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Project 2

User Guide

Download the zipped folder and extract the code to a user accessible folder (i.e. c:\Users\<UserName>\Desktop). This guide was developed using VSCode as the IDE. I will focus on use from within that IDE, but all methods can be implemented in other tools. Once the code is extracted, open the folder in VSCode.

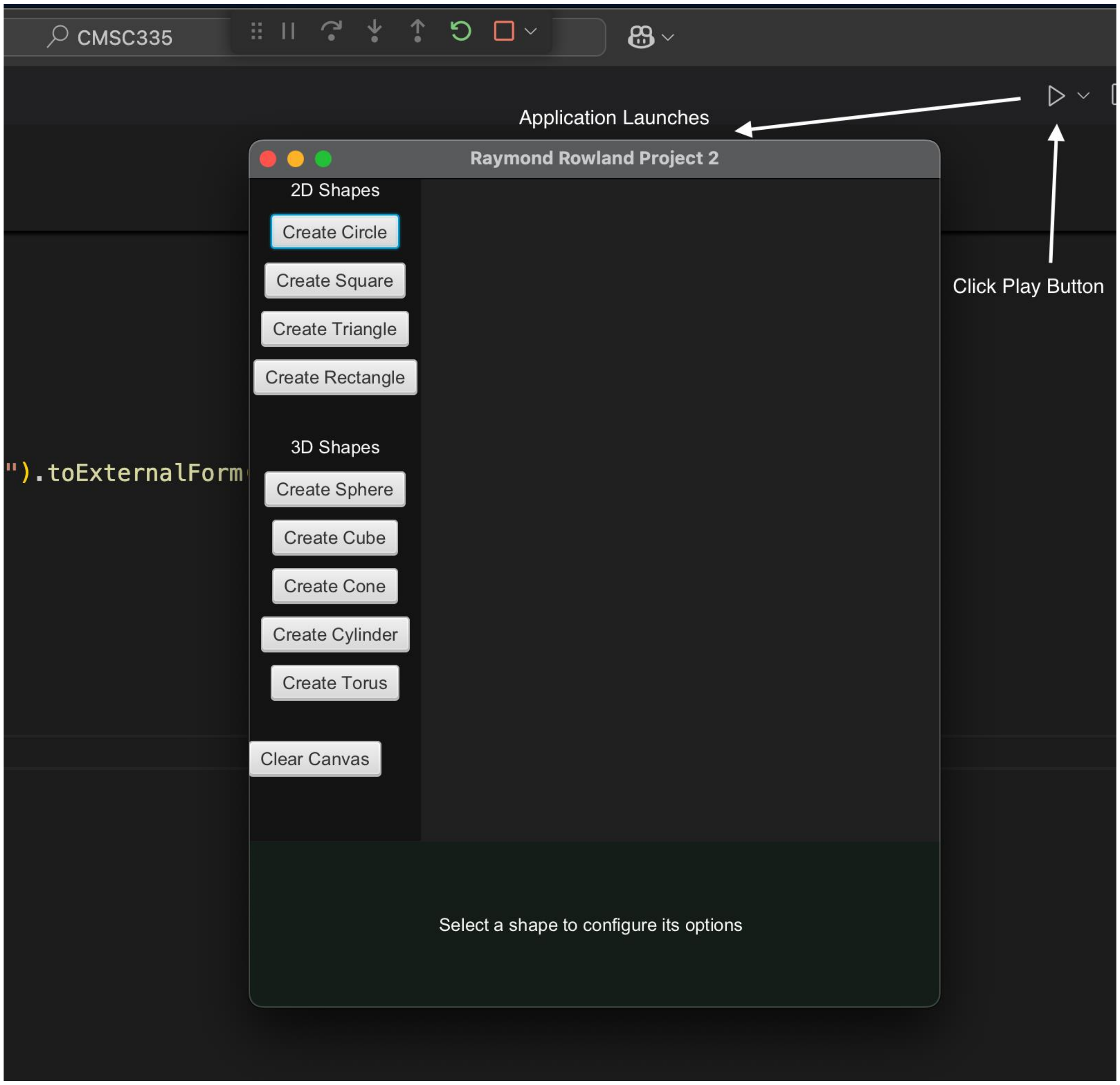
Once opened, install the Extension Pack for Java (v0.29.0) extension. The environment utilized to create and test this project is below.

- Mac macOS 12.7.6
- Java Open-JDK : 21.0.6
- Junit 4.13.2 is used for the test framework with hamcrest-core-1.3 (included in folder).

You can select the play button on the top right of VSCode to start the project and select project 2 from the bar at the top if asked, see the image below.

