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**CSE 321 Lab 6:**

**Task 1:**

import java.io.\*;

import java.util.\*;

public class BankersAlgorithm {

public static void main(String[]args) throws Exception {

BufferedReader b=new BufferedReader(new FileReader("bankers.txt"));

int row = Integer.parseInt(b.readLine());

int column = Integer.parseInt(b.readLine());

String[] process = new String[row];

int [][] max = new int[row][column];

int [][] allocation = new int[row][column];

int [][] need = new int[row][column];

int [][] available = new int[row+1][column];

LinkedList<Integer> track = new LinkedList<Integer>();

for(int i = 0; i<row;i++){

String s = b.readLine();

StringTokenizer st = new StringTokenizer(s," ");

for(int j = 0; j<column;j++){

max[i][j]=Integer.parseInt(st.nextToken());

}

}

for(int i = 0; i<row;i++){

String s = b.readLine();

StringTokenizer st = new StringTokenizer(s," ");

for(int j = 0; j<column;j++){

allocation[i][j]=Integer.parseInt(st.nextToken());

need[i][j]=max[i][j]-allocation[i][j];

}

}

System.out.print("Need Matrix : ");

for (int i = 0; i<row;i++){

System.out.println();

for(int j = 0; j<column;j++){

System.out.print(need[i][j]+" ");

}

}

System.out.println();

String s = b.readLine();

StringTokenizer st = new StringTokenizer(s," ");

int counter = 0;

while(st.hasMoreTokens()){

available[0][counter]=Integer.parseInt(st.nextToken());

counter++;

}

counter = 0;

for(int i = 0; ;i++){

i=i%row;

boolean flag = true;

for (int j = 0; j<column; j++){

if(need[i][j]<=available[counter][j]){

}

else{

flag = false;

break;

}

if(flag&&j==(column-1)&&!track.contains(i)){

for (int k=0;k<column;k++){

available[counter+1][k]=available[counter][k]+allocation[i][k];

}

track.addLast(i);

counter++;

}

}

if(track.size()==row){

break;

}

}

for(int n = 0;n<process.length;n++){

char x= (char)(65+n);

process[n]=Character.toString(x);

}

System.out.println("Safe Sequence is :");

for (int i = 0; i<track.size();i++){

System.out.print(process[track.get(i)]+" ");

}

System.out.println();

System.out.print("Change in available resource matrix : ");

for(int i = 1; i<available.length;i++){

System.out.println();

for(int j=0; j<column;j++){

System.out.print(available[i][j]+" ");

}

}

System.out.println();

b.close();

}

}