

## Chapter 8 - Deadlock

### Multiple Choice Questions

1. In the deadlock example shown in Figure 8.1,  
A) a deadlock is guaranteed to occur.  
B) a deadlock may occur sometime, but not necessarily every time.  
C) a deadlock may occur sometime only if there are more than one instances of thread\_one and thread\_two are running.  
D) a deadlock is guaranteed to occur as long as there are more than one instances of thread\_one and thread\_two are running.
2. In the livelock example shown in Figure 8.2,  
A) a livelock is guaranteed to occur.  
B) a livelock may occur sometime.  
C) a livelock may occur sometime only if there are more than one instances of thread\_one and thread\_two are running.  
D) a livelock is guaranteed to occur as long as there are more than one instances of thread\_one and thread\_two are running.
3. One necessary condition for deadlock is \_\_\_\_, which states that at least one resource must be held in a nonsharable mode.  
A) hold and wait  
B) mutual exclusion  
C) circular wait  
D) no preemption
4. One necessary condition for deadlock is \_\_\_\_, which states that a resource can be released only voluntarily by the process holding the resource.  
A) hold and wait  
B) mutual exclusion  
C) circular wait  
D) no preemption
5. One necessary condition for deadlock is \_\_\_\_, which states that there is a chain of waiting processes whereby  $P_0$  is waiting for a resource held by  $P_1$ ,  $P_1$  is waiting for a resource held by  $P_2$ , and  $P_n$  is waiting for a resource held by  $P_0$ .  
A) hold and wait  
B) mutual exclusion  
C) circular wait  
D) no preemption
6. In a system resource-allocation graph, \_\_\_\_.  
A) a directed edge from a process to a resource is called an assignment edge  
B) a directed edge from a resource to a process is called a request edge  
C) a directed edge from a process to a resource is called a request edge  
D) None of the above
7. In a system resource-allocation graph, \_\_\_\_.  
A) a directed edge from a resource to a process is called an assignment edge  
B) a directed edge from a resource to a process is called a request edge  
C) a directed edge from a process to a resource is called an assignment edge  
D) None of the above
8. In a resource allocation graph, when a process releases a resource,  
A) a request edge is inserted.  
B) an assignment edge is inserted.  
C) a request edge is removed.  
D) an assignment edge is removed.
9. A system will never enter a deadlocked state if  
A) the system chooses to ignore the problem altogether.  
B) the system uses the detection and recovery technique.  
C) the system uses the deadlock avoidance technique.  
D) None of the above.
10. Deadlocks can be prevented only if  
A) all four necessary conditions cannot hold.  
B) at least one of the four necessary conditions cannot hold.  
C) mutual exclusion condition cannot hold.  
D) circular wait condition cannot hold.

11. A \_\_\_\_\_ could be preempted from a process.

- A) mutex lock
- B) CPU registers
- C) semaphore
- D) file lock

12. Deadlock prevention using preempting allocated resources cannot be used for

- A) mutexes.
- B) CPU registers.
- C) database transactions.
- D) memory.

14. Which of the following statement is true?

- A) An unsafe state is a deadlocked state.
- B) A deadlocked state is a safe state.
- C) An unsafe state will lead to a deadlocked state.
- D) An unsafe state may lead to a deadlocked state.

15. Suppose that there are ten resources available to three processes. At time 0, the following data is collected. The table indicates the process, the maximum number of resources needed by the process, and the number of resources currently owned by each process.

Process	Maximum Needs	Currently Owned
P <sub>0</sub>	10	4
P <sub>1</sub>	3	1
P <sub>2</sub>	5	4

At time 1, P<sub>1</sub> requests a resource. Which of the following is correct?

- A) The request will be granted, since the current state is safe.
- B) The request will not be granted, since the current state is not safe.
- C) The request will be granted, since the state after granting the request will be safe.
- D) The request will not be granted, since the state after granting the request will be unsafe.

16. A claim edge in a resource-allocation graph indicates that

- A) a process has been allocated a resource.
- B) a process may request a resource.
- C) a process may release a resource that it has already been assigned.
- D) a process has requested a resource.

17. Which of the following data structures in the banker's algorithm is a vector of length  $m$ , where  $m$  is the number of resource types?

- A) Need
- B) Allocation
- C) Max
- D) Available

18. Suppose that there are two resource types (R1 and R2) with five resources each available to four processes. At time 0, the following data is collected. The table indicates the process, the number of resources of each type currently allocated to the processes, and the current request of each resource type by each process.

	Process		Allocation		Request	
	R1	R2	R1	R2	R1	R2
P <sub>0</sub>	2	0	3	2		
P <sub>1</sub>	1	1	1	0		
P <sub>2</sub>	0	1	1	1		
P <sub>3</sub>	1	1	3	2		

Which of the following sentences is correct?

- A) All four processes are currently deadlocked.
- B) The system is not deadlocked.
- C) Processes P<sub>0</sub> and P<sub>3</sub> are deadlocked.
- D) Processes P<sub>0</sub>, P<sub>1</sub> and P<sub>3</sub> are deadlocked.

19. In a system that uses deadlock detection algorithm,

A) a deadlock is detected as soon as it occurs.

B) a deadlock is detected just before it occurs.

C) a deadlock is detected sometime after it has occurred but not necessarily immediately.

D) a deadlock is detected sometime before it occurs, but not necessarily just before.

20. Which of the following is not a factor in choosing which process to terminate during recovery from a deadlock?

A) Who the parent of the process is.

B) How many more resources the process needs in order to complete.

C) How many processes will need to be terminated.

D) What the priority of the process is

### Essay Questions

1. Explain what has to happen for a set of processes to achieve a deadlocked state.

2. Describe the four conditions that must hold simultaneously in a system if a deadlock is to occur.



3. What are the three general ways that a deadlock can be handled?

4. What is the difference between deadlock prevention and deadlock avoidance?

### True/False Questions

1. The circular-wait condition for a deadlock implies the hold-and-wait condition.

2. Deadlock prevention and deadlock avoidance are essentially the same approaches for handling deadlock.

3. Protocols to prevent hold-and-wait conditions typically also prevent starvation.

4. Ordering resources and requiring the resources to be acquired in order prevents the circular wait from occurring and therefore prevents deadlock from occurring.

5. A system in an unsafe state will ultimately deadlock.

6. If the sum of all needs for a resource type exceeds the available number of instances of that resource type, the system state is unsafe.

7. The banker's algorithm is useful in a system with multiple instances of each resource type.

8. Recovery from a deadlock works best when a single process can be identified whose termination will break the circular wait.