CHITKARA UNIVERSITY

Department of Computer Science & Engineering

Bachelor of Engineering (CSE-AI)

Operating System with Linux

Introduction-Operating System

EXPLORE YOUR POTENTIAL

Contents

- Introduction to Operating Systems .
- Operating System Structure.
- Main Functions and characteristics of Operating Systems .
- Types of Operating Systems.
- System call.

What is Operating System?

- An Operating System (OS) is an interface between a computer user and computer hardware.
- An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers

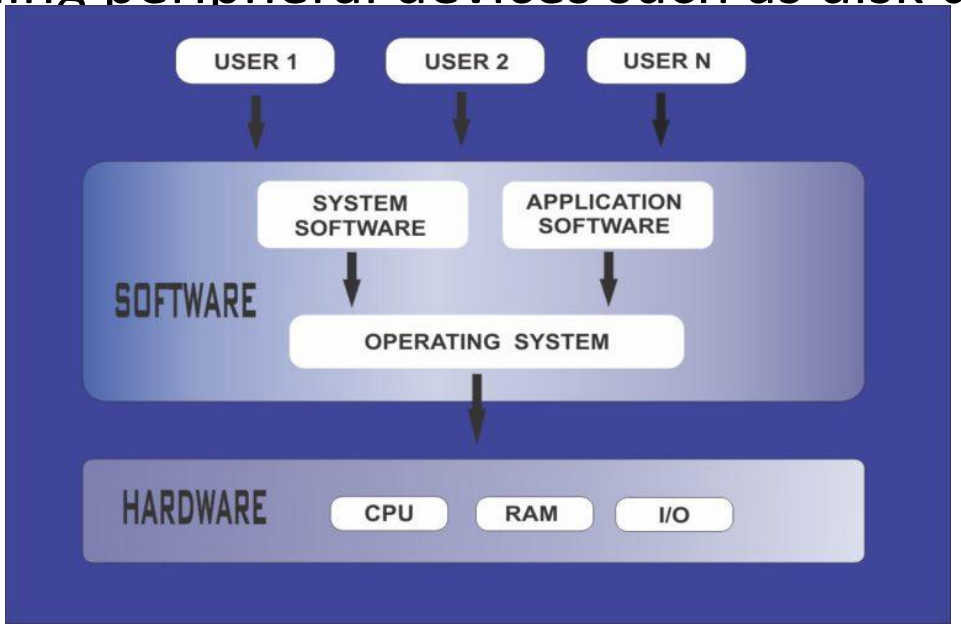
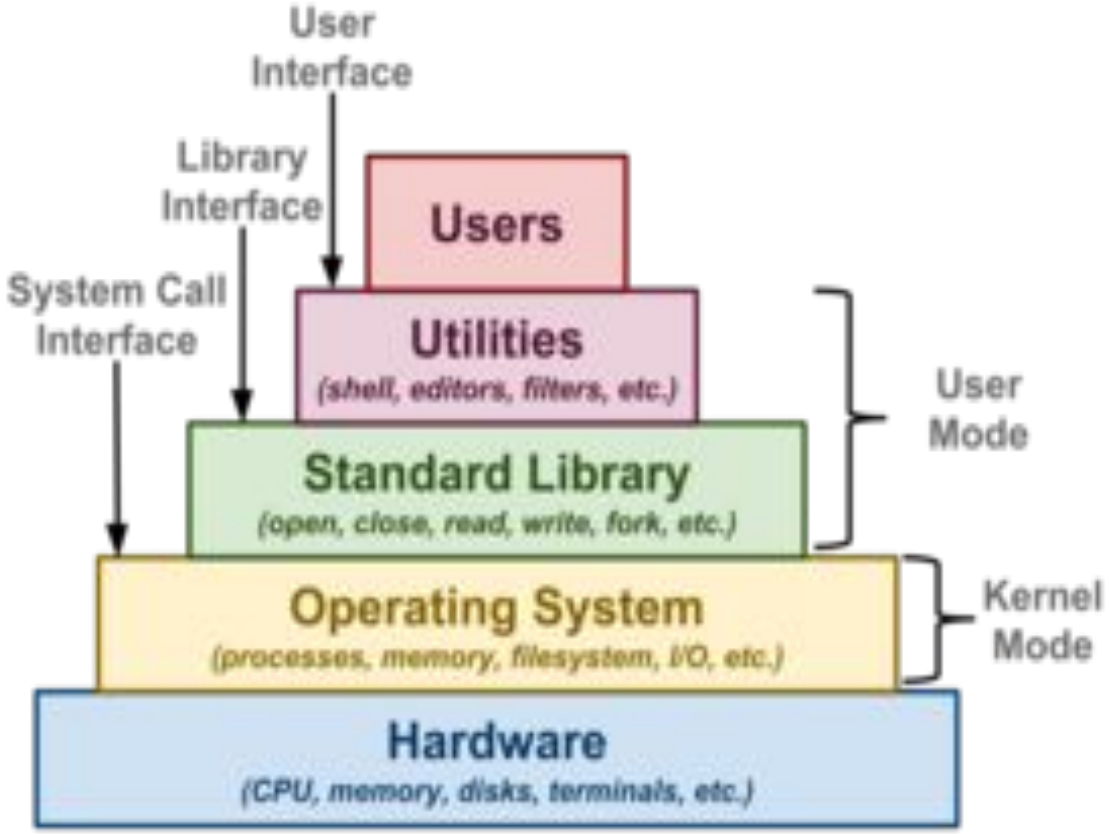


Fig-1 http://www.technicalfan.com/wp-content/uploads/2018/09/operating-768x512.jpg

Operating System Structure.