Figure 1

Starting project in VSCode

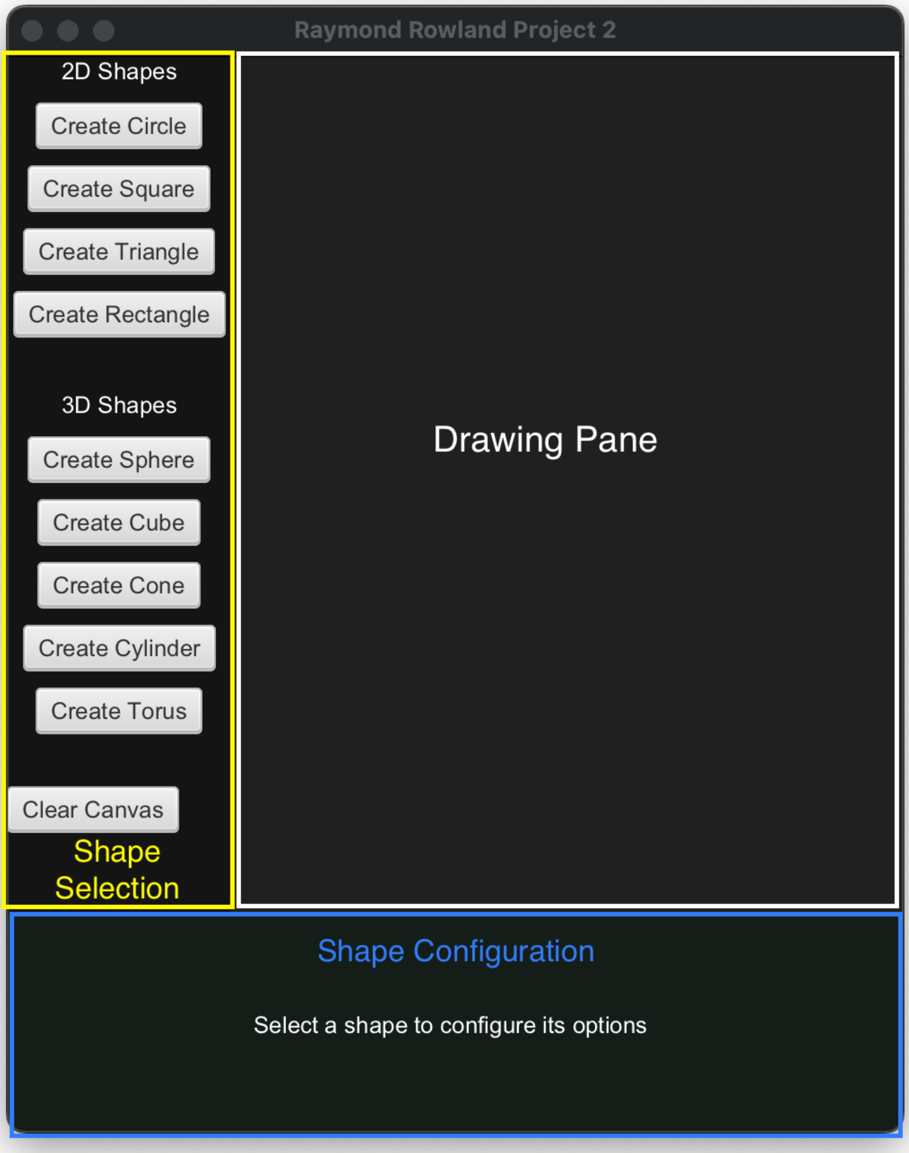


Usage

Once open you will see the main menu above. There are three sections to this UI: the drawing pane, the shape selection, and the shape configuration.

Figure 2

Sections of the application (White Drawing Pane, Yellow Shape Selection, Blue Shape Configuration).

