Presentation

Topic: *Operating Systems*

What is OS?

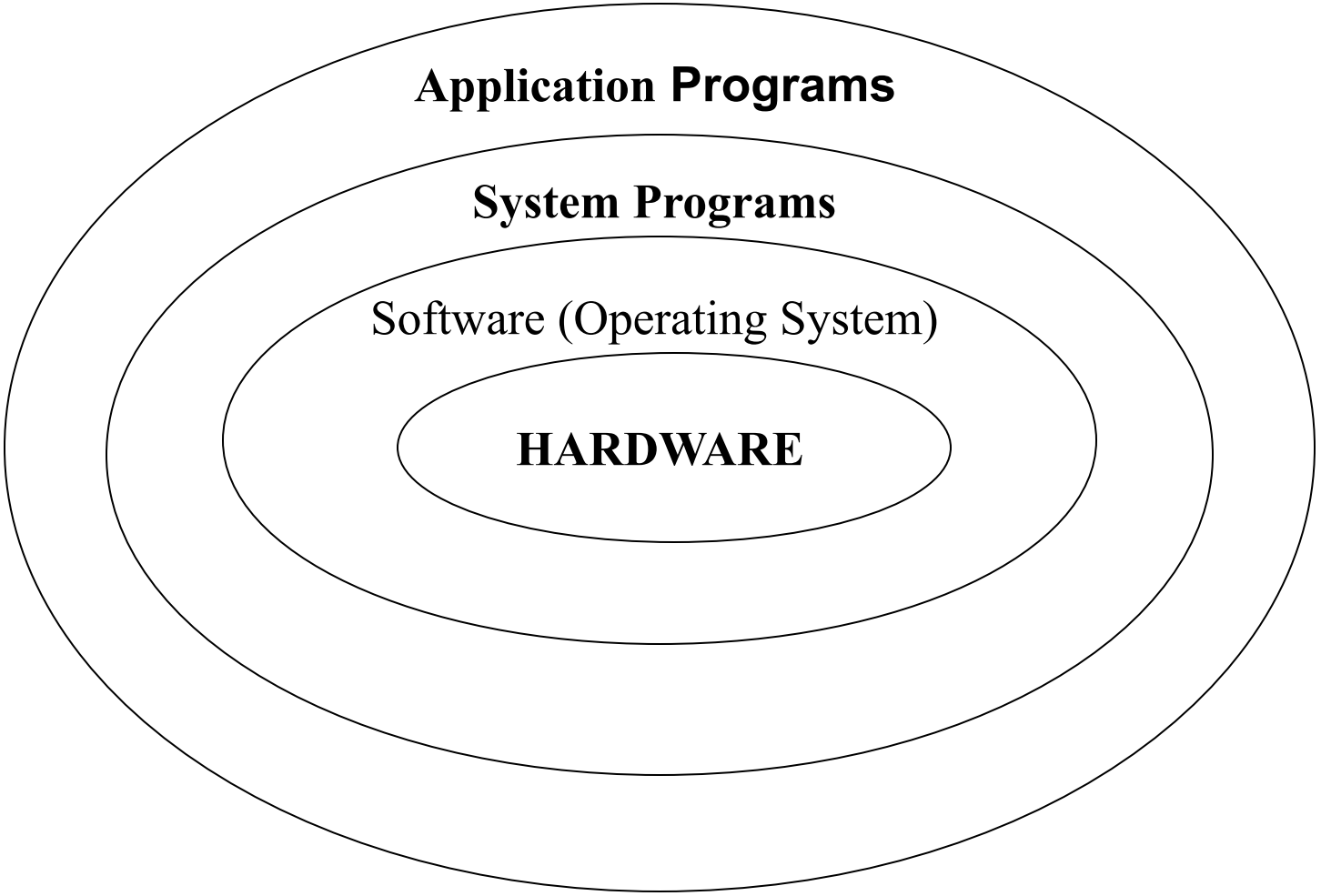
- Operating System is a software, which makes a computer to actually work.
- It is the software the enables all the programs we use.
- The OS organizes and controls the hardware.
- OS acts as an interface between the application programs and the machine hardware.
- Examples: Windows, Linux, Unix and Mac OS, etc.,

What OS does?

An operating system performs basic tasks such as,

- controlling and allocating memory,
- prioritizing system requests,
- controlling input and output devices,
- facilitating networking and
- managing file systems.

Structure of Operating System:



Structure of Operating System

- The structure of OS consists of 4 layers:
  1. **Hardware**

     Hardware consists of CPU, Main memory, I/O Devices, etc,

  2. **Software (Operating System)**

     Software includes process management routines, memory management routines, I/O control routines, file management routines.

Structure of Operating System

3. **System programs**

   This layer consists of compilers, Assemblers, linker etc.

4. **Application programs**

   This is dependent on users need. Ex. Railway reservation system, Bank database management etc.,

Evolution of OS:

- The evolution of operating systems went through seven *major phases*.
- Six of them significantly changed the ways in which users accessed computers through the open shop, batch processing, multiprogramming, timesharing, personal computing, and distributed systems.
- In the seventh phase the foundations of concurrent programming were developed and demonstrated in model operating systems.

