

A person is silhouetted against a sunset sky, standing on a mountain peak and looking out over a valley. The scene is framed by a white L-shaped border on the left and right sides. The title 'OPERATING SYSTEM' is centered in large white letters, underlined.

OPERATING SYSTEM

By Wahid

The better way to enjoy your world

Operating System

An Operating system (OS) is system that acts as an interface between the User and the computer Hardware. It is the “Resource manager” of the computer. Without an OS, a computer is just a box of metal and Silicon.

The primary function of an operation system is to provide an environment for the execution of user’s program.

■ The various function of operating system

1. Process Management
2. Main Memory management
3. Secondary Memory Management
4. File Management
5. I/O Management
6. Protection and security
7. Networking
8. Command Interpretation

Operating System

- Any computer system you use has an operating system. It user interact with the machine via the operating system. Operating system intermediates between the hardware and the user.
- Function of Operating system
- Process Management:- It is a process by which operating system can control the planning, monitoring and performance of a CPU. A process is the basic unit of execution in the operating system.
- A process is a running program . The life cycle of process is from the moment program start until it finishes.
- Core function in Process Management
 - **Scheduling:-** Decides which process used the CPU next using algorithms like Round robin or Priority Scheduling)
 - **Synchronization:-** Ensures orderly execution use locks, semaphores or monitors to prevent race sanitations
 - **Deadlock Handling Handing:-** Detects and prevents situation where processes wait forever for resources.
 - **Inter-Process Communication(IPC):-** Allows process to exchange data via shared memory

Operating System

■ Function of Operating system

■ **Memory Management:-** It is a process of controlling and coordinating computer memory. It ensures that all processes are able to access their memory or not. It track every byte of memory.

■ Key activities in Memory Management

- **Allocation and Deallocation:-** prevents processes from interfering with each other's memory.
- **Protection:-** Prevents processes from interring with each other's memory.
- **Virtual Memory:-** Uses disk space as extra memory to run large programs.
- **Fragmentation Handling:-** Reduces wasted space through compaction.
- **Disk Management:-** Handles file storage, free space, disk scheduling and backups.
- **Paging:-** Dividing memory into fixed-size blocks.

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■ Function of Operating system

■ **File System Management:-** It is the main function of operating system. It manages all data files in a computer system. File management is an operating system organizes and controls how data is stored, named, and accessed on storage devices, making it easy for users to find and use their files.

■ File System Management includes managing

○ **File Attributes:-** Name, type, size and permissions.

○ **File Type:-** Text, binary, and executable files.

○ **Operations:-** Create, read, write and delete files.

○ **Access Methods:-** Sequential, direct, and indexed for faster retrieval.

The librarian. Keeps track of information, location, uses, and status. FAT (File Allocation Table) older file system used by DOS/Windows 98.

NTFS (New Technology File System) Modern, secure file system used by Windows 10/11

Operating System

- Function of Operating system
- **Device Management:-** It is a process of managing the operation and maintenance of input/output devices. It also facilitates the interface between all the connected devices. Device managements in an operating system controls how the computer communicates with hardware devices to ensure smooth and efficient operation
- Major components in Device Management
- **Device Drivers:-** Interface between hardware and OS
- **Buffering and Caching:-** Temporarily store data to match device speeds and improve performance.
- **Spooling (Simultaneous Peripheral Operations On-line):-** Spooling manages data waiting to be processed, particularly in devices like printers. The OS place prints jobs in a spool (Temporary buffer Storage area), allowing the CPU to continue other tasks while the printer works through the queue

Operating System

■ Function of Operating system

- **Protection and Security:-** mechanisms in an OS are designed to safeguard system resources from unauthorized access or misuse. These mechanisms control which processes or users can access specific resources such as memory, file and CPU time. It ensures that only authorized users can perform specific actions.
- The OS protects system resources and user data from unauthorized access and attacks.
- Access Control Limits user and process permissions.
- Authentication verifies users through credentials
- Resources Protection prevents misuse of files, memory, or devices.
- Security Guards against malware, denial of services attacks, and data theft.

Additional Function Beyond core tasks like process and memory management, OS Focus on.

Performance Monitoring

Job Accounting

Error Detection

Types of Operating System

- An Operating System is a software that manages computer hardware and software resources. It acts as a bridge between users and the computer, ensuring smooth operation. Different types of OS serve different needs, Some of handle one task at a time others manage multiple user or real-time process.

The various types of operating system are:

1. Single User operating System
2. Multi User Operating System
3. Simple Batch processing Operating system
4. Multiprogramming Operating System
5. Multitasking Operating System
6. Parallel or Multiprocessing Operating System
7. Timesharing Operating System
8. Distributed Operating System
9. Real Time Sharing Operating System

Batch Operating System

- In this operating system, a number of jobs are put together and executed as a group. This operating system is responsible for scheduling the jobs according to priority and the resource required. E.g. Unix.
- An early computing model (1950s-70s) where similar user jobs are collected by an operator and processed together in groups (batches) without direct user interaction. It improves CPU efficiency for large, repetitive tasks like payroll, but suffers from high turnaround times, difficult debugging, and idle, non-interactive resources.

