

Instructor Led Live Virtual Class

Duration: 5 Day (10-20 hours) | Course Number: LF-Linux-200

Intended Audience

This course is designed for professionals in the industry who need to develop a high-level understanding of Linux Operating System.

Course Description:

This course introduces the Linux family of operating systems. Basic commands, utilities, system structures, scripting and tools are explored. Elements of system administration are presented. This course is primarily oriented for would-be users and administrators of Linux -- in the words of the course text, p. iv, for those "primarily interested in it as a tool".

This general overview of the Linux operating systems will include topics such as the environment, commands, file system, processes, and utilities, as well as Linux history and philosophy. Specific emphasis will be given to the bash shell and user environment.

Learning Objectives:

After successfully completing this course, students should be able to:

- Comfortably use basic Linux commands from the command line (from a terminal window);
- Organize and manage their files within the Linux file system;
- Organize and manage their processes within Linux;
- Usefully combine Linux tools using features such as filters, pipes, redirection, and regular expressions;
- Customize their Linux working environment;
- Be knowledgeable enough about basic Linux shell scripting to be able to successfully read and write
- Bash shell scripts;
- Know how to use Linux resources to find additional information about Linux commands.

1. Linux Essential

- Introduction
- Evolution of Linux

2. Linux Installation

Installation covers most flavors of Linux distribution such as Red hat, Fedora and Ubuntu Linux

- First Stage: Starting the Installation
- First Stage: Boot Media
- Accessing the Installer
- First Stage: Installation Method
- Network Installation Server
- Second Stage: Installation Overview
- Configuring File Systems
- Advanced Partitioning
- Package Selection
- First Boot: Post-Install Configuration

- Starting a Kickstart Installation
- Anatomy of a Kickstart File

3. Linux System Administration - Managing Startup

A. Command line

- Introduction to Bash Shell
- Basic Commands (ls,cd,tail,cat,mkdir)
- Commands to work with file(mv,cp,rm)
- Text editor (vim)
- Stream text editor (grep, sed, and awk)
- STDERR,STDOUT,STDIN ☒ Compression Tar,gzip and bzip2 ☒ Easily accessible tools in linux.

B. System Initialization

- Boot Sequence Overview
- Troubleshooting boot issues
- What is GRUB and grub.conf
- Starting the Boot Process: GRUB
- Kernel Initialization

- init Initialization (init 0,1,2,3,4,5)
- Run Levels
- /etc/rc.d/rc.sysinit
- /etc/rc.d/rc
- System V run levels
- /etc/rc.d/rc.local
- Controlling Services(service,init.d,chkconfig)

C. Booting and run levels

- The boot process: from BIOS to kernel then to user space
- Setting kernel parameters
- Run levels and init scripts
- Configuring services to run at boot
- Securing single-user mode (su login)
- Shutting down and rebooting the system

D. Package Management - Working with packages

- RPM Package Manager
- Installing and Removing Software
- Updating a Kernel RPM
- rpm Queries
- rpm Verification
- About yum
- Using yum
- Searching packages/files
- Configuring Additional Repositories
- Creating a private repository
- Red Hat Network
- Red Hat Network Server
- Entitlements
- Red Hat Network Client

E. Kernel Services - Configuring the kernel

- The Linux Kernel
- Kernel Images and Variants
- Kernel Modules
- Kernel Module Utilities
- Managing the initrd Image
- Accessing Drivers Through /dev
- Device Node Examples
- Managing /dev With udev
- Adding Files Under /dev
- Kernel Configuration With /proc
- /proc Examples
- sysctl : Persistent Kernel Configuration
- Exploring Hardware Devices (hwinfo)

- Monitoring Processes and Resources (kill,ps,pstree,top)

F. System Services – Linux System Services

- Network Time Protocol
- System Logging
- syslog Configuration XOrg: The X11 Server
- XOrg Server Configuration
- XOrg in runlevel 3
- XOrg in runlevel 5
- Remote X Sessions
- SSH: Secure Shell
- VNC: Virtual Network Computing
- cron
- Controlling Access to cron
- System crontab Files
- Daily Cron Jobs
- The anacron System
- CUPS

G. User Administration

- Adding a New User Account
- User Private Groups
- Modifying / Deleting User Accounts
- Group Administration
- Password Aging Policies
- Switching Accounts
- sudo
- Network Users
- Authentication Configuration
- Example: NIS Configuration
- Example: LDAP Configuration
- SUID and SGID Executables
- SGID Directories
- The Sticky Bit
- Default File Permissions
- Access Control Lists (ACLs)
- SELinux
- SELinux: Targeted Policy
- SELinux: Management

H. File system Management

- Adding New File systems to the File System Tree
- Device Recognition
- Disk Partitioning
- Managing Partitions
- Making Filesystems

- Difference between ext3 and ext4
- Filesystem Labels
- tune2fs
- Mount Points and /etc/fstab
- Mounting Filesystems with mount
- Unmounting Filesystems
- mount By Example
- Handling Swap Files and Partitions
- Mounting NFS Filesystems
- Automounter
- Direct Maps
- gnome-mount
- Checking available free space and space used by files (df,du)
- Checking and correcting the integrity of filesystems (fsck)

I. File system security

- Users and groups
- The 'root' user or superuser
- Changing file ownership (chown)
- Changing file group ownership (chgrp)
- Permissions on files
- Permissions on directories
- How permissions are applied
- Changing permissions (chmod)

J. Filesystem concepts and use

- The unified UNIX filesystem
- Special file types
- Symbolic links (ln -s)
- Inodes and directory entries
- Hard links
- Preserving links while copying and archiving

K. Processes and jobs

- What processes are ?
- The properties of a process
- Parent processes and child processes
- Killing processes and sending signals to a process (kill, killall, xkill)

L. Advanced File system Management

- Configuring the Quota System
- Setting Quotas for Users ? Reporting Quota Status ? What is Software RAID?