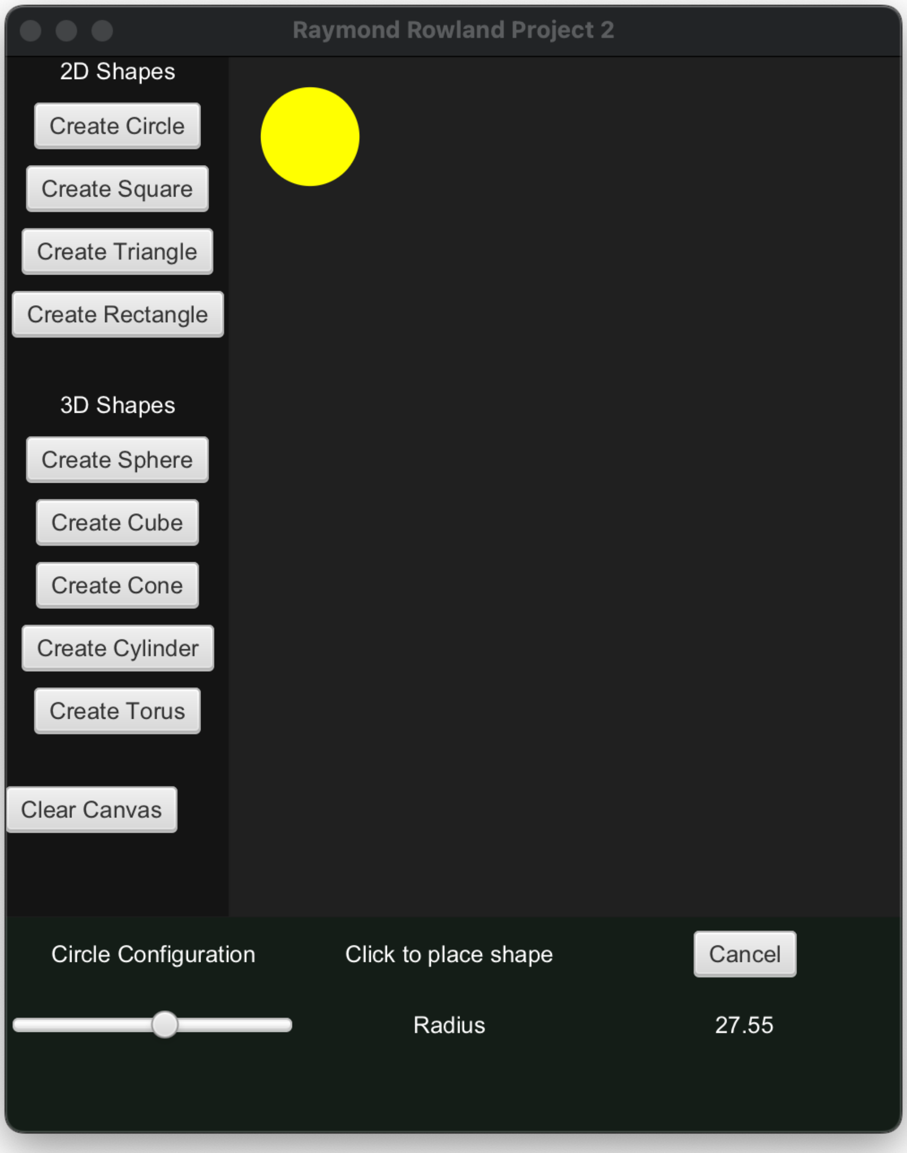


Select a shape to configure its options

You will select a shape from the left pane and the bottom section will switch to a configuration menu for that shape type. Configure the options for the selected shape and click in the drawing pane to place that shape. Click the cancel button to close the configuration pane.

Figure 3

Drawing a Circle



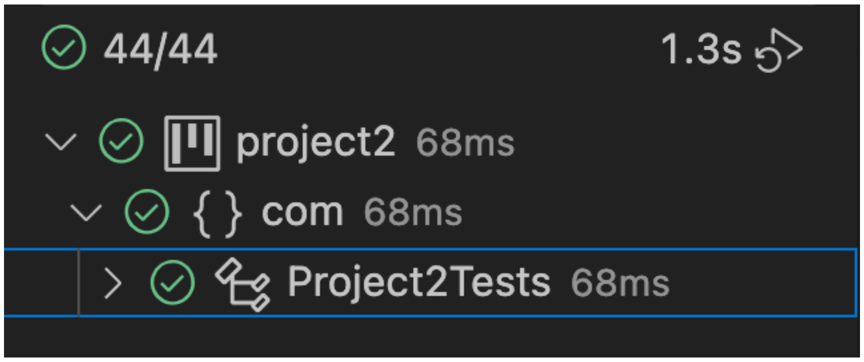
The Clear Canvas button will erase all the placed images from the drawing pane.

Test Plan

Since the shape code is the same as was used in Project 1 the same tests were used to test the shape code. Testing was performed using VSCode with the Extension Pack for Java extension and the built-in test explorer. The JUnit framework is used as the backend test framework. Open the package in VSCode, install the Extension Pack for Java extension. Once the Java packages load into the environment, click the beaker on the side bar to see the tests. In the test explorer, expand the project2/com/Project2Tests folder to see the tests for each file in the test package. Press the play button on the package or class to execute the tests.

