جامعة الأميرة سمية للتكنولوجيا
PSUT
Princess Sumaya University for Technology

A

Operating Systems (11335)
First Exam, First Semester 2018/2019
Fall 2018

November 10, 2018

Time Allowed: 60 minutes

Instructor: Dr. Mohammad Ababneh

Student Name: _____ **Section:** _____

Student Number: | | | | | | | | |

Major: ☐ **Computer Science** ☐ **Software Engineering** ☐ **Graphics** **Other:** _____

Question	Points	Score
1	4	
2	4	
3	4	
4	4	
5	4	
Total	20	

Question 1: (4 points): Answer the following Multiple-Choice Questions

1. **change in the status of a mouse is signaled to the OS by:**
   a) I/O interrupt
   b) Software interrupt
   c) Interrupt vector
   d) Process interrupt
2. **With a uniprocessor if one thread is blocked then:**
   a) all other threads become active (running) at a time
   b) all other threads get blocked
   c) all other threads can access every address in the task
   d) another thread can run
3. **Protection is:**
   a) mechanism for controlling access of processes
   b) defense of the system against internal threats
   c) defense of the system against external threats
   d) safeguarding the system from overflow
4. **Data parallelism** –
   a) distributes subsets of the same data across one core, same operation on each
   b) distributes subsets of the same data across multiple cores, different operations on each
   c) distributes subsets of the same data across multiple cores, same operation on each
   d) distributes subsets of the same data across one core, different operations on each
5. **In multi-threading, each thread has its own copy of:**
   a) registers and stack but sharing data, files only
   b) registers and stack but sharing data, files, code
   c) data, files and code but sharing registers and stack
   d) data and files only but sharing registers and stack
6. **A program at the time of executing is called**
   a) Dynamic program
   b) Static program
   c) Banded Program
   d) A Process
7. **Which one of the following is <u>NOT</u> a property of the communication link of Process Indirect Communications**
   a) Link established only if processes share a common mailbox
   b) Each pair of processes may share several communication links
   c) A link is associated with exactly one pair of communicating processes
   a) Link may be unidirectional or bi-directional
8. **Which one of the following is responsible for CPU scheduling?**
   a) I/O system
   b) Kernel
   c) Synchronous interrupt
   d) Asynchronous interrupt

Question 2: (4 points)

a) What is DMA? Illustrate your answer with a graph. **(1 point)**

b) How do the user goals differ from the system goals when designing a new operating system? **(2 points)**

c) What is an OS Shell? **(1 point)**

Question 3: (4 points): solve two of (b, c, d) or three for a bonus

a) What is a system call? **(1 point)**

b) What are the **three** general methods used by system calls to pass parameters to the OS? **(1.5 points)**

c) A typical printed page of text contains 60 lines of 80 characters each. Imagine that a certain printer can print 10 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 100 milliseconds all-in to service? Explain. **(1.5 points)**

Question 4: (4 points)

a) What are the **five** states of a process? Describe them briefly and give one example of an event that might change each state. **(2 points)**

b) What is process switching / context switching? Support your answer with a diagram. **(2 points)**

Question 5: (4 points):

a) Mention **three** benefits of multi-threading and briefly explain them. **(1.5 points)**

b) Why multi-threading is considered light-weight while multi-processing is considered heavy-weight? **(1 point)**

c) Using Amdahl's Law, calculate the speedup gain of an application that has a 80 percent parallel component for: **(1.5 points)**
   1. Four processing cores

   2. Eight processing cores

   3. What is the difference in the amount of improvement (speedup) in performance gained by adding Eight cores compared to the original Four cores? Is the investment justified? Explain.