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Introduction.

An Operating System (OS) is an interface between a computer operator and computer hardware. It is a software which executes all the elementary tasks like process management, memory management, file management, networking, output and input handling, and monitoring peripheral devices like printers and disk drives. The OS is a written code that acts as a boundary between the computer operator and the computer hardware and controls the implementation of all varieties of programs. Operating systems comprise and manage the applications and programs that a portable device or computer is able to execute, meaning handling the device's hardware and software roles. The operating system is an important element of the system software in a computer.

The figure below, *Figure 1,* shows how a user interact with installed applications.
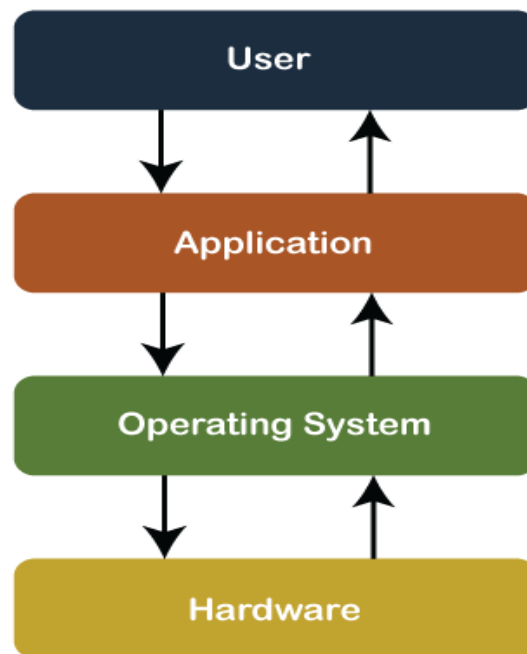
Dissimilar operating systems operate on different types of hardware and are coded for different kinds of applications. There are many types of operating systems out there but only five are common OS. These five operating systems types are probable what run any computer, phone or other portable devices such as a tablet. They are Microsoft Windows OS, Apple iOS, Google's Android OS, Apple macOS and Linux Operating System.

Literature Review.

The First Generation

The original electronic computer was made in 1940 and had no operating system. The operators had complete access to the computer and used to write a program for each job in total machine language. This condition caused even the easiest programs to be very complicated.

The Second Generation

The first OS was developed in the 1950s and was branded as GMOS. General Motors has created OS for the IBM computer. This operating system was created on a solo stream batch processing system because it assembles all alike tasks in batches or groups then sends the tasks to the OS by means of a punch card to process all tasks in the machine. Electronic computers only executed one program at a time.

The Third Generation

Operating system creators were able to create a new operating system that could concurrently perform numerous jobs in a solo computer program called multiprogramming during the late 1960s. The development of multiprogramming has a very significant role in creating operating systems that allow a processor to be active always by executing different jobs on a computer simultaneously.

The Fourth Generation

This generation of operating systems is connected to the creation of the personal computer (PC). Nevertheless, the personal computer is identical to the minicomputers that were created in the third generation. PCs were very expensive at that time. A main factor linked to making personal computers was the arrival of Microsoft and the Windows operating system. Microsoft developed the first windows operating system in the 1970s. The first version of the Unix operating system was created in the late 1960s. Apple is another common operating system created in the 1980s.

Types of Operating System.

Batch Operating System

Batch processing was common in the 1970s. The operators of a batch OS did not interact with the CPU straight. In this practice, similar forms of tasks were batched together and ran in time. In Batch OS, access is given to more than one user, they submit their tasks to the system for the implementation.

The system put all of the tasks in a line on the basis of first come first serve and then runs the tasks one by one. The users gather their output when all the tasks get completed.

Multiprogramming Operating System

Multiprogramming is just an extension of batch processing whereby the microprocessor is continuously kept busy. Each process requires two forms of system time, the processor time and the IO time. In a multiprogramming situation, when a process does its I/O, the microprocessor can start running other processes thus improving the productivity of the system.

Network Operating System

Network Operating System is an OS which contains software and related protocols to communicate with other computers through a network cost-effectively and conveniently. This operating system is installed on a server and offers the server the ability to manage groups, data, operators, security, applications and other networking roles. It is used to let shared file and printer access between several computers in a network. Examples of network OS include Microsoft Windows Server 2012 R2, Microsoft Windows Server 2016, Linux, UNIX and Mac OS X.

Real Time Operating System

A real-time operating system is well-defined as a data processing system in which the time interval needed to process and reply to inputs is very small that it controls the situation. The time taken by the system to reply to an input and display of needed updated data is labelled as the response time. In this technique, the response period is very less as equated to online processing.

Real-time operating systems are used when there are inflexible time requirements on the procedure of a processor or the movement of information and real-time operating systems may be used as a controller in a dedicated application. A real-time OS must have exact, fixed time limitations, else the system will flop. Examples may include medical imaging systems, scientific experiments, weapon systems, industrial control systems, air traffic control systems, robots etc.

Distributed Operating System

The Distributed Operating system is not run on a solo computer, it is separated into chunks, and these chunks are installed on different computers. Distributed Operating system use several CPUs to serve many real-time numerous users and applications. A portion of the distributed Operating system is loaded on each computer so that they can communicate. Distributed Operating systems are very complex, sophisticated and huge than Network operating systems since they also have to take care of changing networking rules.

Functions Of An Operating System.

Memory Management

This refers to administration of Main Memory or Primary Memory. Main memory is a huge collection of bytes or words where each byte or word has a unique address.

