Test Bank—Chapter Three (Operating Systems)

Multiple Choice Questions

1. Which of the following components of an operating system maintains the directory system?

      A. Device drivers   B. File manager   C. Memory manager

ANSWER: B

2. Which of the following components of an operating system handles the details associated with particular peripheral equipment?

      A. Device drivers   B. File manager   C. Memory manager

ANSWER: A

3. Which of the following components of an operating system is not part of the kernel?

      A. Shell   B. File manager   C. Scheduler

ANSWER: A

4. Multitasking in a computer with only one CPU is accomplished by a technique called

      A. Bootstrapping   B. Batch processing   C. Multiprogramming

ANSWER: C

5. Execution of an operating system is initiated by a program called the

      A. Window manager   B. Scheduler   C. Bootstrap

ANSWER: C

6. The end of a time slice is indicted by the occurrence of a signal called

      A. An interrupt   B. A semaphore   C. A login

ANSWER: A

7. A section of a program that should be executed by at most one process at a time is called a

      A. Utility   B. Critical region   C. Privileged instruction

ANSWER: B

8. Which of the following is not an attempt to provide security?

      A. Passwords   B. Privilege levels   C. Multitasking

ANSWER: C

9. Which of the following items of information would not be contained in an operating system's process table?

     A. The location of the memory area assigned to the process
     B. The priority of each process
     C. Whether the process is ready or waiting
     D. The machine language instructions being executed by the process

ANSWER: D

10. Which of the following events is detrimental to an operating system's performance?

     A. Deadlock   B. Interrupt   C. Booting

ANSWER: A

11. Which of the following is a technique for controlling access to a critical region?

     A. Spooling   B. Time sharing   C. Semaphore   D. Booting

ANSWER: C

12. Which of the following is not involved in a context switch?

     A. Interrupt   B. Process table   C. Dispatcher   D. Shell

ANSWER: D

13. Which of the following concepts is not associated with critical regions?

     A. Semaphores   B. Mutual exclusion   C. Bootstrap

ANSWER: C

14. Which of the following is not a role of a typical operating system?

     A. Control the allocation of the machine's resources
     B. Control access to the machine
     C. Maintain records regarding files stored in mass storage
     D. Assist the computer user in the task of processing digital photographs

ANSWER: D

15. Which of the following is a task that is not performed by the kernel of an operating system?

     A. Communicate with the user   B. Schedule processes
     C. Allocate resources   D. Avoid deadlock

ANSWER: A

16. Which of the following is not a means of performing multiple activities at the same time?

     A. Pipeling   B. Multiprogramming   C. Virtual memory   D. Multiple processors

ANSWER: C (Caution: This problem uses terminology from Chapter 1.)

17. Which of the following components of an operating system is executed as the result of an interrupt signal?

        A. Dispatcher   B. Memory manager   C. File manager

ANSWER: A

18. Which of the following would be a concern of the file manager in a multi-user computer system that would not be a concern in a single-user system?

        A. Maintain records regarding the location of files
        B. Maintain records regarding the ownership of files
        C. Maintain records regarding the size of files
        D. None of the above

ANSWER: B

19. Which of the following would not require real-time processing?

        A. Typing a document with a word processor
        B. Navigation of an aircraft
        C. Forecasting word-wide trade for the next five year period
        D. Maintaining a airline reservation system

ANSWER: C

20. Which of the following statements is true?

        A. Allowing several processes to share time in a multiprogramming system is less efficient than executing each of them to completion one after the other.
        B. The use of passwords provides an impenetrable safeguard.
        C. Both A and B
        D. Neither A not B

ANSWER: D

Fill-in-the-blank/Short-answer Questions

1. Suppose an operating system allocates time slices in 10 millisecond units and the time required for a context switch is negligible.

        A. How many processes can obtain a time slice in one second?

            _____

        B. How many processes can obtain a time slice in one second if half of them use only half of their slice?

            _____

ANSWER: A. 100   B. 150

2. If it takes one microsecond to perform a context switch and processes use only half of their allotted 10 millisecond time slices, what percent of a CPUs time is spent performing context switches rather than executing processes?

