

# **LINUX COURSE OUTLINE**

## **Linux History: What is Linux?**

- Where and how did Linux start
- Free Software or Open Source Software and Initiative

## **Components of Linux Operating System**

- Kernel
- Shell
- The Directory Hierarchy
- Applications/Softwares
- Hardwares

## **Quickstart**

Logging in, activating the user interface and logging out

- Graphical mode
- Text mode

## **Distributions or flavors of Linux**

- Red Hat
- Rocky Linux
- CentOS
- Scientific Linux
- Ubuntu
- Debian
- OpenSUSE
- Mandriva
- Gentoo
- Kali linux
- Others (check [www.distrowatch.com](http://www.distrowatch.com))

## **Installing Linux – Rocky Linux 9**

- Download a Rocky Linux 9 iso image from [www.centos.org](http://www.centos.org)
- Oracle Virtual Box or VMWare Workstation
- Rocky Linux 9 installing
- Rocky Linux first logon
- Oracle Virtual Box /VMware Workstation Network Interface
- Configuring the Network
- Adding Dynamic or Static IP Address
- Package Management

## **Logon from MS Windows Using SSH Client**

- Using PuTTY on Windows Machines
- Using MobaXterm on Windows Machine

## **Secure Remote Access / Log in to a Linux Server**

- Using SSH
- Using VNC
- Using VPN

## **Using the Shell – Using Bash**

- About Shells and Terminal Windows
- Using the shell prompt
- Running Commands
- Understanding command syntax
- Choosing Your Shell

## **Working with the Bash Shell – Using Bash Features**

- Recalling Commands Using Bash History

- Command-line editing
- Command-line recall
- Useful Bash Key Sequences

Key or key combination	Function
Ctrl+A	Move cursor to the beginning of the command line.
Ctrl+C	End a running program and return the prompt.
Ctrl+D	Log out of the current shell session, equal to typing <b>exit</b> or <b>logout</b> .
Ctrl+E	Move cursor to the end of the command line.
Ctrl+H	Generate backspace character.
Ctrl+L	Clear this terminal.
Ctrl+R	Search command history
Ctrl+Z	Suspend a program.
ArrowLeft and ArrowRight	Move the cursor one place to the left or right on the command line, so that you can insert characters at other places than just at the beginning and the end.
ArrowUp and ArrowDown	Browse history. Go to the line that you want to repeat, edit details if necessary, and press <b>Enter</b> to save time.
Shift+PageUp and Shift+PageDown	Browse terminal buffer (to see text that has "scrolled off" the screen).
Tab	Command or filename completion; when multiple choices are possible, the system will either signal with an audio or visual bell, or, if too many choices are possible, ask you if you want to see them all.
Tab Tab	Shows file or command completion possibilities.

## Getting Information about commands on the Linux System

- Using man to Get Help
- Using man -k (apropos)
- Whatis
- whereis
- Using info command
- Using the --help Option

## Quickstart Commands

- **ls** Displays a list of files in the current working directory, like the **dir** command inDOS
- **cd directory** change directories
- **passwd** change the password for the current user
- **file filename** display file type of file with name filename
- **cat textfile** throws content of textfile on the screen
- **pwd** display present working directory
- **exit** or **logout** leave this session
- **man *command*** read man pages on **command**
- **info *command*** read Info pages on **command**
- **apropos *string*** search the *whatis* database for strings

## Basic Linux Commands Used in Enterprise Environment

uname ; uname -r; uname -a; id; date; cal; uptime; free; hostname; hostnamectl; w; who; whoami; df -hT; du -h; pwd; last; lastb; lastlog; clear; ctrl + l; history  
ls; ls -l; ls -a; ls -ltrh; ls -F; ls -R; ls -l; ls -asl; cat /etc/hosts; cat /etc/redhat-release

## Understanding Linux Boot Sequence

- Understanding the Linux Boot Sequence

## Introduction to users

- whoami
- who
- who am i
- w
- id
- su to another user
- su to root
- su as root
- su - \$username
- su -

- Run a program as another user
- visudo
- sudo su -
- sudo logging

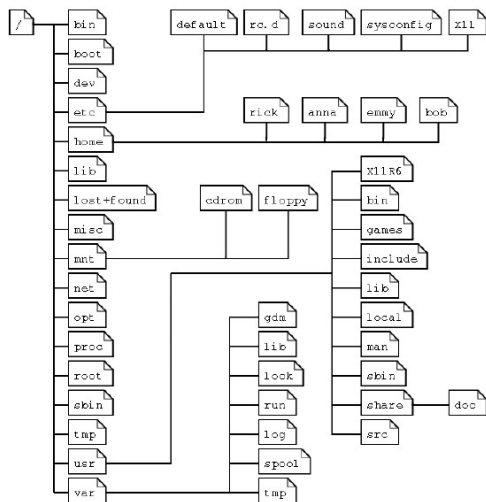
Elevating the Right Privileges of Normal or Regular Users

- Editing /etc/sudoers file using visudo -f and adding the user
- Making the user a member of "wheel" group using "usermod" command

## About files and the file system

General overview of the Linux file system

- Files
- About partitioning
- Orientation in the file system



## The path

Absolute and relative paths

- The most important files and directories
- The most important configuration files
- The most common devices
- The most common variable files
- Manipulating files
- Viewing file properties

## Working with directories

- pwd
- cd
- path completion
- ls
- mkdir
- rmdir
- rm -r
- Working With wildcards

