Chris Piech Section #8

CS 106A March 7, 2018

Solution to Section #8

Based on a problem by Brandon Burr and Patrick Young

**1. Flight Planner Server**

**/\***

**\* File: FlightPlannerServer.java**

**\* ---------------------**

**\* A server program that, when run, reads in information**

**\* about available flights from a data file, and then listens**

**\* for incoming network requests. This program can respond to**

**\* two types of requests:**

**\***

**\* "getAllCities" -> we send back a list of all cities**

**\* "getDestinations" -> (needs parameter "city") we send back a**

**\* list of all cities reachable from the**

**\* provided city.**

**\*/**

**import acm.program.\*;**

**import acm.util.\*;**

**import java.io.\*;**

**import java.util.\*;**

**public class FlightPlannerServer extends ConsoleProgram**

**implements SimpleServerListener {**

**/\* The port number where we listen for requests \*/**

**private static final int PORT = 8080;**

**/\* The name of the file containing our flight data \*/**

**private static final String FLIGHT\_DATA\_FILE = "flights.txt";**

**/\* The server object that we use to listen for requests \*/**

**private SimpleServer server;**

**/\* A map from city names to cities you can fly to from there \*/**

**private HashMap<String, ArrayList<String>> flights;**

**public void run() {**

**readFlightData(FLIGHT\_DATA\_FILE);**

**server = new SimpleServer(this, PORT);**

**server.start();**

**println("Starting server...");**

**}**

**/\* Called when we receive a request to respond to \*/**

**public String requestMade(Request request) {**

**String cmd = request.getCommand();**

**// Send back a list of all city names**

**if (cmd.equals("getAllCities")) {**

**println("Received getAllCities Request");**

**ArrayList<String> cities = new ArrayList<String>();**

**for (String cityName : flights.keySet()) {**

**cities.add(cityName);**

**}**

**return cities.toString();**

**// Send back a list of cities reachable from the provided city**

**} else if (cmd.equals("getDestinations")) {**

**String city = request.getParam("city");**

**println("Received getDestinations Request for " + city);**

**ArrayList<String> destinations = flights.get(city);**

**/\* If that city is not in our map, we need to make an empty**

**\* list because we cannot call toString on null.**

**\*/**

**if (destinations == null) {**

**destinations = new ArrayList<String>();**

**}**

**return destinations.toString();**

**} else {**

**return "Error, cannot process request: " + request;**

**}**

**}**

**/\*\***

**\* Reads in the city information from the given file and stores the**

**\* information in the HashMap of flights.**

**\*/**

**private void readFlightData(String filename) {**

**flights = new HashMap<String, ArrayList<String>>();**

**try {**

**Scanner fileScanner = new Scanner(new File(filename));**

**while (fileScanner.hasNextLine()) {**

**String line = fileScanner.nextLine();**

**if (line == null) {**

**break;**

**}**

**if (line.length() != 0) {**

**readFlightEntry(line);**

**}**

**}**

**fileScanner.close();**

**} catch (IOException ex) {**

**throw new ErrorException(ex);**

**}**

**}**

**/\*\***

**\* Reads a single flight entry from the line passed as an argument,**

**\* which should be in the form**

**\***

**\* fromCity -> toCity**

**\***

**\* Each new flight is recorded by adding a new destination city to**

**\* the ArrayList stored in our flights HashMap under the key for**

**\* the starting city.**

**\*/**

**private void readFlightEntry(String line) {**

**int arrow = line.indexOf("->");**

**if (arrow == -1) {**

**throw new ErrorException("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);**

**flights.get(fromCity).add(toCity);**

**}**

**/\*\***

**\* Defines a city if it has not already been defined. Defining**

**\* a city consists of entering an empty ArrayList in the flights**

**\* map to show that it has no destinations yet.