



Operating Systems

CSN-232

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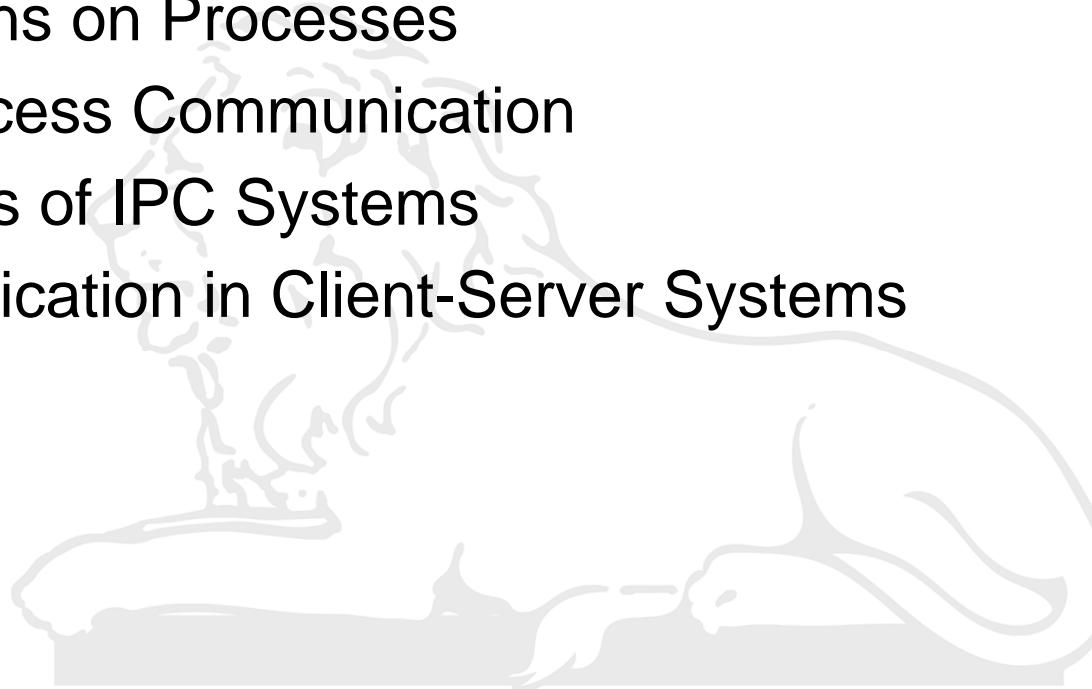
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Process Management

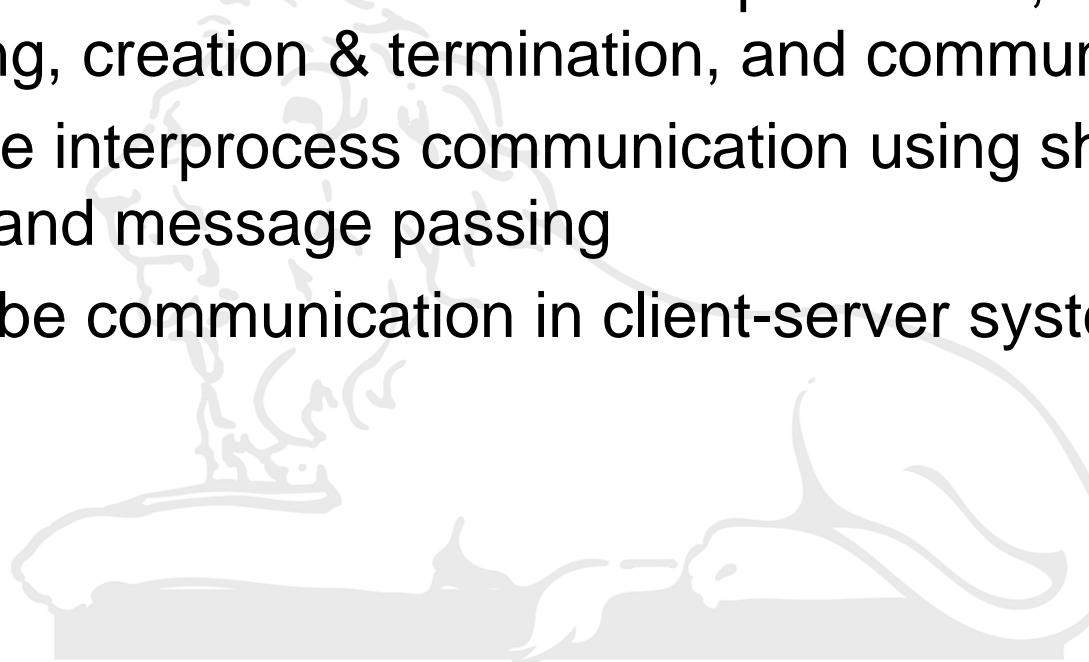
- Process Concept
- Process Scheduling
- Operations on Processes
- Inter-process Communication
- Examples of IPC Systems
- Communication in Client-Server Systems





