

Pre-class Assignment #10

1. Define deadlock.

A cycle of waiting among a set of threads, where each thread waits for some other thread in the cycle to take some action.

2. What are the four necessary conditions for deadlock?

1. Bounded resources
2. No preemption
3. Wait while holding
4. Circular waiting

3. Give four examples of deadlock prevention, one for each of the four conditions you listed in question 2.

1. Provide sufficient resources (virtualization)
2. Preempt resources
3. Release lock when calling out of module
4. Locking ordering

4. How does deadlock avoidance differ from deadlock prevention?

Dead lock avoidance works by allocating enough resources so that there wouldn't be an issue to prevent, while avoidance tries to avoid a specific state by limiting behavior.

5. What are the three types of states identified in the deadlock avoidance approach?

1. Safe state
2. Unsafe state
3. Deadlocked state

6. A system is limited to which state type(s) by use of a deadlock avoidance algorithm?

Safe state only

7. Use the Banker's Algorithm to determine if the following request can be granted.

current state of system

thread	max need	allocated	remaining need
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A	8	2	6
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B	6	3	3
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C	4	2	2
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total units = 10

available units = 3

thread A requests 1 unit

Yes, there is enough resources to grant the request

8. What is the rationale for a detect and recover approach to deadlock versus prevention or avoidance?

Sometimes it is too difficult or expensive to enforce sufficient structure on the system's data and workloads to guarantee that deadlock will never occur.

9. What are the two recovery techniques identified in the textbook?

1. Proceed without the resource
2. Transactions: rollback and retry

10. What is wound wait?

An approach to deadlock recovery that ensures progress by aborting that most recent transaction in any deadlock.