# Operating System Interview Questions

## What is Operating System & Types of OS

* An Operating System is a software that acts as an interface between computer hardware and user applications.
* It manages the resources and provides services for the efficient and secure execution of programs.
* The primary functions of an operating system include process management, memory management, file system management, device management and user interface.

**Types of OS:**

1. **Windows:**
   1. Developed by Microsoft (Founder: Bill Gates, Current CEO: Satya Nadella)
   2. Widely used OS personal computers.
2. **macOS:**
   1. Developed by Apple (Founder: Steve Jobs, Current CEO: Tim Cook)
   2. It is used on Apple Mac Computers.
3. **Linux:** 
   1. An open-source OS that is highly customizable.
   2. Widley used in server environments and embedded systems.
   3. It is known for its stability, security and flexibility.
   4. Famous distribution: Ubuntu, Fedora, CentOS, Kali, etc.
4. **Unix:**
   1. A powerful multiuser operating system that serves as the foundation for many other operating systems including Linux and macOS.
   2. It is known for its stability and secure environment.
   3. Widely used in server applications.
5. Android:
   1. Developed by Google (Founder: Larry Page and Sergey Brin, Current CEO: Sundar Pichai)
   2. It is an open-source operating system maintained and governed by Google.
   3. Primarily designed for mobile devices such as smartphones and tablets, but now is used in Wear OS, Desktop, TV and Automative
6. iOS:
   1. Developed by Apple (Founder: Steve Jobs, Current CEO: Tim Cook)
   2. It is used in iPads and iPods.
7. Real Time Operating System (RTOS):
   1. Widely used in embedded systems, control systems, and IoT devices.

## Process vs Thread vs Program

### Program

* A program is a set of instructions written in a programming language that performs a specific task or set of tasks.
* It is typically stored in a file on disk and represents an executable entity.
* Programs can be compiled or interpreted, and they serve as a blueprint for the execution of tasks on a computer system.

### Process

* A process is an instance of a program in execution. When a program is loaded into memory and executed, it becomes a process.
* A process is an independent entity with its own PCB unit ie. memory space, resources, and execution context.
* PCB :
  + A Process Control Block (PCB) is a data structure used by the operating system to manage information about a process.
  + Process ID: A unique identifier for each process
  + Priority: The process’s scheduling priority
  + State: The current state of the process (e.g., running, sleeping, waiting)
  + CPU Registers: The current values of CPU registers
  + Memory Pointers: Pointers to the process’s memory segments
  + Open Files: A list of open files and their corresponding file descriptors
  + I/O Status: The current I/O status of the process
* Processes are managed by the operating system, and each process runs in its own protected memory space.
* Processes can be concurrent and communicate with each other through inter-process communication (IPC) mechanisms.

### Thread

* A thread is a unit of execution within a process.
* It represents a sequence of instructions that can be scheduled and executed independently.
* Threads share the same memory space and resources within a process.
* Multiple threads within a process can run concurrently, allowing for parallel execution of tasks.
* Threads within the same process can communicate and share data more easily compared to inter-process communication (IPC).
* However, each thread has its own program counter and stack.