#include <stdio.h>

#include <conio.h>

int main()

{

int Max[10][10], need[10][10], alloc[10][10], avail[10], completed[10], safeSequence[10];

int p, r, i, j, process, count;

count = 0;

printf("Enter the no of processes : ");

scanf("%d", &p);

for(i = 0; i< p; i++)

completed[i] = 0;

printf("\n\nEnter the no of resources : ");

scanf("%d", &r);

printf("\n\nEnter the Max Matrix for each process : ");

for(i = 0; i < p; i++)

{

printf("\nFor process %d : ", i + 1);

for(j = 0; j < r; j++)

scanf("%d", &Max[i][j]);

}

printf("\n\nEnter the allocation for each process : ");

for(i = 0; i < p; i++)

{

printf("\nFor process %d : ",i + 1);

for(j = 0; j < r; j++)

scanf("%d", &alloc[i][j]);

}

printf("\n\nEnter the Available Resources : ");

for(i = 0; i < r; i++)

scanf("%d", &avail[i]);

for(i = 0; i < p; i++)

for(j = 0; j < r; j++)

need[i][j] = Max[i][j] - alloc[i][j];

do

{

printf("\n Max matrix:\tAllocation matrix:\n");

for(i = 0; i < p; i++)

{

for( j = 0; j < r; j++)

printf("%d ", Max[i][j]);

printf("\t\t");

for( j = 0; j < r; j++)

printf("%d ", alloc[i][j]);

printf("\n");

}

process = -1;

for(i = 0; i < p; i++)

{

if(completed[i] == 0)//if not completed

{

process = i ;

for(j = 0; j < r; j++)

{

if(avail[j] < need[i][j])

{

process = -1;

break;

}

}

}

if(process != -1)

break;

}

if(process != -1)

{

printf("\nProcess %d runs to completion!", process + 1);

safeSequence[count] = process + 1;

count++;

for(j = 0; j < r; j++)

{

avail[j] += alloc[process][j];

alloc[process][j] = 0;

Max[process][j] = 0;

completed[process] = 1;

}

}

}while(count != p && process != -1);

if(count == p)

{

printf("\nThe system is in a safe state!!\n");

printf("Safe Sequence : < ");

for( i = 0; i < p; i++)

printf("%d ", safeSequence[i]);

printf(">\n");

}

else

printf("\nThe system is in an unsafe state!!");

getch();

}