

Linux Essentials

Lesson 00:

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Document History

Date	Course Version No.	Software Version No.	Developer / SME	Reviewer(s)	Approver	Change Record Remarks
11-August-2016	1.0	5.5	Amal Thambi		Amal Thambi	Created as per the Infra BU requirement

Course Goals

Course Goals

- This course is designed for entry level Infra resources to enable them with the skills required for provisioning and maintaining a Linux Server in production environment.



Pre-requisites

This course requires that you meet the following prerequisites:

- The audience should have completed IS Linux Fundamentals

Intended Audience

- For Entry level Infrastructure Services(IS) resources



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Day Wise Schedule

➤ Day 1

Lesson 1: Basic of RHEL & Installation

Lesson 2: System Initialization

Lesson 3: Device Management

Lesson 4: Process Management

➤ Day 2

Lesson 5: System Services

Lesson 6: Kernel Management

Lesson 7: Bash Editing

Lesson 8: File System / Disk Management

➤ Day 3

Lesson 9: File Management

Lesson 10: Package Management

Lesson 11: User & Group Management

Lesson 12: File Permission

➤ Day 4

Lesson 13: Network Services

Lesson 14: Backup & Restore

Lesson 15: Troubleshooting

Lesson 16: Network Installation

Table of Contents

Lesson 1: Basic of RHEL & Installation

- 1.1 History
- 1.2 Versions
- 1.3 Pre-Req for Installation of RHEL 5.5
- 1.4 Installation of RHEL 5.5 on VM Machine

Lesson 2: System Initialization

- 2.1 BIOS Initialization
- 2.2 Boot Loader
- 2.3 Kernel initialization

Lesson 3: Device Management

- 3.1 Device Nodes
- 3.2 Char Device
- 3.3 Block Device

Lesson 4: Process Management

- 4.1 Process and Job Control

Table of Contents

Lesson 5: System Services

- 5.1. NTP - Network Time Protocol
- 5.2. System Logging
- 5.3. Log Server – Centralized Log Management
- 5.4. VNC Service
- 5.5. SSH Service
- 5.6. SCP Service
- 5.7. CUPS Service
- 5.8. xinetd Service – Telnet
- 5.9. Service Management – inet.d, chkconfig, starting and stopping Services
- 5.10. Scheduling Service – crontab, anacron

Lesson 6: Kernel Management

- 6.1. Kernel Images and Modules
- 6.2. Building custom Kernel using CLI and GUI/Kernel patching

Table of Contents

Lesson 7: Bash Editing

- 7.1. Bash profile & its components
- 7.2. Skel component

Lesson 8: File System / Disk Management

- 8.1. File system Management
- 8.2. Disk Management

Lesson 9: File Management

- 9.1. File Operation
- 9.2. Disk Utilities
- 9.3. Links
- 9.4. Encryption and Archiving
- 9.5. Compression / Decompression of files

Table of Contents

Lesson 10: Package Management

- 10.1. Package management
- 10.2. RPM
- 10.3. YUM - Yellow Update Modifier

Lesson 11: User & Group Management

- 11.1 User & Group Management

Lesson 12: File Permission

- 12.1 File permission
- 12.2 ACL - Access Control List for Files & Directory

Lesson 13: Network Services

- 13.1 Network configuration
- 13.2 NW Devices
- 13.3 Virtual NW Adapters
- 13.4 Routing – Static, Default
- 13.5 NW Diagnostics - ping , traceroute

Table of Contents

Lesson 14: Backup and Restore

- 14.1 Backingup
- 14.2 Restoring using Backup

Lesson 15: Troubleshooting

- 15.1 Root Password Recovery
- 15.2 Linux Rescue Mode
- 15.3 File System Recovery

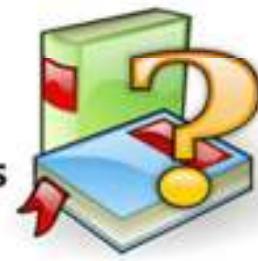
Lesson 16: Network Installation

- 16.1 Introduction to Network Installation

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- Books:

RHCSA/RHCE Red Hat Linux Certification Study Guide (Exams EX300), 6th Edition - Certification Press



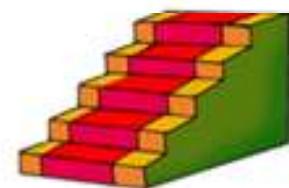
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- Websites

