1 . What is Linux ? and explain its features?

Ans: LINUX is an open-source operating system used extensively worldwide. It is free and its source code is available for everyone.

Linux as an Operating System provides a wide range of features, Mainly it is designed for systems, servers, embedded devices, mobile devices, and mainframes . Ex: Android OS is also based on the Linux kernel

> Applications: Linux is used by companies such as Google, Amazon, and Facebook to defend their servers since it is very trustworthy and stable.

Features/Advantages:

- Linux is free and easily available.
- It is more secure than other operating systems because it uses security auditing and password authentication features.
- Linux has its personal software repository.
- It includes multiple languages throughout the world. Hence Linux supports different language keyboards.
- It offers CLI and GUI to use different commands and applications such as Firefox, VLC, etc.
- Linux allows multiple users to access the system resources at the same time and allows multiple applications to run at the same time.

2. What are the basic elements or components of Linux?

Ans: Linux generally consists of five basic elements or components as given below:

- Kernel: Linux kernel is a core part of the operating system that works as a bridge between hardware and software.
- Shell: Shell is an interface between a kernel and a user. It is used to execute commands, shell scripts and programs.
- Hardware: Peripheral devices such as RAM, HDD, and CPU together constitute the Hardware layer for the LINUX operating system.
- System Utilities: It is the software functions through which users are allowed to manage the system.
- System Library: It is designed to perform a bundle of tasks through a bundle of functions.

3.What are the challenges of using Linux?

Ans: Linux shows hardware compatibility issues in certain devices because manufacturers prioritize Windows compatibility.

Learning Linux is not easy because the configuration and commands require proper knowledge.

network connectivity issues.

Sometimes users face driver and firmware-related issues.

4. What is Kernel? Explain its functions.

Ans: A kernel is considered the main component of Linux OS. t is known as a low-level software system. It acts as a bridge between hardware and software. Its main role is to manage hardware resources for users and it is used to provide an interface for user-level interaction. A kernel is the first program that is loaded whenever a computer system starts.

Its other main functions include: Memory management, process management, device management and Storage management.

5. What is BASH?

Ans: The Linux Bash is also known as 'Bourne-again Shell'. It is a replacement of Bourne shell (sh). The Bash is a **command language interpreter** as well as a **programming language**. It supports **variables, functions, and flow control**, like other programming languages. It can also read and execute the commands from a shell Scripts.

6.Differences between Linux and windows.

Ans:

Linux	**windows**
It is free and open source OS	It is free and not a open source os.
It is highly secure	Windows is less secure compare to linux.
Linux is more effecienct than windows	Windows is less efficient.
As a path separator, it uses forward slash.	Windows uses a backward slash between the directories.
Linux file systems are case-sensitive.	Linux file systems are case-insensitive.

7.Differences between Linux and UNIX

Linux	**Windows**
It is an open-source operating system which is freely available to everyone.	It is an operating system which can be only used by its copyrighters.
Linux supports more file system than Unix.	It also supports file system but lesser than Linux.
Linux is used everywhere from servers, PC, smartphones, tablets to mainframes and supercomputers.	It is used in servers, workstations and PCs.
Cost of the Linux are also cheaper than Windows.	Unix copyright vendors decide different costs for their respective Unix Operating systems
It provides higher security.	It provides higher security.

8. What are two types of Linux User Mode?

Ans: There are two types of Linux user mode as given below:

Command Line : i.e., command line interface. It takes input as a command and runs the tasks of the system.

GUI : Graphical User Interface or the human-computer interface. It uses icons, images, menus, and windows, which can be manipulated through the mouse.

9. Name some Linux Distros/Distributed Systems.

Ans: There are various Linux distros but the following are the most commonly used:

- Ubuntu
- Debian
- CentOS
- Fedora
- RedHat

10. Explain LILO

LILO, i.e., Linux Loader and is a Linux Boot loader. It loads the Linux operating system into memory and starts the execution. Most operating systems like Windows and macOS come with a bootloader. While in Linux, you need to install a separate boot loader, and LILO is one of the Linux boot loaders.

11.What is Swap Space

Ans: Swap space in Linux is used when the amount of physical memory (RAM) is full.Linux uses swap space to expand RAM.

If the system needs more memory resources and the RAM is full, inactive pages in memory are moved to the swap space. While swap space can help machines with a small amount of RAM.

12. What is Linux Shell? What types of Shells are there in Linux?

Ans: Linux shell is a user interface present between user and kernel. It is used for executing commands and communication with Linux OS. It accepts human-readable commands as input and converts them into kernel understandable language.

- csh (C Shell): This shell offers job control and spell checking and is similar to C syntax.]
- ksh (Korn Shell): A high-level shell for programming languages.
- ssh (Z Shell): This shell has a unique nature, such as closing comments, startup files, file name generating, and observing logout/login watching.
- bash (Bourne Again Shell): This is the default shell for Linux.
- Fish (Friendly Interactive Shell): This shell provides auto-suggestion, web-based configuration, etc.

13. What is a root account?

The root is like the user's name or system administrator account in Linux. The root account provides complete system control, which an ordinary user cannot do.

Usually, the root user account is called root .

14. What do you mean by a Process States in Linux?

Ans: Linux Process is a type of process that can be in a number of different states. The process enters these states from start till end. Process states in Linux are as follows:

- New/Ready: In this state, a new process is created and is ready to run.
- Running: In this state, the process is being executed.
- Blocked/Wait: In this state, the process is waiting for input from the user and if doesn't have resources to run such as memory, file locks, input, then it can remain in a waiting or blocked state.
- Terminated/Completed: In this state, the process has completed the execution or terminated by the OS.
- Zombie: In this state, the process is terminated but information regarding the process still exists and is available in the process table.

