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SE COMPS A-3

OPERATING SYSTEMS
EXPERIMENT - 1

AIM: Explore the internal commands of linux and Write shell scripts to do the following:

1. Display top 10 processes in descending order
2. Display processes with highest memory usage.
3. Display current logged in user and no. of users.
4. Display current shell, home directory, operating system type, current working directory.
5. Display OS version, release number.
6. Illustrate the use of sort, grep, awk, etc.

LINUX:

Linux is a community of open-source Unix like operating systems that are based on the Linux Kernel. It was initially released by **Linus Torvalds** on September 17, 1991. It is a free and open-source operating system and the source code can be modified and distributed to anyone commercially or noncommercially under the GNU General Public License.

Initially, Linux was created for personal computers and gradually it was used in other machines like servers, mainframe computers, supercomputers, etc. Nowadays, Linux is also used in embedded systems like routers, automation controls, televisions, digital video recorders, video game consoles, smartwatches, etc. The biggest success of Linux is Android(operating system) it is based on the Linux kernel that is running on smartphones and tablets. Due to android Linux has the largest installed base of all general-purpose operating systems. Linux is generally packaged in a Linux distribution.

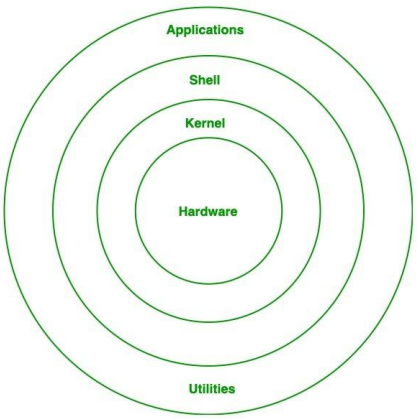
Linux Distribution

Linux distribution is an operating system that is made up of a collection of software based on Linux kernel or you can say distribution contains the Linux kernel and supporting libraries and software. And you can get Linux based operating system by downloading one of the Linux distributions and these distributions are available for different types of devices like embedded devices, personal computers, etc. Around **600 + Linux Distributions** are available and some of the popular Linux distributions are:

- MX Linux
- Manjaro
- Linux Mint
- elementary
- Ubuntu
- Debian
- Solus
- Fedora
- openSUSE
- Deepin

Architecture of Linux

Linux architecture has the following components:



1. **Kernel:** Kernel is the core of the Linux based operating system. It virtualizes the common hardware resources of the computer to provide each process with its virtual resources. This makes the process seem as if it is the sole process running on the machine. The kernel is also responsible for preventing and mitigating conflicts between different processes. Different types of the kernel are:
    - Monolithic Kernel
    - Hybrid kernels
    - Exo kernels
    - Micro kernels
2. **System Library: Is**the special types of functions that are used to implement the functionality of the operating system.
3. **Shell:** It is an interface to the kernel which hides the complexity of the kernel's functions from the users. It takes commands from the user and executes the kernel's functions.
4. **Hardware Layer:** This layer consists all peripheral devices like RAM/ HDD/ CPU etc.
5. **System Utility:** It provides the functionalities of an operating system to the user.

Advantages of Linux

- The main advantage of Linux, is it is an open-source operating system. This means the source code is easily available for everyone and you are allowed to contribute, modify and distribute the code to anyone without any permissions.
- In terms of security, Linux is more secure than any other operating system. It does not mean that Linux is 100 percent secure it has

some malware for it but is less vulnerable than any other operating system. So, it does not require any anti-virus software.

- The software updates in Linux are easy and frequent.
- Various Linux distributions are available so that you can use them according to your requirements or according to your taste.
- Linux is freely available to use on the internet.
- It has large community support.
- It provides high stability. It rarely slows down or freezes and there is no need to reboot it after a short time.
- It maintain the privacy of the user.
- The performance of the Linux system is much higher than other operating systems. It allows a large number of people to work at the same time and it handles them efficiently.
- It is network friendly.
- The flexibility of Linux is high. There is no need to install a complete Linux suit; you are allowed to install only required components.
- Linux is compatible with a large number of file formats.
- It is fast and easy to install from the web. It can also install on any hardware even on your old computer system.
- It performs all tasks properly even if it has limited space on the hard disk.

