

RHEL (REDHAT Enterprise Linux)

Course duration :- 60 HOURS

Course Description

This course is designed for those Newbees in Linux, Technocrats, Linux Administrator, Windows Administrator, who want to make the best of linux capabilities in IT organizations. This course is completely targeted for industrial Environment with In Detailed Practical Approach to LINUX. During this course you will be exposed to Such Linux Capabilities which are an essential for building great secured Linux Corporate Server Environment. The course module has been enhanced with some industry based projects which will be a niche in the market.

Prerequisites

Students are expected to be familiar and comfortable with computers. No familiarity with Linux or other Unix operating systems is expected or required.

Distributions

This course is currently supported on the latest releases of Red Hat Enterprise Linux and Fedora Linux.

Course Module

This course has 3 modules:

Module 1: LB101 - Linux Essentials

Module 2: LB201 - Enterprise Linux Systems Administration

Module 3: LB301 - Enterprise Linux Network Administration

Module 1: LB101 - Linux Essentials

The aim is to provide him or her aware of all the different features and flavors of a GNU/Linux OS and also understanding of some basic system administration part. Designed to provide the essential skills needed to be proficient at the Linux command line. Subjects focused on during this class include the Unix filesystem and how to manipulate it; the basic Unix notions of pipes, redirection; the management of processes and jobs; vi, the standard Unix editor. The class concentrates on the popular Red Hat distribution of the Linux operating system, and covers subjects ranging from initial installation of Linux to day-to-day administrative tasks such as management of user accounts and disk space.

UNIT 1: Installation of Linux & Introduction to Virtualization Software

Installation of RedHat Enterprise Linux Advance Server 5 and Fedora 12

Planning a Linux Installation

Pre-Installation Planning

Hardware Requirements

Partitioning Requirements

Dual Booting with Windows Operating System

Brief operations-level introduction covers installation, administration, of VMware virtual products such as VMware WorkStation and VMware Server, Free virtual machine software for Windows and Linux.

Introduction to XEN (open source virtualization software)

Migration from Microsoft Windows to Fedora Linux

UNIT 2: Browsing the File System / X Usage Basics

Explain the Filesystem Hierarchy Standard (FHS)

Explore the Linux file system (ext, ext3)

Important directories

- /etc, /boot, /var, /srv, /proc, /tmp, /lib, /usr/lib, /usr/local/lib, /bin, /sbin, /usr/bin, /usr/sbin

Partitions (/ , /var, /usr and /boot) and Virtual Memory (SWAP)

Relative and Absolute Pathnames

X Usage Basics:

- Switching between virtual consoles and the graphical environment

- Elements of the X Window System

- Starting the X server

UNIT 3: Running Basic commands, Getting Help and Text Editors

Common BASH Shell commands - Command Line Interface (CLI)

- pwd, ls, cd, touch, cp, mkdir, mv, rm, which, useradd, passwd, cat, echo, date, cal, diff, file, w, wall, watch, whereis, which, who - Important w commands

Familiar with the many help resources in RHEL

- command --help, man, info, whatis, /usr/share/doc, Red Hat documentation

Explore usage of finding and searching user-tools (find, locate)

Slocate - Compare and contrast with find and create system-wide DB

Usage of Archiving Tools: tar
Compression Tools i.e gzip, bzip2
Demonstrate typical usage of vi/vim ASCII text editors

UNIT 4: BASH shell navigation

Types of Shell in Linux
History, editing, completion, shortcuts
Basic BASH shell navigation & PATH
variable manipulation(set,unset,env,export,etc.)
Introduction to Bourne Again Shell (BASH) - Globes/environment
Input (STDIN), output (STDOUT) and standard error (STDERR) redirection
Pipes
Command chaining
BASH for loops
Use grep to process lines
Use awk to process fields
Usage: sed

UNIT 5: System Monitoring & Process Management

Process creation: fork and exec
Demonstrate usage of system monitoring tools (uptime, free, top, vmstat,iostat,
/proc/meminfo, /proc/cpuinfo, kill, watch)
ps, pstree, pidof - explore process lists
Statistics on the virtual memory system: vmstat
Process Priority: nice and renice
Managing Background Process: jobs, fg, bg, Ctrl Z
Usage of killing process: kill,
Peek into Signals
Sending Signals to Processes
limit the system resources: ulimit
Monitoring process activities/Process Accounting: psacct, ac, lastcomm, sa, sar
lists open files: lsof
identify processes using files or sockets: fuser
New:
Linux OS Architecture
Concept: Multiuser, Multitasking, Multithreading, Multiprogramming
Concept: Process, Daemon

