

Deadlocks

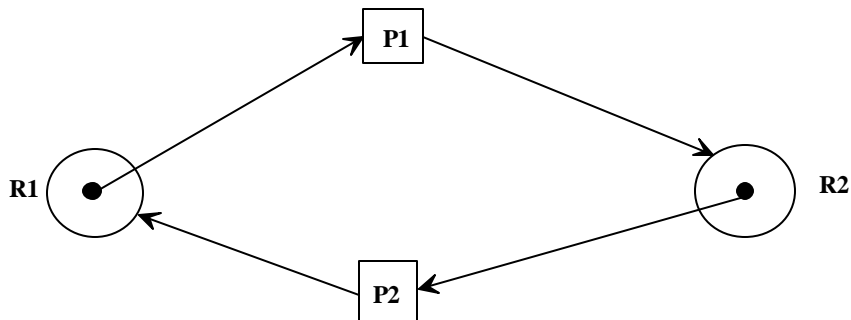
Deadlock conditions

1. More than one resource
2. Mutual Exclusion
3. Hold and wait
4. No preemption
5. Circular wait

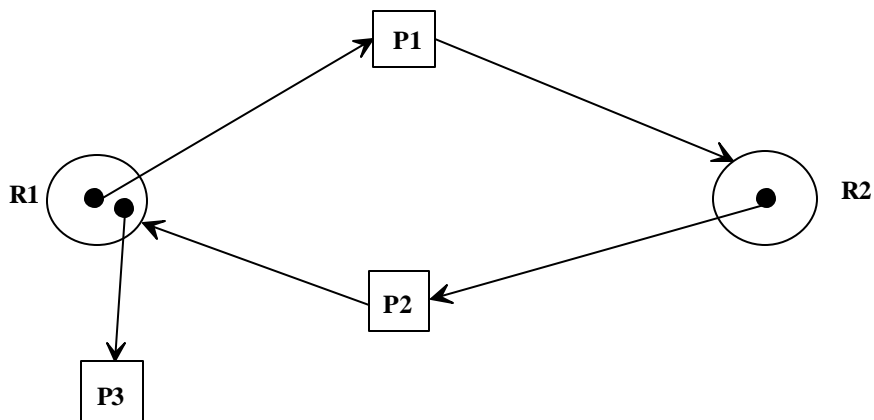
How does this apply to this?

S.Wait(); T.Wait();
T.Wait(); S.Wait();

Resource allocation graph:



Multiple Resources



Handling deadlocks

1. Prevention – Make one of the five impossible
2. Avoidance – Use the banker’s algorithm
3. Detection and recovery – modified banker’s algorithm
4. Do nothing

Avoidance Banker’s algorithm:

	Current		
	A	B	C
P0	2	2	3
P1	1	1	0
P2	0	1	2
P3	1	1	2
P4	0	2	2

	Max		
	A	B	C
	3	4	5
	2	2	2
	1	3	3
	1	1	3
	2	7	4

Free		
A	B	C
0	0	1

Detection and recovery:

	Current		
	A	B	C
P0	2	2	3
P1	1	1	0
P2	0	1	2
P3	1	1	2
P4	0	2	2

	Request		
	A	B	C
	0	0	0
	2	2	2
	1	3	5
	3	1	3
	2	5	4

Free		
A	B	C
0	0	1