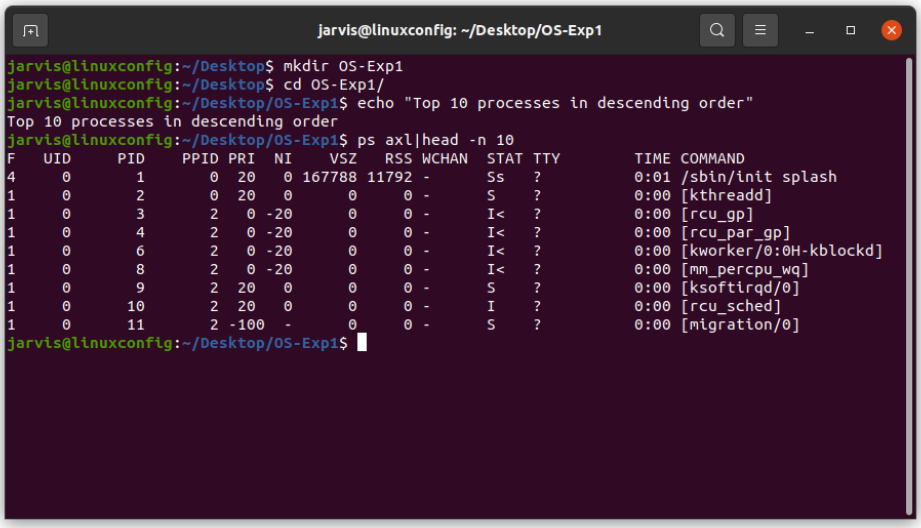
Disadvantages of Linux

- It is not very user-friendly. So, it may be confusing for beginners.
- It has small peripheral hardware drivers as compared to windows.

1. Display top 10 processes in descending order

   ps command is used to list the currently running processes and their PIDs along with some other information depends on different options. It reads the process information from the virtual files in /proc file-system. /proc contains virtual files, this is the reason it's referred as a virtual file system.

```
ps [options]
```

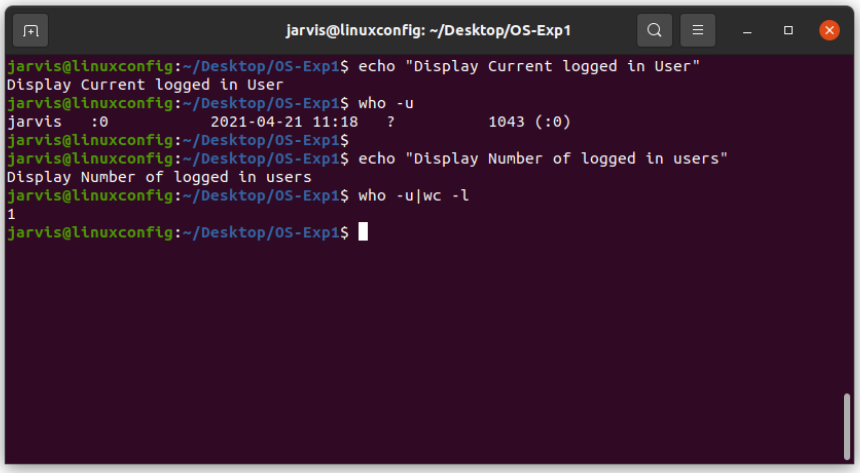


2. Display processes with highest memory usage.

3. Display current logged in user and no. of users.

   who command is used to find out the following information :
   1. Time of last system boot
   2. Current run level of the system
   3. List of logged in users and more.

```
Syntax : $who [options] [filename]
```



4. Display current shell, home directory, operating system type, current working directory.

    1. **whoami** command is used both in *Unix Operating System* and as well as in *Windows Operating System*.
        - It is basically the concatenation of the strings **“who”,”am”,”i”** as **whoami**.
        - It displays the username of the current user when this command is invoked.
        - It is similar as running the id command with the options **-un**.

```
Syntax : $whoami
```