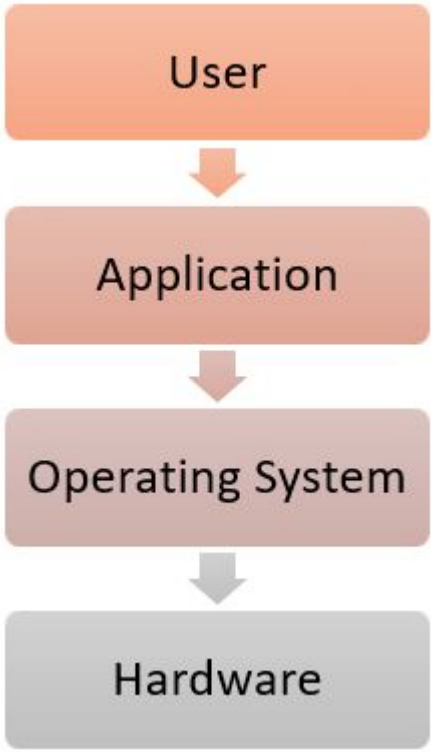


Fig-2 https://www3.nd.edu/~pbui/teaching/cse.30341.fa17/static/img/house.png

Main Functions of Operating Systems

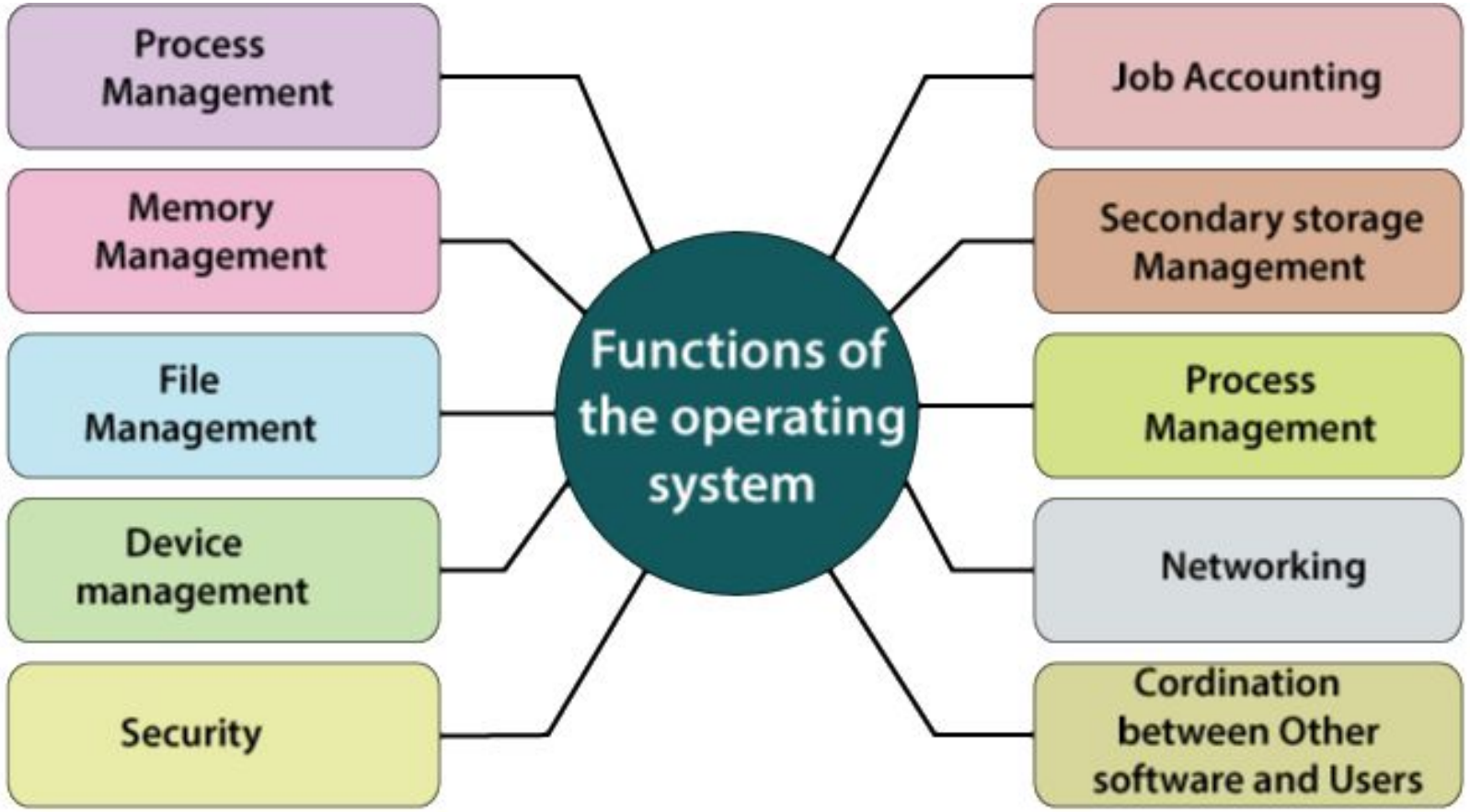


Fig 3:https://www.tutorialandexample.com/functions-of-the-operating-system/

