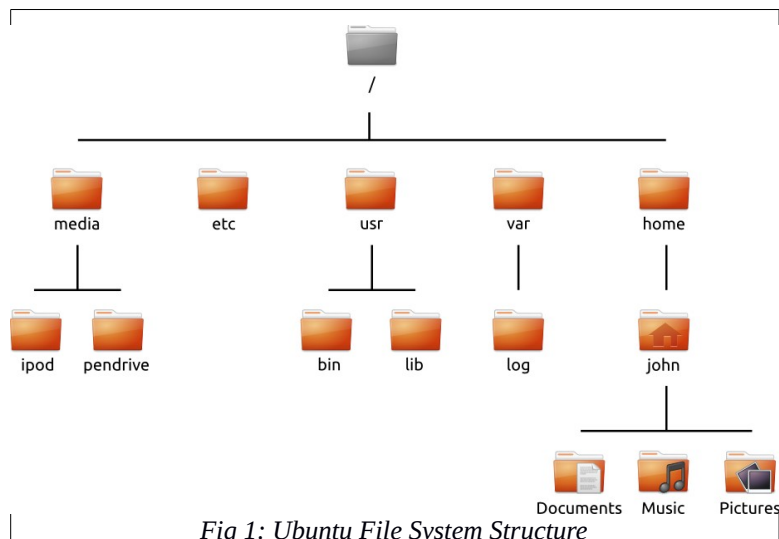


# CL205 - Operating Systems Lab

## Lab#02 - Basics of Ubuntu

### 1. Ubuntu's File System Structure

Ubuntu uses the Linux file system, which is based on a series of folders in the root directory. These folders contain important system files that cannot be modified unless you are running as the root user or use **sudo**. This restriction exists for both security and safety reasons; computer viruses will not be able to change the core system files, and ordinary users should not be able to accidentally damage anything vital.



At the top of the hierarchy is the root directory which is denoted by /. The root directory contains all other directories and files on your system. Below the root directory are the following essential directories:

- **/bin** and **/sbin** Many essential system applications (equivalent to **C:\Windows**).
- **/etc** System-wide configuration files.
- **/home** Each user will have a subdirectory to store personal files (for example, **/home/yourusername**) which is equivalent to **C:\Users** or **C:\Documents and Settings** in Microsoft Windows.
- **/lib** Library files, similar to .dll files on Windows.

- **/media** Removable media (cd-roms and usb drives) will be mounted in this directory.
- **/root** This contains the root user's files (not to be confused with the root directory).
- **/usr** Pronounced "user," it contains most program files (not to be confused with each user's home directory). This is equivalent to C:\Program Files in Microsoft Windows.
- **/var/log** Contains log files written by many applications.

## 2. Terminal

In order to fully realize the power of Ubuntu, 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 is Ubuntu's CLI. It is a method of controlling some aspects of Ubuntu using only commands that you type on the keyboard.

