

Linux-Day-1

13 October 2023 00:26

LINUX

Today session is on Linux operating system. Before we jump into the class,

- ▶ **You guys already having knowledge on Linux operating system?**
 - i. If you don't have knowledge on LINUX operating system no worries I will explain it from the scratch.
 - ii. If you have knowledge on the Linux operating system it's well and good please listen one more time and don't get bored.
- ▶ **Can someone tell what is an operating system?**
 - It's an interface between the user and system.
Image-1
 - So user will communicate with operating system and operating system will communicate with the machine.
- ▶ **What are the popular operating systems in the market?**
Windows
Unix

WINDOWS

- ▶ **Who is the owner/vendor for the windows operating systems?**
 - Microsoft is the owner of the windows operating system.
 - If anyone wants to install windows operating system on any laptops they have to purchase the licence from Microsoft.
 - I mean windows operating systems are not open source operating system.
- ▶ **What is open source? - Tuning required**
 - The **source code which is developed** for windows operating system is **not shared with public users for free**.
 - Only the vendor have authority to modify the source code of windows operating system so windows is not open source operating system.
- ▶ **What are the different flavours of the windows operating system?**
 - Windows Vista
 - Windows XP
 - Windows 2008
 - Windows 2009
 - Windows 2011
 - In this different flavours of windows operating system 90% of the core functionalities are mostly same and only 10% futures are different in the each operating systems.
 - I mean there will be almost 10% delta portion between windows Vista and windows XP operating systems, rest of the core functionalities will be same.
- ▶ **Have you observe so far in the windows I discussed only user desktop level operating systems.**
I mean the operating systems windows Vista, windows XP, windows 2008 2009 2011 are installed in the users laptops.
- ▶ **Microsoft developed server level operating systems also at windows side, the server side flavours of windows operating systems are**
 - Windows 2012 server
 - Windows 2016 server
 - Windows 2019 server
 - Windows 2022 server

This flavours of windows operating systems are installed in server machines.
- ▶ **What is server and desktop?**
Desktop: it's a machine normally that you are using with the normal configurations.
Server: It's a machine with higher configurations in terms of number of CPU, Ram and disk size.
Machines that are provided from AWS/Azure/gcp those machines also will be considered as servers.

UNIX

Now let's jump into the Unix operating system

- ▶ **Many people assume UNIX and LINUX are same operating system is this really true?**
No the UNIX & Linux are both are supporting operating system I will discuss on this now,
- ▶ **Unix operating system invented at Bell Lab's and this UNIX operating system is not an open source operating system if anyone wants to use in its operating system they need to purchase licence from Bell Labs.**
- ▶ **When this UNIX operating system invented this is become very popular at university level and research side.**
- ▶ **So now major companies like**
 - IBM
 - HP
 - Sun Solaris
 - Fujitsu

made agreement with **Bell Lab's** for developing their own operating system based on Unix operating system source code.

 - **IBM developed ==> AIX based out of Unix operating system source code**
 - **Sun Solaris ==> Solaris OS**
 - **HP ==> HP-UX OS**
 - **Fujitsu ==> UXP/DS OS**
- ▶ **So now all these are became the flavours of Unix operating system.**
I mean it's

AIX
Solaris
HP-UX
UXP/DS all are **flavours of the Unix operating system**.

- ▶ Again if you want to use any **flavour of Unix operating system you have to purchase the licence from its vendor** so this flavours of Unix operating system or not free of cost.
- ▶ Now there is a guy call **Linus** a college student developed a free **open source operating system** based on the core principles of the Unix operating system and this operating system named as a **Linux**.
- ▶ So again companies coming to picture the developed they own operating system based on LINUX operating system which was developed by the Linus.
- ▶ OS that are developed based on Linux OS are
 - **RHEL ==> REDHAT(IBM)**
 - **Centos** it is a community OS.
 - **Amazon Linux ==> Amazon**
 - **Fedora**
 - **Ubuntu**

Like this many flavours created from the Linux operating system those operating systems are around **300 Plus**.

- ▶ We can see these all different operating systems in the **AWS cloud site(Amazon)** while creating the instances or servers.
- ▶ Here for your easy understanding **UNIX is a grandfather** and **LINUX is a son for UNIX** and **RHEL/Ubuntu/Fedora all these grandsons of UNIX**.
- ▶ The flavours of Linux almost 90% is same in terms of core functionalities only 10% might be different, so it will be fine if your fine in any one of the operating system you can manage rest of the flavours.

Which OS is easy to learn? Windows/Linux OS

- ▶ My opinion is windows operating system is easy to learn compared to the Linux operating system this is my opinion do you agree on this thing?
 - Yes, windows is easy to learn compared to the Linux operating system because Windows OS is user friendly & GUI.
 - So that anyone I mean any non-technical person can easily interact with windows operating system.
- ▶ But LINUX operating system if you want to operate you have to know the commands.
 - If you want to create file you should know command for that.
 - If you want to create folder you should know the command.
 - In Windows you can just right-click & create new file we can do easily since its GUI
- ▶ Because of this reason 80% of the desktop users I mean in the personal systems having windows operating system & only 20% of machines using the Linux operating system

How Linux OS became very popular than windows OS

Now let's discuss about the next features that made very popular then windows operating system.

