Homework 3 – My Virtual Factory

You are going to write a program that will schedule a machine works in a factory. You will read three text files from your program folder and create an output file for your schedule result. All durations are in minutes and all sizes are in meters.

Below you can find the description and format of each file;

Operations.txt : This file shows the operations can be done by the machine. This file includes two information on each row. First one is the operation code and the second one is its speed (work can be done per minute).

Format: (OperationCode;Amount\n\r)

1;10
2;15
3;100
4;50

First row means that this machine can do operation code 1 and its speed is 10m per minute.

SetupDuration.txt : This file shows the setup durations for operation changes. Starting operation has zero setup duration. However when you pass the machine from one operation to another one it takes this setup time to start second operation. The setup times are equal in two way since each operation couple has one record in this file.

Format: (OperationCode1;OperationCode2;SetupDuration\n\r)

1;2;10
1;3;10
1;4;12
2;3;5
2;4;3
3;4;20

First row means that if you pass from operation1 to operation2 it takes 10 minutes to prepare the machine.

Orders.txt : This files include the clients' orders that must be schedule on our machine. We can simple schedule all the work one by one but we want to increase the machine performance by decreasing the setup durations. On the other hand each order has a deadline to be finished. So we must conform the deadlines and increase the machine's performance. This file gives us the order code, amount of the order in meters, the operation type and the deadline limit in minutes.

Format: (OrderCode;AmountOfWork;OperationCode;Deadline\n\r)

1;100;2;300
2;100;3;300
3;200;1;500
4;200;1;500
5;100;2;1000
6;100;2;1000
7;100;4;1000

Forth row means that Order 4 has 200 meters to be done with first operation type and the deadline for this order is 500 minutes from now. So you have to schedule this order before 301 minute from starting time (Be aware of setup durations).

If the Duration of a job is resulted in a floating point number you have to take it as the nearest upper integer. (ex: for a speed of 4m per minute operation, a job with 22m can be done in 5.5 min but you have to take it as 6min.) Since all the data in files must be integer.

The input files can be as much as your memory allows. Your program can be capable to handle 1.000.000 orders in one file.

The OUTPUT of THE PROGRAM

Your program will create the scheduling output as a text mode file and shows the total duration of the schedule on the screen. The description for the output file is below;

Schedule.txt : Includes your schedule result like the input files format. You will show the schedule time , Operation Code, Order Code , Order Amount and Setup Overhead in each line.

Format: (ScheduleTime;OperationCode;OrderCode;AmountOfWork;SetupOverhead\n\r)

Ex:

0;2;1;100;0
17;3;2;100;10

This two line means that we schedule first order in first place. It starts at t=0 and has 100m work in operation type 2. We have no setup cost for first one.

Second scheduled order is the second one. It starts at t = 17 because the speed of the machine for the previous job is 15m per minute so 100 m job can be done in 6.6min. We take 7min instead and 10min for setup duration between 2 and 3 operations. Calculated start time of the second order results as 10 + 7 : 17.