### **Ques-1 What is the GNU project?**

The GNU Project was launched in 1984 to develop a complete UNIX-like operating system which is free software: the GNU system. The GNU project is a mass collaborative initiative for the development of free software. Variants of the GNU operating system, which use the kernel called Linux, are now widely used; though these systems are often referred to as “Linux”, they are more accurately called GNU/Linux systems.

### **Ques-2 Difference between Unix & linux**

**Linux**

Linux is an open source multi-tasking, multi-user operating system. It was initially developed by Linus Torvalds in 1991. Linux OS is widely used in desktops.

**Unix**

Unix is a multitasking, multi-user operating system but is not free to use and is not open source. It was developed in 1969 by Ken Thompson team at AT&T Bell Labs. It is widely used on servers, workstations etc.

Following are the important differences between Linux and Unix.

| **Sr. No.** | **Key** | **Linux** | **Unix** |
| --- | --- | --- | --- |
| 1 | Development | Linux is open source and is developed by the Linux community of developers. | Unix was developed by AT&T Bell labs and is not open source. |
| 2 | Cost | Linux is free to use. | Unix is a licensed OS. |
| 3 | Usage | Linux is used in wide varieties from desktop, servers, smartphones to mainframes. | Unix is mostly used on servers, workstations or PCs. |
| 4 | Default Shell | Bash (Bourne Again SHell) is the default shell for Linux. | Bourne Shell is the default shell for Unix. |
| 5 | Example | Ubuntu, Debian GNU, Arch Linux, etc. | SunOS, Solaris, SCO UNIX, AIX, HP/UX, ULTRIX etc. |
| 6 | File system support | Linux supports more file systems than Unix. | It also supports file systems but less than Linux. |
| 7 | Operating system | Linux is just the kernel. | Unix is a complete package of Operating systems. |

### **Ques-3 Another firmware than BIOS**

A computer or motherboard is nothing without the firmware (BIOS). Whenever you start your computer the first thing that starts your computer is BIOS.

#### **1. Legacy BIOS**

Legacy BIOS is a type of firmware that was used in computers with older motherboards. This firmware used to serve all the functions a firmware should serve but it faced some limitations.

Some of the limitations of Legacy Bios are as follows:-

1. Legacy BIOS contents were stored in Read-Only Memory (ROMs) so you could not rewrite it without removing the chip from the motherboard.
2. Legacy BIOS takes slower boot time.
3. Legacy BIOS fails to recognize drives larger than 2TB and has an all-text menu setup program.

All these points are the reason why Legacy BIOS is being replaced by another type of motherboard firmware that is UEFI.

### **2. UEFI (Unified Extensible Firmware Interface)**

The UEFI replaced the legacy BIOS due to the limitations legacy BIOS had, any modern computer motherboard has UEFI.

UEFI gave many reasons to use it as motherboard firmware. Some of the reasons are as follow:-

1. UEFI is programmed with C language and has the ability to use large disks partitions of about 2TB due to the use of the modern GUID Partition Table (GPT) technique
2. UEFI features Backward and forward compatibility
3. UEFI has a flexible pre-OS environment, GUI setup, and network capabilities.

These are a few of the reasons why UEFI has replaced Legacy BIOS.

Although everything has pros and cons, it too has some cons like UEFI has limited compatibility because it only supports 64-bit systems and not 32-bit systems. Unified Extensible Firmware Interface (UEFI) has certain advantages over BIOS. For instance, it helps ensure that your PC boots using only software that is trusted by the PC manufacturer, i.e., it supports a feature called ‘Secure Boot’ to improve security.

### **Ques-4 What is UEFI? Difference between BIOS & UEFI?**

UEFI stands for Unified Extensible Firmware Interface. It does the same job as a BIOS, but with one basic difference: it stores all data about initialization and startup in an .efi file, instead of storing it on the firmware.This .efi file is stored on a special partition called EFI System Partition (ESP) on the hard disk. This ESP partition also contains the bootloader.

UEFI was designed to overcome many limitations of the old BIOS, including:

1. UEFI supports drive sizes upto 9 zettabytes, whereas BIOS only supports 2.2 terabytes.
2. UEFI provides faster boot time.
3. UEFI has discrete driver support, while BIOS has drive support stored in its ROM, so updating BIOS firmware is a bit difficult.
4. UEFI offers security like "Secure Boot", which prevents the computer from booting from unauthorized/unsigned applications.
5. UEFI runs in 32bit or 64bit mode, whereas BIOS runs in 16bit mode. So UEFI is able to provide a GUI (navigation with mouse) as opposed to BIOS which allows navigation only using the keyboard.

