

## Solution to Section #8

Parts of this handout by Brandon Burr and Patrick Young

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/*
 * FlightPlanner.java
 * -----
 * Reads in a file of cities and their corresponding flights,
 * and allows the user to plan a flight route.
 */

import acm.program.*;
import acm.util.*;
import java.io.*;
import java.util.*;

public class FlightPlanner extends ConsoleProgram {

    /** Runs the program. */
    public void run() {
        println("Welcome to Flight Planner!");
        readFlightData("flights.txt");

        println("Here's a list of all the cities in our database:");
        printCityList(cities);

        println("Let's plan a round-trip route!");
        String startCity = readLine("Enter the starting city: ");
        ArrayList<String> route = new ArrayList<String>();
        route.add(startCity);
        String currentCity = startCity;

        while (true) {
            String nextCity = getNextCity(currentCity);
            route.add(nextCity);
            if (nextCity.equals(startCity)) break;
            currentCity = nextCity;
        }

        printRoute(route);
    }

    /** Ask user for the name of the next city in the route */
    private String getNextCity(String city) {
        ArrayList<String> destinations = getDestinations(city);
        String nextCity = null;
        while (true) {
            println("From " + city + " you can fly directly to:");
            printCityList(destinations);
            String prompt = "Where do you want to go from " + city + "? ";
            nextCity = readLine(prompt);
            if (destinations.contains(nextCity)) break;
            println("You can't get to that city by a direct flight.");
        }
        return nextCity;
    }
}
```

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/**
 * Given a starting city, looks up the destinations from that
 * city in the HashMap of flights, and return an array list of
 * the destinations that are available.
 */
private ArrayList<String> getDestinations(String fromCity) {
    return flights.get(fromCity);
}

/**
 * Prints a list of cities from the array list. Each city name is
 * indented by a space.
 */
private void printCityList(ArrayList<String> cityList) {
    for(int i = 0; i < cityList.size(); i++) {
        String city = cityList.get(i);
        println(" " + city);
    }
}

/**
 * Given a list of city names, prints out the flight
 * route, with a " -> " between each pair of cities
 */
private void printRoute(ArrayList<String> route) {
    println("The route you've chosen is: ");
    for (int i = 0; i < route.size(); i++) {
        if (i > 0) print(" -> ");
        print(route.get(i));
    }
    println();
}

/**
 * Reads in the city information from the given file storing the
 * information in both the ArrayList of cities and the HashMap of
 * flights.
 */
private void readFlightData(String filename) {
    flights = new HashMap<String, ArrayList<String>>();
    cities = new ArrayList<String>();
    try {
        BufferedReader rd =
            new BufferedReader(new FileReader(filename));
        while (true) {
            String line = rd.readLine();
            if (line == null) break;
            if (line.length() != 0) {
                readFlightEntry(line);
            }
        }
        rd.close();
    } catch (IOException ex) {
        throw new RuntimeException(ex);
    }
}

```

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    }
}

/**
 * Reads a single flight entry from the line passed as an argument,
 * which should be in the form
 *
 * fromCity -> toCity
 *
 * Each new city is added to the ArrayList cities, and each new
 * flight is recorded by adding a new destination city to the
 * ArrayList stored in the HashMap flights under the key for the
 * starting city.
 */
private void readFlightEntry(String line) {
    int arrow = line.indexOf("->");
    if (arrow == -1) {
        throw new RuntimeException("Illegal flight entry " + line);
    }

    // Note: trim() removes leading/ending spaces from a string
    String fromCity = line.substring(0, arrow).trim();
    String toCity = line.substring(arrow + 2).trim();
    defineCity(fromCity);
    defineCity(toCity);
    getDestinations(fromCity).add(toCity);
}

/**
 * Defines a city if it has not already been defined. Defining
 * a city consists of entering it in the cities array and
 * entering an empty ArrayList in the flights table to show
 * that it has no destinations yet.
 */
private void defineCity(String cityName) {
    if (!cities.contains(cityName)) {
        cities.add(cityName);
        flights.put(cityName, new ArrayList<String>());
    }
}

/* Private instance variables */
private Map<String, ArrayList<String>> flights;
private ArrayList<String> cities;
}

```