Characteristics of Operating Systems

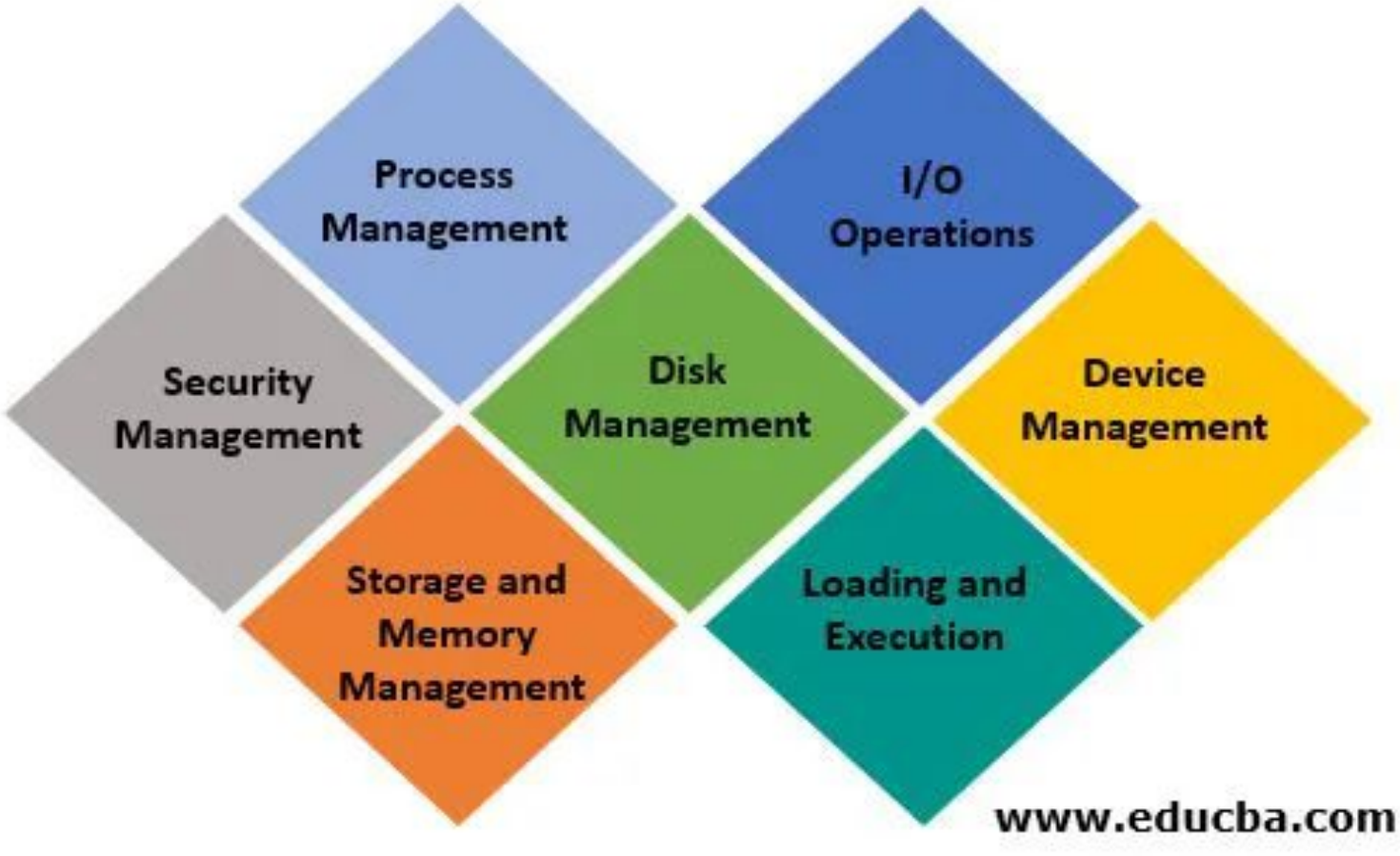


Fig-4https://cdn.educba.com/academy/wp-content/uploads/2020/01/features-of-the-operating-system.jpg.webp

Types of Operating Systems.

