

## Section Handout #7: Data Structures

Parts of this handout by Brandon Burr and Patrick Young

**You do not need to prepare anything for section this week.**

Your task for this section is to write a program that reads in a file containing flight destinations from various cities, and then allow the user to plan a round-trip flight route.

Here's what a sample run of the program might look like:



```
FlightPlanner
File Edit
Welcome to Flight Planner!
Here's a list of all the cities in our database:
  San Jose
  San Francisco
  Anchorage
  New York
  Honolulu
  Denver
Let's plan a round-trip route!
Enter the starting city: New York
From New York you can fly directly to:
  Anchorage
  San Jose
  San Francisco
  Honolulu
Where do you want to go from New York? Anchorage
From Anchorage you can fly directly to:
  New York
  San Jose
Where do you want to go from Anchorage? San Jose
From San Jose you can fly directly to:
  San Francisco
  Anchorage
Where do you want to go from San Jose? San Francisco
From San Francisco you can fly directly to:
  New York
  Honolulu
  Denver
Where do you want to go from San Francisco? Cleveland
You can't get to that city by a direct flight.
From San Francisco you can fly directly to:
  New York
  Honolulu
  Denver
Where do you want to go from San Francisco? New York
The route you've chosen is:
New York -> Anchorage -> San Jose -> San Francisco -> New York
```

The flight data come from a file named `flights.txt`, which has the following format:

- Each line consists of a pair of cities separated by an arrow indicated by the two character combination `->`, as in

`New York -> Anchorage`

- The file may contain blank lines for readability (you should just ignore these).

The entire data file used to produce this sample run appears below.

```
San Jose -> San Francisco
San Jose -> Anchorage

New York -> Anchorage
New York -> San Jose
New York -> San Francisco
New York -> Honolulu

Anchorage -> New York
Anchorage -> San Jose

Honolulu -> New York
Honolulu -> San Francisco

Denver -> San Jose

San Francisco -> New York
San Francisco -> Honolulu
San Francisco -> Denver
```

Your program should:

- Read in the flight information from the file `flights.txt` and store it in an appropriate data structure.
- Display the complete list of cities.
- Allow the user to select a city from which to start.
- In a loop, print out all the destinations that the user may reach directly from the current city, and prompt the user to select the next city.
- Once the user has selected a round-trip route (i.e., once the user has selected a flight that returns them to the starting city), exit from the loop and print out the route that was chosen.

A critical issue in building this program is designing appropriate data structures to keep track of the information you'll need in order to produce flight plans. You'll need to both have a way of keeping track of information on available flights that you read in from the `flights.txt` file, as well as a means for keeping track of the flight routes that the user is choosing in constructing their flight plan. Consider how both `ArrayLists` and `HashMaps` might be useful to keep track of the information you care about.