CS330 Final Exam
Instructor: Daryl H. Hepting
Semester: 200430 (Fall)
Monday, December 13, 14:00-17:00

This exam will be graded out of 100 marks (though there are really 108 marks available). You have 180 minutes. You must pass the final to pass the class.

The exam is printed on BOTH sides of this paper. Write all final answers in the exam booklet.

There are 18 questions here. You need to answer 15 of them. You need to indicate clearly on the front of your exam booklet which questions you did NOT answer. If you don't do this, I will mark the first 15 questions I see.

I will not clarify any questions during the exam period. If you need to make assumptions to answer the question, include them in your response.

Remember that I prefer quality over quantity in your answers (point form is acceptable)! Sometimes, less is more. All the questions have the same weight.

Fully complete the front page of the exam booklet (1 x 1 = 1).

Return this exam sheet in your exam booklet (1 x 1 = 1).

What was Dr. Hepting's personal story of pre-emption? (1 x1 = 1).

Answer 15 of the following 18 (15 x 7 = 105)

1. Why can it be said that it is good to increase the level of multiprogramming? What are some different strategies to do this? When might it be advantageous to decrease the level of multiprogramming?

2. Describe the multi-level feedback queue algorithm for process scheduling. What are its advantages and disadvantages? Use an example.

3. Describe the implementation of I/O operations on a multi-user computer system. Why is this approach necessary and why?

4. Describe the progression of memory management from the first computers to modern ones with virtual memory. What have been the key steps along the way?

5. Discuss what is required of the kernel to switch to perform a context switch, for lightweight and heavyweight processes.

6. What are 5 different CPU scheduling criteria? What might you choose for an interactive system?

7. What is demand paging? Why is it difficult to add to a system? Describe the steps to access a memory location in a system with virtual memory and paging.

8. What is Belady's anomaly? What property do stack algorithms have? Illustrate the contents of the page frames (3 available) with the following reference string under 2 different page-replacement algorithms (choose one stack algorithm and 1 not, from: FIFO, LRU,LFU,MFU). Reference string: 701203042303

9. Describe the purpose of caching and discuss 3 uses of caching as discussed during the semester.

10. What is fragmentation? Where can it occur? Can it be eliminated? Use 2 examples from the semester.

11. Describe the dining philosopher's problem. In what ways can one deal with the possibility of deadlock? Describe each very briefly.

12. Describe the alternatives for directory organization. What is needed to access a file through NFS (Network File System)?

13. How might sharing of an editor (for example) between processes be accomplished? Which approaches make it easy, and which make it difficult? What structures are required?

14. What are 3 problems one might encounter with critical regions? Describe semaphores and how they could be used to enforce mutually exclusive access to critical section.

15. Describe the different approaches to allocation of space on a disk, and how these choices can affect performance of different access methods.

16. With respect to storage management, we discussed memory and file systems. Describe how these two are similar, with examples.

17. Discuss ways in which users of operating system are protected (possibly from other users). Use examples from throughout the semester.

18. What is thrashing? How should it be handled? What is the relationship, if any, between page fault frequency and thrashing?