**Ques-5 When should I go for Ubuntu & when for other systems?**

Ubuntu belongs to the Linux family of the Operating system. It was developed by Canonical Ltd. and is available for free for personal and professional support. The first edition of Ubuntu was launched for Desktops. The later editions were meant for Server and Core which is used for the Internet of Things and Robots.Ubuntu is known to provide an extremely user-friendly environment. The latest version of Ubuntu is Ubuntu 20.04.2 .

### **Advantages**

* It is available free of cost for both personal and professional use.
* The process of setting up in Ubuntu, especially for the purpose of testing, is easy.
* Ubuntu provides an easy user interface.
* Most of the time, the users can avoid the hassle of installing drivers with this Operating System.
* When the Ubuntu Operating System needs to be updated, the users do not need to restart the machine as the updates can easily run in the background. This in turn makes Ubuntu a preferred choice for services like Server.

**What Is Windows**

Windows is a popular Operating system owned and launched by Microsoft in the year 1985. There has been a lot of improvisation done on Windows as an Operating system and finally, its popularity can be ascertained from the fact that most of the computers for personal use have Windows as the Operating system.This Operating system provides a smooth and compatible environment for running a variety of applications and software. It also has robust flexibility and high hardware versatility. The latest version of Windows is Windows 10 however, Windows 7 and Windows Pro have been the most successful versions.

**Advantages**

* Windows provides a smooth, easy, and user-friendly interface.
* Windows is known for its compatibility as an Operating System and is capable of supporting most applications.
* In case a user encounters an error on Windows, the error details are not completely seen to the user. If a user is not technically sound, the error will still be understood, unlike other Operating systems where the error details seem strange to the user if they are not well versed with those words and error codes.
* The installation process of the Windows Operating System is simple and easy to follow.

| Points of Comparison | Windows | Ubuntu |
| --- | --- | --- |
| Company | Microsoft | Canonical Ltd |
| Price | Licensed | Free |
| Operating system | Windows NT | Linux |
| Latest version | Windows 10 | Ubuntu 20.04.2 |
| Security | Virus attack is common. Antivirus needs to be updated frequently. | In built Antivirus |
| Microsoft Office | Works well in Windows. | Does not work very well in Ubuntu. |
| Gaming Supported | Yes | Not meant for games. |
| Performance standard | Medium | High. Better than Windows. |
| User friendly | Extremely user friendly. Can be learnt quickly. | Not easy to learn. |
| Ease of Operation | Mouse and Keyboard needed. | Only keyboard is needed. |
| Browsing Experience | Good | Faster than Windows. |
| Suitability for developers | No | Preferred choice by Developers. |
| Installation of Updates and Restarting machine | YES | Machine does not need restarting. Updates can run in the background. |

### 

### **Ques-6 Various operating systems & their uses ??**

### What Is an Operating System (OS)?

### Operating systems contain and manage all the programs and applications that a computer or mobile device is able to run, which means managing the device’s software and hardware functions. The functions of an OS include:

* Booting: Booting is the process of turning on the computer and powering up the system.
* Memory management: This feature controls and coordinates the computer applications while allocating space for programs.
* Loading and execution: Your OS will load, or start up, a program and then execute the program so that it opens and runs.
* Data security: A good OS includes features that keep your data safe and computer programs secure. Security features are set up to keep unwanted cyberattackers at bay.
* Disk management: This manages all the drives installed in a computer, including hard drives, optical disk drives, and flash drives. Disk management can also be used to divide disks, format drives, and more.
* Process management: Your OS is designed to allocate resources to different computer processes, enable the processes to share information, protect them, and synchronize them.
* Device controlling: Your OS will allow you to open or block access to devices like removable devices, CD/DVDs, data transfer devices, USBs, and more.
* Printing controlling: As an extension of device controlling, your OS takes control of the printers that are connected to the computer, and the materials that need to be printed. p
* User interface: Also referred to as a UI, this is the part of the OS that allows a user to enter and receive information. This can be done with typed commands, code, and other formats.

There are five main types of operating systems.