## Working with files - Creating and deleting files and directories

- touch
- echo
- cat
- vi/vim
- file
- rm

- cp
- mv

### Working with file contents

- head
- tail
- cat
- more and less

### Piping and Redirection

- Piping
- Redirection

## Introduction to vi(m) – Text Editors

### Three Modes of Operation of vi(m)

- (i) Command/Escape mode
- (ii) Insert, Input or Edit mode
- (iii) Last Line mode

### Finding Files

- Using locate to find files by name
- Searching for files with find
- Searching in files with grep

### Using Links

- inodes
- Understanding Hard Links
- Understanding Symbolic Links
- Creating Links
- Removing Links

### Archival and Compression

- Archiving Files Using tar
- Compressing Files with gzip
- Compressing Files with bzip2
- Archiving and Compressing Files Using zip and unzip

## User and Group Management

### Bash Configuration Files – User Startup Files

- /etc/profile
- ~/.bash\_profile
- ~/.bash\_history
- /etc/bashrc
- ~/.bashrc
- ~/.bash\_logout

### User and Group Information

- The /etc/passwd File
- The /etc/shadow File
- The /etc/group File
- The /etc/gshadow File

### Managing User Accounts and Group Information

- Creating User Accounts
- The passwd Command
- Deleting User Accounts
- Changing User Accounts and Group Assignment
- Changing User Information Directly—vipw, vigr, vipw -s
- Creating, Changing and Deleting Groups
- Using newgrp command to temporarily change to a group

### Logging In Through an External Authentication Sources

- Understanding LDAP

## **File and Directory Ownership**

- Understanding the Role of Ownership
- Displaying Ownership – chown and chgrp
- Changing User Ownership
- Changing Group Ownership
- Understanding Default Ownership

## **Managing Basic Permissions - chmod**

- Basic Permissions: Read, Write, and Execute
- Applying Read, Write, and Execute Permissions
- umask setting, Initial and Default Permission
- Setting Default Permission using umask value

## **Advanced/Special File Permissions**

- setuid on regular files
- setgid bit on regular files and directory
- sticky bit on directory

## **Managing Access Control Lists (ACLs)**

- Understanding ACLs
- Preparing Your File System for ACLs
- Changing and Viewing ACL Settings with setfacl and getfacl
- Working with Default Access Control Lists
- Working with Attributes

## **Package Management – RPM Package Manager (RPM) and Yellowdog Updater Modified (yum)**

### **Managing Software Packages with RPM**

- What is RPM
- Understanding RPM Filenames
- Installing, Querying, erasing and Verifying Software with the rpm command

### **Managing Software Packages with yum**

- Understanding How yum works
- Understanding the Role of Repositories
- Using yum to find Software
- Creating More Information About Packages
- Installing and Removing Software Packages
- Showing Lists of Packages
- Updating Packages
- Working with yum Package Groups
- Downloading RPMs from a yum repository
- Creating Your Own Repositories – Local yum repository

## **Process Management**

- Understanding Processes
- Listing processes, ps, top, pstree, ps aux, ps afx, ps -ef
- Managing Background and Foreground Processes
- Starting background processes
- Using foreground and background commands
- Signaling processes – kill -l
- Killing and Renicing Process
- Using kill to signal processes by PID
- Using killall to signal processes by name
- Setting Processor priority with nice and renice

## Managing Services – systemd

- Checking the status , starting and stopping of daemons using systemctl

## Scheduling Jobs – crond and atd

- Scheduling repetitive jobs - cron
- Scheduling one time jobs - at

Cron and at administrative details

- /etc/cron.allow and /etc/cron.deny
- /etc/at.allow and /etc/at.deny)

## Disk Management and Filesystems

- Understanding Disk Storage
- Partitioning Hard Disks
- Understanding MBR and GPT Partitions
- Understanding MBR Partitioning Scheme
- Understanding Partition Tables

Managing Partitions and Filesystems

- Creating MBR Partitions with fdisk
- Creating a Single-Partition and Multiple-Partition Disk
- Using Extended and Logical Partitions on MBR
- Creating GPT Partitions with gdisk
- Viewing Disk Partitions

File Systems Overview

- Creating File Systems using mkfs command
- Changing File System Properties
- Adding Swap Partitions
- Adding Swap Files

Mounting Filesystems

- Manually Mounting Filesystems
- Using Device Names, UUIDs or Disk Labels
- Automatically Filesystem Mounts using /etc/fstab
- Using umount command

## Working with Logical Volumes

LVM Architecture and Features

- Creating Physical Volumes
- Creating Volume Groups
- Creating Logical Volumes and Filesystems
- Understanding LVM Device Naming

Resizing LVM Logical Volumes

- Resizing Volume Groups
- Resizing Logical Volumes and Filesystems
- Working with Snapshots
- Replacing Failing Storage Devices

## Linux Networking

- Networking Basics - OSI Reference Model and TCP/IP
- TCP/IP or Three-Way Handshake
- Ports and Protocols
- IP Addressing and Routing
- Names and the DNS

Understanding Networking Configuration Files

- Network Interface Files
- Other Networking Files

Setting Up Hostname and Name Resolution

- Hostnames

- DNS Resolving
- Troubleshooting Networking

## **\*\*\*\*\*LINUX ENGINEERING\*\*\*\*\***

- \* Installing Softwares from source - Apache tomcat
- \* Network File System (NFS) - Configuring NFS: NFSv3 vs NFS4
- \* Security Administration - Understanding and Configuring Security Enhanced Linux (SELinux) - Mandatory Access Control