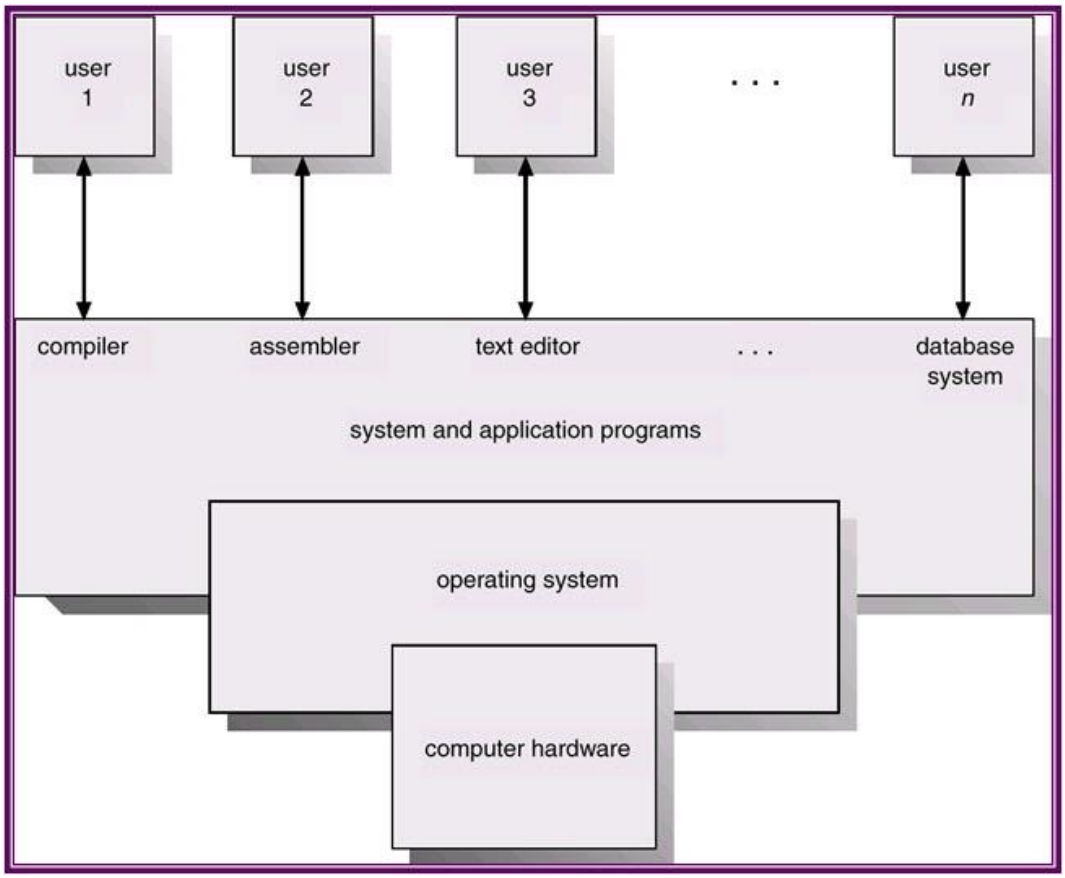
Operating Systems

BCAN301

Abstract view of the system components

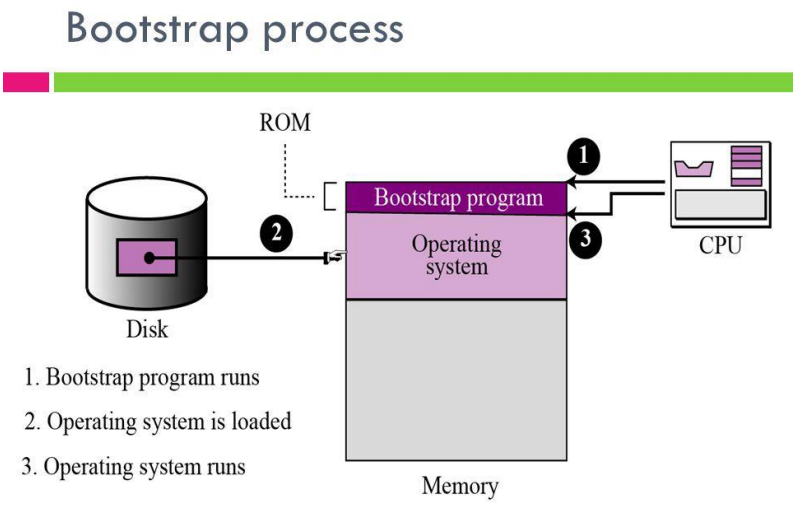


Important terms to consider :

1)Bootstrap Program: It is the initialization process of the program which is going to be loaded to startup the machine by starting operating system.