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Next Step Courses

- RHEL 7 Administration



View Details

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Other Parallel Technology Areas

- Red Hat Linux Server

Linux Essentials

Lesson 1 Basic of RHEL & Installation

Module Overview

1.1 History

1.2 Versions

1.3 Pre-Req for Installation of RHEL 5.5

1.4 Installation of RHEL 5.5 on VM Machine

1.1. History

- **1984: The GNU Project and the Free Software Foundation.**
 - Creates open source version of UNIX utilities.
 - Creates the General Public License (GPL).
- **Software license enforcing open source principles**
 - 1991: Linus Torvalds Creates open source, UNIX-like kernel, released under the GPL
Ports some GNU utilities, solicits assistance online.
 - Today: Linux kernel + GNU utilities = complete, open source, UNIX-like operating system.
- **Packaged for targeted audiences as distributions.**

1.2 Versions

➤ Versions

- RHEL 2.1
- RHEL 3
- RHEL 4
- RHEL 5
- RHEL 6
- RHEL 7

➤ Editions

- Server
- Workstation

1.3 Pre-Req for Installation of RHEL 5.5

- CPU
 - 2GHz or higher
- Memory/RAM
 - 1 GB minimum, upto the system limit
- Hard Disk
 - 4 GB minimum

1.4 Installation of RHEL 5.5 on VM Machine

1. Boot from DVD
2. Select Install or upgrade existing system options.
3. Anaconda is the Linux installer performs the installation.
4. Select language as English
5. Select Keyboard type as US English
6. Optionally test media if required
7. Select the storage device
8. Enter the hostname
9. Select the timezone
10. Enter the root password
11. Select the partition option
12. Select the type of installation(default:basic server)
13. Select additional software to be installed
14. Start the installation.
15. Once the installation is completed, perform the post installation tasks

Summary

- In this Module you have learnt:
 - What is the history of Linux?
 - What are the different version of Linux?
 - What are the Pre-Req for Installing of RHEL 5.5
 - Installation of RHEL 5.5 on VM Machine

Lab Exercise



➤ INSTALLATION OF Linux

Review Questions

1. Who created Linux?
2. What is the latest version of RHEL?

Linux Essentials

Lesson 2 System Initialization

Module Overview

- 2.1 BIOS Initialization**
- 2.2 Boot Loader**
- 2.3 Kernel initialization**

2.1 BIOS Initialization



2.2 Boot Loader



- Bootloader loads the OS
- 2 Major Bootloaders available for Linux
 - GRUB
 - LILO

GRUB

- **GRUB- the Grand Unified Bootloader**
 - Command-line interface available at boot prompt.
 - Mostly Boots from ext2/ext3
 - Can be password protected
- **Grub configuration file is /boot/grub/grub.conf.**
- **Changes to grub.conf take effect immediately.**

2.3 Kernel initialization

- **Kernel boot time functions**
 - Device detection
 - Device driver initialization
 - Mounts root file system read only
 - Loads initial process (init)
- **Kernel Parameters are set in /etc/sysctl.conf , used to pass additional information to the kernel**
- **Messages from Kernel is stored in Kernel Ring Buffer, which can be seen by using dmesg command**

init initialization

- **init reads its config: /etc/config**
 - Initial run level
 - System initialization scripts
 - Run level specific scripts directories
 - Initialize X in run level 5

/etc/rc.d/rc.sysinit

➤ **Important tasks include:**

- Activate udev & selinux
- Sets kernel parameters in /etc/sysctl.conf
- Sets the system clock
- Loads keymaps
- Enables swap partitions
- Sets hostname
- Root filesystem check & remount
- Activate RAID & LVM devices
- Enable disk quotas
- Check & mount other file systems
- Cleans up stale locks and PID files

Run Levels

- init defines run levels 0-6, S.
- The run level is selected by either,
 - The default in /etc/inittab at boot.
 - Passing an argument from the boot loader.
 - Running init x after boot (where x is the desired run level).
- Show current & previous run levels
 - /sbin/runlevel

/etc/rc.d/rc

- Initializes the default run level as per the /etc/inittab initdefault line such as id:3:initdefault:
 - /etc/rc.d/rc 0
 - /etc/rc.d/rc 1
 - /etc/rc.d/rc 2
 - /etc/rc.d/rc 3 ← (Run level 3)
 - /etc/rc.d/rc 4

