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TECOC64
Subject: SPOS

Assignment 5

INPUT

```
import java.util.Scanner;
public class Bankers{
   private int need[][],allocate[][],max[][],avail[][],np,nr;

   private void input(){
    Scanner sc=new Scanner(System.in);
    System.out.print("Enter no. of processes and resources : ");
    np=sc.nextInt();  //no. of process
    nr=sc.nextInt();  //no. of resources
    need=new int[np][nr];  //initializing arrays
    max=new int[np][nr];
    allocate=new int[np][nr];
    avail=new int[1][nr];

    System.out.println("Enter allocation matrix -->");
    for(int i=0;i<np;i++)
        for(int j=0;j<nr;j++)
       allocate[i][j]=sc.nextInt();  //allocation matrix

    System.out.println("Enter max matrix -->");
    for(int i=0;i<np;i++)
        for(int j=0;j<nr;j++)
       max[i][j]=sc.nextInt();  //max matrix

      System.out.println("Enter available matrix -->");
      for(int j=0;j<nr;j++)
       avail[0][j]=sc.nextInt();  //available matrix

      sc.close();
   }

   private int[][] calc_need(){
     for(int i=0;i<np;i++)
       for(int j=0;j<nr;j++)  //calculating need matrix
        need[i][j]=max[i][j]-allocate[i][j];

     return need;
   }

   private boolean check(int i){
     //checking if all resources for ith process can be allocated
     for(int j=0;j<nr;j++)
     if(avail[0][j]<need[i][j])
        return false;
```

```
    return true;
    }

    public void isSafe(){
      input();
      calc_need();
      boolean done[]=new boolean[np];
      int j=0;

      while(j<np){  //until all process allocated
      boolean allocated=false;
      for(int i=0;i<np;i++)
       if(!done[i] && check(i)){  //trying to allocate
          for(int k=0;k<nr;k++)
          avail[0][k]=avail[0][k]-need[i][k]+max[i][k];
        System.out.println("Allocated process : "+i);
        allocated=done[i]=true;
             j++;
           }
        if(!allocated) break;  //if no allocation
      }
      if(j==np)  //if all processes are allocated
      System.out.println("\nSafely allocated");
      else
       System.out.println("All proceess cant be allocated safely");
    }

    public static void main(String[] args) {
      new Bankers().isSafe();
    }
}
```

Output

```
Enter no. of processes and resources : 3 4
Enter allocation matrix -->
1 2 2 1
1 0 3 3
1 2 1 0
Enter max matrix -->
3 3 2 2
1 1 3 4
1 3 5 0
Enter available matrix -->
3 1 1 2
Allocated process : 0
Allocated process : 1
Allocated process : 2
Safely allocated
```