Lab Manual with Solutions

1. *Write a Java Applications to extract a portion of a character string and print the extracted string.*

```java
import java.util.Scanner;
/*
@Purpose   : Find the substring of a string given the start and end index numbers.
 */
public class ExtractString{
    public static void main(String args[]){
        String string, subString;
        int firstIndex, secondIndex;
        Scanner in = new Scanner(System.in);
        System.out.println("Enter the String : ");
        string = in.next();
        System.out.println("Enter the index 1 : ");
        firstIndex = in.nextInt();
        System.out.println("Enter the index 2 : ");
        secondIndex = in.nextInt();
        subString = string.substring(firstIndex, secondIndex);
        System.out.println("The Substring is : " + subString);
    }
}
```

```
OUTPUT :

Enter the String :
BeautifulDay
Enter the index 1 :
9
Enter the index 2 :
12
The Substring is : Day
```

2. *Write a Java Program to implement the concept of multiple inheritance using Interfaces*

```java
/*
@Purpose     : Implement multiple interface using Interfaces.
 */
class Student{
    int rollNo;
    String name = "Smith Jones";
    void setRollNumber(int rollNumber)
    {
        rollNo = rollNumber;
    }
```

```java
    void printStudentDetails()
    {
        System.out.println("RollNo   :  " + rollNo);
        System.out.println("Name     :  " + name);
    }
}

class StudentTest extends Student{
    int mark1, mark2;
    void setMarks(int firstMark, int secondMark)
    {
        mark1 = firstMark;
        mark2 = secondMark;
    }

    public void printMarks()
    {
        System.out.println("Mark1    :  " + mark1);
        System.out.println("Mark2    :  " + mark2);
    }
}

interface Sports{
    int sportsMark = 75;
    void printSportsMark();
}
class Result extends StudentTest implements Sports{
    int totalMarks;
    public void printSportsMark()
    {
        System.out.println("SportMark=" + sportsMark);
    }
    void displayTotalMarks()
    {
        totalMarks = mark1 + mark2 + sportsMark;
        System.out.println("\tSCORE CARD");
        printStudentDetails();
        printMarks();
        System.out.println("\n\nSports Marks    :" + sportsMark);
        System.out.println("Total Marks     :" + totalMarks);
    }
}

class  ExampleMultipleInheritance{
    public static void main(String args[])
    {
        Result studentObject = new Result();
        studentObject.setRollNumber(1000);
        studentObject.setMarks(75, 100);
        studentObject.displayTotalMarks();
    }
}
```

```
OUTPUT :

 SCORE CARD

 RollNo   :  1000
 Name     :  Smith Jones
 Mark1    :  75
 Mark2    :  100
 Sports Marks   :75


 Total Marks    :250
```

3. **Write a Java Program to create an Exception called payout-of-bounds and throw the exception.**

```java
   import java.io.DataInputStream;
   import java.io.IOException;

 /*
 @Purpose      - This program throws an exception when the payout is out of
 bounds.
  */
 public class ExceptionCheck {

    public static void main(String args[]) throws IOException {
         int payAmount;
         DataInputStream inputAmount = new DataInputStream(System.in);
         System.out.println("\n\nCHECK PAY MODULE");
         System.out.println("* * *");
         System.out.println("\n Enter a Basic Pay Amount   : ");
         payAmount = Integer.parseInt(inputAmount.readLine()); // This
 denotes the deprecated function DataInputStream Class.

 /* A piece of code enclosed within a try - catch block will be handled by
 the Exception Handler */
         try {
              if (payAmount > 1000)
                     throw new PayoutOfBoundException("Basic Pay is Out of
 Bound");
              else
                     System.out.println("\n Given Basic Pay is:" +
 payAmount);
         } catch (Exception exception) {
              System.out.println("Caught:" + exception);
         }
     }
 }

 class PayoutOfBoundException extends IOException {
```

```java
        private static final long serialVersionUID = 1L;
        PayoutOfBoundException(String message) {
            System.out.println("\nOOPS!!!! -----    "+message);
        }
}
```