UNIT 6: File Ownership & Permissions

Explain UNIX/Linux file security & permissions rules & concepts
- Symbolic Way: (-rwxrwxrwx)
- Octal Way: (777)
Setting Permissions with chmod
Setting Default Access Permissions: umask

Advance File Permissions:

- "set user id" (suid bit)
- "set group id" (sgid bit)
- sticky bit

File attributes on the linux file system

- lsattr
- chattr

Access Control List (ACL): setfacl, getfacl

Secure File Deletion: shred

UNIT 7: User and Group Administration

User Administration\Management

Group Administration

User admin Tools: useradd, userdel, usermod, pwconv, pwunconv, grpconv,grpunconv

Group Commands: groups, gpasswd, groupadd, groupmod, groupdel

Verification Commands: pwck, grpck

Changing User and Group Ownership: chown, chgrp

Use system-config-users to create and manage users and groups

User and group creation & management concepts - passwd, shadow,group,gshadow files

Password aging under Linux: chage

User profile implementation logic and concepts (Bash profile/etc/skel/aliases/PATH/etc.)

The Linux login process and login authentication

User Login Activity: Whois, Who, w, wc

Alter users GECOS information: chfn

Changing users default shell: chsh

User information lookup program: finger, last, lastlog, faillog

Mingetty/MOTD/Banners/Issue File

MODULE 2: LB201 Enterprise Linux Systems Administration

This in-depth course helps students acquire the variety of skills needed to set up and maintain Linux Server. The goal of this course is also to provide the student with a fundamental knowledge of the internals of the Linux kernel. The focus is on understand the workings of the kernel, and not the theory.

UNIT 1: X Windows Exploration

X Windows Exploration

X Server / X Client / Window Manager / Desktop Environment

Configuring X

XOrg: The X11 Server

XOrg Server Configuration

UNIT 2: Package Management

Discuss RedHat Package Manager (RPM) concepts, features and applications
Demonstrate usage of RPM to install, upgrade, freshen and remove packages
Usage of RPM to import public keys
Usage of RPM to verify the integrity of downloaded packages
Installing Software through tarballs, srpm
Usage of YUM
- Searching packages/files
- Configuring Additional Repositories
- Creating a private repository
Red Hat Network Server / Client

UNIT 3: RedHat Linux Boot Process

BIOS / MBR

Boot loaders / managers - GRUB & LILO

Kernel Initialization

Discuss the role of the init grandfather process and illustrate logical boot flow - /etc/inittab

System V Init Runlevel (0 - 6) concepts

The Run Level Scripts In /etc/rc.d

Identify key startup files, including scripts (inittab,Sscripts,Kscripts,etc.)

- /etc/rc.d/rc.sysinit

- /etc/rc.d/rc

Demonstrate Daemon/Service management with (chkconfig/ntsysv/redhatconfig-services/system-config-services)

- /etc/rc.d/init.d/

Identify startup log files & entries using DMESG & exploration

UNIT 4: Using sudo

Simple Sudo Examples

- Temporarily Gaining root Privileges
- Becoming root for a Complete Login Session

The /etc/sudoers File

Simple /etc/sudoers Examples

- Granting All Access to Specific Users
- Granting Access To Specific Users To Specific Files
- Granting Access to Specific Files as Another User
- Granting Access Without Needing Passwords
- Using Aliases in the sudoers File

UNIT 5: Configuring the Quota System

Enable file system quota

Setting Quotas for users: setquota, edquota, quotaon, quotaoff, quotacheck

Quota Concept:

- Soft Limit
- Hard Limit
- Grace Period

Reporting Quota Status

- quota
- repquota
- warnquota

UNIT 6: SYSLOG Concepts / Log Rotatio

Syslog facilities & levels

Syslog administration

Discuss & demonstrate automatic log rotation and customization

Implementation of Centralize Log Server

UNIT 7: CRON Process Scheduling

Identify various predefined CRON entries and schedules

Define custom cron jobs system-wide

Define custom cron jobs user-wide

Evaluate results of cron jobs

UNIT 8: Backup and Recovery

Backup media: Magnetic Tape, CD-ROM, Hard Disk, Which form of Media to use?

