

**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