#### **Microsoft Windows**

The Windows OS has been around since the 1980s and has had several versions and updates. Microsoft Windows is one of the popular operating system types and is preloaded on most new PC hardware. With each new Windows update or release, Microsoft continues to work on improving their users’ experience, hardware, and software, making Windows more accessible and easier to use.

Microsoft Windows contains a control panel, a desktop and desktop assistant, disk cleanup, event viewer, and more. Many users prefer Microsoft Windows because they say it’s compatible with many other kinds of software. Many kinds of computer programs run best on Microsoft Windows because they’re developed by Microsoft.

#### **Apple macOS**

Head-to-head in the competition with Microsoft Windows is Apple’s macOS. macOS and Windows are both examples of proprietary operating systems, meaning that the company conceptualized, designed, developed, and now sells their own OS. They’re designed and sold by the companies and aren’t meant to be tampered with or tweaked by users. Apple and Macintosh computers run on the proprietary macOS and OS X system, the first of which launched 20 years ago.

The macOS and Apple/Mac products are also known and beloved by their users for ease of use and continually improving user experience. Fast processing speeds, a simple desktop interface, and a wide variety of helpful resources make users excited about macOS.

Google's Android OS.

The OS that companies including Google use to run its Android mobile smartphones and tablets is based on Linux distribution and other open source software. Android OS is the primary OS for Google mobile devices like smartphones and tablets. Android has gained increasing popularity since its release as an alternative to Apple’s iOS for smartphone users and is continuing to increase in popularity with new updates and exciting features.

#### Apple iOS.

Apple's iOS is another mobile operating system used exclusively for iPhones, some of the most popular mobile devices on the market. iOS integrations have regular updates, new expansions to software, and continually are offering new features for users even if they have older devices. Many users appreciate the unique user interface with touch gestures, and the ease of use that iOS offers. This operating system also allows other Apple devices to connect, giving users easy connections to other devices or people.

#### Linux Operating System.

Linux is different from Windows and Apple in that it’s not a proprietary software, but rather a family of open source systems. In other words, anyone can modify and distribute it. Linux may be the least known on this list, but it’s free and available in many different open source versions. Linux is popular because of its ease of customization and offers a variety of options to those who understand how to use it. If you know how to customize and work with operating systems, Linux is an ideal choice. And if this kind of coding and back-end work is interesting to you, it may be a good idea to purchase a Linux system and get started on manipulating it.

### **Ques-7 Various linux distributions**

### **1. Debian**

Debian is renowned for being a mother to popular Linux distributions such as Deepin, Ubuntu, and Mint which have provided solid performance, stability, and unparalleled user experience. Note that Debian 10.5 does not constitute a new version of Debian Buster and is only an update of Buster with the latest updates and added software applications. Also included are security fixes that address pre-existing security issues. If you have your Buster system, there’s no need to discard it. Simply perform a system upgrade using the APT package manager.

### **2. Gentoo**

Gentoo is a distro built for professional use and experts who take into consideration what packages they are working with from the word go. This category includes developers, system & network administrators. As such, it’s not ideal for beginners in Linux. Gentoo comes recommended for those who want to have a deeper understanding of the ins and outs of the Linux operating system.

### **3. Ubuntu**

### Created and maintained by Canonical, Ubuntu is one of the most popular Linux distros enjoyed across the globe by beginners, intermediate users, and professionals alike. Ubuntu was specifically designed for beginners in Linux or those transitioning from mac and Windows.

### **4. Linux Mint**

Linux Mint is a hugely popular community-driven Linux distro based on Ubuntu. It has transcended time to provide one of the most elegant, and user-friendly distributions loved by desktop users and professionals alike. Despite the controversy surrounding the latest release – Mint 20 – dropping snap support by default, Mint remains a stable, powerful and outstanding Linux distribution.

### **5. Red Hat Enterprise Linux**

Abbreviated as RHEL, Red Hat Enterprise Linux is a Linux distro designed for Enterprise or commercial purposes. It’s one of the leading open-source alternatives to other proprietary systems such as Microsoft. Red Hat is usually a top choice for server environments given its stability and regular security patches which boost its overall security.

### **6. CentOS**

The CentOS Project is a community-driven free operating system that aims at delivering a robust and reliable open source ecosystem. Based on RHEL, CentOS is a perfect alternative to Red Hat Enterprise Linux since it is free to download and install. It gives users the stability and reliability of RHEL while allowing them to enjoy free security and feature updates. CentOS 8 is a favourite among Linux enthusiasts who want to savour the benefits of RHEL.

