Department of Computer Science and Engineering

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CS-501

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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.