    2. The command ‘*uname*‘ displays the information about the system.

```
Syntax: $uname [OPTION]
```

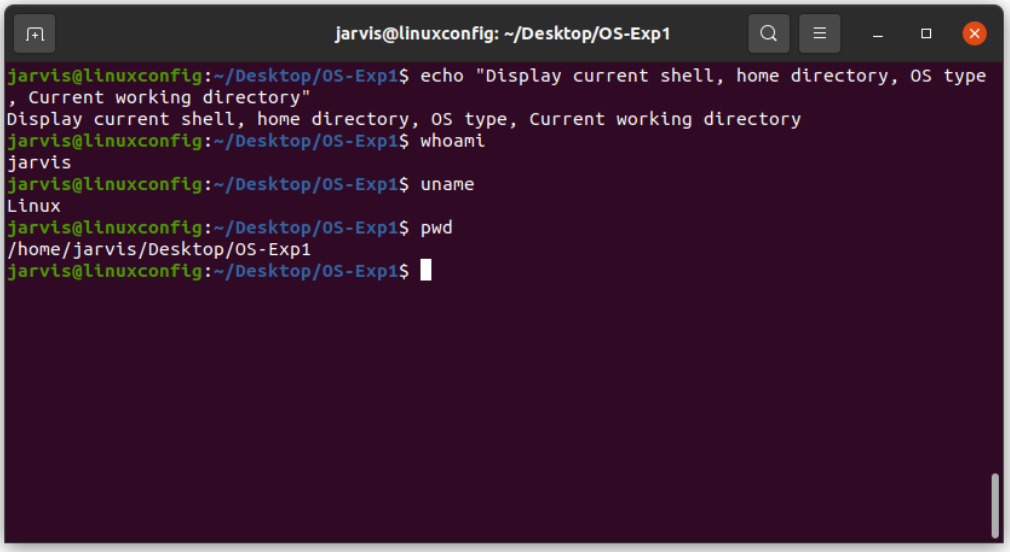
    3. **pwd** stands for **P**rint **W**orking **D**irectory. It prints the path of the working directory, starting from the root.

        pwd is shell built-in command(pwd) or an actual binary(/bin/pwd).

$PWD is an environment variable which stores the path of the current directory.

This command has two flags.

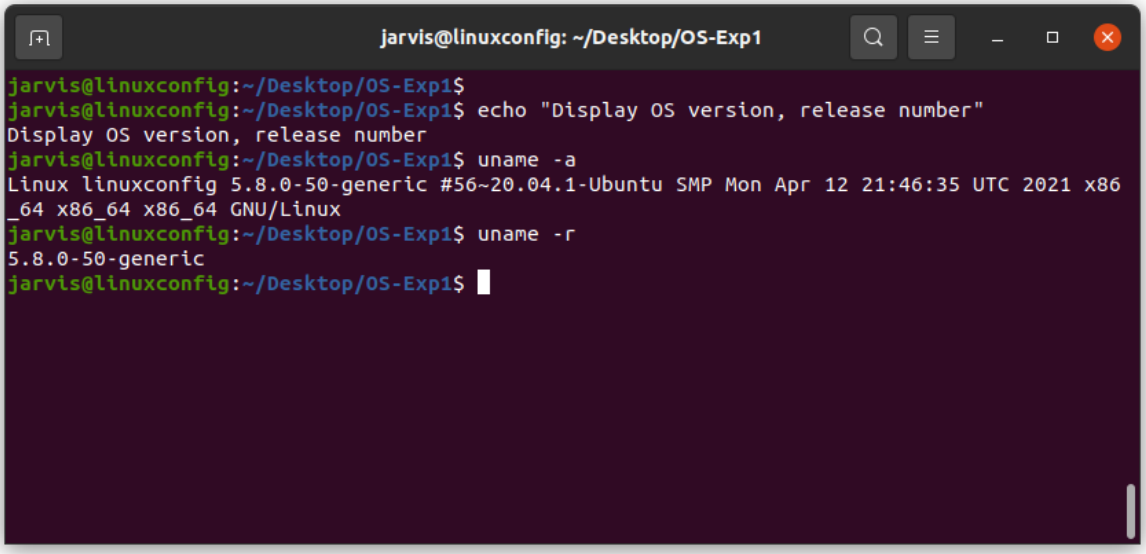
```
$pwd -L: Prints the symbolic path.
$pwd -P: Prints the actual path.
```



5. Display OS version, release number.
   The command '*uname*' displays the information about the system.

```
Syntax: uname [OPTION]
```

```
OPTIONS:
-a option: It prints all the system information
-s option: It prints the kernel name.
-n option: It prints the hostname of the network node
-r option: It prints the kernel release date
-v option: It prints the version of the current kernel.
-m option: It prints the machine hardware name.
-p option: It prints the type of the processor.
-i option: It prints the platform of the hardware.
-o option: It prints the name of the operating system.
```



6. Illustrate the use of sort, grep, awk, etc.

SORT:

SORT command is used to sort a file, arranging the records in a particular order. By default, the sort command sorts file assuming the contents are ASCII. Using options in sort command, it can also be used to sort numerically.