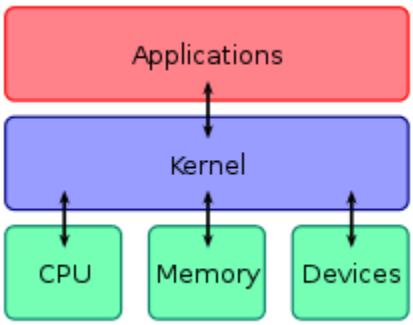
Normally it is store in **ROM (firmware)** it checks whether all the resources are capable and functioning properly.

Now days the bootstrap program is not install inside the ROM but only the bootstrap loader in the **ROM**. Bootstrap loader is in a special block in the hard disk called as **boot block**.



2)Firmware: Firmware is a software program or set of instructions programmed on a hardware device.

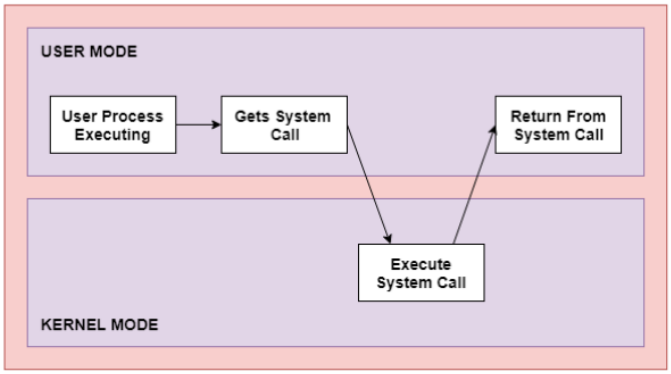
3)Kernel: A *kernel* is the central part of an operating system.



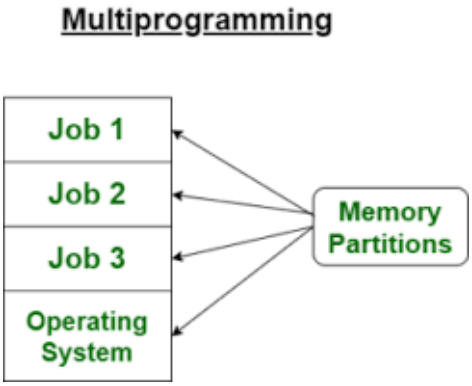
4)init: In Unix-based computer operating systems, ***init*** (short for *initialization*) is the first process started during booting of the computer system. *Init* is a daemon process that continues running until the system is shut down.

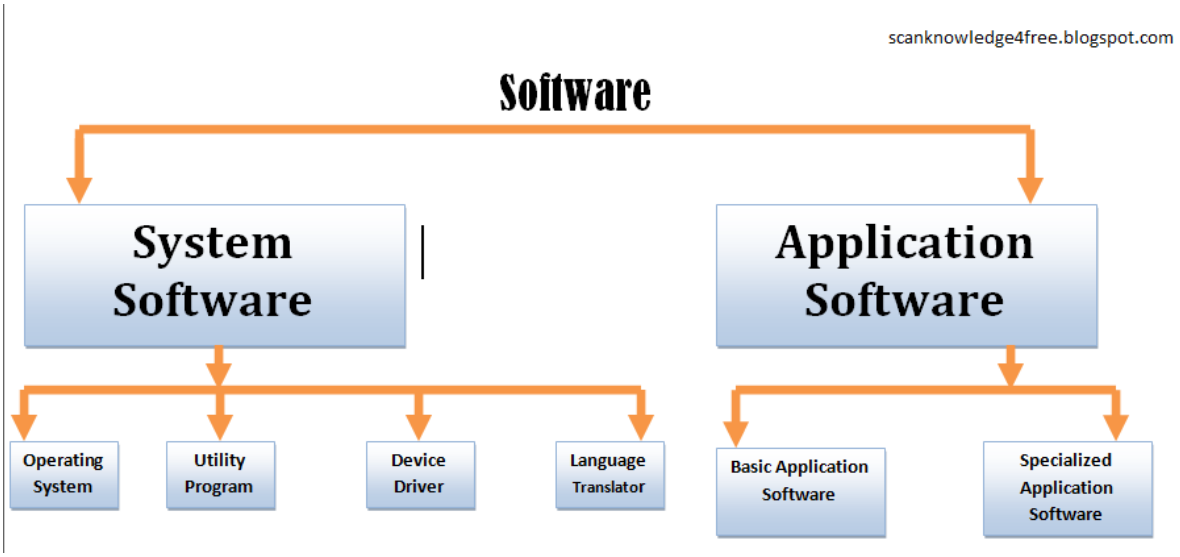
5)interrupt: An **interrupt** is a signal sent to the processor that interrupts the current process. It may be generated by a hardware device or a software program.