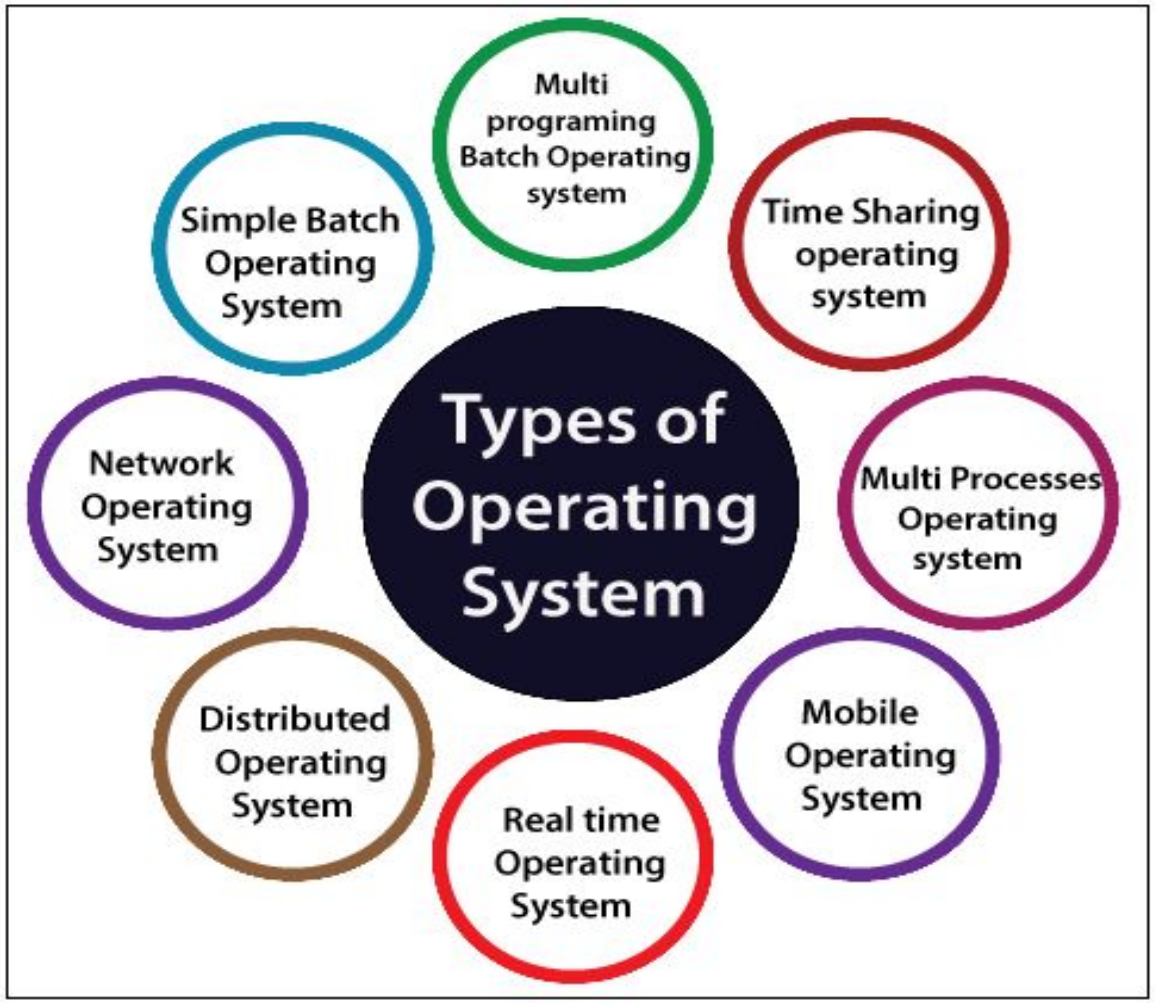


Fig-5 :https://www.tutorialandexample.com/wp-content/uploads/2020/02/Types-of-Operating-System.png

Simple Batch operating system

- ✔ There is no direct communication between the user and the computer.
- ✔ In this, firstly, the user submits a job to the computer operator, and after submitting the job, the computer operator creates a batch of the jobs on an input device.
- ✔ The batch of jobs is created on the basis of the type of language and needs. After the batch of the job is created, then a special program monitors and manages each program in a batch.
- ✔ ***Example:*** Bank Statements, Payroll system, etc.

Simple Batch operating system

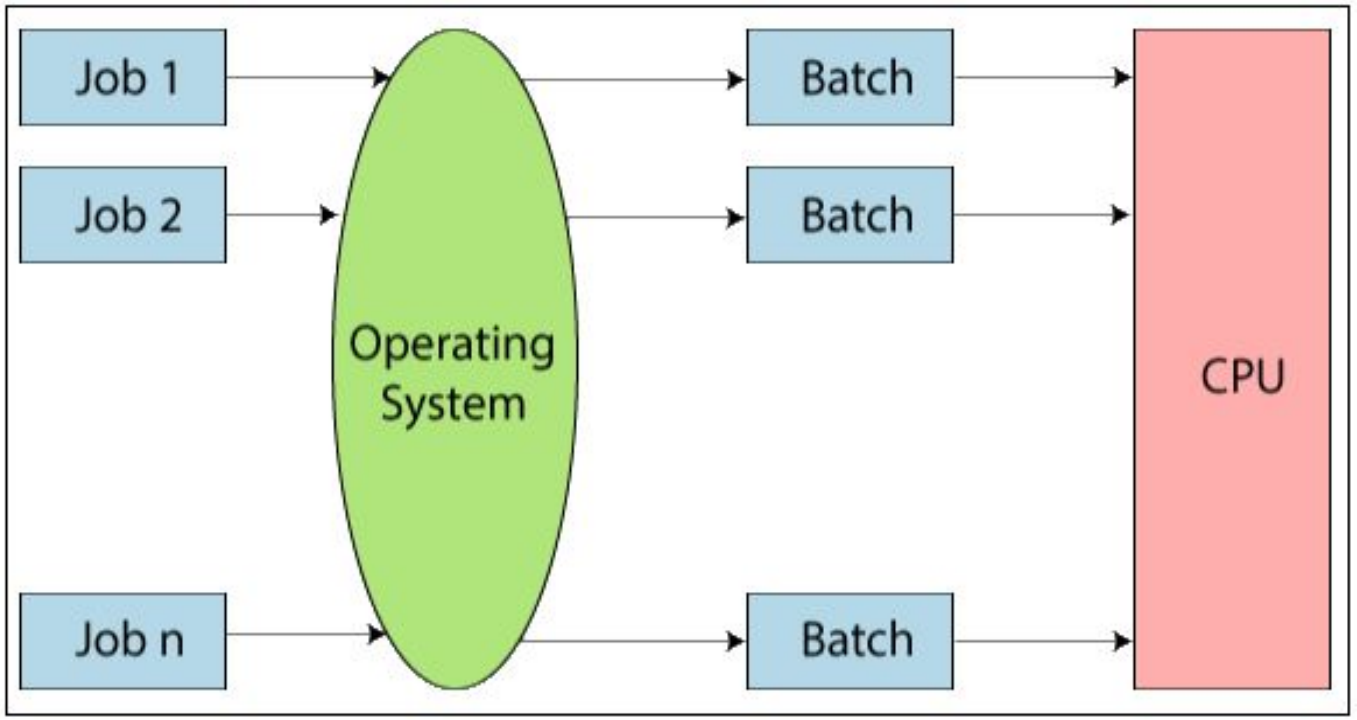


Figure 6: https://www.tutorialandexample.com/wp-content/uploads/2020/02/Types-of-Operating-System2.png

Batch Processing System

Advantages of Simple Batch Operating System

- ✔ No mechanism to prioritize the processes.
- ✔ There is no Direct communication between the user and the computer.
- ✔ The ideal time is very less for a batch operating system.

Disadvantages of a Simple Batch Operating System

- ✔ Debugging is very hard.
- ✔ The Batch operating systems are costly.

Multiprogramming Batch Operating System

- The Operating system first selects the job, and after selecting the job, it begins to execute one of the jobs from memory.

