UNIX and Linux Systems Basics I and II

Course Summary

Description

This course is designed to help technical staff gain a mastery of UNIX and/or Linux operating systems. It builds a foundation of UNIX/Linux system structure and commands designed to develop the student's understanding of UNIX/Linux. Following the completion of this course, the student will have a proficiency in the basic commands necessary to exploit the power of the UNIX/Linux operating system.

This course also serves to further expose students to the UNIX operating system. By providing a detailed look at additional aspects of the UNIX operating environment, it builds on the foundation of UNIX system structure and commands and is designed to further develop the student's understanding of UNIX. At the completion of this course, the student will have a proficiency in additional commands necessary to fully utilize the power of the UNIX operating system.

By using a continuous lab environment, the student stays logged on to both a Linux and a UNIX system, interacting with it constantly, in parallel with the lecture.

Objectives

After taking this course, students will be able to:
- Understand why things work the way they do in UNIX
- Understand the differences between UNIX and Linux
- Understand the differences between Linux distributions
- Understand UNIX command syntax
- Understand the details of the UNIX file system
- Understand how security is implemented in UNIX
- Understand how the Korn and bash shells work
- Read and understand a shell script
- Use the vi and vim editors
- Understand how to use different UNIX utilities
- Use scheduling commands to execute other UNIX commands at a future time

- Understand the various UNIX commands that allow for session management
- Understand how UNIX provides networking services such as FTP, ssh, dns
- Understand how to work with ACLs to provide additional security flexibility
- Understand the graphical UNIX desktop environment
- Understand virtualization concepts
- Understand basic Linux Installation and software management issues
- Communicate effectively with System Administrators
- Understand UNIX network file sharing
- Use printer commands

Topics

- Introduction to UNIX and Linux
- Getting started
- Navigating UNIX File Systems
- File system security
- Additional UNIX commands
- Using the vi and vim editors
- Introduction to the UNIX shell and shell programming
- Introduction to UNIX Power Utilities
- Communicating with Other UNIX Users

- Networking in UNIX and Linux
- Extended Permissions
- Scheduling Commands
- Process and Session Management
- Introduction the the Linux graphical desktop
- Overview of virtualization via VMWare
- Walk-thru of a Linux install
- Walk-thru of Linux software installation and maintenance
- Printing

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Course Summary (cont'd)

Audience

This course is designed for system/application end-users who have little or no experience with the UNIX or Linux operating systems. This course provides a functional familiarity with basic system tools and commands to those individuals with other operating systems experience.

Prerequisites

There are no prerequisites for this course.

Duration

Five days

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Course Outline

I. Introduction to UNIX and Linux (2 hours)
A. Introduction to UNIX and Linux
B. Evolution of UNIX and Linux
C. What is UNIX?
D. Key UNIX Characteristics
E. The UNIX Structure
F. Practical Applications of UNIX
G. UNIX System Administration
H. Existing UNIX Variants
I. Differences Between UNIX Variants
J. UNIX vs. Linux
K. What is Linux?
L. Which Linux Distribution is better?
M. RedHat Family
N. Debian Family
O. Other Linux Distributions
P. UNIX Standards

II. Getting Started with UNIX & Linux (1/2 hour)
A. Logging in using PuTTY
B. Access Levels in UNIX
C. Nested Login with su
D. Switching shells, Logging Out
E. Password Rules

III. Navigating UNIX File Systems (3 hours)
A. Getting Some Files
B. Getting help: the man cmd
C. The Role of the File System
D. File System Naming Guidelines
E. Common Filename Extensions
F. Absolute Pathnames
G. Relative Pathnames
H. Pathname Abbreviations
I. File Tree Navigation Exercise
J. System Directory Structure
K. User Files & User Directories
L. Default Directory
M. /etc/passwd File Format
N. /etc/group Format
O. Default Group
P. Command Syntax
Q. Commands, Options, and Arguments
R. Basic File Commands: pwd
S. Basic File Commands: cd
T. Basic File Commands: ls -l
Lab: ls Command
U. touch – change file timestamps
V. mkdir Command
W. rmdir Command
X. Basic File Commands: cat

Lab: cat
Y. File Commands: more, less, pg
Z. Basic File Commands: head
AA. Basic File Commands: tail
BB. Basic File Commands: cp
CC. Basic File Commands: mv
DD. Basic File Commands: rm
EE. Hard and Symbolic Links
Hard Link Lab
Soft Link Lab
FF. du Command
GG. df Command
Lab: Directories

IV. UNIX File System Security (2 hours)
A. Detailed Output of the ls Command
B. UNIX File Security: Permissions
C. Working with Permissions
D. Changing Permissions
E. Three chmod Examples, Same Result
F. UNIX Directory Permissions
Lab: chmod
Lab: Permissions
G. File/Dir Permissions - umask
Lab: umask
H. Changing File Ownership
I. Switching Groups

