



**LAB MANUAL  
ON  
MOBILE APPLICATION DEVELOPMENT LAB**

**Objective:**

In this lab, a student is expected to design, implement, document and present a mobile client/server system using standard Java and Java 2 Micro Edition (J2ME) platform. Specifically it is required to design and implement a system that consists mainly of a mobile client (MC) and a Proxy Server (PS). MC will be written in J2ME, MIDP 2.0, while PS will be written in standard Java. It is necessary to use a mobile phone emulator to develop and demonstrate the experiments.

It may be necessary to use other components or existing resources (servers) as needed. For instance a database local to PS or a web service available on the Internet that can be invoked by the PS.

**Week - 1: Installation of Java Wireless Toolkit (J2ME)**

- 1) If the Java Development Kit (JDK) is not theory only having the Java Runtime Environment (JRE) installed, install the latest JDK from <http://java.sun.com/javase/downloads/index.jsp>. Current stable release of Java is JDK 6 Update 7 but check the web page in case there are newer non-beta releases available.
- 2) Next, download the Java Wireless Toolkit (formerly called J2ME Wireless Toolkit) from: <http://java.sun.com/products/sjwtoolkit/download.html>.
- 3) Run the installer (for example, for Windows it is: sun\_java\_wireless\_toolkit-2\_5\_2-windows.exe). The installer checks whether a compatible Java environment has been pre-installed. If not, it is necessary to uninstall old versions of Java and perform Step 1 again. Once after successful installation of Java and the tool kit compile this program and run the following program in the toolkit.

Steps to run this program in toolkit:

Start -> All Programs -> Sun Java Tool Kit -> Wireless Tool Kit  
Click New Project – Enter Project Name -> Enter Class Name -> Click on Create Project.  
Choose appropriate API Selection and Configurations.  
Place Java Source file in WTK2.1 / WTK2.2\apps\projectname\src  
Build the Project.  
Run the Project.

```
import javax.microedition.lcdui.*;  
import javax.microedition.midlet.*;
```

```
public class HelloWorld extends MIDlet{  
    private Form form;  
    private Display display;  
  
    public HelloWorld(){  
        super();  
    }  
  
    public void startApp(){  
        form = new Form("Hello World");  
        String msg = "Hello World!!!!!!";  
        form.append(msg);  
        display = Display.getDisplay(this);  
        display.setCurrent(form);  
    }  
}
```

```

}

public void pauseApp(){ }

public void destroyApp(boolean unconditional){
    notifyDestroyed();
}
}

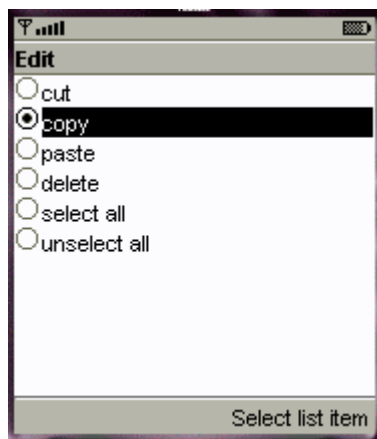
```

## Week - 2 Working with J2ME Features:

**Working with J2ME Features: Say, creating a Hello World program Experiment with the most basic features and mobile application interaction concepts (lists, text boxes, buttons, radio boxes, soft buttons, graphics, etc)**

**Create a program which creates to following kind of menu.**

- \* **cut**
- \* **copy**
- \* **paste**
- \* **delete**
- \* **select all**
- \* **unselect all**



Program:

Source code:

```

import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class MenuCreation extends MIDlet implements CommandListener {
    public ChoiceGroup ch;
    public Form form;
    public Display display;
    public Command command;
    public StringItem st;
    public MenuCreation()
    {
        display=Display.getDisplay(this);

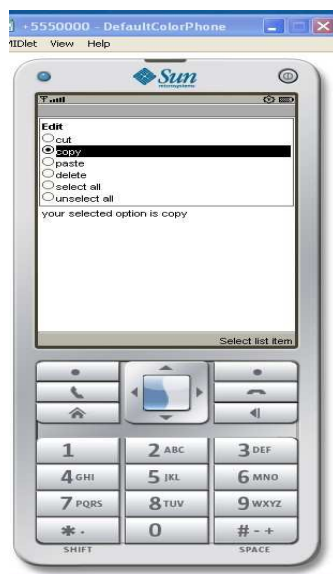
```

```

ch=new ChoiceGroup("Edit",Choice.EXCLUSIVE);
ch.append("cut",null);
ch.append("copy",null);
ch.append("paste",null);
ch.append("delete",null);
ch.append("select all",null);
ch.append("unselect all",null);
ch.setSelectedIndex(1, true);
command=new Command("Select list item",Command.OK,1);
form=new Form("");
form.append(ch);
form.addCommand(command);
form.setCommandListener(this);
st=new StringItem("", "");
}
public void startApp() {
display.setCurrent(form);
}
public void pauseApp() {
}
public void destroyApp(boolean unconditional) {
}
public void commandAction(Command command,Displayable displayable)
{
if(command==command)
{
st.setText("");
st.setText("your selected option is "+ch.getString(ch.getSelectedIndex()));
form.append(st);
}
}
}
}
}