- When this job requires an I/O operation operating system, it switches to another job (operating system and CPU always busy). In this, the jobs present in memory are always minimum than the jobs present in the job pool.

- If different jobs are ready to execute at the same time, then the job is selected for CPU scheduling. In a simple batch operating system, sometimes CPU is idle and doesn't perform any task, but in the multiprogramming batch operating system, CPU is busy and will never sit idle and always keeps on processing.

Multiprogramming Batch Operating System

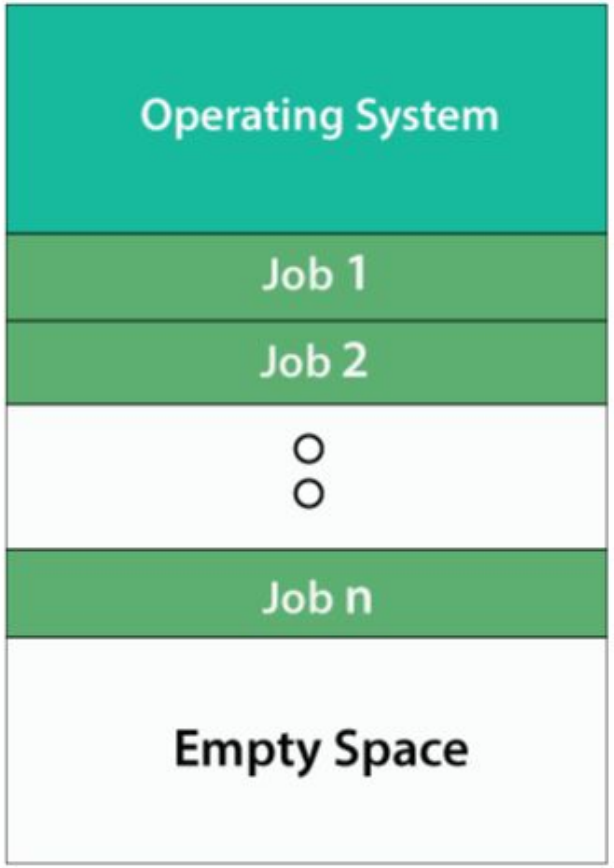


Fig 7:https://www.tutorialandexample.com/wp-content/uploads/2020/02/Types-of-Operating-System3.png

Time-Sharing Operating System

- In Time-sharing operating system, we assign some time to each job so that all the jobs work efficiently and smoothly.

- The task may be from a single user as well as multiple users. The time taken by each job to execute the job is known as quantum. After the interval of time is over, the operating system moves to the next task. Time-sharing allows the various number of users to be placed at various terminals so that they can use a particular system at the same time. Time-sharing is sharing the processor's time with multiple users simultaneously.

- The major difference between Time-sharing operating system and Multiprogramming batch operating system is that the time-sharing operating system aims to minimize the response time, whereas the Multiprogramming batch operating system is to increase the use of the processor.

