



# Linux Development: Fundamentals, Tools, & Techniques

## Course Description

This course is designed to bring C developers up to speed with a variety of tools and capabilities of Linux. This includes development and debugging tools as well as system and library functions. The intent is to provide background that will be of general interest to all Linux based developers.

## Overview

This course provides substantial practice with key tools and capabilities available to developers of Linux based applications and system software. The course shows attendees how to use development and debugging tools and how to make use of many Linux system calls and library routines. Attendees will spend approximately 50 percent of the class time actually gaining hands-on experience with these topics.

## Course Objectives

- To provide an understanding of development tools for Linux.
- To give you practical experience in developing Linux application software.
- To give you practical experience in using Linux system calls and library routines.

## Attendees will learn:

- How to use GNU tools for compiling and debugging.
- How to write POSIX Threaded applications.
- How to use system calls for such things as inter-process communication, interacting with the file system, signals, time, creating a daemon, and scheduling.

## Who Should Attend:

The course is for programmers who are new to Unix and Linux. Attendees should have experience with C and be able to perform basic Unix commands.

**Duration:** Four and one-half days (four days when on-site).

## 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:

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



# **Linux Development Fundamentals, Tools & Techniques**

- 1. Linux Development**
  - 1.1. Objectives and format
  - 1.2. Course overview
- 2. Overview Of Linux Programming**
  - 2.1. Linux kernel overview
  - 2.2. System calls and library routines
- 3. System Libraries and Headers**
  - 3.1. System Include files
  - 3.2. Using and creating libraries
  - 3.3. Linking
  - 3.4. Using Make
- 4. Programming with GNU tools**
  - 4.1. gcc
  - 4.2. optimization
  - 4.3. linker
  - 4.4. debugging with gdb
- 5. Tools**
  - 5.1. IDEs: KDevelop & Eclipse
  - 5.2. Electric Fence & Valgrind
  - 5.3. cachegrind
  - 5.4. dmalloc
  - 5.5. gprof
  - 5.6. gcov
- 6. System Limits and Portability**
  - 6.1. System Configuration
  - 6.2. Linux Standards Base
  - 6.3. POSIX
- 7. Process Management**
  - 7.1. Creating processes
  - 7.2. Process signaling and status
  - 7.3. Process and user ID's
- 8. Linux File System**
  - 8.1. Access Permissions
  - 8.2. I/O System Calls
  - 8.3. Manipulating files
  - 8.4. Higher performance I/O
- 9. Inter-process Communication**
  - 9.1. Pipes
  - 9.2. Semaphores
  - 9.3. Message Queues
  - 9.4. Sockets
  - 9.5. Shared Memory
- 10. Scheduling**
  - 10.1. Process scheduling
  - 10.2. Manipulating priorities
  - 10.3. Preemption
- 11. Signals**
  - 11.1. Sending signals
  - 11.2. Reliable signal handling
  - 11.3. Signal sets
  - 11.4. Queueing signals
- 12. Time**
  - 12.1. Current date and time
  - 12.2. Timing events
  - 12.3. Timers
- 13. POSIX Threads**
  - 13.1. Creating threads
  - 13.2. Synchronizing threads
  - 13.3. Thread scheduling
  - 13.4. Threads and signals
- 14. Daemon Programming**
  - 14.1. Process groups
  - 14.2. Starting Daemons
  - 14.3. Error reporting
- 15. Building Packages**
  - 15.1. Binary RPM's
  - 15.2. Source RPM's
  - 15.3. LSB packaging
- 16. Python Programming Intro**
  - 16.1. What is Python
  - 16.2. Basic statements and constructs
  - 16.3. Python Examples