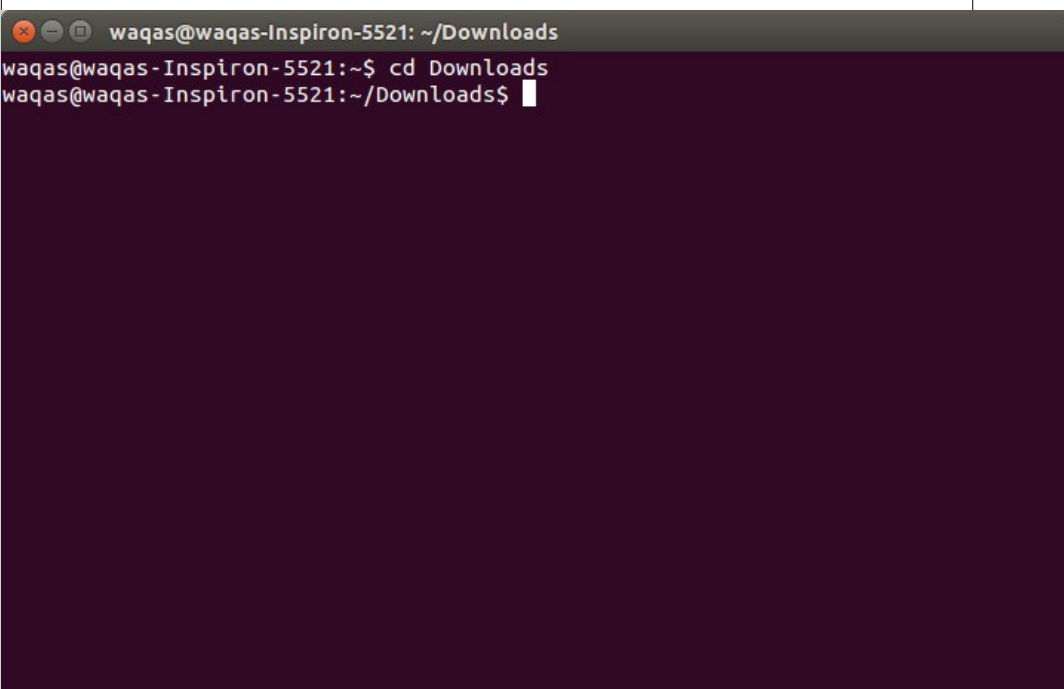
### Why would you want to use the terminal?

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. These usually take the form of **-h** or **--help**, for example. In fact, **--help** can be added to most commands to display a short description of the command, as well as a list of any other parameters that can be used with that command. Often, some type of output will be displayed confirming the action was completed successfully, although this can depend on the command being executed. For example, using the **cd** command to change your current directory will change the prompt but will not display any output, as shown in the figure below.

A terminal window with a dark purple background. The title bar at the top shows a red close button, a yellow minimize button, and a green maximize button, followed by the text "waqas@waqas-Inspiron-5521: ~/Downloads". The terminal content shows the prompt "waqas@waqas-Inspiron-5521:~\$" followed by the command "cd Downloads". The next line shows the prompt "waqas@waqas-Inspiron-5521:~/Downloads\$" with a white cursor block at the end, indicating the directory has been successfully changed.

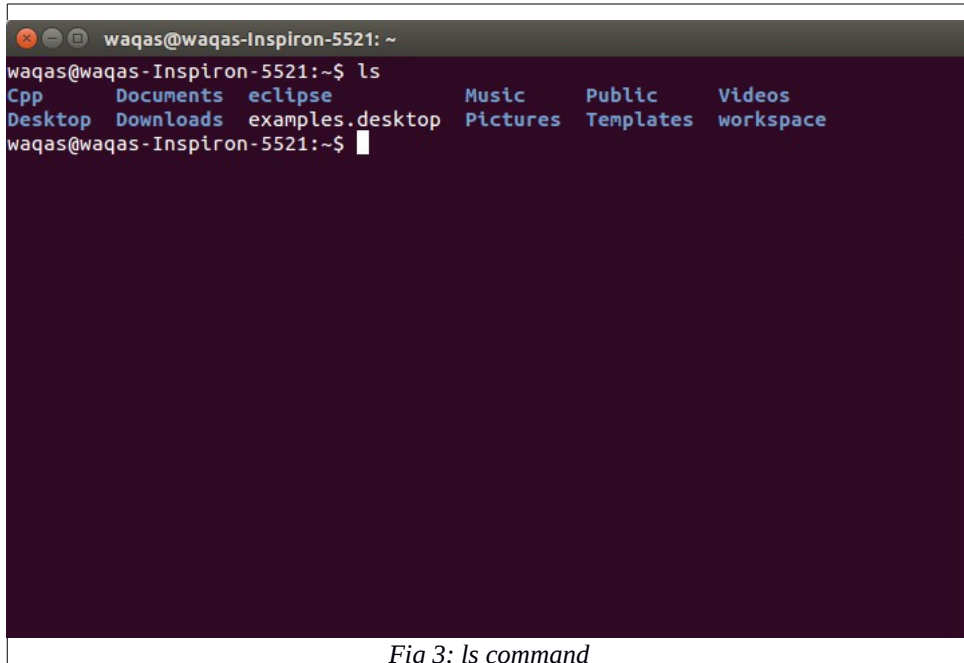
```
waqas@waqas-Inspiron-5521: ~/Downloads
waqas@waqas-Inspiron-5521:~$ cd Downloads
waqas@waqas-Inspiron-5521:~/Downloads$
```

