Exercise 5

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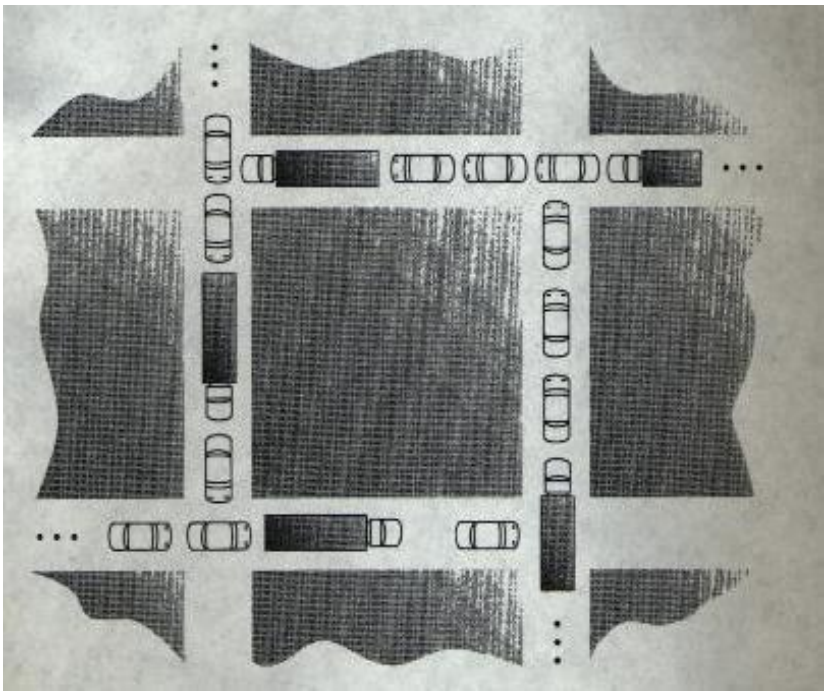
Ex.1

Answer following questions.

Consider the traffic deadlock depicted in Figure



a. Show that the four necessary conditions for deadlock indeed hold in this example.

Put your answer here.

Mutual exclusion → One car occupies various area.

No preemption → Other cars cannot remove it when a car go through a interaction.

Hold and Wait → Other cars should wait when a car go through a interaction.

Circular and Wait → There is probability. It means Circular and Wait. Because four roads have circular directions.

b. State a simple rule that will avoid deadlocks in this system.

Put your answer here.

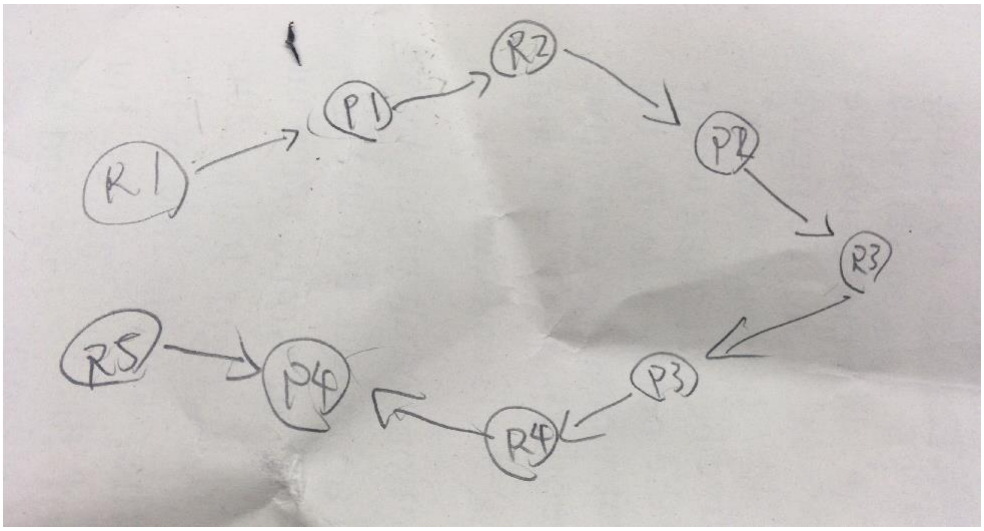
For example, we remove one condition of the deadlock necessary conditions.

This is why we can prevent deadlock.

Ex.2

Consider a system consisting of five resources of the same type that are shared by four processes. Each of these processes needs at most two resources. Show that the system is deadlock-free. Paint the resource-allocation graph.

Put your answer here.



Ex.3

Consider the following snapshot of a system:

	Allocation	**Max**	**Available**
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	

P_4 0 0 1 4 0 6 5 6

Answer the following questions using the banker's algorithm:

a. What is the content of the matrix *Need*?

Put your answer here.

P0 = (0,0,0,0) P1 = (0,7,5,0) P2 = (1,0,0,2) P3 = (0,0,2,0) P4 = (0,6,4,2)

Need = Max - Allocation

b. Is the system in a safe state?

Put your answer here.

P0 Need <= Available = (1,5,2,0) + (0,0,1,2) = (1,5,3,2) Granted

P1 Need >= Available Not Granted

P2 Need <= Available = (1,5,3,2) + (1,3,5,4) = (2,8,8,6) Granted

P3 Need <= Available = (2,8,8,6) + (0,6,3,2) = (2,14,11,8) Granted

P4 Need <= Available = (2,14,11,8) + (0,0,1,4) = (2,14,12,12) Granted

System is in a safe state.

c. If a request from process P_1 arrives for (0,4,2,0) can the request be granted immediately?

Put your answer here.

Available = (1,5,2,0) – (0,4,2,0) = (1,1,0,0)
Allocation = (1,0,0,0) + (0,4,2,0) = (1,4,2,0)
Need = (0,7,5,0) – (0,4,2,0) = (0,3,3,0)