Explain Deadlock and its characteristics?

Answer:

Deadlock is a situation where two or more processes are waiting for each other.

For example, let us assume, we have two processes P1 and P2. Now, process P1 is holding

he resource R1 and is waiting for the resource R2. At the same time, the process P2

is having the resource R2 and is waiting for the resource R1. So, the process P1 is

waiting for process P2 to release its resource and at the same time, the process P2

is waiting for process P1 to release its resource. And no one is releasing any resource. So, both are waiting for each other to release the resource. This leads to infinite waiting and no work is done here. This is called Deadlock.

characteristics:

Mutual Exclusion

There should be a resource that can only be held by one process at a time.

In the diagram below, there is a single instance of Resource 1 and it is held

by Process 1 only.

Hold and Wait

A process can hold multiple resources and still request more resources

from other processes which are holding them. In the diagram given below,

Process 2 holds Resource 2 and Resource 3 and is requesting the Resource 1

which is held by Process 1

No Preemption

A resource cannot be preempted from a process by force.

A process can only release a resource voluntarily. In the diagram below, Process 2 cannot preempt Resource 1 from Process 1. It will only be released when Process 1 relinquishes it voluntarily after its execution is complete

Circular Wait

A process is waiting for the resource held by the second process, which is waiting for the resource held by the third process and so on, till the last process is waiting for a resource held by the first process. This forms a circular chain.
For example: Process 1 is allocated Resource2 and it is requesting Resource 1.
Similarly, Process 2 is allocated Resource 1 and it is requesting Resource 2.
This forms a circular wait loop.