Time-Sharing Operating System

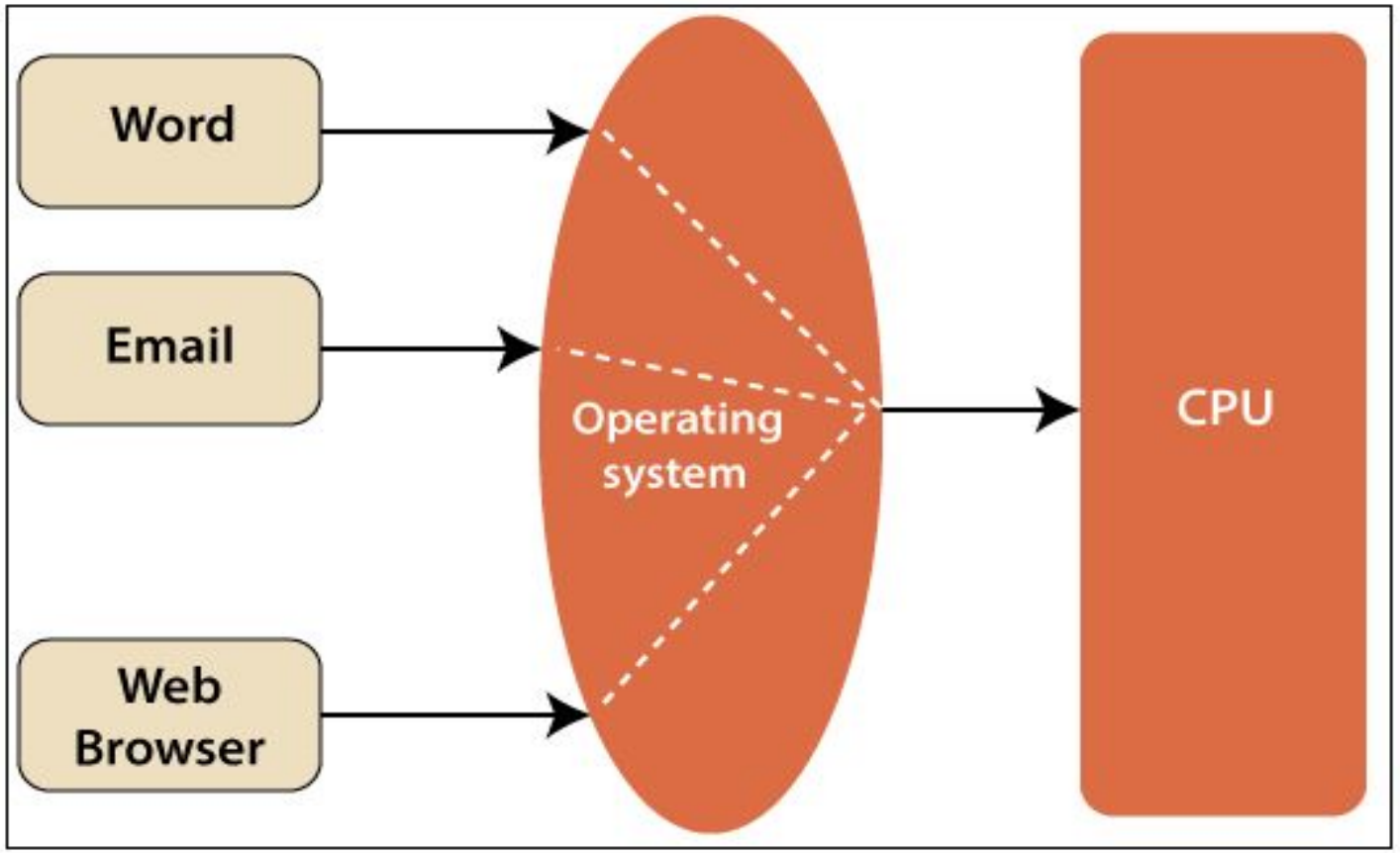


Fig 8:https://www.tutorialandexample.com/wp-content/uploads/2020/02/Types-of-Operating-System4.png

Time-Sharing Operating System

Advantages of Time-Sharing Operating System

- CPU remains idle for less time.
- No partiality occurs between the jobs.
- It quickly responses.

- **Disadvantages of Time-Sharing Operating System**

- The Problem of Data communication.
- Not reliable

Multiprocessor Operating System

- A Multiprocessor Operating System means the use of two or more processors within a single computer system.
- These multiple processors are in close communication and share the memory, computer bus, and other peripheral devices.
- These systems are known as tightly coupled systems.
- It offers high speed and computing power.
- In Multiprocessor operating system, all the processors work by using a single operating system.

Multiprocessor Operating System

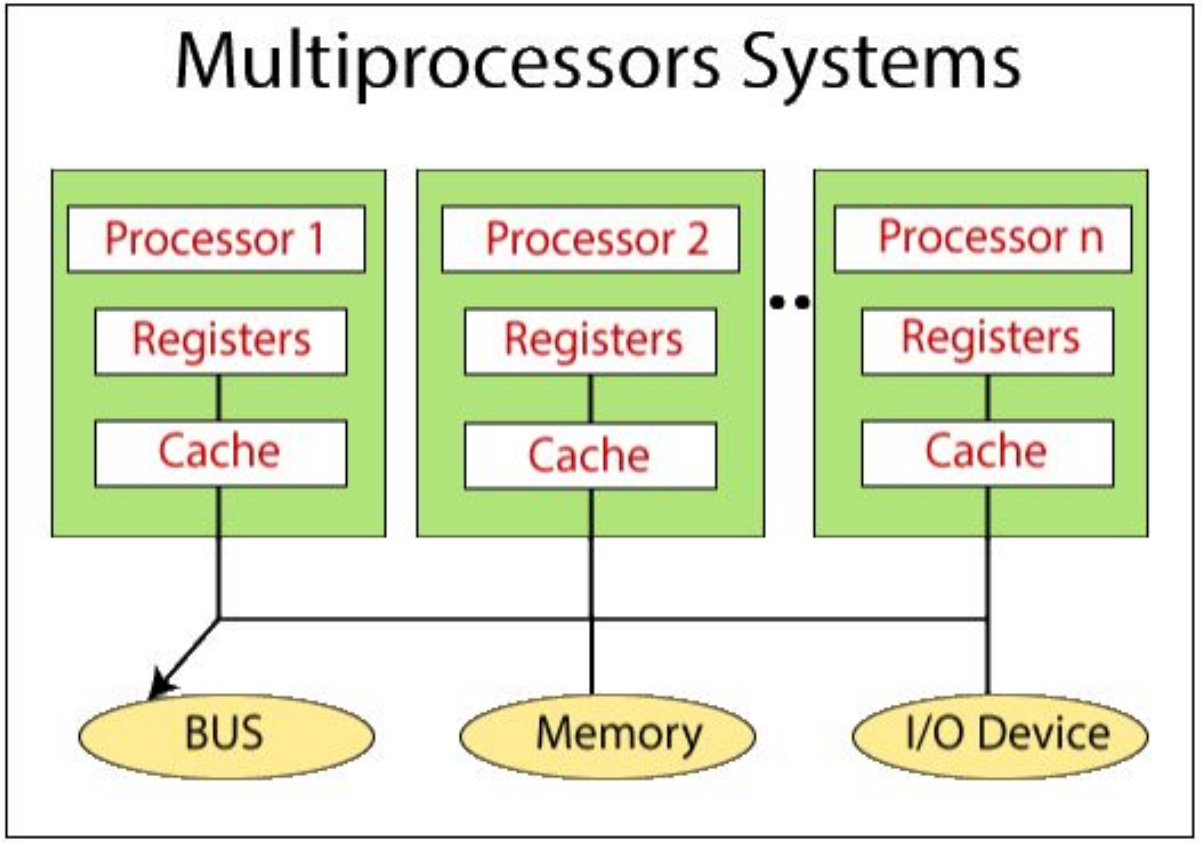


Fig 9:
https://www.tutorialandexample.com/wp-content/uploads/2020/04/Multiprocessor-system.png

Advantages of Multiprocessor

- ✔ Improved performance.
- ✔ By maximizing the number of processors, more work is done in less time. In this way, throughput is increased.
- ✔ Increased reliability.

Distributed Operating System

- ✔ Distributed systems are also known as loosely coupled systems.
- ✔ In this type of operating system, multiple central processors are used to serve multiple real-time applications and multiple users.
- ✔ In this, the jobs of data processing are shared in the processors accordingly.

