

# L2910-5335 Exam 1

Phong Vo

TOTAL POINTS

**51 / 100**

QUESTION 1

1 0 / 5

✓ - **5 pts** Incorrect (correct answer is "Monolithic OS design")

QUESTION 2

2 0 / 5

✓ - **5 pts** Incorrect (correct answer is Ready)

QUESTION 3

3 5 / 5

✓ - **0 pts** Correct

QUESTION 4

4 2 / 5

✓ - **3 pts** Slightly correct (the first three bullets all apply)

QUESTION 5

5 0 / 5

✓ - **5 pts** Incorrect (correct answer is Mailbox)

QUESTION 6

6 0 / 5

✓ - **5 pts** Incorrect (correct answer is (A) message passing, (B) file system management)

QUESTION 7

7 5 / 5

✓ - **0 pts** Correct

QUESTION 8

8 0 / 5

✓ - **5 pts** Incorrect (correct answer is "Platform as a Service")

QUESTION 9

9 2 / 2

✓ - **0 pts** Correct

QUESTION 10

10 2 / 2

✓ - **0 pts** Correct

QUESTION 11

11 0 / 2

✓ - **2 pts** Incorrect (correct answer is False)

QUESTION 12

12 2 / 2

✓ - **0 pts** Correct

QUESTION 13

13 0 / 2

✓ - **5 pts** Incorrect (correct answer is True)

QUESTION 14

14 0 / 2

✓ - **2 pts** Incorrect (correct answer is False)

Blocking send or receive are considered synchronous.

QUESTION 15

15 0 / 2

✓ - **2 pts** Incorrect (correct answer is True)

System calls are considered to be software interrupts.

QUESTION 16

16 0 / 2

✓ - **2 pts** Incorrect (correct answer is True)

See the link to the Wikipedia entry for the Windows NT kernel provided in the Module 1 content folder on Blackboard.

QUESTION 17

17 2 / 2

✓ - 0 pts Correct

QUESTION 18

18 2 / 2

✓ - 0 pts Correct

QUESTION 19

19 10 / 10

✓ - 0 pts Correct (enough for full credit!)

QUESTION 20

20 10 / 10

✓ - 0 pts Correct (or enough for full credit!)

- Google Chrome creates a new process for each browser tab. It also maintains separate processes for functions such as the rendering engine, a "sandbox" process for scripts (which is isolated from the file system), and for each browser extension. Thus, tabs and functions are isolated from each other in terms of failure.

QUESTION 21

21 7 / 10

✓ - 3 pts Partially correct

- The key idea is to note that the `fork()` system call will never be executed in this situation, because the code of the parent process will be replaced by the `exec()` system call. Basically, the child is never created, and the parent ends up executing the code that was intended for the child.

QUESTION 22

22 2 / 10

✓ - 8 pts Key concept is the difference in data

**representation on different architectures.**

- A standard intermediate form (IMF) or external data representation (XDR) is required to compensate for the differences between word sizes and bit lengths, bit ordering and byte ordering ("endianness") on various hardware architectures, as well as multiple character encodings. Note that hardware architectures are the big contributor with respect to endianness, not so much the differences between operating systems.

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Exam #1: Part 1 of 2

COMP.3080-201-202 – Operating Systems; October 15, 2019 – 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 answer(s).

1. **(MARK A SINGLE ANSWER)** Which of the following operating system designs allows direct intercommunication between every component, making the system highly efficient?
  - ☐ Distributed OS design
  - ☒ Hybrid OS design
  - ☐ Layered OS design
  - ☐ Microkernel OS design
  - ☐ Monolithic OS design
  - ☐ None of the above
  
2. **(MARK A SINGLE ANSWER)** When an I/O interrupt arrives for a process, the operating system places the process into the \_\_\_\_\_ state.
  - ☐ New
  - ☐ Ready
  - ☐ Running
  - ☐ Terminated
  - ☒ Waiting
  - ☐ None of the above
  
3. **(MARK A SINGLE ANSWER)** Function parameters and local variables are stored in the \_\_\_\_\_ of a process's memory.
  - ☐ Code (text) section
  - ☐ Data (global) section
  - ☐ Heap section
  - ☒ Stack section
  - ☐ None of the above
  
4. **(MARK ALL THAT APPLY)** Which of the following are true for a peer-to-peer (P2P) network?
  - ☐ Does not distinguish between client nodes and server nodes
  - ☐ A given node may act as a client, a server, or both
  - ☒ Each node must join the P2P network either via registering with a central lookup service, or via a distributed discovery protocol
  - ☐ None of the above

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5. **(MARK A SINGLE ANSWER)** A message passing system that does not require the sender to know the identity of the receiver, or vice versa, is known as a(n) \_\_\_\_\_.  
☐ Asynchronous message  
☐ Blocked communication  
☒ Direct message  
☐ Mailbox  
☐ Rendezvous  
☐ None of the above
6. **[Mark the single "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) message passing; (B) file system management  
☐ (A) device management; (B) networking  
☐ (A) networking; (B) process management  
☒ (A) interprocess communication; (B) low-level memory management  
☐ None of the above
7. **(MARK A SINGLE ANSWER)** Suppose that a host with IP address 140.33.44.55 wishes to download a file from the web server at IP address 236.19.20.117 (using the standard HTTP port). Select a valid socket pair for a connection between this pair of hosts.  
☐ 140.33.44.55:80 and 236.19.20.117:80  
☐ 140.33.44.55:80 and 236.19.20.117:3400  
☐ 140.33.44.55:148 and 236.19.20.117:80  
☒ 140.33.44.55:3192 and 236.19.20.117:80  
☐ None of the above
8. **(MARK A SINGLE ANSWER)** A cloud service in which the cloud vendor provides a customer with a software stack (e.g., database server) ready for application 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

