

Necessary conditions for Deadlock

1. Mutual exclusion $\rightarrow$ At least one resource must be held in a non-sharable mode; that is only one process at a time can use the resource. If another process requests for the resource, the requesting process must be delayed until the resource has been released.
2. Hold and wait $\rightarrow$ A process must be holding at least one resource and waiting to acquire additional resources that are currently being held by other processes.
3. No preemption $\rightarrow$ Resources cannot be preempted; that is, a resource can be released only voluntarily by the process holding it, after that process has completed its task.
4. Circular wait $\rightarrow$ A set $\{P_0, P_1, P_2, \dots, P_n\}$ of waiting processes must exist such that P_0 is waiting for resource held by P_1 , P_1 is waiting for resource held by $P_2, \dots, P_{n-1}$ is waiting for resource held by P_n and P_n is waiting for resource held by P_0 .