15. Name different types of modes used in VI editor.

VI editor (Visual Editor) is basically a default text editor that usually comes with most of the Linux OS. There are basically three types of modes used in VI editor as given below:

- Command Mode/Regular Mode: It is the default mode for the vi editors. It is generally used to type commands that usually perform particular or specific vi functions. To enter this mode from another mode (Insert mode), one must press [esc]. In simple words, it lets you view the content.
- Insertion Mode/Edit Mode: This mode allows you to do text editing, or type text into a file. To enter this mode from another mode (command mode), one must press [esc]. In simple words, it lets you delete or insert text or content.
- Ex Mode/Replacement Mode: This mode is generally used to save the files and execution of the commands. It basically executes files with different parameters. To enter this mode, one must press [:]. In simple words, it lets you overwrite content or text.

16. What is absolute path and Relative Path?

Ans: An absolute path is defined as specifying the location of a file or directory from the root directory(/). In other words,we can say that an absolute path is a complete path from start of actual file system from / directory.

```
Ex: cat /home/kt/abc.sql
```

Relative path is defined as the path related to the present working directly(pwd). It starts at your current directory.

1. **Changing directory with relative path concept :**

```
$pwd
 /home/kt
$cd abc
$pwd
/home/kt/abc
```

2. **Changing directory with absolute path concept:**

```
$pwd
/home/kt
$cd /home/kt/abc
$pwd
/home/kt/abc
```

17. What is a maximum length for a filename under Linux?

Ans: The maximum length for a filename under Linux is 255 bytes.

18. Under the Linux system, what is the typical size for swap partitions?

The typical size for a swap partition under a Linux system should be twice the amount of physical memory or RAM available on the system.

19. What are file permissions in Linux? Name different types of file systems in Linux.

There are three owners in the Linux System i.e., user, group, and others. These owners have three types of permissions defined as listed below:

Read (r): It allows the user to open and read the file or list the directory.

Write (w): It allows the user to open and modify the file.

Execute (x): It allows the user to execute or run the file.

19.What is LVM?

Ans: LVM (Logical Volume Management) is basically a tool that provides logical volume management for the Linux kernel. It is being introduced simply to make physical storage device management easier. It also includes allocating disks, striping, mirroring, resizing logical volumes. Its main advantages are increased abstraction, flexibility, and control. It simply allows for flexible disk space management. It is especially required to resize the size of the file system online. In Linux, the size of the LVM partition can be extended using “lvextend” command and can be reduced using “lvreduce” commands, respectively.

20.what is shell Scripting?

Ans: script means programming language that is being used to control applications. It simply allows the execution of different commands that are entered in the shell. It generally helps you to create complex programs containing conditional statements, loops, and functions.

(or)

As a shell can also take commands as input from file, we can write these commands in a file and can execute them in shell to avoid this repetitive work. These files are called Shell Scripts

Each shell script is saved with `.sh` file extension e.g., myscript.sh.

21. Name the first process that is started by the kernel in Linux and what is its process id?

The first process started by the kernel in Linux is “init” and its process id is 1.

22. what is load Average?

Ans: Load average, as the name suggests, is the average system load on Linux servers being calculated over a given period of time. The load average of Linux servers can be found using “top” and “uptime” commands. It is simply used to keep track of system resources. It is represented by a decimal number starting at 0.00.

23. What is INODE and Process Id?

INODE: It is a unique name given to each file by OS. Each inode has a unique inode number within a file system. It stores various information about files in Linux such as ownership, file size, file type, access mode, number of links, etc.

PID(process Id): The PID is a unique number assigned to each process when it is created and is used to identify the process in the operating system.

24. What is the difference between a process and a thread?

Process	Thread
Creation time is higher	Creation time is lesser.
t is independent because it does not share memory.	It depends on other threads because they share some memory with other threads.
Resource use is higher	Requires lesser resources
The termination time is higher	The termination time is less.

25. How do you secure a Linux Server?

Ans: There are multiple methods to secure the Linux server and protect it from data breaches, security threats, and unauthorized access. Here are some of these methods:

- Create a strong password
- Update the server and apply security patches.
- Disable all unused network services.
- Create regular backups.

26. What do you understand about the standard streams?

Ans: Output and input in Linux OS are divided into three standard streams:

- Stdin (standard input)

- stdout(standard output)
- stderr (standard error)

27. How do you list all the processes running in Linux?

Ans: You can list the currently running process in Linux through various commands such as:

ps Command:

The ps command displays brief information about the running processes. You can use the ps -f or ps -f command because the -f option shows the full-format result, and the -e option displays all processes. Moreover, you can use the ps auxf command to get a detailed list of processes.

top and htop Command:

The top command displays the real-time details about the system process and the complete resource usage.

The htop command is the improved version of the top command because it displays the color-coded list with additional features such as sorting, filtering, sorting, etc.

28. What is the chmod command in Linux, and how do you use it?

Ans: You can use the chmod command to change the file permissions of the directories. It offers a simple way to control the read and write permissions. For instance, if you want to change the permission of the ABC.sh script and give it the write and executable permission, you can run the below command:

```
chmod u+wx ABC.sh
```

29. How do you check disk space usage?

- **du** shows the disk usage of files, folders, etc. in the default kilobyte size
- **du -h** shows disk usage in human-readable format for all directories and subdirectories
- **du -a** shows disk usage for all files
- **du -s** provides total disk space used by a particular file or directory