Assignment No : 2

DPU
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Title :- Write a Java program to implement Banker's algorithm.

Objective :- 1) Understand functional of OS
2) To learn & understand process, resource & memory management.

Software / Hardware Requirement :- 64 bit open source, linux, OS (Ubuntu), Eclipse IDE etc.

Theory :-

Banker's Algorithm -

It is deadlock algorithm of avoidance & used for resource allocation. The name was choosen because algorithm could be used in banking system to ensure that the bank never allocate its available cash in such a way that it could no longer satisfy needs of all its customers.

Available - No. of available resources
Max - Maximum demand of each process
Allocation - No. of resources of each type currently allocated to each process.
Need - Indicates remaining resources need of each person.
Safety Algorithm - Need $\leq$ work
work $\leq$ work + Allocation.

Example :- 5 processes P0 P1 P2 P3 P4
3 Resources A B C

A → 10 instances
B → 5 instances
C → 7 instances.

Process	Allocation A B C	Max A B C	Available A B C	Need A B C
P0	0 1 0	7 5 3	3 3 2	7 4 3
P1	2 0 0	3 2 2	5 3 2	1 2 2
P2	3 0 2	9 0 2	7 4 3	6 0 0
P3	2 1 1	2 2 2	7 4 5	0 1 1
P4	0 0 2	4 3 3	7 5 5	4 3 1
			10 5 7	

Need ≤ Available then
Available = Available + Allocation.

P0 ⇒ 743 ≤ 332
P1 ⇒ 122 ≤ 332
∴ New available = 532
P2 ⇒ 600 ≤ 532
P3 ⇒ 011 ≤ 532
∴ New available = 743
P4 ⇒ 431 ≤ 743
∴ New available = 745

Again,
P0 ⇒ 743 ≤ 745
∴ New available = 755
P2 ⇒ 600 ≤ 755
∴ New available = 10 5 7

∴ Set Sequence - P1 - P3 - P4 - P0 - P2

Example - 5 Processes P_1 P_2 P_3 P_4 P_5
3 instances A B C

Process	Allocation A B C	Max A B C	Available A B C	Need A B C
P_0	0 3 0	7 5 3	2 1 0	7 2 3
P_1	3 0 2	3 2 2		0 2 0
P_2	3 0 2	9 0 2		6 0 0
P_3	2 1 1	2 2 2		0 1 1
P_4	0 0 2	4 5 3		4 5 1

A → 10 instances
B → 5 instances
C → 7 instances

$P_0 \Rightarrow 723 \leq 210$
$P_1 \Rightarrow 020 \leq 210$
$P_2 \Rightarrow 600 \leq 210$
$P_3 \Rightarrow 011 \leq 210$
$P_4 \Rightarrow 451 \leq 210$

RSP

As, all the resources are in deadlock,
∴ It is ~~surface~~ unsafe state.

Conclusion :- Thus we implemented & studied Banker's algorithm.