Figure 4

Image Showing Test Menu



```
✓ 44/44                1.3s
⌄ ✓ project2 68ms
  ⌄ ✓ { } com 68ms
    › ✓ Project2Tests 68ms
```

Table 1

Project2 Shape Tests

Test #	Description	Screenshot	Pass/Fail
1	IsShapeObject: Checks if Circle is an instance of Object	Automated	PASS
2	Is2DShapeAShape: Checks if Circle is an instance of Shape	Automated	PASS
3	IsCircle2DShape: Checks if Circle is an instance of TwoDimensionalShape	Automated	PASS

4	IsSquare2DShape: Checks if Square is an instance of TwoDimensionalShape	Automated	PASS
5	IsTriangle2DShape: Checks if Triangle is an instance of TwoDimensionalShape	Automated	PASS
6	IsRectangle2DShape: Checks if Rectangle is an instance of TwoDimensionalShape	Automated	PASS
7	Is3DShapeAShape: Checks if Sphere is an instance of Shape	Automated	PASS
8	IsSphere3DShape: Checks if Sphere is an instance of ThreeDimensionalShape	Automated	PASS
9	IsCube3DShape: Checks if Cube is an instance of ThreeDimensionalShape	Automated	PASS
10	IsCone3DShape: Checks if Cone is an instance of ThreeDimensionalShape	Automated	PASS
11	IsCylinder3DShape: Checks if Cylinder is an instance of ThreeDimensionalShape	Automated	PASS
12	IsTorus3DShape: Checks if Torus is an instance of ThreeDimensionalShape	Automated	PASS
13	CreateCircle: Creates a Circle and checks its area calculation	Automated	PASS
14	CreateCircleWithFloat: Creates a Circle with a float radius and checks its area calculation	Automated	PASS
15	CreateCircleInvalid: Checks if setting a negative radius throws an IllegalArgumentException	Automated	PASS
16	CreateRectangle: Creates a Rectangle and checks its area calculation	Automated	PASS
17	CreateRectangleWithFloat: Creates a Rectangle with float dimensions and checks its area calculation	Automated	PASS
18	CreateRectangleInvalidHeight: Checks if setting a negative height throws an IllegalArgumentException	Automated	PASS
19	CreateRectangleInvalidWidth: Checks if setting a negative width throws an IllegalArgumentException	Automated	PASS

20	CreateSquare: Creates a Square and checks its area calculation	Automated	PASS
21	CreateSquareWithFloat: Creates a Square with float sides and checks its area calculation	Automated	PASS
22	CreateSquareInvalid: Checks if setting a negative side length throws an IllegalArgumentException	Automated	PASS
23	CreateSquareInvalidWidth: Checks if setting a negative side width throws an IllegalArgumentException	Automated	PASS
24	CreateSquareInvalidSides: Checks if setting a negative sides throws an IllegalArgumentException	Automated	PASS
25	CreateTriangle: Creates a Triangle and checks its area calculation	Automated	PASS
26	CreateTriangleWithFloat: Creates a Triangle with float dimensions and checks its area calculation	Automated	PASS
27	CreateTriangleInvalid: Checks if setting negative base or height throws an IllegalArgumentException	Automated	PASS
28	CreateSphere: Creates a Sphere and checks its volume calculation	Automated	PASS
29	CreateSphereWithFloat: Creates a Sphere with a float radius and checks its volume calculation	Automated	PASS
30	CreateSphereInvalid: Checks if setting a negative radius throws an IllegalArgumentException	Automated	PASS
31	CreateCube: Creates a Cube and checks its volume calculation	Automated	PASS
32	CreateCubeWithFloat: Creates a Cube with float sides and checks its volume calculation	Automated	PASS
33	CreateCubeInvalid: Checks if setting a negative side length throws an IllegalArgumentException	Automated	PASS
34	CreateCubeInvalidHeight: Checks if setting a negative side height throws an IllegalArgumentException	Automated	PASS
35	CreateCone: Creates a Cone and checks its volume calculation	Automated	PASS

36	CreateConeWithFloat: Creates a Cone with float dimensions and checks its volume calculation	Automated	PASS
37	CreateConeInvalid: Checks if setting negative radius or height throws an IllegalArgumentException	Automated	PASS
38	CreateCylinder: Creates a Cylinder and checks its volume calculation	Automated	PASS
39	CreateCylinderWithFloat: Creates a Cylinder with float dimensions and checks its volume calculation	Automated	PASS
40	CreateCylinderInvalid: Checks if setting negative radius or height throws an IllegalArgumentException	Automated	PASS
41	CreateTorus: Creates a Torus and checks its volume calculation	Automated	PASS
42	CreateTorusWithFloat: Creates a Torus with float dimensions and checks its volume calculation	Automated	PASS
43	CreateTorusInvalid: Checks if setting negative major or minor radius throws an IllegalArgumentException	Automated	PASS
44	CreateTorusInvalidMinorLess: Checks if setting minor radius greater than major radius throws an IllegalArgumentException	Automated	PASS