Evolution of OS:

Major Phases	Technical Innovations	Operating Systems
Open Shop	**The idea of OS**	**IBM 701 open shop (1954)**
Batch Processing	**Tape batching,** **First-in, first-out scheduling.**	**BKS system (1961)**
Multi-programming	**Processor multiplexing,** **Indivisible operations,** **Demand paging,** **Input/output spooling,** **Priority scheduling,** **Remote job entry**	**Atlas supervisor (1961),** **Exec II system (1966)**

Evolution of OS:

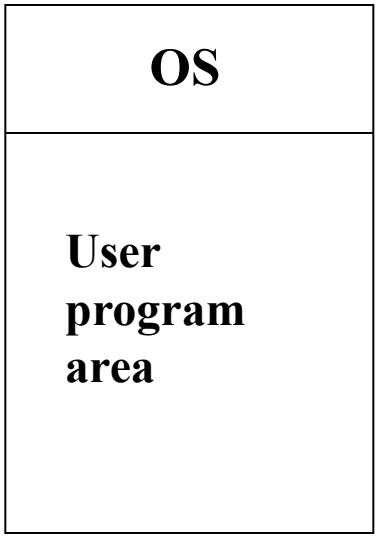
Timesharing	**Simultaneous user interaction,** **On-line file systems**	**Multics file system (1965),** **Unix (1974)**
Concurrent Programming	**Hierarchical systems, Extensible kernels, Parallel programming concepts, Secure parallel languages**	**RC 4000 system (1969),** **13 Venus system (1972),** **14 Boss 2 system (1975).**
Personal Computing	**Graphic user interfaces**	**OS 6 (1972)** **Pilot system (1980)**
Distributed Systems	**Remote servers**	**WFS file server (1979)** **Unix United RPC (1982)** **24 Amoeba system (1990)**

Batch Processing:

- In Batch processing same type of jobs batch *(BATCH- a set of jobs with similar needs)* together and execute at a time.
- The OS was simple, its major task was to transfer control from one job to the next.
- The job was submitted to the computer operator in form of punch cards. At some later time the output appeared.
- The OS was always resident in memory. (Ref. Fig. next slide)
- Common Input devices were card readers and tape drives.

Batch Processing :

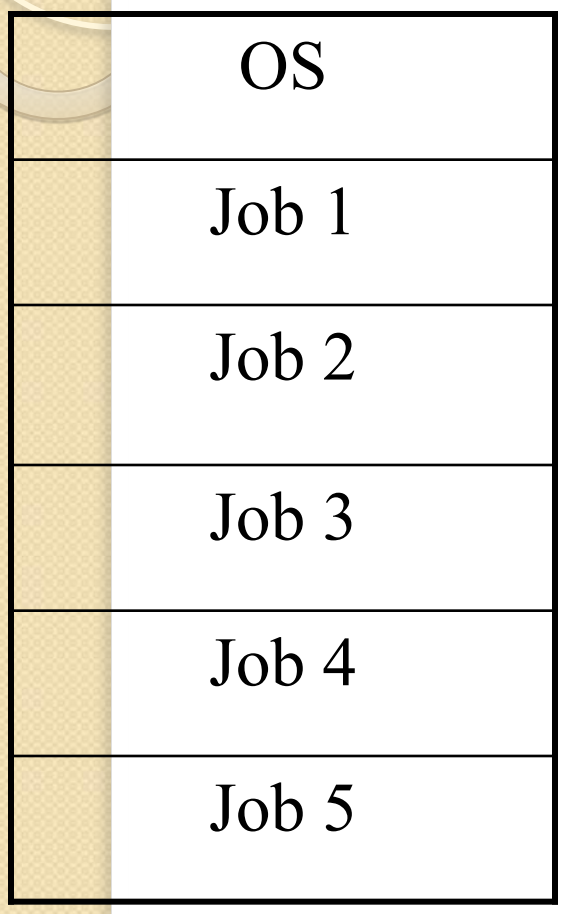
- Common output devices were line printers, tape drives, and card punches.
- Users did not interact directly with the computer systems, but he prepared a job (comprising of the program, the data, & some control information).



Multiprogramming:

- Multiprogramming is a technique to execute number of programs simultaneously by a single processor.
- In Multiprogramming, number of processes reside in main memory at a time.
- The OS picks and begins to executes one of the jobs in the main memory.
- If any I/O wait happened in a process, then CPU switches from that job to another job.
- Hence CPU in not idle at any time.

Multiprogramming :



- Figure dipicts the layout of multiprogramming system.
- The main memory consists of 5 jobs at a time, the CPU executes one by one.

Advantages:

- Efficient memory utilization
- Throughput increases
- CPU is never idle, so performance increases.

Time Sharing Systems:

- Time sharing, or multitasking, is a logical extension of multiprogramming.
- Multiple jobs are executed by switching the CPU between them.
- In this, the CPU time is shared by different processes, so it is called as “Time sharing Systems”.
- Time slice is defined by the OS, for sharing CPU time between processes.
- Examples: Multics, Unix, etc.,

Operating Systems functions:

- The main functions of operating systems are:

1. Program creation
2. Program execution
3. Input/Output operations
4. Error detection
5. Resource allocation
6. Accounting
7. protection

Types of OS:

Operating System can also be classified as,-

- **Single User Systems**
- **Multi User Systems**

Single User Systems:

- Provides a platform for only one user at a time.
- They are popularly associated with Desk Top operating system which run on standalone systems where no user accounts are required.
- Example: DOS

Multi-User Systems:

- Provides regulated access for a number of users by maintaining a database of known users.
- Refers to computer systems that support two or more simultaneous users.
- Another term for *multi-user* is *time sharing*.
- Ex: All mainframes and are multi-user systems.
- Example: Unix