Operating Systems, 3e
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Test Bank

Chapter One: Introduction

True/false

1. A modern, well-designed operating system still has design flaws.
2. The OS is the part of the system software that manages the use of the hardware by application software that chooses to take advantage of its (the OS) services.
3. System software must be useful in most application domains.
4. Abstraction simplifies the way an application program controls the hardware, but can also limit flexibility to manipulate the hardware.
5. An abstraction cannot be simpler than the actual resource interface.
6. In a conventional, single-CPU computer system, multiple programs can execute simultaneously.
7. Multiple program executions each appear to have their own private computer—an abstract machine—on which to execute.
8. Well-designed multiprogramming can improve the performance of most processes.
9. Resource isolation is mandatory for the correct operation of most abstract machines.
10. All system software is implemented as trusted software.

Short Answer

1. The _____'s view of the computer is of the application software.
2. System software and hardware exist to support the creation and effective use of _____.
3. In a computer system, _____ are used to eliminate tedious detail that a programmer otherwise would have to handle.
4. True simultaneous program execution is called _____.
5. _____ mechanisms allow processes to use common resources through their own coordination strategy.
6. Contemporary operating systems are constructed as _____ in order for the overall system to behave correctly.
7. _____ was the first class of operating system to support multiprogramming.
8. Small communicating computers are influencing operating technology in the trend from process-based computing to _____-based computing, which uses fewer system resources.
9. The _____ class of operating systems stimulated new operating system developments to support multiple sessions and virtual terminals.
10. A timesharing multiprogramming system that supports multiple processes per user is sometimes called a _____ system.

Multiple Choice

1. The operating system does each of the following <u>except</u>
    a. Allocates the computer's components to different programs
    b. Synchronizes individual programs' activities
    c. Ensures that programs terminate their execution
    d. Provides the general mechanisms that are needed so that the programs execute in perfect harmony

2. Which is not an example of system software?
    a. Command line interpreter
    b. Database management system
    c. Window system
    d. Personal productivity package
3. An operating system is distinguished from other system software by each of the following except
    a. It interacts directly with the hardware to provide an interface used by other system software and application software
    b. It allows different applications to share the hardware resources through its resource management policies
    c. It can be used to support a broad range of application domains
    d. The hardware resource abstractions it provides are convenient, but their use by applications is optional.
4. Good abstractions will do each of the following except
    a. Allow the programmer to easily perform every operation on the resources used in the application domain
    b. Be easy for the end user to understand
    c. Be easy for the programmer to understand
    d. Be suited to one or more application domains
5. Which is not an example of a resource that is commonly space-multiplexed?
    a. CPU
    b. Video RAM
    c. Hard drive
    d. Main memory
6. Which is not an example of a resource that is commonly time-multiplexed?
    a. Network interface
    b. CPU
    c. Graphics accelerator
    d. Main memory
7. Which is not a process execution characteristic that can be used to speed up a system using parallelism?
    a. Each process spends most of its time using hardware I/O devices
    b. A process does not need the processor while doing I/O
    c. I/O operations take much longer than processor operations
    d. Most processes use the CPU more than doing I/O
8. Which one of the following must be implemented as trusted software?
    a. DBMS
    b. Multiprogramming manager
    c. Compiler
    d. Command interpreter
9. Which is not an example of a time-sharing system?
    a. Multics
    b. UNIX
    c. MS-DOS
    d. Cal

10. Embedded systems have influenced modern operating systems in the following ways except
    a. Data movement
    b. Scheduling
    c. Human-computer interaction
    d. Real-time management

ANSWERS (w/ Page References)

True/false

1. T, p. 2
2. F, p. 4
3. F, p. 6
4. T, p. 7
5. F, p. 8
6. F, p. 11
7. T, p. 11
8. F, p. 14
9. T, p. 16
10. F, p. 17

Short Answer

1. end user's, p. 3
2. application software, p.4
3. abstractions, p. 7
4. parallel execution, p. 11
5. explicit resource sharing, p. 16
6. trusted software, p. 17
7. batch systems, p. 19
8. thread, p. 34
9. personal computers and workstations, p. 29
10. multitasking, p. 25

Multiple Choice

1. c, p.1
2. d, p. 5-6
3. d, p. 6-7
4. b, p. 8
5. a, p. 12
6. d, p. 12
7. d, p. 15
8. b, p. 17-18
9. c, p. 23-24
10. c, p. 38

CHAPTER 2: Using the Operating System

True/false

1. The reason for a concurrency abstraction is to provide an environment in which concurrent process have shared access to system components.
2. Algorithm languages are good for designing a solution, as they rarely omit detail or contain ambiguity.
3. A file is a named, non-linear stream of bytes of information kept on a device.
4. The motivation for evolving the classic process model was to create a more powerful (yet complex) abstraction to allow multiple entities that execute the same program.
5. Today, threads are an important tool for concurrent programmers.
6. A classic process normally has a shared address space.
7. A modern process creation system call must always define a thread.
8. Whenever a process calls fork(), a new child process is created with its own copies of the parent's program text, data, and stack segments, and access to all open file descriptors.
9. After the child has been created, both the parent and child processes are ready to use the processor, as they each have their own abstract machine.
10. An object's behavior is defined completely by its class definition.