4. *Write a Java Program to implement the concept of multithreading with the use of any three multiplication tables and assign three different priorities to them.*

```java
import java.lang.Thread;
/*
@Purpose    : The purpose of this program is to implement multithreading
using 3 threads
 */
class FirstThread extends Thread {
    public void run() {
        int firstNumber = 0, secondNumber = 2, result;
        for (firstNumber = 1; firstNumber <= 4; firstNumber++) {
            result = firstNumber * secondNumber;
            System.out.println("From thread FirstThread:" + firstNumber
+ "*"
                    + secondNumber + "=" + result);
        }
        System.out.println("====== \n Exit from FirstThread \n====== \n
");
    }
}

class SecondThread extends Thread {
    public void run() {
        int firstNumber, secondNumber = 3, result;
        for (firstNumber = 1; firstNumber <= 4; firstNumber++) {
            result = firstNumber * secondNumber;
            System.out.println("From thread SecondThread: " +
firstNumber + "*"
                    + secondNumber + "=" + result);
        }
```

```java
        System.out.println("====== \n Exit from SecondThread \n====== \n
");
    }
}

class ThirdThread extends Thread {
    public void run() {
        int firstNumber, secondNumber = 5, result;
        for (firstNumber = 1; firstNumber <= 4; firstNumber++) {
            result = firstNumber * secondNumber;
            System.out.println("From ThirdThread :" + firstNumber + "*"
                        + firstNumber + "=" + result);
        }
        System.out.println("====== \n Exit from ThirdThread \n====== \n
");
    }
}

class ExampleMultiThreading {
    public static void main(String args[]) {
        int tempPriority = 0;
        FirstThread firstThreadObj = new FirstThread();
        SecondThread secondThreadObj = new SecondThread();
        ThirdThread thirdThreadObj = new ThirdThread();
        firstThreadObj.setPriority(Thread.MAX_PRIORITY);
        secondThreadObj
                    .setPriority(firstThreadObj.getPriority() +
tempPriority);
        thirdThreadObj.setPriority(Thread.MIN_PRIORITY);
        secondThreadObj
                    .setPriority(firstThreadObj.getPriority() +
tempPriority);
        thirdThreadObj.setPriority(Thread.MIN_PRIORITY);
        System.out.println("----\nStart thread FirstThread\n----");
        firstThreadObj.start();
        System.out.println("----\nStart thread SecondThread\n----");
        secondThreadObj.start();
        System.out.println("----\nStart thread ThirdThread\n----");
        thirdThreadObj.start();
    }
}
```

```
OUTPUT :

----
Start thread FirstThread
----
----
Start thread SecondThread
----
----
Start thread ThirdThread
----
```

```
From thread FirstThread:1*2=2
From thread FirstThread:2*2=4
From thread FirstThread:3*2=6
From thread SecondThread: 1*3=3
From thread FirstThread:4*2=8
From thread SecondThread: 2*3=6
======
 Exit from FirstThread
======

From thread SecondThread: 3*3=9
From thread SecondThread: 4*3=12
======
 Exit from SecondThread
======

From ThirdThread :1*1=5
From ThirdThread :2*2=10
From ThirdThread :3*3=15
From ThirdThread :4*4=20
======
 Exit from ThirdThread
======
```

5. **Write a Java Program to draw several shapes in the created windows.**

```java
import java.awt.*;
import java.applet.*;
/*
@Purpose     : This applet draws several shapes in the window created.
 */
public class Shapes extends Applet {
   private static final long serialVersionUID = 1L;
   int xPoint[] = { 60, 240, 440, 40 };
   int yPoint[] = { 60, 240, 40, 40 };
   int nPoints = 4;

   public void paint(Graphics g) {
        g.drawPolygon(xPoint, yPoint, nPoints);
        g.drawLine(20, 20, 160, 280);
        g.drawRect(300, 200, 160, 280);
        g.fillRect(200, 200, 80, 40);
        g.fillRoundRect(40, 320, 20, 60, 10, 10);
        g.drawRoundRect(20, 300, 160, 100, 20, 20);
        g.drawOval(550, 400, 100, 40);
   }
}
/*
 * <html> <head> <applet code="shapes",height=400 width=400> </applet>
</head>
```

```
 * </html>
 */
```