V. Additional UNIX Commands (1 hour)
A. who - query session information
B. wc – word count
C. date – Display formatted date/time
D. file – Display File Type
E. diff – Show difference between files
F. diff: Example
G. cmp - Compare Two Files
H. cmp: Example
I. whereis – Display cmd Location
J. whence – Display cmd Location
K. cal - Display calendar
L. banner – display a large banner

VI. Using the vi and vim Editors (2 hours)
A. UNIX Text Editors
B. Launching vi
C. Basic vi Modes
D. Switching to and from Input Mode
E. Scrolling in Browse Mode
F. vi File cmds
vi: Lab 1
G. Editing Files with vi - Repeat n
H. Editing Files with vi - .exrc

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Course Outline (cont'd)

vi: Lab 2
I.   vi: Regular Expressions
J.   vi: Regular Expression Examples
K.   vi: Searching for Text
vi: Search Lab
L.   Substitute command detail
vi: Text Substitution Lab
M.   Advanced vi Modes (optional)
N.   Edit Mode
O.   ex Mode
P.   Basic ex Commands
Q.   vim Extensions

VII.   Introduction to the Unix Shell (3 hours)
A.   Key Shell Features
B.   Different Shell Flavors
C.   The Shell Prompt
D.   Intro to Shell Variables
E.   Creating & Using Shell Variables
F.   The Environment & Shell Variables
G.   Exporting Shell Variables
H.   Useful Shell Variables
I.   Understanding Shell Quote Usage
J.   Command-line Editing
K.   Shell Initialization: Startup Scripts
Shell Initialization Variables: Lab
L.   Bash Initialization: Startup Scripts
Bash Initialization Variables: Lab
M.   Shell Scripts
N.   Shell Scripts - Example
O.   Languages: Compiled vs. Scripting
P.   Viewing Exit Status in the Shell
Q.   Using Exit Status in a Shell Script
R.   Shell: Redirection to & from Files
S.   Shell: Pipes
T.   Shell: Wildcards
U.   Shell: Command Alias
V.   UNIX Process Management
W.   UNIX Process Mgmt: the ps cmd
X.   UNIX Process Mgmt: Background
Y.   Shell Job Control Commands
Z.   UNIX Process Mgmt: Kill
UNIX Process Management Lab

VIII.   Intro to UNIX Power Utilities (2 hours)
A.   UNIX Power Utilities
B.   UNIX Power Tools: sort
C.   Basic File Commands: find
D.   find Examples
E.   Relationship Between find and ls
Lab: find
F.   grep Utility

G.   grep Utility Examples w/ Results
H.   grep Examples
I.   sed Editing Utility
J.   sed Editing Exercise
K.   awk Utility
L.   Metacharacters
M.   Power Utility Examples
N.   Additional UNIX Power Utilities
O.   Archiving Files
P.   Compressing files

IX.   Communicating with other UNIX Users (1 hour)
A.   E-mail and Messaging Differences
B.   The mail Command
C.   UNIX mail
D.   Sending Mail
E.   Mail Commands:
F.   Using write and wall
G.   Using who
H.   wall Command
I.   The mesg Command
J.   The finger and talk commands

X.   Networking in UNIX and Linux (2 hours)
A.   TCP/IP Functionality in UNIX
B.   Two Similar Packet Delivery Systems
C.   Packet Routing
D.   Network Physical Layer, IP Layer
E.   TCP/IP Sockets
F.   Well Known UDP & TCP Ports
G.   TCP/IP Services
H.   DNS Domains
I.   TCP/IP Applications
J.   Telnet Access
K.   SSH Features
L.   SSH Host and User keys
M.   Using ssh for Remote Access
N.   TCP/IP Applications: rsh, rexec
O.   Using ssh for Remote execution
P.   FTP (File Transfer Protocol)
Q.   FTP HELP
R.   SFTP (Secure FTP)
S.   SCP (Secure Copy Protocol)
T.   TCP/IP Diagnostic Commands

XI.   Extended File Permissions (1/2 hour)
A.   UNIX File Permissions review
B.   UNIX Special Permissions
C.   Changing Permissions
D.   Access Control Lists - examples
Access Control List Lab

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Course Outline (cont'd)

XII.   **Scheduling Commands (1 hour)**
   A.   Scheduling Work w/ cron & at
   B.   Scheduling Work: at
   C.   at exercises
   D.   Scheduling Work: cron
   E.   Scheduling Work: crontab Examples
   F.   Scheduling Work: cron table
   G.   cron exercise