Objectives

- To introduce the notion of a process -- a program in execution, which forms the basis of all computation
- To describe the various features of processes, including scheduling, creation & termination, and communication
- To explore interprocess communication using shared memory and message passing
- To describe communication in client-server systems





Scheduling Criteria

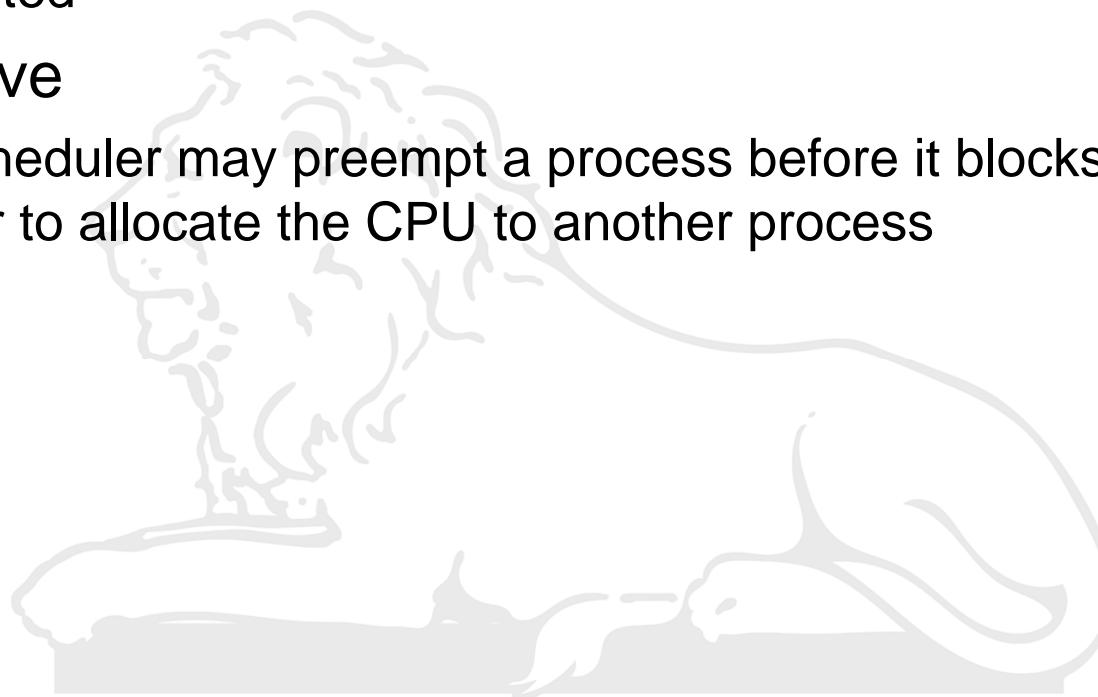
- CPU utilization
- Balanced Utilization
- Throughput
- Turnaround time
- Wait time
- Response time
- Predictability
- Fairness
- Priorities





