Differences between operating systems - Linux, Windows, Mac OS

LINUX

The Linux OS is an open source operating system project that is a freely distributed, cross-platform operating system developed based on UNIX. This operating system is developed by Linus Torvalds. It is basically the system software on a computer that allows apps and users to perform some specific task on the computer. The development of Linux operating systems pioneered open source development and became the symbol of software collaboration.

Features:

- Linux is free and can be downloaded from the Internet or redistribute it under GNU licenses and has the best community support.
- Linux OS is easily portable which means it can be installed on various types of devices like mobile, tablet computers, SoCs, IoT devices and many more.
- It is a multi-user, multitasking operating system.
- BASH is the Linux interpreter program which can be used to execute commands.

- Linux provides multiple levels of file structures i.e. hierarchical structure in which all the files required by the system and those that are created by the user are arranged.
- Linux provides user security using authentication features and also threat detection and solution is very fast because Linux is mainly community driven.

Drawbacks:

- There's no standard edition of Linux hence confusing for users and also becoming familiar with Linux may be a problem for new users.
- More difficult to find applications to support user needs since Linux does not dominate the market.
- Since some applications are developed specifically for Windows and Mac, those might not be compatible with linux and sometimes users might not have much of a choice to choose between different applications like in Windows or Mac since most apps are developed for operating systems that have a huge user base.
- Some hardware may not be incompatible with Linux since it has patchier support for drivers which may result in malfunction.
- There are plenty of forums to resolve Linux issues, but it may not always match the user's own level of technical understanding.

Windows

Windows is an operating system designed by Microsoft to be used on a standard x86 Intel and AMD processors. It provides an interface, known as a graphical user interface(GUI) which eliminates the need to memorize commands for the command line by using a mouse to navigate through menus, dialog boxes, buttons, tabs, and icons. The operating system was named windows since the programs are displayed in the shape of a square. This Windows operating system has been designed for both a novice user just using at home as well as for professionals who are into development.

Features:

- It is designed to run on any standard x86 Intel and AMD hence most of the hardware vendors make drivers for windows like Dell, HP, etc.
- It supports enhanced performance by utilizing multi-core processors.
- It comes preloaded with many productivity tools which helps to complete all types of everyday tasks on your computer.
- Windows has a very large user base so there is a much larger selection of available software programs, utilities.

- Windows is backward compatible meaning old programs can run on newer versions.
- Hardware is automatically detected eliminating the need of manually installing any device drivers.

Drawbacks:

- Windows can be expensive since the OS is a paid license and majority of its applications are paid products.
- Windows has high computer resource requirements like it should have high ram capacity, a lot of hard drive space and a good graphics card.
- Windows slows and hangs up if the user loads up many programs at the same time.
- Windows includes network sharing that can be useful if the user has a network with many PCs.
- Windows is vulnerable to virus attacks since it has a huge user base and users have to update OS to keep up-to-date with security patches.

MacOS

MacOS is the computer operating system for Apple Computer's MacIntosh line of personal computers and workstations. A popular feature of its latest version, Mac OS X , is a desktop interface with some 3-D appearance characteristics. OS X has a modular design intended to make it easier to add new features to the operating system in the future. It runs UNIX applications as well as older Mac applications.

Features:

- MacOS Comes with useful free productivity apps such as Pages, Numbers, and Keynote that are free unlike the Microsoft Office Suite apps that are generally sold separately.
- The operating system has a feature for running multiple workspaces that are similar to opening numerous desktops or home screens.
- MacOS has the advantage of having a user interface that is simpler and more upfront.

- Compatibility with other Apple devices and services - files or data are synchronized across devices due to dedicated and free cloud services from Apple.
- Less susceptibility to malware and security issues
- Optimized software and hardware due to better integration - third-party hardware components are selected based on established criteria while third-party apps undergo tests and verifications for compatibility and security.

