CIS 452 - Operating Systems Concepts

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Images taken from Silberschatz book

Scheduling Criteria

CPU scheduler is responsible for finding best order to run processes

What is "best" will depend on goals of system

We will look at several different criteria for measuring effectiveness of CPU scheduling algorithms

CPU utilization -- how busy does the CPU stay?

Generally want this number to be as high as possible

In real systems 40% - 90% utilization should be the target

Throughput -- how many processes are completed in a set time?

For example, "5 processes per second" could be one measurement of throughput

Favors shorter processes

Turnaround time -- how long does it take for a single process to complete?

This is what any given process cares about

Includes time running on CPU, time waiting in I/O queues, time in ready queue, etc.

Note that turnaround time vs throughput is a lot like latency vs throughput, which you learned about in 351

Turnabout time is measured in units of time, such as seconds

Throughput is measured in processes per unit time, such as processes per second

Waiting time -- how long did process spend in ready queue?

CPU-scheduling algorithm does not affect how long a process takes once it is on CPU, nor how long I/O takes

Waiting time is directly affected by choice of scheduling algorithm

Response time -- how long does it take to respond to a user request?

In interactive environments, responsiveness may be a priority for users

Measured as how long it takes the process to start responding, rather than long it takes to completely output the response, because CPU scheduler has more effect on the former

Want to maximize

- CPU utilization
- throughput

Want to minimize

- turnaround time
- waiting time
- response time

Many processes on the system, and system may run indefinitely

Generally concern ourselves with the average of the measures

Sometimes the maximum or minimum is also appropriate -- for example, ensuring maximum response time is below some threshold

When comparing CPU scheduling algorithms here, we will primarily consider average waiting time