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COURSE	Java Programming

LAB ASSESSMENT #3

All labs can also be found at:

<https://github.com/jacobjohn2016/Java-Programming>

Applets

Draw a ball, filled with default color. Move the ball from top to bottom of the window continuously with its color changed for every one second. The new color of the ball for the next second should be obtained by adding 20 to the current value of Red component, for the second time by adding 20 to the blue component, and for the third time by adding 20 to the blue component, till all reach the final limit 225, after which the process should be repeated with the default color.

Code

```
import
java.applet.Applet;

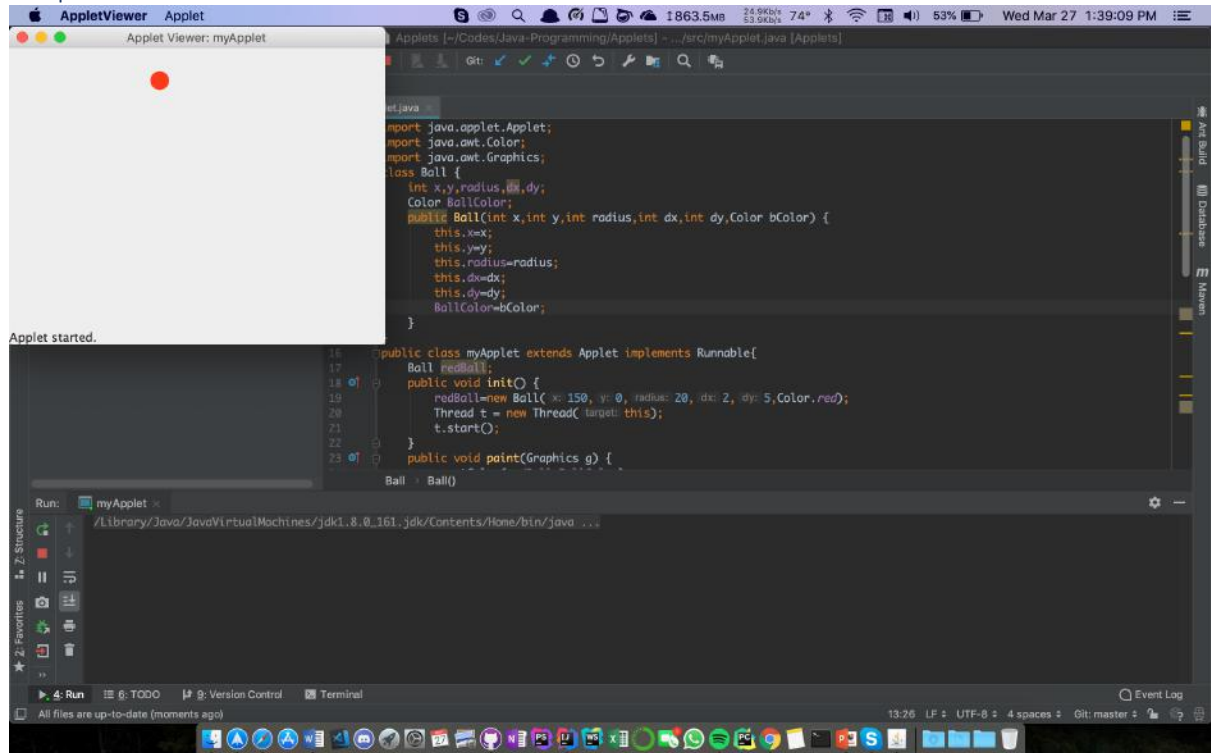
import java.awt.Color;
import java.awt.Graphics;
class Ball {
    int x,y,radius,dx,dy;
    Color BallColor;
    public Ball(int x,int y,int radius,int dx,int dy,Color
bColor) {
        this.x=x;
        this.y=y;
        this.radius=radius;
        this.dx=dx;
        this.dy=dy;
        BallColor=bColor;
    }
}
public class myApplet extends Applet implements Runnable{
    Ball redBall;
    public void init() {
        redBall=new Ball(150,0,20,2,5,Color.red);
    }
}
```

```

        Thread t = new Thread(this);
        t.start();
    }
    public void paint(Graphics g) {
        g.setColor(redBall.BallColor);
        g.fillOval(redBall.x, redBall.y, redBall.radius,
redBall.radius);
    }
    public void run() {
        try {
            Color c = redBall.BallColor;
            redBall.BallColor = new Color(c.getRed(),
c.getBlue()+20, c.getGreen());
            redBall.y=redBall.y+redBall.dy;
        }
        catch(Exception e){}
        while(redBall.BallColor.getBlue()!=255) {
            try {
                displacementOperation(redBall);
                Thread.sleep(1000);
                repaint();
            }
            catch(Exception e){}
        }
    }
    public void displacementOperation(Ball ball) {
        Color c = ball.BallColor;
        ball.BallColor = new Color(c.getRed(), c.getBlue()+20,
c.getGreen());
        ball.y=ball.y+ball.dy;
    }
}