Summary

- In this Module you have learnt:
 - BIOS Initialization
 - Boot Loader
 - Kernel initialization

Lab Exercise

- **Changing the runlevel**
- **Viewing the runlevel directories, default runlevel**
- **changing the default runlevel**

Review Questions

- 1. What is a runlevel?**
- 2. What is the default runlevel of your linux server?**
- 3. What is initrd?**



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Lesson 3 Device Management

Module Overview

3.1 Device Nodes

3.2 Char Device

3.3 Block Device

3.1 Device Nodes

- In order for the operating system to recognize the hardware device, the device must have a software name, usually referred to as a device special file or device node.
- Device nodes correspond to resources that an operating system's kernel has already allocated.
- computer system accesses device nodes using standard system calls and treats them like regular computer files

- All devices are managed by udev

3.2 Char Device

- Character special files or character devices provide unbuffered, direct access to the hardware device.
- They do not necessarily allow programs to read or write single characters at a time; that is up to the device in question.
- Character devices are sometimes known as raw devices

E,g) Keyboard

3.3 Block Device

- Block special files or block devices provide buffered access to hardware devices, and provide some abstraction from their specifics.

e.g) hard disk

Summary

- In this Module you have learnt:
 - Device Nodes
 - Char Device
 - Block Device

Lab Exercise



- View the list of devices detected

Review Questions

- 1. How is harddisk accessed**
- 2. How a 3rd IDE hdd will be detected in Linux**

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Lesson 4 Process Management

Module Overview

4.1 Process and Job Control

ps

- ps command is used to display the process attributes of all active processes.
- Syntax:
 - ps [option [arguments] ...]
- Options:
 - -f - full form
 - -e - system processes

nice-renice

Command /Utility	Description
nice	Changes the priority of a new process
renice	Changes the priority of a existing running process

- Higher the nice value , lower the priority
- Nice values may be altered.
 - When starting a process:
`$ nice -n 5 command`
 - After starting:
`$ renice 5 PID`
- Only root may decrease nice value

Top

- Interactive Process Management Tool
- Capabilities
 - Display real-time process information.
 - Allow sorting, killing and re-nicing.

nohup

- When using the command shell, prefixing a command with nohup prevents the command from being aborted if you log out or exit the shell.

- e.g) nohup gcalctool

kill - killall

- kill used to kill individual process
- killall is used to kill process all process that matches by name

Number	Signal	Description
9	SIGKILL	Forces the process to terminate unconditionally. This is the "sure kill" signal.
15	SIGTERM	Termination signal. Shuts down the process but gives the process a chance to terminate properly by cleaning up.

Example :
kill -9 1814
kill -15 1814
killall -9 gcalcctool

bg - fg - jobs

- bg - bg is a job control command that resumes suspended jobs while keeping them running in the background.

e.g) bg %1

- fg - bg is a job control command that resumes suspended jobs while keeping them running in the background.

e.g) fg command continues a stopped job by running it in the foreground

- jobs - List the status of all running jobs.

- e.g) jobs

Summary

➤ **In this lesson you have learnt**

- Process command and its options
- Modifying the priority of process
- Kill command
- Foreground and background process

Lab Exercise

- List processes
- Change process priority
- Kill foreground and background process

Review Questions

- Question 1: _____ is appended to the command to send it at the background.

- Question 2: _____ command is used to know which all command are running at the background.



Linux Essentials

Lesson 5 System Services

Module Overview

5.1. NTP - Network Time Protocol

5.2. System Logging

5.3. Log Server – Centralized Log Management

5.4. VNC Service

5.5. SSH Service

5.6. SCP Service

5.7. CUPS Service

5.8. xinetd Service – Telnet

5.9. Service Management – inet.d, chkconfig, starting and stopping Services

5.10. Scheduling Service – crontab, anacron

5.1. NTP - Network Time Protocol

- Network Time Protocol daemon.
- Network Time Protocol is the most common method to synchronize the software clock of a GNU/Linux system with internet time servers.
- It is designed to mitigate the effects of variable network latency and can usually maintain time to within tens of milliseconds over the public Internet.

