CST8221 – JAP
Hybrid Activity #10
Transforming a GUI Application into an Applet

Terminology

A Java application can be deployed in three different ways: as a desktop application, as a Java Web start application (JNLP), or as an applet. The standard way to deploy a Java desktop application is to create an executable jar file. An applet is a special kind of Java GUI application that a browser enabled with Java technology can download from the Internet and run. An applet is typically embedded inside a web page and runs in the context of a browser. An applet must be a subclass of the *java.applet.Applet* class. The *Applet* class provides the standard interface between the applet and the browser environment.

The Nature of Things

Applet is a Java GUI application which is launched and run by a Java enabled browser. In principal, any Java GUI desktop application can be transformed to run as an applet. Often the Java applications have a dual life - they can run both as desktop applications and applets. Applets are Java programs that are included in an HTML page. The HTML page must tell the browser which applet to load and then when to put which applet on the web page. As you might expect there must be a specialized a HTML `<applet>` tag. The `<applet>` tag must tell the browser when to get the class files, and how the applet is positioned on the web page. The browser then retrieves the class files from the internet (or from a local directory on the user's computer) and automatically runs the applet. In order for a browser to run applets it must be Java enabled, and it must be configured to allow Java applets to run. The Oracle-Sun provides a special "Java-plug-in" which is usually installed with the Java JDK, or can be installed separately. For development purposes, Oracle-Sun provides a specialized tool *appletviewer* which is part of the Java JDK (it resides in the *bin* folder of the JDK installation).

References

Java Tutorial Link:
http://download.oracle.com/javase/tutorial/deployment/applet/index.html
https://docs.oracle.com/javafx/2/deployment/deployment_toolkit.htm

Exercise

The purpose of the hybrid activity is to give you a hand-on experience of how to transform a Java GUI application into an applet

To transform your Calculator Assignment 1, Part 2 desktop applications into an applet follow the steps outlined below. Before you start make sure that you have a calculator application that compiles and runs. It is not required to have a completely functional calculator – it must simply run without crashing at launch.

Step 1.
Write a new class called **CalculatorApplet**. The class must extend **JApplet**. Override the *JApplet init()* method. Inside the *init()* method: call the init() method of the super class; create an instance of your **CalculatorView** class; add the instance to this applet (actually, to the content pane of this applet – do not forget that *JApplet* contains a *JRootPane* similar to *JFrame*).

Compile the **CalcualtorApplet** class. Once it compiles, go to Step 2.

Step 2.
In this step you must create a **jar** file.
Create a folder called **Calculator_Applet**.
Copy into this folder all the class files of your Calculator application including the newly created **CalculatorApplet** class file and your image file.

Open a Command (Terminal) window and run the following command:

```
jar cvfe Calculator.jar Calculator *.class image_file_name.gif
```

or

```
jar cvfe Calculator.jar Calculator *.class resources
```

where the `image_ file_name.gif` is the name of your splash screen image. If your image file is stored in a folder (i.e. `resources`) , use the second command.

Once the Clculator.jar file is created, go to step 3.

Note 1: If you get the message:

'jar' is not recognized as an internal or external command, operable program or batch file.

your operating system PATH environment variable is not set to point to the **bin** folder to your Java JDK installation. You can set it temporarily using the DOS set command or you can go to *Control Panel>System* (System and Security in Windows 7/8/10), click the Advanced tab, click the Environment variables button, and edit the Path (PATH) System variable adding the path to your Java JDK **bin** folder (usually `c:\Program Files\Java\jdk1.X.X_XX\bin`).

If you want to use Eclipse to create the *jar* file, first copy your image file to the project *src* folder and refresh the project (F5), highlight your Applet project in Package Explorer, and then use *File>Export> Java>JAR file* (do not use *Runnable JAR file*). Follow the steps. Specify the Calculator class as a *class of the application entry point (main class)*. Do not forget to click on the "*Generate the manifest file*" radio button. If you use NetBeans IDE, it will create an executable jar file automatically when you build the project. You will find the jar file in the project *dist* folder.