*Fig 2: Changing the current directory*

### 3. Basic Commands

- a) `ls`: list directory contents

(The `ls` command will show you the list of files in your current directory)

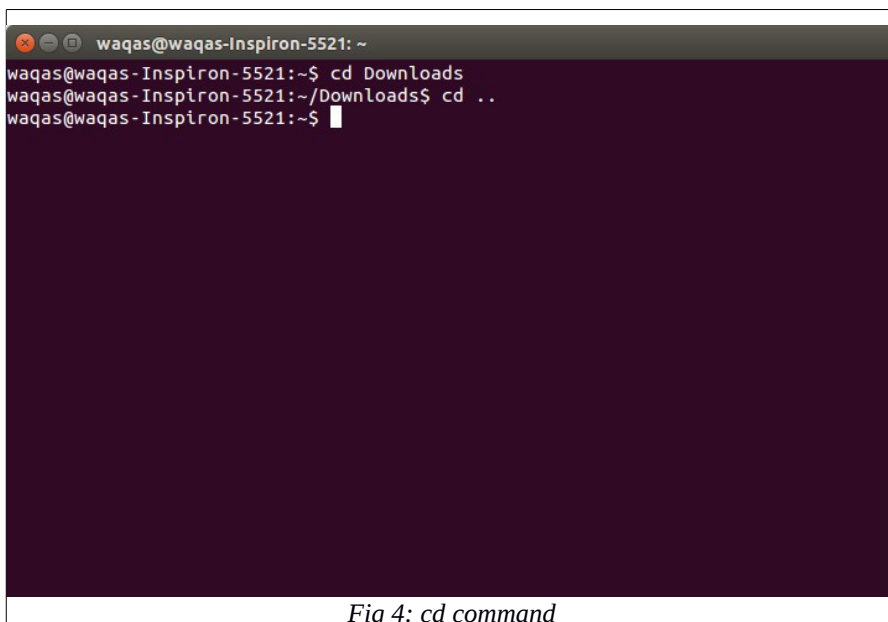
A terminal window titled 'waqas@waqas-Inspiron-5521: ~' showing the output of the 'ls' command. The output lists files and directories in two rows: 'Cpp', 'Documents', 'eclipse', 'Music', 'Public', 'Videos' on the first row, and 'Desktop', 'Downloads', 'examples.desktop', 'Pictures', 'Templates', 'workspace' on the second row. The prompt 'waqas@waqas-Inspiron-5521:~\$' is followed by 'ls' and the output is displayed. The prompt 'waqas@waqas-Inspiron-5521:~\$' is followed by a cursor.

```
waqas@waqas-Inspiron-5521: ~  
waqas@waqas-Inspiron-5521:~$ ls  
Cpp      Documents  eclipse    Music     Public    Videos  
Desktop  Downloads  examples.desktop  Pictures  Templates workspace  
waqas@waqas-Inspiron-5521:~$
```

*Fig 3: ls command*

- b) `cd`: Change Directory

(The `cd` command will allow you to change directories.)