```

Output



Java Network Programming

Develop a UDP based client-server application to notify the client about the integrity of data sent from its side. Use checksum to do this.

Server

```
// Java
program to
illustrate
Server
side

// Implementation using DatagramSocket
import java.io.IOException;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;
import java.net.SocketException;

public class udpBaseServer_2
{
    public static void main(String[] args) throws IOException
    {
        // Step 1 : Create a socket to listen at port 1234
        DatagramSocket ds = new DatagramSocket(1234);
        byte[] receive = new byte[65535];

        DatagramPacket DpReceive = null;

        // Step 2 : create a DatagramPacket to receive the data.
        DpReceive = new DatagramPacket(receive, receive.length);

        // Step 3 : retrieve the data in byte buffer.
        ds.receive(DpReceive);

        System.out.println("Client:-" + data(receive));
        String ls = data(receive).toString();
        int l = Integer.valueOf(ls);

        int i, nob, sum = 0, chk_sum;

        // Initializes the arrays based on data length received
        int c_data[] = new int[l];
        int data[] = new int[l];

        System.out.println("Data received (along with checksum) is");
```

```

        for(i = 0; i < data.length; i++)
        {
            // Step 2 : create a DatagramPacket to receive the data.
            DpReceive = new DatagramPacket(receive, receive.length);
            // Step 3 : receive the data in byte buffer.
            ds.receive(DpReceive);
            System.out.println("Client : " + data(receive));
            ls = data(receive).toString();
            // Reading the data being sent one by one
            data[i] = Integer.valueOf(ls);

            // Complementing the data being received
            nob = (int)(Math.floor(Math.log(data[i]) / Math.log(2))) +
1;

            c_data[i] = ((1 << nob) - 1) ^ data[i];

            // Adding the complemented data
            sum += c_data[i];
        }
        System.out.println("Sum (in ones complement) is : "+sum);

        // Complementing the sum
        nob = (int)(Math.floor(Math.log(sum) / Math.log(2))) + 1;
        sum = ((1 << nob) - 1) ^ sum;
        System.out.println("Calculated Checksum is : "+sum);

        if(sum == 0){
            System.out.println("Success!");
        }
        else{
            System.out.println("Failure");
        }
    }

    // A utility method to convert the byte array
    // data into a string representation.
    public static StringBuilder data(byte[] a)
    {
        if (a == null)
            return null;
        StringBuilder ret = new StringBuilder();
        int i = 0;
        while (a[i] != 0)
        {
            ret.append((char) a[i]);
            i++;
        }
    }

```

```

    }
    return ret;
}
}

```

Client

```

// Java
program to
illustrate
Client
side

// Implementation using DatagramSocket
import java.io.IOException;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;
import java.util.Scanner;

public class udpBaseClient_2
{
    public static void main(String args[]) throws IOException
    {
        // Setting maximum data length
        int MAX = 100;
        Scanner sc = new Scanner(System.in);

        // Step 1: Create the socket object for
        // carrying the data.
        DatagramSocket ds = new DatagramSocket();

        InetAddress ip = InetAddress.getLocalHost();
        byte buf[] = null;

        int i, l, sum = 0, nob;
        System.out.print("Enter data length : ");
        l = sc.nextInt();

        // Array to hold the data being entered
        int data[] = new int[MAX];

        // Array to hold the complement of each data
        int c_data[] = new int[MAX];

        System.out.println("Enter data to send : ");
    }
}

