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Department of Compute Science
North Academic Center, Room 8/206
160 Convent Avenue, New York, NY 10031

Assignment 5 – Fall 2021

Due Date: *by Sunday November 28, 2021 11:59PM*
How to submit: *upload JAVA files to Blackboard*

> **Please note:**
> ✓ This is an individual assignment; please do your own work. Sharing and/or copying code in part or as a whole with/from others will result in a grade of 0 and disciplinary actions for all involved parties. If you run into problems and have done your best to solve them, please talk to me during office hours or by e-mail.
> ✓ There is a 25% grade deduction for every day the assignment is late unless prior permission is granted.

Preamble

This assignment relies on JavaFX and serialization. You are given an existing JavaFX application, and asked to add several new features. The final application is shown in **Error! Reference source not found.**.

Note: starting with version 9, JavaFX is longer packaged with the JDK. Java 8 users can start using JavaFX right away after downloading the proper plugin for their IDE. For later Java versions, refer to the instructions shown during class or in the tutorial "Getting Started with JavaFX" here https://openjfx.io/openjfx-docs/#introduction.

What to submit:

Please compress the following files and upload a single compressed file to blackboard:

1. PainterAssignment5.xml
2. Assignment5_Controller.java
3. PainterAssignment5.java
4. Newly added class(es) for the XML serialization procedure

Getting started

1. Start by creating a new JavaFX project using either Eclipse or IntelliJ. Use the following information

Project Name:	You can choose any name.
Location:	Use the default or change the location to where you'd like to save your project
Group ID (IntelliJ):	edu.cuny.ccny
Package (Eclipse):	edu.cuny.ccny.assignment_5

2. Delete the TWO Java file UNDER the package $edu.cuny.ccny.assignment\_5$
3. Delete the FXML file
4. Copy the file module-info.java NEXT the package $edu.cuny.ccny.assignment\_5$. Ensure it is next to the package and not under the package.
5. Copy the Java files provided with the assignment under the package $edu.cuny.ccny.assignment\_5$
6. Copy the FXML file:
    ➢ IntelliJ: UNDER the package $edu.cuny.ccny.assignment\_5$ UNDER the $resources$ folder
    ➢ Eclipse: UNDER the package $edu.cuny.ccny.assignment\_5$ WITH the Java files.

7. Start the application, you should see the window in Figure 1. Notice that the Drawing Shape $ComboBox$ only has one entry.
8. Do not proceed if you are not able to see the window from Figure 1. Fix any problems before moving on.

What you should complete?

✓ (30pts) GUI (Figure 2):
  1. (5pts) Title: make the title of the window $Assignment\ 5 - \ <\ your\ name\ >$
  2. (5pts) Under the $Drawing\ Color$, change the label color for $Green, Red$, and $Blue$
  3. (5pts) Change the background color for the $Exit$ button to red and the font color to $White$
  4. (5pts) Add the new button Save as XML
  5. (10pts) Add a new entry called $Rectangle$ to the Drawing Shape $ComboBox$. The new value should be added in the $Controller$ java file.

✓ (70pt) Events:
  1. (10P) Add the proper event handler to the $Exit$ button to terminate the application.
  2. (20P) When the $Rectangle$ option is selected in the $ComboBox$, the canvas draws $Rectangle$ shapes instead of circles. Use the class $javafx.scene.shape.Rectangle$. To change the color, use the $fill$ property. There is an enumerator for drawing shapes in the controller.
  3. (40P) Save as XML
     ✓ (5pts) Show a file open dialog box which allows for the selection of an XML file. Use $javafx.stage.FileChooser$; for simplicity, please set the initial directory to ".". An example on using $javafx.stage.FileChooser$ is in Chapter 15 slides 72–88.
     ✓ (10pts) Using regular expressions, make sure the file (1) starts with an upper-case letter, (2) followed by 4 or more alpha or numeric characters, (3) followed by the extension "XML" or "xml".
     ✓ If the filename does not pass validation, print an error message.
     ✓ (25pts) If the filename passes validation, write all drawn $Rectangle$ to the selected XML file. Your code must distinguish between $Circles$ and $Rectangle$ objects; the $instanceof$ operator is useful here. One way to serialize to XML is as follows:
        1. Create a POJO class (e.g., $A5Rectangle.java$) with 5 members x, y coordinates, $width, height$, and $color$. The x, y, and $radius$ are of type $double$. The $color$ member should be of type $String$.
        2. For every drawn $Rectangle$, create an instance of type $A5Rectangle$. Use the fill property and its $toString$ method to convert the $Color$ to a $String$. The $toString$ method returns a hex representation of the color.
        3. Use $java.bean.XMLEncoder$ write the $Rectangle$ instance. Figure 4 shows a sample serialized XML file. Note that your output will be different.

