Unit One Lecture Two

Topic 1: Using a class from java.awt

The java.awt library contains many classes. Suppose we would like to use the Rectangle class from that library.

The first thing you must do is skip a line after your comments and import the class.

```
import java.awt.Rectangle;
```

Next, inside main, declare one or more variables of type Rectangle and construct them with appropriate data. Variables in Java are usually lower case letters or a combination of lower case letters, digits, and underscore characters. The first character can’t be a digit.

```
Rectangle x;
x = new Rectangle(5, 8, 10, 20);
```

The first line declares x to be of type Rectangle. In other words, x is an instance of the Rectangle class. x is also called an object variable.
The second line constructs an object of type Rectangle and returns to x the memory location where the object is stored. The upper left corner of this rectangle is 5 pixels to the right and 8 pixels down from the upper left corner of the window. This rectangle has a width of 10 pixels and a height of 20 pixels. A Rectangle object could also have been constructed using one line of code.

```
Rectangle x = new Rectangle(5, 8, 10, 20);
```

The next thing that is typically done to a defined object is to invoke a method of that object. For example, suppose I would like to move this rectangle to a new location. I would invoke the *setLocation* method of this object.

```
x.setLocation(15, 18);
```

This command moved the rectangle so it's upper left corner is now 15 pixels to the right and 18 pixels down. *setLocation* is a void method that is why there is no equal sign in the command.

What if I wanted to find out if a specific point was inside the bounds of my rectangle. I would have to invoke the *contains* method of this object. Since the *contains* method returns a boolean value, the code would have to look like this.

```
boolean y;
y = x.contains(12, 9);
```

or this

```
boolean y = x.contains(12, 9);
```

y would equal true if the point (12, 9) was inside the bounds of the rectangle. y would equal false if the point was not inside the bounds of the rectangle.

Java does permit you to print, to the console, a rectangle.

```
System.out.println(x);
```

This command simply prints out the data used to construct the rectangle.

Topic 2: Java Applets

Applets are programs that can run inside a web browser. These programs do not require a main method but do require an init method.

First, you probably want to import two classes from java.awt.

```
import java.awt.Graphics;
import java.awt.Color;
```

Second, the class you are creating is going to have to inherit characteristics from the java.applet.Applet class. (The concept of inheritance is very powerful and will be covered in great detail later in the course.)

```
import java.applet.Applet;

public class U1A2b extends Applet
{
```

or

```
import javax.swing.JApplet;

public class U1A2b extends JApplet
{
```

Next, you will want to set up an init() method in your class. init is a reserved word from the Applet class and its purpose is to set initial characteristics of your applet (very similar to form_load() in Visual Basic). Below is an example of an init() method.

```
public void init()
{
     setBackground(Color.yellow);
}
```

Next, you will want to set up a paint(Graphics g) method in your class. paint is also a reserved word from the Applet class and its purpose is to place graphics objects on the applet. Below is an example of a paint(Graphics g) method.

```
public void paint(Graphics g)
{
     g.setColor(Color.blue);
     g.drawRect(5, 8, 10, 20);

     g.setColor(Color.red);
     g.fillRect(5, 8, 10, 20);
}
```

The setBackground method was inherited by the Applet class from the java.awt.Component class. In Color.yellow, yellow is an instance field (data) of the Color class. setColor, drawRect, and fillRect are all methods of the Graphics class.

Since applets are programs designed to run inside a web browser, they require an HTML file to get them started. If you do not have a specific HTML document for your project, a part of the text editor called the appletviewer will create a new one for you, each time you select Run Java Applet.

For each applet that you create, you could create (in notepad) your own HTML document and save it in your project folder. It can be as simple as this...

```
<HTML>
<applet code = "U1A2b.class"  width = "400"  height = "200">
</applet>
</HTML>
```

Once the HTML document has been saved, you can execute this applet by double clicking on the HTML icon or you can select Run Java Applet and you will be asked if it could be run using the HTML document you created. Answer YES.

Primitive Data Types included in the AP subset of Java

int denotes integer data type. All positive and negative whole numbers and zero. In other words, an integer data type is a number without a fractional part.

Java integers range from -2,147,483,648 to 2,147,483,647.

* Integer.MIN_VALUE and Integer.MAX_VALUE, which are defined in a class called Integer, contain these values.

* In 2010 added to the list of testable material on the AP Computer Science Exam

double denotes a real data type. All positive and negative numbers that can be represented by the quotient of 2 integers. In other words, a double data type is a number with a fractional part.

Double-precision floating point numbers are less limited than the integer. They can go up to more than 10^{300}. However, the double data type can store only about 15 significant digits.

boolean denotes a boolean data type. A variable defined to be of type boolean can have only one of two possible values. The variable can contain true or the variable can contain false.

Assignment U1A2: Rectangles