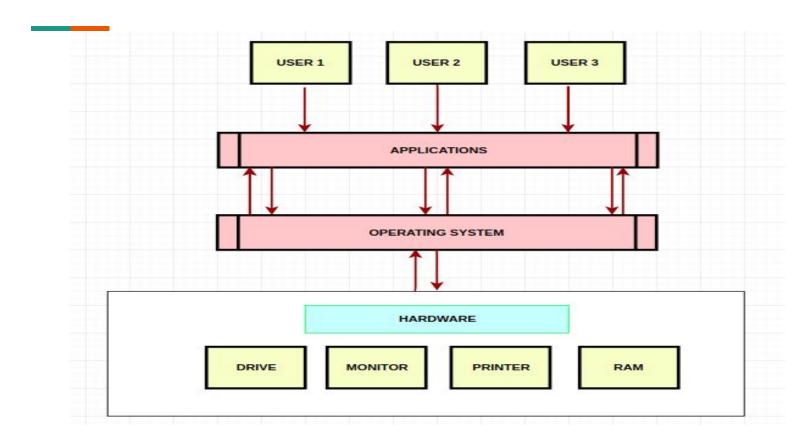
# **OPERATING SYSTEM**



- An Operating System is a program that acts as an interface between a user of a computer and the computer hardware.
- Operating System is a system software that manages hardware and software resources and provide services for computer programs and makes the computer into a useful tool for its users.

- Computer understand machine language, also known as Machine code. Machine code is a set of binary instructions consisting of 1's and 0's.
- Your operating system also works as a translator in your PC. It converts those 1s and 0s, values into a human readable language that user will understand.

 All computers and computer-like devices require operating systems, including your laptop, tablet, desktop, smartphone, smartwatch, and router.

- Primary goals:
  - Convenience (windows)
    - Windows and Mac are the most convenient OS for the users.
  - Throughput (linux)
    - Multiple tasks executed per unit time, it means we have running multiple applications and OS need to respond fast.
    - Respond fast in specific amount of time.

- 1. Resource Management
- 2. Process Management
- 3. Storage Management
- 4. Memory Management
- 5. Security Management

- 1) Resource management.
  - a) Resource management works when multiple users connected from a single machine like server.
  - b) Especially it use where parallel users connected from a machine.

#### 2) Process management

a) If we have multiple applications/process running at a time like media player, browser, gaming app, OS manages it using CPU SCHEDULING.

- 3) Storage Management (Hard drive).
  - a) Store data in drive using file system.
- 4) Memory Management (RAM)
  - a) All process first come in RAM before execution.
  - b) RAM allocate memory and send it to CPU.
  - c) CPU executes the program/application.

#### 5) Security Management

- a) Operating System refers to specified steps or measures used to protect the OS from threats, viruses, worms, malware or remote hacker intrusions.
- b) Check the authentication.

# **History Of Operating Systems**

# **Operating System History (cont..)**

- Earlier computers were built to perform a series of single tasks, like a calculator.
- Basic operating system features were developed in the 1950s.
- In the early 1950s, a computer could execute only one program at a time.

# **Operating System History (cont..)**

- Later machines came with libraries of programs.
- Unix is the complete OS, earlier so many OS introduced but that all have some problems.
- UNIX is Closed Source Operating System.
- The right to use the UNIX Trademark requires the Licensee to pay to The Open Group an additional annual fee.

# **Operating System History (cont..)**

- UNIX is the operating system which is developed in 1970's in Bell Labs by
  Ken Thompson and Dennis Ritchie.
- Dennis Ritchie also the creator of c language.
- Later AT&T purchased unix operating system.

### Why linux IS better than WINDOWS for SERVERS

- Free and Open Source
  - Linux is free and open source; you can see the source code used to create Linux (kernel).
- Stability and Reliability
  - Linux is Unix-based and Unix was originally designed to provide an environment that's powerful, stable and reliable yet easy to use. Linux systems are widely known for their stability and reliability, many Linux servers on the Internet have been running for years without failure or even being restarted.

# Why linux IS better than WINDOWS for SERVERS (con)

#### Security

 Linux is without doubt the most secure kernel out there, making linux based operating systems secure and suitable for servers.

