CL118- Programming Fundamental Lab

Lab Manual 2

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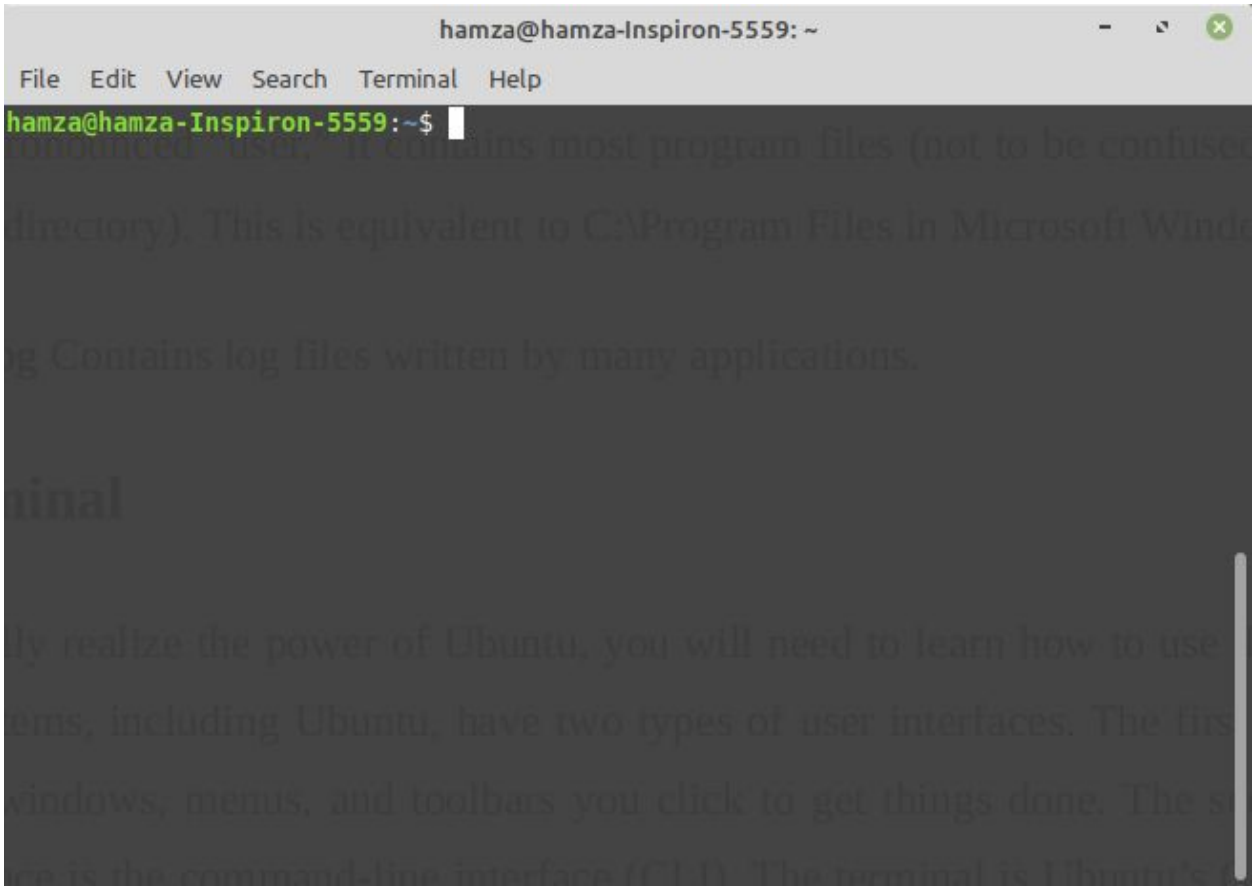
Terminal

In order to fully realize the power of Linux, you will need to learn how to use the terminal. Most operating systems, including Ubuntu, have two types of user interfaces. The first is a GUI. This is the desktop, windows, menus, and toolbars you click to get things done. The second, much older type of interface is the command-line interface (CLI). The terminal in Ubuntu's CLI. It is a method of controlling some aspects of Ubuntu using only commands that you type on the keyboard. Whenever you will open a terminal you will find yourself within **/home/[username]** directory.



