Chapter 5 Questions

Submitted by
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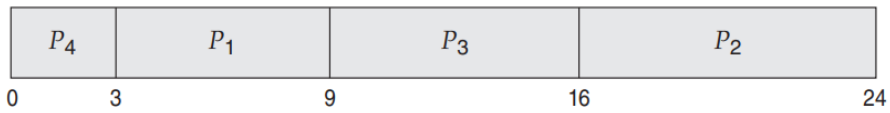
I. True or False
1. In a cpu-burst frequency, there are more short bursts than long bursts. (True)
2. There are 4 instances wherein a CPU scheduling decision may take place (True)
3. Throughput is the amount of time to execute a particular process (False)
4. Scheduling domain is a set of threads that can be balanced against one another (False).
5. The time quantum (q) in a round robin scheduling algorithm should be longer than most of the cpu bursts. (False)

II. Multiple Choice
1. What is the simplest CPU Scheduling algorithm?
   a. Round-Robin Scheduling
   b. Priority Scheduling
   c. First-Come, First-Served Scheduling
   d. Shortest-Job-First (SJF) Scheduling
2. Given the Gantt Chart of a schedule:



   What is its average time?
   a. 7 (0+3 + 9 + 16)/4 = 4
   b. 13
   c. 8
   d. 8.5
3. The scheduling algorithm schedules periodic tasks using a static priority policy with preemption.
   a. Priority-Based Scheduling
   b. Earliest-Deadline-First Scheduling
   c. Rate-Monotonic Scheduling
   d. Priority Scheduling
4. Multiprocessor applies to the following system architectures **EXCEPT**
   a. NUMA systems
   b. Heterogeneous multiprocessing
   c. Single-Threaded Systems
   d. Multicore CPUs
5. Which of the following scheduling algorithms could result in starvation?
   a. Round-Robin Scheduling
   b. Priority Scheduling
   c. First-Come, First-Served Scheduling
   d. Shortest-Job-First (SJF) Scheduling

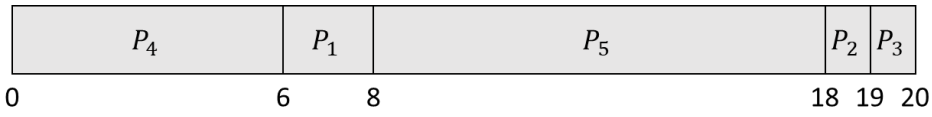
III. Identification/Illustration

1. Suppose that the processes arrive in the order: P_1, P_2, P_3, P_4, P_5 and given the table:

Process	Burst Time	Priority
P_1	2	2
P_2	1	3
P_3	1	4
P_4	6	1
P_5	10	2

Create a Gantt Chart using Priority Scheduling

Answer:

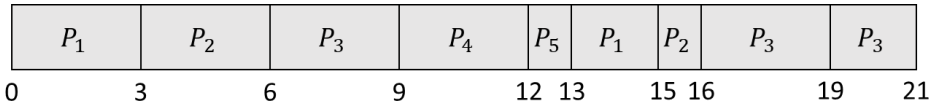


2. Suppose that the processes arrive in the order: P_1, P_2, P_3, P_4, P_5 and given the table:

Process	Burst Time
P_1	5
P_2	4
P_3	8
P_4	3
P_5	1

Create a Gantt Chart using Round Robin with time quantum $q = 3$ w/ FCFS

Answer:



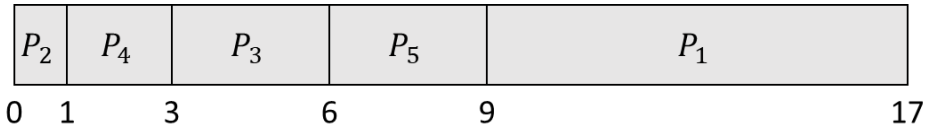
3. Suppose that the processes arrive in the order: P_1, P_2, P_3, P_4, P_5 and given the table:

Process	Burst Time
P_1	8
P_2	1

P_3	3
P_4	2
P_5	3

Create a Gantt Chart using Shortest-Job-First (SJF) Scheduling w/ FCFS

Answer:



CHAPTER 6: SYNCHRONIZATION TOOLS **Questions and Answers**

5 TRUE OR FALSE

1. The signal() operation was originally called V, from “verhogen” meaning “to test.” **FALSE**
2. We say that a set of processes is in a deadlocked state when every process in the set is waiting for an event that can be caused only by another process in the set. **TRUE**
3. The Peterson’s Solution for the critical section problem is highly effective in multithreaded operations. **FALSE**
4. Race condition is a concurrency problem. **TRUE**
5. Memory Model is an instruction that forces any change in memory to be propagated (made visible) to all other processors. **FALSE**