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

1. The operating system kernel consists of all system and application programs in a computer.  
☐ True  
☒ False
2. System calls can be run in either user mode or kernel mode.  
☐ True  
☒ False
3. The difference between a program and a process is that a program is an active entity while a process is a passive entity.  
☒ True  
☐ False
4. In UNIX systems, the `exec()` system call creates a new process.  
☐ True  
☒ False
5. Ordinary pipes in UNIX require a parent-child relationship between the communicating processes.  
☐ True  
☒ False
6. Non-blocking `send` or `receive` operations are considered synchronous.  
☒ True  
☐ False
7. Interrupts may be triggered by either hardware or software.  
☐ True  
☒ False
8. In the "Windows NT" architecture, the Win32 Environment Subsystem and the Windows Subsystem for Linux coexist as user mode services, running above a kernel mode layer comprising the Executive Services and a microkernel.  
☐ True  
☒ False
9. Mac OS is a hybrid system incorporating aspects of monolithic/modular, layered, and microkernel designs.  
☒ True  
☐ False
10. Real-time operating systems must guarantee that well-defined fixed time constraints are always met.  
☒ True  
☐ False

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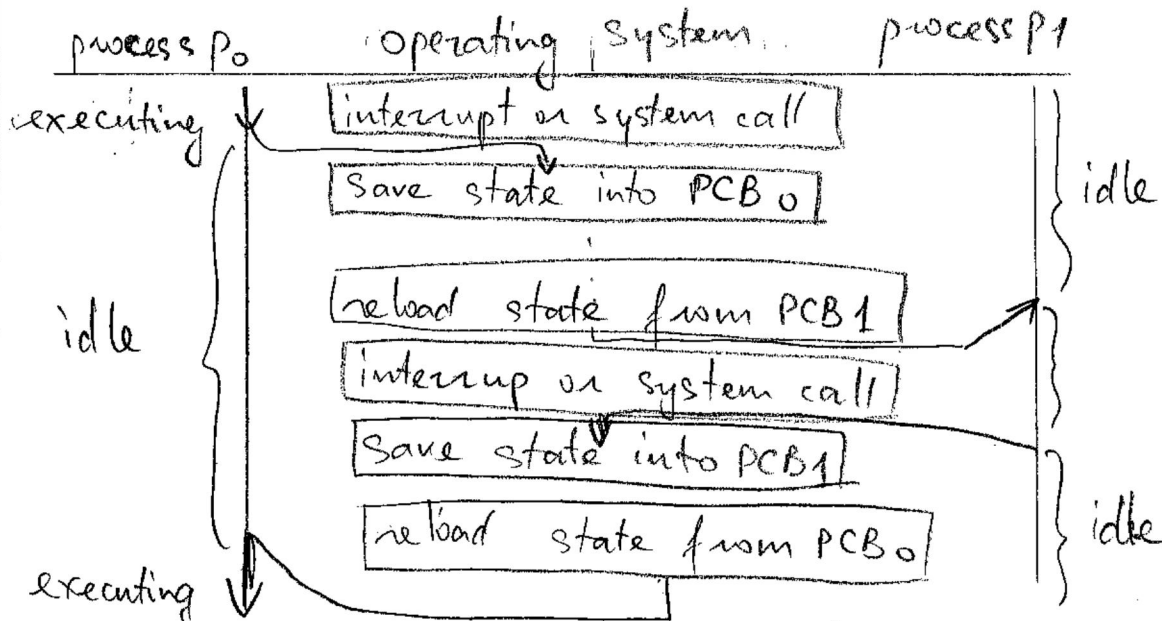
Exam #1: Part 2 of 2

COMP.3080-201-202 – Operating Systems; October 15, 2019 – Dr. Wilkes

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

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

1. Describe the steps performed by the operating system during a process context switch.



2. Explain why Google Chrome uses multiple processes.

Because google chrome uses an application kernel that allows chrome to load/reload the content of all active browsing tabs at a time. That kernel is named chrome kernel, developed by google.

Name: \_\_\_\_\_

3. In UNIX programming, ordinarily the `exec()` system call follows the `fork()` call. Explain what would happen if a programmer were to inadvertently place the call to `exec()` before the call to `fork()`.

- In the child process, the `fork()` returns 0, whereas in the parent process, the `fork()` call returns the PID of the child process.
- The programmer wants to make a calling process to run a different program. Then the `exec()` would return the value after the process has done.

4. Explain why the operating system must translate function parameter and return values to and from a standard intermediate form in order to perform a Remote Procedure Call.

Because Remote Procedure Call is the calling process allows inter-communicating between the kernel of the Operating System and the application programs.