The sort command follows these features as stated below:

1. Lines starting with a number will appear before lines starting with a letter.
2. Lines starting with a letter that appears earlier in the alphabet will appear before lines starting with a letter that appears later in the alphabet.
3. Lines starting with a lowercase letter will appear before lines starting with the same letter in uppercase.

```
Syntax : $ sort filename.txt
```

GREP:

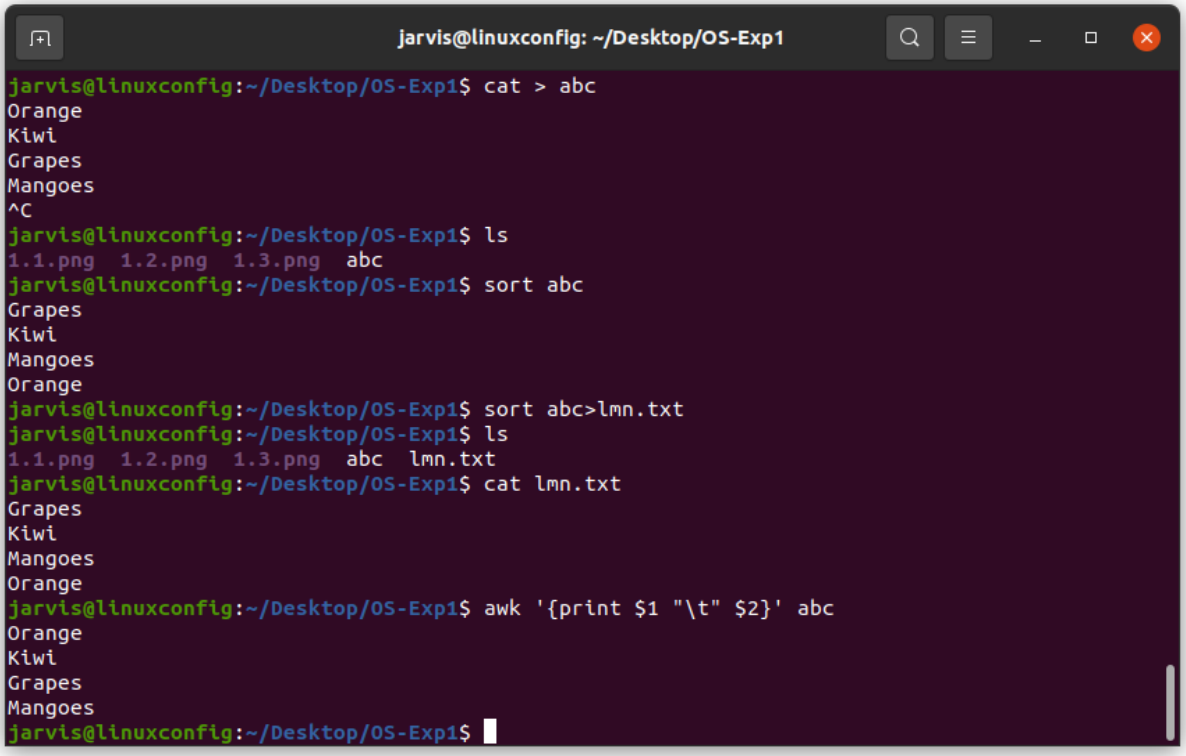
The grep filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression (grep stands for globally search for regular expression and print out).

```
Syntax: grep [options] pattern [files]
```

AWK:

Awk is a utility that enables a programmer to write tiny but effective programs in the form of statements that define text patterns that are to be searched for in each line of a document and the action that is to be taken when a match is found within a line. Awk is mostly used for pattern scanning and processing. It searches one or more files to see if they contain lines that matches with the specified patterns and then performs the associated actions.

```
Syntax: awk options 'selection _criteria {action }' input-file > output-file
```



CONCLUSION: We learned a few linux commands, their syntax and implemented them from the linux terminal.

OPERATING SYSTEMS
Experiment 2

Aim- System calls for file manipulation

Problem Statement –
Try different file manipulation operations provided by linux

1. pwd Command

pwd, short for the print working directory, is a command that prints out the current working directory in a hierarchical order, beginning with the topmost root directory (/).

To check your current working directory, simply invoke the pwd command as shown.

```
$ pwd
```

2. mkdir Command

You might have wondered how we created the tutorials directory. Well, it's pretty simple. To create a new directory use the mkdir (make directory) command as follows:

```
$ mkdir directory_name
```

3. ls Command

The ls command is a command used for listing existing files or folders in a directory. For example, to list all the contents in the home directory, we will run the command.

```
$ ls
```

4. cd Command

To change or navigate directories, use the cd command which is short for change directory.