6)System call: The interface between a process and an operating system is provided by system calls.

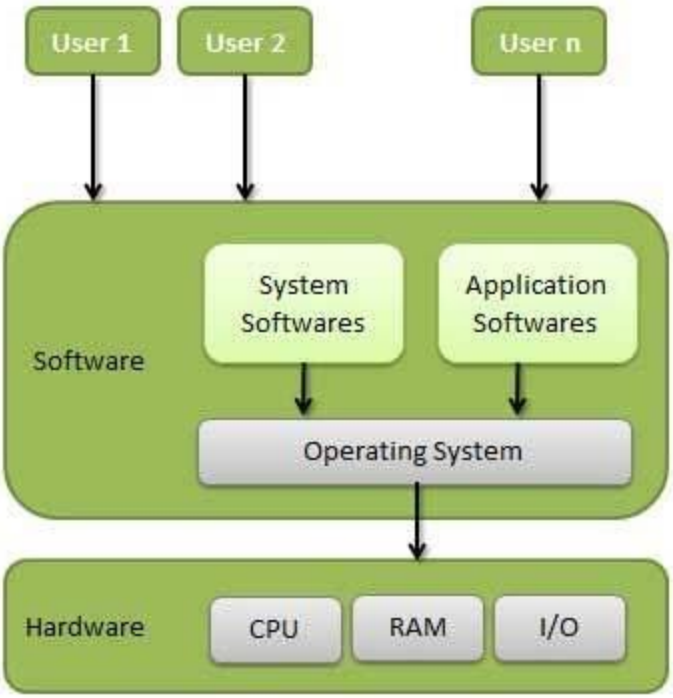


7)Multiprogramming: More than one program present in the RAM at the same time and any one of them can be selected to be executed by CPU.





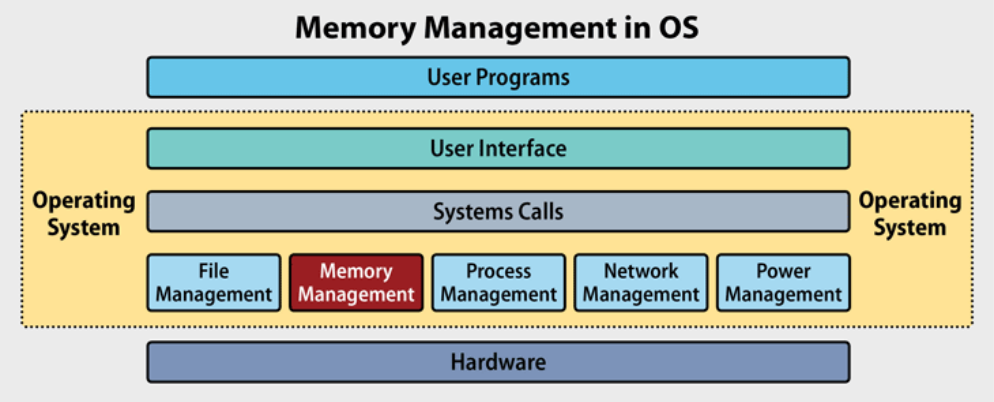
What is Operating System: **An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs. It is also known as Resource Manager of the system.**



Following are some of important functions of an operating System.

- Memory Management
- Processor Management
- Device Management
- File Management
- Security
- Control over system performance
- Job accounting
- Error detecting aids
- Coordination between other software and users

Memory management refers to management of Primary Memory or Main Memory.



