11 YASHRAJ DEEPAK DEVRAT

```
#include<stdio.h>
int
max[10][10],allocation[10][10],need[10][10];
int avail[10];
int np, nr;
void readmatrix(int matrix[10][10])
{
    int i,j;
    for(i=0;i<np;i++)
    for(j=0;j<nr;j++)
        scanf("%d",&matrix[i][j]);

}
void display_matrix(int matrix[10][10])
{
    int i,j;
    for(i=0;i<np;i++)
    {
```

```
        printf("\n P%d",i);
        for(j=0;j<nr;j++)
        {
            printf("  %d",matrix[i][j]);
        }

    }

}
void calculate_need()
{
    int i,j;
    for(i=0;i<np;i++)
    for(j=0;j<nr;j++)
        need[i][j]=max[i][j]-allocation[i][j];
}

void banker()
{
    int i,j,k=0,flag;
```

```
    int finish[10],safe_seq[10];
    for(i=0;i<np;i++)
    {
        finish[i]=0;//Declare as all processes
are incomplete
    }
    for(i=0;i<np;i++)
    {   flag=0;
        if(finish[i]==0)//Execute incomplete
processes
        {
            for(j=0;j<nr;j++)//check a need of
each process
            {
               if(need[i][j]>avail[j])
               {
                    flag=1;//Break a loop as need
is greater than avail and go to next process
                    break;
               }
```

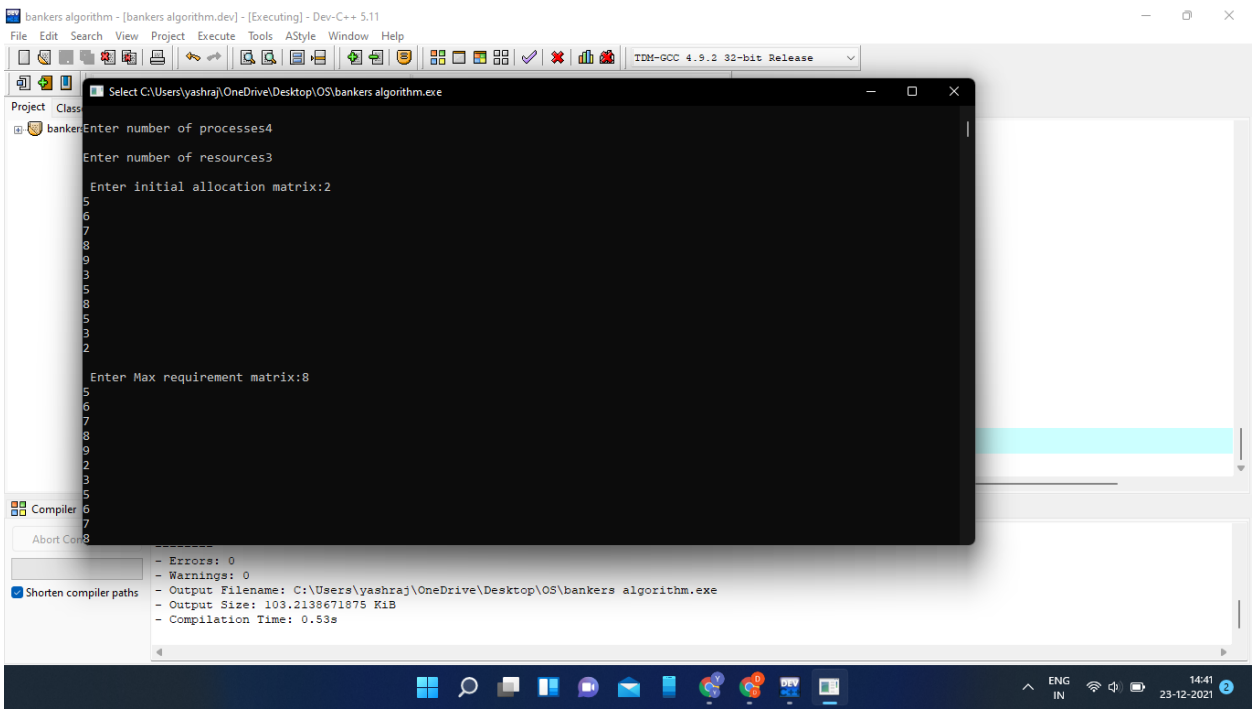
```
            }
            if(flag==0)//Need is lesser than avail
so complete process
            {
                finish[i]=1;
                safe_seq[k]=i;
                k++;
                //Add allocated resources of
finished process in available resources.
