

Course Description: This course focuses on some of the intermediate level features of the Linux Operating System. Topics include an overview of Linux, system administration, job control, shell programming, software tools, system processes, system startup and shutdown, software package administration, kernels, networking, the Network File System, and naming services. The course is supplemented with many hands-on exercises that reinforce the lectures.

Who Should Attend: This course is intended for programmers and/or end users and all those who wish to become Linux System Administrators.

Prerequisites: Students are expected to have completed the Introduction to Linux course or have equivalent experience.

Benefits of Attendance: Upon completion of this course, students will be able to:

- Understand the responsibilities and the tools of the system administrator
- Use awk and sed to solve system administration tasks
- Backup and restore all or parts of the system
- Perform system administration tasks including adding and deleting users, adding devices, partitioning the disk, and other administrative functions
- Use job control features of the shell
- Write simple shell scripts
- Effectively use the software tools
- Perform various Linux system processes
- Carry out startup and shutdown procedures
- Understand the RedHat Package Manager (RPM)
- Configure, install, and build the Linux kernel
- Perform networking tasks
- Use the Network File System (NFS)
- Use the Domain Name System (DNS)

Course Outline:

Introduction to Linux

History of Unix
Contemporary Products
Advantages of Linux
Components of the Linux Environment
Important Parts of the Kernel
Shells with Red Hat Linux
Major Linux Services
Organization of the Red Hat Filesystem
Responsibilities of a System Administrator
Getting Help

What You Should Already Know

Beginning Linux Topics
Shell Variables
The PATH Variable
Exporting Variables
The Command Line
The PS2 Variable
Command History
Command Substitution
cut, paste
expand, fmt, unexpand
head, tail, nl, od
wc, split
pr, tac, tr
xargs, join
sed
Directory Manipulation Commands
File Manipulation Commands - cp
File Manipulation Commands - mv
File Manipulation Commands - rm, touch
Using Filename Expansion Characters
Special I/O Files
Standard I/O Files
Pipes
Process Management
ps, pstree
top
Signals
Job Control
nice, renice
Regular Expressions
Shells

Shell Variables
Shell Aliases
Functions
Startup Files
Key Mappings
Writing Shell Scripts
Executing Your Script
A Script's Environment
Exit Status
Programming the Shell

System Administration

Duties of the System Administrator
Bringing up the System
Multi-User Mode
Shutting Down the System
Adding Users
The /dev Directory
The awk Language
awk Scripts
awk Odds and Ends
The sed Command
Special sed Characters
The find Command
Backing up Files
cpio
tar
File System Commands
The at Command
The crontab Command

Job Control

Processes
Parent and Child Processes
System Startup
Shell Initialization
Foreground vs. Background
ps Command
The kill Command
Suspending Jobs
jobs Command
fg and bg Commands

Shell Programming

Shells
Scripting Rationale
Creating a bash Script
bash Startup Files
A Script's Environment
Exporting Variables

Exit Status
Programming the Shell
Parameter Passing
Operators
if
Arithmetic
Looping Constructs
Input and Output
Interrupts

Software Tools

C Language and Linux
A Little History of the Linux C Compiler
Creating Programs in C
Creating a Library
Using the Library
Static vs. Shared Libraries
make
Revision Control
Concurrent Versioning System (CVS)
Other Languages

Linux System Processes

Linux Process Components
Linux Process Creation
The ps (Process Status) Command
The top (Top Jobs) Command
The kill Command
The at Command
How to Execute the at Command
Scheduling Tasks Using cron
The crontab File Format
Creating a cron Entry

System Startup and Shutdown

Introduction to the Boot Process
Stages of the Boot Process
Linux System Runlevels
Linux System Initialization Scripts (/etc/init.d)
Red Hat Linux ntsysv and serviceconf Tools
The chkconfig Command
xinetd
X Windows

Shutting Down the System

Software Package Administration

The RedHat Package Manager (RPM)
Standard Commands and Options
Installing Packages
Naming Conventions for RPM Packages
Installing a Package
Upgrading Packages
Uninstalling Packages
Querying Packages
Verifying Packages
Installing Packages with Package Manager

Kernel Configuration

Overview of the Linux Kernel
Configuring the Linux Kernel
Configuration Options
Building and Installing the Kernel
Building the Kernel
Installing a New Kernel
Configuring your Boot Manager
Troubleshooting the New Kernel
Troubleshooting and Recovery

Network Basics

Network Terminology
LAN Characteristics
LAN Topology
Network Transmission Media
Network Access Methods
Network Hardware
Standards and Protocols
Packets
The ISO/OSI Model
TCP/IP Network Model
IPv6
IPSec Security Example
Why Move to IPv6?
Transitioning to IPv6
Mixing IPv4 and IPv6
Using a Secure Tunnel
Network Configuration
IPv6 Addresses
Example IPv6 Commands
Special IPv6 Addresses

Unix Network Applications

Secure Shell (SSH)
Trusted Hosts
Example ssh Session
ftp and sftp
scp
vsFTP
The telnet Command
Simple telnet Session
The r* Commands
The Extended Internet Services Daemon
sendmail
Filesystems
Network File System
/etc/exports
NIS

The Network File System (NFS)

Introduction to NFS
The NFS Server
TCP Wrappers
The NFS Client
Configuring the NFS Environment

Naming Services

Naming Services Overview
The Domain Name Service (DNS)
Installing a DNS Server with Red Hat
Configuring a DNS Server Using bind-config
The NIS+ Environment
The NIS Environment
NIS Servers and Clients
NIS Components
Installing the Software
Configuring a NIS Master Server
Configuring a NIS Client
Configuring an NIS Slave Server
Name Service Switch Configuration File