Why would you want to use the terminal?

You can perform most day-to-day activities without ever needing to open the terminal. However, the terminal is a powerful and invaluable tool that can be used to perform many useful tasks you might not be able to accomplish with a gui. For example:
Troubleshooting any difficulties that may arise when using Ubuntu sometimes requires you to use the terminal.
A command-line interface is sometimes a faster way to accomplish a task. For example, it is often easier to perform operations on many files concurrently using the terminal.
Learning the command-line interface is the first step towards more advanced troubleshooting, system administration, and software development skills. If you are interested in becoming a developer or an advanced Ubuntu user, knowledge of the command-line is essential.
The terminal gives you access to what is called a shell. When you type a command in the terminal,
the shell interprets this command, resulting in the desired action. All commands in the terminal

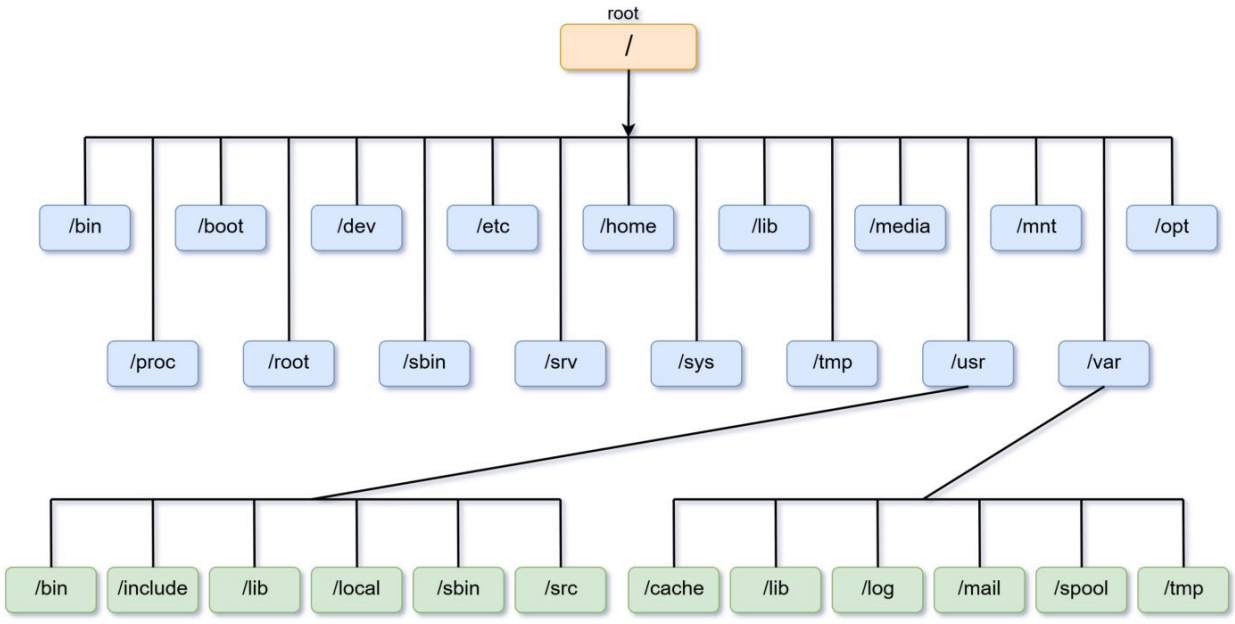
follow the same approach: Type a command, possibly followed by some parameters, and press Enter to perform the specified action. Parameters (also called switches) are extra segments of text,usually added at the end of a command, that change how the command itself is interpreted.

Terminal Shortcut

To open a new terminal: **Ctrl + Alt + T**
To open a new tab in terminal: **Ctrl + Shift + T**
To close a tab: **Ctrl + Shift + W** or **Ctrl + D**
To close terminal window: **Ctrl + Shift + Q**
Switching to next tab: **Ctrl + PageUp**
Switching to previous tab: **Ctrl + PageDown**

Linux File System

File system is the way in which data is stored in the secondary storage devices. In the Linux File system everything is stored under one directory which is called **root** and it is represented by a forward slash **(/)**.



/bin
Contains all of the most used commands.

/boot
Contains core of the OS i.e Kernel.