Scheduling Algorithms

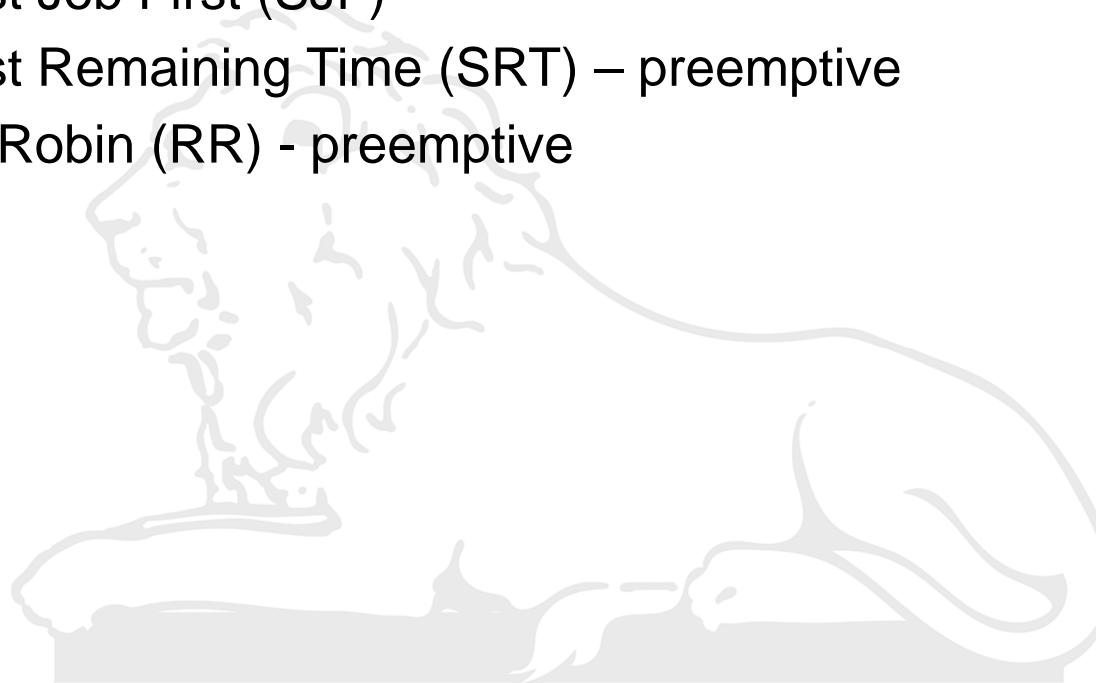
- Nonpreemptive
 - A process retained control of the CPU until the process blocked or terminated
- Preemptive
 - The scheduler may preempt a process before it blocks or terminates in order to allocate the CPU to another process





Scheduling Algorithms

- Based on Queue
 - First Come First Serve (FCFS)
 - Shortest Job First (SJF)
 - Shortest Remaining Time (SRT) – preemptive
 - Round Robin (RR) - preemptive





Processing Schedule date

| Process | Arrival time | Processing time |
|---------|--------------|-----------------|
| A | 0.000 | 3 |
| B | 1.001 ✓ | 6 |
| C | 4.001 ✓ | 4 |
| D | 6.001 ✓ | 2 |

(1) FCFS



Average turn around
time

$$\text{ATAT for FCFS} =$$

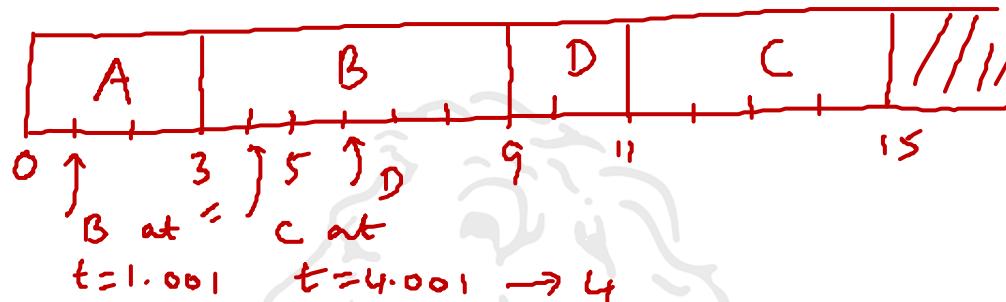
$$\left\{ (3-0) + (8-1) + (13-4) + (15-6) \right\}$$