5.2. System Logging

- Linux system administrators often need to look at log files for troubleshooting purposes. In fact, this is the first thing any sysadmin would do.
- The default location for log files in Linux is /var/log

5.3. Log Server – Centralized Log Management

- Monitoring individual servers is difficult.
- We can designate one server as a centralized log server and make the clients to record their logs to the central server using rsyslog

5.4. VNC Service

- We can use VNC to take the control of a remote desktop

e.g) tigervnc

5.3. SSH Service

- sshd
- used for secure connectivity to server
- It uses port 22

5.3. Log Server – Centralized Log Management

- We can configure all the Clients/Server Linux system to record the logs to a centralized Server, with the help of rsyslog

5.4. SCP Service

- scp allows files to be copied to, from, or between different hosts.
- It uses ssh for data transfer and provides the same authentication and same level of security as ssh

5.5. CUPS Service

- CUPS (an acronym for Common Unix Printing System)
- Is a modular printing system for Unix-like computer operating systems which allows a computer to act as a print server.
- A computer running CUPS is a host that can accept print jobs from client computers, process them, and send them to the appropriate printer.
- One can access the browser interface by <http://localhost:631>

5.6. xinetd Service – Telnet

➤ Xinetd

- It is a super daemon, that facilitates other daemons like telnet
- starts programs that provide Internet services.
- Instead of having such servers started at system initialization time, and be dormant until a connection request arrives, xinetd is the only daemon process started and it listens on all service ports for the services listed in its configuration file. When a request comes in, xinetd starts the appropriate server.
- Because of the way it operates, xinetd (as well as inetd) is also referred to as a super-server.

➤ Telnet

- Is a program that allows users to log into your server and get a command prompt
- One of the disadvantages of Telnet is that the data is sent as clear text. This means that it is possible for someone to use a network analyzer to peek into your data packets and see your username and password. A more secure method for remote logins would be via Secure Shell (SSH) which uses varying degrees of encryption.

5.7. Service Management

- `chkconfig` can be used to activate/deactivate/list the services in your server
 - `chkconfig httpd on`
- `service` command can be used to start/stop/status services in your system
 - `service httpd start`

5.8. Scheduling Service – crontab, anacron, at

- A system daemon which performs a specific task at regular intervals.

where the file contains the commands to execute

MIN	HOUR	DOM	MOY	DOW	COMMAND
(0-59)	(0-23)	(1-31)	(1-12)	(0-6)	---
\$ 0	18	*	*	*	/home/gather

- Anacron was similar to cron, but it is duration/interval based instead of time based. It fires after a delay, recurring every some interval.
- At is another utility that we can use to schedule jobs that doesn't recur(one time execution only). List of all jobs waiting to be executed can be seen by using atq command.

Summary

➤ **In this lesson you have learnt**

- What is NTP?
- How to see System Logging?
- How to centralize logging?
- What is VNC?
- What is SSH Service?
- What is SCP?
- What is CUPS?
- What is xinetd. How it helps other services?
- How to manager Services?
- How to schedule tasks using crontab?



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Lesson 6 Kernel Management

Module Overview

6.1 Kernel Images and Modules

6.2 Building Custom Kernel using CLI and GUI/Kernel Patching

6.1 Kernel Images and Modules

➤ Kernel Image

- vmlinuz is the kernel image that will be used by the linux.

➤ Kernel Module

- Kernel modules are pieces of code that can be loaded and unloaded into the kernel upon demand. This is to keep the kernel image as small as possible by not loading unnecessary modules before hand.

Working with Kernel Modules

- List Currently Loaded Modules => lsmod | less
- List Available Kernel Modules => modprobe -l | less
- To show information about a module => modinfo <modulename>
- To add a new module to kernel => insmod <modulename>
- Remove a Module from the Kernel => rmmod ts_fsm

6.2 Building Custom Kernel using CLI and GUI/Kernel Patching

- You can build custom kernel as per your requirements with the customized kernel sources
- You can patch the kernel with fixes/enhancements depending on your requirements.

Summary

➤ **In this lesson you have learnt**

- What is Kernel Module
- How to see the loaded/available Module

Lab Exercise

- Find the list of all loaded modules
- Find the list of all available modules
- Load a Module
- Unload/Remove a Module

Review Questions

- Question 1: What is a Kernel Module?
- Question 2: How can I load a Module into Kernel?