Step 3.

Double-click on the jar file or run your application as a desktop application with the following command:

```
javaw -jar Calculator.jar
```

The application should run as a desktop application. If it does not, repeat step 2.

Step 4.

One HTML file is provided for you in a zip file posted on BB. Unzip and copy the **CalculatorApplet.html** into the **Calculator_Applet** folder**.**
The **CalculatorApplet.html** contains the **<applet>** tag needed to launch the applet in a browser.

Open a Command Window, make the folder containing the jar and html files current and type the following command:

```
appletviewer CalculatorApplet.html
```

The *appletviewer* should start and display your applet. If it does not display, repeat the steps above. If it appears, you can skip Step 5 and go to Step 6.

Step 5. Displaying an Applet in a Browser
If you are running Java version 1.7.21 or higher, you will not be able to display the applet from your local file system. The reason is that the security policy of the security manager has been changed since Java 1.7.20. The *Medium* security level has been removed from the *Security* option of the Java plug-in, and unsigned or self-signed applet are not allowed to run anymore.
If you want to see your applet in a browser, you must either sign it, or post it on a web-site and include the web site URL in the Exception Security list of the plug-in Java Control Panel.
Before to display the applet in your favorite browser, you have to change some settings. Go to *Control Panel>All Control Panel Items (or Control Panel>Programs)* and click on the Java icon. The Java Control Panel should appear on your screen. Click *Security,* lower security to *High,* and check the *Enable Java content in the browser check box.* Then click *Advanced*, check *Show Console*, and make sure that Java is default for all your browsers. Check *Apply* and *OK* buttons.

Make sure that you have the latest version of Java VM installed and your browser has Java enabled and also make sure to allow blocked content if the browser gives you a warning saying that some content is blocked.

In Internet Explorer 11, to enable Java you should go to *Tools>Internet Options>Security.* Slide the security level to *Medium.* Then go to *Custom level* and enable *Scripting of Java Applet.*

Note: Try to run the applet from the local HTML file in Internet Explorer. If you see a dialog box saying that "The page you are viewing uses Java… ", you do not have a proper Java plug-in installed. More likely, the reason is that you are running 32-bit browser and have 64-bit java installation. To solve the problem you can do three things:
- Click on the *More info button,* follow the instructions, and install the Java plug-in.
- Run the 64-bit version of Internet Explorer.
- "*Forget about it*" and do not use Internet Explorer at all.

Try to open the **CalculatorApplet.html** local file with your favorite browser. The browser will display a lot of security warnings and will not run the applet. If you really want to run the applet and you have a web site, post the applet there, include the web site URL in the Exception Security list of the Java Control Panel, and point to the `CalculatorApplet.html` URL. The bowser will display a security warning, and the applet will run nicely after you give a permission to run.

Step 6.
Demonstrate your work to me (see below).

Submission
No submission is required for this Hybrid Activity but if you want to earn some marks, you have to demonstrate your work on by the end of your lab period during the 11th week of the semester.

Marks: **3% of your maximum course mark**
The lab exercises will be marked according to the following marking scheme:
You demonstrate a working application and applet – You Score! GO Java GO!

Marking Scheme

Deduction Event	ActionPerformed (Deduction (%))
Missing or late demonstration	100
Application or applet do not run	**up to 100**
Application does not run from jar file	40
Applet does not display in the appletviewer tool	80
Missing splash screen when run as a desktop application	10

Note: If you want to learn how to convert a JavaFX application to an applet, visit the following link:

http://stackoverflow.com/questions/8566818/is-it-possible-to-make-javafx-web-applet/26689258#26689258

Enjoy the building and do not forget that:

"Tools are useful when you know what to do with them."   Anonymous

But also never forget that*:*

"Do not use a hammer to make your browser run Java applets!"   Another Anonymous