### **7. Fedora**

Fedora has enjoyed a reputation for being one of the most user-friendly distros for quite a while now owing to its simplicity and out-of-the-box applications which enable newcomers to easily get started.

It’s a powerful and flexible operating system that’s tailored for desktops & laptops, servers, and even for IoT ecosystems. Fedora, just like CentOS, is based on Red Hat and is in fact, a testing environment for Red Hat before transitioning to the Enterprise phase. As such, it’s usually used for development and learning purposes and comes in handy for developers and students.

### **8. Kali Linux**

Developed and maintained by offensive security, Kali Linux is a Debian-based Linux distro designed for penetration testing and conducting digital forensics. It ships with out-of-the-box tools meant for penetration testing such as Nmap, Metasploit Framework, Maltego, and Aircrack-ng to mention a few.

### **9. Arch Linux**

Arch Linux is a lightweight and flexible geeky Linux distro designed for advanced users or Linux experts who care much about what is installed and the services running. It gives users the freedom to custom or configure the system to their preference. In a nutshell, Arch is meant for users who really know the ins and outs of working with Linux.

### **10. OpenSUSE**

The OpenSUSE project is a modern and comprehensive community project that provides 2 main SUSE branches: SUSE Leap which is a point release that targets desktop users as well as enterprise development and for testing purposes. This makes it a perfect choice for open source developers and System administrators.

**Ques-8 What are Getty commands and Uname commands?**

**Ans -** Getty command - The getty command sets and manages terminal lines and ports. The

Getty command is run by the help of init command. This command is linked to the terminal

State manager program. The terminal state manager Program provide combined terminal

control and logic structure.

Syntax:

agetty [options] port [baud\_rate...] [term]

Arguments:

* port: It is a pathname relative to the */dev* directory.
* baud\_rate… : It is a comma-separated list of one or more baud rates. It should be specified in the descending order.
* term: It is the value to be used for the TERM environment variable.

Options:

* -8: Assume 8-bit tty.
* -a, –autologin: Automatic login for the specified user.
* -c, –noreset: Do not reset control mode.
* -E, –remote: Typically the login (1) command is given a remote hostname when called by something such as telnetd(8).
* -I, –noissue: Do not display the issue file.
* -J –noclear: Do not clear the screen before prompt.
* -m, –extract-baud: Use extract baud rate during connection.
* -n , –skip-login: Do not prompt for login.
* -p, –login-pause: Wait for the user to press any key before the login prompt.
* -s, –keep-baud: Try to keep the previously used baud rate.
* -t, –timeout: It will terminate the login session if no user name can be read within *timeout* seconds.
* -U, –detect-case: This is used to turn on the support for detecting uppercase-only terminals.

**Uname Command-**  Uname Command is used for displaying the information

about this system

SYNTAX- uname [option]

OPTIONS-

* -a It prints all the system information in the following order:

*Kernel name, network node hostname, kernel release*

*date, kernel version, machine hardware name, hardware*

*platform, operating system*

*Syntax:*$uname -a

* -s It prints the kernel name.

Syntax:$uname -s

* -n It prints the hostname of the network node (current computer).

Syntax:$uname -n

* -r It prints the kernel release date.

Syntax:$uname -r

* -v It prints the version of the current kernel.

Syntax:$uname -v

* -m It prints the machine hardware name.

Syntax:$uname -m

* -p It prints the type of the processor.

Syntax:$uname -p

* -i It prints the platform of the hardware.

Syntax:$uname -i

* -o It prints the name of the operating system.

Syntax:$uname -o

### **Ques- 9 What are the System Integrity checks** **?**

The system integrity check performed by BIOS is called POST(Power On Self Test).

This is a very brief test on CPU, memory and storage devices to verify that the system is in a boot-able state.

### **Ques- 10 What does five mean in systemd.unit(5)?**

Here in the braces the digit denotes the manual page which consists of 8 sections.

| S NO | Description |
| --- | --- |
| 1 | General Commands |
| 2 | System Calls |
| 3 | Library functions, covering in particular the C standard library |
| 4 | Special files (usually devices, those found in /dev) and drivers |
| 5 | File formats and conventions |
| 6 | Games and screensavers |
| 7 | Miscellanea |
| 8 | System administration commands and daemons |