

LAB EXAM 7

Section 2

Apr. 05, 2016

In this lab assignment, you are going to write a program that stores location information of cities, and calculates distance between them.

Your program will have two main functionalities;

1. City Data Input,
2. City Distance Calculation.

1. City Data Input:

Firstly your program should create an array, which has 100 size, to store city information. After creating array, your program will start to ask city data which are;

1. City Name,
2. Latitude in Degrees,
3. Latitude in Minutes,
4. Latitude in Seconds,
5. Longitude in Degrees,
6. Longitude in Minutes,
7. Longitude in Seconds,

Your program will continue to ask city information and put every city into array, until "Q" is given as city name. If user enters "Q" as city name, your program should print out all information which is previously added, and proceed to distance calculation part.

Your program should display following prompts in "City Data Input" part;

```
Please enter city name : (Q to exit..) :  
Latitude in Degrees :  
Latitude in Minutes :  
Latitude in Seconds :  
Longitude in Degrees :  
Longitude in Minutes :  
Longitude in Seconds :
```

2. City Distance Calculation:

After printing out, your program should ask user to select indexes of two cities to calculate distance between them. If “-1” or an invalid index is given for the index of first city the program should end.

Your program should display following prompts in “City Distance Calculation” part:

```
Please enter index of first city : (-1 to quit)
Please enter index of second city :
```

Please refer to the sample run for details:

Sample Run:

```
Please enter city name : (Q to exit..) : Ankara
Latitude in Degrees : 39
Latitude in Minutes : 56
Latitude in Seconds : 6
Longitude in Degrees : 32
Longitude in Minutes : 50
Longitude in Seconds : 56
City created ...
```

```
Please enter city name : (Q to exit..) : Eskisehir
Latitude in Degrees : 39
Latitude in Minutes : 45
Latitude in Seconds : 28
Longitude in Degrees : 30
Longitude in Minutes : 31
Longitude in Seconds : 51
City created ...
```

```
Please enter city name : (Q to exit..) : Q
End of City Data Input Part...
```

```
0. City Name : Ankara, Latitude : 39.93499, Longitude : 32.84888
1. City Name : Eskisehir, Latitude : 39.75777, Longitude : 30.53083
```

```
Please enter index of first city : (-1 to exit..) 0
Please enter index of second city : 1
Distance of two cities : 258.05504 km
```

```
Please enter index of first city : (-1 to exit..) 9
Please enter index of second city : 1
```

Invalid index. Program will exit...

You should implement two classes named 'City' and 'Country'.

In City class you should include a constructor which takes; *City Name, Latitude in Degrees, Latitude in Minutes, Latitude in Seconds, Longitude in Degrees, Longitude in Minutes, Longitude in Seconds* values as parameters.

You should include functions named; **'public double getLatitude()'**, **'public double getLongitude()'**, **'public String getCityName()'** which returns corresponding values.

You also should include a function named **'public double convertToDegrees (int deg, int min, int sec)'**, which convert degrees, minutes and seconds values into pure degrees value for calculation (i.e. $39^{\circ} 56' 6'' \rightarrow 39.93499^{\circ}$). You can use following formulation.

$$\text{Degrass} = \text{Degrees} + \text{Minutes}/60 + \text{Seconds}/3600$$

In Country class, you should write a main method, which implements "City Data Input" and "City Distance Calculation" functionalities with while/for loops and if/else statements. You should create an instance of City class in each loop of data input part. You should also include a function named **'public static double distanceCalculate(City firstCity, City secondCity)'** which calculates distance between two cities by using Euclidean Distance. In your calculation; assume that, the world is flat and distances are not too big (i.e. calculate distances between cities of Turkey), and 1° is about 111 km for latitude and longitude.

Note that this is an exam. You are not allowed to communicate with any person other than your teaching assistant. Those who do not obey this rule will be subject to disciplinary investigation. You can use only the features (techniques, classes, methods and statements) that are covered in the class. After finishing your work, select your folder (e.g. Lab07), then right click and select "Send to" option. Click "Compressed (zipped) folder". Rename your zip file as "Lab07_Surname_Name". Note that, your file type is "zip", namely your file name will not be "Lab07_Surname_Name.zip". Upload your zip file to Unilica. Note that you must upload your file before 16:40; you cannot upload your file after that time.