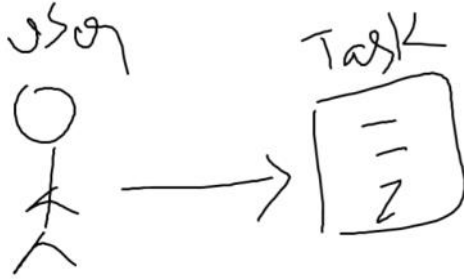
- ▶ **First one is open source operating system**
 - We know that Linux is an open source operating system.
 - Since its open source operating system
 - You no need to purchase any licence.
 - The source code that is used to develop the Linux operating system is available for free so any public user whoever having access to the internet they can read modify the source code and they can develop their own flavour of Linux operating system.
- ▶ **Security**
In terms of security we mainly concerned about **hackers** and **viruses**.
 - **Who is hacker?**
 - Hacker is a very good technical person on the systems with bad in tensions.
 - I mean he always try to connect to others machines and try to steal the information like credit/debit/bank details and any personal information & do scams.
 - **Why hackers mostly target Windows based machines?**
 - I don't say hackers only target the windows operating system and not the Linux operating system?
But the chances for hacking the windows operating systems are very high compared to the Linux operating system because the number of desktop uses for the windows operating system around 80% are there what the Linux operating system disturb only 2% so the hackers will target large number of people only instead of this number of less Linux people.
 - **When we come to the virus section, windows 7 having more chances to get virus attacks**
 - i. **Why there are more chances of having virus on the windows machines?**
 - How a normal install software on windows machines will just go to the internet and directly will download .exe/.msi file & will run it as an administrator & will click on next-next button on the software will get installed.
 - Suppose if the MSI are having virus that will affect the all the files & folders of the machine. Like entire C: drive & D: drive
 - So in this case we have to reach like the machine because of the machine will become very slow after the virus attack.
 - To remove virus on systems re-install the OS & sometimes this might lead to data loss also this will be a huge cost to the company.
 - ii. In case of Linux OS when we are installing any software we can download the software packages only from the official site of the respective operating system. So there is a less chances to get the virus affected software's or packages into the Linux systems.
 - iii. Also any virus affected software or package installed on the Linux machine it don't spread to the all the files are folders of the Linux operating system, because of the file/folder permissions. So we can simply delete folder that affected with virus will resolve issue.
- ▶ **The next feature is less resources**
So why Linux building less resources compared to the windows operating system?
 - **If you take example of MP3 file and MP4 file what is the main difference between this two files?**
 - MP3 song audio file.
 - MP4 is in video + audio file.

- The size of the MP3 file will be normally around 5 MB.
- The size of MP4 file how much it will be there it should be around 100MB
- **Why MP3 file size is very less compared to the MP4 file?**
Because MP3 saving only audio content but MP4 file having audio Plus video content. So this is causing MP4 file must have largest size compared to the MP3 files.
- **This is a similar case for windows & Linux also.**
Linux is only command line operating system but the windows is **command-line + graphical user interface** so it consumes lot of resources like CPU/RAM/HD
- When you install and windows operating system it will take around 80GB but when you install Linux operating system it will take around 5 to 10 GB.
- Also the CPU utilisation will be very high in windows machines because of the graphical user interface functionalities but it won't take that much of CPU usage in the Linux machine.
- So companies will mainly look for less resources obviously they will go for Linux operating system.

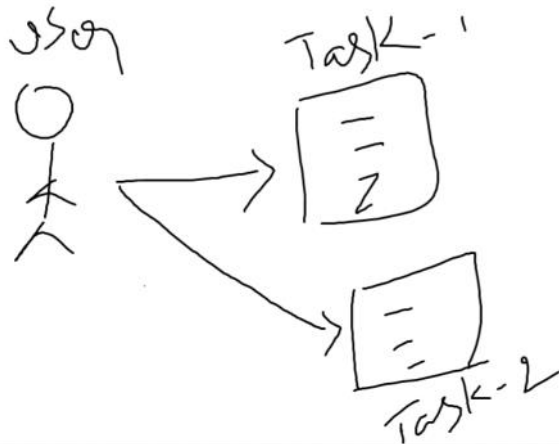
► Multi user and multitasking

Before we understand this feature let's take an example like

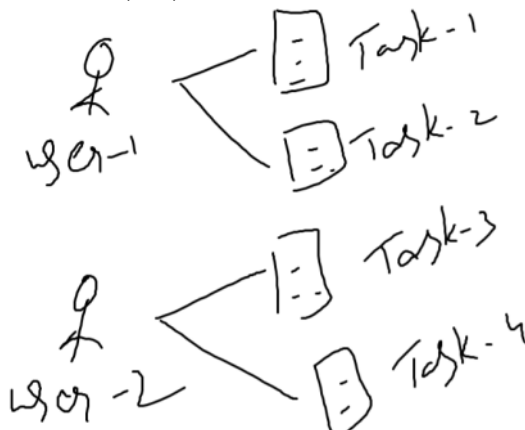
- One user perform one task.
 - At a given time single user only can connect to machine & can perform only one action either create a file/folder & after this activity only user can do other task.
 - EX: DOS