An Operating System does the following activities for memory management −

- Keeps tracks of primary memory, i.e., what part of 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 process no longer needs it or has been terminated.

Processor management refers that in multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called **process scheduling**. An Operating System does the following activities for processor management −

- Keeps tracks of processor and status of process by **PCB**(Process Control Block / Task Control Block)
- Allocates the processor (CPU) to a process.
- De-allocates processor when a process is no longer required.

Device Management refers that an Operating System manages device communication via their respective drivers. It does the following activities for 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. These directories may contain files and other directions.

An Operating System does the following activities for file management −

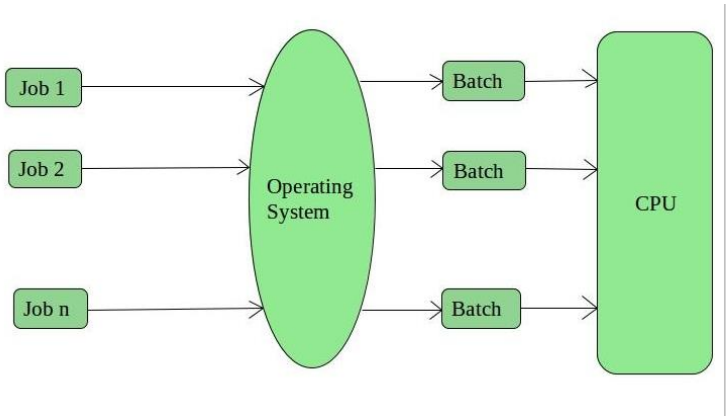
- Keeps track of information, location, uses, status etc. The collective facilities are often known as **file system**.
- Decides who gets the resources.
- Allocates the resources.
- De-allocates the resources.

Following are some other important activities that an Operating System performs −

- **Security** − By means of password and similar other techniques, it prevents unauthorized access to programs and data.
- **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 aids** − Production of dumps, traces, error messages, and other debugging and error detecting aids.
- **Coordination between other softwares and users** − Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

Types of Operating System

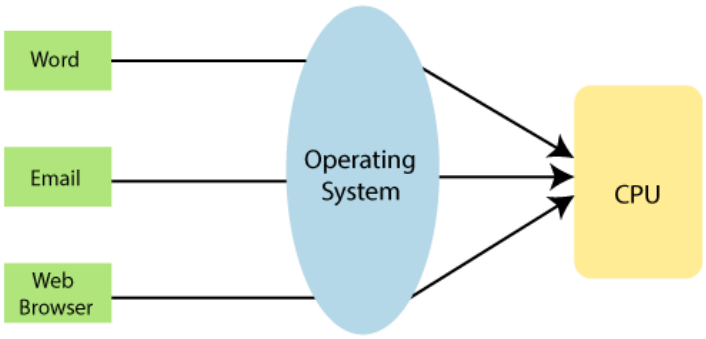
Batch operating system



The problems with **Batch Systems** are as follows −

- Lack of interaction between the user and the job.
- CPU is often idle, because the speed of the mechanical I/O devices is slower than the CPU.
- Difficult to provide the desired priority.

Time-sharing operating systems



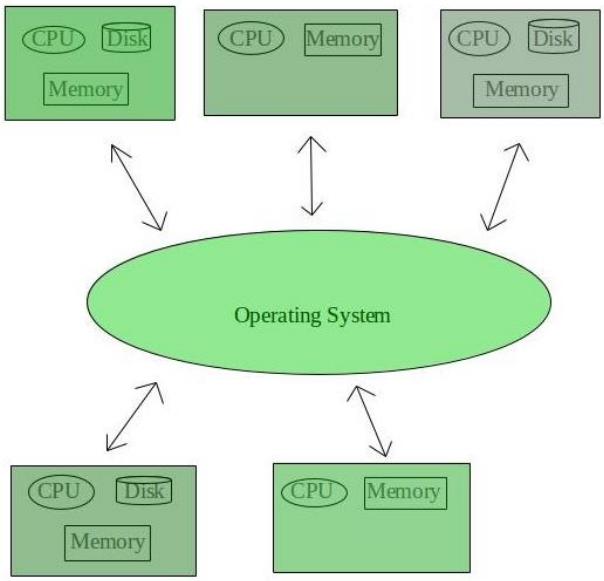
Advantages of **Timesharing operating systems** are as follows −

- Provides the advantage of quick response.
- Avoids duplication of software.
- Reduces CPU idle time.