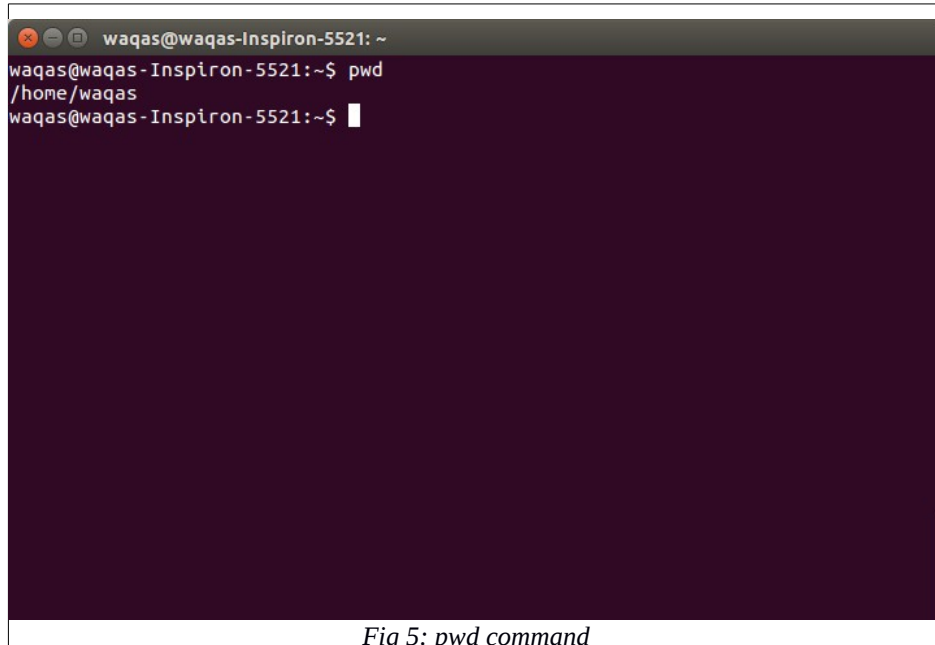
A terminal window titled 'waqas@waqas-Inspiron-5521: ~' showing the usage of the 'cd' command. The first line shows 'cd Downloads' being executed. The second line shows the current directory as '~ / Downloads' and then 'cd ..' is executed. The third line shows the prompt 'waqas@waqas-Inspiron-5521:~\$' with a cursor.

```
waqas@waqas-Inspiron-5521: ~  
waqas@waqas-Inspiron-5521:~$ cd Downloads  
waqas@waqas-Inspiron-5521:~/Downloads$ cd ..  
waqas@waqas-Inspiron-5521:~$
```

*Fig 4: cd command*

c) `pwd` : print the current/working directory

(The **pwd** command will allow you to know in which directory you are currently working)

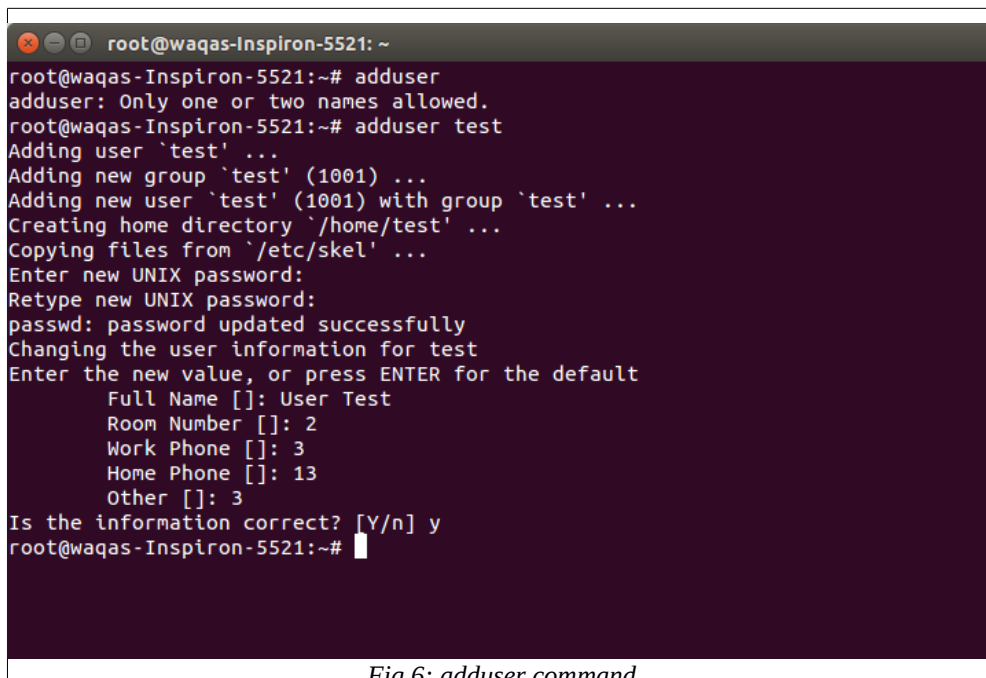
A terminal window titled 'waqas@waqas-Inspiron-5521: ~' with a dark purple background. The prompt is 'waqas@waqas-Inspiron-5521:~\$'. The user enters 'pwd' and the output is '/home/waqas'. The prompt returns to 'waqas@waqas-Inspiron-5521:~\$' with a cursor.

```
waqas@waqas-Inspiron-5521: ~
waqas@waqas-Inspiron-5521:~$ pwd
/home/waqas
waqas@waqas-Inspiron-5521:~$
```