**

**\*/**

**private void defineCity(String cityName) {**

**if (!flights.containsKey(cityName)) {**

**flights.put(cityName, new ArrayList<String>());**

**}**

**}**

**}**

**2. Flight Planner Client**

**/\***

**\* File: FlightPlannerClient.java**

**\* ------------------**

**\* A client program that talks to a flight server to allow**

**\* a user to plan out a flight path from a starting city**

**\* back to that starting city.**

**\*/**

**import acm.program.\*;**

**import java.io.\*;**

**import java.util.\*;**

**public class FlightPlannerClient extends ConsoleProgram {**

**/\* The network address for the flights server we should contact \*/**

**private static final String HOST = "http://localhost:8080/";**

**public void run() {**

**println("Welcome to Flight Planner!");**

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

**ArrayList<String> cities = fetchCitiesList();**

**if (cities == null) {**

**println("Error: could not get list of all cities");**

**return;**

**}**

**printCityList(cities);**

**ArrayList<String> route = readInFlightRoute();**

**if (route == null) {**

**println("Error: could not get destinations");**

**return;**

**}**

**printRoute(route);**

**}**

**/\*\***

**\* Prompts the user for cities to travel to until they end in**

**\* the same city in which they started. Returns null if we weren't**

**\* able to get a response for a network request.**

**\*/**

**private ArrayList<String> readInFlightRoute() {**

**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);**

**if (nextCity == null) {**

**// An error occurred**

**return null;**

**}**

**route.add(nextCity);**

**if (nextCity.equals(startCity)) {**

**break;**

**}**

**currentCity = nextCity;**

**}**

**return route;**

**}**

**/\*\***

**\* Returns the list of all cities that the user can start at,**

**\* or null if we weren't able to get a response to our request.**

**\*/**

**private ArrayList<String> fetchCitiesList() {**

**try {**

**// The getAllCities request needs no parameters**

**Request request = new Request("getAllCities");**

**String result = SimpleClient.makeRequest(HOST, request);**

**return makeListFromString(result);**

**} catch (IOException e) {**

**return null;**

**}**

**}**

**/\*\***

**\* Fetches all the cities the user could travel to from the given**

**\* city, and prompts them for a destination until they enter one**

**\* of these cities. Then returns the city they chose. If we**

**\* weren't able to get a response for our request of destinations**

**\* for this city, this method returns null.**

**\*/**

**private String getNextCity(String city) {**

**ArrayList<String> destinations = fetchDestinations(city);**

**if (destinations == null) {**

**// An error occurred**

**return null;**

**}**

**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;**

**}**

**/\*\***

**\* Returns a list of cities that can be reached from the given**

**\* city. Returns null if we weren't able to get a response to our**

**\* request.**

**\*/**

**private ArrayList<String> fetchDestinations(String city) {**

**try {**

**/\* The getDestinations request has a "city" parameter**

**\* that is the name of the city to get destinations for.**

**\*/**

**Request request = new Request("getDestinations");**

**request.addParam("city", city);**

**String result = SimpleClient.makeRequest(HOST, request);**

**return makeListFromString(result);**

**} catch (IOException e) {**

**return null;**

**}**

**}**

**/\*\***

**\* Prints a list of cities from the provided 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();**

**}**

**/\*\***

**\* (PROVIDED)**

**\* This is a wonderfully useful method that takes a list in string**

**\* form and turns it into and ArrayList. For example the string:**

**\* "[cs106a, rocks, socks]"**

**\* will return an ArrayList with three elements:**

**\* "cs106a" "rocks" and "socks"**

**\*/**

**private ArrayList<String> makeListFromString(String listStr) {**

**ArrayList<String> list = new ArrayList<String>();**

**String raw = listStr.substring(1, listStr.length() - 1);**

**String[] parts = raw.split(",");**

**for(String part : parts) {**

**String str = part.trim();**

**if(!str.isEmpty()) {**

**list.add(str);**

**}**

**}**

**return list;**

**}**

**}**