Single User Operating System

- It is a type of operating system which allows only one user at a time. Operating system for personal computer (PC) is a single user OS. They are designed to manage one task at a time.
- Types of single user system
 1. Single User, Single-tasking:- Designed for devices that run only one application at a time. The user must finish one task before starting another. MS-DOS, Palm OS.
 2. Single User, Multi-tasking:- The most common type for modern personal computing. It allows one user to run several programs (like a web browser and a word processor) simultaneously. Example Windows 10/11, macOS, and Linux (when used as a personal desktop).

Multi-User Operating System

- A Multi-user OS allows users to access a single computer's resources (CPU, Memory, Storage) simultaneously. It is typically managed by a powerful central server that handles requests from various terminals. VMS
- Time Sharping:- The OS allocates a small "Slice" of CPU time to each user in rotation. Because the CPU is so fast, every user feels like they have the entire system to themselves.
- Resource Distribution:- Hardware resources are shared efficiently among all connected users, preventing any single person from monopolizing the system.
- Security and Privacy:- High level security protocols ensure that one user cannot access or modify another user's private data or files.

Multi-programming Operating System

- An operating system technique where multiple program are loaded into the computer's main memory RAM simultaneously to ensure the CPU is never idle.

Multi-tasking Operating system

- In this operating system, more than one processes can be executed concurrently. It also allows the user to switch between the running applications. E.g. Linux, Unix Window 95
- We can say, multitasking is the system's capability to work on more than one job or process at the same tie. It means that whenever a job needs to perform I/O operations, the CPU can be used for executing some other job or process that is also residing in the system and is ready to use the CPU.
- Multitasking OS further classified into two types
 1. Cooperative Multitasking:- In cooperative multitasking, a program can acquire the CPU for the required amount of time. A program can share CPU with any other program that is executing simultaneously, if it does not currently require the CPU. MS window 3.x and MultiFinder for Macintosh computer are the examples of cooperative multitasking.
 2. Preemptive multitasking:- In Preemptive multitasking the operating system allocates particular time to a program. The CPU is preempted if higher priority job arrives in a system. In this types of multitasking, programs are forced to share the CPU whether they want to use it or not. Unix, windows NT, and later versions of Mac OS are the examples of preemptive multitasking.

Multi-processing system

- Multiprocessor system is the system that contains two or more processors or CPUs and has ability to simultaneously execute several programs. Hence the name “Multi-processor”
- In such a system, multiple processors share the clock, bus, memory and peripheral devices.
- Multiprocessor system is also known as parallel system.
- Multiprocessor system are categorized into two different types:
 1. Symmetric Multiprocessing (SMP) each processor runs an identical copy of the operating system. The processors can communicate with each other and execute these copies concurrently. As a result they share equal amount of load.
 2. Asymmetric Multiprocessing (ASMP) In ASMP, different processor do different things, i.e., they are not identical thus, there is imbalance among the processors. Hence the name ‘asymmetric.’ In ASMP each processor is given a specific task and do not share equal load. There is master-slave relationship between the processors. One of the processors that controls the system is called master. The other processors follow the instruction given by the master or have predefined tasks. These are called slaves.

Time Sharing Operating System

- Timesharing refers to the allocation of computer resources in a time dependent fashion to several programs simultaneously.
- A timesharing system has many user terminals that are connected to same computer simultaneously. Using terminal, different users can work on a system at the same time..
- Thus, it is uses multiprogramming with a special CPU scheduling algorithm to achieve this.
- In time sharing system, the CPU time is divided among all the users on a scheduled basis.
- Each user program is allocated a very short period of CPU time one by one, beginning from the first user program and proceeding the last one, and then again beginning from the first one.
- This short period of time is known as “time slice” time slot or quantum.
- In time sharing system this various programs can be one of the following three states
- Running, Ready, and Blocked

Distributed System

- A distributed system is a collection of processors located in a geographical dispersed physical location.
- In the system the workload is distributed or divided between two or more computers that are linked together by a communication network. that is the different processors communicate using communication links, such as telephone lines and buses.
- The various processors do not share memory, clock, or peripheral, devices. Instead each processor has its own local memory.
- Some examples of distributed operating system are Amoeba, Angle, Chorus, Mach, Alpa Kernal.
- Models of Distributed operating System
 1. Client-Server Model
 2. Peer-to-Peer Model

Real Time System

- In a real time operating system (RTOS), job is to be completed within the rigid time constraints otherwise job loses its meaning.
- A real time system functions correctly only if it returns the correct result within its time constraints.
- Real time operating systems are categorized into:
 1. Hard real time systems:- Deadline is absolute, complete the critical tasks within the definite interval of constraints. If the critical task is not completed within the time constraint, then the hard real time system fails. All the processes within a definite deadline and a single leads to a crash or an unstable aircraft.
 2. Soft Real time System:- are less restrictive in nature and are not affected by the lapse of time interval and do not cause any critical failure. Soft real time system are used in the area of multimedia, virtual reality. Nuclear power station and airbags.