_____

ANSWER: .02% (1/5000)

3. In contrast to early batch processing techniques, _____ allows the user to communicate with the computer while the user's application is being executed. In turn, this type of processing requires that the computer's responses to its environment be performed in a timely manner, a requirement known as _____ .

ANSWER: Interactive processing, Real-time processing

4. Fill in the blanks below with the part on the operating system (file manager, memory manager, device drivers, window manager, scheduler, dispatcher) that performs the activity described.

      A. _____ Maintains a record of what is displayed on the computer's screen

      B. _____ Performs the switching from one process to another

      C. _____ Maintains the directory system

      D. _____ Creates virtual memory

ANSWER: A. Window manager   B. Dispatcher   C. File manager   D. Memory manager

5. Fill in the blanks below with the part on the operating system (file manager, memory manager, device drivers, window manager, scheduler, dispatcher) that performs the activity described.

      A. _____ Places new entries in the process table

      B. _____ Performs the actual communication with I/O units

      C. _____ Maintains a record of memory allocations

      D. _____ Protects files from unauthorized access

ANSWER: A. Scheduler   B. Device drivers   C. Memory manager   D. File Manager

6. Fill in the blanks below with the part on the operating system (file manager, memory manager, device drivers, window manager, scheduler, dispatcher) that performs the activity described.

      A. _____ Executes each time a time slice terminates

      B. _____ Removes entries from the process table

      C. _____ Maintains a record of available mass storage space

      D. _____ Displays icons on the computer screen

ANSWER: A. Dispatcher   B. Scheduler   C. File manager   D. Window manager

7. In each blank below write a term that might be considered the opposite of the term next to the blank.

    A. _____ Interactive processing

    B. _____ System software

    C. _____ Waiting process

ANSWER: A. Batch processing   B. Application software   C. Ready process

8. What action is performed as a result of executing each of the following types of instructions?

    A. Test-and-set _____

    B. Interrupt disable _____

    C. Interrupt enable _____

ANSWER: A. Checks to see if the contents of a memory cell is 0 or 1 and sets the value to a 1.
        B. Causes the CPU to not recognize incoming interrupts.
        C. Causes the CPU to begin recognizing incoming interrupts.

9. Which necessary condition for deadlock is removed by each of the following.

    A. Require processes to request all required resources at once.

        _____

    B. Allow only one process at a time in the process table.

        _____

    C. Take all resources from processes when deadlock occurs and restart the processes.

        _____

ANSWER: A. Resources must be requested on a partial basis.
        B. There must be competition for nonshareable resources.
        C. Resources cannot be forcibly retrieved.

10. List four resources whose access an operating system should coordinate.

    A. _____   B. _____

    C. _____   D. _____

ANSWER: Possible answers include: Memory space, mass storage space, printers, space in process table, CPU time, and many more

11. What problem could occur if, to allow more processes to share time in a multiprogramming environment, an operating system is designed to use very short time slices?

    _____

ANSWER: The time spent switching between processes could become significant when compared to the time spent actually executing processes.

12. What is meant by the term *load balancing* in the context of multiprocessor computers?

_____

ANSWER: Load balancing refers to the task of assigning tasks to the processors in a way that leads to efficient use of all processors.

13. A _____ is a set of instructions. In contrast, a _____ is the activity of executing those instructions.

ANSWER: program, process

14. List three features provided by modern CPUs that are used by operating systems to implement multitasking environments.

        A. _____

        B. _____

        C. _____

ANSWER: Possible answers include: privilege levels, privileged instructions, test-and-set instructions, memory limit registers, and others.

15. List three popular operating systems.

        A. _____

        B. _____

        C. _____

ANSWER: Possible answers include: UNIX, LINX, and Microsoft's Windows series

Vocabulary (Matching) Questions

The following is a list of terms from the chapter along with descriptive phrases that can be used to produce questions (depending on the topics covered in your course) in which the students are ask to match phrases and terms. An example would be a question of the form, "In the blank next to each phrase, write the term from the following list that is best described by the phrase."

