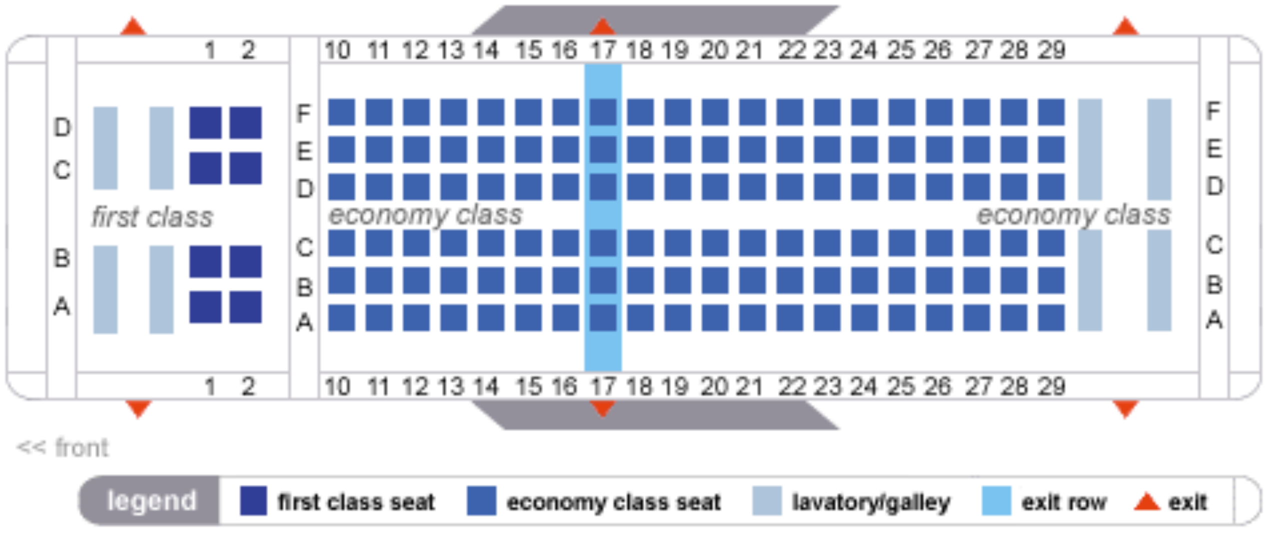
CS151 Fall 2018 Section 6 Dr. Yeung

Programming Assignment 1
Airline Reservation System

Objectives

- To exercise the analysis, design, and implementation activities of software development.
- To learn requirement analysis using use cases
- To learn noun-verb analysis and CRC technique
- To produce UML class diagrams and UML sequence diagrams; Use a software tool to draw UML diagrams

In this assignment, you will implement an airplane seat reservation system. An airplane has two classes of service (first and economy). Each class has a sequence of seat rows. The following figure shows the seat chart of the airplane.



In the above seat chart, the seat rows are numbered as 1,2, etc.

A reservation request has one of two forms. One form is that an individual passenger request consists of the passenger name, a class of service, and a seat preference such as W(indow), C(enter), or A(aisle) seats. The reservation program either finds a matching seat (the search may start from the first row of the class.) and reserves it for the passenger, or it fails if no matching seat is available. (For example, if the user's preference is a W(indow) seat and none is available, tell the user no Window seat is available and ask for another seat preference.) The other form is that a group request consists of a list of passenger names and a class of service. (Groups cannot specify a seat preference). The reservation program finds the first row of adjacent seats in a seat row that is sufficient to accommodate the group, or if no such seat row exists, finds the row with the largest number of adjacent seats in any seat row, fills it up with members of the group, and repeats that process (finding the row with the largest number of adjacent seats) until all members of the group have been seated. If there is insufficient space to seat all members of the group, none should be seated.

A cancellation request consists of the name of one or more passengers. The seats that are occupied by passengers in the request are emptied; passengers in the request that are not seated are ignored.

There are two kinds of report: seat availability chart and manifest list. A seat availability chart shows the available seats of each row of each class as shown below. You can guess the rest of the seat availability chart based on the example for the First Class.

Availability List:

```
First 1: B, D  2: C, D   Economy
```

A manifest lists the occupied seats and the passengers seated in them:

```
First   1A: John Williams 1C: Harry Hacker 2A: Sarah Michaels 2B: Jonah Arks  Economy
```

Your program must be called **ReservationSystem**. Use a command line argument to read the name of a file that holds information from a prior program run. If the file does not exist, the program creates one. You may use the exists() method of the File class to check.

The following shows how you would run the program on command prompt.

```
java ReservationSystem flightname
```

where flightname is the name of a file that holds information from a prior program run.

In Eclipse, follow Run-> Run Configurations -> Arguments, enter the command line argument, in our case flightname, in the box named Program Arguments, and run the program.

The user interacts with the program to make a reservation, and the user input is read from standard input (System.in). The user interface for this program is as follows. Prompt the user:

```
Add [P]assenger, Add [G]roup, [C]ancel Reservations, Print Seating [A]vailability Chart,
Print [M]anifest, [Q]uit
```

The following describes the function(s) of each option.

- Add [P]assenger
  When the user wants to add a passenger, prompt the user:

  ```
  Name: John Smith Service Class: First Seat Preference: W
  ```

Print the seat number such as 1A on which the passenger has been seated, or Request failed.