Distributed Operating System

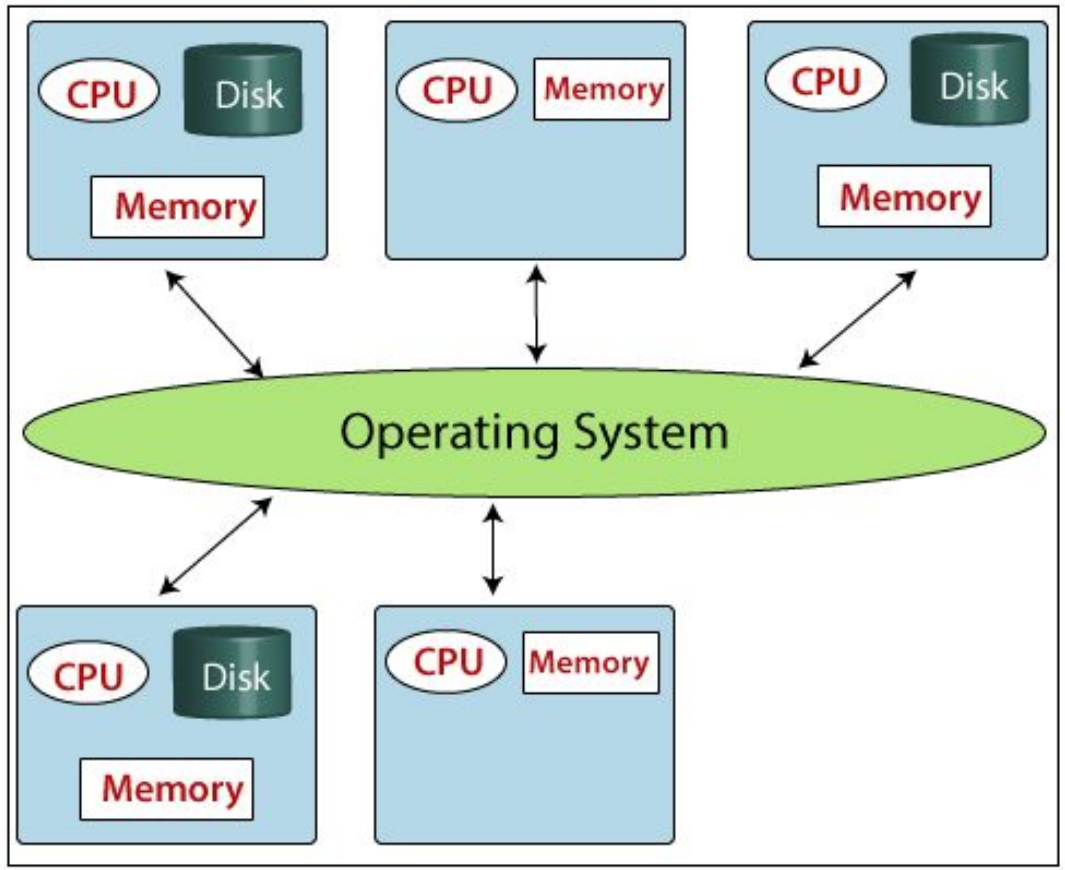


Fig 10:https://www.tutorialandexample.com/wp-content/uploads/2020/04/distributed-operating-system.png

Distributed Operating System

Advantages of Distributed Operating System

- The advantages of a distributed system are:
- Speed is increased by the exchange of information with the help of electronic mail.
- It offers better services to customers.
- Reduce delays in the processing of data.
- By resource sharing ability, a user at one site can access the resources that are available at another site.
- It offers reliability. If, in any case, one site fails then, the rest of the other sites work properly.
- Reduces load on the host computer.

Distributed Operating System

- **Disadvantages of Distributed Operating System**
- Distributed systems are more expensive.

- Failure of the central network stops the whole communication.

Real-Time Operating System

- Real-time operating systems are the operating systems that are used in real-time applications where the data processing must be done in a fixed interval of time.
- The Real-time operating system gives the response very fast and quick.
- The Real-time operating system is used when a large number of events are processed in a short interval of time.

Real-Time Operating System

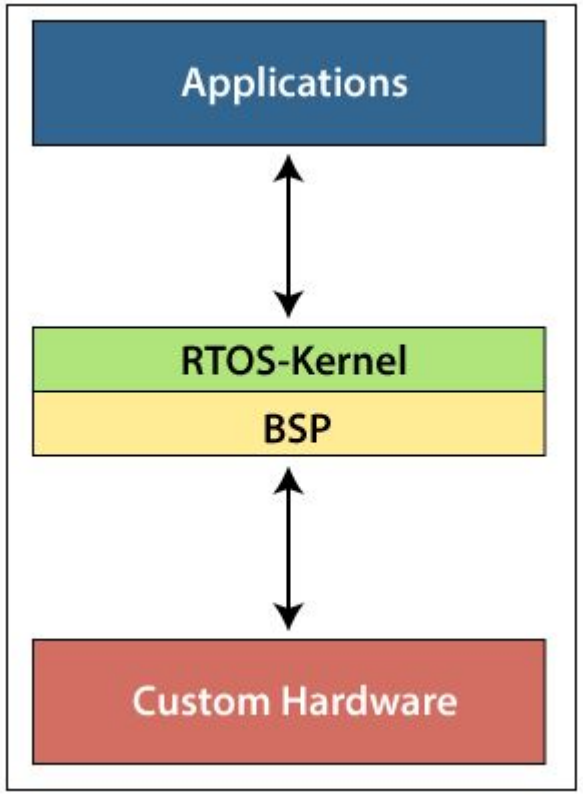


Fig 11: https://www.tutorialandexample.com/wp-content/uploads/2020/04/real-time-operating-system.png

Real-Time Operating System

Advantages of Real-Time Operating System

- Real-time operating systems are error-free.
- Real-time operating systems offer the facility of memory allocation management.
- It offers better utilization of devices and systems and produces more output from all the resources.
- The real-time operating system more focuses on running the applications and give less importance to those applications which are present in the queue.

