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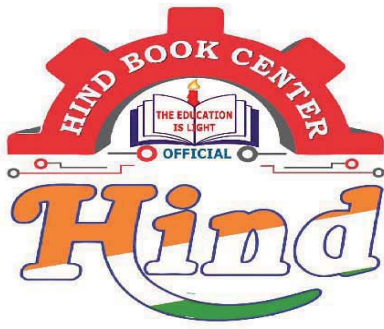
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Operating Systems

Trapti Singh..

Teaching Schedule

I. Introduction and Background.

II. Process Management

- process concept
- CPU scheduling ✓
- Synchronization
- Concurrent Programming.
- Deadlocks
- Threads.

III. Memory Management.

- RAM Chip Implementation
- Loading, Linking & Address Binding
- Techniques
 - paging
 - Multilevel paging.
 - Inverted paging
 - Segmentation
 - Segmented Paging.
- Virtual Memory.

IV. File Systems.

Textbooks

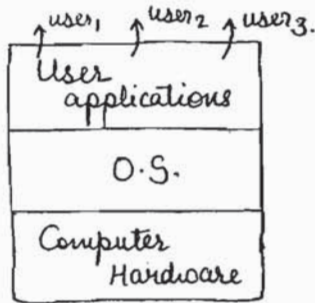
1. OS by Galvin.
2. Modern OS by A.S. Tenenbaum.
3. OS by William Stallings.

Chapter 1

Introduction and Background

Q. What is an OS?

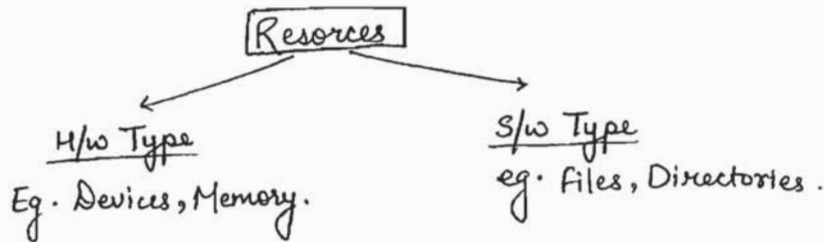
OS is an interface between user and computer hardware.



```
main()
{
  int x;
  printf("Hello");
}
```

internally calls write() System Call in order to communicate with the monitor.

- System Call: System call is the request made by the user program to the OS in order to get any kind of service.
- Operating System is also called as Resource Allocator because it is responsible for allocating resources of a computer.



Goals of O.S.

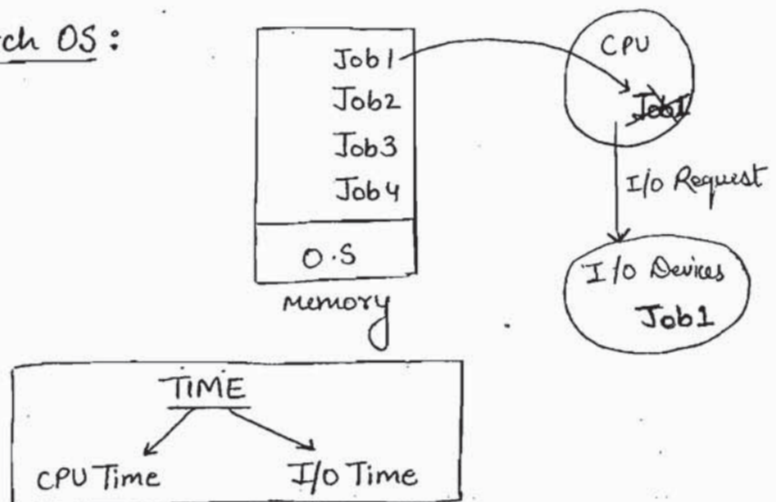
1. The primary goal is convenience. (easy to use)
2. The secondary goal is efficiency. (Stability).

Types of OS.

1).

Types of OS

(1). The Batch OS:

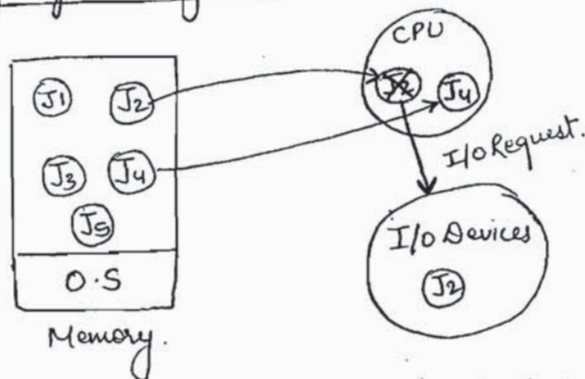


- If the Job is completed completely then only another Job will be scheduled onto CPU.
- increased CPU idleness.
- Decreased throughput of the system.