OUTPUT:
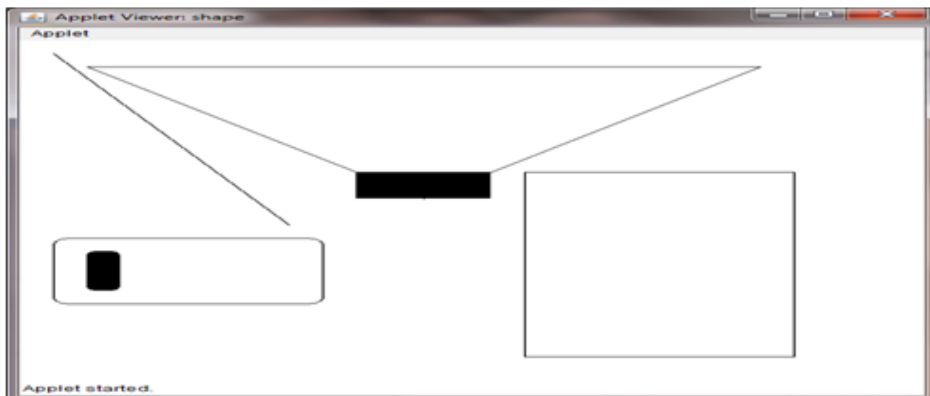
6. *Write a Java Program to create a frame with four text fields name, street, city and pin code with suitable tables. Also add a button called "my details". When the button is clicked its corresponding values are to be appeared in the text fields*

```java
import java.awt.*;
import java.awt.event.*;
/*
@Purpose    : This Java Program creates a frame with four text fields
name, street, city and pin code with suitable tables.   Also add a button
called "my details"
When the button is clicked its corresponding values are to be appeared in
the text fields
*/
public class ButtonClick extends Frame implements ActionListener {
    private static final long serialVersionUID = 1L;
    TextField nameTextField, streetTextField, cityTextField,
placeTextField;
    Label nameLabel, streetLabel, cityLabel, placeLabel;
    Button button1;

    ButtonClick() {
        setLayout(new GridLayout(4, 2));
        nameTextField = new TextField(30);
        streetTextField = new TextField(30);
        cityTextField = new TextField(30);
        placeTextField = new TextField(30);
        nameLabel = new Label("name:", Label.LEFT);
        streetLabel = new Label("street:", Label.LEFT);
        cityLabel = new Label("city:", Label.LEFT);
        placeLabel = new Label("place:", Label.LEFT);
        button1 = new Button("my details");
        add(nameLabel);
        add(nameTextField);
```

```java
            add(streetLabel);
            add(streetTextField);
            add(cityLabel);
            add(cityTextField);
            add(placeLabel);
            add(placeTextField);
            setLayout(new FlowLayout(FlowLayout.CENTER));
            button1.addActionListener(this);
            add(button1);
    }

    public void actionPerformed(ActionEvent actionEventObj) {
        if (actionEventObj.getSource() == button1) {
            nameTextField.setText("Vivek Sabu");
            streetTextField.setText("Nehru Nagar");
            cityTextField.setText("Texas City");
            placeTextField.setText("20");
        }
    }

    public static void main(String arg[]) {
        ButtonClick buttonObj = new ButtonClick();
        buttonObj.setSize(600, 300);
        buttonObj.addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
                System.exit(0);
            }
        });
        buttonObj.show();
    }
}
```
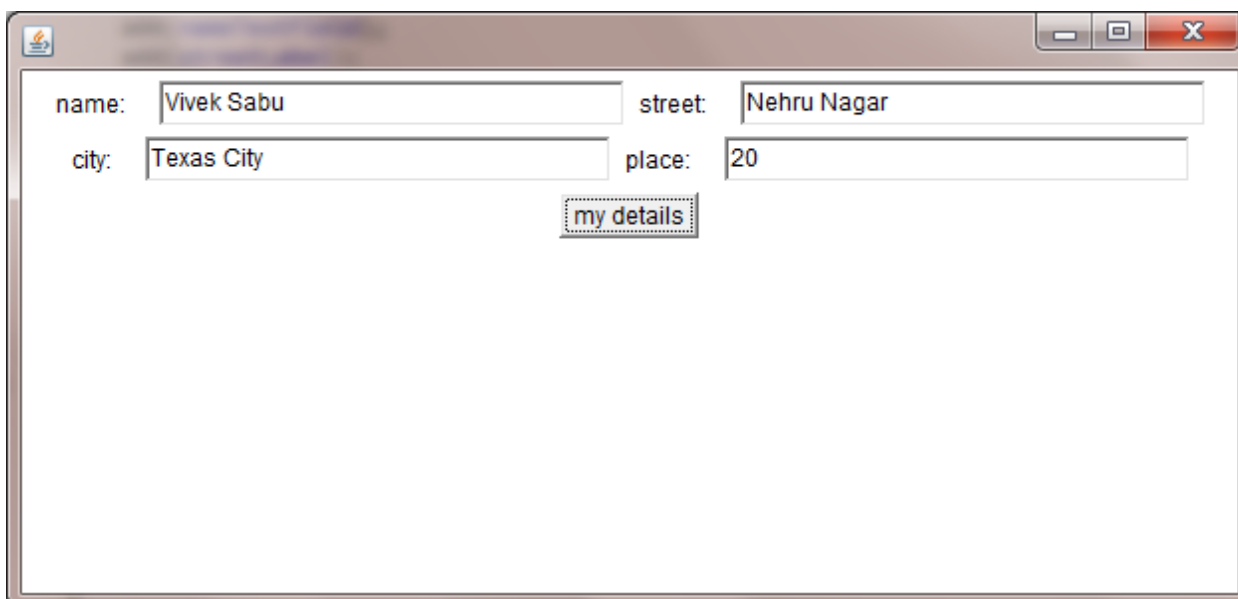
OUTPUT:

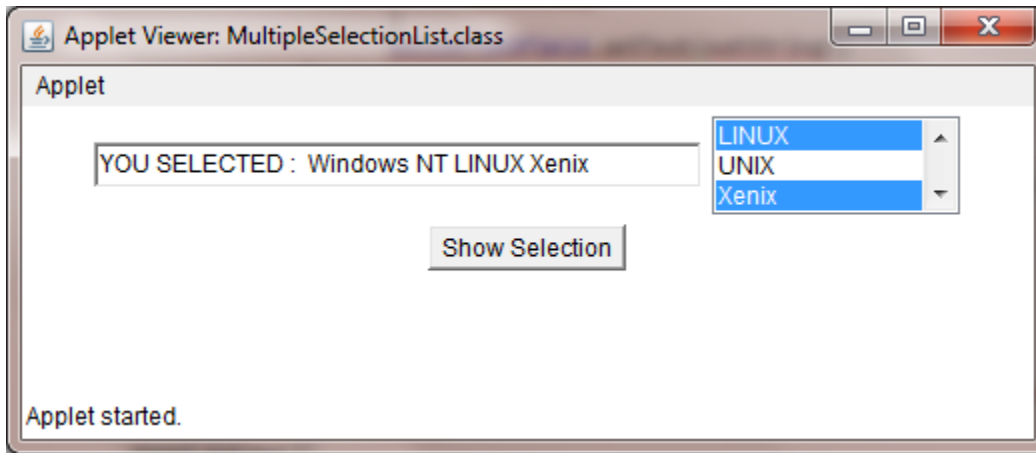7. *Write a Java Program to demonstrate the Multiple Selection List-box.*

```java
import java.applet.Applet;
import java.awt.*;
import java.awt.event.*;
/*
@Purpose      : This Java applet creates multiple selection list box.
*/
public class MultipleSelectionList extends Applet implements
ActionListener {
    private static final long serialVersionUID = 1L;
    List osList;
    TextField osListTextField;
    Button showButton;

    public void init() {
        osListTextField = new TextField(40);
        add(osListTextField);
        osList = new List(3, true);
        osList.add("Windows NT");
        osList.add("Windows Vista");
        osList.add("Windows XP");
        osList.add("LINUX");
        osList.add("UNIX");
        osList.add("Xenix");
        add(osList);
        showButton = new Button("Show Selection");
        showButton.addActionListener(this);
        add(showButton);
    }

    String Selections[];

    public void actionPerformed(ActionEvent e) {
        String outString = new String("YOU SELECTED : ");
        if (e.getSource() == showButton) {
            osListTextField.setText("");
            Selections = osList.getSelectedItems();
            for (int loopIndex = 0; loopIndex < Selections.length;
loopIndex++) {
                outString += " " + Selections[loopIndex];
            }
            osListTextField.setText(outString);
        }
    }
}
/*
 * <html> <applet code = MultipleSelectionList.class width=400 height=400>
 * </applet> </html>
 */
```

