CLOUD COMPUTING LAB-(03,04)

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Q. Write a program to implement **Min-Min scheduling algorithm** and find the makespan.

CODE:

```
#include<stdio.h>
#include <limits.h>
int main(){
int nT,nM;
printf("\nEnter number of machines and tasks\n");
scanf("%d%d",&nM,&nT);
int minMin[nM][nT];
int tmp[nM][nT];
int makespan=0;
printf("\nFill Data\n");
for(int i=0;i<nM;i++)
for(int j=0;j<nT;j++){
scanf("%d",&minMin[i][j]);
tmp[i][j]=minMin[i][j];
}
printf("\nOriginal Data\n");
for(int i=0;i<nM;i++){
for(int j=0;j<nT;j++)
printf("%d ",minMin[i][j]);
printf("\n");
}
int resultTask[nT];
int resultMachine[nT];
int resultTime[nT];
int ptr=-1;
while(ptr<nT-1){
int time[nT],machine[nT];
for(int j=0;j<nT;j++){
int minimum = INT_MAX;
int pos=-1;
for(int i=0;i<nM;i++){
if(minMin[i][j]<minimum){
minimum=minMin[i][j];
pos=i;
}
}
time[j]=minimum;
machine[j]=pos;
}
int minimum=INT_MAX;
int pos=-1;
for(int j=0;j<nT;j++){
if(time[j]<minimum){
minimum=time[j];
pos=j;
}
}
resultTask[++ptr]=pos;
resultMachine[ptr]=machine[pos];
resultTime[ptr]=tmp[machine[pos]][pos];
if(minimum>makespan)
makespan=minimum;
for(int i=0;i<nM;i++){
for(int j=0;j<nT;j++){
if(j==resultTask[ptr])
minMin[i][j]=INT_MAX;
else if(i==resultMachine[ptr] &&
minMin[i][j]!=INT_MAX)
minMin[i][j]+=minimum;
else
continue;
}
}
}
printf("\nScheduled Task are :\n");
for(int i=0;i<nT;i++){
printf("\nTask %d Runs on Machine %d with
Time %d
units\n",resultTask[i]+1,resultMachine[i]+1,resultT
ime[i]);
}
printf("\nMakespan : %d units\n",makespan);
return 0;
}
```

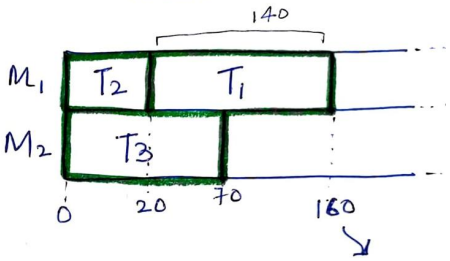
OUTPUT:

```
Enter number of machines and tasks
2
3

Fill Data
For M1 and T1 : 140
For M1 and T2 : 20
For M1 and T3 : 60
For M2 and T1 : 100
For M2 and T2 : 100
For M2 and T3 : 70

Original Data
140 20 60
100 100 70

Scheduled Task are :

Task 2 Runs on Machine 1 with Time 20 units

Task 3 Runs on Machine 2 with Time 70 units

Task 1 Runs on Machine 1 with Time 140 units

Makespan : 160 units
```

EXPLAINATION:

	T_1	T_2	T_3
M_1	140	20	60
M_2	100	100	70

chart



makespan = 160

1) Minimum value for all the tasks.

$T_1 - M_2 - 100$

$T_2 - M_1 - 20$

$T_3 - M_1 - 60$

Choosing the minimum value

2)

	T_1	T_2	T_3
M_1	140+20 = 160	DONE	60+20 = 80
M_2	100	DONE	70.