Securing your backup

Backup concepts

Backup software: mt, tar, cpio, dump and restore, dd

Remote Backup of a server using rsync

Roll your own: Performing a backup, Verifying Backups and Restore from backup

UNIT 9: Kernel Module Management & Kernel Re-Compilation

Identify and discuss kernel implementation

Use kernel utils to identify modules and supported hardware

Discuss proper kernel update procedures

Remove outdated kernel and confirm results

Download and Install the latest Uniprocessor-based kernel

Types of Kernels

Updating Modules

Patching the kernel

Kernel Compiling Methods

Compilation Process

Booting with modified kernel

Examine changes to GRUB and other key directory trees

SYSCTL - use to view and modify run-time variables

UNIT 10: File System Management

Identify the various types of files on Linux systems

Understanding different linux file systems like ext2, ext3 and reiserfs

Maintenance - checking consistency with fsck, monitoring disk usage with df, du

Concept of Inodes and Directories

Symbolic Links: Hard and Soft Link
Producing file statistics: stat
Device Recognition
Disk Partitioning
Managing Partitions: fdisk, sfdisk, GNU parted, partprobe
Making Filesystems: mkfs, mkfs.ext3
Filesystem Labels: e2label
Viewing Filesystem Parameters: dumpe2fs
Adjusting Filesystem parameters: tune2fs
Mount Points and /etc/fstab - explore File System Table
Mounting Filesystems with mount and Unmounting Filesystems
Use FDISK to create a swap partition
Create Swap file using MKSWAP
Provision additional swap space using swapon & swapoff
Mounting/unmounting basic Linux floppy, CD & ISO images - create ISOs with mkisofs

UNIT 11: What is Logical Volume Manager (LVM)?

Creating Logical Volumes
Resizing Logical Volumes
Logical Volume Manager Snapshots
Using LVM Snapshots

UNIT 12: What is Software RAID?

Understanding different RAID Levels(0,1,4,5 and 6)
Software RAID Configuration
Software RAID Testing and Recovery

MODULE 3: LB301 Enterprise Linux Network Administration

Students interested in developing skills as network administrators find this course invaluable. Topics explored and implemented in the class include the setup and maintenance of many of the most popular network services available for Linux and Unix today, including servers for DNS, DHCP, NFS & NIS, Web (HTTP, HTTPS), FTP, SMB (Windows networking), Squid Proxy, email (SMTP, POP3, IMAP) and Firewall (IpTables)

UNIT 1: Network Utilities

Assigning an IP address: ifconfig, ip addr
Activating and De-Activating your NIC: ifup, ifdown
Configuring your NIC: Speed and Duplex settings: mii-tool, ethtool
Defining the local host name: hostname
Send ICMP Echo Request Packets to Hosts - ping
Print the Route Packets take to Network Host - traceroute, mtr
show / manipulate the IP routing table route, netstat , ip route
Print Network Statistics - netstat

Dump traffic on a network: tcpdump
Manipulate the System ARP Cache - arp
Verify DNS Connectivity dig, host, nslookup
Query a Whois or Nicname database whois, host, nslookup

UNIT 2: Network - Physical & Logical Configuration

Understand network device recognition
Know how to configure network interfaces: Ethernet(eth0), Dialup(ppp0)
Dynamic IPV4 Configuration and Static IPV4 Configuration
Use network configuration utilities
- /etc/sysconfig/network
Network IP aliasing (Device Aliases)
Understand IP route configuration
Local Resolver: /etc/hosts
Remote Resolver: /etc/resolv.conf, /etc/nsswitch.conf

UNIT 3: Remote Administration

Secure SHELL (SSH)
Putty
Telnet
VNC server/viewer
Rdesktop

UNIT 4: Implement Very Secure VSFTPD (FTP) service

Implement Very Secure VSFTPD File Transfer Protocol (FTP) services
Implement anonymous FTPD
Implement user-level FTPD access
Implement FTPD banners
Disable anonymous access

UNIT 5: TCP Wrappers and Xinetd super server concepts

Concept: TCP Wrappers
TCP Wrappers Configuration Files: hosts.deny and hosts.allow
Identify services controlled by Xinetd and xinetd Configuration files
/etc/xinetd.d/
/etc/xinetd.conf
Enable & disable Xinetd-controlled services & examine results
Implement access control on Xinetd controlled services

UNIT 6: SELinux

SELinux: Targeted Policy
SELinux: Management
SELinux: semanage
SELinux: File Types

UNIT 7: Network File System (NFS) Implementation with NIS Server

NFS Server Configuration and NFS Clients
Setup an NFS server and export directories
Configure NIS client as part of the EXAMPLE.COM domain
Review /etc/exports parameters and options
Evaluate access to NFS exports

UNIT 8: Network Information Service (NIS Server)