Drawbacks:

- Limited and restricted availability of apps - Windows enjoys a huge selection of apps from different categories and it also has a broader selection of games whereas MacmacOS has limited game titles.
- Inflexibility for hardware upgrades and customization - for instance, the CPU or RAM of a MacBook laptop or iMac desktop cannot be replaced easily because these components are deeply integrated with the entire hardware system.
- It can be very expensive to own a MacOS device.

Difference between Linux and Windows

S.NO	LINUX	WINDOWS
1.	Linux is a open source operating system.	While windows are the not the open source operating system.
2.	Linux is free of cost.	While it is costly.
3.	It's file name case-sensitive.	While it's file name is case-insensitive.
4.	In linux, monolithic kernel is used.	While in this, micro kernel is used.
5.	Linux is more efficient in comparison of windows.	While windows are less efficient.
6.	There is forward slash is used for Separating the directories.	While there is back slash is used for Separating the directories.
7.	Linux provides more security than windows.	While it provides less security than linux.
8.	Linux is widely used in hacking purpose based systems.	While windows does not provide much efficiency in hacking.

Difference between Windows and MacOS

WINDOWS	MACOS
It was developed and is owned by **Microsoft Incorporation**.	It was developed and is owned by **Apple Incorporation**.
It was launched in 1985.	It was launched in 2001.
It is designed for PC of all companies.	It is specifically designed for Apple mac computers.
Current stable version is Windows 10.	Current stable version is mac 10.15.1 (Catalina).
It is for workstation, personal computers, media center, tablets and embedded systems.	Its target system type is workstation, personal computers and embedded systems.
Computer architectures supported by Windows are IA-32, x86-64, IA-64, ARM, Alpha, MIPS and PowerPC.	Computer architectures supported are x86-64(10.4.7-present), IA-32(10.4.4-10.6.8) and PowerPC(10.0-10.5.8).
File systems supported are NTFS, FAT, ISO 9660, UDF, HFS+, FATX and HFS.	File systems supported are HFS+, APFS, HFS, UFS, AFP, ISO 9660, FAT, UDF, NFS, SMBFS, NTFS, FTP, WebDAV and ZFS.
Kernel type is Hybrid with modules here.	Kernel type is Hybrid with modules here also.
Package management is MSI or custom installer.	Package management is macOS installer.
Update management is Windows Update.	Update management is Software Update.
The native APIs are Win32 and NT API.	The native APIs are Carbon, Cocoa, Java and BSD-POSIX.

Difference between Linux and MacOS

S.NO.	LINUX	MACOS
1.	It was developed by **Linus Torvalds**.	It was developed by **Apple Incorporation**.
2.	It was launched in 1991.	It was launched in 2001.
3.	Its target system types are embedded systems, mobile devices, personal computers, servers, mainframe computers and supercomputers.	Its target system types are workstation, personal computers and embedded systems.
4.	Computer architectures supported by Linux are IA-32, x86-64, ARM, PowerPC and SPARC.	Computer architectures supported by macOS are Ax86-64(10.4.7-present), IA-32(10.4.4-10.6.8) and PowerPC(10.0-10.5.8).
5.	Its kernel type is Monolithic.	Its kernel type is Hybrid with modules.
6.	Its native APIs are LINUX/POSIX.	Its native APIs are Carbon, Cocoa, Java and BSD-POSIX.
7.	It has preferred license of GNU GPLv2 (kernel).	It has the preferred license of Proprietary, APSL and GNU GPL.
8.	Its package management depends on the distribution.	Its package management is macOS installer.
9.	The non-native APIs supported through its subsystems are Mono, Java, Win16 and Win32.	The non-native APIs supported through its subsystems are Toolbox, Win16 and Win32.
10.	Its update management depends on the distribution.	Its update management is Software Update.
11.	File systems supported by Linux are ext2, ext3, ext4, btrfs, ReiserFS, FAT, ISO 9660, UDF and NFS.	File systems supported by macOS are HFS+, APFS, HFS, UFS, AFP, ISO 9660, FAT, UDF, NFS, SMBFS, NTFS, FTP, WebDAV and ZFS.