Assignment-1 : Introduction to Linux…

1 Mark Questions.

1) What is a OS?
   - An operating system is a program that manages computer hardware and software for the user and An operating system also manages software applications.
2) Why the name Linux has derived?
   - Linux is a fast and stable open source operating system for personal computers (PCs), which was invented by “Linus Torvalds” so this os name is derived from his creator.
3) What is a notation used for current directory in Linux?
   - “pwd” is used to know which directory wee are in linux os andnotation is”.”
4) What is a notation used for Parent directory in Linux?
   - Generally “..”(two periods) represents the parent directory in Linux.
5) When was the first Linux has been released?
   - First Linux was intrudused in 1991 and the kernel version was intrudused in 1994.
6) What is the significance of /bin directory?
   - The /bin directory contains user bineries , executable files, which are used in single user – mode.
7) What is the difference between cp and mv command?
   - Cp:- Used to copy the file.
   - Mv:- Used to rename the file.
8) How many levels of security has been found in Linux files system?

- Here Linux has file permission such as -r:- read, -w:- write, -x:- Eexcutable a user can use file in linux depending on permission user and file has been given
- It also has file ownership such as ownership such as owner ,group, other.

9) What is the use of chmod command?
   - Chmod:-- used to change or give file permission to the file in Linu.

10) What does chown command does?
   - ls: it's a commond in Linux which used to List the files in the directory.

<u>7 Mark Questions</u>

1) What is Linux? Give the characteristics of OS?
   - Linux is a fast and stable open source operating system for personal computers (PCs) and work stations that features professional-level Internet services, extensive development tools, fully functional graphical user interfaces (GUIs), and a massive number of applications ranging from office suites to multimedia applications. Charecterstics of linux:--
   - Linux is a multiuser and multitasking system.
   - As it is a multitasking system, you can ask the system to perform several tasks at the same time.
   - While one task is being done, you can work on another. For example, you can edit a file while another file is being printed. You do not have to wait for the other file to finish printing before you edit.
   - As it is a multiuser system, several users can log in to the

- system at the same time, each interacting with the system through his or her own terminal.
- File management, program management, and user interaction are traditional features common to all operating systems.

2) Describe the file system structure in Linux.

the structure of file systems under Linux. This will help to clarify your understanding of the concept and let you see more easily how to take advantage of the architecture.

i-Nodes:--

- The most fundamental building block of many Linux/UNIX file systems is the i-node.
- An i-node is a control structure that points either to other i-nodes or to data blocks.
- The control information in the i-node includes the file's owner, permissions, size, time of last access, creation time, group ID, and so on. (For the truly curious, the entire kernel data structure for the ext2 file system is available in /usr/src/kernels/*/include/ linux/ext2_fs.h—assuming, of course, that you have the source tree installed in the /usr/ src directory.) The one information an i-node does not provide is the file's name.

Superblocks:--

- The first piece of information read from a disk is its superblock. This small data structure reveals several key pieces of information, including the disk's geometry, the amount of available space, and, most importantly, the location of the first i-node.

- Without a super- block, an on-disk filesystem is useless.
- The designers of most Linux file systems intelligently included this superblock redundancy into the file system design.

ext3 and ReiserFS:--

- Ext3 and ReiserFS are two popular Linux file systems used by the major Linux distributions.
- The ext3 file system is an enhanced extension of the ext2 file system.
- As of this writing the ext2 file system is somewhere around 16 years old. This means two things for us as system administrators. First and foremost, ext2 is rock-solid.
- It is a well-tested subsystem of Linux and has
- had the time to become well optimized. Second, other file systems that were considered
- experimental when ext2 was created have matured and become available to Linux.
- The two file systems that are popular replacements for ext2 are the ext3 and ReiserFS file systems.

3) What is the difference between naming the file with absolute path and relative path? Illustrate with an example.

