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Operating System

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Abstract

Operating system in general is a mediator between the user and the Computer and the physical components of the computer automated. The function of operating system is to enable the user to use all the capacity available in the physical components with high efficiency. The other function is to make the Computer comfortable and easy to use. It can be considered as operating systems like government as it provides the environment that can be for all companies and organizations that operate in accordance with the laws and can be considered as these companies are programs and applications.

1.1 Introduction

It is known that the computer is an electronic device capable of receiving and processing of data and then store them or show them to the user in another way. In order to do these operations, there are devices that help him on that. Which is essentially the Processor, Memory, Hard Drive, Keyboard, and Mouse. Which together form what is known as the physical components of a computer hardware.

However, the multiplicity of these components and the difficulty of dealing directly with them, necessitated finding able to control the various elements of these programs and to facilitate the use of commonly used right. The solution was with special software called: operating systems.

1.2 Operating system

Operating system is the first program you see when a computer running and the last program you see when you close it, it is a set of programs responsible to manage the several of physical resources of the device. Operating system is a mediator between the user, hardware, and applications. Role of operating system here is similar to the role of interpreter for two people do not understand one other languages, and by providing user-friendly interface for the user being able to overcome the various physical complications of the device.

The operating system is doing two things:

- Physical entity management (Hardware), and moral (Programs) computer systems.

- The link between applications and equipment without having to know every detail.

1.3 The objectives of the operating system

• Facilitate communication between the user and the computer, through:

1- Operating system provides assistant programs, such as text editors programs.

2- The operating system identifying ways to implement processes and priorities.

3- Connect the subsidiary organs of the computer with a CPU operating.

4- Provide protection for entities and information stored on the computer.

5- Provide device with correction and Explorers errors.

• Computer Resource Management:

1- Measure the accuracy of the execution of orders.

2- The device implementation of the order of operations (processor).

3- Provide the necessary resources to carry out operations.

4- Find a storage area and find a suitable place on the memory for the exchange of information required to perform the task and the provision of processor time to perform this task.

• The opportunity to implement more of the task at once.

• Provide the possibility of participating on one device from multiple users.

• Maximize the benefit of available resources within the device.

1.4 The components of the operating system

• Operating nucleus

The most important part of the operating system is called the heart of the operating system, also called the Executive Director of the operating system.

The following tasks:

1- Movement between programs process during operation.

2- Control in the physical components of a computer.

3- Control software.

4- Management and coordination of operations.

5- Implementation of the order of operations and provide the necessary requirements to implement them.

6- Linkage between operations and places of storage results.

7- Ensure the completion of operations and identify signs of the end of each process.

• bootloader: It is a system operator, which connects directly with the ROM and adjusts its program which the BIOS, and loads the kernel on the RAM.

• Libraries: It is a language libraries and translators which the compilers.

• Command interpreter: It is a translator requests the user to machine language.

• Director of Operations.

• Prioritization coordinator.

• File manager.

• Memory Manager.

2.1 Basic functions of an operating system

Definition

An operating system is a group of computer programs that coordinates all the activities among computer hardware devices. It is the first program loaded into the computer by a boot program and remains in memory at all times.

Functions of an operating system

The basic functions of an operating system are:

a) Booting the computer.
b) Performs basic computer tasks.
c) Provides a user interface.
d) Handles system resources.
e) Provides file management.

Booting the computer

The process of starting or restarting the computer is known as booting. A cold boot is when you turn on a computer that has been turned off completely. A warm boot is the process of using the operating system to restart the computer.

Performs basic computer tasks

The operating system performs basic computer tasks, such as managing the various peripheral devices such as the mouse, keyboard and printers. For example, most operating systems now are plug and play which means a device such as a printer will automatically be detected and configured without any user intervention.

Provides a user interface

A user interacts with software through the user interface. The two main types of user interfaces are: command line and a graphical user interface (GUI). With a command line interface, the user interacts with the operating system by typing commands to perform specific tasks. An example of a command line interface is DOS (disk operating system). With a graphical user interface, the

user interacts with the operating system by using a mouse to access windows, icons, and menus. An example of a graphical user interface is Windows Vista or Windows 7.

The operating system is responsible for providing a consistent application program interface (API) which is important as it allows a software developer to write an application on one computer and know that it will run on another computer of the same type even if the amount of memory or amount of storage is different on the two machines.

Handles system resources

The operating system also handles system resources such as the computer's memory and sharing of the central processing unit (CPU) time by various applications or peripheral devices. Programs and input methods are constantly competing for the attention of the CPU and demand memory, storage and input/output bandwidth. The operating system ensures that each application gets the necessary resources it needs in order to maximize the functionality of the overall system.