- Add [G]roup
  When the user wants to add a group, prompt as follows: (bold are user inputs; the group member names should be separated by a comma)

  ```
  Group Name: cssjsu  Names: Venkathan Subramanian,Karl Schulz  Service Class:
  Economy
  ```

  Print the seat numbers on which the passengers have been seated, or Request failed.

- [C]ancel Reservations
  First prompt the user asking if the cancellation is for an individual or a group. When the user wants to cancel an individual reservation (as opposed to a group reservation), prompt as follows:

  ```
  Names: John Smith
  ```

  When the user wants to cancel a group reservation, prompt as follows: (bold are user inputs)

  ```
  Group Name: cssjsu
  ```

  A cancellation of a group reservation will cancel the reservations of all group members. For simplicity, let's assume an individual group member cannot cancel his/her reservation only.

- Print Seating [A]vailability Chart
  Prompt the user asking the desired service class. The program displays the seat availability chart of the service class only.
- Print [M]anifest
  Prompt the user asking the desired service class. The program displays the manifest of the requested service class only.
- [Q]uit
  When the user quits, save the reservations in the text file whose name was given on the command line when the program starts. As a designer, you should determine what to save in which order to store the reservations already made. This file contains the final reservations only.

Note 1

Here is a simple scenario to understand this requirement. When you run the program for the first time as follows

```
java ReservationSystem CL34
```

the file doesn't exist, and thus the program creates one. Then, suppose reservations X, Y, Z are made, and the program quits. Then, X, Y, Z are stored in the file CL34. In the second time of program execution, the ReservationSystem restores reservations (X, Y, Z) from CL34. Suppose Y is cancelled, and A and B are added. The file contains X, Z, A, and B only.

Note 2

When the program starts, data from the file CL34 will initialize data structure(s) of your choice (e.g. array list) that will hold data throughout the program execution. Adding and cancelling will change the content of the data structure(s), not the file CL34. Only when the Quit option is chosen, the latest snap shot of the data structure(s) will be saved in the file CS34 in a proper format.

Submission

- Submit both design documents and your Java source code to Assignment #1 on Canvas. All the design documents should be in a single zip file with file name: **hw1.zip** and uploaded to Canvas. All your Java source code should be in your GitHub Classroom repository. You need to submit your repository link to Canvas. **Due: Refer to Canvas**
- **Design Documents:**
    - Use cases
    - A set of final CRC cards
    - UML class diagram (submit both simple and comprehensive versions of class diagram, draw it using a software tool)
    - UML sequence diagram (draw it using a software tool)
- **Java Program**:
    - All source code you wrote (.java) required to run the application.
        - Name the class with main method as **ReservationSystem**.
        - Put javadoc comments in the source codes.
    - A file called input.txt that contains a sample set of inputs with which you have tested your program. I am going to use input.txt to run your program using input redirection as shown below.

      ```
      java ReservationSystem CL34 < input.txt
      ```

      assuming that the file CL34 doesn't exist when the program executes for the first time.

    - **Readme.txt**: A manual that explains the format of input data and shows how to enter them in an interactive mode. This document will be used only if input redirection fails to run your application.

      If you want to try input redirection, run the program on command line prompt.

Useful Hints:

Where to download an open source cross-platform UML software tool:

Try ArgoUML. It is a popular open source UML modeling tool and includes support for all standard UML 1.4 diagrams. It runs on any Java platform.

Download ArgoUML here: http://argouml.tigris.org/

How to read command line arguments in a Java program:

You may find this tutorial useful:
http://docs.oracle.com/javase/tutorial/essential/environment/cmdLineArgs.html

How to use input redirection:

The following document is copied from "http://chortle.ccsu.edu/java5/Notes/chap22/ch22_2.html" without any modification.

Input Redirection

A program that reads input from the keyboard can also read input from a text file. This is called input redirection, and is a feature of the command line interface of most operating systems.

Say that you have a program named echo.java that reads characters from the keyboard and echoes them to the monitor. Here is how the program usually works:

```
c:\> java echo
Enter your input:
User types this.
You typed: User types this.
c:\>
```

Without making any changes to the program, its input can be connected to a disk file:

```
c:\> java echo < input.txt
Enter your input:
You typed: This is text from the file.
c:\>
```

The "< input.txt" part of the command line connects the file input.txt to the program which then uses it as input in place of the keyboard. The file contained the characters

```
This is text from the file.
```

Notice that all the program's output is sent to the monitor, including the (now useless) prompt.

The file input.txt must exist before the program is run. It could have been created with a text editor.

How to run a program on command line prompt on Windows:

To make sure that Windows can find the Java compiler and interpreter:

Select Start -> Computer -> System Properties -> Advanced system settings -> Environment Variables -> System variables -> PATH.

Prepend C:\Program Files\Java\jdk1.6.0_27\bin; (or whatever path to your java) to the beginning of the PATH variable.

Click OK three times.

Let's assume C:\CS151\hw1 directory contains ReservationSystem and input.txt.

```
C:\CS151\hw1\>java ReservationSystem CL34 < input.txt
```

will run ReservationSystem getting user input from input.txt instead of from the keyboard.