



CSc 360

Operating Systems

Term Review

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What is this course?

Computer Operating Systems

CSc 360

* how about *human operating systems* (HOS)?

What is “computer”?

- From CSC230: Computer Architectures
 - CPU
 - PC, registers, ALU/FPU, instructions and microcode
 - now goes multi-CPU and multi-core!
 - Memory
 - * unified memory?
 - including main memory and virtual memory
 - I/O (including storage, HDD, SSD, etc)
 - port number
 - interrupt number
 - DMA number

What is “operating systems”?

- The first layer of software to manage computers
 - Operating system overview
 - multiprogramming, services, interfaces, structures, etc
 - Process Management
 - how to control and coordinate CPU
 - Memory Management
 - how to control and coordinate memory
 - I/O Management
 - mainly storage management in this class
 - how to control and coordinate them

1. In User Mode, the CPU is allowed to access peripheral devices like the hard drive or network card. (correct answer in blue)

A) True

B) False

2. Why are operations like "Setting the Clock" or "Memory Cleaning" restricted to Kernel Mode?

A) Because they are slow.

B) Because they are dangerous operations.

C) Because User Mode does not have enough memory.

How to manage CPU

- Process management
 - process & thread operations
 - concepts, create/schedule/comm/sync/terminate, etc
 - CPU scheduling
 - scheduler, dispatcher, scheduling **algorithms**, etc
 - process synchronization
 - critical section, mutual exclusion, software **algorithms**, hardware primitives, semaphores, monitors, examples, etc
 - deadlock
 - prevention, avoidance, detection/resolution **algorithms**, etc

3. If Thread A locks a Mutex,
Thread B is allowed to unlock it.

A) True

B) False

4. Which mechanism is best used to manage a resource pool with N available items (e.g., 5 available printers)?

A) A Mutex

B) A Counting Semaphore

B) A Binary Semaphore

5. What are the two standard atomic operations usually associated with Semaphores?

A) Open and Close

B) Start and Stop

C) Wait (P) and Signal (V)

6. Which of the following is a common technique to prevent Starvation?

A) Rebooting the computer

B) Aging (gradually increasing priority)

C) Adding more hard drives?

How to manage memory

- **Memory management**
 - memory operations
 - concepts, logical/physical address, mapping, etc
 - memory allocation
 - contiguous/noncontiguous, internal/external fragmentation
 - paging and segmentation
 - page table organization and **algorithms**
 - virtual memory
 - page replacement **algorithms**
 - page allocation **algorithms**

How to manage I/O

- **Filesystems**
 - filesystem operations
 - file, directory, filesystem
 - filesystem implementation
 - allocation **algorithms**, free space management, etc
 - file directory/allocation table, i-node
 - **disk management**
 - disk scheduling **algorithms**, RAID, etc
- **I/O systems**
 - I/O access, characteristics, interfaces, structures, etc

* how to store what you learned and look up quickly?

7. An Inode (Index Node) stores the file's data content (the actual text or pixels).

A) True

B) False

8. The size of Virtual Memory is NOT strictly limited by the amount of Physical RAM installed in the computer.

A) True

B) False

9. What is the purpose of the TLB (Translation Lookaside Buffer)?

A) To store the entire Operating System.

B) To cache recent Virtual-to-Physical address translations for speed.

C) To increase the size of the hard drive.

10. Is Thrashing caused by the CPU being too slow?

A) Yes

B) No

(US) Thanksgiving today!

- Thanks to our TA Jinwei, Quanwei and Johnathan!
 - email me if you have anything to say
 - nominate them for UVic TA award if you like!
- Thanks to our course rep too!
 - Fawzan Hussain
- Thanks to Prof. Jianping Pan for sharing slides
 - <https://webhome.cs.uvic.ca/~pan/>
- Questions, comments, suggestions
 - wenjnyang@uvic.ca

What's next

- After M3 (next Monday)
 - no class anymore
 - no office hours anymore
 - welcome to meet me by appointment

Official course feedback

- Course experience survey (CES)
 - <http://ces.uvic.ca>
 - we need to improve response ratios
 - we appreciate your feedback a lot