Figure 5

Automated Results for Table 1

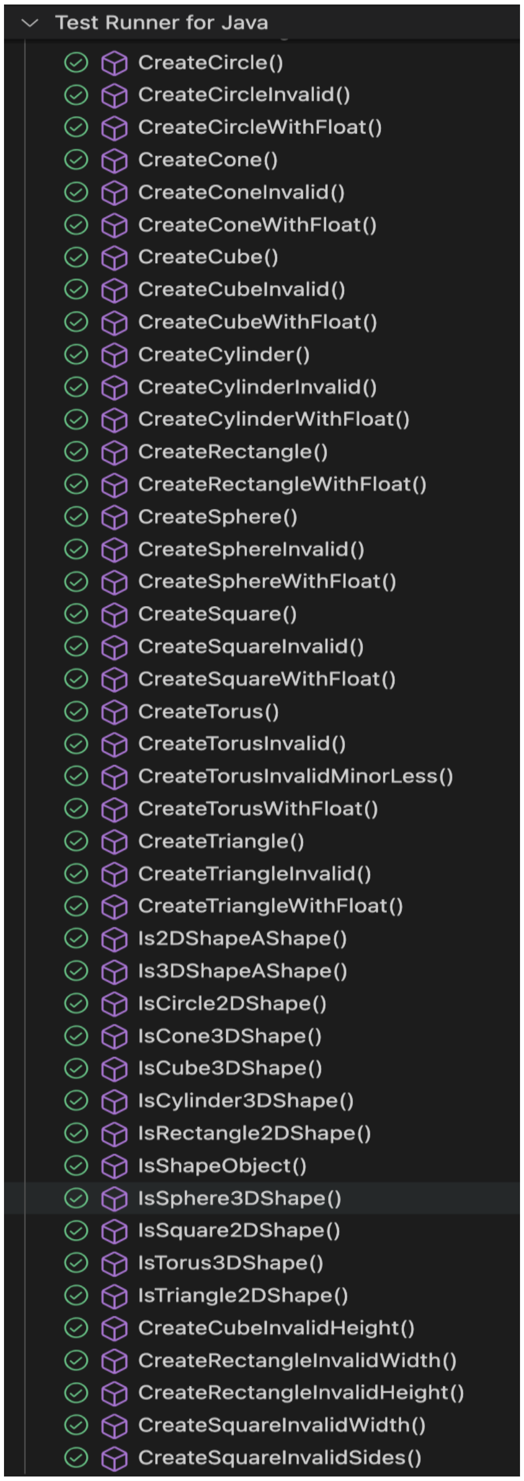
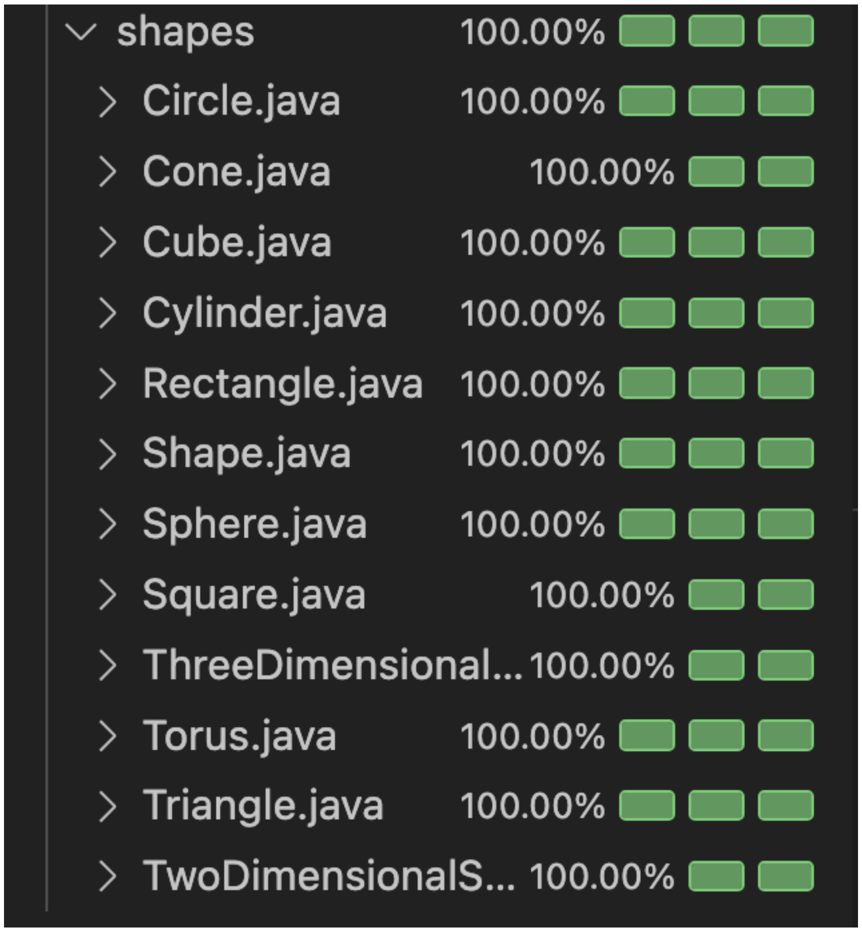

```
Test Runner for Java
  ✓ CreateCircle()
  ✓ CreateCircleInvalid()
  ✓ CreateCircleWithFloat()
  ✓ CreateCone()
  ✓ CreateConeInvalid()
  ✓ CreateConeWithFloat()
  ✓ CreateCube()
  ✓ CreateCubeInvalid()
  ✓ CreateCubeWithFloat()
  ✓ CreateCylinder()
  ✓ CreateCylinderInvalid()
  ✓ CreateCylinderWithFloat()
  ✓ CreateRectangle()
  ✓ CreateRectangleWithFloat()
  ✓ CreateSphere()
  ✓ CreateSphereInvalid()
  ✓ CreateSphereWithFloat()
  ✓ CreateSquare()
  ✓ CreateSquareInvalid()
  ✓ CreateSquareWithFloat()
  ✓ CreateTorus()
  ✓ CreateTorusInvalid()
  ✓ CreateTorusInvalidMinorLess()
  ✓ CreateTorusWithFloat()
  ✓ CreateTriangle()
  ✓ CreateTriangleInvalid()
  ✓ CreateTriangleWithFloat()
  ✓ Is2DShapeAShape()
  ✓ Is3DShapeAShape()
  ✓ IsCircle2DShape()
  ✓ IsCone3DShape()
  ✓ IsCube3DShape()
  ✓ IsCylinder3DShape()
  ✓ IsRectangle2DShape()
  ✓ IsShapeObject()
  ✓ IsSphere3DShape()
  ✓ IsSquare2DShape()
  ✓ IsTorus3DShape()
  ✓ IsTriangle2DShape()
  ✓ CreateCubeInvalidHeight()
  ✓ CreateRectangleInvalidWidth()
  ✓ CreateRectangleInvalidHeight()
  ✓ CreateSquareInvalidWidth()
  ✓ CreateSquareInvalidSides()
```