OUTPUT:

Applet Viewer: MultipleSelectionList.class

Applet

YOU SELECTED : Windows NT LINUX Xenix

LINUX
UNIX
Xenix

Show Selection

Applet started.

8. *Write a Java Program to create a frame with three text fields for name, age and qualification and a text field for multiple line for address*

```java
import java.awt.*;
import java.awt.event.*;
/*
 @Purpose      : This Program creates a frame with three text fields for
name, age, qualification and a text field for multiple line for address
 */
public class PersonalDetails extends Frame {
    private static final long serialVersionUID = 1L;
    TextField nameText, ageText, qualificationText, addressText;
    Label nameLabel, ageLabel, qualificationLabel, addressLabel;
    TextArea textArea;

    PersonalDetails() {
        setLayout(new GridLayout(4, 2));
        nameText = new TextField(30);
        ageText = new TextField(30);
        qualificationText = new TextField(30);
        addressText=new TextField(40);
        textArea = new TextArea(" ", 2, 5);
        nameLabel = new Label("Name", Label.LEFT);
        ageLabel = new Label("Age", Label.LEFT);
        qualificationLabel = new Label("Qualification", Label.LEFT);
        addressLabel = new Label("Address", Label.LEFT);
        add(nameLabel);
        add(nameText);
        add(ageLabel);
        add(ageText);
        add(qualificationLabel);
        add(qualificationText);
        add(addressLabel);
        add(addressText);
    }

    public static void main(String[] args) {
```
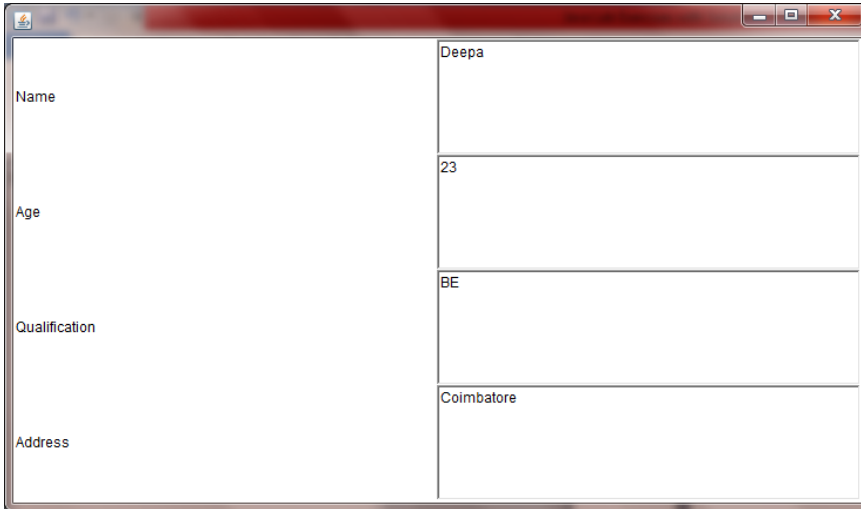
```java
        PersonalDetails personalDetails = new PersonalDetails();
        personalDetails.setSize(300, 250);
        personalDetails.addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
                System.exit(0);
            }
        });
        personalDetails.show();
    }
}
```
OUTPUT:

9. Write a Java Program to create Menu Bars and pull down menus

```java
import java.awt.*;
import java.applet.*;
/*
@Purpose      : This Applet creates a menu bar and sets menu items on the
menu bar.
 */
public class MenuBarApplication extends Applet {
    private static final long serialVersionUID = 1L;

    public void init() {
        /* method initializationOfMenuBar is described. */
        int width = Integer.parseInt(getParameter("width"));
        int height = Integer.parseInt(getParameter("height"));
        Frame frame = new Frame("First Frame"); /** Frame constructor
with String Parameter */
        frame.resize(width, height);
        MenuBar menuBar = new MenuBar();
        frame.setMenuBar(menuBar);
        Menu menuFile = new Menu("File");/* Menu constructor with String
Parameter */
```
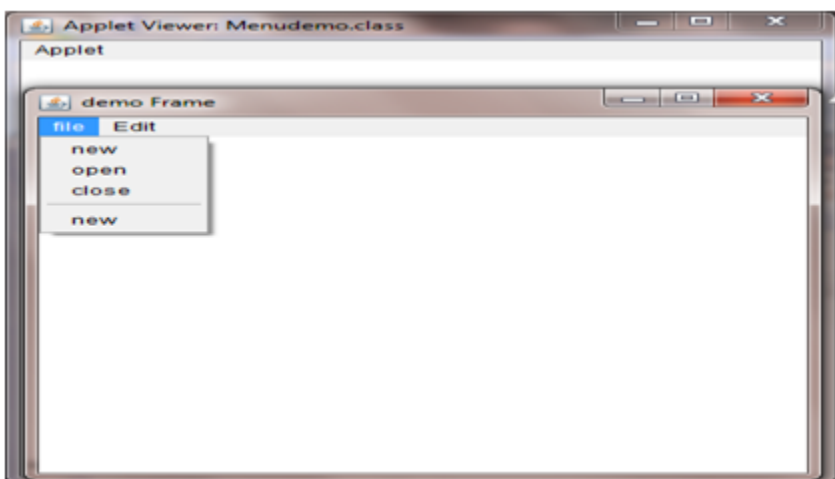
```java
        menuFile.add(new MenuItem("New"));
        menuFile.add(new MenuItem("Open"));
        menuFile.add(new MenuItem("Close")); /* File operation on Menu */
        menuFile.add(new MenuItem("-"));
        menuFile.add(new MenuItem("new"));
        menuBar.add(menuFile);
        Menu menuEdit = new Menu("Edit");/*  Menu constructor with String
Parameter*/
        menuEdit.add(new MenuItem("Cut"));
        menuEdit.add(new MenuItem("Copy")); /* Menu Items to edit */
        menuEdit.add(new MenuItem("paste"));
        menuEdit.add(new MenuItem("-"));
        Menu menu = new Menu("Special");/* Menu constructor with String
Parameter */
        menu.add(new MenuItem("First"));
        menu.add(new MenuItem("Second")); /* Add Menu Items */
        menu.add(new MenuItem("Third"));
        menuEdit.add(menu);
        menuEdit.add(new CheckboxMenuItem("Debug"));
        menuEdit.add(new CheckboxMenuItem("Testing"));
        menuBar.add(menuEdit);
        frame.show();
    }
}
<html>
<head>
<applet code="Menudemo.class" width=400 height=400>
</applet>
</head>
</html>
```

OUTPUT:

10. *Write a Java Program to create frames which respond to the mouse clicks. For each events with mouse such as*

mouse up, mouse down, etc., the corresponding message to be displayed.

```java
import java.applet.*;
import java.awt.*;
import java.awt.event.*;
/*
@Purpose    : This Java Applet tracks the Mouse Events and displays
appropriate messages .
 */
public class MouseEventTracking extends Applet implements MouseListener,
        MouseMotionListener {
    private static final long serialVersionUID = 1L;
    String msg = " ";
    int msgheight, msgwidth, mousex = 0, mousey = 0;

    public void init() {
        addMouseListener(this);
        addMouseMotionListener(this);
    }

    public void mousePressed(MouseEvent me) {
        msgheight = 50;
        msgwidth = 100;
        msg = "Mouse Pressed";
        repaint();
    }

    public void mouseClicked(MouseEvent me) {
        msgheight = 50;
        msgwidth = 100;
        msg = "You CLICKED your Mouse";
        repaint();
    }

    public void mouseExited(MouseEvent me) {
        msgheight = 50;
        msgwidth = 100;
        msg = "Oops! You have EXITED";
        repaint();
    }

    public void mouseReleased(MouseEvent me) {
        msgheight = 50;
        msgwidth = 100;
        msg = "Mouse is RELEASED :)";
        repaint();
    }

    public void mouseEntered(MouseEvent me) {
        msgheight = 50;
        msgwidth = 100;
```

```java
            msg = "Mouse ENTERING the frame!!!";
            repaint();
    }

    public void mouseDragged(MouseEvent me) {
            msg = "";
            showStatus("DRAGGING at" + me.getX() + "," + me.getY());
            repaint();
    }

    public void mouseMoved(MouseEvent me) {
            showStatus("MOVED at" + me.getX() + "," + me.getY());
            repaint();
    }

    public void paint(Graphics g) {
            g.drawString(msg, msgheight, msgwidth);
    }
}
<html>
<head>
<applet code="MouseEvents", width=400 height=400>
</applet>
</head>
</html>
```
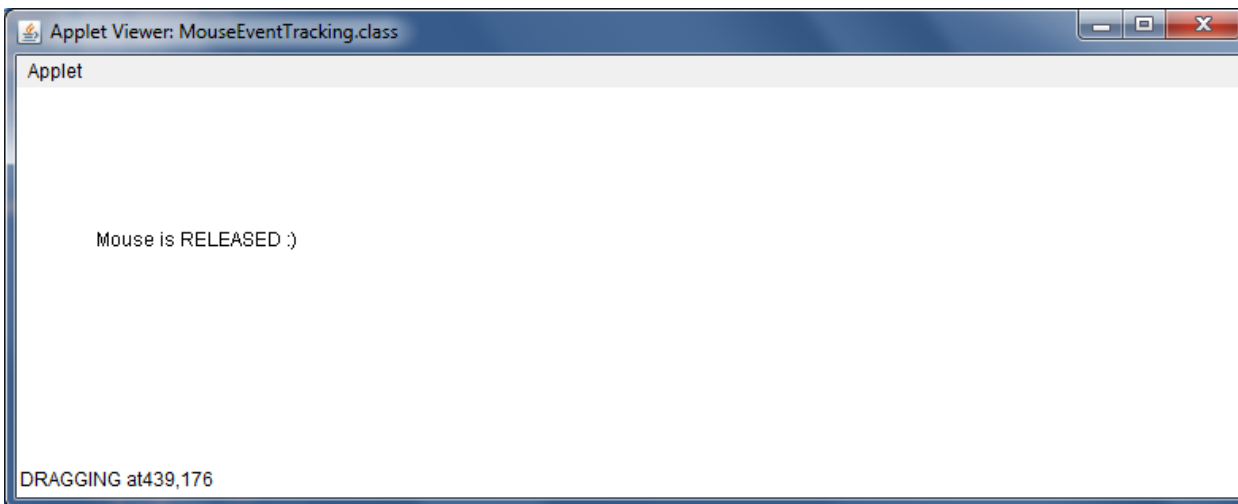
OUTPUT:

11. *Write a Java Program to draw circle, square, ellipse and rectangle at the mouse click positions.*

```java
import java.applet.*;
import java.awt.*;
import java.awt.event.*;
/*
@Purpose    : This Applet draws a shape on the screen.
  */
```
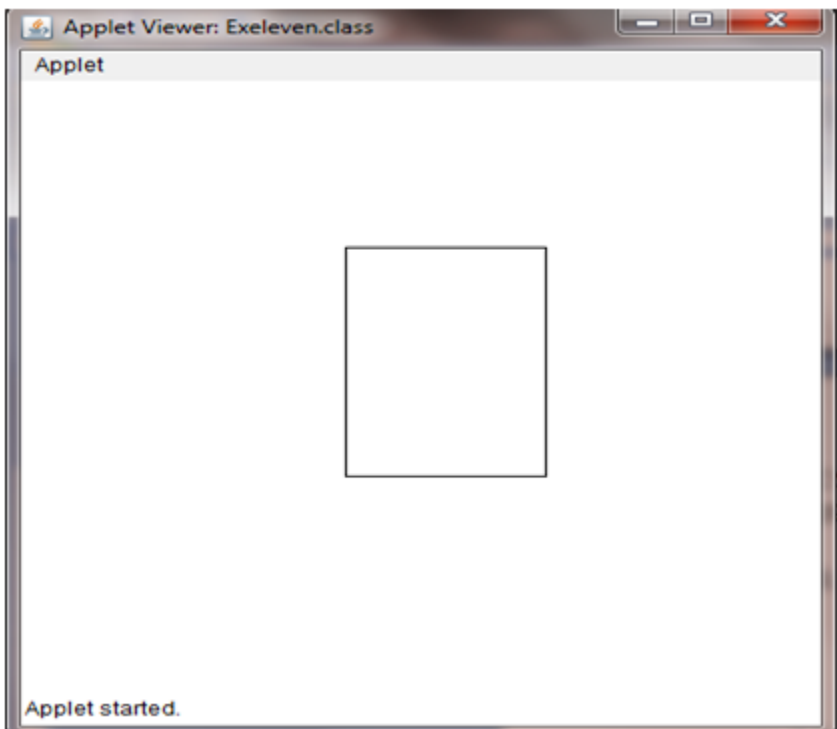
```java
public class MouseClick extends Applet {
    private static final long serialVersionUID = 1L;
    int length = 0, width = 0, count = 0;

    public void init() {
        addMouseListener(new MouseAdapter() {
            public void mousePressed(MouseEvent event) {
                count++;
                length = event.getX();
                width = event.getY();
                repaint();
            }
        });
    }

    public void Paint(Graphics g) {
        if (count % 4 == 1)
            g.drawOval(length, width, 150, 150);
        else if (count % 4 == 2)
            g.drawRect(length, width, 150, 150);
        else if (count % 4 == 3)
            g.drawOval(length, width, 100, 150);
        else if (count % 4 == 0)
            g.drawRect(length, width, 100, 150);
    }
}
/*
 * <html> <head> <title>Mouse click</title></head> <body> <applet code =
 * Mouseclick.class width=400 height=400> </applet> </body> </html>
 */
```

OUTPUT:

12. *Write a Java Program which open an existing file and append text to that file.*

```java
import java.io.*;
/*
@Purpose   : This Program opens an existing file and appends text(CHENNAI)
to that file.
 */
public class RandomAccessFileTryOut{
    public static void main(String args[]){
        RandomAccessFile randomFile;
        try
        {
            randomFile = new RandomAccessFile("city.txt", "rw");
            randomFile.seek(randomFile.length());
            randomFile.writeBytes("\nCHENNAI");
            randomFile.close();
        }
        catch (IOException ioe)
        {
            System.out.println(ioe);
        }
    }
}
```

OUTPUT:

CHENNAI