Provides file management

The operating system also handles the organization and tracking of files and directories (folders) saved or retrieved from a computer disk. The file management system allows the user to perform such tasks as creating files and directories, renaming files, coping and moving files, and deleting files. The operating system keeps track of where files are located on the hard drive through the type of file system. The type two main types of file system are File Allocation table (FAT) or New Technology File system (NTFS).

Types of file system

- File Allocation table (FAT)
- New Technology file system (NTFS)

File Allocation table (FAT) uses the file allocation table which records, which clusters are used and unused and where files are located within the clusters.

NTFS is a file system introduced by Microsoft and it has a number of advantages over the previous file system, named FAT32 (File Allocation Table).

One major advantage of NTFS is that it includes features to improve reliability. For example, the new technology file system includes fault tolerance, which automatically repairs hard drive errors without displaying error messages. It also keeps detailed transaction logs, which tracks hard drive errors. This can help prevent hard disk failures and makes it possible to recover files if the hard drive does fail.

NTFS also allows permissions (such as read, write, and execute) to be set for individual directories and files.

2.2 How the operating system works

Definition

An operating system is the application that controls every aspect of a computer. The most common operating systems are Windows, UNIX and Macintosh. To put it simply, an operating system carries out two basic functions:

(1) It serves as a manger for the hardware and software resources held in the system.

(2) It deals with hardware without the applications having to know every aspect along the way.

The duties of the operating system fall into six different categories:

a. Processor management.
b. Memory management.
c. Device management.
d. Storage management.
e. Application interface.
f. User interface.

Processor Management

Processor management involves the certainty that all applications and processes get the appropriate amount of time from the processor so that it

can function properly. It also involves taking advantage of as many processor cycles as it possibly can to make everything work together properly. The operating system uses the process or thread of the processor to carry out these functions and it continuously switches between processes at the rate of thousands of processes per second.

Memory Management

Memory management is the process of ensuring that each process has the amount of memory needed to execute the task so that processes do not steal memory from each other. Another part of memory management is managing each type of memory so that it is used properly.

Device Management

Every piece of hardware uses a driver, a special program, to communicate with the system. The operating system uses the drivers as a translator between the electrical signals from the hardware and the programming code found in applications. The driver takes data from the operating system to the device and vice versa. The operating system controls this process by calling on the appropriate driver when it is needed.

Application Program Interface

Just like hardware has drivers, applications have application program interfaces (APIs). APIs allow the programmers to use parts of the operating system and computer to carry out certain functions. The operating system holds all of the APIs that are recognizable to the computer and plays the role of interpreter for the APIs. It then sends the data required so that the function is carried out.

User Interface

The user interface aspect of the operating system manages the interaction between the user and computer. Many operating systems use graphical user interfaces, which mean that it uses images and icons to communicate with the user. The operating system once again plays the role of interpreter to communicate with both the user and the computer in languages that they both understand.

3.1 Type of operating system

There is two type operating systems:

> 1- The ability to run more than one Task to the user at the same time.
>
> 2- The ability to allow more than one User to work on the machine at the same time.

And their two types of them:

In the Task Section there is:

1- Multi Task
2- Single Task

In the User Section there is:

1- Multi User
2- Single User

And by that you can define four types of operating systems:

1- Multi User Multi Task
2- Multi User Single Task
3- Single User Multi Task
4- Single User Single Task

Multi User Multi Task System

Allows different users to use computer resources in that one with a management system for the confiscation of even the ensures that the impact of any other user so that each user interacts with the computer through the console especially examples of this system

Examples

- Uinux
- VMS

Multi User Single Task System

Allows more than one user that each one performs a program at one time so that provides each user unit insert composed and directed from the keyboard and display screen communicate with the central computer and is also called the system time post system because time periods fixed gives users to use the processor

Examples

- Windows NT

Single User Multi Task System

This system does not allow more than one user to work on it It allows the user to run more than one application at the same time and switch between them as needed

Examples

- Windows
- Linux
- Mac

Single User Single Task System

This system does not allow the user to run more than one application at the same time if it needs to run another application to be settled with the previous application to be able to work on the next one

Examples

- Microsoft DOS

4.1 Examples of operating system

1- Windows

Windows is Microsoft's operating system that use GUI (graphical user interface).

Windows versions:

There are so many different version of windows depends on the bases

Such as DOS-based, Windows 9x and Windows NT-based.

A- DOS-based Systems

Windows 1.0

Windows 1.0 is the first operating system from Microsoft based on DOS-based was, released on November 20, 1985 that use the GUI .