Term	Descriptive Phrase
shell	The part of an operating system that communicates with the user
multiprogramming	A technique that allows multiprocessing on a computer with a single CPU
time sharing	The act of more than one user using a computer at the same time
process	The activity of executing a program
queue	A storage system in which the first entry in is the first entry out
virtual memory	Extended storage space created by the memory manager

ROM	Memory area whose contents cannot be altered
multitasking	The phenomenon of a user performing more than one activity at the same time
interactive processing	Allows the user to communicate with the computer system while the user's application is being performed
deadlock	A situation in which activities find themselves waiting on each other
GUI	A means of communicating with a computer user by means of images rather than words
mutual exclusion	The requirement that a process complete a block of instructions before another process is allowed to start the block
bootstrap	The program first executed when a computer is turned on
directory path	A sequence of folders each containing the next
kernel	The heart of an operating system
interrupt	A signal that suspends the CPU's current activities
auditing software	A tool used to monitor a computer system's activities
privilege levels	A means of restricting the capabilities of different processes

General Format Questions

1. Explain the difference between application software and system software.

ANSWER: System software provides the infrastructure required by the application software. It includes the operating system and utilities. Application software provides the unique functionality required to perform the particular tasks for with the computer is used. Examples include word processors, spreadsheet systems, database systems, and image processing systems.

2. Describe a scenario that leads to deadlock in a computer system.

ANSWER: There are many possible answers. One would be the case of two processes in a multiprogramming environment, each of which needs to spawns additional processes to complete its task even though the process table is full. In this case, each process would hold a nonshareable resource (space in the process table) that the other needed to progress resulting in deadlock.

3. What conditions are necessary for deadlock to occur?

ANSWER: There must be competition for nonshareable resources, resources must be requested on a piecemeal basis, and resources, once allocated, cannot be forcibly retrieved.

4. What are privileged instructions?

ANSWER: Privileged instructions are machine language instructions that request activities that general application programs should not be allowed to perform. These instructions can only be executed when the CPU is operating in "privileged mode." Examples of privileged instructions include requests to change the CPU's current privilege level and requests to alter registers that control memory access limits.

5. What is the difference between a process that is waiting as opposed to a process that is ready?

ANSWER: A process that is waiting would not be able to advance if given a time slice (perhaps because it is waiting for a peripheral device to complete a task) whereas a process that is ready would be able to continue execution if given a time slice.

6. Describe the bootstrap process.

ANSWER: When the computer is first turned on, the bootstrap program stored in ROM is executed. This program directs the computer to load the operating system into main memory from mass storage. The bootstrap then executes a jump to the operating system, the operating system takes over.

7. Why is a "test-and-set" instruction included in most machine languages for CPUs designed for multitasking environments?

ANSWER: The "test-and-set" instruction are useful when bits in main memory are used to record whether various nonshareable resources have been allocated because they allow memory cells to be read and altered without fear of interruption.

8. Explain why the average length of a time slice would be reduced if the processes in an operating system's process table perform lots of I/O operations.

ANSWER: Once a process requests an I/O operation, its time slice will be terminated, it will be labeled as a waiting process, and another process will be allowed to start another time slice. Thus, the first process's effective time slice would be reduced.

9. In the sense of the term virtual memory, give an argument that multiprogramming creates virtual CPUs.

ANSWER: The term virtual memory refers to the illusion of a memory space that is larger than that actually present. This illusion is created by the operating system. Multiprogramming is a technique used by operating systems to create the illusion of more CPUs than are actually present.

10. Describe concerns that occur when designing a time-sharing/multitasking operating system that do not occur in the case of a single tasking system.

ANSWER: Possible answers include: The implementation of multiprogramming, the need to protect each process from malicious behavior of other processes, and the need to deal with the possibility of deadlock.