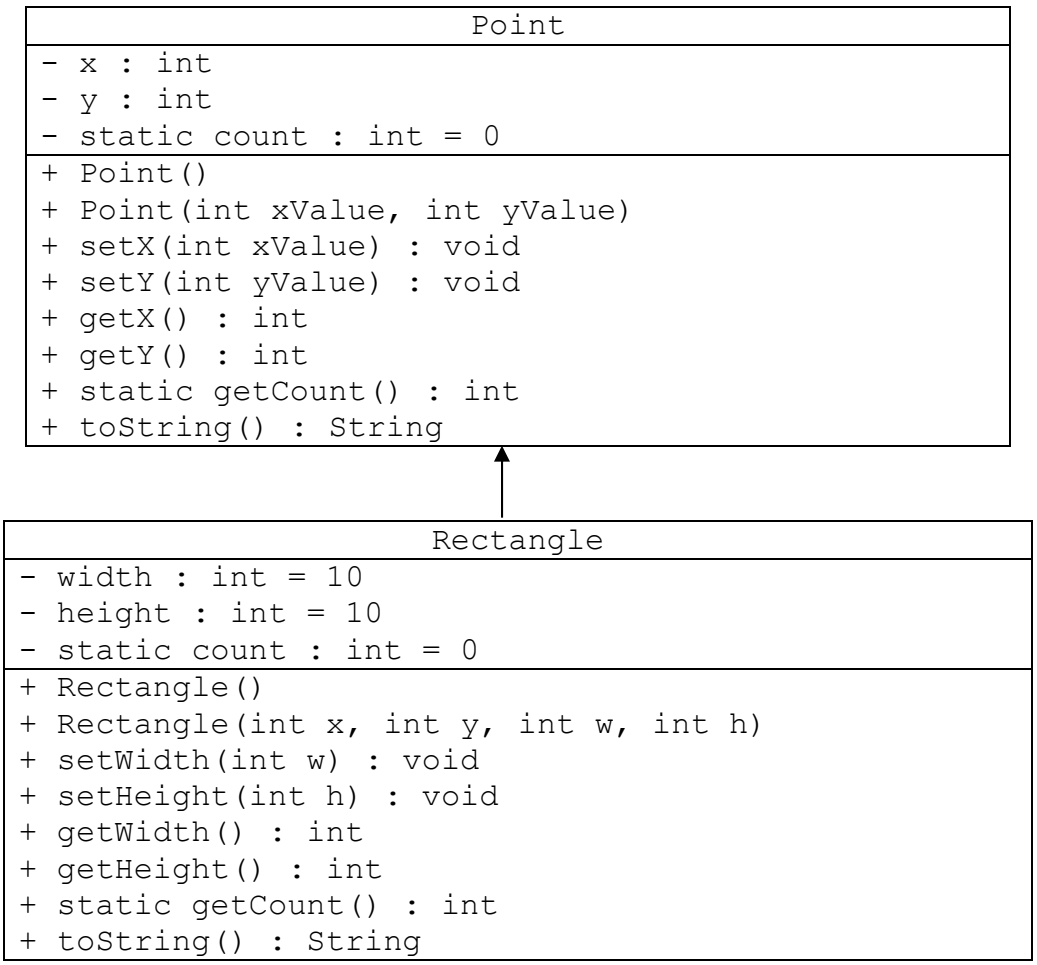
บทที่ 10 การออกแบบ Class แบบ Inheritance และใช้งาน Garbage Collection

การออกแบบและสร้าง Class แบบ Inheritance โดยมีการออกแบบ Class ตาม Class Diagram ดังนี้



การทดลองที่ **10-1**

```
// File Name : Point.java
public class Point {
   private int x = 10;  // x part of coordinate pair
   private int y = 10;  // y part of coordinate pair
   private static int count = 0;
   // no-argument constructor
   public Point() {
      setX(0);
      setY(0);
      count++;
   }
   // constructor
   public Point( int xValue, int yValue )  {
      setX(xValue);
      setY(yValue);
      count++;
   }
```

```
   // finalizer
   protected void finalize() {
      count--;
   }

   // set x in coordinate pair
   public void setX( int xValue ) {
      x = xValue;  // no need for validation
   }

   // return x from coordinate pair
   public int getX() {
      return x;
   }

   // set y in coordinate pair
   public void setY( int yValue ) {
      y = yValue;  // no need for validation
   }

   // return y from coordinate pair
   public int getY() {
      return y;
   }

   public static int getCount() {
      return count;
   }

   // return String representation of Point object
   public String toString() {
      return "[" + getX() + ", " + getY() + "]";
   }

} // end class Point
```

```
// File Name : PointJFrame.java
import javax.swing.*;
import java.awt.*;

public class PointJFrame extends javax.swing.JFrame {
   int size;
   Point p[] ;
   public PointJFrame()
   {
      super("Program Inheritance Point");
      String input;  // user's input

      // obtain user's choice
      input = JOptionPane.showInputDialog(
                  "Enter number of point : " );
```

