

LAB ASSIGNMENT № 1

CS 111 - Spring 2017

Assigned: 01/09/2017

Due: In One Week

Problem Description

Your task is to design a program to help a hospital analyze the flow of patient arrivals in their emergency room. A text file contains patient arrivals 7 days a week, 24 hours a day for 4 weeks. Each value represents the number of patients that entered the emergency room during a given hour. Each row in the data file contains 24 values, one for each hour in the day, for all 7 days of the week. Each row contains 24*7 or 168 values. The first set of values in each row is for day zero or Sunday of each week. Each hour is based on military time with hour 0 being 12am, and hour 23 being 11 pm.

Requirements

Read data from a text file into a 3 dimensional array. From the data, compute:

1. the total number of patients that entered the emergency room per week
2. the total number of patients that entered the emergency room per day for each week
3. the average number of patient visits per week
4. the number of patient visits per day, averaged over all weeks
5. the busiest day for each week
6. the least busy for each week

Specifications

Create two modules: one for reading the data and one for analyzing it.

Reading the data

Create a module to read data from a text file and return a 3 dimensional array. The module should contain the ERDataReader class with a readData() function. It should have the following signature:

Listing 1: ERDataReader Module

```
1 public class ERDataReader {
2     public static int[][][] readData(String dataFile)
3         throws IOException, NoSuchElementException, IllegalStateException {}
4 }
```

Analyzing the data

Create an ERDataAnalyzer class with the following API:

Listing 2: ERDataAnalyzer Module

```
1 public class ERDataAnalyzer {
2     public static int[] patientsPerWeek(int[][][] data) {}
3     public static int[][] patientsPerDayPerWeek(int[][][] data) {}
4     public static double[] averagePatientsPerWeek(int[][][] data) {}
5     public static double[] averagePatientsPerDayAcrossWeeks(int[][][] data) {}
6     public static int[] busiestDayPerWeek(int[][][] data) {}
7     public static int[] leastBusyDayPerWeek(int[][][] data) {}
8 }
```

API Consumption

You can expect your modules to be used in the following manner:

Listing 3: API Consumption: Example Use Case

```
1 package assignment1;
2
3 // imports
4
5 public class Assignment1 {
6     public static void main(String[] args){
7         Scanner in = new Scanner(System.in);
8         String dataFile = in.next();
9         in.close();
10
11         int[][][] data = // initialize array
12         try {
13             data = ERDataReader.readData(dataFile);
14         } catch (FileNotFoundException e) {
15             System.err.println("File cannot be found or accessed: " + dataFile);
16         } catch (IOException e) {
17             e.printStackTrace();
18         }
19
20         int[] patientsPerWeek = ERDataAnalyzer.patientsPerWeek(data);
21         System.out.println("Patients per week: " + patientsPerWeek);
22         // Calls to other ERDataAnalyzer functions...
23     }
24 }
```

The two modules will be used in the scope of a larger program (which you do not have to write). Therefore it is important to adhere to the API specifications exactly.

Further Instructions

For this lab assignment, you may choose to work with **one** partner.

Deliverables

Each student must submit via ECampus a tar file with the following contents:

1. assignment1.tar.gz
 - (a) ERDataReader.java - the code for the ERDataReader module
 - (b) ERDataAnalyzer.java - the code for the ERDataAnalyzer module

Submission Deadlines

For Section 11 (Monday Lab): The assignment is due by 6:00pm, Monday January 16th.

For Section 12 (Tuesday Lab): The assignment is due by 3:30pm, Tuesday January 17th.