#### Flexibility

 Linux is so powerful and flexible. You can tune it to meet you server needs: it allows you to do whatever you want (if possible). You can install a GUI (graphical user interface) or simply operate your operate your server via a terminal only.

# Why linux IS better than WINDOWS for SERVERS (cont..)

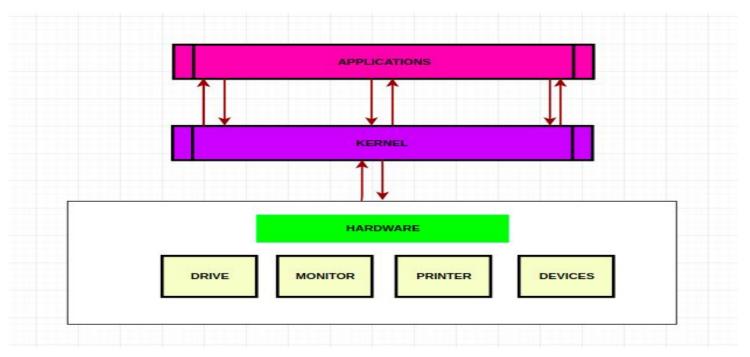
- Cost And Maintenance
  - Finally, the total cost of owning and maintaining a Linux server is lower compared to a Windows server, in terms of licensing fees, software/hardware purchase and maintenance costs, system support services and administrative costs.

**Linux and the Open Source Movement** 

#### What is LINUX?

- An open-source operating system modelled on UNIX.
- Just like Windows XP, Windows 7, Windows 8, and Mac OS X, Linux is an operating system.
- An operating system is software that manages all of the hardware resources associated with your desktop or laptop.
- The operating system manages the communication between your software and your hardware. Without the operating system (often referred to as the "OS"), the software wouldn't function.

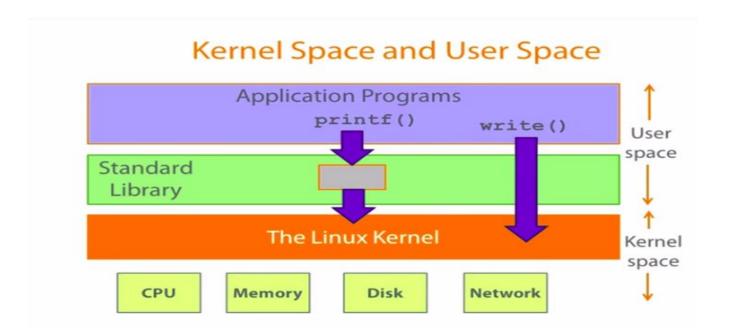
## WHAT IS KERNEL?



#### WHAT IS KERNEL?

- Kernel is the core component of the Operating system.
- Kernel manages the hardware of the device in which the Operating system is running.
- Computer consists on many hardware components like RAM, CPU,
  DRIVE etc.
- Kernel connects hardware with the applications.

#### KERNEL SPACE AND USER SPACE



#### KERNEL SPACE AND USER SPACE Program 1 Application Programs User space Program 2 Program 3 SYSTEM CALLS GNU C LIBRARY Linux kernel Kernel space HARDWARE MONITOR PRINTER RAM

#### KERNEL SPACE AND USER SPACE

- Kernel space and User space.
  - Kernel space is where the kernel (i.e., the core of the operating system) executes (i.e., runs) and provides its services.
  - User space is that set of memory locations in which user processes (i.e., everything other than the kernel) run.
  - One of the roles of the kernel is to manage individual user processes within this space and to prevent them from interfering with each other.
  - Kernel space can be accessed by user processes only through the use of system calls

#### Main Memory

Interrupt handling routines	
Process scheduling	
Memory management routines	Kernel space
Hardware drivers	
User program 1	
User program 2	₫ \
User program 1	
User program 3	
User program 4	User space

#### LINUX (cont..)

#### The OS is comprised of a number of pieces:

#### The Bootloader:

 The software that manages the boot process of your computer. For most users, this will simply be a splash screen that pops up and eventually goes away to boot into the operating system.

#### • The kernel:

 The kernel is the core of the system and manages the CPU, memory, and peripheral devices. The kernel is the "lowest" level of the OS.