For a program to run, it must in the primary memory. An OS executes the following actions for memory management:

➢ Retains tracks of main memory
➢ Chooses which process will get how much memory and when in multiprogramming.
➢ Assigns the memory when a process asks it to do so.
➢ Releases the memory whenever a process has been finished or no longer wants it.

Processor Management

The OS chooses which process uses the processor for how long and when in multiprogramming situation. This role is called process scheduling. It does the following events for processor management:

➢ Saves trails of processor and state of process. The program accountable for this job is called traffic controller.
➢ Assigns the CPU to a process.
➢ Returns processor once a process is no longer needed.

Device Management

An Operating System administers device communication through their individual drivers. The OS does the following actions for device management:

➢ Retains trails of all connected devices. Program accountable for this job is called the Input/Output (I/O) controller.
➢ Elects which process uses the device for how long and when.
➢ Assigns the device in the effective way.
➢ Releases devices.

File Management

A file system is generally prepared into directories for relaxed usage and navigation. These directories might encompass files and further directories. The OS executes the following actions for file management:

➢ Saves trail of data, position, status, uses etc. The joint services are called file system.
➢ Chooses who gets the resources.
➢ Assigns the resources.
➢ Releases the resources.

Other Important OS Functions include the following:

➢ *Security* − It stops illegal admission to data and programs by means of password and alike other methods.
➢ *Control over system performance* − Records delays between request for a service and system's response.
➢ *Job accounting* − Retaining track of resources and time used by various tasks and operators.
➢ *Error detecting aid* − Creation of traces, dumps, error messages, error detecting aids and debugging.
➢ *Coordination between users and other software* − Assignment and coordination of compilers, assemblers, interpreters and other software to the several operators of the computer systems.

Best Operating Systems.

Examples of OSs include Microsoft Windows OS, Google's Android OS, Apple macOS, Linux Operating System and Apple iOS. Apple macOS is runs on Apple computers like the Apple Macbook Pro, Apple Macbook and Apple Macbook Air. Microsoft Windows OS is found on many personal computer platforms from makes like HP, Dell and Microsoft

itself. Linux is an open-source operating system that can be altered by users, not like those from Microsoft or Apple.

Microsoft Windows Operating System

This is an operating system that was created by Microsoft Cooperation. It is one of the most familiar operating systems globally for office and home computers. Microsoft Windows OS is a proprietary operating system, which means that the company theorized, designed, established and now sells this OS. It uses a graphical user interface (GUI). It allows users to watch videos, save information, execute applications, connect to the Internet and play games. The original version of Microsoft Windows is version 1.0 and was release in the early 1980s. Microsoft Windows is presented in numerous flavors, including Windows XP, Vista, Windows 95, Windows 7, 8, 10, 11, and 12. Efforts to use varieties of the Windows OS for smartphones have remained less fruitful even though some tablets use Windows 10.

Apple macOS.

One-on-one in the race with Microsoft Windows is the Apple's macOS. macOS is also a proprietary operating system. It is not intended to be tweaked or altered by users. Macintosh and Apple computers run on the proprietary macOS and OS X system. The original of which was announced about 20 years ago. The Apple/Mac and macOS products are also recognized and adored by their operators for effortlessness of use and constantly improving user experience. A simple desktop interface, fast processing speeds and a variety of supportive resources make operators thrilled about macOS. Numerous users enjoy the instantaneous connection with their mobile phone hardware and computers, and appreciate the absence of hackers and bugs that Apple operating systems are known for.

Linux Operating System.

Linux operating system was built by Finnish programmer Linus Torvalds in the early 1990s. Linux is unlike Apple and Windows in that it is not a proprietary software but an open-source operating system. This means anyone can alter and distribute it. Linux is

free and existing in numerous different open-source versions. Linux is popular since it is customizable and offers a variety of choices to those who know how to use it. A preferred of numerous programmers, Linux is broadly used on commercial and scientific servers, plus cloud computing surroundings. Linux is a perfect choice if you know how to tailor and work with operating systems.

Android Operating System.

Android is a Linux-based operating system that is primarily intended for several portable devices like tablets and smartphones. The operating system has advanced excellently from black and white phones to current smartphones and minicomputers. Android OS is currently one of the popular mobile OSs. The operating system that firms including Google use to run its Android portable smartphones and tablets is created on Linux distribution plus other open-source software program. Android has expanded growing fame since its release as an alternative to Apple's iOS for smartphone operators and is ongoing to rise in fame with new updates and thrilling features. Android 1.0 which was released in 2008 is the original version of the Android development kit and the up-to-date version is Android 12.0.

Conclusion.

As technology continues to develop and as newer generations grow up with technology and enter the workforce, the requirement for technology in professional settings will also grow. Newer generations are driving the applications and features that operating systems offer for business and personal use. The development of operating systems has come to the lead of security. An amplified level of fears that exist when sending information over networks, particularly over public ones, like the Internet. Several current operating systems have sophisticated data defense tools based on data encryption, authorization and authentication.

The ease of interactive work with a computer is regularly being upgraded by integrating advanced graphical interfaces into the operating system that use video and sound along with graphics. The user interface of the operating system is becoming extra intelligent,

guiding human actions in typical conditions and taking routine choices for it. Current OSs contain virtualization tools that permit users to run applications for other platforms in secluded virtual machines into which other OSs can be installed. Provision for cloud computing is an entirely new tendency in the development of the operating system.

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