$M_2 - T_1 - 100$

$M_2 - T_3 - 70$

3)

	T_1	T_2	T_3
M_1	160	DONE	DONE
M_2	100+70 = 170	DONE	DONE

$T_1 - M_1 - 160$

Q. Write a program to implement **Max-Min scheduling algorithm** and find the makespan.

CODE:

```
#include<stdio.h>
#include <limits.h>
int main(){
int nT,nM;
printf("\nEnter no. of machines and tasks \n");
scanf("%d%d",&nM,&nT);
int maxMin[nM][nT];
int tmp[nM][nT];
int makespan=0;
printf("\nFill Data: \n");
for(int i=0;i<nM;i++)
for(int j=0;j<nT;j++)
{ printf("For M%d and T%d: ",i+1, j+1);
scanf("%d",&maxMin[i][j]);
tmp[i][j]=maxMin[i][j];
}
printf("\nOriginal Data\n");
for(int i=0;i<nM;i++){
for(int j=0;j<nT;j++)
printf("%d ",maxMin[i][j]);
printf("\n");
}
int resultTask[nT];
int resultMachine[nT];
int resultTime[nT];
int ptr=-1;
while(ptr<nT-1){
int time[nT],machine[nT]; //
for(int j=0;j<nT;j++){
int minimum = INT_MAX;
int pos=-1;
for(int i=0;i<nM;i++){
if(maxMin[i][j]<minimum){
minimum=maxMin[i][j];
pos=i;
}
}
time[j]=minimum;
machine[j]=pos;
}
int maximum=INT_MIN;
int pos=-1;
for(int j=0;j<nT;j++){
if(time[j]>maximum && time[j] != INT_MAX){
maximum=time[j];
pos=j;
}
}
resultTask[++ptr]=pos;
resultMachine[ptr]=machine[pos];
resultTime[ptr]=tmp[machine[pos]][pos];
if(maximum>makespan)
makespan=maximum;
for(int i=0;i<nM;i++){
for(int j=0;j<nT;j++){
if(j==resultTask[ptr])
maxMin[i][j]=INT_MAX;
else if(i==resultMachine[ptr] &&
maxMin[i][j]!=INT_MAX)
maxMin[i][j]+=maximum;
else
continue;
}
}
}
printf("\nScheduled Task are :\n");
for(int i=0;i<nT;i++){
printf("\nTask %d Runs on Machine %d with
Time %d
units\n",resultTask[i]+1,resultMachine[i]+1,resultTim
e[i]);
}
printf("\nTotal elapsed time : %d units\n",makespan);
return 0;
}
```

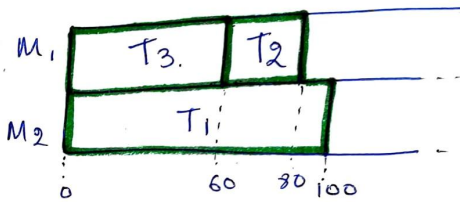
OUTPUT:

```
Enter number of machines and tasks respectively:
2
3

Fill Data:
For M1 and T1: 140
For M1 and T2: 20
For M1 and T3: 60
For M2 and T1: 100
For M2 and T2: 100
For M2 and T3: 70

Original Data
140 20 60
100 100 70

Scheduled Task are :

Task 1 Runs on Machine 2 with Time 100 units

Task 3 Runs on Machine 1 with Time 60 units

Task 2 Runs on Machine 1 with Time 20 units

Total elapsed time : 100 units
```

EXPLAINATION:

	T_1	T_2	T_3
M_1	140	20	60
M_2	100	100	70

Chart



makespan = 100

1) Minimum value of all task.

$T_1 - M_2 - 100$
$T_2 - M_1 - 20$
$T_3 - M_1 - 60$

selecting max^m value of the task in these three min^m values

2)

	T_1	T_2	T_3
M_1		20	60.
M_2		100+100 =200.	70+100 170.

$T_2 - M_2 - 20$
$T_3 - M_1 - 60$

3)

	T_1	T_2	T_3
M_1		60+20 =80	
M_2		200	

$M_1 - T_2 - 80$.
