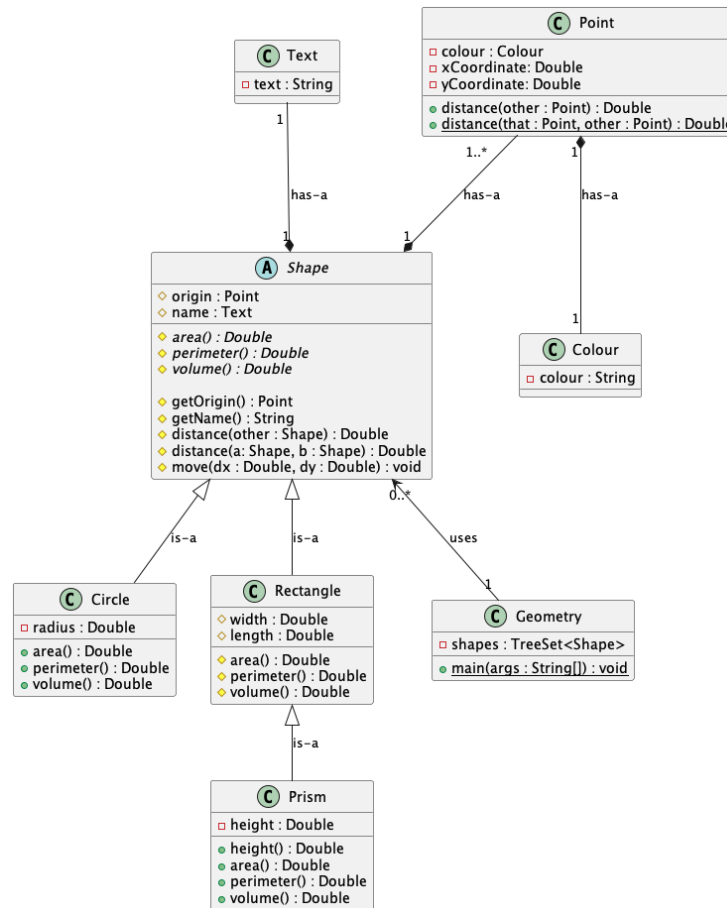


Exercise 1:

Geometry.java Class Diagram:



Relationship Descriptions:

1. **Text – Shape:** Shape has exactly one Text-class attribute.
2. **Point – Shape:** Shape has at least one point (i.e. at least one Point-class attribute)
3. **Point – Colour:** Point has exactly one Colour attribute
4. **Shape – Rectangle:** Rectangle extends Shape
5. **Shape – Circle:** Circle extends Shape
6. **Rectangle – Prism:** Prism extends Rectangle
7. **Shape – Geometry:** Geometry uses the Shape class
 - A Geometry object uses Shapes in a TreeSet `shapes`

Source Files Descriptions:

Geometry.java

The main() function instantiates the following objects: 2 Rectangles, 2 Circles, and 2 Prisms. These objects are then printed for the user to view. Geometry has a TreeSet that holds any object of class Shape or object that is of the Shape superclass. This means that this TreeSet can hold Rectangle, Circle, Prism objects.

Prism.java

Prism class inherits all aspects of the Shape class. Prism has its own definition for 3 of Shape's abstract classes. In addition, Prism has an attribute called height, used to calculate volume.

Rectangle.java

Rectangle class inherits all aspects of the Shape class. Rectangle has its own definition for 3 of Shape's abstract classes. In addition, Rectangle has attributes called length and width, used to calculate area and perimeter (volume will be 0).

Circle.java

Circle class inherits all aspects of the Shape class. Circle has its own definition for 3 of Shape's abstract classes. In addition, Circle has an attribute called radius, used to calculate area and perimeter (volume will be 0).

Shape.java

Shape is an abstract class (cannot be instantiated, but can be extended).

- ☐ Each Shape object is described by its origin and name (Point object, and Text object, respectively).
- ☐ Each Shape class has the following abstract methods (they need to be defined in Circle and Rectangle (and Prism via extension)):
 - ☐ area(), perimeter(), volume()
- ☐ Each Shape class has the following concrete methods:
 - ☐ distance():
distance() can be used to calculate the distance between 2 Shapes. This method can be called via a Shape object (i.e. s1.distance(s2)) or statically called (i.e. distance(s1, s2)).
 - ☐ move():
move() moves the Shape object's origin by a specified value.

Text.java

Text class contains text stored as a String. Each Shape has exactly one Text object.

Point.java

Point class represents a point in a Shape. Each Shape has at least 1 Point.
Each Point only has one Colour and has x and y coordinates stored as type Double.
distance() can be used to calculate the distance between 2 Points. This method can be called via a Point object (i.e. p1.distance(p2)) or statically called (i.e. distance(p1, p2)).