Creating a NIS Master Server
NIS Client Configuration
Slave Server Configuration
Exploring Configuration Files:
- /etc/sysconfig/network
- /etc/yp.conf
Adding New NIS Users
Enable ypxfrd for high-performance database transfers between master and slave NIS servers
Configure autofs to access an NFS export
- /etc/auto.master
- /etc/auto.misc

UNIT 9: BIND Domain Name Server (DNS)

Implement BIND 9.x
Configure BIND as a caching-only DNS server
Configure BIND as a primary DNS server
named.conf Syntax and Options Block
Test primary name resolution from Linux hosts
Configure BIND as a secondary(slave) DNS server
Implement poor man's load balancing using DNS round robin
Evaluate results of BIND configuration using DIG
Configure DNS zones
Configure zone transfers
Zone Database File Syntax
SOA - Start of Authority
A -Address / PTR-Pointer
NS - Name Server
CNAME -Alias / MX-Mail Host
Allowing Queries
Allowing Recursion
Allowing Transfers
Remote Name Daemon Control (rndc)

UNIT 10: Implement Samba services

- Implement Linux & Windows Integration via Samba
- Explore Samba Configuration files
- Mount Windows shares seamlessly using Samba File System (SMBFS)
- Samba Client Tools: smbclient, nmblookup, mounts
- Configure FSTAB to support repetitive mounts
- Implement secure SMBFS credentials for mounting
- Install Samba Server support
- Install Samba Web-based Administration Tool (SWAT)

UNIT 11: Implement Dynamic Host Configuration Protocol (DHCP) services

Explain the various steps of the DHCP process
Configure global & scope-level DHCP options
Configure IP reservations based on layer 2 MAC addresses
Enable Linux DHCP services

UNIT 12: Apache Web Server Implementation

Discuss Apache server's features and concepts
Examine Apache - Red Hat HTTPD CONF hierarchy
Examine various configuration files
Configure IP-based Virtual Hosts
Configure Name-based Virtual Hosts
Restrict access to content based on IPs and subnets
Configure .htaccess file with directives
Implement Basic and digest authentication schemes
Implement Apache logging system per virtual host

UNIT 13: Email Concepts

SMTP theory
Email Protocols
Email Program Classifications
Mail Transport Agents
Mail Delivery Agents
Mail User Agents
Email Work Flow Architecture
Smtplib Error Codes

UNIT 14: Sendmail: Features, Process, Components, and Configuration

Configure mail server to accept internet mail
Blocking spam email id, ips with access database
Relay access to my network through access database
Route mail to specific hosts or mailserver FEATURE(`mailertable')
Masquerading outgoing email address

Configure sendmail as a smart host
Force sendmail to deliver a message in sendmail mail queue
Configure Sendmail SSL encryption for sending and receiving email
Limiting Denial of Service (DOS) Attack
Mail Forwarding
Route all mail to unknown users (for verification) to a single mail account.

UNIT 15: Configure Dovecot as POP3/IMAP Server

Discuss the capabilities and limitations of POP3/IMAP
Implement POP3/IMAP services
Demonstrate access to POP3 services from the client perspective
Demonstrate access to IMAP services from the client perspective
Implement Secure IMAP services using SSL (IMAPS) with self-signed certificate

UNIT 16: Implement Postfix Mail Server

Using alternatives to Switch MTAs
Service Profile: Postfix
sMasquerading or changing outgoing SMTP email address
Redirect one users mail to another user
Limit the mailbox size for users
Flush the Mail Queue
SSL Certificate Installations and Configuration
Block Malware with blacklist
Block .bat, .exe .com .vbs mime attachments - common virus spreading files
Postfix Spam filtering with blacklists
Anti Spam Database service providers
Postfix mail server error and solution
Test Mail Server for an open relay

UNIT 17: Implement SQUID Proxy Server

Configure web browser to utilize proxy services
Grant permissions to permit local hosts to utilize proxy services
Configure SQUID Define an ACL for authorized IP networks
Apply the ACL using http_access
Test multiple HTTP-based ACLs
Configure transparent proxy services

UNIT 18: IPTABLES (Netfilter Linux Kernel-based Firewall)

Introduction to Firewalls
- Stateless Firewalls
- Stateful Firewalls
Implement IP Forwarding between disparate subnets
Discuss IPTABLES/Netfilter Concepts
Explore default tables and chains

Explain IPTABLES default chains/filters and policies

Implement ICMP inbound filtration based on various hosts

Restrict access to various daemons (SSH/FTP/HTTP/etc.)

Implement Network Address Translation (NAT)

IP Masquerading Using IPTables