```

```

        for (i = 0; i < l; i++)
        {
            data[i] = sc.nextInt();

            // Complementing the entered data
            // Here we find the number of bits required to represent
            // the data, like say 8 requires 1000, i.e 4 bits
            nob = (int)(Math.floor(Math.log(data[i]) / Math.log(2))) +
1;

            // Here we do a XOR of the data with the number 2^n -1,
            // where n is the nob calculated in previous step
            c_data[i] = ((1 << nob) - 1) ^ data[i];

            // Adding the complemented data and storing in sum
            sum += c_data[i];
        }
        // The sum(i.e checksum) is also sent along with the data
        data[i] = sum;
        l += 1;

        System.out.println("Checksum Calculated is : " + sum);
        System.out.println("Data being sent along with Checksum...");

        // Sends the data length to receiver
        // convert the input into the byte array.
        String temp = Integer.toString(l);
        buf = temp.getBytes();

        // Step 2 : Create the datagramPacket for sending
        // the data.
        DatagramPacket DpSend = new DatagramPacket(buf, buf.length, ip,
1234);

        // Step 3 : invoke the send call to actually send
        // the data.
        ds.send(DpSend);

        // Sends the data one by one to receiver
        for (int j = 0; j < l; j++){
            temp = Integer.toString(data[j]);
            buf = temp.getBytes();
            DpSend = new DatagramPacket(buf, buf.length, ip, 1234);
            ds.send(DpSend);
        }
    }

```

```

    }
}

```

Output

The screenshot shows the IntelliJ IDEA IDE with the project 'RMI' open. The file 'MyClient.java' is selected in the 'src' directory. The code in the editor is as follows:

```

package Multiples;

import java.rmi.*;
import java.util.Scanner;

public class MyClient {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of data: ");
        int n = sc.nextInt();
        System.out.println("Enter data separated by space: ");

        for(int i = 0; i < n; i++) {
            int k = sc.nextInt();
            int j = sc.nextInt();
            sc.nextLine();
            try {
                Modder stub = (Modder) Naming.lookup("rmi://localhost:1900" + "/" + args[0]);
                System.out.println(stub.modd(k, j));
            } catch (Exception e) {}
        }
    }
}

```

The 'Run' window at the bottom shows the execution output for 'MyClient':

```

Enter number of data: 4
Enter data separated by space:
5 10
True
20 23
True
4 28
False
Process finished with exit code 0

```


RMI

Develop an RMI application to invoke a remote method that takes two numbers and returns true if one number is an exact multiple of the other and false otherwise.

Remote interface

```
package
Multiples;

import java.rmi.*;

public interface Modder extends Remote{
    public String modd(int x,int y)throws RemoteException;
}
```

Implementation

```
package
Multiples;

import java.rmi.*;
import java.rmi.server.*;

public class ModderRemote extends UnicastRemoteObject implements Modder{
    ModderRemote()throws RemoteException{
        super();
    }
    public String modd(int x,int y){
        if(x%y == 0 || y%x == 0){
            return "True";
        }
        else
            return "False";
    }
}
```

Server

```
package
Multiples;

import java.rmi.*;
import java.rmi.registry.*;

public class MyServer{
    public static void main(String args[]){
        try{
            Modder stub=new ModderRemote();

            // rmiregistry within the server JVM with
            // port number 1900
            LocateRegistry.createRegistry(1900);
        }
    }
}
```

```

        // Binds the remote object by the name
        // sonoo
        Naming.rebind("rmi://localhost:1900" + "/sonoo", stub);
    }catch(Exception e){System.out.println(e);}
    }
}

```

Client

```

package
Multiples;

import java.rmi.*;
import java.util.Scanner;

public class MyClient{
    public static void main(String args[]){
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number of data: ");
        int n = sc.nextInt();
        System.out.println("Enter data separated by space: ");

        for(int i = 0; i < n; i++){
            int k = sc.nextInt();
            int j = sc.nextInt();
            sc.nextLine();
            try{
                Modder stub=(Modder)Naming.lookup("rmi://localhost:1900"
+ "/sonoo");
                System.out.println(stub.modd(k,j));

            }catch(Exception e){}
        }
    }
}

```

Output

The image displays two screenshots of the IntelliJ IDEA IDE, showing the execution of a Java application for socket programming. The project is named "Socket-Programming" and the code is located in the "src" directory.

