

1. Define consumable resources	Produced and destroyed by a process	13. In the context of addressing deadlock, what does manual intervention mean?	Having the operator reboot the machine if it seems too slow.
2. Define deadlock.	Permanent blocking of a set of processes that either compete for system resources or communicate with each other.	14. In the context of addressing deadlock, what is prevention?	Designing the system so that deadlock is impossible.
3. Define reusable resources	Used by one process at a time and not depleted by that use; these are obtained and released.	15. In the context of consumable resources, when might deadlock occur?	When a receive message is blocking; when two processes are attempting to request additional memory before releasing any.
4. Given a claim matrix, allocation matrix, resource vector, and available vector, determine whether the system is in a safe/unsafe state.	Cool.	16. In the context of deadlock prevention, define hold and wait.	A process holding one resource while waiting for another.
5. Given an example of deadlock, determine how to use one of the methods to avoid deadlock	Cool.	17. In the context of deadlock prevention, how is circular wait avoided?	Choosing a resource request strategy that will not introduce a cycle (e.g. assigning a total order to all the resources that will be requested)
6. Given the four linked conditions implied by deadlock, what can be done to prevent deadlock.	Ensuring that at least one of those conditions is false at all times.	18. In the context of deadlock prevention, what are the disadvantages to allowing preemption?	Inefficiency and wasting CPU and other resources
7. Given the matrices representing the system's state, how is it determined whether deadlock can occur?	A tuple in the claim matrix is compared to the available vector. If the entries in the tuple from the claim matrix are less than or equal to the entries in the available vector, the state is safe.	19. In the context of deadlock prevention, what are the two approaches to avoiding hold and wait?	Force a process to request all needed resources at once; force a process to release all resources it is holding before acquiring a new resource.
8. Give some examples of consumable resources	Interrupts, signals, messages, and information in I/O buffers	20. In the context of deadlock prevention, what are the two strategies that allowing preemption includes?	If a process holding certain resources is denied a further request, that process must release original resources; if a process requests a resource that is held by another process, the OS may force the latter process to release resources.
9. Give some examples of reusable resources.	CPU, memory, files, databases, semaphores		
10. How can you detect a circular wait?	Look for a cycle.		
11. In the context of addressing deadlock, what does avoidance mean?	Constructing a system of states, then choosing a strategy that (when resources are assigned to processes) does not allow the system to go to a deadlock state		
12. In the context of addressing deadlock, what does detection and recovery mean?	Periodically/sporadically check for deadlock, then recover		

21. In the context of deadlock prevention, what four linked conditions are implied by deadlock?	Mutual exclusion, hold and wait, no preemption, circular waiting.	32. In the context of the prevention approach to deadlock, what are the disadvantages of preemption?	Preempts more than necessary
22. In the context of resource allocation denial, define an unsafe state.	A state in which there is NOT at least one sequence of actions that does not result in deadlock.	33. In the context of the prevention approach to deadlock, what are the disadvantages of requesting all resources at once?	Inefficient; delays processes starting; future resource requirements must be known by processes
23. In the context of resource allocation denial, define a safe state.	There is at least one sequence of actions that does not result in deadlock and allows all processes to run to completion.	34. In the context of the prevention approach to deadlock, what are the disadvantages of resource ordering?	Disallows incremental resource requests.
24. In the context of resource allocation denial, define the state of the system.	The current allocation of resources to processes.	35. Prove that deadlock does not happen when circular wait is not allowed.	Cool.
25. In the context of the avoidance approach to deadlock, what are the advantages of finding at least one safe path?	No preemption necessary	36. What are different methods for addressing deadlock?	Prevention, avoidance, detection and recovery, and manual intervention
26. In the context of the avoidance approach to deadlock, what are the disadvantages of finding at least one safe path?	Future resource requirements must be known by OS; processes can be blocked for long periods	37. What are strategies for once deadlock is detected?	Abort all deadlocked processes; back up each deadlocked process to some predefined checkpoint and restart (though the deadlock may reoccur); successively abort deadlocked processes until deadlock no longer exists; successively preempt resources until deadlock no longer exists.
27. In the context of the detection approach to deadlock, what are the advantages of invoking periodically to test for deadlock?	Never delays process initiation; facilitates online handling	38. What are the criteria for deciding which deadlocked process to terminate?	Least amount of processor time consumed so far; most estimated time remaining; least total resources allocated so far; lowest priority
28. In the context of the detection approach to deadlock, what are the disadvantages of invoking periodically to test for deadlock?	Inherent preemption losses		
29. In the context of the prevention approach to deadlock, what are the advantages of preemption?	Convenient when applied to resources whose state can be saved and restored easily.		
30. In the context of the prevention approach to deadlock, what are the advantages of requesting all resources at once?	Works well for processes performing single burst of activity; no preemption necessary		
31. In the context of the prevention approach to deadlock, what are the advantages of resource ordering?	Feasible to enforce via compile-time checks; needs no runtime computation		

39. What are the requirements necessary to implement deadlock avoidance?	Max resource requirement must be stated in advance, there must be a fixed number of resources to allocate, processes under consideration must be independent (that is, no synchronization must be needed), no process may exit while holding resources
40. What does deadlock avoidance involve?	The resource manager seeing the worst case scenario - if an incremental resource request could lead to deadlock, it is not granted
41. What extra information does deadlock avoidance require?	The maximum claim for each process
42. What is an algorithm to detect a cycle?	DFS
43. What is the resource allocation policy of the avoidance approach?	Midway between detection and prevention.
44. What is the resource allocation policy of the detection approach?	Very liberal
45. What is the resource allocation policy of the prevention approach?	Conservative
46. When should the safe state algorithm be run?	Before allocating resources.
47. Which of the methods of preventing deadlock are extremely costly and impractical?	No hold and wait

48. Which of the methods of preventing deadlock are nearly impossible?	Preventing mutual exclusion
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