There are four necessary conditions that must be present simultaneously for a deadlock situation to arise:

1. Mutual Exclusion: At least one resource must be held in a non-shareable mode, meaning that only one process at a time can use the resource. This means that if one process is using the resource, other processes must wait until it is released.

2. Hold and Wait: A process must be holding at least one resource and waiting for another resource to be released by another process. This means that a process may be blocking the release of resources it holds, preventing other processes from accessing them.

3. No Preemption: Resources cannot be preempted, meaning that a resource cannot be taken away from a process until it has completed its task. This means that a process may hold onto resources longer than necessary, even if it is not actively using them.

4. Circular Wait: A circular chain of processes must exist, where each process is waiting for a resource held by the next process in the chain. This means that the processes are waiting for each other, creating a cycle of dependencies that cannot be broken.

If all four conditions are met, a deadlock situation can arise. It is important for operating systems to detect and prevent deadlock situations from occurring by implementing deadlock prevention, avoidance, or recovery algorithms. These algorithms can help ensure that resources are allocated efficiently and that processes do not get stuck in a deadlock.

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70. What are the various services provided by Operating system ?
71. What do you mean by PCB? Where is it used? What are its contents? Explain.
72. What is Binary and Counting semaphores ?
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74. What are System call? Explain briefly about various types of system call provided by an Operating System?
75. What are points to be consider in file system design? Explain linked list allocation in detail?
76. Write a Semaphore solution for dining Philosopher’s problem?
77. Consider the following page reference string:1,2,3,4,5,3,4,1,2,7,8,7,8,9,7,8,9,5,4,5.

How many page faults would occur for the following replacement algorithm, assuming four frames:a) FIFOb) LRU

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