Final checklist:

  ✓ Window's title
  ✓ Correct required colors
  ✓ Can exit the application through the Exit button
  ✓ Can draw rectangle shapes
  ✓ Can select an XML file that matches the Regular Expression
  ✓ Can serialize drawn Rectangles to file
  ✓ No runtime Exceptions especially if the select file dialog is closed or during serialization
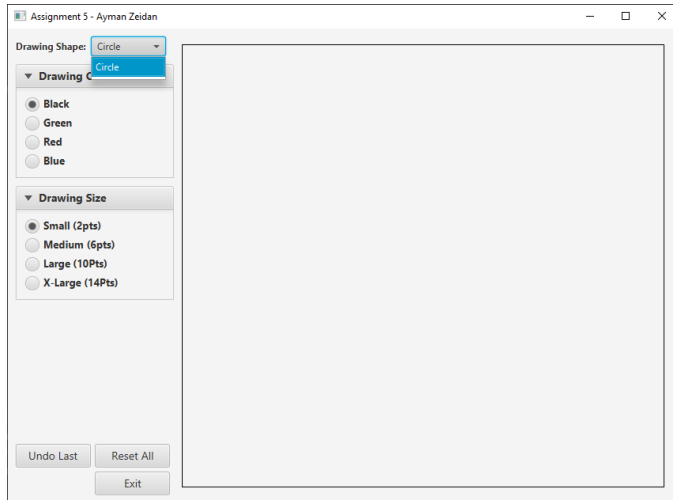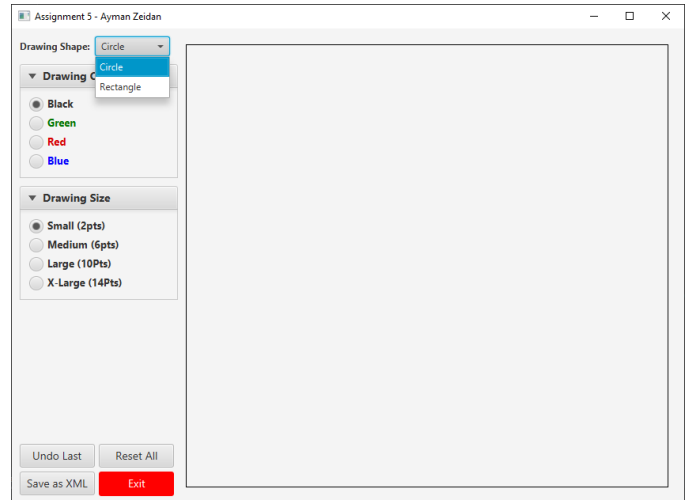
Figures:

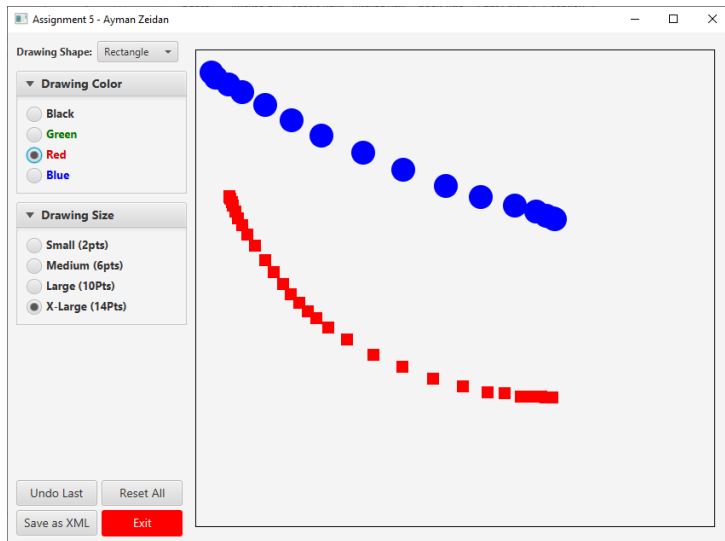*Figure 1: Initial window*

Figure 2: Completed window

Figure 3: Completed window with Rectangle and Circle drawings

```xml
<?xml version="1.0" encoding="UTF-8"?>
<java version="16.0.1" class="java.beans.XMLDecoder">
 <object class="edu.cuny.ccny.assignment_5.A5Rectangle">
  <void property="height">
   <double>6.0</double>
  </void>
  <void property="s">
   <string>0x000000ff</string>
  </void>
  <void property="x">
   <double>303.0</double>
  </void>
  <void property="y">
   <double>190.0</double>
  </void>
 </object>
 <object class="edu.cuny.ccny.assignment_5.A5Rectangle">
  <void property="height">
   <double>6.0</double>
  </void>
  <void property="s">
   <string>0x000000ff</string>
  </void>
  <void property="x">
   <double>301.0</double>
  </void>
...
```

Figure 4: Sample portion of serialized Rectangle drawings to XML. Your file will differ slightly.