#### LINUX (cont..)

#### Daemons:

These are background services (printing, sound, scheduling, etc)
 that either startup during boot, or after you log into the desktop.

## **INSTALLATION LINUX**

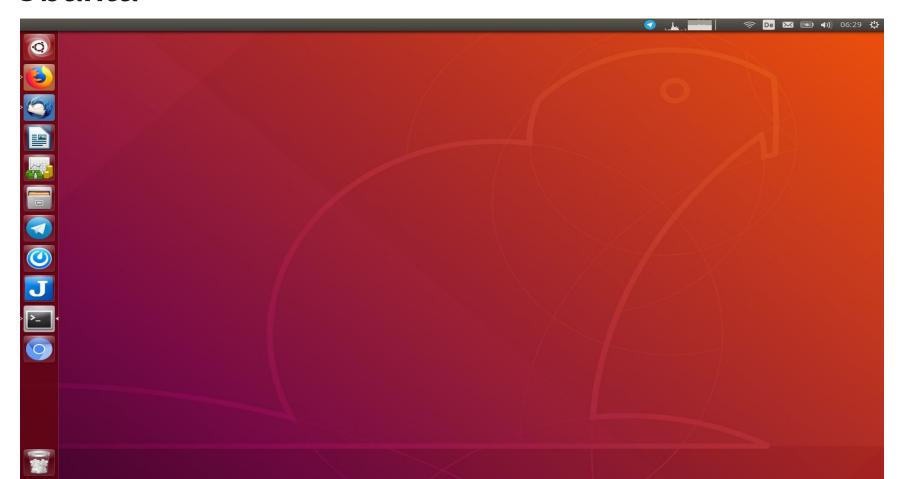
#### **Install Linux for Beginners**

https://www.youtube.com/watch?v=Dx2dJUPsJso

**How to dual boot Windows and Ubuntu?** 

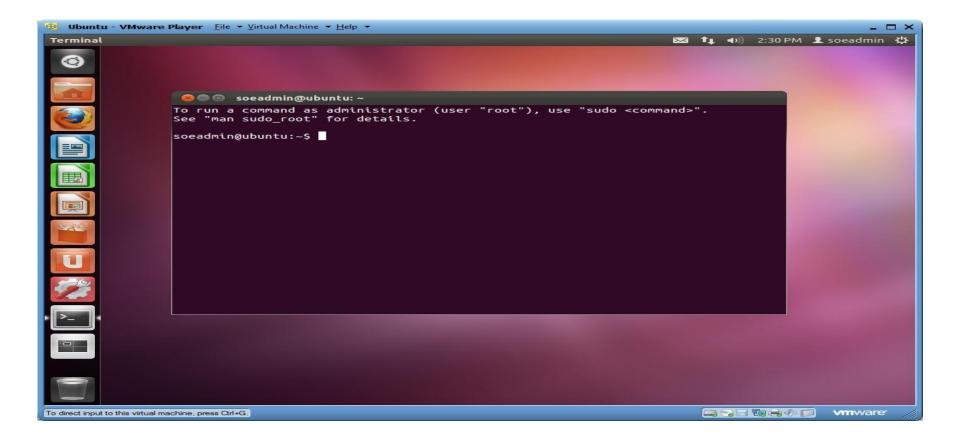
https://www.youtube.com/watch?v=JvBZBfY5Pfc&feature=youtu.be

# Ubuntu



# **Getting to Know Shell**

IN SEARCH BAR WRITE "TERMINAL"



#### **TERMINAL COMMANDS**

- The shell is where you can run executable files and shell scripts.
- The shell is also what we call the command line. Commands are written using the general syntax below:
  - command option1 option2 . . . optionN

#### **FEW COMMANDS BELOW:**

- uptime
  - uptime is the command that shows the duration that the computer has been up.

# Files System

- Linux organizes files using a hierarchical system.
- Files are stored in directories and these directories can also contain other directories.
- When you compare the Linux filesystem to Windows, you will find that there are no drive letters in Linux.

# Files System

- All files are stored in a single root directory noted as /.
- To find a file in Linux, you also need the information about the directory hierarchy known as the pathname.

