vim', 'gedit', 'nano'

SYSTEM ADMINISTRATION BASICS

- Rebooting and shutting down
- Managing software packages ('apt-get', 'yum', 'dnf')
- Networking basics ('ifconfig')
- Network File System (NFS)

MONITORING AND PERFORMANCE TUNING

- Introduction to 'top', 'htop', 'iostat', 'vmstat', and system tuning

02

Lab

The Bash Shell and Scripting

TOPICS

- Command history and navigation
- Environmental variables and 'PATH'
- Customizing the prompt
- Startup files ('.profile', '.bashrc')
- Aliases and basic shell scripting

FUNCTIONS IN BASH SCRIPTS

- Writing reusable functions in scripts for modularity

03

Lab

Lab

Remote Access and Network Tools

TOPICS

Secure Shell (SSH) · File Transfer Protocol (FTP)

04

Programming with Processes, Signals, and Threads

PROGRAMMING WITH PROCESSES

- 'getpid()', 'getppid()'
- Forking and executing processes (fork/exec idiom)
- Handling process termination ('wait()', 'sigchld')
- Managing zombie processes

SIGNALS

- Introduction to signal handlers
- Signal safety and implementation
- Using 'kill', 'raise', 'sigaction', and 'sigqueue'
- Real-Time Signals
- Implementing real-time signal handling in applications

05

Lab

Lab

POSIX Threads (Pthreads)

TOPICS

- Thread creation and attributes
- Managing detached threads and thread cancellation
- Using thread-specific data
- Synchronization with mutexes, semaphores, and condition variables

06

Lab

Lab

Inter-Process Communication and Time Management

INTER-PROCESS COMMUNICATION (IPC)

- Pipes and FIFOs
- POSIX semaphores
- Message queues
- Shared memory
- Sockets (Network & Unix domain)

TIME MANAGEMENT

- Current time management
- Real-time and process time
- Using timers in programs
- Time Synchronization in Networks
- Understanding and configuring NTP for time synchronization

Practise What You Learn

#	MODULE	ACTIVITY
01	Text Editors and Basic Administration	■ Editing tasks with different text editors ■ Installing and managing software packages ■ Configuring basic network settings and monitoring system performance
02	The Bash Shell and Scripting	Writing and debugging shell scripts
03	Remote Access and Network Tools	■ Connecting to remote servers via SSH ■ Transferring files with FTP and setting up remote desktop access
05	POSIX Threads (Pthreads)	■ Writing C programs for process management ■ Implementing signal handling and real-time signal processing
06	Inter-Process Communication and Time Management	■ Implementing IPC mechanisms in programs ■ Working with time and timers, and setting up NTP for network time synchronization

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Hands-on exercises throughout the course
- Delivery by certified instructors and subject matter experts
- Course completion certificate from Koenig

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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