1 Introduction to Operating Systems

1.1 Definition

A program that acts as an intemediary between user of a computer and computer hardware.

Goals:

- Execute user programs
- Making it easier to use compute hardware
- Efficient way to use computer hardware

1.2 Functions

A good OS should have following:

- Ease of use
- Good Performance
- Resource Utilization

OS is a resource allocator which manages all resources suchs as CPU time, storage devices etc, and decides between conflicting requests by processes for efficient and fair usage of resource. It is a control program that controls execution of programs to prevent misuse and managing control over devices. A **kernel** is component which keeps running all the time.

NOTE

Bootstrap is loaded at the power-up/reboot and is stored in ROM/E-PROM and initializes all aspects of system.

1.3 Structure

Multiprogramming[1]

One program cannot be keep the CPU busy and thus this calls for some kind of management which in this case is job scheduling. A subset of all

[1] Batch System

the programs is kept in the memory.One job is selected and run via job scheduling.

Time Sharing[2]

This is an extension of multiprogramming in which CPU switches job so frequently that users can interact with each job. Time sharing should be $< 1ms$. If the processes don't fit in memory, swapping moves them in & out to run. **Virtual Memory** allows execution of processes not completely in memory.

1.4 Interrupts

Interrupts alert CPU to events that require attention. Interrupt transfers control to the Interrupt Service Routine generally through **Interrupt vector**, a vector which contains the addresses of all service routines. When a CPU is interrupted, it immidiately transfer execution to that particular location. As soon as the interrputed process is completed the CPU should return to the interrupted computation.

Interrupt Driven

- **Hardware Interrupt** driven by one of the devices.
- **Software Interrupt** (Execution or Trap):
  - Software Error
  - Request for OS Service
  - Other process problems include infinite loop,processes modifying each other or the operating system.

1.5 OS Operations

1.5.1 Dual Mode Operation

[2]Multitasking