*Fig 5: pwd command*

d) `adduser` : Addition of new user

(This command will create a new user in /home directory)

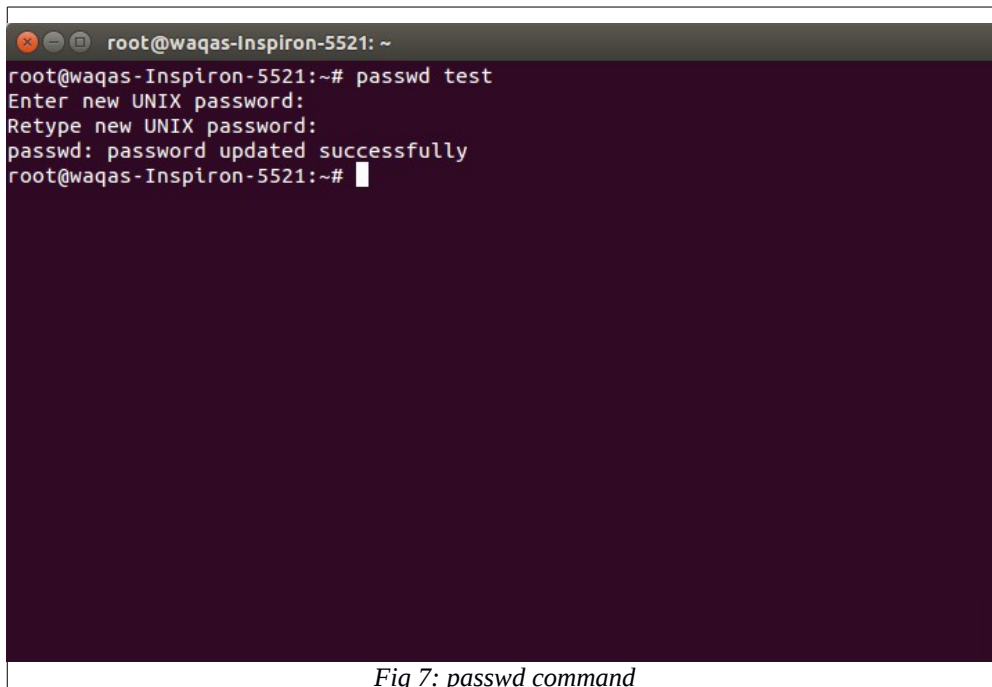
A terminal window titled 'root@waqas-Inspiron-5521: ~' with a dark purple background. The prompt is 'root@waqas-Inspiron-5521:~#'. The user enters 'adduser'. The output shows the process of adding a new user 'test', including creating a group, user, and home directory, and setting a password. It then prompts for user information like full name, room number, and phone numbers. The user enters 'y' for 'Is the information correct?'. The prompt returns to 'root@waqas-Inspiron-5521:~#'.

```
root@waqas-Inspiron-5521: ~
root@waqas-Inspiron-5521:~# adduser
adduser: Only one or two names allowed.
root@waqas-Inspiron-5521:~# adduser test
Adding user `test' ...
Adding new group `test' (1001) ...
Adding new user `test' (1001) with group `test' ...
Creating home directory `/home/test' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for test
Enter the new value, or press ENTER for the default
  Full Name []: User Test
   Room Number []: 2
   Work Phone []: 3
   Home Phone []: 13
    Other []: 3
Is the information correct? [Y/n] y
root@waqas-Inspiron-5521:~#
```