Figure 6

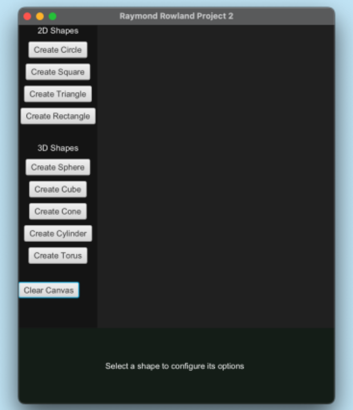
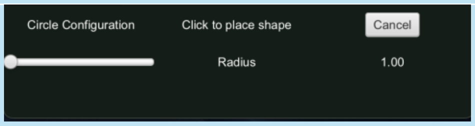
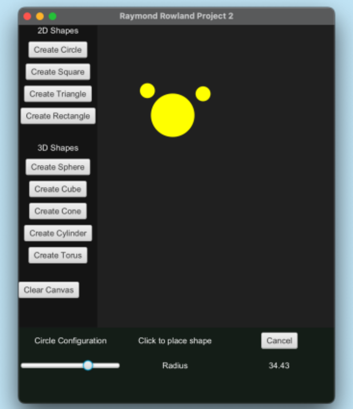
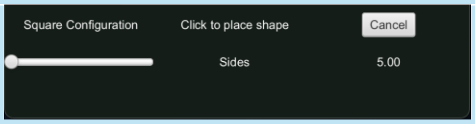
Test Coverage

