Due Date: 28.10.2019 23:59

CENG211 – Programming Fundamentals

Homework #1

In this homework you are expected to implement an "**Weather Forecast Application**" in Java. You should fulfill the concepts of:

- Defining Classes
- Scanner
- CSV File I/O
- Arrays
- 2-dimensional Arrays
- Constructors, Getters & Setters

In the Weather Forecast Application, six main information about the weather for each city in Turkey is stored as well as some other basic information. You are expected to implement classes for City, Region, Weather, CityWeather, WeatherQuery, WeatherForecastApp and other helper classes (e.g. FileIO) with the information given below:

City:

- Plate No → [1, 81]
- Name → {Adana, Adıyaman, Afyon, ⋯, Düzce}
- Region
- Altitude → [0, 5000] m

Region:

- ID → [1, 7]
- Name → {Doğu Anadolu, Ege, ⋯, Marmara}
- Cities → City[]

Weather:

- Wind → [0, 75] km/h
- Temperature → [-50, 50] °C
- Feels-like Temperature → [-50, 50] °C
- Humidity → [0, 100]%
- Precipitation → [0, 100]%
- Visibility → {low, medium, high}

CityWeather:

- City
- Weather
- Date → {14.10.2019, 15.10.2019, ⋯, 20.10.2019}

WeeklyForecast:

- Two-dimensional array that holds CityWeather objects for each city for the next 7 days.
  Example: Today's weather for Izmir is at [35][0], Tomorrow's weather for Ankara is at [6][1].
  Note: The plate numbers are in [1, 81]. So, row 0 can be left empty.

Implement necessary methods to respond the following queries in WeatherQuery class:

1. Name of the city (or cities) with the lowest feels-like temperature in the next week
2. Name of top 3 cities with the highest temperature variation in the next week
   Hint: You can calculate the standard deviations
3. Name of the region with the highest average humidity in the next week
4. Mean temperature in the highest and lowest altitude cities
5. Name of the cities that are rainy in the next 2 days (tomorrow and the day after tomorrow)
   Note: You can assume that it will rain if precipitation is greater than or equal to 80%
6. Date (or dates) suitable for flying drones for a given city in the next week
   Hint: You should get city name from user (console input)
   Note: Wind should be less than 40 km/h and visibility should be medium at least

You are expected to create City, Region, Weather and CityWeather objects using the given CSV files **CENG211_HW1_Cities.csv** and **CENG211_HW1_Weather.csv**:

- In CENG211_HW1_Cities.csv file, the information is as follows:
  `PlateNo,Name,RegionID,RegionName,Altitude`
- In CENG211_HW1_WeeklyForecast.csv file, the information is as follows:
  `PlateNo,Date,Wind,Temperature,FeelsLikeTemperature,Humidity,Precipitation,Visibility`

Expected Output Format:

```
1) Isparta,Aksaray
2) Adana,Çanakkale,Erzurum,Ordu
3) Doğu Anadolu
4) 14.143,16.429
5) Ankara,Giresun,Sakarya,Samsun
6) Enter a city name to view flightworthy days:
İstanbul
15.10.2019,16.10.2019,20.10.2019
```

Important Notes:

1. You should pay attention to the **I/O format**. User should be asked for a console input ONLY for the 6th query. Please do NOT request additional inputs in your app.
2. The data in the "**Expected Output Format**" does NOT represent the actual results, it simply indicates "how the output should look like" in console.
3. You are NOT allowed to use **List / ArrayList** interfaces in this homework. You can implement helper methods to increase the capacity of arrays when it is needed.
4. You can use standard **java.io** packages to read files. Do NOT use other 3rd party libraries.
5. You should use relative paths (e.g. `Files/sample.csv`) instead of absolute paths (e.g. `C:\\user\\eclipse-workspace\\MyProject\\Files\\sample.csv`).

6. To support Turkish characters, you may need to change your project's text file encoding to **UTF8**: Right click on your project (in package explorer) → Properties → Text file encoding → Other → UTF8 → Apply.
7. You are expected to write clean, readable, and tester-friendly code. Please try to maximize reusability and prevent from redundancy in your methods.

Assignment Rules:

1. In this lecture's homework, there are no cheating allowed. If any cheating has been detected, they will be **graded as 0** and there will be no further discussion on this.
2. You are expected to submit your homework in groups. Therefore, **only one of you** will be sufficient to submit your homework.
3. Make sure you export your homework as an **Eclipse project**. You can use other IDEs as well, however, you must test if it supported by Eclipse.
4. Submit your homework through **CMS**.
5. Name and export your Java Project with your assigned **group ID** (which will be announced on CMS) as the given format below:

   G25_CENG211_HW1.zip

6. Please be informed that your submissions may be anonymously used in software testing and maintenance research studies. Your names and student IDs will be replaced with non-identifying strings. If you do not want your submissions to be used in research studies, please inform the instructor (Dr. Tuglular) via e-mail.