                for(j=0;j<nr;j++)
                    avail[j]+=allocation[i][j];

                //start checking from first process
again.
                i=-1;
            }
        }
    }
    flag=0;//Check if all processes are
completed
```

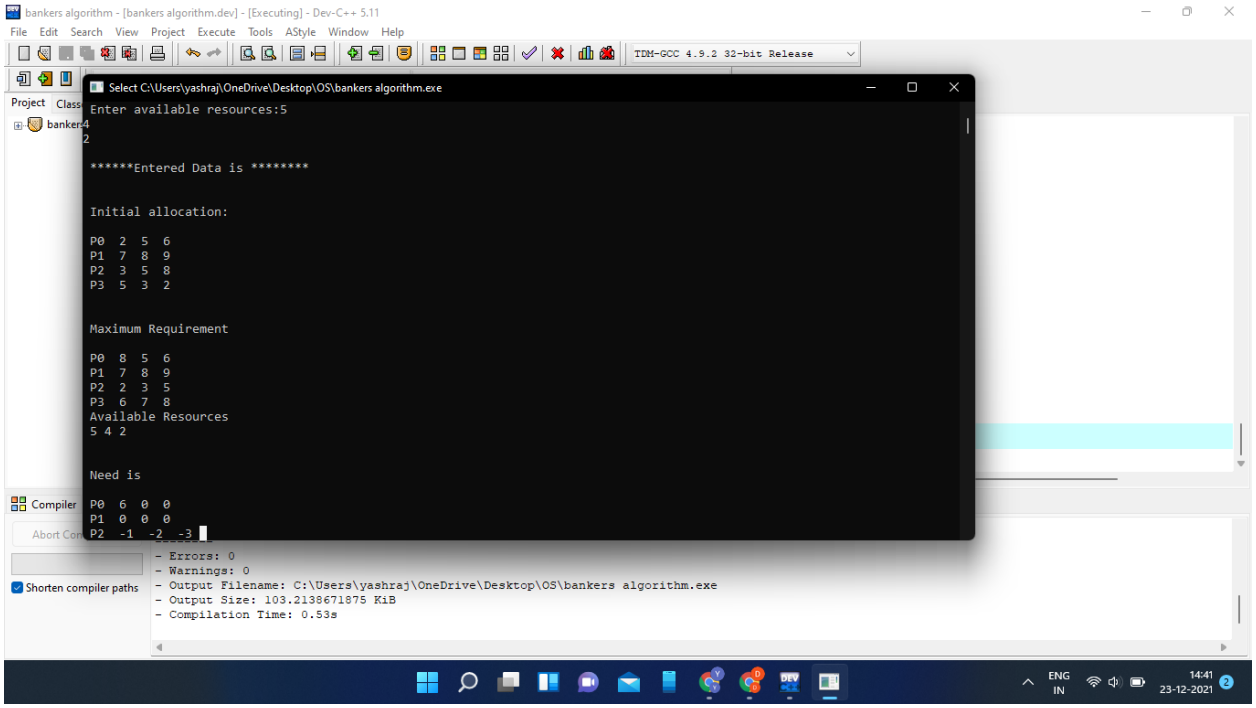
```
    for(i=0;i<np;i++)
    {
        if(finish[i]==0)
        {
            printf("\nThe system is in
deadlock");
            flag=1;
            break;
        }
    }
    if(flag==0)
    {
        printf("\n The system is in safe state! \n
Safe sequence is ==>");
        for(i=0;i<np;i++)
            printf(" P%d", safe_seq[i]);

    }
```

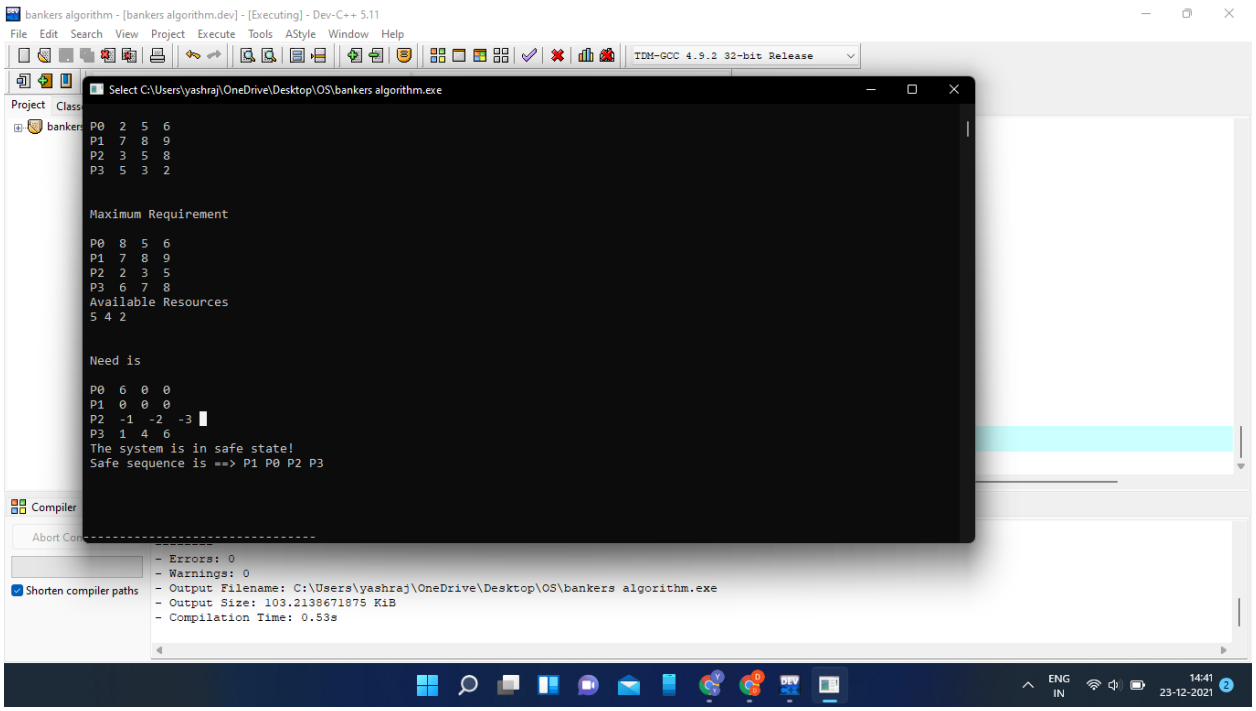
```
}

int main()
{

    int j;

    //read input
    {
    printf("\nEnter number of processes");
    scanf("%d",&np);
    printf("\nEnter number of resources");
    scanf("%d",&nr);
    printf("\n Enter initial allocation matrix:");
    readmatrix(allocation);
    printf("\n Enter Max requirement
matrix:");
    readmatrix(max);
    printf("\n Enter available resources:");
```

```
    for(j=0;j<nr;j++)
        scanf("%d",&avail[j]);
    }
    //Display entered data
    {
    printf("\n ******Entered Data is
********\n\n");
    printf("\n Initial allocation:\n");
    display_matrix(allocation);
    printf("\n\n\n Maximum Requirement\n");
    display_matrix(max);
    printf("\n Available Resources\n");
    for(j=0;j<nr;j++)