/sbin
Contains programs that are run by root.

/dev
Contains all the devices connected with your PC as a file.

/temp
Stores temporary files.

/var
Contains all the files which change their size with time.

/lib
Stores all the library files which are used by different programs.

/etc
Contains all the configuration files of linux.
/home
Contains users personal files.

/usr
User programs and data.

Reading Material

Commands

A command is a request from a programmer, an operator, or a user to Linux operating systems asking that a specific function be performed. For Example, a request to list all files in your current directory will be the command ls.

Syntax

The general way commands are entered in Linux is as such:

command -option(s) argument(s)

Here, A command tells the operating system what to do.

Option(s) tells the way of action to be performed. For example, ls command displays directory contents, and -r option tells the way in which the directory should be displayed. Here -r displays directory contents in reverse (alphabetically) order.

Argument tells that on what objects (file, directory, devices, etc.) the command and its options are applied. For example if we need to display all files starting with alphabet a, you will give “ls a*” and press enter.

Note Make sure you don't forget that there is always a space between the command, the options, and the arguments.

The Asterisk *

The asterisk * symbol is basically a wildcard. It can be used in a number of contexts.
It can be used to denote everything. For example, in MS-Dos, typing delete * will delete all files in a current directory. With Linux, you can use rm * to do the same thing.
It can be used as a filter. For example, typing ls ab* will print all file/folder names that start with ab.

Case Sensitivity

Linux Commands are case-sensitive. All standard Linux commands are given in lower case letters only. As an example, typing ls will print the directory contents. Typing Ls, or LS, or lS will result in a command syntax error.

Auto-Completion

Auto-Completion is a short-cut feature for quickly entering commands that are long or you have

forgotten their spelling. To practice, just type f and press the TAB key. You will see the list of all commands starting with an f. Type fd and press TAB, you will see all commands starting with fd. Type fdi and press TAB, you will see a list of commands all starting with fdi, so on and so forth. You can also use the auto-completion to detect directories. For example, you want to access the
home directory of a user who for some strange reason is called abcdefghijklmnopqrstuvwxyz. From the root directory (/), you will type cd /home/a and press TAB. The rest of the characters bcdefghijklmnopqrstuvwxyz will be given automatically and you will be spared the time and effort
of writing such a large name.

Redirection

You can use the > and < symbols to redirect your output. The types of redirection are as such:

- > Output redirection to a file
- 1 > Same as >
- 2 > Error output redirection to a file
- < Output redirection from file to terminal

Try it using the following set of commands

```
cd
ls
touch newfile
ls
ls > newfile
cat < newfile
lsot
lsot 2 > newfile
cat < newfile
rm newfile
```

Using single > OR < will remove the previous file contents. If you want to append the content in the file use >> OR << instead

Practicing Commands

Some of the most commonly used commands are given below. Try and practice each one of them and see what they do.

echo

Used for printing strings on standard output

date
Shows date and time

cal
Shows current month's calendar

cd
Stands for change directory, you can change switch directories using cd. If you enter cd without any arguments, it will take you to **/home/[username]** directory.

ls
ls command list down all the files and directories which are available in the current directory.

man
Man command will display the documentation of any command.

Clear
Clears the screen. Shortcut is **Ctrl + L**

touch
Is used for changing the time of file when it was last edited. Or you can create a new empty file.

mkdir
Create a new directory

rmdir
Remove a directory (if it is empty)

cat
View contents of a file, or write contents to a file

cp
Copy a file from one location to another

mv
Move a file from one location to another

rm
Remove file(s) and/or directory(ies)

To see them working, practice the following set of commands, the # sign represents the shell prompt.

mkdir temporary
cd temporary
temporary# ls
temporary# cat > newfile
Type any text and press CTRL+D
temporary# cat newfile
temporary# mkdir another
temporary# cp newfile another/newest
temporary# cp newfile newester
temporary# cd another
another# ls
another# cp newest newestest
another# cat newestest
another# cd ..
temporary# mv newester another/newester
temporary# ls
temporary# ls another/n*
temporary# cd ..
rm temporary# rm temporary/*
rm temporary
rm temporary -r -f

Exercise 1

Implement the following directory tree.