U19CS009

OS - Class Test

Q-1 Following are the conditions necessary for deadlock to occur:-

1. Mutual Exclusive => In this condition

a. There must be at least one resource in system which can be used by only one process at a time.

b. eg. a printer

c.

2. Hold and wait => In this there must exist a process which holds some resource and waits for another resource held by some other process.

3. No pre-emption => In this following should be satisfied.

a. Once the resource has been allocated to the process, it can not be preempted.

b Resource cannot be snatched forcefully from one process and given to other.

c. Process must release resource ~~vulne~~ voluntarily by itself.

4. Circular Wait => In this all process must wait for resource in a cyclic manner where last process waits for resources held by first process

=> All 4 conditions must simultaneously occur for deadlock to occur.

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Q-2 To prevent hold and wait condition we need to do following :-

a. prevent process from holding resources and requesting others

a.i => request all resources at process creation

a.ii => release all held resources before requesting a set of new ones simultaneously.

To prevent circular wait condition we need to do following :-

1. a process should only hold 1 resource at a time

=> problem here is in some cases a process needs to hold multiple resources

2. Impose a total ordering of all resources types and require each process to request resources in increasing order.

i.e. we use ordering

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Ans-3 Suppose the system is deadlocked. This implies that each process is holding one resource and is waiting for one more. Since there are 3 process & 4 resources, one process must be able to obtain two resources. This process requires no more resources and therefore it will return its resources when done

P_1	P_2	P_3	P_1	P_2	P_3
R	R	R	1	1	1
R			1		

As soon as P_1 is complete, the resources can be utilised by either P_2 or P_3

Ans-4

Total allocation	X	Y	Z
	5	4	3
total resources	5	5	5
available	0	1	2

	Allocation			Requested		
	X	Y	Z	X	Y	Z
P_0	1	2	1	1	0	3
P_1	2	0	1	0	1	2
P_2	2	2	1	1	2	0

Process P_0 ⇒ need = 1 0 3

Available ⇒ 0 1 2

need ≰ Available

then P_1

need = 0 1 2, Available = 0 1 2

$\therefore P_1$ is granted resources

Available = 0 1 2
+ 2 0 1
= 2 1 3

then P_2

→ Need = 1 2 0
Available = 2 1 3

Need $\not\leq$ Available

then P_0

need = 1 0 3
Available = 2 1 3

Need $\leq$ Available

$\therefore P_0$ granted

then Available = 0 3 + 1 2 1
+ 2 1 3 + 2 1 2
3 1 6 3 3 4

Then P_2

need = 1 2 0
Available = 3 3 4

$\therefore P_2$ is granted

$\therefore$ order = $P_1 \rightarrow P_0 \rightarrow P_2$ $\therefore P_2$ is last