Week-8

1.) Aim : To implement bankers Algorithm.

	Max			Allocation			Available		
	A	B	C	A	B	C	A	B	C
P0	0	0	1	0	0	1			
P1	1	7	5	1	0	0			
P2	2	3	5	1	3	5			
P3	0	6	5	0	6	3			
Total				2	9	9	1	5	2

Need = Max - Allocation

	Need		
	A	B	C
P0	0	0	0
P1	0	7	5
P2	1	0	0
P3	0	0	2

Safety Algorithm.

Work = Available

Finish [i] = false $i = 0, 1, 2, 3$

finish :

F	F	F	F
0	1	2	3

Need1 <= work

$Need_0 = 0, 0, 0$

$Need_0$ <= Work ✓

$Need_0$ <= Work

0,0,0 1,5,2

finish[0] = True

P0 Work = (1,5,2) + (0,0,1)

Work = 1 5 3

$Need_1 = 0, 7, 5$

P1 Need1 > Work

(0,7,5) (1,5,3) X

$Need_2 = 1, 0, 0$

P2

$Need_2$ <= Work

(1,0,0) < (1,5,3)

finish[2] = True ✓

Work = (1,5,3) + (1,3,5)

= (2 8 8)

P3 Need 3 = 0, 0, 2

Need$_3$ <= Work

(0,0,2) < (2,8,8) ✓

Finish[3] = True

~~Work = (0,0,2) + (2,~~

(2,8,8) + (0,6,3)

Work = (2 14, 11)

P2 Need $_2$ = 0,7,5

Need$_2$ <= Work

(0,7,5) < (2,14,11)

~~Work =~~ finish[2] = True

Work = (2,14,11) + (1,0,0)

Work = (3, 14, 11)

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finish[i] = true for $0 \leq i \leq 3$

Hence system in safe state

Finish = | T | T | T | T |

Safe sequence : < P0, P2, P3, P1

P1 request additional resource (0,5,2)

$req_1 <= Need$

$(0,5,2) < (0,7,5)$ ✓

$req_1 <= Available$

$(0,5,2) <= (1,5,2)$ ✓

Available = Available − request

$= (1,5,2) - (0,5,2)$

$= (1,0,0)$

Allocation = Allocation + request

$= (1,0,0) + (0,5,2)$

$= (1,5,2)$

Need = Need − request

$= (0,7,5) - (0,5,2)$

$= (0,2,3)$

Check for safe sequence

	Max			Allocation			Available		
	A	B	C	A	B	C	A	B	C
P0	0	0	1	0	0	1			
P1	1	7	5	1	5	2			
P2	2	3	5	1	3	5			
P3	0	6	5	0	6	3			
Total				2	14	11	1	0	0

	Need		
	A	B	C
P0	0	0	0
P1	0	2	3
P2	1	0	0
P3	0	0	2

safety Algorithm

Work = Available

finish = | F | F | F | F |
0 1 2 3

Step -1

Need$_0$ <= Work

P0 (0,0,0) (1,0,0) ✓

Work = (1,0,0) + (0,0,1)

= (1,0,1) finish[0] = True

Step 2.

$Need_1 > Work$ X

P1 $(0,2,3) > (1,0,1)$

finish[1] = false

Step 3

P2 $Need_2 <= Work$

$(1,0,0) <= (1,0,1)$ ✓

finish[2] = True.

$Work = (1,0,1) + (1,3,5)$

$= (2,3,6)$

Step 4

$Need_3 <= Work$

P3 $(0,0,2) <= (2,3,6)$ ✓

finish[3] = True

$Work = (2,3,6) + (0,6,3)$

$= (2,9,9)$

Step 5

$Need_1 \leq Work$

P1 $(0,2,3) \leq (2,9,9)$ ✓

finish[1] = True

Work = (2,9,9) + (1,5,2)

= (3, 14, 11)

finish[1] = true $0 \leq 1 \leq 3$

Hence system is in safe state

The safe sequence is $\langle P0, P2, P3, P1 \rangle$

Yes we can grant request immediately

(i) (1, 5, 2)
A B C

(ii)

	A	B	C
P0	0	0	0
P1	0	7	5
P2	0	7	5
P3	0	0	2

(iii) Yes, It satisfied safety Algorithm

(iv) $\langle P0, P2, P3, P1 \rangle$

(v) Yes, Bankers Algorithm grant request immediately

(vi) New Table + safe sequence.