*Fig 6: adduser command*

e) passwd : Change password for user

(This command changes the password of a specific user)

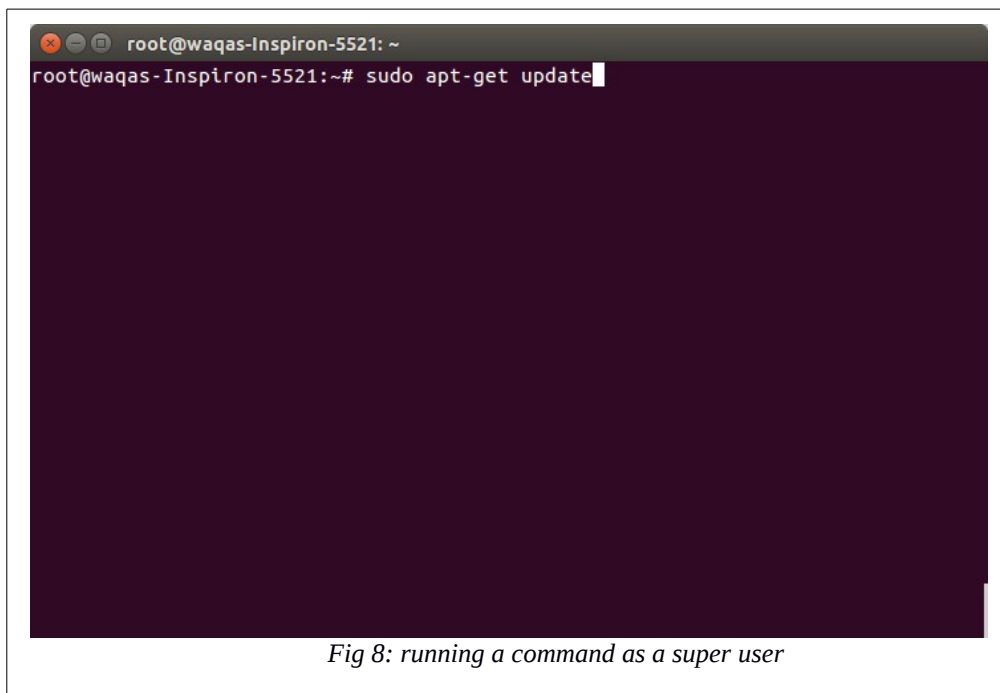
A terminal window with a dark purple background and a title bar that reads "root@waqas-Inspiron-5521: ~". The terminal shows the following text: "root@waqas-Inspiron-5521:~# passwd test", "Enter new UNIX password:", "Retype new UNIX password:", "passwd: password updated successfully", and "root@waqas-Inspiron-5521:~#".

```
root@waqas-Inspiron-5521: ~
root@waqas-Inspiron-5521:~# passwd test
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
root@waqas-Inspiron-5521:~#
```

*Fig 7: passwd command*

f) sudo command

(run command as a super user (root))

A terminal window with a dark purple background and a title bar that reads "root@waqas-Inspiron-5521: ~". The terminal shows the text: "root@waqas-Inspiron-5521:~# sudo apt-get update".

```
root@waqas-Inspiron-5521: ~
root@waqas-Inspiron-5521:~# sudo apt-get update
```

*Fig 8: running a command as a super user*

- g) `ifconfig` – show network information
- h) `iwconfig` – show wireless information