

Name: _____

Exam #1: Part 1 of 2 – Sample Questions
COMP.3080 – Operating Systems – Dr. Wilkes

Note: *This exam is closed book and notes, except for one 8.5x11" sheet of paper with handwritten notes, front and back (no photocopies).*

Multiple Choice Questions – 5 points each: Mark the correct single answer.

1. Which of the following operating system designs is the most popular design today, due to its combination of relatively high flexibility and performance?
 - ☐ Distributed OS design
 - ☐ Layered OS design
 - ☐ Microkernel OS design
 - ☐ Modular OS design
 - ☐ Monolithic OS design
 - ☐ None of the above
2. Suppose that a host with IP address 150.23.56.42 wishes to display an image from the web server at IP address 244.01.02.123 (using the standard HTTP port). Select a valid socket pair for a connection between this pair of hosts.
 - ☐ 150.23.56.42:80 and 244.01.02.123:80
 - ☐ 150.23.56.42:80 and 244.01.02.123:3400
 - ☐ 150.23.56.42:2701 and 244.01.02.123:80
 - ☐ 150.23.56.42: 2701 and 244.01.02.123:3400
3. A race condition _____.
 - ☐ will result only if the outcome of execution does not depend on the order in which instructions are executed
 - ☐ results when several threads try to access the same data concurrently
 - ☐ results when several threads try to access and modify the same data concurrently
 - ☐ none of the above
4. According to Amdahl's Law, what is the speedup gain for an application that is 80% parallel and we run it on a machine with 10 processing cores?
 - ☐ 1.33
 - ☐ 2.40
 - ☐ 3.08
 - ☐ 3.57
 - ☐ 4.33

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5. A blocking `send()` and non-blocking `receive()` is known as a(n) _____.
☐ asynchronous message
☐ blocked communication
☐ rendezvous
☐ synchronized message
☐ none of the above
6. **[Mark the "fill-in-the-blanks" answer below that is the best fit for the following statement:]**
In a microkernel architecture, the kernel typically includes only a small number of services, such as **(A)** _____; most other services, such as **(B)** _____, execute outside of the microkernel with a lower privilege level.
☐ (A) device management; (B) networking
☐ (A) file system management; (B) low-level memory management
☐ (A) low-level memory management; (B) file system management
☐ (A) networking; (B) process management
7. A cloud service in which the cloud vendor provides a customer with a complete virtual server image ready for use via the Internet is called:
☐ Infrastructure as a Service (IaaS)
☐ Platform as a Service (PaaS)
☐ Software as a Service (SaaS)
☐ None of the above
8. A(n) _____ refers to code in which a process is **requesting** access to shared data.
☐ critical section
☐ entry section
☐ mutex
☐ test-and-set
☐ none of the above

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True/False Questions – 2 points each: Mark the correct single answer.

1. The operating system kernel consists of the portion of the operating system that is always running.
☐ True
☐ False
2. The difference between a program and a process is that a process is an active entity, whereas a program is a passive entity.
☐ True
☐ False
3. System calls can be run only in kernel mode.
☐ True
☐ False
4. Interrupts can be triggered only by hardware.
☐ True
☐ False
5. In UNIX systems, the `exec()` system call causes the calling process to run a different program.
☐ True
☐ False
6. Named pipes in UNIX require a parent-child relationship between the communicating processes.
☐ True
☐ False
7. Concurrency means that multiple tasks can execute simultaneously if multiple cores or processors are available, whereas parallelism means that multiple tasks can achieve progress via serial execution on a single core or processor.
☐ True
☐ False
8. It is possible to create a thread library without any user-level support.
☐ True
☐ False
9. Each thread has its own register set and virtual memory space.
☐ True
☐ False
10. Practical solutions to the critical section problem require hardware support.
☐ True
☐ False

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Short Answer Questions – 10 points each: Write your answer in the space provided.

1. Briefly describe what is involved in a process context switch.
2. In UNIX programming, the `fork()` system call creates a child process that is a clone of the parent process. What is the one difference between the parent process and the child process when the `fork` is complete?