For instance, to navigate to particular directory run the command:

```
$ cd directory_name
```

To go a directory up append two dots or periods in the end.

```
$ cd ..
```

To go back to the home directory run the cd command without any arguments.

```
$ cd
```

5. **rmdir Command**

   The rmdir command deletes an empty directory. For example, to delete or remove the tutorials directory, run the command:

```
$ rmdir tutorials
```

6. **touch Command**

   The touch command is used for creating simple files on a Linux system. To create a file, use the syntax:

```
$ touch filename
```

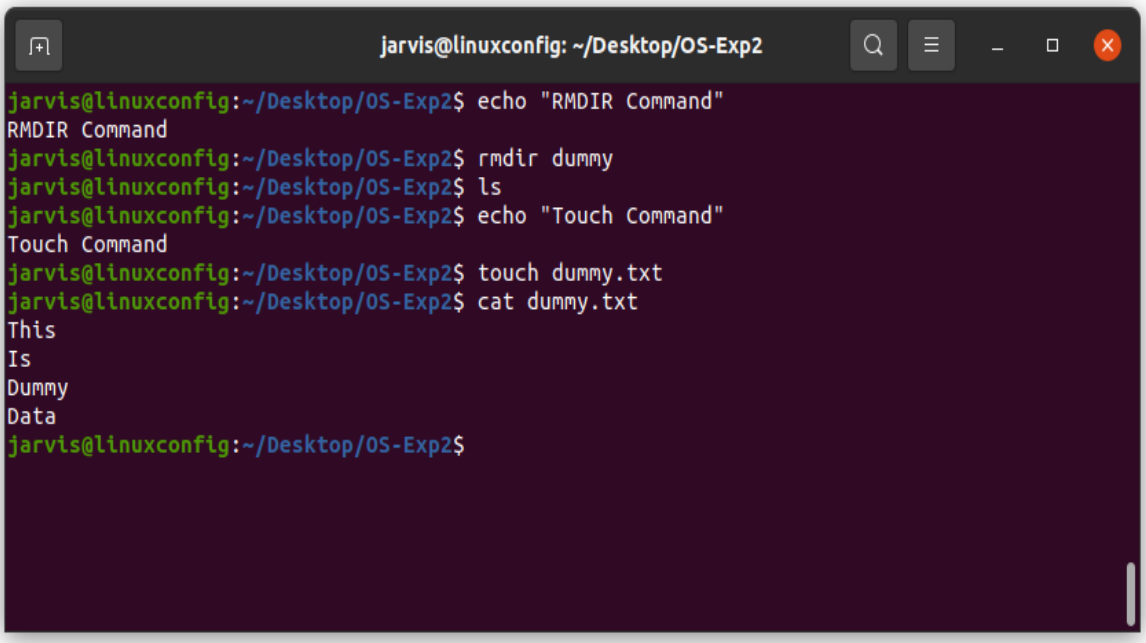
   For example, to create a file1.txt file, run the command:

```
$ touch file1.txt
```

7. **cat Command**

   To view the contents of a file, use the cat command as follows:

```
$ cat filename
```