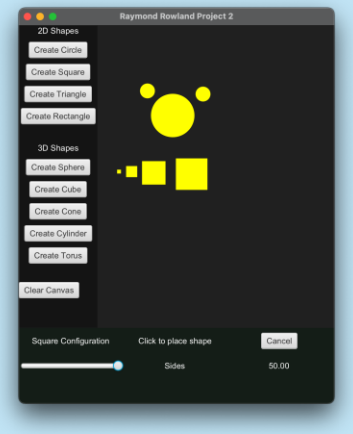
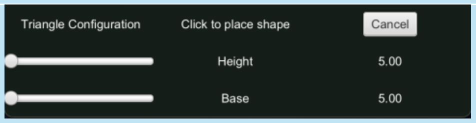
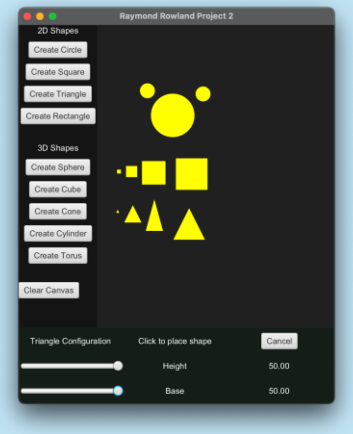
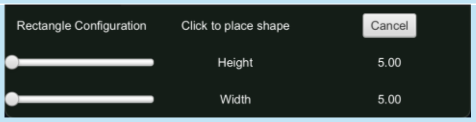


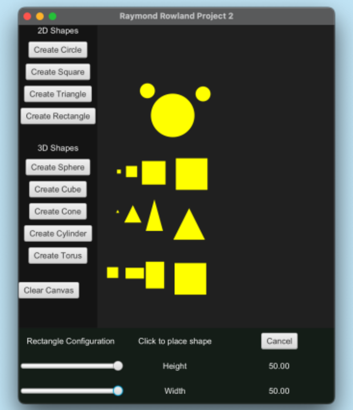
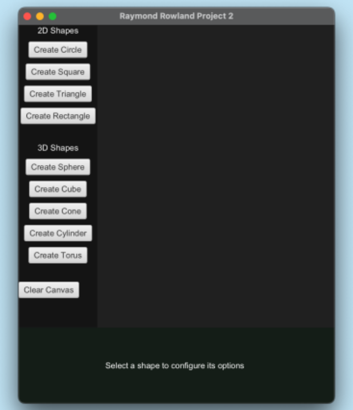
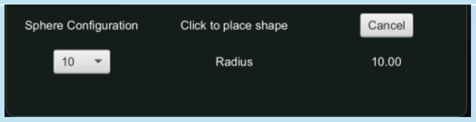
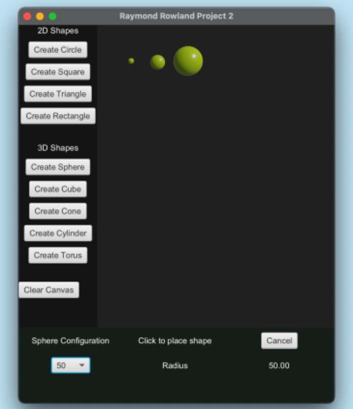
```
∨ shapes                   100.00% 🟩 🟩 🟩
   > Circle.java           100.00% 🟩 🟩 🟩
   > Cone.java                100.00% 🟩 🟩
   > Cube.java             100.00% 🟩 🟩 🟩
   > Cylinder.java         100.00% 🟩 🟩 🟩
   > Rectangle.java        100.00% 🟩 🟩 🟩
   > Shape.java            100.00% 🟩 🟩 🟩
   > Sphere.java           100.00% 🟩 🟩 🟩
   > Square.java              100.00% 🟩 🟩
   > ThreeDimensional...   100.00% 🟩 🟩
   > Torus.java            100.00% 🟩 🟩 🟩
   > Triangle.java         100.00% 🟩 🟩 🟩
   > TwoDimensionalS...    100.00% 🟩 🟩
```

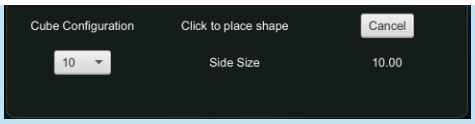
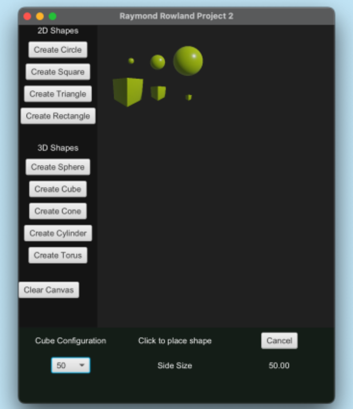
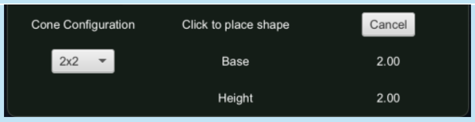
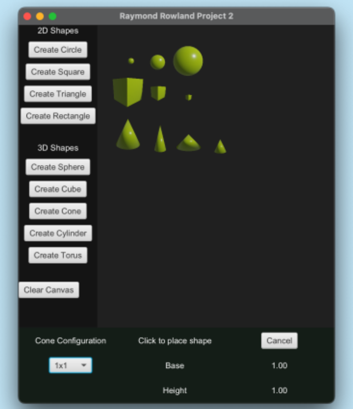
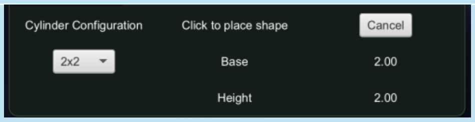
Table 2