Top Screenshot (Client Execution):

- The code in `udpBaseClient_2.java` is shown, with the `main` method being executed.
- The console output shows:


```
Enter data length : 1
Enter data to send :
10
12
42
Checksum Calculated is : 29
Data being sent along with Checksum...
```

Bottom Screenshot (Server Execution):

- The code in `udpBaseServer_2.java` is shown, with the `main` method being executed.
- The console output shows:


```
Client:-4
Data received (along with checksum) is
Client : 10
Client : 12
Client : 42
Sum (in ones complement) is : 31
Calculated Checksum is : 0
Success!
```

Servlet Programming

XML

```
<?xml
version="1.0"
encoding="UTF-
8"?>
```

```
<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://xmlns.jcp.org/xml/ns/javaee"
xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee
http://xmlns.jcp.org/xml/ns/javaee/web-app_4_0.xsd" id="WebApp_ID"
version="4.0">
  <display-name>Servlet-Programming</display-name>
  <welcome-file-list>
    <welcome-file>index.html</welcome-file>
    <welcome-file>index.htm</welcome-file>
    <welcome-file>index.jsp</welcome-file>
    <welcome-file>default.html</welcome-file>
    <welcome-file>default.htm</welcome-file>
    <welcome-file>default.jsp</welcome-file>
  </welcome-file-list>
  <servlet>
    <servlet-name>HelloForm</servlet-name>
    <servlet-class>HelloForm</servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>HelloForm</servlet-name>
    <url-pattern>/HelloForm</url-pattern>
  </servlet-mapping>
  <servlet>
    <servlet-name>ReadCookies</servlet-name>
    <servlet-class>ReadCookies</servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>ReadCookies</servlet-name>
    <url-pattern>/ReadCookies</url-pattern>
  </servlet-mapping>
  <servlet>
    <servlet-name>DeleteCookies</servlet-name>
    <servlet-class>DeleteCookies</servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>DeleteCookies</servlet-name>
    <url-pattern>/DeleteCookies</url-pattern>
  </servlet-mapping>
```

```
</web-app>
```

Hello.html

```
<html>

  <body>
    <form action = "HelloForm" method = "GET">
      First Name: <input type = "text" name = "first_name">
      <br />
      Last Name: <input type = "text" name = "last_name" />
      <br />
      <input type = "radio" name = "campus" value = "Chennai" checked/>
Chennai Campus
      <br />
      <input type = "radio" name = "campus" value = "Vellore" /> Vellore
Campus
      <br />
      <input type = "submit" value = "Submit" />
    </form>
  </body>
</html>
```

HelloForm.java

```
// Import
required
java
libraries

import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

// Extend HttpServlet class
public class HelloForm extends HttpServlet {

    /**
     *
     */
    private static final long serialVersionUID = 1130507799293250862L;

    public void doGet(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {

        // Create cookies for first and last names.
        Cookie firstName = new Cookie("first_name",
request.getParameter("first_name"));
```

```

        Cookie lastName = new Cookie("last_name",
request.getParameter("last_name"));
        Cookie campus = new Cookie("campus", request.getParameter("campus"));

// Set expiry date after 24 Hrs for both the cookies.
firstName.setMaxAge(60*60*24);
lastName.setMaxAge(60*60*24);
campus.setMaxAge(60*60*24);

// Add both the cookies in the response header.
response.addCookie( firstName );
response.addCookie( lastName );
response.addCookie( campus );

// Set response content type
response.setContentType("text/html");

PrintWriter out = response.getWriter();
String title = "Setting Cookies Example";
String docType =
    "<!doctype html public \"-//w3c//dtd html 4.0 \" +
    \"transitional//en\">\n";

out.println(docType +
    "<html>\n" +
    "<head><title>" + title + "</title></head>\n" +
    "<body bgcolor = \"#f0f0f0\">\n" +
    "<h1 align = \"center\">" + title + "</h1>\n" +
    "<ul>\n" +
    "    <li><b>First Name</b>: "
    + request.getParameter("first_name") + "\n" +
    "    <li><b>Last Name</b>: "
    + request.getParameter("last_name") + "\n" +
    "    <li><b>Campus</b>: "
    + request.getParameter("campus") + "\n" +
    "</ul>\n" +
    "<a href=\"http://localhost:8080/Servlet-
Programming/ReadCookies\">
    + "<button type=\"button\">Read Cookies</button></a>" +
    "</body></html>"
    );
}
}

