Operating Systems (11335)
First Exam, Spring 2017/2018

April 1, 2018

Time Allowed: 60 minutes

Instructor Name: _____

Section Time: _____

Student Name: _____

Student Number: ☐☐☐☐☐☐☐☐☐

Question	Points	Score
1	4	
2	4	
3	4	
4	4	
5	4	
6	4	
7	4	
8	4	
Total	20	

Answer <u>Five</u> questions out of <u>eight</u> questions

Question 1: (4 points)

    a) If you are asked to define an O.S, what appropriate definition would give? Justify why.

    b) What will happen if the scheduler doesn't balance between I/O bound and CPU bound processes?

Question 2: (4 points)

    a) Explain two cases of switching from user mode to OS supervisor mode.

    b) What is a privileged instruction?

Question 3: (4 points)

a) Explain the terms:

    i. "interrupt"

    ii. "trap"

    iii. "interrupt vector".

b) A typical printed page of text contains 50 lines of 80 characters each. Imagine that a certain printer can print 6 pages per minute and that the time to write a character to the printer's output register is so short that it can be ignored. Does it make sense to run this printer using interrupt-driven I/O if each character printed requires an interrupt that takes 50 μsec all-in to service? Explain.

Question 4: (4 points)

Explain the term "context switching" with reference to:
  a) Multiprogramming with a uniprocessor
  b) Multithreading at kernel level
  c) Multithreading at user level

Question 5: (4 points)

  a) Distinguish between the modular system and Microkernel system?
  b) Why every process is assigned an address space and explain the multiple parts of the process briefly?

Question 6: (4 points)

a) Using Amdahl's Law, calculate the speedup gain of an application that has a 70 percent parallel component for
   1. two processing cores

   2. four processing cores.

b) Compare between direct communication and indirect communication

Question 7: (4 points)

a) Give advantages and disadvantages for each of the OS structures?

Question 8: (4 points):

a) Which of the following components of program statements are shared across threads in a multithreaded process?
- Register values
- Heap memory
- Global variables
- Stack memory

b) Consider two scenarios:
- i) two user threads are mapped into one kernel thread, and
- ii) each of the two user threads is mapped into a unique kernel thread.

Which achieves better concurrency in execution? And why?

c) What is the role of a thread library? And explain the two ways of implementing a thread library.

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