- Relative Permissions:

  chmod only changes the permissions specified in the command line and leaves the other
  permissions unchanged. Its syntax is:
  chmod category operation permission filename(s) chmod takes an expression as its argument which
  contains: user category (user, group, others)
  Category operation permission

u – user
g - group o - others
a - all (ugo)

+ assign
- remove
= absolute

r - read
w - write
x - execute

Let us discuss some examples: Initially,

-rw-r--r-- 1 kumar metal 1906 sep 23:38 xstart

chmod u+x xstart

-rwxr--r-- 1 kumar metal 1906 sep 23:38 xstart

The command assigns (+) execute (x) permission to the user (u), other permissions remain

unchanged.

chmod ugo+x xstart or

chmod a+x xstart or

chmod +x xstart

-rwxr-xr-x 1 kumar metal 1906 sep 23:38 xstart chmod accepts multiple file names

in command line

chmod u+x note note1 note3 Let initially,

-rwxr-xr-x 1 kumar metal 1906 sep 23:38 xstart chmod go-r xstart

Then, it becomes -rwx--x--x 1 kumar metal 1906 sep 23:38 xstart…

- Absolute Permissions…
  Here, we need not to know the current file permissions. We can set all nine
  permissions explicitly. A string of three octal digits is used as an expression. The permission can be
  represented by one octal digit for each category. For each category, we add octal digits. If we
  represent the permissions of each category by one octal digit, this is how the permission can be
  represented:
  Read permission – 4 (octal 100)
  Write permission – 2 (octal 010)
  Execute permission – 1 (octal 001)
  We Octal
  0

  Permissions
  - - -

  Significance
  no permissions
  1 - - x execute only
  2 - w - write only
  3 - w x write and execute
  4 r - - read only
  5 r - x read and execute
  6 r w - read and write
  7 r w x read, write and execute
  have
  thre
  e
  cate
  gori

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each category, so three octal digits can describe a file's permissions completely. The most

significant digit represents user and the least one represents others. chmod can use this three-
digit string as the expression.

Using relative permission, we have,
chmod a+rw xstart
Using absolute permission, we have, chmod 666 xstart

-rw-r--r-- 1 kumar metal 1906 sep 23:38 xstart
chmod u+x xstart
-rwxr--r-- 1 kumar metal 1906 sep 23:38 xstart
chmod 644 xstart
chmod 761 xstart
will assign all permissions to the owner, read and write permissions for the group and only
execute permission to the others.
777 signify all permissions for all categories, but still we can prevent a file from being
deleted. 000 signifies absence of all permissions for all categories, but still we can delete a file. It
is the directory permissions that determine whether a file can be deleted or not. Only owner can

change the file permissions. User can not change other user's file's permissions. But the system
administrator can do anything.

4) Give the different levels of security implementation available with Linux O.S.

- The Security Implications:-
  Let the default permission for the file xstart is
  -rw-r--r--
  chmod u-rw, go-r xstart or
  chmod 000 xstart

  This is simply useless but still the user can delete this file On the other hand,
  chmod a+rwx xstart chmod 777 xstart
  -rwxrwxrwx
  The UNIX system by default, never allows this situation as you can never have a secure system.
  Hence, directory permissions also play a very vital role here.
  We can use chmod Recursively.
  chmod -R a+x shell_scripts

This makes all the files and subdirectories found in the shell_scripts directory, executable by

all users. When you know the shell meta characters well, you will appreciate that the * doesn't

match filenames beginning with a dot. The dot is generally a safer but note that both commands

change the permissions of directories also.

Directory Permissions..

It is possible that a file cannot be accessed even though it has read permission, and can be

removed even when it is write protected. The default permissions of a directory are,

rwxr-xr-x (755)

A directory must never be writable by group and others Example:

mkdir c_progs ls –ld c_progs

drwxr-xr-x 2 kumar metal 512 may 9 09:57 c_progs

If a directory has write permission for group and others also, be assured that every user can remove

every file in the directory. As a rule, you must not make directories universally writable unless

you have definite reasons to do so.

Changing File Ownership:--

Usually, on BSD and AT&T systems, there are two commands meant to change the ownership of a file or directory. Let kumar be the owner and metal be the group owner. If sharma copies a file of kumar, then sharma will become its owner and he can manipulate the attributes chown changing file owner and chgrp changing group owner On BSD, only system administrator can use chown. On other systems, only the owner can change both.

Chown:--

Changing ownership requires superuser permission, so use su command ls -l note

-rwxr----x 1 kumar metal 347 may 10 20:30 note

chown sharma note; ls -l note

-rwxr----x 1 sharma metal 347 may 10 20:30 note

Once ownership of the file has been given away to sharma, the user file permissions that previously applied to Kumar now apply to sharma. Thus, Kumar can no longer edit note since ther is no write privilege for group and others. He can not get back the ownership either. But he can copy the file to his own directory, in which case he becomes the owner of the copy.