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Lesson 7 Bash Editing

Module Overview

- 7.1. **Bash profile & its components**
- 7.2. **Set Environment Variables**
- 7.3. **Create aliases**

7.1. Bash profile & its components

- The default shell is the Bash shell.
- Bash is a command language interpreter that executes commands read from any input(file/keyboard).
- The Bash Shell starts by reading the /etc/profile file , which usually contains the system variables, user environment and aliases.
- The login process continues with the files
 - .bash_profile
 - .bash_login
 - .profile
- If you want to modify the template of the profile files from which the profile files of new users will be created, you can modify /etc/skel/ files

User Environment initialization

execute /etc/profile

IF ~/.bash_profile exists THEN

 execute ~/.bash_profile

ELSE

 IF ~/.bash_login exist THEN

 execute ~/.bash_login

 ELSE

 IF ~/.profile exist THEN

 execute ~/.profile

 END IF

END IF

END IF

7.2. Set Environment Variables

- Variables which are available in the users total environment are called as environment variables.
- Few common environment variables are,
 - HOME
 - describes the path to user's home directory.
 - PATH
 - specifies the path, in which, invoked commands needs to be searched.
 - SHELL
 - Sets the default shell that will be used by Tools.

```
export <envvariablename>=value
```

For persistent environment variables modify the appropriate profile files(system wide or user specific)

Commonly used Environment Variables

- PS1 – Can be used to customize your shell prompt.
- PATH – Display lists directories the shell searches, for the commands.
- EDITOR – The user's preferred text editor.(for sudo, git, subversion, ...)
- HISTFILESIZE -The maximum number of lines contained in the history file
- HOME – User's home directory to store files.
- EUID - Effective User ID

7.3. Create aliases

- The alias command allows you to make new shortcuts and synonyms for commonly used commands. The basic usage is:

```
alias newcommand='yourcommand -arguments'
```

```
alias ls='ll'
```

Summary

➤ **In this lesson you have learnt**

- What is bash profile?
- How to set environment variable?
- How to create alias?

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Lesson 8 File system and Disk Management

Module Overview

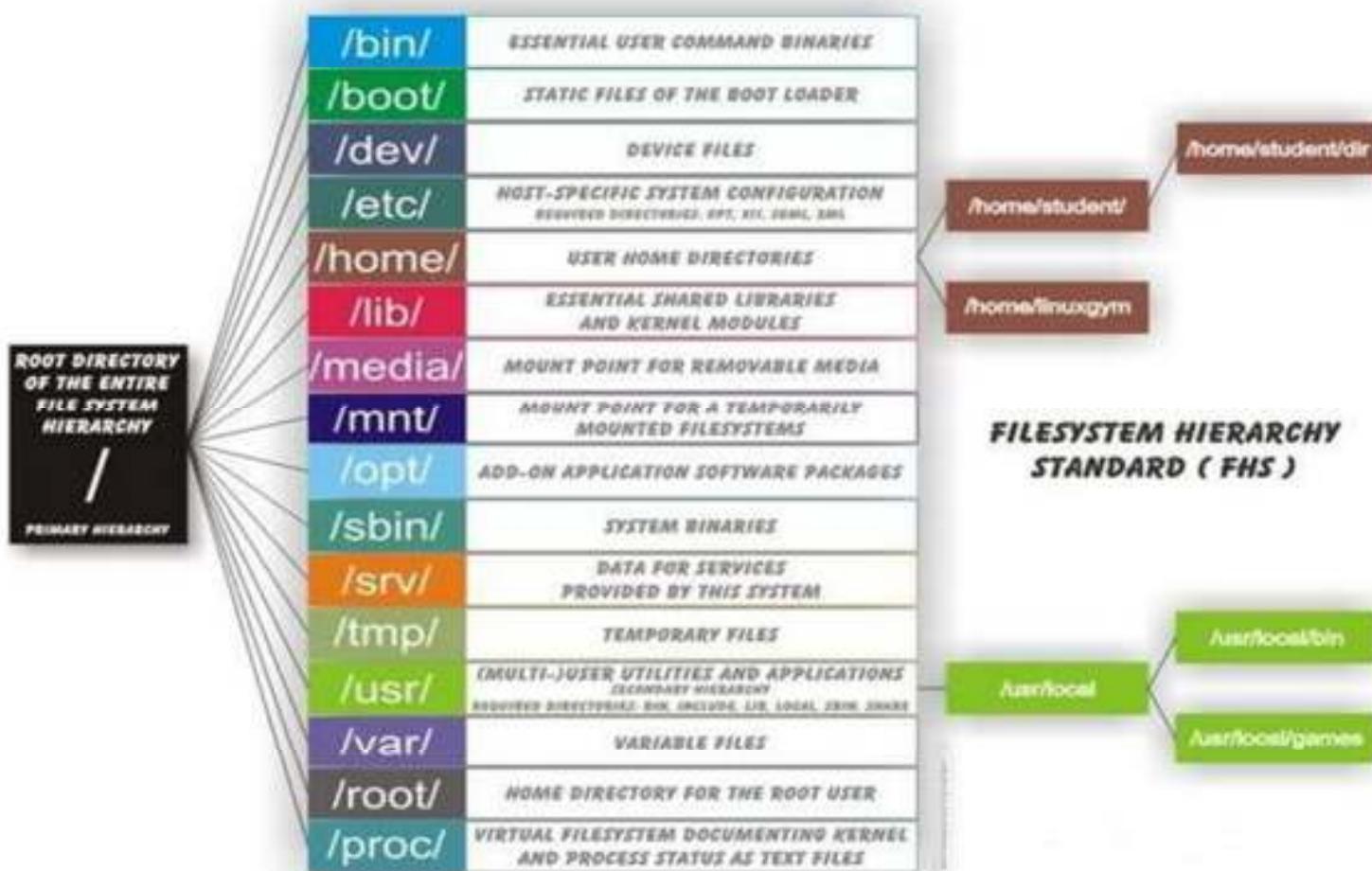
- 8.1. **File system Management**
- 8.2. **Disk Management**

