OPERATING SYSTEM (INTRODUCTION)

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Objectives

- To describe the basic organization of computer systems.
- To provide a grand tour of the major components of operating systems.

Goals of OS

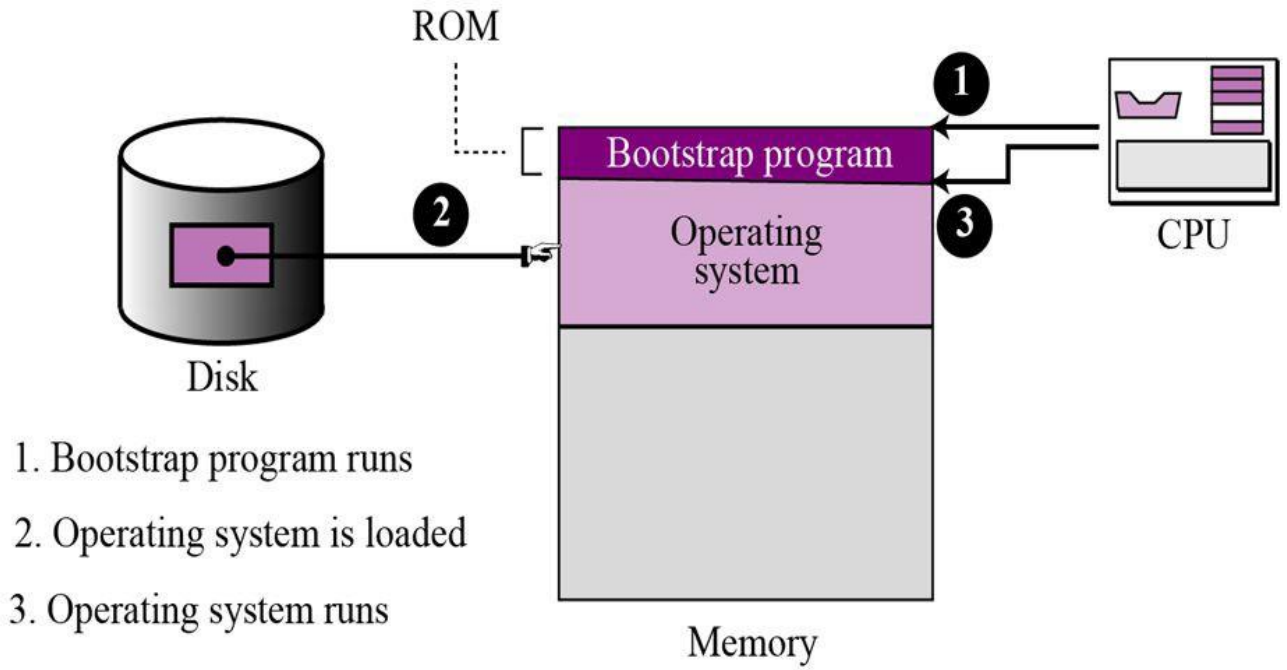
- Users want convenience
    1. ease of use
    2. good performance

Computer Startup

- **bootstrap program** is loaded at power-up or reboot
  - Typically stored in ROM or EPROM, generally known as **firmware**
  - Initializes all aspects of system
  - Loads operating system kernel and starts execution

- Firmware is data that is stored on a computer or other hardware device's ROM (read-only memory) that provides instruction on how that device should operate. Unlike normal software, **firmware** cannot be changed or deleted by an end-user without using special programs, and remains on that device whether it's on or off.

