

## CS/CE 1337-50x – Fall-2016 – PROJECT 5

### Interplanetary Delivery Service

**Due Date:** April 15, 2014 at 11:59 PM

**Submission:** All programs are to be submitted in eLearning. Projects submitted after the due date are subject to the late penalties described in the updated syllabus (i.e. 1% per hour late (rounded up) for up to 30 hours). **Comments at the top of your program should include your name, course, section, and project number.**

**Problem:** You have been hired by an interplanetary delivery service to keep track of shipments throughout the solar system. Shipments can be made between any two planets in the solar system (excluding Pluto since it lost planetary status recently). The shuttle which is used for transportation can never hold more than 10 Earth tons. Your program should record the shipping information in an output file. Also, you are expected to use as many classes as necessary to implement your solution.

**Requirements:** The program must use a structure for the planets and the shuttle. The planet structure must keep track of the following items:

- Planet name
- Distance from sun
- Surface gravity factor

Your program should create an array of planet structures initialized by reading data from a file. See the table at the end of this documentation for the information.

- Cargo type
- Pick-up planet
- Delivery planet
- Speed (in miles per hour)
- Total distance to travel
- Weight in pick-up planet pounds
- Weight in delivery planet pounds
- Weight in Earth pounds
- Travel time for hours
- Travel time for days
- Travel time for years

At a minimum, the program should use a function for each of the following tasks:

- Retrieving user input
- Calculate the number of hours necessary to make the delivery
- Convert the hours necessary to make the delivery to days and years
- Convert weight to Earth pounds
- Convert weight to other planet pounds

**Input:** Your program should validate all input. Do not assume the user will enter data of the proper data type. Continue asking the user for input until the user enters valid information. Ensure that your program will not crash if a string is entered for a numeric value and vice versa.

The user will enter the cargo type, pick-up planet, delivery planet, weight of the cargo in pick-up planet pounds and speed of the shuttle (maximum speed being the speed of light: 670616629 mph). You may use a menu to prompt the user for the pick-up and delivery planets, validating as necessary. Remember that the shuttle cannot hold more than 10 Earth tons of cargo.

The pick-up planet and delivery planet cannot be the same.

**Output:** The program should output the shipment information to a text file named Delivery\_Report.txt. The shipment information should include the following:

- Cargo of the ship
- Weight of the cargo in Earth pounds
- Weight of the cargo on the other planets involved in the shipment
- The distance the shipment will travel
- The time it will take to deliver the cargo (based on the speed of the shuttle as entered by the user) in hours, days and years

Each shipment record should be separated in some way from other shipping records. Create your program in such a way that the output file does not get overwritten between executions of the program. The user should have the option to enter as many shipping records as he/she wants every time the program executes.

**Planet Information:**

Planet	Distance from Sun (Millions of Miles)	Surface Gravity Factor
Mercury	36	0.27
Venus	67	0.86
Earth	93	1.00
Mars	141	0.37
Jupiter	483	2.64
Saturn	886	1.17
Uranus	1782	0.92
Neptune	2793	1.44