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BSIT – 301

1. Describe the deadlock scenario illustrated above based on your understanding. (5 points)

- the impasse scenario outlined above, in which processes P and Q fight for resources A and B. One process at a time is the only one that can use each resource. Whereas waiting for the resource A to become available, the process P collects and retains the resource B, while the process Q acquires and holds the resource A while the resource B is being made available. Because both processes need to use resources A and B simultaneously and because process P, like process Q, is reluctant to let go of resource B, the scenario results in a deadlock.

2. What do you think would happen if both Process P and Q need to get the same resource? (5 points)

- A database needs three records, numbered 1, 2, and 3, for each of the two processes, A and B. Deadlock is impossible if A requests them in the order 1, 2, 3, and B requests them in the same order. Deadlock is feasible if B requests them in the order 3, 2, and 1, though.

3. Which concurrency mechanism would you suggest that might prevent the deadlock situation above? Rationalize your answer. (5 points)

- Deadlocks can be prevented by eliminating any of the above with four conditions. Mutual Exclusion, Hold and Wait, No Preemption, Circular wait.

4. Define in detail the Execution Paths 2 to 6. (5 items x 3 points)

Example: Execution Path 1 – Process Q acquires Resource B and then Resource A. Process Q then releases Resource B and A, respectively.

- The following are the specific execution pathways from 2 to 6:2. P executes A's request and stops it. Q releases B and A. Q receives B, then A. P can acquire both resources when he resumes. 3. Deadlocks are inevitable because Q locks A while P locks B during execution, resulting in Q getting B and P getting A. Deadlock is unavoidable because a Q block on A and a P block on B are now running. Q requests a block from Band, which P enables after obtaining A and B. You can obtain both resources when Q has resumed. 6. P obtains A and B before releasing them. You can acquire both resources when Q starts up again.

5. Do Execution Paths 3 and 4 encompass the first three conditions for a deadlock to occur? Explain your answer. (5 points)

- A deadlock can only exist if three conditions are met: • Mutual exclusion; this criterion cannot be bypassed. • Hold-and-wait - By making a process request all of the resources it needs at once, the hold-and-wait condition can be avoided. The process is then suspended until all requests are

granted at once. • No preemption - A process having resources must abandon those resources and re-request them together with the new resource if its new request is rejected.

6. If you are to implement deadlock prevention before the processes above reach the critical section, would it be an indirect method or an indirect method? Why? (5 points)

- Because it prevents the occurrence of one of the prerequisites specified previously, for me, it will be an indirect technique.

7. Which deadlock avoidance approach would you suggest for the given situation above and why? (5 points)

- If the request might deadlock, do not start the process. When allocating resources incrementally, avoid deadlocks by not allowing processes to do so.

8. Would you agree that deadlock is relative to the number of processes and available resources in an operating system? Why or why not? (5 points)

- Yes, since two processes compete for the same two resources in opposing ways. There is only one process used. The latter process must be postponed. A deadlock occurs when one process locks the first resource while another locks the second resource.

9. If you are asked to reconstruct the progress diagram above to eliminate the critical section, which is the deadlock-inevitable region, which aspect(s) or area(s) would you modify? Explain how the modification eliminates the deadlock. (5 points)

- If an execution path hits this crucial part, deadlock is inevitable. There won't be a deadlock until the two processes cooperate to create a path into the crucial region.