Throughput: No. of jobs completed per unit time. is called throughput of the system.

Exp: IBM OS/2

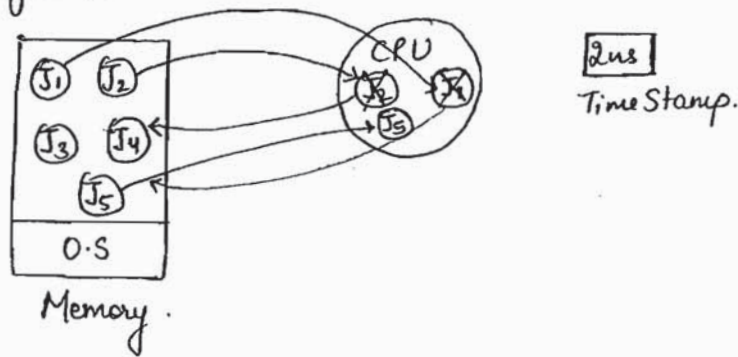
(2). Multiprogramming O.S.:



- If the job is leaving the CPU to perform IO operation, then another job which is ready for execution will be scheduled onto CPU.
- Advantage
 - Increased CPU Utilization.
 - Increased throughput of the system.

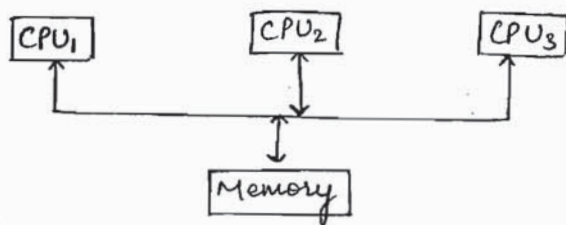
Exp: Windows, UNIX.

(3). Multitasking OS :



- Multitasking is an extension of multiprogramming OS.
 - The jobs will be executed in the time sharing mode.
- Exp: Windows, Unix

(4). Multiprocessor Systems :

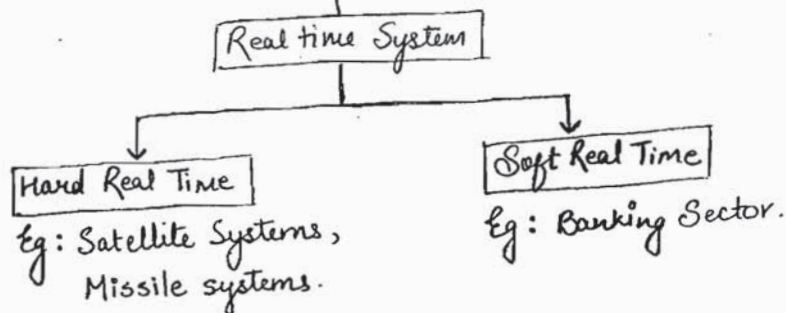


- Advantage
 - Increase the throughput of the system
 - Reliability
 - ↳ fault Tolerant Systems.
 - Economical.

Exp: UNIX.

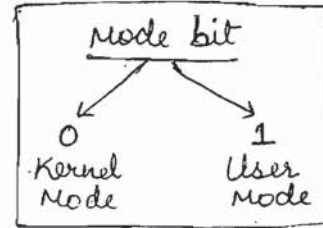
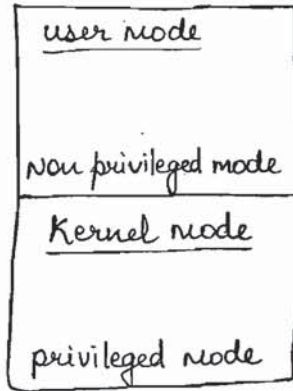
(5). Real Time Systems :

- The systems which are strict deadly time bound are called as real time systems.



Exp: S_x works, V_x works, RTO's.

Dual Mode Operation:



- In the hardware level, the instructions are executed by using dual mode operation like
 1. user mode / non privileged mode
 2. kernel mode / privileged mode / system mode / monitor mode.
- The dual mode operation is used in order to provide protection & security to the user programs. and also to the operating system from "errant users" (unauthorized users).
- It is purely the decision of the operating system in which particular mode, the instruction has to be executed.
- The mode bit is used to identify in which particular mode, the current instruction is executing.
- The priviledged instructions are executed in the kernel mode & non priviledged instructions are executed in the user mode.
- In the Boot time, the system always starts only in the Kernel mode.
- The operating system always runs only in the kernel mode

Note: The mode switching takes very less time compared to process switching.

Privileged Instructions :

1. I/O operation
2. Context Switching
3. Disabling the interrupts
4. Set the time of clock.
5. Clearing the memory map.
6. Changing the memory map.

Non-Privileged Instructions :

1. Reading the time of the clock
2. Reading the status of the processor.