```

ReadCookies

```
// Import
required
java
libraries

import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

// Extend HttpServlet class
public class ReadCookies extends HttpServlet {

    /**
     *
     */
    private static final long serialVersionUID = 1L;

    public void doGet(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {

        Cookie cookie = null;
        Cookie[] cookies = null;

        // Get an array of Cookies associated with this domain
        cookies = request.getCookies();

        // Set response content type
        response.setContentType("text/html");

        PrintWriter out = response.getWriter();
        String title = "Reading Cookies Example";
        String docType =
            "<!doctype html public \"-//w3c//dtd html 4.0 \" +
            \"transitional//en\">\n";

        out.println(docType +
            "<html>\n" +
            "<head><title>" + title + "</title></head>\n" +
            "<body bgcolor = \"#f0f0f0\">\n" );

        if( cookies != null ) {
            out.println("<h2> Found Cookies Name and Value</h2>");

            for (int i = 0; i < cookies.length; i++) {
                cookie = cookies[i];
                out.print("Name : " + cookie.getName( ) + ", ");
            }
        }
    }
}
```

```

        out.print("Value: " + cookie.getValue() + " <br/>");
    }
} else {
    out.println("<h2>No cookies founds</h2>");
}
if( cookies != null ) {
    for (int i = cookies.length-1; i >= 0; i--) {
        cookie = cookies[i];
        if(cookie.getName().contains("first_name")) {
            out.print("Welcome " + cookie.getValue() + " from ");
        }
        if(cookie.getName().contains("campus")) {
            out.print(cookie.getValue() + " campus </br>");
        }
    }
}
out.println("<a href=\"http://localhost:8080/Servlet-Programming/DeleteCookies\">"
    + "<button type=\"button\">Delete all cookies</button></a>");
out.println("</body>");
out.println("</html>");
}
}

```

Delete Cookies

```

// Import
required
java
libraries

import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

// Extend HttpServlet class
public class DeleteCookies extends HttpServlet {

    /**
     *
     */
    private static final long serialVersionUID = 1L;

    public void doGet(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {

        Cookie cookie = null;
    }
}

```



```

Cookie[] cookies = null;

// Get an array of Cookies associated with this domain
cookies = request.getCookies();

// Set response content type
response.setContentType("text/html");

PrintWriter out = response.getWriter();
String title = "Delete Cookies Example";
String docType =
    "<!doctype html public \"-//w3c//dtd html 4.0 \" +
    \"transitional//en\">\n";

out.println(docType +
    "<html>\n" +
    "<head><title>" + title + "</title></head>\n" +
    "<body bgcolor = \"#f0f0f0\">\n" );

if( cookies != null ) {
    out.println("<h2> Cookies Name and Value</h2>");

    for (int i = 0; i < cookies.length; i++) {
        cookie = cookies[i];
        cookie.setMaxAge(0);
        response.addCookie(cookie);
        out.print("Deleted cookie : " + cookie.getName( ) + "<br/>");
    }
} else {
    out.println("<h2>No cookies founds</h2>");
}

out.println("<a href=\"http://localhost:8080/Servlet-
Programming/ReadCookies\">
    + "<button type=\"button\">Read cookies</button></a>");
out.println("</body>");
out.println("</html>");
}
}

```

Output

