King Saud University

College of Computer and Information Sciences
Computer Science Department

Course Code:	CSC 227
Course Title:	Operating Systems
Semester:	Spring 2018
Type of Examination:	Midterm 1Exam.
Exam Duration:	90 Minutes

Student Name:	
Student ID:	
Student Section No.	
Instructor Name:	

Tick the Relevant	Computer Science B.Sc. Program ABET Student Outcomes	Question No. Relevant Is Hyperlinked	Covering %
X	a) Apply knowledge of computing and mathematics appropriate to the computer science;	Q.1	25%
X	b) Analyze a problem, and identify and define the computing requirements appropriate to its solution	Q.2-Q.4	50%
X	c) Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;	Q.5	25%
X	d) Function effectively on teams to accomplish a common goal;		

	Full Mark	Student's Mark
Question No.1	8	
Question No.2	3	
Question No.3	3	
Question No.4	3	
Question No.5	3	
Total	20	

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Question 1. [8 Marks: CLO (a)] Select ONLY ONE ANSWER (the best answer).

Copy your answer for question 1-1 to 1-16 in the table on page2. ONLY THAT TABLE WILL BE GRADED.

1.	The mode bit is added to the hardware of the computer to indicate:
A.	The mode of processing: CPU processing or I/O processing.
B.	The mode of operation: kernel mode or user mode.
C.	The mode of disk controller: reading mode or writing mode.
D.	The mode of CPU caching: enabled or disabled.

2.	A program counter is used to:
A.	Count the number of executed instructions so far.
B.	Count the total number of instructions in a program.
C.	Specify the location of the next instruction to be executed.
D.	Count the number of instructions the CPU will execute for a program within the current time slice.

3.	In a multiprocessor environment, making sure that the local cache of each CPU maintains the same value of a datum is called:
A.	Cache coherency.
B.	Cache redundancy.
C.	Cache poisoning.
D.	Cache replacement policy.

4.	A database server provided by a cloud service provider is an example of:
A.	Software as a Service.
B.	Platform as a Service.
C.	Server as a Service.
D.	Infrastructure as a Service.

5.	Initial program that runs at the startup of computer and initializes all aspects of the system is called:
A.	Firmware
B.	Bootsware
C.	Software
D.	Interrupt vector

6.	The program that handles interrupt is called:
A.	Interrupt vector
B.	Interrupt service routine
C.	Interrupt supervisor
D.	Interrupt service provider

7.	Handheld computers are optimized for:
A.	Design and cost
B.	Software and hardware
C.	Usability and battery life
D.	Speed and size

8.	When an external device needs processor attention the device sends …….. signal to the processor.
A.	Timer
B.	Stop
C.	Handler
D.	Interrupt

9.	operating-system services are functions that are helpful to the user such as:
A.	Load a program into memory and run that program.
B.	Process I/O operations for the running program

10.	Processes may exchange information, on the same computer or between computers over a network. Communications may be via:
A.	via shared memory only
B.	through message passing only

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C.	File manipulation for the running program
D.	All the above

C.	via shared memory or through message passing
D.	None of the above

11.	APIs are:
A.	Win32 API for Windows
B.	POSIX API for POSIX-based systems
C.	Java API for the JVM.
D.	All the above

12.	Why would a programmer use APIs rather than invoke actual system calls?
A.	Portability: An application programmer designing a program using an API can expect his/ her program to compile and run on any system that supports the same API.
B.	Actual system calls may be more detailed and hence difficult to work with.
C.	A and B
D.	None of the above

13.	Which of the following components is a hardware component?
A.	The CPU scheduler
B.	The memory controller
C.	The file system
D.	The disk driver

14.	In microkernel communication takes place between user modules using ----------
A.	Bus
B.	Shared memory
C.	Message passing
D.	System call

15.	In a modular operating system, which of the statements is true?
A.	All components can be loadable as needed within the kernel
B.	All components communicate through the kernel message passing
C.	All components run in user mode
D.	Each component uses functions and services provided only by lower-level layers.

16.	Which system structure the different OS modules are loadable on need basis into the kernel?
A.	Microkernel system structure
B.	Monolithic system structure
C.	Layered System structure
D.	Modular system structure

Please copy your answer for question 1-1 to 1-12 in the following table:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
B	C	A	B	A	B	C	D	D	C

11.	12.	13	14	15	16	17.	18.	19.	20.
D	C	B	C	A	D				

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Question 2. [3. Marks: CLO (a)]

2.1 Two common computing models are: client-server computing computing model and peer-to-peer computing model. What is the difference between these models? [1 mark]

In the client-server model, the clients request services and only the server can provide a service. In peer-to-peer model, each node can request or provide services.

2.2 What is an advantage of peer-to-peer model over client-server model? [0.5 marks]

No single point of failure or bottleneck.

2.3 I n a peer-to-peer model, there are two general ways to determine what services are available, explain these two ways? [1.5 marks]

Centralized service lookup: in this way, when a node joins a P2P network, it registers its service with a centralized lookup service on the network which can then be consulted by nodes requesting service.

Discovery protocol: A node requesting a service broadcasts a request to all nodes in the network. A node that provides the service can then respond to such request.

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Question 3. **[3. Mark]** CLO (b)

3.1 What is the main advantage of multiprogramming? (1.5 Points)
Multiprogramming makes efficient use of the CPU by overlapping the demands for the CPU and its I/O devices from various users. It attempts to increase CPU utilization by always having something for the CPU to execute.
Q 1. 3.2 What are the main differences between operating systems for mainframe computers and PCs? (1.5 Points)
The design goals of operating systems for these machines are quite different. PCs ease of use is the main focus. As for the mainframes, resource use is maximized.

Question 4. **[3. Mark]** CLO (b)

4.1 Describe the three general methods used to pass parameters to a system call. **(1.5 Mark)**.
• Simplest: pass the parameters in registers. In some cases, may be more parameters than registers • Parameters stored in a block, or table, in memory, and address of block passed as a parameter in a register. This approach taken by Linux and Solaris. • Parameters placed, or pushed, onto the stack by the program and popped off the stack by the operating system. Block and stack methods do not limit the number or length of parameters being passed.
4.2 Name three types of system calls. **(1.5 Mark)**.
• Process control • File management • Device management • Information maintenance • Communications • Protection

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Question 5. [3. Mark] SO(b)

1- List the advantages of microkernel system structure: [1 Point]

a. Easier to extend a microkernel
b. Easier to port the operating system to new architectures
c. More reliable (less code is running in kernel mode)
d. More secure

2- List the disadvantages of microkernel system structure [1 Point]

a. Performance overhead of user space to kernel space communication, because all communication between user space module should go through the messaging system of the kernel.

3- Explain the difference between a system call and a system program [1 Point]

System calls refer to operating system service and are executed in kernel mode.
System programs are user side programs that provide a convenient environment for program development and execution. They call system calls to execute.

END OF THE EXAM.