COMP1161 Semester1 2018/19

Assignment #1 (Due at 11:55 PM, Monday October 15, 2018)

The Atlantic Hurricane Season runs from June 1 to November 30 of each year. During this period, tropical storms form off the coast of Africa and travel westward through the Caribbean and onto the American East Coast. This project will simulate tracking of storms as they are born and travel throughout a region.

There are five properties of a storm that are important for tracking:

Name Every storm has a unique name.

Position The position of a storm is measured by a pair of coordinates. For our simple map we will use X-Y coordinates.

Strength A storm's strength is measured by the speed at which its winds gust in a circular pattern. Strength is measured in miles per hour.

Bearing The whole system moves in a direction that is reported as a bearing. A bearing is simply an angle measured clockwise from North. In other words, a bearing of 270 degrees means that the storm is moving due west

Speed This whole system moves through the region at a number of miles per hour.

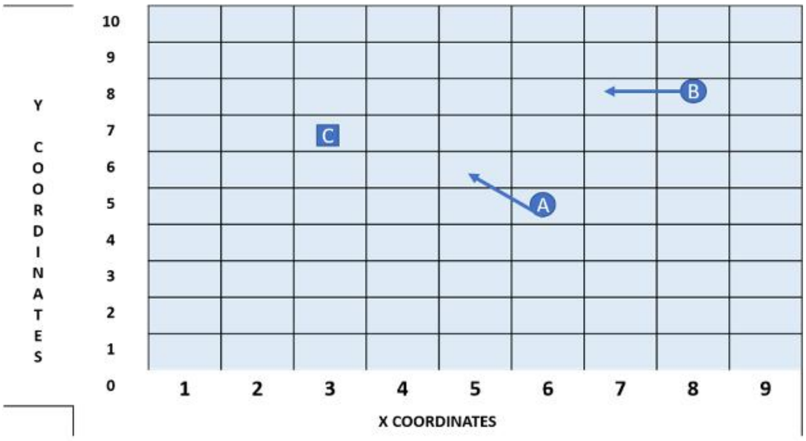

Figure 1: A map showing two storms (A & B) and on country (C)

Figure 1 shows an example of a map with two storms and one country. The country is the square at position (3,7) while the storms are at positions (6,5) and (8,8). Storm A has a bearing of 315 degrees while Storm B has a bearing of 270 degrees. Simple coordinate geometry can be used to calculate between two objects on the map, or to calculate the change in position of a storm over time. For the purpose of the simulation we will use the following:

- Time is measured in ticks where 1 tick = 1 hour
- All distances and coordinates are measured in miles.
- An x coordinate is the number of miles horizontally from the lower left hand of the map.
- A y coordinate is the number of miles vertically from the lower left hand of the map.

A Model of the Storm Tracker

A part of the UML model for the program is shown in Figure 2.

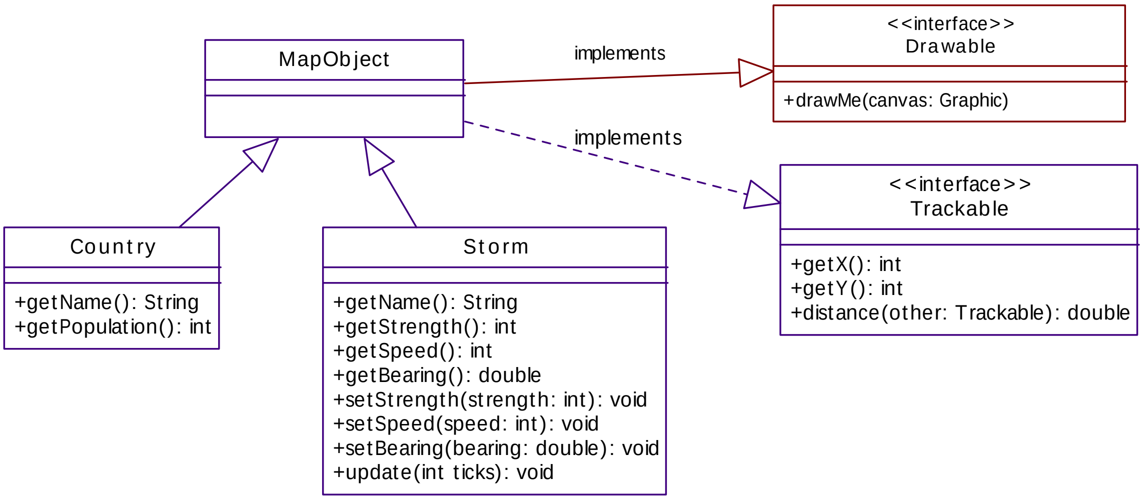

Figure 2: Partial UML Model of the Storm Tracker

MapObject A storm tracking map manages objects that are generally referred to as map objects. A map object is trackable and also drawable.

Trackable The interface Trackable declares the methods that a trackable object must implement. These are:

`getX` returns the x coordinate of the object

`getY` returns the y coordinate of the object

`distance` computes distance between an object and another trackable object.

Drawable The interface Drawable declares one method that a drawable object must implement. A drawable object must know how to draw itself on a canvas.

Country Is a map object that has a name (e.g. “Jamaica”), and a population (e.g. 3,500,000).

`getName` returns the name of the country

`getPopulation` returns the population of the country.

Storm Is a map object that represents a storm. In addition to the methods that a storm inherits from the MapObject class, a storm implements the following methods:

`getName` returns the name of the storm.

`getStrength` returns the windspeed (or strength) of the storm.

`getBearing` returns the bearing of the storm. A bearing is measured on a 360 degree scale where 0 degrees is North and West degrees.

`getSpeed` returns the speed at which the storm is moving in number of units per tick.

`setStrength` sets the strength of the storm to the parameter value.

`setSpeed` sets the speed of the storm to the parameter value.

`setBearing` sets the bearing of the storm to the parameter value.

`update` changes the storm's position to reflect its movement along its current bearing and speed for a number of ticks equal to the parameter value.

Assignment Tasks

1. Write a constructor for the MapObject class to accept the x, and y coordinates of a map object, in that order. [2]

2. Implement the methods getX and getY in the MapObject class. [1]

3. Implement the method distance in the MapObject class to calculate the distance from a map object to another trackable object. You will have to use some trigonometry to do this. [4]

4. Write a stub for the drawMe method in the MapObject class. Later on in the project, you will override these methods in each of Country and Storm. [1]

5. Write a constructor for the Country class to accept the name of the country, its population, x coordinate, and y coordinate in that order. [2]

6. Create two static constants named MAX_X, and MAX_Y in the Storm class to define the upper right corner of your map. These constants define the size of the tracking map. Choose any values you wish for these constants. [1]

7. Write a constructor for the Storm class to accept the name of the storm, strength, speed, and bearing, in that order. All storms are born at the extreme right of the map, roughly half way to the top of the map. You will use the constants you defined above to do this. [2]

8. Write the getter and setter methods for the Country and Storm classes. [8]

9. Write the update method of the Storm class. Again, you will need to use some trigonometry to do this. [4]

Total Points	=	**25**
Coursework Contribution:		**5%**

Please submit your classes as a Java Archive (jar) file with source included.