CS 350 HW8

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4. a Resource should be [(9, 5, 6)]

Claim matrix

	R_1	R_2	R_3
P_1	7	5	3
P_2	3	2	2
P_3	9	0	2
P_4	2	2	2
P_5	4	3	3

Allocation matrix

	R_1	R_2	R_3
P_1	0	1	0
P_2	2	0	0
P_3	3	0	2
P_4	2	1	1
P_5	0	0	2

Still Need Matrix = CM − AM

P_1	7	4	3	✓
P_2	1	2	2	✓
P_3	6	0	0	✓
P_4	0	1	1	✓
P_5	4	3	1	✓

We add extra minimum availability to make sure the process can be finished.

Available = (0, 0, 0)

Safe path:

give P_4 (0, 1, 1)
give P_2 (1, 2, 2)
give P_5 (4, 3, 1)
give P_3 (6, 0, 0)
give P_1 (7, 4, 3)
No more process

Available + (0, 1, 1)
(2, 2, 2)
(4, 2, 2) + (0, 1, 0)
(4, 3, 4) + (2, 0, 0)
(9, 3, 6) + (0, 1, 0)
(9, 5, 6)

final Available
[(9, 5, 6)]

b. $R_n(10, 5, 7)$

Available $(10-7, 5-2, 7-5) = (3, 3, 2)$

	Safe path	Available
		$(2, 3, 0)$
	grant $P_2(1, 0, 2)$	
P_2 finish	grant $P_2(0, 2, 0)$	$(2, 1, 0) + P_2 = (5, 3, 2)$
P_4 finish	grant $P_4(0, 1, 1)$	$(5, 2, 1) + P_4 = (7, 4, 3)$
P_5 finish	grant $P_5(4, 3, 1)$	$(3, 1, 2) + P_5 = (7, 4, 5)$
P_1 finish	grant $P_1(7, 4, 3)$	$(0, 0, 2) + P_1 = (7, 5, 5)$
P_3 finish	grant $P_3(6, 0, 0)$	$(1, 5, 5) + P_3 = (10, 5, 7)$

Original claim

From the safe path we can get all resorces back and finish all process.

C. granted path $P_1(0, 2, 0)$

Available $(2, 3, 0)$ from part b. → $(2, 1, 0)$

Allocation matrix

	R_1	R_2	R_3
P_1	0	3	0
P_2	3	0	2
P_3	3	0	2
P_4	2	1	1
P_5	0	0	2

Still need matrix.

	R_1	R_2	R_3
P_1	7	2	3
P_2	0	2	0
P_3	6	0	0
P_4	0	1	1
P_5	4	3	1

No, It is not safe grant $P_1(0, 2, 0)$ because if we do so, we cannot finish any processes which lead to deadlock.