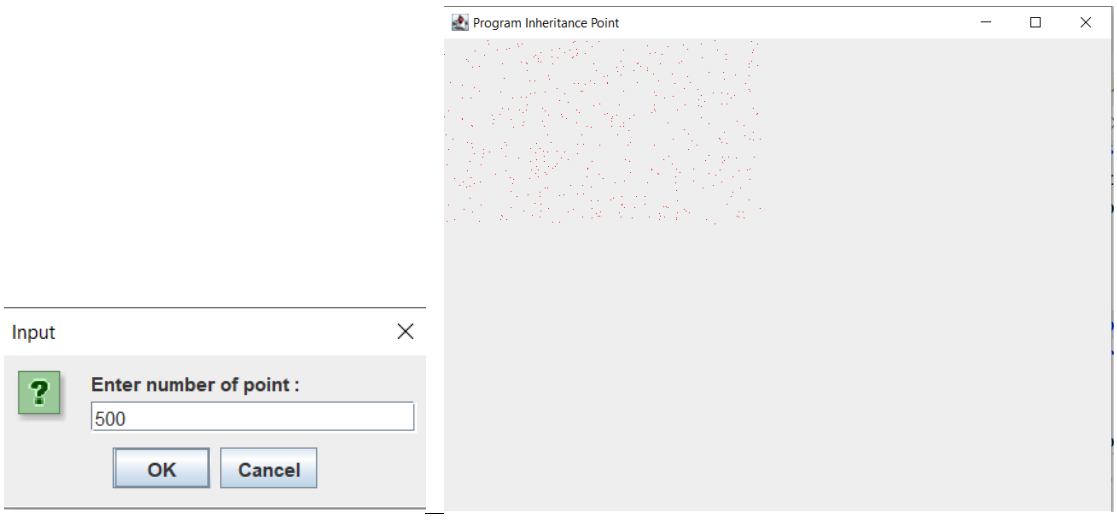
```
      size = Integer.parseInt( input );  // convert input to int
      p = new Point[size];

      for(int n = 0 ; n < p.length ; n++) {
         int x = 5 + (int) (Math.random() * 300);
         int y = 5 + (int) (Math.random() * 200);
         p[n] = new Point(x, y);
      }
   } // end method init

   // draw shapes on applet's background
   public void paint( Graphics g )
   {
      super.paint( g ); //call paint method inherited

      for ( int n = 0; n < p.length; n++ ) {
         // set color
         g.setColor( new Color(255,0,0) );
         // plot point
         g.drawLine( p[n].getX(), p[n].getY(), p[n].getX(),
               p[n].getY() );
      } // end for
      //showStatus("จำนวน Object : "+ Point.getCount());
   } // end method paint
    public static void main(String[] args) {
        PointJFrame test = new PointJFrame();
        test.setSize(640, 480);
        test.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        test.setVisible(true);
    }
}
```

ผลลัพธ์



การทดลองที่ **10-2**

```
// File Name : Rectangle.java

public class Rectangle extends Point {
   private int width = 10;
   private int height = 10;
   private static int count = 0;

   /** Creates a new instance of Rectangle */
   public Rectangle() {
   }

   public Rectangle(int x, int y, int w, int h ) {
      super(x,y);
      setWidth(w);
      setHeight(h);
   }

   public void setWidth(int w) {
      width = w;
   }

   public void setHeight(int h) {
      height = h;
   }

   public int getWidth() {
      return width;
   }

   public int getHeight() {
      return height;
   }

   public int  getArea() {
      return width*height;
   }

   public static int getCount() {
```

```
      return count;
   }

   protected void finalize() {
      count--;
   }

   public String toString() {
      return "Conner Left = " + super.toString() + "; Width = " +
             getWidth() + ";  Height = " + getHeight();
   }
}
```

```
// File Name : RectangleJFrame.java

import javax.swing.*;
import java.awt.*;

public class RectangleJFrame extends javax.swing.JFrame {
   int x, y;
   Rectangle r ;

   public RectangleJFrame()
   {
        super("Program Inheritance Rectangle");
          String input;  // user's input
      // obtain user's choice
      input = JOptionPane.showInputDialog(
                  "Enter value x of left point : " );
      x = Integer.parseInt( input );  // convert input to int
      input = JOptionPane.showInputDialog(
                  "Enter value y of left point : " );
      y = Integer.parseInt( input );  // convert input to int

      int w = 10 + (int) (Math.random() * 280);
      int h = 10 + (int) (Math.random() * 180);
      r = new Rectangle(x, y, w, h);
   } // end method init

   public void paint( Graphics g )
   {
          super.paint( g ); //call paint method inherited
      // set color
      g.setColor( Color.ORANGE );
      g.drawRect(r.getX(),r.getY(),r.getWidth(), r.getHeight());
      g.setColor( Color.BLUE );
      g.drawString( "Point Left : " + r.getX() + ", " + r.getY(),
                    r.getX(), r.getY());
      g.drawString( "Width :  " +  r.getWidth() , r.getX(),
                    r.getY() + 15);
```

```
      g.drawString( "Height :  " +  r.getHeight() , r.getX(),
                    r.getY() + 30);
      g.drawString("Area  :  "+r.getArea(),r.getX(),r.getY()+45);

   } // end method paint
    public static void main(String[] args) {
       RectangleJFrame test = new RectangleJFrame();
       test.setSize(640, 480);
       test.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
       test.setVisible(true);
    }
}
```

ผลลัพธ์