Linux System Administration

Students Will Learn:

- Installation and Configuration
- Managing Software and Hardware
- Managing Users and Groups
- File Systems and File Security

- Network Configuration
- Apache Web Server
- NFS, DHCP, and DNS
- Samba File Sharing

Course Description: This hands on Linux administration course teaches students how to install, configure and maintain a Linux system in a networked environment. Students will not only learn to perform basic administrative tasks such as adding and managing users, creating and maintaining file systems, developing and implementing a security policy, and performing software installation and package management, but will also learn to perform Linux network-related tasks, including installing and supporting SSH, NFS, Samba, DNS, DHCP, and the Apache web server. Extensive hands on exercises are used throughout to reinforce learning and develop real competency.

The course includes comprehensive hands on practice installing and configuring Linux systems including CentOS 6 / Red Hat Enterprise Linux 6 / SuSE. Labs include adding and deleting users, backing up and restoring the system, adding/deleting software, automating the scheduling of tasks, creating file systems, managing remote access, and installing and tuning Samba and Apache, as well as working with modern system logging utilities such as rsyslog. Class participants will also discuss common security issues, and be introduced to several tools, such as PAM modules, that can help secure the operating environment. Upon completion of this course, students will be prepared to competently maintain a Linux system in a networked business environment.

Course Prerequisites: Students should be experienced UNIX or Linux users. Knowledge of the Linux file system and commands equivalent to attendance in the *UNIX/Linux Fundamentals* course is required.

Linux System Administration Course Overview:

System Administration Overview

- UNIX, Linux and Open Source
- Duties of the System Administrator
- Superusers and the Root Login
- Sharing Superuser Privileges with Others (su and sudo Commands)
- TCP/IP Networking Fundamentals
- Online Help

Installation and Configuration

- Planning: Hardware and Software Considerations
- Site Planning
- Installation Methods and Types
- Installation Classes
- Partitions
- Logical Volume Manager - LVM
- File System Overview
- Swap Partition Considerations
- Other Partition Considerations
- The Linux Boot Loader: grub
- Software Package Selection
- Adding and Configuring Peripherals
- Printers
- Graphics Controllers
- Basic Networking Configuration
- Booting to Recovery Mode

Booting and Shutting Down Linux

- Boot Sequence
- The upstart Daemon
- System Startup and Shutdown Scripts
- The Traditional /etc/inittab File
- Run Levels
- The chkconfig Command
- The service Command
- Network Adapters
- Shutdown Commands
- Handling Power Failures

Managing Software and Devices

- Identifying Software Packages
- Using rpm to Manage Software
- Using yum to Manage Software
- Installing and Removing Software
- Identifying Devices
- Displaying Device and System Information (PCI, USB)
- Plug and Play Devices
- Device Configuration Tools

X Window System Administration

- X Window System Introduction
- Configuring Xorg
- Utilities for Configuring X Windows
- Window Managers
- Desktop Environments

The Linux File System

- Filesystem Types
- Conventional Directory Structure
- Mounting a File System
- The /etc/fstab File
- Special Files (Device Files)
- Inodes
- Hard File Links
- Soft File Links
- Creating New File Systems with mkfs
- The lost+found Directory
- Repairing File Systems with fsck
- The Journaling Attribute
- File and Disk Management Tools

Working with the Linux Kernel

- Linux Kernel Components
- Types of Kernels
- Kernel Configuration Options
- Recompiling the Kernel

Managing Users and Groups

- Setting Policies
- User File Management
- The /etc/passwd file
- The /etc/shadow file
- The /etc/group file
- The /etc/gshadow file
- Adding Users
- Modifying User Accounts
- Deleting User Accounts
- Working with Groups
- Setting User Environments
- Login Configuration Files

Linux File Security

- File Permissions
- Directory Permissions
- Octal Representation
- Changing Permissions
- Setting Default Permissions
- Access Control Lists (ACLs)
- The getfacl and setfacl commands
- SUID Bit
- SGID Bit
- The Sticky Bit

Shell and Perl Scripting

- Shell Script Fundamentals
- Bash Shell Syntax Overview
- Shell Script Examples
- Fundamentals of Perl
- Using Perl for Administration
- Perl Script Examples

Controlling Processes

- Characteristics of Processes
- Parent-Child Relationship
- Examining Running Processes
- Background Processes
- Controlling Processes
- Signaling Processes
- Killing Processes
- Automating Processes
- cron and crontab
- at and batch
- System Processes (Daemons)

Troubleshooting the System

- Common Problems and Symptoms
- Troubleshooting Steps
- Repairing General Boot Problems
- Repairing Boot Problems
- Repairing the GRUB Boot Loader
- Memory Allocation
- Hard Drive Problems
- Configuring Shared Libraries
- System Logs
- System Logging with ryslogd

The Apache Web Server

- What is Apache?
- Configuring the Apache Web Server
- Common Directives
- Apache Virtual Hosting

System Backups

- Backup Concepts and Strategies
- User Backups with tar and cpio
- System Backup Options
- The dump and restore Commands

Basic Networking

- TCP/IP Fundamentals
- Review of Internet Addressing
- Network Services Overview
- Commonly Available Services
- Fundamental Network Configuration Files
- Network Control Scripts and Daemons
- Enabling Services Using xinetd

NFS, DHCP, and DNS

- Network File System (NFS)
- How to Configure the NFS Server
- Exporting NFS Shares
- How to Configure the NFS Client
- Implementing the Dynamic Host Configuration Protocol (DHCP)
- DHCP Configuration with Fixed and Leased Addresses
- Purpose of DNS, Configuring DNS (bind)
- The rndc Command
- Zone Files, Running the named Daemon
- Legacy Networking Commands: telnet, ftp, rsh, rlogin, rcp
- Installing and Configuring Secure Shell (ssh)

Introduction to System Security

- Security Overview
- Maintaining System Security
- Server Access
- Physical Security
- Network Security
- Security Tools
- Port Probing with nmap
- Intrusion Detection and Prevention
- PAM Security Modules
- Scanning the System
- Maintaining File Integrity
- Using Firewalls
- Packet Filtering with iptables
- Masquerading with iptables

The Samba File Sharing Facility

- Using Samba to Connect Homogeneous File Systems (Linux-to-Linux)
- Using Samba to Connect Heterogeneous File Systems (Linux-to-Windows)
- Configuring Samba
- Uing the smbclient Command
- Mounting SMB Shares