**LINUX ASSIGNMENT**

* **Vrushasen Deshmukh**

**Part A – Conceptual Questions**

**Q.1]​ What is the difference between Linux and Unix?​**

* Unix requires a paid commercial license to use whereas Linux is open source and free to use and modify.
* Unix requires specific hardware to use. Linux can run on almost every hardware.
* Unix most often comes with command line interface, and a GUI is uncommon. Linux has number of GUI to choose from (Gnome in debian).

**Q.2]​ Explain the Linux file system hierarchy with examples.**

* Linux file system is similar to a tree data structure where there is one parent node and all other nodes branches out from it. In case of Linux the parent node is /root directory.
* All other files and directories are stored inside the root directory (/home, /etc, /bin). All User directories are stored inside the /home directory.

**Q.3]​ What are absolute and relative paths in Linux?**

* Absolute path: Path of a file/directory from the root directory (cd /home/vrush/Documents)
* Relative path: Path of the directory/file from the current directory. Lets say there was a folder inside Documents called Notes. (cd Notes)

**Q.4]​ What does each field in -rw-r--r-- mean?​**

* These are the permissions given to the Owner,group and others of the file respectively.
* Indications of each field:
  + - Type of file: simple file
  + rw- Permission of owner: read and write
  + r-- Permission of group read
  + r-- Permission of others read

**Q.5]​ What is the significance of the first character in ls -l output?**

* Let's consider this as an example output:
  + -rw-r--r-- 1 vrush vrush 84423 Aug 15 17:31 'Linux Assignment.pdf'
  + drwxr-xr-x 2 vrush vrush 4096 Aug 15 19:43 'Section A'
  + drwxr-xr-x 2 vrush vrush 4096 Aug 15 19:11 'Section B'
* Where the first column "drwxr-xr-x" shows the permission of the file the very first character tells about the type of file or directory.
* Example: "-" says it is a normal file. "d" says that it is directory.

**Q.6]​ Define the roles of owner, group, and others in Linux permissions.**

* Owners are the one that creates the files and have full control over it.Owner has the permission to read, write and execute files. (rwx)
* Group are collective users set in a group that have shared access to the files created by the owner. Group has the permission to read and execute files. (r-x)
* Everyone else in the system who are neither the user nor belong to any group. Others have the permission to only read files. (r--)

**Q.7] What is the difference between chmod 755 and chmod 700?**

* chmod is used to change the permissions of existing files.chmod numbers are digits that represent permissions for Owner, Groups and Others respectively.
* Read(4), Write(2), Execute(1)
* Therefore the numbers signify these permissions respectively:
  + chmod 755:
    - 7: [Owner] -> r(4) + w(2) + x(1) = rwx
    - 5: [Group] -> r(4) + x(1) = r-x
    - 5: [Others -> r(4) + x(1) = r-x
  + chmod 700:
    - 7: [Owner] -> r(4) + w(2) + x(1) = rwx
    - 0: [Group] -> 0 = -
    - 0: [Others -> 0 = -

**Q.8] How is a symbolic link different from a hard link?​**

* Symbolic link also called as soft link, only creates a shortcut of the original file and is left dangling if the original file is deleted.
* It type file becomes -l and it is able to point paths to directories unlike hard link.

**Q.9] What is the purpose of umask?**

* Umask is used to change the default permissions of the files when they are created.
* Syntax:
  + umask octal\_numbers

**Q.10]​ What are the default permissions of a new file created by touch?**

* We can see that when we run umask in bash that the permissions ommit 022.
* Meaning the permissions are 644 (rwxr--r--) that is Read write and execute for owner, read for group and others.

**Q.11] ​What is the function of grep and how is it used in log analysis?​**

* Grep function is used to search and locate a specific text or pattern in files.
* Its use in log analysis is to monitor errors and track user activities and track errors.

**Q.12] ​How does cut differ from awk?**

* cut: Cut is used to extract specific columns or text from a file based on some delimiters. Its is fast and simple. But cannot perform complex operations.
* awk: Is slight slower than cut but it is very complex and supports full scripting. Filtering, Modifying, Calculations etc

**Q.13] ​What is the use of the find command? Give syntax.​**

* Find command is used to find a specific file in your system.
* Syntax:
  + $ find /directory -name filename.extension
  + $ find /directory -type file\_type -name filename

**Q.14] How does sed handle file editing?​**

* sed is a text editing tool in Linux.
* It reads the text line by line, applies command on each line and outputs to standard output by default.
* sed is non-interactive and can automate repetitive text editing, making it very useful in log processing, configuration updates, and scripting.

**Q.15] What’s the difference between df -h and du -sh?**

* df -h: Shows the free and used storage details of the filesystem and partitions.
* du -sh: Shows the storage of a specific directory.

**Q.16]** **What is the use of ps, top, and htop?**

* ps: Displays the information about a selection of the active processes.
* top: Displays real time view of the running system. Displays system summary as well as threads and processes currently being managed by the kernel.
* htop: Similar to top but more interactive and colorful.

**Q.17] ​Explain how cron is used for scheduling in Linux.​**

* cron runs in the background as a daemon and checks the crontab for any scheduled tasks.
* cron tab is where the tasks are assigned for scheduling. Specific details for scheduling can be assigned like time, date etc.
* cron runs tasks repeatedly and is not best if you want to schedule task only once.

**Q.18] ​What are environment variables and how are they set?​**

* Environment variables are small piece of information that computer uses.
* Some are temporary that gets erased after the terminal is closed and some are permanent which are usable even after the system is rebooted.

**Q.19] What does the pipe | operator do in Linux?​**

* Pipe | is used to run multiple commands at once.
* This is mostly used for controlling stdin and stdout.
* Most likely used to store outputs elsewhere or opening a command output in separate window.

**Q.20] ​How is tar different from zip?​**

* tar files are archive files similar to zip files.
* tar files are more commonly found in Linux OS and Zip files are more common in Windows.
* tar files only archives bunch of files, where zip both archives and compresses it.

**Q.21]​ What’s the difference between apt update, upgrade, and install?**

* apt update: It updates the list of packages that are available on the internet repositories.
* apt upgrade: It updates the installed packages on the system to the latest version.
* apt install: It is used to install packages and software. The command does nothing if the package or software is already installed.

**Q.22] ​What is the use of /etc/passwd and /etc/shadow?​**

* /etc/passwd: used to store the user account information. Each line equals to one user.
* /etc/shadow: Stores the user's encrypted passwords and its setting. Can only be accessed by the root user.

**Q.23] Explain process states in Linux (Running, Sleeping, Zombie)**

* Running: Process is running or ready to run. Tasks that are using CPU.
* Sleeping: Process is waiting for input/output or is reading files.
* Zombie: Process has completed running but not cleaned up from the system or are not using any memory or cpu.

**Q.24] What is the significance of inode in Linux?**

* Inode stores the metadata about the file. File type, timestamp, owner, permissions, links or pointers in the system etc. Except the file name.
* Linux used inode to identify files. Even if the name of file is changed.

**Q.25] Explain the concept of standard input, output, and error.**

* std input: Designates where the input for the command comes from.
* std output: Designates where the output of the command goes to.
* std error: Designates where the error of the command goes to.