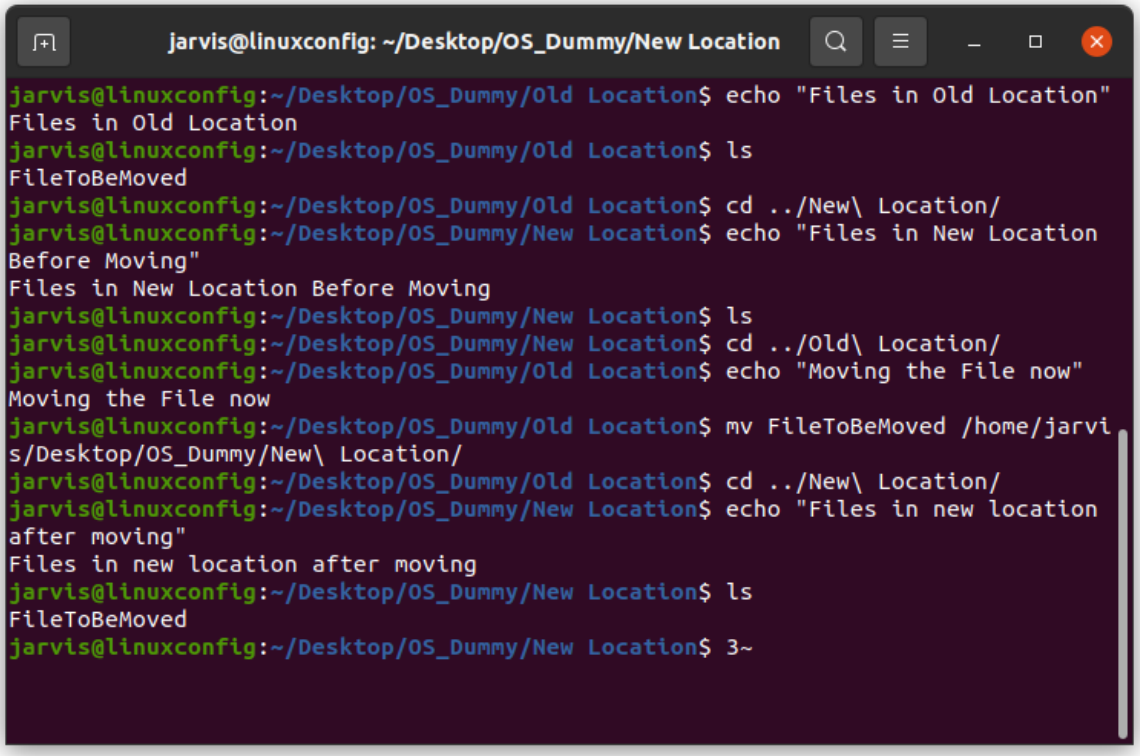


8. mv Command

The mv command is quite a versatile command. Depending on how it is used, it can rename a file or move it from one location to another.

To move the file, use the syntax below:

```
$ mv filename /path/to/destination/
```



9. cp Command

The cp command, short for copy, copies a file from one file location to another. Unlike the move command, the cp command retains the original file in its current location and makes a duplicate copy in a different directory.

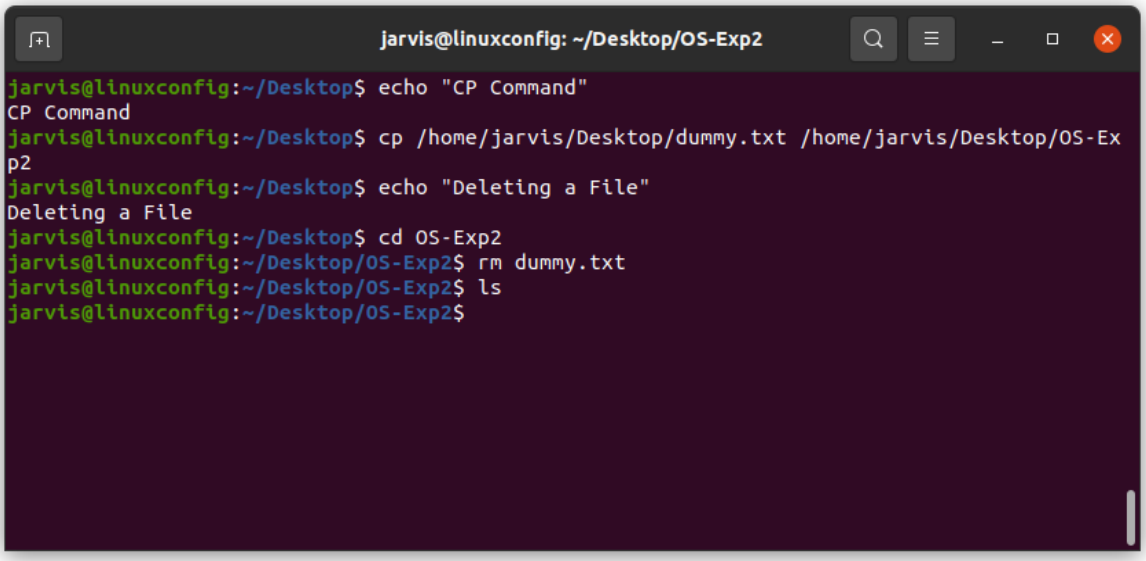
The syntax for copying a file is shown below.

```
$ cp /file/path /destination/path
```

10. Deleting a File

rm command could be used to delete a file. It will remove the filename file from the directory.

```
$rm filename
```



CONCLUSION: We learnt about linux commands for file management, their syntax and also implemented these commands.