Colour.java

Colour class describes a Point's colour.

Exercise 2:

Program Output:

```
<terminated> Geometry [Java Application] /Users/redge/.p2/pool/plugins/org.eclipse.justj.openjdk.hotspot.jre.full/bin/macosx.x86_64/java
Shape name: R1
Origin: X-coordinate: 3.0
Y-coordinate: 4.0
Black point
Width: 6.0
Length: 5.0

Shape name: C1
Origin: X-coordinate: 13.0
Y-coordinate: 14.0
Green point
Radius: 15.0

Shape name: R2
Origin: X-coordinate: 23.0
Y-coordinate: 24.0
Black point
Width: 26.0
Length: 25.0

Shape name: C2
Origin: X-coordinate: 33.0
Y-coordinate: 34.0
Yellow point
Radius: 35.0

Shape name: P1
Origin: X-coordinate: 43.0
Y-coordinate: 44.0
White point
Width: 46.0
Length: 45.0
Height: 47.0

Shape name: P2
Origin: X-coordinate: 53.0
Y-coordinate: 54.0
Gray point
Width: 56.0
Length: 55.0
Height: 57.0

Adding Rectangle, Circle, and Prism objects to the list...

<terminated> Geometry [Java Application] /Users/redge/.p2/pool/plugins/org.eclipse.justj.openjdk.hotspot.jre.full/bin/macosx.x86_64/java
Showing information about objects added to the list:

Shape name: C1
Origin: X-coordinate: 13.0
Y-coordinate: 14.0
Green point
Radius: 15.0

Shape name: C2
Origin: X-coordinate: 33.0
Y-coordinate: 34.0
Yellow point
Radius: 35.0

Shape name: P1
Origin: X-coordinate: 43.0
Y-coordinate: 44.0
White point
Width: 46.0
Length: 45.0
Height: 47.0

Shape name: P2
Origin: X-coordinate: 53.0
Y-coordinate: 54.0
Gray point
Width: 56.0
Length: 55.0
Height: 57.0

Shape name: R1
Origin: X-coordinate: 3.0
Y-coordinate: 4.0
Black point
Width: 6.0
Length: 5.0

Shape name: R2
Origin: X-coordinate: 23.0
Y-coordinate: 24.0
Black point
Width: 26.0
Length: 25.0

Showing area, perimeter, and volume of objects in the list:
The area, perimeter, and volume of C1 are: 706.86, 94.25, 0.00.
The area, perimeter, and volume of C2 are: 3848.45, 219.91, 0.00.
The area, perimeter, and volume of P1 are: 12694.00, 182.00, 97290.00.
The area, perimeter, and volume of P2 are: 18814.00, 222.00, 175560.00.
The area, perimeter, and volume of R1 are: 30.00, 22.00, 0.00.
The area, perimeter, and volume of R2 are: 650.00, 102.00, 0.00.
```

Code:

in **607-a2-exercise-2.zip**

Exercise 3:

Sample Outputs:

Sample Output 1 – Human Player vs Random Player:

```
<terminated> Game (1) [Java Application] /Users/r

Please enter the name of the 'X' player: Red

What type of player is Red?
 1: Human
 2: Random Player
 3: Blocking Player
 4: Smart Player
Please enter a number in the range 1-4: 1

Please enter the name of the 'O' player: Blue

What type of player is Blue?
 1: Human
 2: Random Player
 3: Blocking Player
 4: Smart Player
Please enter a number in the range 1-4: 2
|col 0|col 1|col 2|
+-----+
row 0 |   |   |   |
+-----+
row 1 |   |   |   |
+-----+
row 2 |   |   |   |
+-----+

The Referee has started the game ...

Red, what row should your next X be placed in? 0
Red, what column should your next X be placed in? 2
|col 0|col 1|col 2|
+-----+
row 0 |   |   | X |
+-----+
row 1 |   |   |   |
+-----+
row 2 |   |   |   |
+-----+

Blue's turn.
|col 0|col 1|col 2|
+-----+
row 0 |   | 0 | X |
+-----+
row 1 |   |   |   |
+-----+
row 2 |   |   |   |
+-----+
```

```
Red, what row should your next X be placed in? 1
Red, what column should your next X be placed in? 1
|col 0|col 1|col 2|
+-----+
row 0 |   | 0 | X |
+-----+
row 1 |   | X |   |
+-----+
row 2 |   |   |   |
+-----+

Blue's turn.
|col 0|col 1|col 2|
+-----+
row 0 |   | 0 | X |
+-----+
row 1 |   | X |   |
+-----+
row 2 |   | 0 |   |
+-----+

Red, what row should your next X be placed in? 2
Red, what column should your next X be placed in? 0
|col 0|col 1|col 2|
+-----+
row 0 |   | 0 | X |
+-----+
row 1 |   | X |   |
+-----+
row 2 | X | 0 |   |
+-----+

THE GAME IS OVER: Red is the winner!
```

