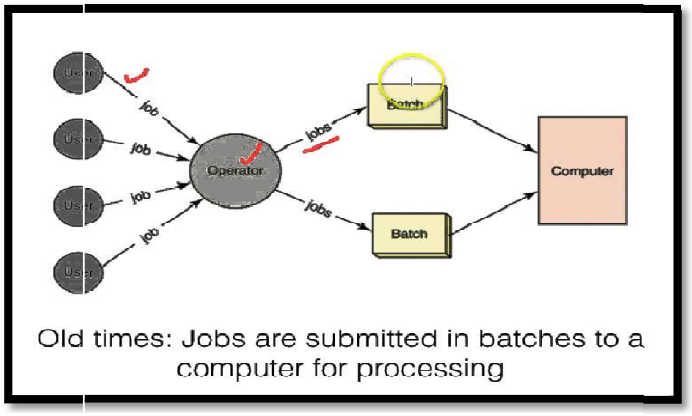
# UNIT-1 TYPES OF OPERATING SYSTEM

## 1) Batch operating system

- The users of batch operating system **do not interact with the computer** directly. Each user prepares his job on an **off-line device** like **punch cards** and submits it to the computer operator.



Old times: Jobs are submitted in batches to a computer for processing

- To speed up processing, **jobs with similar needs are batched together** and **run as a group**. Thus, the programmers left their programs with the operator. The operator then sorts programs into batches with similar requirements.

- The **problems** with Batch Systems are following.
  - **Lack of interaction** between the user and job.
  - CPU is often **idle**, because the speeds of the mechanical I/O devices are slower than CPU.
  - Difficult to provide the desired **priority**.

## 2) Multiprogramming Operating System

- **Batch operating system, the processor is often idle**. The **problem** is that I/O devices are **slow compared to processor**. So processor is idle for such a time. **To solve this problem multiprogramming operating system was developed.**

- **Multiprogramming OS** having **same sequence of process** which batch operating system has but difference is there that in **batch processing system there is only one program** is loaded in memory and waiting for I/O response but **in multiprogramming there is one or more than** one programs are loaded in main memory.

- If one process is going on and **job waiting for I/O**, the processor can **switch to the other job,** which likely not waiting for I/O.

- Furthermore, we might **expand memory to hold three, four or more programs** and **switch among** all of them. The process is **known as multiprogramming or multitasking**.

### 3) Real Time Sharing Operating System:

- Real time operating system is **used in environments** where a large number of events, mostly external to the computer system, must be accepted and processed in a **short time** or **within certain deadlines**.

- Such **applications** include industrial control: telephone switching equipment, flight control and real time simulations. **Real time systems are also frequently used in military applications.**

- A **primary objective** of real-time systems is to provide **quick event-response times**, and thus meet the scheduling deadlines.

- The processor is normally allocated to the higher priority processes usually block execution of the lower-priority processes. This form of scheduling called **priority-base preemptive scheduling** is used by a majority of real-time systems.

- There are two types of real-time operating systems.

**1) Hard real-time systems**

- Hard real-time systems guarantee that **critical tasks complete on time**. In hard real-time systems secondary storage is limited or missing with data stored in ROM. In these systems virtual memory is almost never found.

**2) Soft real-time systems**

- Soft real time systems are **less restrictive**. Critical real-time task gets priority over other tasks and retains the priority until it completes.

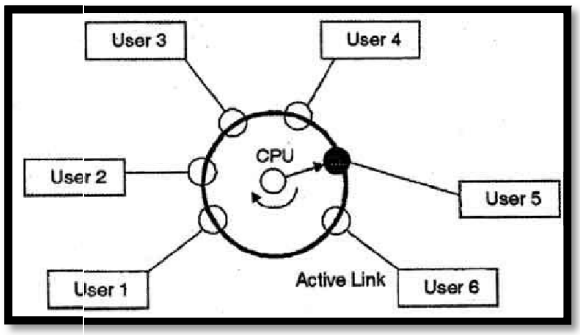
- Soft real-time systems have limited utility than hard real-time systems. For example, Multimedia, virtual reality, Advanced Scientific Projects like undersea exploration and planetary rovers etc.

## 4) Time-sharing operating systems

- Time sharing is a technique which **enables many people**, **located at various terminals**, to use a particular computer system **at the same time**.

- Time-sharing or multitasking is a **logical extension** of multiprogramming.

Processor's time which is shared among multiple users simultaneously is termed as time-sharing.




- Multiple jobs are executed by the CPU by switching between them, but the switches occur so frequently. Thus, the user **can receive an immediate response**. For example, in a transaction processing, processor execute each user program in a short burst or quantum of computation.

- That is if n users are present, each user can get **time quantum**. When the user submits the command, the response time is in few seconds at most.

- Advantages of Timesharing operating systems are following
  - Quick response.
  - Avoids duplication of software.
  - Reduces CPU idle time.
- Disadvantages of Timesharing operating systems are following.
  - Problem of reliability.
  - Question of security and integrity of user programs and data.
  - Problem of data communication.

## 5) Distributed operating System

- Distributed systems use multiple central processors to serve **multiple real time application** and **multiple users**. Data processing jobs are distributed among the processors accordingly to which one can perform each job most efficiently.

- The processors communicate with one another through various communication lines (such as **high-speed buses** or **telephone lines**). These are referred as **loosely coupled** systems or distributed systems.

- Processors in a distributed system may vary in size and function. These processors are referred as sites, nodes, and computers and so on.

- The advantages of distributed systems are following.
  - With resource sharing facility user at one site may be able to use the resources available at another.
  - If one site fails in a distributed system, the remaining sites can potentially continue operating.
  - Better service to the customers.
  - Reduction of the load on the host computer.
  - Reduction of delays in data processing.

- The disadvantages of distributed systems are following.
  - Reduced ability to pool memory and processor resources among distinct nodes.
  - Security weakness.

# 6) Network operating System

- Network Operating System **runs on a server** and provides server the capability to manage data, users, groups, security, applications, and other networking functions.

- The primary purpose of the network operating system is to **allow shared file** and **printer** **access among multiple computers in a network**, typically a local area network (LAN), and a private network or to other networks.

- The advantages of network operating systems are following.
  - Centralized servers are highly stable.
  - Security is server managed.
  - Upgrades to new technologies and hardware's can be easily integrated into the system.
  - Remote access to servers is possible from different locations and types of systems.

- The disadvantages of network operating systems are following.
  - High cost of buying and running a server.
  - Dependency on a central location for most operations.
  - Regular maintenance and updates are required.

# 7) Embedded operating System

- An embedded system is a computer that is part of a different kind of machine. **It has limited features**. It is usually **designed for some particular operations** to control an electronic device.

- Examples include **computers in cars**, **traffic lights**, **digital televisions**, **ATMs**, **airplane controls**, **point of sale (POS) terminals**, **digital cameras**, **GPS navigation systems**, digital media receivers and smart meters, among many other possibilities.

- Different special electronic devices are also controlled by the OS that are stored into a ROM chip. Ex Pocket PC, Palm OS.

- **Applications of Embedded Operating Systems**

  Here we have different applications of Embedded Operating System in our everyday life. These applications include

  - **Symbian:** It is used in mobile phones **mainly in Nokia.**
  - **BlackBerry Operating System:** It is particularly used in **BlackBerry Phones**,
  - **Embedded Linux:** It is used in **Android phones and other devices like printers**.
  - **IOS:** It is used in MAC operating systems and other **Apple devices**.
  - **Windows Mobile Operating System:** It is used in **window phones**.