5 MULTIPLE CHOICE

1. Q either waits until P leaves the monitor or waits for another condition. **A. Signal and continue**

    A. Signal and continue
    B. x.wait();
    C. Signal and wait
    D. x.signal();

2. This code segment is responsible for accessing and modifying values in a shared resource. **C. critical section**

    A. race condition
    B. remainder section
    C. critical section
    D. preemptive kernel

3. Which requirement for the solution to the critical-section problem is responsible for strictly executing one process in its critical section at a time? **D. mutual exclusion**

    A. starvation
    B. deadlock
    C. bounded waiting
    D. mutual exclusion

4. A lock is considered as _____ if a thread is blocked while trying to acquire the lock. **A. Contended**

    A. Contended

B. Uncontended
C. High Contention
D. Low Contention

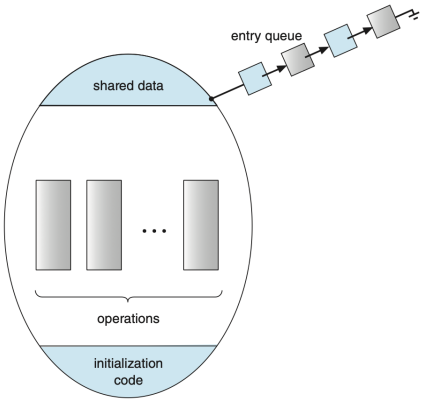
5. What are the memory guarantees a computer architecture makes to application programs? **C. Memory Model**

   A. Memory
   B. Memory Barrier
   C. Memory Model
   D. Atomic Variables

3 IDENTIFICATION/ ILLUSTRATION

1. Draw the schematic view of a monitor.

   Answer:



2. Priority inversion is a liveness problem where it can only occur in systems with more than two priorities. What solution is implemented in order to avoid this problem?

   Answer: Priority-inheritance Control

3. This is a form of deadlock wherein a process may never be removed from the semaphore queue in which it is suspended.

   Answer: Starvation

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Quiz Answer Key

I. True or False

1. On Single-processor systems, Windows uses interrupt masks to protect access to global resources on uniprocessor systems. **- T**

2. Both Windows and macOS systems provide POSIX named semaphores. **– F (Windows should be Linux)**

3. Concurrent applications present an increased risk of race conditions and liveness hazards such as deadlock **- T**
4. Transactional memories originated in the synchronization theory **– F (Synchronization should be database)**
5. The dining-philosophers problem is a simple representation of the need to allocate several resources among several processes in a deadlock-free and starvation-free manner. **- T**

II. Multiple Choice

1. A user-mode mutex that can often be acquired and released without kernel intervention

   A. Dispatcher objects
   C. Uncontented lock
   B. Spinlock
   D. Critical-section object

2. Calling this function releases the mutex lock, thereby allowing another thread to access the shared data and possibly update its value so that the condition clause evaluates to true.

   A. pthread_cond_wait( )
   C. pthread_mutex_lock( )
   B. pthread_mutex_init( )
   D. pthread_cond_init( )

3. In synchronization in Java, this is owned by a single thread and is used to provide mutually exclusive access to a shared resource

   A. Semaphores
   C. Java Monitors
   B. Reentrant Locks
   D. Conditional Variables

4. This approach prevents problems from concurrent applications without the involvement of locks. Thus, deadlocks are impossible.

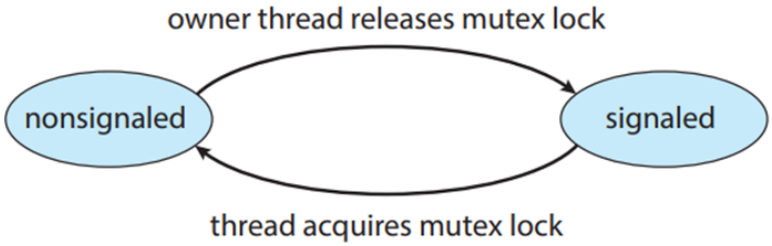
A. OpenMP
C. Transactional Memory
B. Parallel Computing
D. Functional Programming Languages

5. Which variation of the Readers-writers problem requires that no reader should wait for other readers to finish simply because a writer is waiting.

A. First
C. Third
B. Second
D. Fourth

III. Identification/Illustration

1. Owned by a single thread and is used to provide mutually exclusive access to a shared resource.
   (Ans: Reentrant Lock)
2. Ø A user-mode mutex that can often be acquired and released without kernel intervention
   (Ans: Critical Section Object)
3. Illustrate the state transition of a mutex lock dispatcher (aka Mutex Dispatcher Object)



Ans:

CHAPTER 8 - Deadlock Questions

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I. True or False

1. A thread must request a resource before using it and must release the resource after using it. ***True***
2. The wait-for graph scheme is applicable to a resource-allocation system with multiple instances of each resource type. ***False***
3. Reserve-Allocation Graph is a graphical representation used to analyze and understand the allocation and potential deadlocks in an operating system. ***False***
4. Deadlock occurs when a thread keeps trying to perform an action, but that action continuously fails, preventing any forward progress. ***False***
5. Deadlock prevention is ensuring that at least one of the conditions for a deadlock does not hold ***True***