8.1. File system Management

- Linux supports numerous file systems, but common choices for the system disk on a block device include the ext* family (ext2, ext3 and ext4), XFS, JFS, ReiserFS and btrfs.
- You need to format a partition with appropriate file system before storing data.
- mkfs is used to build a Linux file system on a device, usually a hard disk partition.

- df
- du

Linux Directory Structure(Recap)



8.2. Disk Management

- Disks can be managed using GUI using Disk Utility tool
- fdisk can be used to create/delete/list partitions
- configuration file /etc/fstab contains the necessary information to automate the process of mounting partitions, for persistently mounting partitions, lvm and nfs shares.

Summary

➤ **In this lesson you have learnt**

- What are the different file systems used in linux?
- How to create a file system on a partition?
- How to partition a hard disk?



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Lesson 9 File Management

Module Overview

- 9.1. File Operation
- 9.2. Disk Utilities
- 9.3. Links
- 9.4. Compression / Decompression of files

9.1. File Operation

Creating a File

- touch file.txt
- cat > file.txt
- vi file.txt

Copying a File

- cp example1.txt barney.txt

Renaming/Moving a File

- mv foo2.txt backups/foo3.txt

Deleting a File

- rm bar.txt

Directory Manipulation

Creating a Directory

- mkdir amal
- mkdir -p linuxtutorialwork/foo/bar
- mkdir -pv linuxtutorialwork/foo/bar

Copying a Directory

- cp example1 barney

Renaming/Moving a Directory

- mv barney backups

Deleting an Empty Directory

- rmdir linuxtutorialwork/foo/bar

Deleting a Non-Empty Directory

- rm -r backups

9.2. Disk Utilities

➤ df

- df finds the disk free space or disk usage.
- Ex: \$df
- Outputs a table consisting of six columns. Column names explains each column. Columns, size, used and avail use kilobyte as unit.

➤ du

- du command displays the list of directories that exist in the current directory along with their sizes.
- The last line of the output gives the total size of the current directory including its subdirectories.
- Note that by default the sizes given are in kilobytes.

9.3. Links

➤ HardLinks

- Hard links cannot link directories.
- Cannot cross file system boundaries.

In /full/path/of/original/file /full/path/of/hard/link/file

➤ SoftLinks

- To create links between directories.
- Can cross file system boundaries.
- Removing the original file of a softlink will break the link

In -s /full/path/of/original/file /full/path/of/soft/link/file

9.4 Compression / Decompression of files

- Red Hat Enterprise Linux provides the bzip2, gzip, and zip tools for compression from a shell prompt.
- The bzip2 compression tool is recommended because it provides the most compression and is found on most UNIX-like operating systems.
- The gzip compression tool can also be found on most UNIX-like operating systems.
- To transfer files between Linux and other operating system such as MS Windows, use zip because it is more compatible with the compression utilities available for Windows..
- bzip2 performs better compression(in terms of compressed size), but takes more time.

