11. bankers algorithm

```
#include<stdio.h>
#include<conio.h>
int max[100][100];
int alloc[100][100];
int need[100][100];
int avail[100];
int n,r;
void input();
void show();
void cal();
int main()
{
int i,j;
printf("********** Banker's Algo ************\n");
input();
show();
cal();
getch();
return 0;
}
void input()
{
int i,j;
printf("Enter the no of Processes\t");
scanf("%d",&n);
printf("Enter the no of resources instances\t");
scanf("%d",&r);
printf("Enter the Max Matrix\n");
for(i=0;i<n;i++)
{
```

```
for(j=0;j<r;j++)
{
scanf("%d",&max[i][j]);
}
}
printf("Enter the Allocation Matrix\n");
for(i=0;i<n;i++)
{
for(j=0;j<r;j++)
{
scanf("%d",&alloc[i][j]);
}

}
printf("Enter the available Resources\n");
for(j=0;j<r;j++)
{
scanf("%d",&avail[j]);
}
}
void show()
{
int i,j;
printf("Process\t Allocation\t Max\t Available\t");
for(i=0;i<n;i++)
{
printf("\nP%d\t ",i+1);
for(j=0;j<r;j++)
{
printf("%d ",alloc[i][j]);
}
```

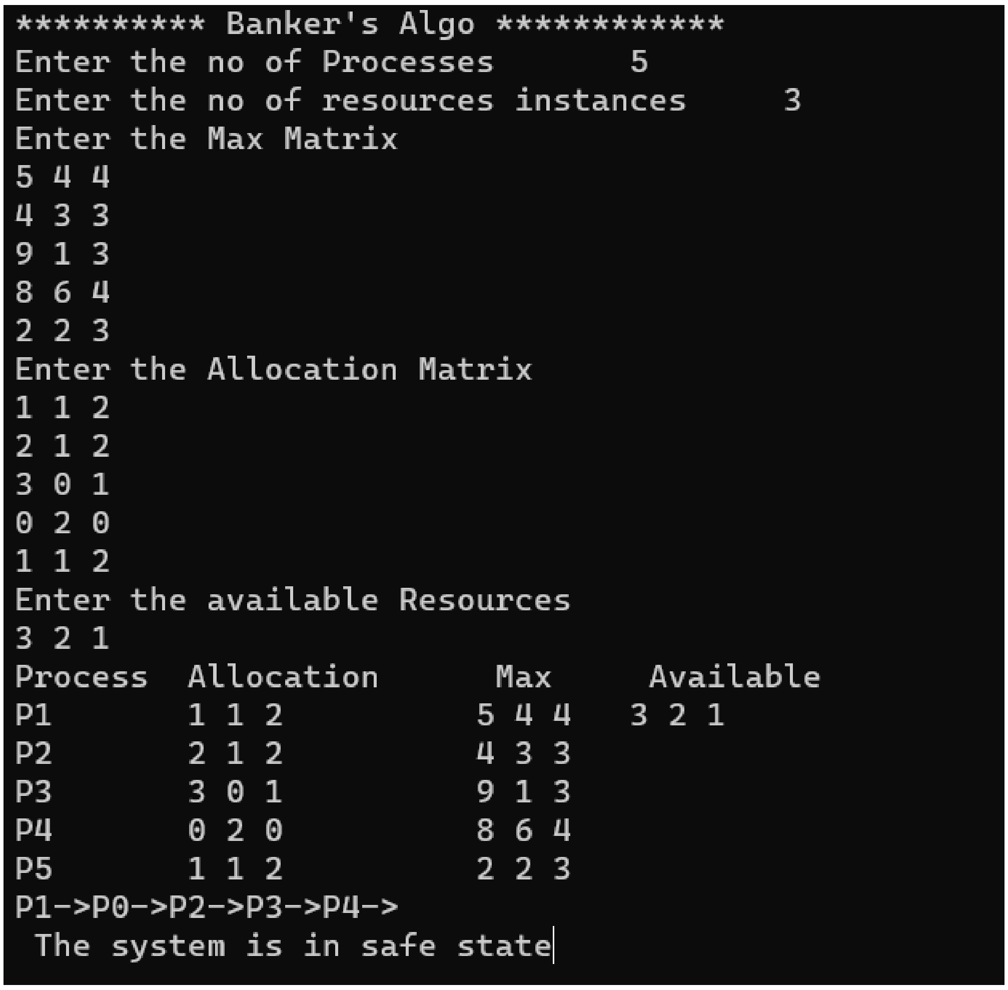
```
printf("\t\t");
for(j=0;j<r;j++)
{
printf("%d ",max[i][j]);
}
printf("\t");
if(i==0)
{
for(j=0;j<r;j++)
printf("%d ",avail[j]);
}
}
}
void cal()
{
int finish[100],temp,need[100][100],flag=1,k,c1=0;
int safe[100];
int i,j;
for(i=0;i<n;i++)
{
finish[i]=0;
}
for(i=0;i<n;i++)
{
for(j=0;j<r;j++)

{
need[i][j]=max[i][j]-alloc[i][j];
}
}
printf("\n");
```

```
while(flag)
{
flag=0;
for(i=0;i<n;i++)
{
int c=0;
for(j=0;j<r;j++)
{
if((finish[i]==0)&&(need[i][j]<=avail[j]))
{
c++;
if(c==r)
{
for(k=0;k<r;k++)
{
avail[k]+=alloc[i][j];
finish[i]=1;
flag=1;
}
printf("P%d->",i);
if(finish[i]==1)
{
i=n;
}
}
}
}
}
}
for(i=0;i<n;i++)
{
```

```
if(finish[i]==1)
{
c1++;
}
else
{
printf("P%d->",i);
}
}
if(c1==n)
{
printf("\n The system is in safe state");
}
else
{
printf("\n Process are in dead lock");
printf("\n System is in unsafe state");
}
}
```

Output:



```
********** Banker's Algo ************
Enter the no of Processes       5
Enter the no of resources instances      3
Enter the Max Matrix
5 4 4
4 3 3
9 1 3
8 6 4
2 2 3
Enter the Allocation Matrix
1 1 2
2 1 2
3 0 1
0 2 0
1 1 2
Enter the available Resources
3 2 1
Process  Allocation      Max      Available
P1       1 1 2          5 4 4   3 2 1
P2       2 1 2          4 3 3
P3       3 0 1          9 1 3
P4       0 2 0          8 6 4
P5       1 1 2          2 2 3
P1->P0->P2->P3->P4->
 The system is in safe state
```