Sample Output 2 – Human Player vs Blocking Player:

```
<terminated> Game (1) [Java Application] /Users/r

Please enter the name of the 'X' player: Red
What type of player is Red?
1: Human
2: Random Player
3: Blocking Player
4: Smart Player
Please enter a number in the range 1-4: 1
Please enter the name of the 'O' player: Blue
What type of player is Blue?
1: Human
2: Random Player
3: Blocking Player
4: Smart Player
Please enter a number in the range 1-4: 3
|col 0|col 1|col 2|
+-----+
row 0 |       |       |       |
+-----+
row 1 |       |       |       |
+-----+
row 2 |       |       |       |
+-----+

The Referee has started the game ...
Red, what row should your next X be placed in? 1
Red, what column should your next X be placed in? 0
|col 0|col 1|col 2|
+-----+
row 0 |       |       |       |
+-----+
row 1 |  X   |       |       |
+-----+
row 2 |       |       |       |
+-----+

Blue's turn.
|col 0|col 1|col 2|
+-----+
row 0 |       |       |       |
+-----+
row 1 |  X   |  O   |       |
+-----+
row 2 |       |       |       |
+-----+

Red, what row should your next X be placed in? 2
Red, what column should your next X be placed in? 2
|col 0|col 1|col 2|
+-----+
row 0 |       |       |       |
+-----+
row 1 |  X   |  O   |       |
+-----+
row 2 |       |       |  X   |
+-----+

Blue's turn.
|col 0|col 1|col 2|
+-----+
row 0 |       |       |       |
+-----+
row 1 |  X   |  O   |  O   |
+-----+
row 2 |       |       |  X   |
+-----+
```

```
Red, what row should your next X be placed in? 2
Red, what column should your next X be placed in? 0
|col 0|col 1|col 2|
+-----+
row 0 | 0   |   | X   |
+-----+
row 1 | X   | 0  | 0   |
+-----+
row 2 | X   |   | X   |
+-----+
Blue's turn.
|col 0|col 1|col 2|
+-----+
row 0 | 0   |   | X   |
+-----+
row 1 | X   | 0  | 0   |
+-----+
row 2 | X   | 0  | X   |
+-----+
Red, what row should your next X be placed in? 0
Red, what column should your next X be placed in? 1
|col 0|col 1|col 2|
+-----+
row 0 | 0   | X   | X   |
+-----+
row 1 | X   | 0  | 0   |
+-----+
row 2 | X   | 0  | X   |
+-----+
Draw!
```

```

<terminated> Game (1) [Java Application] /Users/
Please enter the name of the 'X' player: X
What type of player is X?
1: Human
2: Random Player
3: Blocking Player
4: Smart Player
Please enter a number in the range 1-4: 1
Please enter the name of the 'O' player: O
What type of player is O?
1: Human
2: Random Player
3: Blocking Player
4: Smart Player
Please enter a number in the range 1-4: 4
|col 0|col 1|col 2|
+-----+
row 0 |      |      |      |
+-----+
row 1 |      |      |      |
+-----+
row 2 |      |      |      |
+-----+

The Referee has started the game ...
X, what row should your next X be placed in? 0
X, what column should your next X be placed in? 0
|col 0|col 1|col 2|
+-----+
row 0 |  X   |      |      |
+-----+
row 1 |      |      |      |
+-----+
row 2 |      |      |      |
+-----+

O's turn.
|col 0|col 1|col 2|
+-----+
row 0 |      |      |      |
+-----+
row 1 |      |      |      |
+-----+
row 2 |      |      |      |
+-----+

X, what row should your next X be placed in? 2
X, what column should your next X be placed in? 2
|col 0|col 1|col 2|
+-----+
row 0 |  X   |      |      |
+-----+
row 1 |      |      |      |
+-----+
row 2 |      |      |  X   |
+-----+

O's turn.
|col 0|col 1|col 2|
+-----+
row 0 |  X   |      |      |
+-----+
row 1 |      |      |      |
+-----+
row 2 |      |      |      |
+-----+

```


ENSF 607

Assignment 2

Redge Santillan

Chioma Ukaegbu

Christian Valdez

```
X, what row should your next X be placed in? 1
X, what column should your next X be placed in? 2
|
+---+---+---+
|   |   |   |
+---+---+---+
row 0 | X | 0 | X |
+---+---+---+
row 1 | 0 | 0 | X |
+---+---+---+
row 2 |   |   | X |
+---+---+---+
THE GAME IS OVER: X is the winner!
```

Code:

in **607-a2-exercise-3.zip**