XIII.   **UNIX Process Management (1/2 hour)**
   A.   Basic UNIX Session Management
   B.   What is a Process?
   C.   The ps Command
   D.   Killing a Process
   E.   Signaling from Std. Input
   F.   Viewing Processes and Usage
   G.   top: Options
   H.   top: User Commands
   I.   Job Control from the Shell

XIV.   **Using the Gnome Linux Desktop (1 hour)**
   A.   Overview of the Linux Desktop
   B.   X System client/server architecture
   C.   The GNOME Desktop Environment
   D.   Log In
   E.   Log Out and Shut Down
   F.   GNOME Desktop Components
   G.   Manage Icons in GNOME
   H.   Use GNOME File Manager (Nautilus)
   I.   Access Command-Line Interface from Desktop

XV.   **VMWare ESXi Overview (45 minutes)**
   A.   Benefits Of Virtualization
   B.   ESXi Server
   C.   ESX Overview (Components)
   D.   P2V (Physical to Virtual) migration
   E.   When To Create Virtual Systems
   F.   Virtual Infrastructure Client
   G.   VI Client Logon To ESXi Host
   H.   VI Client Creating A Virtual Machine
   I.   Invoking The Wizard
   J.   Name The Virtual Machine
   K.   Select The DataStore For The VM
   L.   Select The Guest Operating System
   M.   How Many VCPUs
   N.   How Much Virtual RAM
   O.   How Many Virtual NICs?
   P.   Disk Image Size
   Q.   Summary Screen
   R.   A New VM!
   S.   Installing A Guest Operating System

   T.   Edit Settings
   U.   Choices Of Where To Get CD From
   V.   Virtual Machine Console
   W.   Console View
   X.   Log In!
   Y.   Once The VM Is Powered Up
   Z.   Power Off
   AA.   VMware Tools
   BB.   What Is VMotion?
   CC.   Information To Be Moved
   DD.   Requirements Of VMotion
   EE.   VMotion – Cold Migration
   FF.   Choose Host
   GG.   Choose Cluster
   HH.   Where Do I Put The VM Files?
   II.   Review/Finish
   JJ.   Migration Complete
   KK.   VMotion – System Powered On
   LL.   Select The VM To Move
   MM.   Select Host
   NN.   Cluster Resource Validation
   OO.   Select Priority
   PP.   Review And Finish
   QQ.   VMotion Complete

XVI.   **CentOS Installation (1 hour)**
   A.   Language Selection
   B.   Install KeyBoard Selection
   C.   Partitioning Hard Disk
   D.   Install Network Configuration
   E.   Clock Setup
   F.   Installing Packages

XVII.   **Linux Package Management (1/2 hour)**
   A.   Package Management Features
   B.   Major Linux Packaging Systems
   C.   RPM File Format
   D.   RPM Tools
   E.   RPM Commands
   F.   yum
   G.   Debian Tools
   H.   apt-get

XVIII.   **NFS and Samba Overview (1 hour, Optional)**
   A.   NFS Setup
   B.   NFS Export Rules
   C.   Mounting an NFS Filesystem
   D.   SMB – Server Message Block
   E.   NetBIOS Naming Service
   F.   NetBIOS Naming Service - WINS
   G.   What is Samba?

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Course Outline (cont'd)

H. SAMBA Daemons
I. SAMBA Command line tools
J. Example: Installing Samba on Centos
K. Testing & Troubleshooting Samba
L. Accessing Samba Shares from Windows
M. Accessing Windows Shares from Linux

XIX. Perl Overview (15 minutes)
A. What is Perl ?
B. A perl script
C. perl data types
D. Example perl program with looping

XX. Printing in UNIX and Linux Environments (1/2 hour, optional)
A. General Print Queue Concepts
B. Printing: SVR4 vs BSD
C. Using the lp Command
D. Specifying Printer Destinations
E. The Print Job-Id
F. Using lpstat
G. Canceling Print Jobs
H. Printer Administration

XXI. Miscellaneous Q & A Notes (1/2 hour)
A. How do I know what kernel or Linux Distro?
B. How do I rm or mv a file that begins with a dash?
C. How to turn off, restart, and shut down Linux?
D. How to Display Installed Hardware?
E. How to Create PDF Documents?
F. What is Asterisk?
G. How do you set your IP address in Asterisk?
H. How to get an IP address from a DHCP server?
I. How Do I switch Linux Desktops?
J. How Do I Control Services from the command line?
K. Control service startup from command line?
L. How do I use a DLT tape drive with Linux?
M. How do I Create a new UNIX Group?
N. How do I Review Boot Messages?
O. How do I Find setuid and setgid files?
P. Setting up ssh to work w/o requiring password
Q. What is a zombie process?
R. How To Kill A Ton Of Processes Quickly?
S. Example .profile with intelligent PATH updating
T. Linux Basic Runlevels