        printf(" %d",avail[j]);
    }
    //Calculate and display need
    {
    calculate_need();
    printf("\n\n\n Need is \n");
    display_matrix(need);
```

```
    }
    //Execute proceeses using Bankers
Algorithem
    banker();
    printf("\n\n\n\n");
    return 0;

}
```




bankers algorithm - [bankers algorithm.dev] - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
TDM-GCC 4.9.2 32-bit Release
Select C:\Users\yashraj\OneDrive\Desktop\OS\bankers algorithm.exe
Enter available resources:5
4
2
******Entered Data is ********
Initial allocation:
P0 2 5 6
P1 7 8 9
P2 3 5 8
P3 5 3 2
Maximum Requirement
P0 8 5 6
P1 7 8 9
P2 2 3 5
P3 6 7 8
Available Resources
5 4 2
Need is
P0 6 0 0
P1 0 0 0
P2 -1 -2 -3
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\yashraj\OneDrive\Desktop\OS\bankers algorithm.exe
- Output Size: 103.2138671875 KiB
- Compilation Time: 0.53s
Compiler
Shorten compiler paths
ENG
IN
14:41
23-12-2021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Select C:\Users\yashraj\OneDrive\Desktop\OS\bankers algorithm.exe
P0 2 5 6
P1 7 8 9
P2 3 5 8
P3 5 3 2
Maximum Requirement
P0 8 5 6
P1 7 8 9
P2 2 3 5
P3 6 7 8
Available Resources
5 4 2
Need is
P0 6 0 0
P1 0 0 0
P2 -1 -2 -3
P3 1 4 6
The system is in safe state!
Safe sequence is ==> P1 P0 P2 P3
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\yashraj\OneDrive\Desktop\OS\bankers algorithm.exe
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