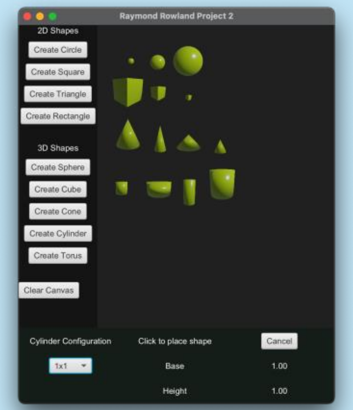
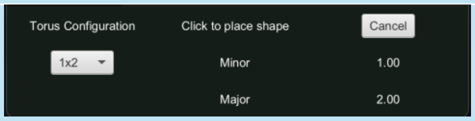
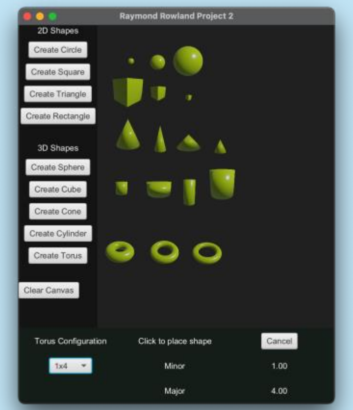
Manual Testing

Test #	Description	Screenshot	Pass/Fail
1	Run Main Menu	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Select a shape to configure its options	PASS
2	Open Circle Menu	 Circle Configuration Click to place shape Radius 1.00	PASS
3	Draw Circle	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Cancel Circle Configuration Click to place shape Radius 34.43	PASS
4	Open Square Menu	 Square Configuration Click to place shape Sides 5.00	PASS

5	Draw Squares	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Cancel Square Configuration Click to place shape Sides 50.00	PASS
6	Open Triangle Menu	 Triangle Configuration Click to place shape Height 5.00 Base 5.00	PASS
7	Draw Triangles	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Cancel Triangle Configuration Click to place shape Height 50.00 Base 50.00	PASS
8	Open Rectangle Menu	 Rectangle Configuration Click to place shape Height 5.00 Width 5.00	PASS

9	Draw Rectangles	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Cancel Rectangle Configuration Click to place shape Height 50.00 Width 50.00	PASS
10	Clear Canvas	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Select a shape to configure its options	PASS
11	Open Sphere Menu	 Sphere Configuration Click to place shape 10 Radius 10.00	PASS
12	Draw Spheres	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Cancel Sphere Configuration Click to place shape 50 Radius 50.00	PASS

13	Open Cube Menu	 Cube Configuration · Click to place shape · Cancel 10 · Side Size · 10.00	PASS
14	Draw Cubes	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Cube Configuration · Click to place shape · Cancel 50 · Side Size · 50.00	PASS
15	Open Cone Menu	 Cone Configuration · Click to place shape · Cancel 2x2 · Base · 2.00 Height · 2.00	PASS
16	Draw Cones	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Cone Configuration · Click to place shape · Cancel 1x1 · Base · 1.00 Height · 1.00	PASS
17	Open Cylinder Menu	 Cylinder Configuration · Click to place shape · Cancel 2x2 · Base · 2.00 Height · 2.00	PASS

18	Draw Cylinders	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Click to place shape Cancel Cylinder Configuration 1x1 Base 1.00 Height 1.00	PASS
19	Open Torus Menu	 Torus Configuration Click to place shape Cancel 1x2 Minor 1.00 Major 2.00	PASS
20	Draw Torus	 Raymond Rowland Project 2 2D Shapes Create Circle Create Square Create Triangle Create Rectangle 3D Shapes Create Sphere Create Cube Create Cone Create Cylinder Create Torus Clear Canvas Click to place shape Cancel Torus Configuration 1x4 Minor 1.00 Major 4.00	PASS

Lessons Learned

From Project 1, I wanted to use a build pipeline. I chose Maven for this project. It simplified the build and run pipeline. It also made changing dependencies much easier to manage.

A big lesson here was that decoupled code made the transition of project 1 from a CLI application to a GUI application simple. I was able to leave all the shape code untouched, minus adding a getter for some data. I then simply removed the CLI code and added the GUI code without any refactor.