# Department of Computer Science and Engineering

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# PROCESS SCHEDULING

# Context Switch

- When CPU switches to another process, the system must save the state of the old process and load the saved state for the new process.
- Context-switch time is overhead; the system does no useful work while switching.
- Time dependent on hardware support.

# Preemptive/Non-preemptive Scheduling

- CPU scheduling decisions may take place when a process:

1. Switches from running to waiting state
2. Switches from running to ready state
3. Switches from waiting to ready
4. Terminates

- Scheduling under 1 and 4 is non-preemptive.
- All other scheduling is preemptive.

# Dispatcher

- Dispatcher module gives control of the CPU to the process selected by the short-term scheduler; this involves:
  - switching context
  - switching to user mode
  - jumping to the proper location in the user program to restart that program
- Dispatch latency – time it takes for the dispatcher to stop one process and start another.

# Scheduling Criteria

- CPU utilization – keep the CPU as busy as possible.
- Waiting time – the sum of the periods of time in which a process waits in the ready queue.
- Turnaround time – the interval from the time of submission of process to the time of completion of the process.
- Throughput – the number of processes that completed by the CPU in unit time.
- Response time – amount of time it takes from when a request was submitted until the first response is produced.

# Optimization Criteria

- **Maximize**
  - CPU utilization
  - Throughput
- **Minimize**
  - Turnaround time
  - Waiting time
  - Response time

# Exercise

1. Explain Context Switching.
2. What are the various criteria for CPU scheduling?
3. Describe the actions taken by a kernel to context-switch between processes.
4. Describe the differences among short-term, medium-term, and long term schedulers.
5. What are the various optimization criteria.

# References


1. Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley.

2. William Stallings, “Operating Systems: Internals and Design Principles”, 6th Edition, Pearson Education.

3. D M Dhamdhere, “Operating Systems: A Concept based Approach”, 2nd Edition, TMH.

**Thank You.**