Bootstrap process

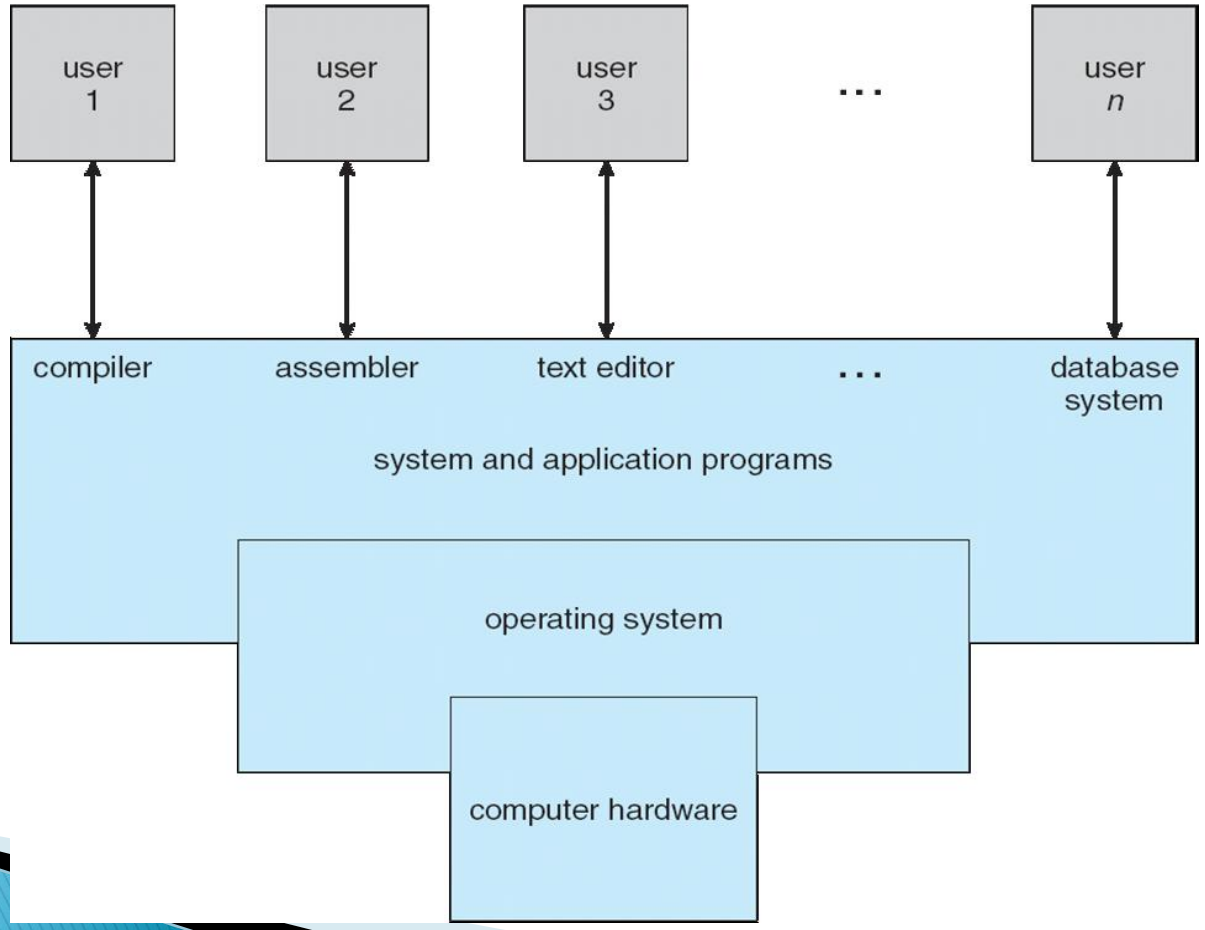


Introduction of OS

- Operating system is a interface between user and hardware.
- Operating system act as a manager of all hardware and software devices in our computer system.
- Operating system is a system software. It is used to manage hardware devices and control all the execution of all kind of programs.
- The most common operating systems for personal computers are **Microsoft Windows**, **macOS**, **Linux, Android, and iOS.**

Structure of Computer System

An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs..