- Software RAID Configuration ? Software RAID Testing and Recovery ? What is Logical Volume Manager (LVM)?
- Creating Logical Volumes
- Resizing Logical Volumes
- Logical Volume Manager Snapshots
- Using LVM Snapshots
- Archiving tools: tar ? Archiving Tools: dump/restore ? Archiving Tools: rsync:

4. Linux Network Administration – Managing Network

A. Network Setup and Configuration

- Network Interfaces
- Driver Selection
- Speed and Duplex Settings
- IPv4 Addresses
- Dynamic IPv4 Configuration
- Static IPv4 Configuration
- Device Aliases
- Routing Table
- Default Gateway
- Configuring Routes
- Verify IP Connectivity
- Defining the Local Host Name
- Local Resolver
- Remote Resolvers
- Verify DNS Connectivity
- Network Configuration Utilities
- Transparent Dynamic Configuration
- Implementing IPv6
- IPv6: Dynamic Interface Configuration
- IPv6: Static Interface Configuration
- IPv6: Routing Configuration
- New and Modified Utilities

B. Basic networking configuration

- Configure a network device to connect to a local network
- Configure a network device to connect to a wide-area network
- Communicate between subnets within a single network
- Configure a network device to implement authentication

- Configuring a multi-homed network device
- Resolving networking and communication problems
- /sbin/route
- /sbin/ifconfig
- /bin/netstat
- /bin/ping
- /sbin/arp
- /usr/sbin/arpwatch
- /usr/sbin/tcpdump
- /usr/sbin/lsof
- /usr/bin/nc

C. Troubleshooting network issues

- ifconfig
- route
- netstat
- /etc/network and /etc/sysconfig/network - scripts/
- System log files
- ping
- /etc/resolv.conf
- /etc/hosts
- /etc/hosts.allow and /etc/hosts.deny
- /etc/hostname and /etc/HOSTNAME
- traceroute
- nslookup and dig
- dmesg

D. Organizing Networked Systems

- Host Name Resolution
- DNS-Specific Resolvers
- Trace a DNS Query with dig
- Exploring DNS with host
- Service Profile: DNS
- Getting Started with BIND
- bind-chroot Package
- caching-nameserver Package

5. Linux Server Administration – Managing Servers

A. Security tasks

- Auditing source code
- Securing SSH
- Getting security alerts
- Open mail relays
- Installing Intrusion Detection Systems
- Port scanning with nmap
- Firewall using IP Tables
- Filter and NAT Rules
- SMTP Overview and Implementations
- Connections and Relays
- SMTP AUTH & StartTLS/SSL
- Password Security and PAM
- Security Considerations
- Activating and Interfacing with SELinux
- SELinux commands and Roles
- Location & Access
- Boot level security (GRUB)
- Security need for TCP wrappers
- /etc/inetd.conf
- /etc/hosts.allow and /etc/hosts.deny
- xinetd
- Net filter Overview
- Rules: General Considerations
- Connection Tracking
- Network Address Translation (NAT)
- IP tables
- /proc/sys/net/ipv4

B. Introduction to Shell Script

- Different type of shell ☐ Shell script basics ☐ Executing shell scripts.
- Header, comments on script
- Redirection
- Variables
- Conditions
- Loops
- Eg: Backup script and scheduling the script

C. Storage

- Configure a system as an iSCSI initiator that persistently mounts an iSCSI target

Note: Permitting time, the course will include most of these topics and may include additional topics depending on the job and student needs.

Additional Resources

For Linux learning on Ubuntu

1. Basics of Linux
https://www.youtube.com/watch?v=_gCwCOhMcog
2. Go through each of the following documents and learn and understand each and every commands, Many of the commands are repeated in these documents but will give you more practice.
 - a) <http://isites.harvard.edu/fs/docs/icb.topic839892.files/Linux/Unixrefcard.pdf>
 - b) http://sites.tufts.edu/cbi/files/2013/01/linux_cheat_sheet.pdf
 - c) <http://cheat-sheets.s3.amazonaws.com/linux-commands-cheat-sheet-new.pdf>
 - d) [http://academy.delmar.edu/Courses/ITSC1358/eBooks/Unix\(CommandsCheatSheet\).pdf](http://academy.delmar.edu/Courses/ITSC1358/eBooks/Unix(CommandsCheatSheet).pdf)
 - e) <https://ubuntudanmark.dk/filer/fwunixref.pdf>
 - f) <http://isites.harvard.edu/fs/docs/icb.topic839892.files/Linux/Unixrefcard.pdf>
3. Prepare the environment to practice the Linux commands in Ubuntu
 - Download VMware player ; Its free [VMware Workstation 12 Player for Windows 64-bit]
<https://www.vmware.com/products/player/playerpro-evaluation.html>
 - Download Ubuntu ; Its free 1006 MB so it will take some time to download, download from here [correct version is [ubuntu-14.04.3-desktop-amd64](http://www.ubuntu.com/download/desktop)]
<http://www.ubuntu.com/download/desktop>
 - Create the Ubuntu VM , the procedure will take about 20 minutes.
4. Open up the TERMINAL (Command Prompt). Run the commands given in the documents mentioned above and understand the purpose of each command. The details are very well explained in the documents
 - Using the Ubuntu command shell execute each of the commands. These will be very helpful on your job.