Short Answer

1. The OS defines a _____ on top of the hardware.
2. The set of function calls implemented by any given software package is called its _____.
3. A classic process is defined to be _____.
4. A computational approach in which a process defines program and data, but has two different program executions inn progress at the same time is called _____.
5. _____ are an abstract resource used to enable two processes to communicate with each other.
6. A modern process creation system call usually creates a _____ to execute within the process.
7. The operating system maintains a data structure called a _____ to keep all the details required to manage a process.
8. With the UNIX fork() call, a child's behavior is completely defined by _____.
9. _____ was a model of an autonomous entity to represent the operation of such a unit within a simulated system.
10. A class is similar to an _____ that maintains its own state in its private variables and can be executed as an autonomous unit of computation.

Multiple Choice

1. Algorithms may be expressed each of the following <u>except</u>
    a. Pseudocode
    b. Natural language
    c. Mathematical notation
    d. Heuristic formulae

2. A binary program may also be known as each of the following except
    a. Executable program
    b. Process program
    c. Binary object program
    d. Object program
3. The process is the computational environment that includes each of the following except
    a. Operating system
    b. Data
    c. Program
    d. Files
4. Threads can be implemented in each of the following ways except
    a. Run-time libraries
    b. Operating system
    c. Java Virtual Machine
    d. Parent/child processes
5. Which statement about resources is false?
    a. A process/thread must request a resource before using it
    b. The operating system can provide resources
    c. Resources may be requested from another process
    d. A thread suspends its operation until a requested resource is allocated.
6. Files are distinguished from other resources except that
    a. The interface is exceptionally complex as compared with most other resources.
    b. They are the prevalent form of storing information
    c. Operating systems often use the file as a primitive for modeling other resource abstractions
    d. UNIX pipes can be modeled as files
7. Operating system-supplied resources include the following except
    a. Processor
    b. Time
    c. Keyboards
    d. Displays
8. Thread status may include the following except
    a. Which resource is being waited on, if blocked
    b. Address of the next instruction to execute
    c. Whether or not the thread is blocked waiting for a resource
    d. Address of the first instruction in the program
9. Early process abstraction primitives included the following except
    a. FORK()
    b. RESTART()
    c. QUIT()
    d. JOIN()
10. A UNIX process contains each of the following except
    a. Text segment
    b. Data segment

c. Thread segment
d. Stack segment

ANSWERS (w/ Page References)

True/false

1. F, p. 43
2. F, p. 44
3. F, p. 48
4. F, p. 54
5. T, p. 55
6. F, p. 57
7. F, p. 58
8. T, p. 60
9. T, p. 60
10. T, p. 73

Short Answer

1. logical software environment, p. 43
2. application programming interface (API), p. 45
3. a program in execution, p. 45
4. multithreaded computation, p. 46
5. pipes, p. 52
6. base thread, p. 58
7. process descriptor, p. 59
8. the parent process' profile and default behavior, p. 65
9. object, p. 72
10. abstract data type, p. 72

Multiple Choice

1. d, p. 44
2. b, p. 45
3. a, p. 45
4. d, p. 47
5. c, p. 47
6. a, p. 48
7. b, p. 52
8. d, p.53
9. b, p.55
10. c, p.58

CHAPTER 3: Operating System Organization

True/false

1. Device drivers implement the device independent aspects of device management.

2. The independent part of the device manager defines a general software environment in which a device-dependent driver can execute.
3. Device management is a very complex part of operating system design.
4. The process managers prevent multiple users from sharing the machine by providing multiple execution environments.
5. Every operating system design issue must be evaluated with respect to its contribution to the functionality of the system and its impact on the computer's performance.
6. Operating system design is more art than science.
7. A process generally has little need of determining whether it has exclusive control of a resource, since the resource manager handles such issues.
8. A thread executing in user mode changes to supervisor mode when it is executing kernel code during a system call.
9. UNIX kernels have traditionally been implemented using a microkernel approach.
10. Microkernels potentially display more overhead than monolithic kernel approaches, because of a large number of system calls required.

Short Answer

1. One of the basic responsibilities of an operating system is to create an _____ with multiple, autonomous abstract components.
2. A basic OS responsibility is to coordinate use of components according to _____.
3. The memory manager cooperates with the process manager to administer the allocation and use of _____.
4. Modern memory managers provide _____ extensions so that the abstract machine's primary memory appears to be larger than the physical machine's memory.
5. _____ are an abstraction of storage devices.
6. _____ defines the machine-specific strategy for managing access to resources.
7. The mode bit is set by _____.
8. The two techniques by which a user-mode program can request kernel services include _____ and _____.
9. The success of the UNIX and Windows OS interfaces has resulted in severe _____.
10. Today, the most universally portable operating system is _____.