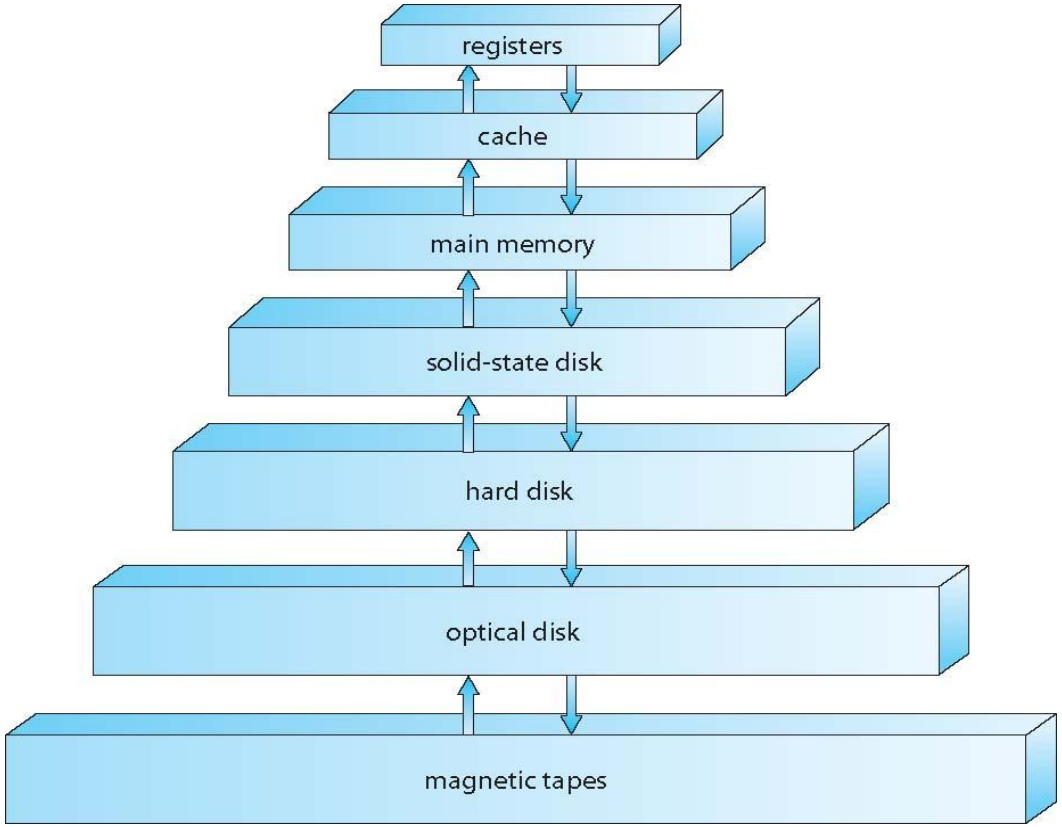
Important Functions of an Operating System

- Memory Management
- Process Management
- Device Management
- File Management
- Security
- Control over system performance
- Job accounting
- Error detection

Memory Management

- Memory management refers to management of Primary Memory or Main Memory.
- Main memory provides a fast storage that can be accessed directly by the CPU.
- In multiprogramming, the OS decides which process will get memory when and how much.
- Main memory – only large storage media that the CPU can access directly
  - Random access
  - Typically volatile
- Secondary storage – extension of main memory that provides large nonvolatile storage capacity

Storage-Device Hierarchy



Memory Management

An Operating System does the following activities for memory management −

- Keeps tracks off primary memory,, i.e., what part off it are in use by whom, what part are not in use.
- In multiprogramming, the OS decides which process will get memory when and how much.
- Allocates the memory when a process requests it to do so.
- De-allocates the memory when a processes no longer needs it or has been terminated..

Process Management

- Keeps tracks of processor and status of process.
- Allocates the processor (CPU) to a process.
- De-allocates processor when a processes is no longer required.
- In multiprogramming environment, the OS decides which process gets the processor when and for how much time.

Device Management

- Keeps tracks of all devices. Program responsible for this task is known as the I/O controller.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way.
- De-allocates devices.

File Management

- A file system is normally organized into directories for easy navigation and usage.
- Keeps track of information, location, uses, status etc.
- Allocates the resources.
- Decides who gets the resources.
- De-allocates the resources.

Security and Protection

- By means of password and similar other techniques, it prevents unauthorized access to programs and data.
- Protection of the system against internal and external attacks.

- **Control over system performance** – Recording delays between request for a service and response from the system.
- **Job accounting** – Keeping track of time and resources used by various jobs and users.
- **Error detecting** – traces,, error messages, and other debugging and error detecting.

References

1. Book: Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley Publication.
2. www.google.com

THANKS