$$= (3 + 8 + 9 + 9) / 4 / 4$$

$$= 7.25$$



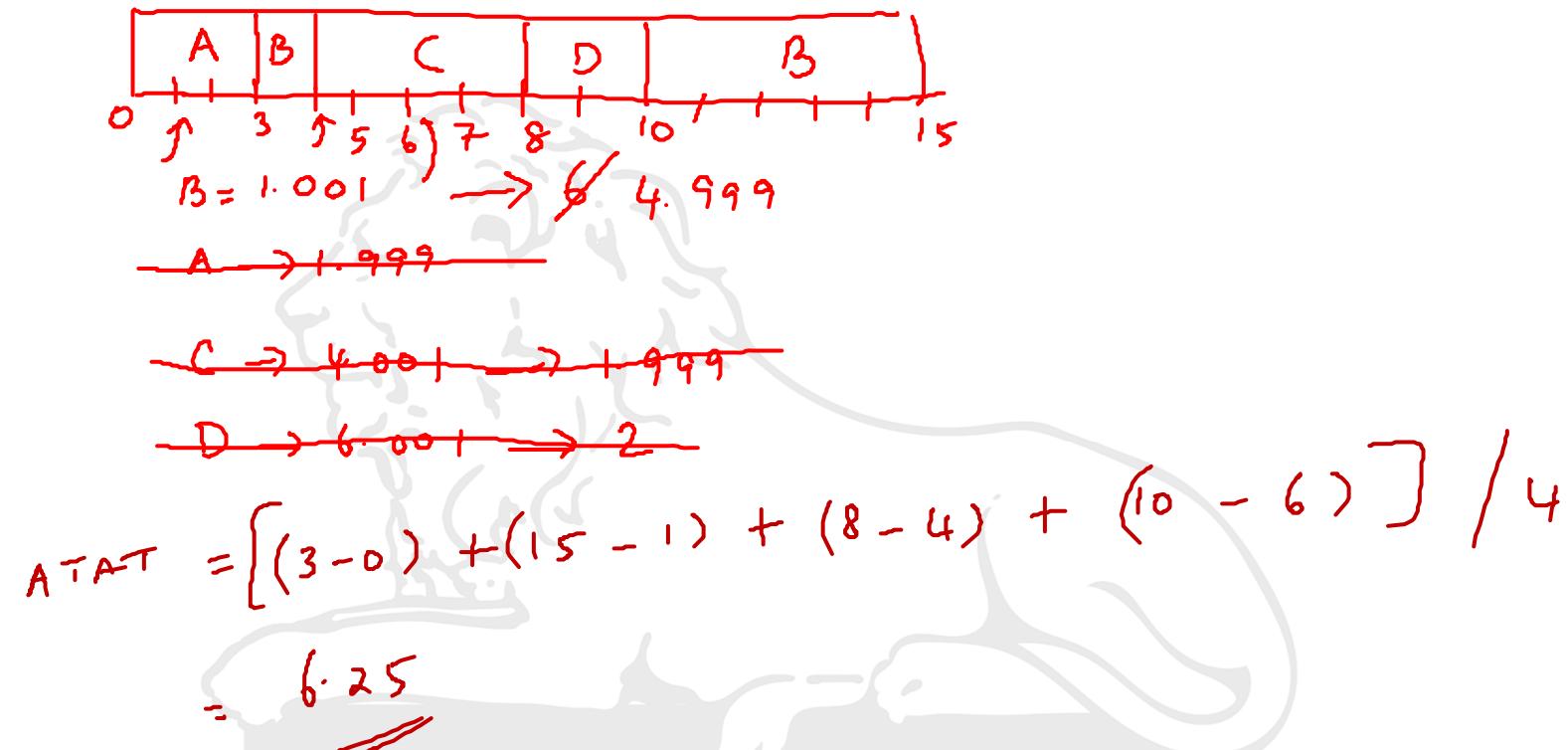
(2) Shortest Job First (SJF)



$$ATAT = \left[(3-0) + (9-1) + (15-4) + (11-6) \right] / 4$$
$$= 6.75$$

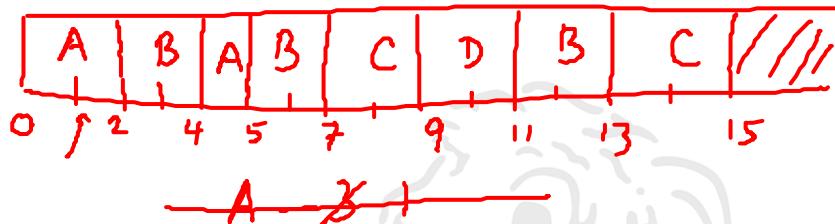


(3) Remaining Job First





(4) Round robin (Quantum = 2)



~~A - 3 +~~

~~B - 8 X 2~~

at 4.00 C - 4 X 2

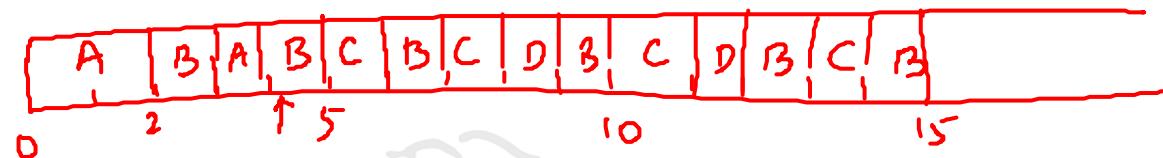
at 6.00 D - 2

$$ATAT = \frac{[(5-0) + (13-1) + (15-4) + (1-6)]}{4}$$

$$= 8.25$$



(5) Round robin (Quantum 1)



~~A B +~~
1. 001 B - 6 15 14 B Z 1
4. 001 C - 4 B Z 1
6. 001 D → Z X

$$ATAT = \frac{[(4-0) + (15-1) + (14-4) + (12-6)]}{4}$$

$$= \underline{\underline{8.5}}$$

