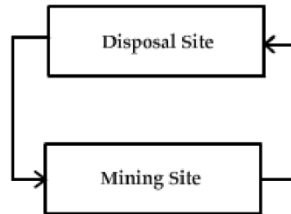


CMPE 160 Project 1

Coal Mining Simulator

Specification:

Your software company plans to develop a simulator for coal mining companies. Mining companies will be able to estimate their vehicle requirements for a specific coal mining site. This simulator performs detailed utilization analysis for vehicles carrying coal from mining site to disposal site.



There are three types of vehicles that can be deployed: forklifts, trucks, and large trucks. The user will enter the number of each vehicle at the site and total simulation time. After simulation, detailed statistic for each vehicle will be reported to the user.

Requirements:

1. The following classes **must** be used in the project:
 - i. Queue
 - ii. Vehicle
 - iii. Simulation Manager.

You can add more classes as you see fit.

2. Both loading and unloading are performed according to FIFO policy with given estimated service times. Initially all vehicles are at Mining Site (MS) as unloaded. Furthermore, forklifts precede trucks, and trucks precede long trucks in the mining queue. When a vehicle is loaded it travels to Disposal Site (DS) for unloading. You will assign service times randomly between its minimum and maximum values based on the type of vehicle. These values together with the capacity of each vehicle are given below in Table 1. Please note that, there is a single queue for all vehicle types.

Table 1: Loading and Unloading Times, and Capacity of Vehicles

	Loading Time (mins)	Unloading Time (mins)	Capacity (tons)
Forklift	1-8	2-5	2
Truck	8-13	6-14	10
Long Truck	15-20	19-30	14

- Each vehicle travels faster between MS and DS when it is empty. The travel times have a triangular distribution (will be discussed in PS) with parameters given in Table 2.

Table 2: Travel Times for Each Vehicle

	From MS to DS (mins)	From DS to MS (mins)
Forklift	1-3-4	1-2-2.5
Truck	4-6-9	3-5-8
Long Truck	8-12-17	6-10-13

- The Queue class should have the default queue implementation without any extra variable or function definitions.
- The Vehicle class should have any required variable and function declarations for performing simulation correctly.
- The SimulationManager class is responsible for managing queues and vehicles in the system. It also handles the movements of trucks between mining site and disposal site queues properly.
- When the simulation is complete (simulation time is reached), the simulator should report detailed statistics about each vehicle and vehicle type in the system.
- Loaded time statistics means the total time between completion of a loading and an unloading.
- Seed for Random should be taken from the user and only one object of Random should be instantiated for a complete simulation.
- User interface for your program must be in the form given below.

User Interface / Sample Run:

Welcome to CMS

Enter the number of forklifts: 3

Enter the number of trucks: 2

Enter the number of long trucks: 2

Enter total simulation time: 480

Enter seed: 12

Starting simulation...

Forklift#1 is loaded at time 9

...

Truck#1 is loaded at time 19

...

Forklift#1 is unloaded at time 22

....

LongTruck#1 is loaded at time 27

....

Truck#1 is unloaded at time 33

...

Truck#2 is unloaded at time 479

Completed simulation...

Simulation Results

Forklift#1 made 21 travels with 248 minutes total loaded time

.....

Truck#1 made 21 travels with 235 minutes total loaded time

.....

LongTruck#1 made 20 travels with 238 minutes total loaded time

....

Forklifts carried a total of 290 tons with average 12 mins round trip time.

Trucks carried a total of 1203 tons with average 28 mins round trip time.

Long trucks carried a total of 1430 tons with average 40 mins round trip time.

What to deliver: Your complete working code will be mailed to eryigit@boun.edu.tr until 11/04/2011 17.00. The subject of mail should be CMPE160_PR1_StudentNumber where *Studentnumber* is your student number. For instance, if your number is 2009123456, the title of the mail should be CMPE160_PR1_2009123456. If you do not follow this rule, 50 points will be deducted from your grade. You need to send only your java files and your report in a zip archive (do not include class files). Please write your name and number as comments to the top of each java file. Clear code with meaningful variable names and good commenting is requested. Your usage of javadoc will also be evaluated so try to use javadoc as much and as reasonable as possible. Your report should be short, discussing the relationships between your classes, and other stuff that cannot be understood from your code/comments. The report should also include a user's manual that is just a paragraph long.