Compression Tool	File Extension	Decompression Tool
bzip2	.bz2	bunzip2
gzip	.gz	gunzip
zip	.zip	unzip

Summary

➤ **In this lesson you have learnt**

- How to perform different file operations?
- How to use different disk utilities?
- What is the difference between hard and soft links?
- How to compress/decompress in linux?



Linux Essentials

Lesson 10 Package Management

Module Overview

- 10.1. Package management
- 10.2. RPM
- 10.3. YUM - Yellow Update Modifier

10.1. Package management

- RPM started as packaging format for Red Hat Linux.
- It is a program for installing, uninstalling and managing software packages in Linux.
- Advantages:
 - Straight forward program installation/uninstallation.
 - Ease of updating programs.
 - Availability of versions.
 - Software information stored in a local database.
- Packages are provided by Red Hat Network.
 - Centralized management of multiple systems.
 - Easy retrieval of errata packages.
 - Systems must be registered first.
 - Custom package repositories may also be used.

10.2. RPM

- Package installation is never interactive.
 - Applies to all software(Core OS & Add-ons).
-
- Primary RPM options:
 - Install : rpm -i
 - Erase: rpm -e
 - Verbose: -v
 - Query all installed packages : -qa
 - Query a installed package : -qp <rpmname>
 - Query a package before installation(to know details of a package): -qip <rpmname>.rpm

10.3. YUM - Yellow Update Modifier

- Yum allows automatic updates, package and dependency management.
- Configuration in /etc/yum.conf and /etc/yum.repos.d/
- Used to install, remove and list software
 - `yum install packagename`
 - `yum remove packagename`
 - `yum update packagename`
 - `yum list available`
 - `yum list installed`
- Graphical Package Management
 - List and install software updates
 - View, install and un-install other packages

Summary

➤ **In this lesson you have learnt**

- What is rpm format?
- How to install/remove packages using rpm?
- How to install/remove packages using yum?

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Lesson 11 User Management Essentials

Module Overview

11.1 User and Group Management

11.2 Sudo

11.1 User and Group Management

Command	Description
useradd	Adds a new user account.
userdel	Deletes an user account.
usermod	Modifies an user account.
groupadd	Adds a new group.
groupmod	Modifies an existing group (for example, changes the GID or name).
groupdel	Deletes a group

User Information

- All user account information except encrypted password is stored in /etc/passwd.
- The fields in /etc/passwd are as follows:
 - username:password:UID:GID:comment:home_directory:login_shell.
- The /etc/shadow file contains the users' encrypted passwords and is very important to protect.

Working with Passwords

- passwd can be used to change user's own password, as well as by root to reset the password of other users.

Deleting User Accounts

- `# userdel usera` ==> to remove the user account

- `# userdel -r usera` ==> to remove both the users account & home directory

11.2 sudo

- **sudo**
 - execute a command as another user.
- **Users listed in /etc/sudoers execute commands with :**
 - an effective user id of 0
 - Group id of root's group
- **An administrator will be contacted if a user not listed in /etc/sudoers attempts to use sudo.**

Summary

In this lesson you have learnt

- How to create/modify/delete users?
- How to create/modify/delete groups?
- Where user-password information is stored?
- What is sudo?

Linux Essentials

Lesson 12 File Permissions

Module Overview

12.1 File permission

12.2 ACL - Access Control List for Files & Directory

12.1 File permission

- File/Directory Permissions can be modified with chmod by using 2 methods:
 - Symbolic
 - Numeric
- Default permissions of new file/directory is controlled by umask of the user who creates the file/directory

Changing File Permissions - chmod

- chmod command is used to change the file permissions.
- Syntax: chmod <category> <operation> <permission> <filenames>

Changing Permissions – Symbolic Method

\$ chmod u+x note

- \$ ls -l note
 - -rwx r-- r-- 1 note

\$ chmod ugo+x note

- \$ ls -l note
 - -rwxr-xr-x note

- When we use + symbol, the previous permissions will be retained and new permissions will be added.
- When we use = symbol, previous permissions will be overwritten.