Top-Level Directory	Files that the directory contains
1	Single root directory – file system base
/bin	Executable files such as Linux commands cat,cp,ls
/boot	Files that the boot loaders access during start-up — including the Linux kernel
/dev	Files for the different hardware/devices
/etc.	Initialization scripts and system config files
/home	User directories
/lib	Library files which includes driver modules
/lost+found	For lost files
/media	Mounting removal media filesystems
/mnt	Temporary directory for mounted filesystems
/opt	For storing application packages
/proc	Information on Linux processes
/root	Root user home directory
/sbin	Executable files for commands used by root user
/srv	For services hosted by the system (e.g. FTP, web)
/tmp	Temporary directory – deleted during system reboot
/usr	Contains subdirectories for program files
/var	Log files

#### TERMINAL COMMANDS

- uname –srv
  - o uname is the command to show the operating system name. –s (print the operating system name), -r (print the operating system release), and –v (print the operating system version) are options that you can use for the uname command.

### **Navigation In Directories**

- To navigate in the directories on Linux, you can either use the GUI, using the universal text-based search function, or by using the command line.
- You can use the following useful commands in your terminal to:
  - o Is
    - List down all the contents of a director
  - $\circ$  cd
    - Changes directory

- You can use the following useful commands in your terminal.
  - cd ~
    - the tilde (~) sign signifies the user's home dir change dir to home directory.

- You can use the following useful commands in your terminal.
  - o cd ..
    - Means to change directory one level up. For example, you are currently /home/daniyal/, using the command will take you to /home/

• You can use the following useful commands in your terminal to: (cont

..)

- o mkdir
  - A command used to create directories.

- pwd
  - Short for present working directory. This command will display the directory where you are currently in.
- touch
  - This command creates the file.

- You can use the following useful commands in your terminal to: (cont ..)
  - cat test.txt
    - Command to print all the contents of test.txt in the screen
  - cp text.txt /home
    - Copy contents of text.txt to /home

- mv text.txt /home
  - Move the file text.txt to the /home/ directory. You can also use this command to move the entire directory to another directory.

You can use the following useful commands in your terminal to:

(cont ..)

- o rm text.txt
  - Delete the file text.txt.
- hostname
  - System host name

- hostname -l
  - Display the IP addresses of the host
- o man
  - This command displays all the options that you can use. Try to use the command for every Linux command that you encounter.

- find / -name "linux\*"
  - This command is use for searching using the command line. The command here will search for any file or directory with a name that starts with linux
- uname -a
  - This command displays information about the machine, the processor architecture, and the operating system details.

#### Iscpu

- This command returns more information about the system such as the number of CPUs and the CPU speed.
- df -h
  - This command displays the disk space usage in all of the mounted devices. The -h option presents the results in a humanreadable output, using G for gigabytes or M for megabytes sizes.

- du /home/edulaney/files/
  - This command displays all the files inside the specified directory and their corresponding file sizes. You can also specify a filename.
- du -s /home/edulaney/files/
  - The –s option provides the total file size of the specified directory.

You can use the following useful commands in your terminal to: (cont

..)

- date
  - Show the current date and time
- o cal
  - Show this month's calendar

- $\circ$  W
  - Display who is online

- apt-get install package-name (advanced package tool)
  - This command use to install packages to your computer.
- apt-cache search keyword
  - This command will download the specific package name that you want to install. In case you do not know the package name, you can search for a keyword.

- apt-cache search.
  - To get a list of all packages.
- info
  - Shows online information about a command
- whatis
  - Shows a short description of a specific keyword
- type
  - Shows the location of a command file

- bg
  - Run a program or a process in the background
- free
  - Check for the free memory
- kill
  - Stop a process

- nice
  - Run a program with a low priority.
- ps
  - Show current running processes
- top
  - Show list of CPU and memory utilization of processes

- SU -
  - To switch to root while in the shell, input your root password.
    Changing to root password while in the shell environment will allow you to run tasks that only administrators and superusers can do.
- shutdown
  - Turn off computer

## Assignment

Create file "assignment.txt" using command line interface (cli).

Edit file "assignment.txt" using vi editor of terminal.

# **THANK YOU**