Disadvantages of **Time-sharing operating** systems are as follows −

- Problem of reliability.
- Question of security and integrity of user programs and data.
- Problem of data communication.

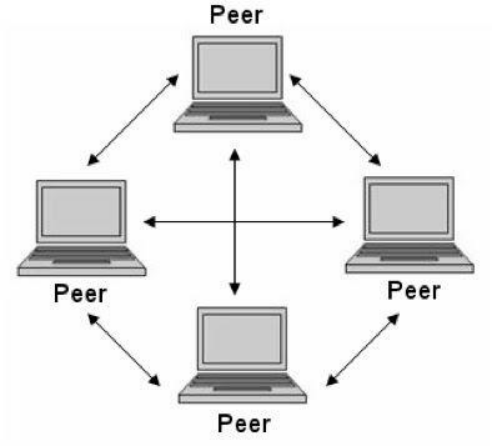
Distributed operating System (loosely coupled systems)



The advantages of **distributed systems** are as follows −

- With resource sharing facility, a user at one site may be able to use the resources available at another.
- Speedup the exchange of data with one another via electronic mail.
- 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.

Network operating System



Examples of **network operating systems** include Microsoft Windows Server 2003, Microsoft Windows Server 2008, UNIX, Linux, Mac OS X, Novell NetWare, and BSD.

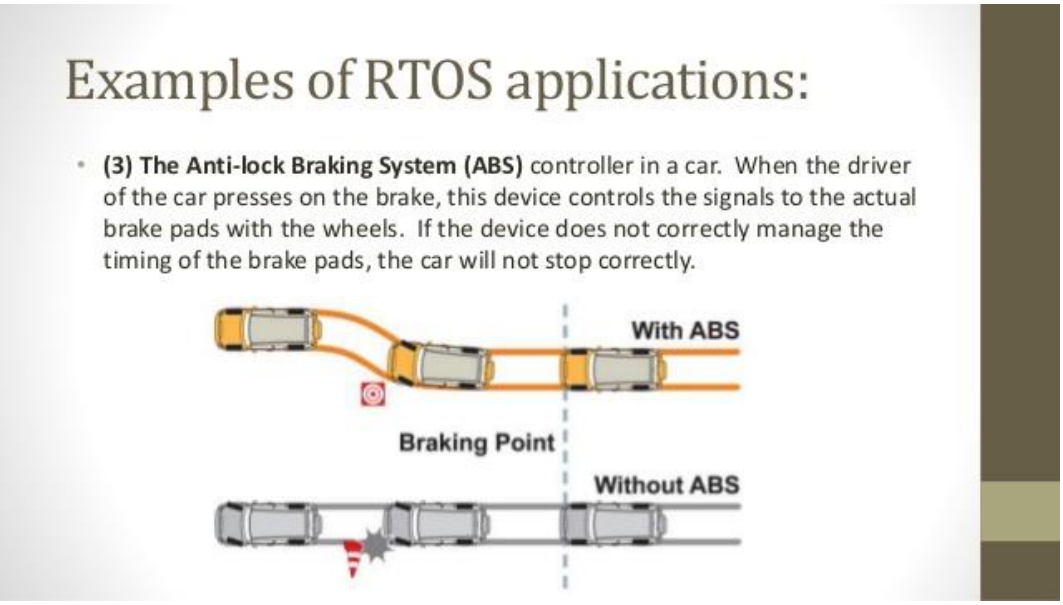
The advantages of network operating systems are as follows −

- Centralized servers are highly stable.
- Security is server managed.
- Upgrades to new technologies and hardware 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 as follows −

- High cost of buying and running a server.
- Dependency on a central location for most operations.
- Regular maintenance and updates are required.

Real Time operating System



The response time is very less as compared to online processing.

The time taken by the system to respond to an input and display of required updated information is termed as the **response time**.

There are two types of real-time operating systems.

Hard real-time systems

Hard real-time systems guarantee that critical tasks complete on time.

Soft real-time systems

It is less restrictive. A 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.

Example: Car Airbag System

Missile Weapons defense system