Category	Operations	Attribute
u-user	+assigns permission	r-read
g-group	-remove permission	w-write
o-others	=assigns absolute permission	x-execute
a-all		

Changing Permissions – Numeric Method

➤ Octal notation:

- It describes both category and permission.
- It is similar to = operator (absolute assignment).
 - read permission: assigned value is 4
 - write permission: assigned value is 2
 - execute permission: assigned value is 1
- Example 1:

```
$ chmod 666      note
  ▪ It will assign read and write permission to all.
```

Special Permissions

- **suid**
 - When set on a file, the file will execute with permissions of the owner of the command, and not as executor (default) of the command
- **sgid**
 - When set on a file, runs with group affiliation of the group of the command
 - When set on a directory all files/directories within it will have the same group membership
- **sticky bit**
 - files in directories with the sticky bit set, can only be removed by the owner and root, regardless of the write permissions of users on that directory

12.2 ACL - Access Control List for Files & Directory

- ACL provides an additional flexible permission mechanism for file system on a Linux system.
- It enhances the traditional UNIX file permissions for files & folder. With ACL, you can give permissions for any user or any group with fine-grained access rights.

- Set Permissions
 - `setfacl -R -m u:rajesh:rwx /test/demoacl.txt`
- Get(list ACL permissions) Permissions
 - `getfacl /test/demoacl.txt`

Summary

In this lesson you have learnt

- How to configure file/directory permissions?
- How to configure fine-grained permissions using ACL?

Linux Essentials

Lesson 13 Network Services

Module Overview

- 13.1 Network configuration
- 13.2 NW Devices
- 13.3 Virtual NW Adapters
- 13.4 NW Diagnostics - ping , traceroute, host

13.1 Network configuration

- Network configuration can be modified using:
 - Using GUI
 - CLI using ifconfig
 - Using system-config-network
 - Modifying configuration files

13.2 NW Devices

- Network interfaces in Linux are enumerated as eth[0123...], but these names do not necessarily correspond to actual labels on the chassis.

e.g) eth0, eth1, eth2

13.3 Virtual NW Adapters

Multiple number of virtual network adapters can be added in a Virtual machine.

Virtual network adapters can be configured to directly communicate with the physical network or as private or as NAT or host only connection.

13.4 NW Diagnostics - ping , traceroute, host

- **ping**

- Can be used to test the network connectivity to a remote host

- **traceroute**

- Can be used to find the list of all intermediate hops a packet is travelling to reach the destination

- **host/dig command**

- Can be used to test DNS name resolution

Summary

In this lesson you have learnt

- How to configure network using commandline?
- How to add/remove/configure Virtual Network Adapters?
- What are the network diagnostic tools and how to use them?

Linux Essentials

Lesson 14 Backup and Restore

Module Overview

14.1 Backing up

14.2 Restoring using Backup

14.1 Backing up

- **tar**
 - Tape Archive. Combines multiple files/directories into a single tar file.
- **dd**
 - used for copying and converting data. It can also be used for backup/restore
- **dump**
 - more powerful tool for performing backup and recovery. Can perform incremental backup.
- **rsync**
 - Can be used for performing copying and synchronizing files across systems. Can be used in performing incremental backup.

14.2 Restoring using Backup

- restore command can be used to restore data from dump backups.
- It supports interactive and non-interactive restores.

Summary

In this lesson you have learnt

- How to backup?
- How to restore?

Linux Essentials

Lesson 15 Troubleshooting

Module Overview

- 15.1 Root Password Recovery
- 15.2 Linux Rescue Mode
- 15.3 File System Recovery

15.1 Root Password Recovery

- Root password might get forgotten or no more available
- In these type of cases, one can delete/reset the root password

1.Login as single user mode

2.Delete the root password as below:

```
passwd -d root
```

15.2 Linux Rescue Mode

- This is used to recover from some failures.
- One can boot from DVD and enter rescue mode, to access the files stored on your system's hard drive, even if you cannot actually run Red Hat Enterprise Linux from that hard drive.
- Rescue environment will find your Linux installation and mount it under the directory /mnt/sysimage
- You can mount your original Linux installation root from /mnt/sysimage to / by using chroot command

15.3 File System Recovery

- We can check the consistency of a file system by using fsck command
- It can be used to repair found errors.

Summary

In this lesson you have learnt

- How to recover from the loss of the root password?
- How to use rescue mode to recover from failures?
- How to check the consistency of filesystem?

Linux Essentials

Lesson 16 Network Installation

Module Overview

16.1 Introduction to Network Installation

16.1 Introduction to Network Installation

- We can install Linux over the network
- Additionally if you want to automate (without manually providing all options during installation) the installation, we can use a kickstart file (Similar to answer file in windows)
- We can use syslinux as the bootloader for implementing Network Installation

Summary

In this lesson you have learnt

- What is network installation?
- How to perform network installation?