II. Multiple Choice

1. Which of the following conditions of a deadlock is the MOST PRACTICAL TO BE PREVENTED in terms of preventing a deadlock?
   a. Mutual Exclusion
   b. Hold and Wait
   c. No Preemption
   d. Circular Wait

2. Which of the following data structures is NOT needed for Banker's algorithm
   a. Available
   b. Max
   c. Linked List
   d. Allocation
   e. Need

3. A vector of length m indicates the number of available resources of each type .
   a. Available
   b. Allocation
   c. Request
   d. Finish

4. Under the normal mode of operation, a thread may utilize a resource in only the following sequence. Which of the following is NOT part of the sequence?
   a. Release
   b. Wait
   c. Use
   d. Request

5. In this condition, the threads hold at least one resource and wait for additional resources held by other threads, creating a dependency.

a. Mutual Exclusion
b. Hold and Wait
c. No Preemption
d. Circular Wait

III. Identification/Illustration

1. It is defined as a situation when resources requested are held by other waiting threads, this waiting thread sometimes can never again change state. ***Deadlock/s***
2. This method clearly will break the deadlock cycle, but at great expense. ***Abort all deadlocked processes***
3. A state where a system can allocate resources to each thread (up to its maximum) in some order and still avoid a deadlock. ***Safe state***

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CHAPTER 9 QUESTIONS

TRUE OR FALSE.

_____ 1. A user program accesses the real physical addresses and also deals with logical addresses.

_____ 2. In a first-fit strategy, searching can start either at the beginning of the set of holes or at the location where the previous first-fit search ended.

_____ 3. Compaction is not possible if relocation is dynamic, and is done at execution time.

_____ 4. In Dynamic Loading, the routine is loaded even before it is called.

_____ 5. In Dynamic Linking, linking is postponed until execution time.

MULTIPLE CHOICE.

1. The run-time mapping from virtual to physical addresses is done by what hardware device?
    a. Memory-Management Unit (MMU)
    b. central processing unit (CPU)
    c. graphics processing unit (GPU)
    d. power supply unit (PSU)
2. It takes place on the allocation of a process to a partition greater than the process requirement. The leftover space causes degradation of system performance. It occurs in the worst-fit memory allocation strategy.
    a. external fragmentation
    b. Internal Fragmentation
    c. outer fragmentation
    d. inner fragmentation
3. These are system libraries that are linked to user programs when the programs are run.
    a. static libraries
    b. shared libraries
    c. Dynamically Linked Libraries
    d. system libraries
4. This is also called associative memory, a special fast-lookup hardware cache, that is used to solve the two-memory access problem.
    a. memory management unit (MMU)
    b. Two-memory access problem solver thingy
    c. address space identifiers (ASIDs)
    d. Translation Look-aside Buffers (TLBs)
5. This is a non-self-modifying code that never changes during execution. Thus, two or more processes can execute the same code at the same time.
    a. Reentrant Code
    b. shared code
    c. private code
    d. relocatable code

IDENTIFICATION.

1. This register holds the smallest legal physical memory address.
2. Construct the diagram of the Memory Management Unit (MMU).
3. What does PTBR stand for?

CHAPTER 9 QUESTIONS - ANSWER KEY

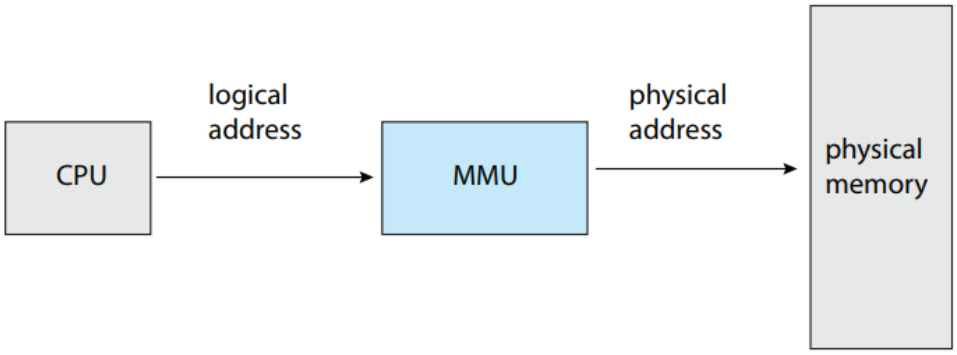
TRUE OR FALSE.

1. False
2. True
3. False
4. False
5. True

MULTIPLE CHOICE.

1. a. Memory-Management Unit (MMU)
2. b. Internal Fragmentation
3. c. Dynamically Linked Libraries
4. d. Translation Look-aside Buffers (TLBs)
5. a. Reentrant Code

IDENTIFICATION.

1. Base register
2. 

3. Page-Table Base Register