Disadvantages of a Real-Time Operating System

- In Real-Time Operating System, the task of writing the algorithm is very challenging and complex.
- Real-Time Operating System is expensive because it is using heavy system resources.

System Call

- The interface between a process and an operating system is provided by system calls.
- In general, system calls are available as assembly language instructions.
- They are also included in the manuals used by the assembly level programmers.
- System calls are usually made when a process in user mode requires access to a resource. Then it requests the kernel to provide the resource via a system call.

System Call

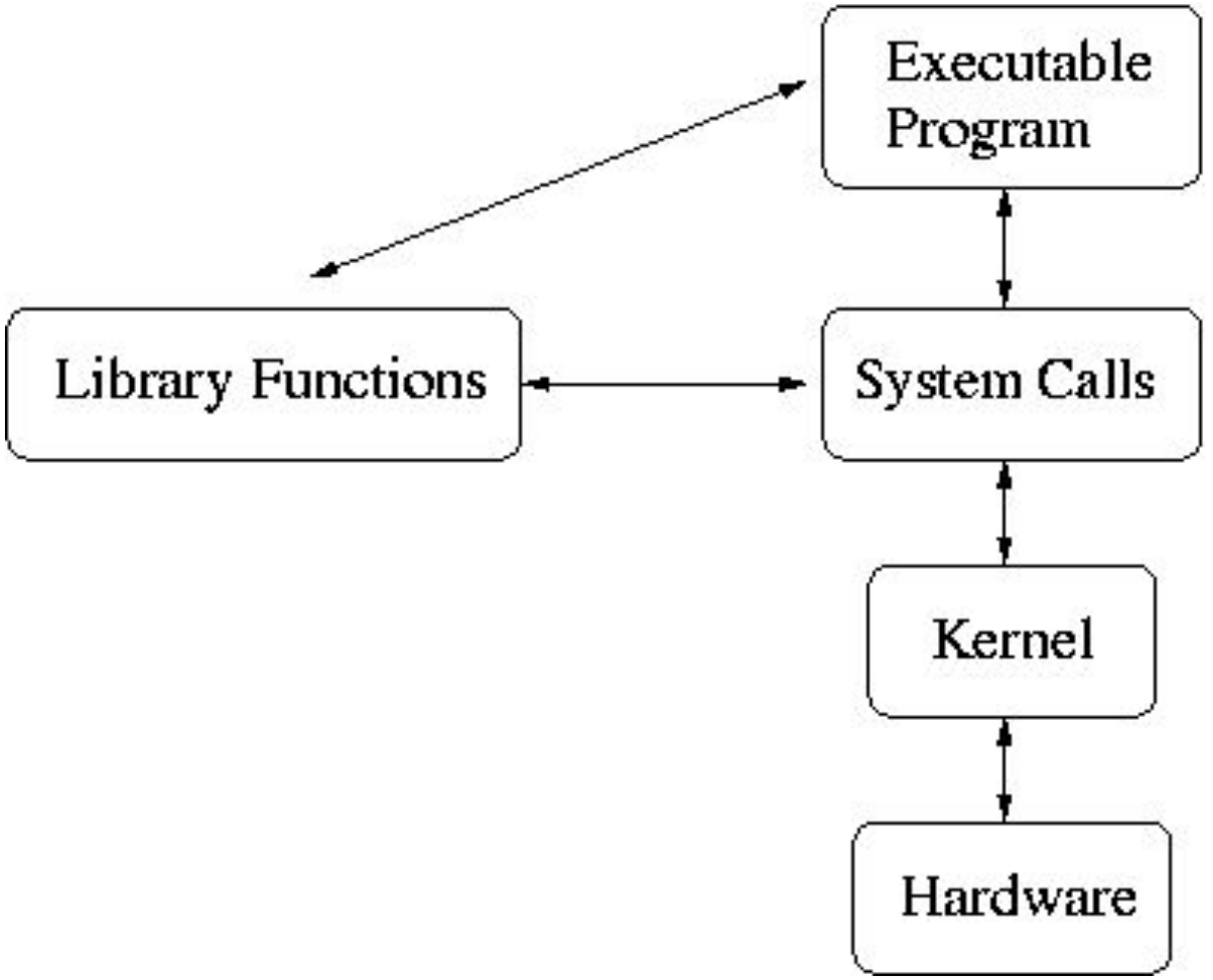


Fig 12:https://www.cs.uregina.ca/Links/class-info/330/SystemCall_IO/System_Calls.gif

Services Provided by System Calls

- ✔ Process creation and management
- ✔ Main memory management
- ✔ File Access, Directory and File system management
- ✔ Device handling(I/O)
- ✔ Protection
- ✔ Networking, etc

Home Work

- What is Operating System?
- What are the functions of Operating System?
- What is the difference between Multitasking and Multiprogramming Operating System?
- Define System Call.

References

Online Video Link

- https://www.geeksforgeeks.org/operating-systems/
- https://www.geeksforgeeks.org/operating-systems/
- **TEXT BOOKS**

✔ **T1:** Galvin, Peter B.,Silberchatz,A.,"*OperatingSystemConcepts*",AddisonWesley,9th Edition.

✔ **T2:** William Stallings, Operating Systems: Internals and DesignPrinciples,7th edition Pearson Education Limited, 2014ISBN:1292061944, 9781292061948.

REFERENCE BOOKS

✔ **R1:** Andrew Tananbaum, "*Operating System*", PHIL earning.

✔ **R2:** Godbole , Kahate, "*Operating System: A Concept Based Approach*", Tata Mc-Graw-Hill.

THANK YOU