Chgrp:--

This command changes the file's group owner. No superuser permission is required. ls –l dept.lst

-rw-r--r-- 1 kumar metal 139 jun 8 16:43 dept.lst chgrp dba dept.lst; ls –l dept.lst

-rw-r--r-- 1 kumar dba 139 jun 8 16:43 dept.lst

In this chapter we considered two important file attributes – permissions and ownership. After we

complete the first round of discussions related to files, we will take up the other file attributes.

5) What is the usage of chown and chmod commands in Linux?

- Chown:--
- **chown** command is used to change the file Owner or group. Whenever you want to change ownership you can use chown command.
- **Syntax:**
- `chown [OPTION]… [OWNER][:[GROUP]] FILE…`
- `chown [OPTION]… –reference=RFILE FILE`

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previously applied to Kumar now apply to sharma. Thus, Kumar can no longer edit note since there
is no write privilege for group and others. He can not get back the ownership either. But he can
copy the file to his own directory, in which case he becomes the owner of the copy.

- Change Mode: chmod:--
- **hmod** - To change access permissions, change mode.
- **SYNOPSIS**

```
chmod [Options]... Mode [,Mode]... file...
chmod [Options]... Numeric_Mode file...
chmod [Options]... --reference=RFile file...
```

- chmod changes the permissions of each given file according to mode, where mode describes the permissions to modify. Mode can be specified with octal numbers or with letters.

Directories and files within the Linux system have permissions associated with them. By default, permissions are set for the owner of the file, the group associated with the file, and everyone else who can access the file (also known as owner, group, and other, respectively). When you list files or directories, you see the permissions in the first col- umn of the output.

EXAMPLES

Read by owner only

```
$ chmod 400 sample.txt
```

Read by group only

```
$ chmod 040 sample.txt
```

6) List the different operations and their equivalent decimal values on a file for different users.

a) Execution operation
b) Write operation
c) Execute and write operation
d) Read operationread nd Excute operation
e) Read and write operation
f) Read write excute operation
g) Do nothing

7)Give the features of Linux O.S.

- Linux is a fast and stable open source operating system for personal computers (PCs) and work stations that features professional-level Internet services, extensive development tools, fully functional graphical user interfaces (GUIs), and a massive number of applications ranging from office suites to multimedia applications.
- Linux is a PC version of the Unix operating system that has been used for decades on mainframes and minicomputers and is currently the system of choice for network servers and workstations.
- Linux brings the speed, efficiency, scalability, and flexibility of Unix to your PC, taking advantage of all the capabilities that PCs can now provide.
- An operating system is a program that manages computer hardware and software for the user.
- Operating systems were originally designed to perform repetitive hardware tasks, which centered around managing files, running programs, and receiving commands from the user.
- An operating system also manages software applications. To perform different tasks such as editing documents or

performing calculations you need specific software applications.

- The operating system controls the loading and execution of all programs,
- including any software applications. When you want to use an editor, simply instruct the operating system to load the editor application and execute it.
- File management, program management, and user interaction are traditional features common to all operating systems.
- To perform different tasks such as editing documents or performing calculations you need specific software applications.
- The operating system controls the loading and execution of all programs, including any software applications.

8) Illustrate how to change different file permissions in Linux with example.

- A file or a directory is created with a default set of permissions, which can be determined by umask.
- Let us assume that the file permission for the created file is -rw-r-- r--. Using chmod command, we can change the file permissions and allow the owner to execute his file.
- command can be used in two ways:
- In a relative manner by specifying the changes to the current permissions In an absolute manner by specifying the final permissions.
- Relative Permissions:---
- chmod only changes the permissions specified in the command line and leaves the other
- permissions unchanged. Its syntax is:

- chmod category operation permission filename(s) chmod takes an expression as its argument which
- contains: user category (user, group, others)
- Category
  u – user
  g - group o - others
  a - all (ugo)
- operation
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  - remove
  = absolute
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  permissions explicitly. A string of three octal digits is used as an expression. The permission can be
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  10 Mark Questions:---

  1) In detail give the structure of Linux OS..

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2) Illustrate with examples how to change ownership as well as permissions of a file.
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