Multiple Choice

1. Operating system functions are normally categorized into one of these categories <u>except</u>
    a. Process, thread and resource management
    b. Memory management
    c. Device management
    d. Window management
2. The operating system device manager handles all of the following according to policies chosen by the designer or administrator <u>except</u>

   a. Specification of devices
   b. Allocation of devices
   c. Sharing of devices
   d. Isolation of devices
3. The process manager deals with the following except
   a. Thread management
   b. Resource management
   c. Process management
   d. Window management
4. Primary operating system design issues include the following except
   a. Efficiency in the use of machine resources
   b. Compact memory representation
   c. Resource isolation
   d. Maximizing availability of resource for use by applications
5. Basic operating system implementation mechanisms to address design issues do not include
   a. Processor modes
   b. Kernels
   c. Compilers
   d. Methods for invoking system services
6. Supervisor mode instructions are called the following, except
   a. Privileged
   b. Protected
   c. Supervisor
   d. Super-user
7. Which of the following statements about kernels is not true?
   a. The kernel implements the basic mechanism that assure secure operation of the entire operating system.
   b. Kernel extensions must execute in supervisor mode.
   c. The kernel executes as trusted software.
   d. Kernel-implemented functions may be easy to implement.
8. The process manager commonly interacts with other components except
   a. Device controller
   b. Device manager
   c. Memory manager
   d. File manager
9. The Windows NT/2000/XP supervisor does not include
   a. NT executive
   b. Hardware abstraction layer
   c. Win32 API
   d. NT kernel
10. Which of the following statements about UNIX is untrue?
   a. Philosophy is to implement minimum functionality necessary to support a broad range of policies for OS managers.
   b. UNIX is commonly implemented as a monolithic software module.
   c. UNIX is more complex than its predecessor, Multics.

d. UNIX is known for its clean user interface and extensible design.

ANSWERS (w/ Page References)

True/false

1. F, p. 91
2. T, p. 91
3. F, p. 91
4. F, p. 93
5. T, p. 95
6. T, p. 95
7. F, p. 95
8. T, p.101
9. F, p. 103
10. T, p. 103

Short Answer

1. abstract machine environment, p.89
2. policies of the machine's administrator, p. 89
3. primary memory, p. 93
4. virtual memory, p. 93
5. files, p. 94
6. a security policy, p. 96
7. the user mode trap instruction, p. 97
8. system calls and message passing, p. 99
9. constraints on continued growth of OS technology, p. 104
10. Linux, p. 107

Multiple Choice

1. d, p. 90
2. a, p. 90
3. d, p. 92
4. b, p. 94
5. c, p. 94-95
6. d, p. 96
7. b, p. 98
8. a, p. 102
9. c, p. 108
10. c, p. 104

CHAPTER 4: Computer Organization

True/false

1. Stored program computers were invented in the 20th century by such folks as Zuse, Atanasoff, Aiken, and von Neumann.
2. von Neumann computers are based on the idea that the machine has a flexible set of electronic parts whose actions are determined by a fixed program.

3. All units in a von Neumann computer are connected using a bus.
4. The hardware process is a special type of threaded process.
5. Multiprocessors use asynchronous digital logic.
6. Different computers define the word size according to the design of their CPU.
7. Memory is usually word-addressable, to match the CPU word size.
8. Programmers need to know device details in order to use a device.
9. Interrupts are not allowed in a strict von Neumann architecture.
10. The CPU is responsible for saving all registers when an interrupt occurs.

Short Answer

1. A computer that has a stored (but changeable) program is called a _____ architecture computer.
2. The fetch-decode-execute cycle is also known as the _____ process.
3. The speed at which the ALU can perform operations is limited by _____ and _____.
4. After a _____, the memory unit copies the contents of the designated memory cell into the MDR.
5. I/O devices are attached to _____
6. _____ connects the device to the computer's address and data bus.
7. _____ controllers are able to read and write information directly from/to primary memory with no CPU intervention.
8. memory-mapped I/O reduces _____ in the processor.
9. Polling I/O introduces _____ .
10. Multiprocessors depart from the conventional von Neumann architecture by introducing _____.

Multiple Choice

1. Examples of general purpose stored program computers include the following <u>except</u>
   a. Workstations
   b. Personal computers
   c. Network servers
   d. Personal MP3 players
2. Which of these is not a component typical of a von Neumann computer?
   a. Central processing unit
   b. Analog/digital converter
   c. Primary memory unit
   d. Interconnection buses
3. A von Neumann arithmetic logic unit doesn't contain this component:
   a. General registers
   b. Status registers
   c. Control unit
   d. Function unit
4. The ALU performs a computation by doing all of the following <u>except</u>
   a. Loading binary values into general registers