- One user perform multiple tasks.
 - At a given time single user only can connect to machine & can perform multiple actions like create a file & same time listen music
 - EX: WIN-2008, WIN-2010



- Many user perform multiple tasks.
 - At a given time multiple users can connect to machine & can perform multiple actions like create a file & same time listen music on their own space.
 - EX: Win-server-2012/2019/2022



► Highly available

- I mean the reboot time for the Linux is very long I mean that server will run for longer run without reboot, companies we can observe some of the machines not rebooted from two three years.
- But in windows it is not like that so reboot will required after the patch updates or else if you action on server & it is not replicating correctly reboot will required.

So all this features will out satisfying the company requirements that want to be number one position in the market.

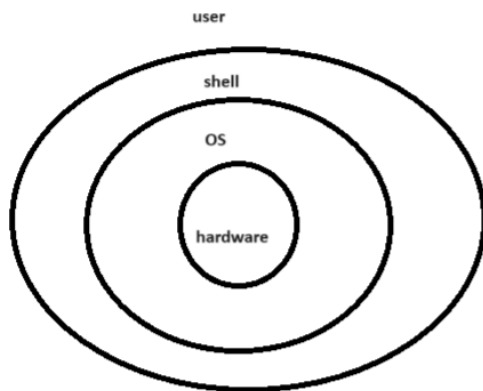
Futures like

- Open source & less resources - comes under expenditure & speed(CLI)
- Security feature - higher quality
- Longer runs without reboot - always available

These features making the choice of Linux on the servers instead of windows machines.

Architecture of Linux

Before we discuss about the architecture of Linux let's see how **windows architecture** will be there



Let's see this picture here

- ▶ hardware is nothing but our physical tab laptops,
- ▶ on this laptops normally install windows operating system
- ▶ On top of Windows OS shell layer will be there
- ▶ And finally on top of the shell layer user will be available.

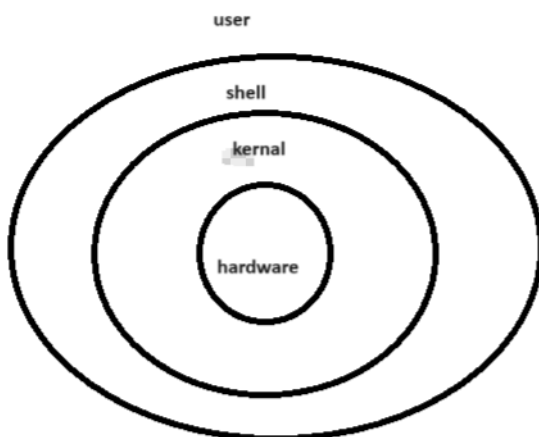
So user normally communicate with shell(user --> shell)

- shell will communicate with operating system(shell --> OS)
- operating system is a communicate with hardware(OS --> Hardware)
- And similarly in reverse way we will get the response from Hard ware to OS and OS to shell & shell to user.

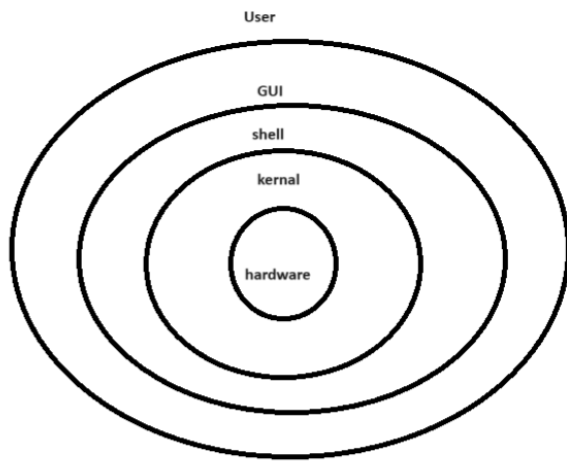
▶ Now let's see what is shell?

- Let me open your command prompt so here you can see the black screen & this black screen we consider as shell.
- As a user I can communicate with shell and this shell communicate with OS and OS with hardware.
- Let me find out number of folders/files present in current path, so I provided a **dir** command in the shell so this **dir** command will reach OS & hardware will get response with the list of the files/folders present in current path.

- ▶ So the Linux architecture also almost same with the windows architecture so there is a technical word difference between windows architecture and LINUX architecture in windows we call it as **OS layer** and in Linux we call it as a **kernel layer**.



- ▶ But there is one more difference between these two architecture that made Linux is faster than the windows. That is **GUI layer** which is present on top of the shell layer.
- ▶ So when you create a folder from the shell it will be very quick but when you create your folder from windows machines first we are communicating in the GUI layer and this GUI layer again communicate with SHELL layer.



- So there is a third person between the user and shell this is delaying speed like folder creation