



QUESTION:

A system has three resource types (A, B, C) and four processes {P1, P2, P3, P4}. The total units of system resources are: (8, 5, 4) units of A, B and C, respectively. The maximum demands for each process is P1(1,2,3), P2(3,2,1), P3(6,5,4) and P4(4,4,2). The current allocation is: P1(0,1,1), P2(2,2,0) and P3(3,0,1) and P4(1,0,1).

(a) Allocation table is given for the 3 processes with the following four columns: PROCESS, ALLOCATION, MAX and NEED. And fill this table with the current allocation state.

(b) Is this state a safe state? Explain your answer by identifying a successful future sequence of processes that makes the state safe, or by explaining which processes are part of the problem that makes the state unsafe?

ANSWER:

(a)

The total units of system resources are: (8, 5, 4)

PROCESS	ALLOCATION	MAX	NEED= MAX - ALLOCATION
P1	0 1 1	1 2 3	1 1 2
P2	2 2 0	3 2 1	1 0 1
P3	3 0 1	6 5 4	3 5 3
P4	1 0 1	4 4 2	3 4 1

(b)

The total number of need matrix 8 10 7 but the total number of system resource units are 8 5 4. Hence, there will be shortage of allocation for the resources B and C. The process p3 is itself using all the 5 units of the resources.

Available can be calculated as follows:

Available = total units – allocation units

$$= 8 \ 5 \ 4 - 6 \ 3 \ 3$$

$$= 2 \ 2 \ 1$$

as available is 2 2 1 and need of P1 is 1 1 2 we can perform process P1 now

after completion of P1 the allocated resources of P1 will be available as the process is completed so

new available is = old available + allocated of P1

$$= 2 \ 2 \ 1 + 0 \ 1 \ 1$$

$$= 2 \ 3 \ 2$$

Now available is 2 3 2 we can perform P2 as need of P2 is 1 0 1

after completion of P2 the allocated resources of P2 will be available as the process is completed so

now new available is = old available + allocated of P2

$$= 2 \ 3 \ 2 + 2 \ 2 \ 0$$

$$= 4 \ 5 \ 2$$

as available is 4 5 2 and need of P4 is 3 4 1 we can perform P4

after completion of P4 the allocated resources of P4 will be available as the process is completed so.

now new available is = old available + allocated of P4

$$= 4 \ 5 \ 2 + 1 \ 0 \ 1$$

$$= 5 \ 5 \ 3$$

now available is 5 5 3 we can perform P3 as need of P3 is 3 5 3

after completion of P3 the allocated resources of P3 will be available as the process is completed so.

now new available is =old available + allocated of P3

$$= 5 \ 5 \ 3 + 3 \ 0 \ 1$$

$$= 8 \ 5 \ 4$$

Hence, the sequence is P1 → P2 → P4 → P3

For this sequence the system is in safe state