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File Operations (Chapter 10)

In the Linux operating system, everything is treated as a file. As we interact with different applications through the same kind of Input/Output operations. The filesystem is structured like a tree(inverted) . The beginning point is called the root directory. It is denoted by '/'. The root user and root directory are not the same. Many filesystems are supported by linux such as:

ext3,ext4,squashfs,btrfs.Filesystems which are used on other alien operating systems (Windows, SGI,IBM,MacOs) can be implemented in linux. The most common file systems types are ext4,xfs,btrfs,and jfs. As these file systems types have high performance and cannot be easily corrupted. Partitions of filesystems are used to organize the content of disks. Advantage of partition is that, whenever a partition is exhausted the system still operates normally.

The filesystems which are mounted at /proc are called pseudo-file systems as they have no permanent presence anywhere on the disk. /proc contains only virtual files that do not contain real files. One kind of pseudo-file called /dev Directory used by most software and hardware devices except for network devices contains device nodes. The files which are expected to change in content and size as the system is running are contained in /var Directory.File extensions in Linux do not necessarily mean that a file is of a certain type.

Text Editors(Chapter 11)

Linux Administrators quite often sidestep the text editors, by using graphical utilities for creating and modifying system configuration files. However, this can be more laborious than directly using a text editor, and be more limited in capability. There are two kinds of Linux text editors : Basic editors and Advanced editors. Two examples of Basic editors are nano and gedit. Vi and emacs are two examples of Advanced editors. A particularly easy to use one is the text terminal-based editor nano. As a graphical editor, gedit is part of the GNOME desktop system. The gedit and kwrite editors are very easy to use and are extremely capable. They are also very configurable. Advanced editors like vi and emacs are easily available on all distributions and are completely compatible with the versions available on other operating systems. vi and emacs can have significantly steep learning curves for new users, they are extremely efficient when one has learned how to use them. GNOME extends vi with a very graphical interface known as gvim and KDE offers kvim. Either of these may be easier to use at first.

User Environment(Chapter 12)

- Linux is a multi-user operating system.
 - **whoami** gives the current user
 - **Who** gives all the logged in users
 - Files in **/etc** directory can be used by all users(global files)
- When logged into linux **/etc/profile** is read and evaluated.
- Whenever we create a new shell we do not perform full system login, instead we **./bashrc** file is read and evaluated
- Using **alias** you can create commands or can modify the existing commands where as **unalias** remove an alias
- Group members are administered by **/etc/group** file
- **Useradd** and **userdel** are used to add and delete users respectively
- **groupadd** and **groupdel** are used to add and delete a group respectively where as **usermod** is used to add a user to an existing group.
- Using **sudo** is less dangerous than using **su** while granting permissions.
- Sudo files are stored in **/etc/sudoers** files in **sudoers.d** directory which by default is empty.
- Deploying aliases are used to define shortcuts.

- An environment variable is actually just a character string that contains information used by one or more applications. **set** , **env** & **export** are used to view values of currently set variables.
- **HOME** is an environment variable used to represent Home directory. **cd** without arguments will change the current working directory to the value of **HOME**.
- **PATH** is an ordered list of directories, to be scanned to find program or script to run. **SHELL** points to the user's default command shell
- The information of command appeared last in the list is stored in **~/.bash_history**
- HISTFILESIZE, HISTFILE, HISTSIZE, HISTCONTROL, HISTIGNORE are some of the environmental variables for history.
- **chown**, **chgrp**, **chmod** are used to set permissions for the users.

Manipulating Text(Chapter 13)

- **cat** command to read and print files and viewing the file content.
- **echo** command is simply used to display text
- **Less** and **more** commands are used to view documents in less and more lines of a large file.
- **Head** and **tail** will return the first and last lines(by default 10) in the given file.
- **zcat**, **zless**, **zmore**, **zgrep**, **zdiff** can be used for compressed files
- **Sed** command prints the manipulated strings on the output, but does not manipulate in the read file.
- **awk** is used to extract and then print specific contents of a file and is often used to construct reports.
- **sort**, **uniq**, **paste**, **join**, **split** are some of the string manipulation functions.
- For searching in files we can use **grep** with certain regular expressions.