Some Important OS

- Window is a group of operating system manufactured by Microsoft.
- A widely used proprietary graphical operating system development by Microsoft first released in 1985 that manages computer hardware and software resources, serving as the interface between users and their PCs. It support diverse application gaming, and file management, with modern version Like Windows 11 offering AI-driven, cloud-synced feature for home, business, and IoT devices
- Unix The first version of Unix was developed in 1969 by Ken Thompson and Dennis Ritchie. It is primarily used to a server rather than a workstation and should not be used by anyone who does not understand the systems.
- LINUX the first Linux Kernal was released in September 1991, by Linus Torvalds. It is an open source.
- Macintosh Mac OS it was introduced in January 1984 by Steve Jobs and was initially named as system software, which later renamed as Mac OS.
- Android it is mobile OS developed by Google based on Linux (main part of OS). It is basically designed for touch screen mobile devices like Tablets, Smartphones etc. the platform frequently updates, recent version was Android 15 (vanilla Ice Cream), and Android 16 (baklava).
- Symbian OS was developed and sold by Symbian Ltd 1998 . It is an open source mobile OS designed for smartphones. The king of the early 2000s, pioneered by Nokia

Some Important OS

- **iOS** is a closed-source mobile operating system developed by Apple Inc. exclusively for its hardware, primarily the iPhone. Since its debut in 2007 it has set the standard for fluid performance, high security, and premium user experience.
- iOS 26 the latest version feature the “Liquid Glass” design language, offering a more immersive and tactile interface.
- **Blackberry OS** was a proprietary mobile OS developed by Research in Motion RIM for its line of Blackberry smartphones. It is renowned for its robust security, physical QWERTY keyboard, industry leading “push Email” technology.
- **Window phone** Microsoft’s attempt at a third major OS, known as its unique “Live Tiles” interface
- Emerging and Regional Alternatives
- **HarmonyOS** (Huawei)
- **KaiOS** powering ‘smart feature phones’ like the jioPhone
- **GrapheneOS/LineageOS** “de-googled”

MS DOS

- The DOS OS was developed by MS in 1980 for micro computers. MS DOS was the first OS that run on PC developed by IBM corporation in 1981. DOS is a single user operating system. It is only operating system which can be loaded in the main memory of the computer using a single disk.
- Structure of the DOS there are four essential programs associated with the control of computer and the way it interacts with them.
 1. **The Boot Record**:- it includes loading the operating system into main memory. It is the main program of MS-DOS.
 2. **IO. SYS** (Input/Output) this hidden system file that acts as the interface between the hardware and the OS
 3. **MSDOS.sys** This is hidden file is the “heart” of the OS. It manages high-level functions like file management, memory allocation, and application execution. It translates program requests into action the hardware can understand.
 4. **COMMAND.COM** (the shell/interpreter) This is the user interface. It display the command prompt e.g. C:\, accepts user input, and executes command. It contain internal commands

The configuration of DOS

- 1). **Config.sys** it adjusts the system according the commands.
- 2). **Autoexec.bat** when the system is powered on, this file executes in automatically command line

MS DOS

Internal Command	External Command
CLS :- Clear the screen.	XCOPY:- copies files and directory trees
DIR:- List files and folders.	FORMAT:- Erase disk and prepared track/sectors
COPY:- copies a file from one location to another	CHKDSK:- Cheick Disk for errors and bad sectors.
REN:- Rename a file.	DISKCOPY:- copies entire content of one floppy disk to another
DEL/ERASE:- Deletes a file.	EDIT:- Open the text editor.
MD/CD/RD:- Make/Change/Rename	TREE;- display directory structure graphically.
VER:- display version.	PRINT:- prints a text file to a line printer.
TYPE;- Displays contents of a text file.	Sort:- sorts input data.
DATE/TIME;- view or set system date/time	MOVE:- Moves files from one directory to another
VOL:- Display Volume label	FORMAT;-
PATH:- sets search path for executable files	
MKDIR:- Create New directory	

Tit-Bite

- **Booting** starting up a computer computer appliance until it can be used. It can be cold and warm booting
- **Cold Booting** when computer is turned ON alter in has be completely shutdown. **Warm Booting** when a computer is restarted by Ctrl+Alt+Del key or restart button.
- BIOS Location → stored in ROM specifically EEPROM in modern Computers.
- **Deadlock** a situation where two processes are waiting for each other to release a resources , causing the system to hang.
- **Spooling** is the process of sending data to a spool or buffer or temporary storage area of computer memory
- **Kernal** is the core of the operating system that supports the process by providing a path to the peripheral devices
- **Shell** is the program which interprets commands given by the user
- **Thread** is a task that runs with other tasks concurrently within the same process
- A program is execution is called a **Process**
- **Window OS** is a single user multitasking Operating system.
- System running more then one process concurrently are called as **multiprogramming**
- **MS DOS** was the first operating system development by **Microsoft**.
- **Firmware** is a software program that is written to a hardware device. It allow the hardware to be updated



Android	2008
iOS	2007
Windows	1985
Mac OS	2001
MS-DOS	1981
Chrome OS	2011
Window Phone	2010
Blackberry OS	1999
Firefox OS	2013
UNIX	1969
Linux	1991

THANK YOU

wahid6005356659@hotmail.com