

Review for Midterm

CS 416: Operating Systems Design

Department of Computer Science

Rutgers University

<http://www.cs.rutgers.edu/~vinodg/teaching/416/>

Reminders

Write name on all answer books.

Closed book. Closed notes. No calculators, cell phones, laptops, etc.

No questions during the exam. If in doubt, make an assumption and write it down.

Be concise. Write just enough to answer questions.

Cheating will be punished severely!

Architecture

Caching. Why? Examples? When does it work well?

Invoking the OS. Mechanisms? Differences?

I/O event notification. Mechanisms? Differences?

Send/receive data to I/O devices. Mechanisms? Differences?

Processes and Threads

Stack. Activation records. What is stored there?

Heap. What is stored there?

Address space. What is it?

Process context. Thread context. What do they comprise?

PCB. TCB. Where are they stored? What do they store?

Context switching. How does it happen? Any problems?

Thread states.

User-level and kernel-level threads. Pros and cons?

Synchronization

Critical section. Locks. Semaphores. Monitors.

Atomic operations. Examples?

Spinning vs. blocking. Tradeoff?

Deadlock. Necessary conditions? Techniques for tackling deadlocks?

Banker's algorithm.

CPU Scheduling

Metrics: thruput, utilization, turnaround, response time, deadlines

Preemption.

Policies: FCFS, SJF, RR, Priorities, Feedback. Pros and cons.

Memory Management

Paging. Segmentation. How do they work? Pros and cons?

Translation Lookaside Buffer. How does it work? How are misses handled?

Translation from logical (virtual) to physical address. How?

Page tables. Where are they stored? What can we do to reduce their size?

Page replacement policies: FIFO, LRU, Optimal, 2nd chance, Nth chance.

Working set. Thrashing. Swapping.

File systems

File system implementation. Layout and management of disk pages.

Inodes and directory entries. UNIX-like inodes.

Managing free space. Bitmaps and free lists.

File system consistency semantics.

Log-structured file system implementation. Tradeoffs and design criteria. Segment cleaning mechanisms and policies. Tradeoffs.