Network Operations(Chapter 14)

- IPV4 and IPV6 are used for classifying networks.
- IPV4 uses 32 bit where as IPV6 uses 128 bits to meet the modern requirement.
- IPV4 is divided into classes according to range
 - Class A from 1.0.0.0 to 127.255.255.255.
 - Class B from 128.0.0.0 to 191.255.255.255.
 - Class C from 192.0.0.0 to 223.255.255.255.

- A range of IP addresses are requested from your Internet Service Provider (ISP) by an organization's network administrator.
- The Dynamic Host Configuration Protocol (DHCP) is used to assign IP addresses.
- Accessing the machine over the network becomes easier while searching using hostname instead of the IP address.
- The special IP address **127.0.0.1** is used to describe the localhost
- Network configuration files are located in /etc directory
- **ip** and **ifconfig** utilities are used to know about a particular network interface or all network interfaces.
- **ping** is used to check whether a machine attached to a network can send and receive data or not.
- **Route** is used to view or change the IP routing table.
- **traceroute** is used to find the route from which the data packet takes to reach the destination host. This makes it quite useful for troubleshooting network delays and errors.
- Browsers are used to transmit, retrieve and explore information resources, usually on the World Wide Web.
- Non graphical browsers such as Lynx, Elinks, w3m are also used in Linux.
- **wget** is a command line utility that is used to handle downloads
- **Curl** command can be used to obtain additional information like the source coding being used.
- **File Transfer Protocol (FTP)** is a well-known and popular method for transferring files between computers using the Internet.
- FTP clients are to transfer files using the FTP protocol. ftp, yafc, sftp and ncftp are command line FTP clients used in Linux.
- **Secure Shell (SSH)** is a cryptographic network protocol used for secure data communication.
- To copy a local file to a remote system, at the command prompt we use **scp** utility

The Bash Shell and Basic Scripting(Chapter 15)

- Scripts are a sequence of statements and commands stored in a file that can be executed by a shell. The most commonly used shell in Linux is bash.
- Commonly used interpreters include: /usr/bin/perl, /bin/bash, /bin/csh, /usr/bin/python and /bin/sh.

- All shell scripts generate a return value upon finishing execution, which can be explicitly set with the exit statement.

More on Bash Shell Scripting(Chapter 16)

- Linux allows you to create temporary files and directories, which store data for a short duration, both saving space and increasing security.
- To extract all characters in a string after a dot (.), use the following expression:
`${string#*.*}`.
- Case statements are often used to handle command-line options.
- **For, while, until** loops are used for repeating a set of statements.
- Debugging helps you troubleshoot and resolve such errors, and is one of the most important tasks a system administrator performs.

Printing(Chapter 17)

- The Linux standard for printing software is the Common UNIX Printing System(CUPS).
- CUPS provides two command-line interfaces: the System V and BSD.
- Debugging helps you troubleshoot and resolve such errors, and is one of the most important tasks a system administrator performs.
- `lpoptions` is used to set printer options and defaults.
- `enscript` is to convert a text file to PostScript and other formats.

Local Security Principles(Chapter 18)

- Linux consists of several different types of accounts in order to handle different workloads, they are root(high privileged, signed as #), system, normal and network.
- In Linux, you can use either su or sudo to temporarily grant root access to a normal user.
- sudo has the ability to keep track of unsuccessful attempts at gaining root access.
- The SHA-512 algorithm is typically used to encode passwords. They can be encrypted, but not decrypted.
- PAM(PLUGGABLE AUTHENTICATION MODULES) can be configured to automatically verify that a password created or modified using the passwd utility is sufficiently strong.