#include <stdio.h>

#include <string.h>

#include <stdlib.h>

void ResReq(char Pname[50][10],int AVAIL[50],int MAXIMUM[50][50],int ALLOC[50][50],int NEED[50][50],int nP,int nR){

int i,req[50],flag = -1;

char pname[10];

printf("Enter Process Name: ");

scanf("%s",pname);

for(i=0;i<nP;i++){

if(strcmp(pname,Pname[i]) == 0){

flag = i;

break;

}else

flag = -1;

}

if(flag == -1){

printf("Process does not exist\n\n");

return;

}

printf("Enter the request:\n ");

for(i=0;i<nR;i++){

printf("Number of resource %d needed: ",i+1);

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

}

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

if(req[i] > NEED[flag][i]){

printf("\Entered Resource amount is more than need of the process)\n");

exit(0);

}

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

if(req[i] > AVAIL[i]){

printf("\nRequested number of resources unavailable\n");

exit(0);

}

for(i=0;i<nR;i++){

AVAIL[i]-=req[i];

ALLOC[flag][i]+=req[i];

NEED[flag][i]-=req[i];

}

printf("Resources Successfully Allocated\n");

}

void ProcessData(char Pname[50][10],int AVAIL[50],int MAXIMUM[50][50],int ALLOC[50][50],int nP,int nR){

int NEED[50][50],i,j,k,Tmp[50],p;

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

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

NEED[i][j] = MAXIMUM[i][j] - ALLOC[i][j];

int completed[50] = {0};

char sequence[50][10];

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

Tmp[i] = AVAIL[i];

int total\_process = 0;

while(total\_process < nP){

int flag = 0;

for(i=0;i<nP;i++){

if(completed[i] == 0){

for(j=0;j<nR;j++){

if(NEED[i][j] > Tmp[j])

break;

}

if(j == nR){

for(p=0;p<nR;p++){

Tmp[p] += ALLOC[i][p];

}

strcpy(sequence[total\_process++],Pname[i]);

completed[i] = 1;

flag = 1;

}

}

}

if(flag == 0){

printf("System not Safe State");

return;

}

}

printf("System in Safe State!\n");

for(i=0;i<5;i++)

printf("%s ",sequence[i]);

while(1){

printf("\nRequest New Resource?(0/1): ");

int opt;

scanf("%d",&opt);

if(opt == 1)

ResReq(Pname,AVAIL,MAXIMUM,ALLOC,NEED,nP,nR);

else

break;

}

}

int main(){

int nP,nR,i,j;

char Pname[50][10];

int AVAIL[50],MAXIMUM[50][50],ALLOC[50][50];

printf("Enter the number of Processes:");

scanf("%d",&nP);

printf("Enter the number of Resources:");

scanf("%d",&nR);

printf("Enter names of Processes: ");

for(i = 0; i<nP;i++){

scanf("%s",Pname[i]);

}

printf("Enter Available instance of each Resource: ");

for(i = 0; i<nR;i++){

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

}

printf("Enter Max and Alloted resource of each Process: ");

for(i = 0; i < nP ;i++){

printf("\n%s:\n",Pname[i]);

for(j = 0; j<nR;j++){

printf("Resource %d : ",j+1);

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

}

}

ProcessData(Pname,AVAIL,MAXIMUM,ALLOC,nP,nR);

}