Microsoft stopped developing this operating system after it released the newest version of windows. Look at Figure (1).
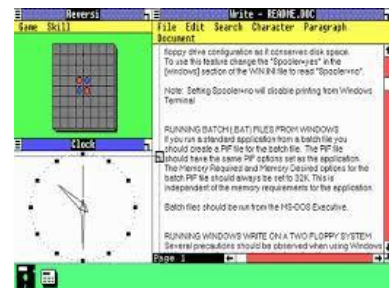

Figure (1)

Windows 2.0

Windows 2.0 released on December 9, 1987 it was faster, more stable than the previous version of windows. Look at Figure (2).
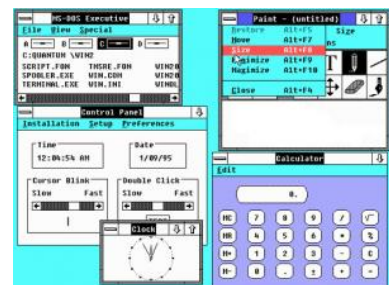

Figure (2)

Windows 3.0

Windows 3.0 is the last version of DOS-based Systems this version support 16 colors, has a great graphical interface it was faster than the previous versions. Look at Figure (3).
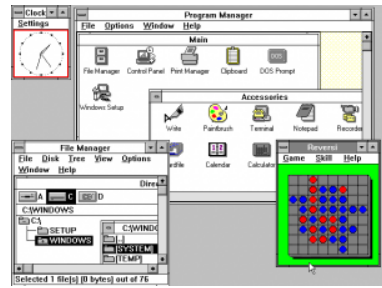

Figure (3)

B- Windows 9x Systems
Windows 95

Windows 95 was released on August 24, 1995 it was a huge sales success, this system has significant improvement compared with the old versions. It has most closely GUI with a simple Plug-n-Play with more colors and support TCP/IP. Look at Figure (4).
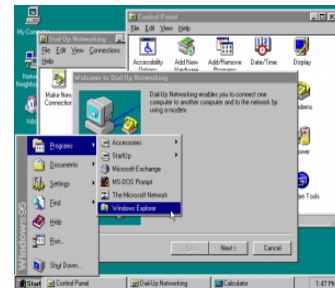

Figure (4)

Windows 98

Windows 98 was released on August 24, 1995 it has an improvement in speed and Plug-N-Play, support USP and it has (quick launch) Feature. Look at Figure (5).

Figure (5)

Windows ME

ME is the short form of Millennium Edition, it was the last operating system use the Windows 95 code base. It has new feature (system restore) but the overextended code made vulnerabilities to the operating system which make it unstable. Look at Figure (6).
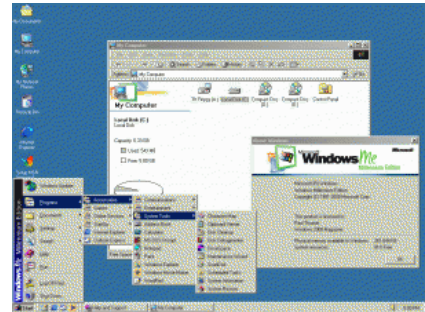

Figure (6)

C- Windows NT-based Systems

There are many operating systems that use Windows NT base and we will sort some of them.

Windows NT

Windows NT has many editions and Windows NT 3.1 was the first operating system of that series it was released on July 27, 1993. Look at Figure (7).

Figure (7)

Windows XP

Windows XP is another edition of windows NT it was released on August 24, 2001 .it support 64bit computing ,more stable, improved appearance also it came with DirectX which enabled 3D gaming. Look at Figure (8).

Figure (8)

Windows 7

Windows 7 was built on vista kernel. windows 7 had the appearance of vista with improved in start up and program speed. It was released to manufacturing on July 22, 2009, and became available to public on October 22, 2009. Look at Figure (9).

Figure (9)

Windows 10

Windows 10 is the latest version based on Windows NT it has the appearance of windows 8 but with improvement on the graphics and the speed of the system it was released on July 15, 2015. Look at Figure (10).

Figure (10)

2- UNIX

Is an operating system that originated in 1969 as an interactive time-sharing system. UNIX was invented by Ken Thompson and Dennis Ritchie.

3- Linux

Linux is an operating system designed with GUI to provide personal computer users for free or low cost first released was on 5 October 1991.

4- MAC OS X

Mac OS an operating system for Apple Computer's. The latest version of this operating system has an interface with some 3D appearance also, it has a modular design intended to make it easy for the user to add new features to the operating system.

Conclusion

In conclusion, Computers are devices that capable of processing the data and store it so the user can retrieve it any time. To control the computer you need an operating system to make a communication with the machine, there are many operating systems and each one has its advantages and disadvantages but they mainly serve the same purpose, which is providing an interface that helps the user to communicate and interact with the machine.

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