```

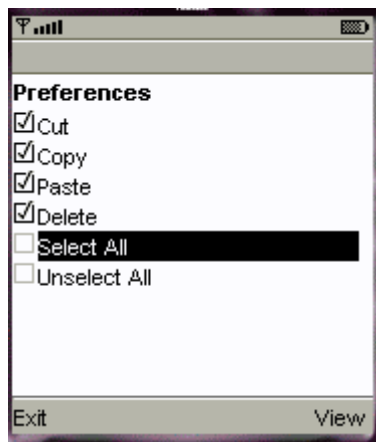
Output:



## Event Handling.

Create a menu which has the following options:

- \* cut - can be on/off
- \* copy - can be on/off
- \* paste - can be on/off
- \* delete - can be on/off
- \* select all - put all 4 options on
- \* unselect all - put all 4 options off



Program:

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class MenuEvents extends MIDlet implements CommandListener,ItemStateListener {
public ChoiceGroup ch;
public ChoiceGroup ch1;
public Form form;
public Form form1;
public Display display;
public Command View;
public Command Exit;
public Command Back;
public StringItem options;
public Item item;
public MenuEvents()
{
display=Display.getDisplay(this);
form=new Form("");
form1=new Form("Selcted Options are");
ch=new ChoiceGroup("Preferences",Choice.MULTIPLE);
ch.append("cut",null);
ch.append("copy",null);
ch.append("paste",null);
ch.append("delete",null);
ch.setSelectedIndex(1, true);
form.append(ch);
ch1=new ChoiceGroup("",Choice.EXCLUSIVE);
```

```

ch1.append("select all",null);
ch1.append("unselect all",null);
ch1.setSelectedIndex(1, true);
form.append(ch1);
View=new Command("View",Command.OK,1);
Exit =new Command("Exit",Command.EXIT,1);
Back=new Command("Back",Command.BACK,1);
form.addCommand(View);
form.addCommand(Exit);
form1.addCommand(Back);
form.setCommandListener(this);
form1.setCommandListener(this);
form.setItemStateListener(this);
}
public void startApp()
{
display.setCurrent(form);
}
public void pauseApp() {
}
public void destroyApp(boolean unconditional) {
}
public void commandAction(Command command,Displayable displayable)
{
if(displayable==form)
{
if(command==View)
{
boolean opt[]=new boolean[ch.size()];
options=new StringItem("", "");
String values="";
ch.getSelectedFlags(opt);
options.setText("");
for(int i=0;i<opt.length;i++)< p=""> </opt.length;i++)<>
{
if(opt[i])
{
values+=ch.getString(i)+"\n";
}
}
options.setText(values);
form1.append(options);
display.setCurrent(form1);
}
else if(command==Exit)
{
destroyApp(true);
notifyDestroyed();
}
}
}

```

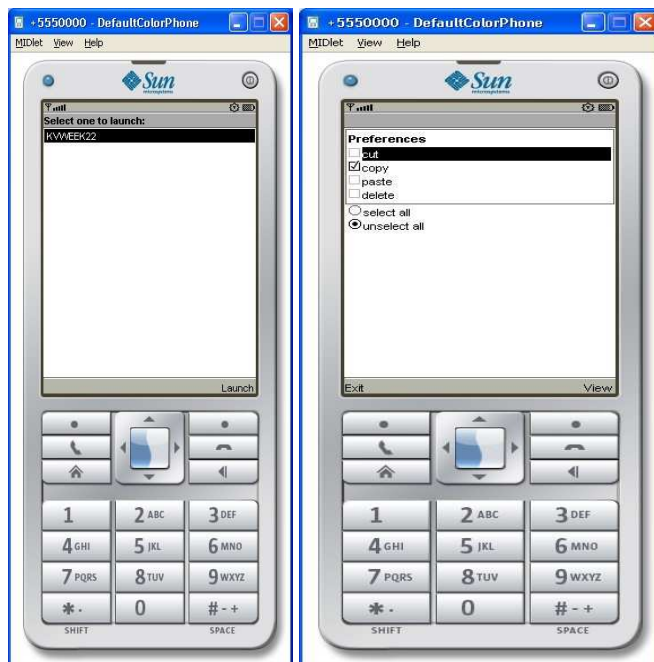
```

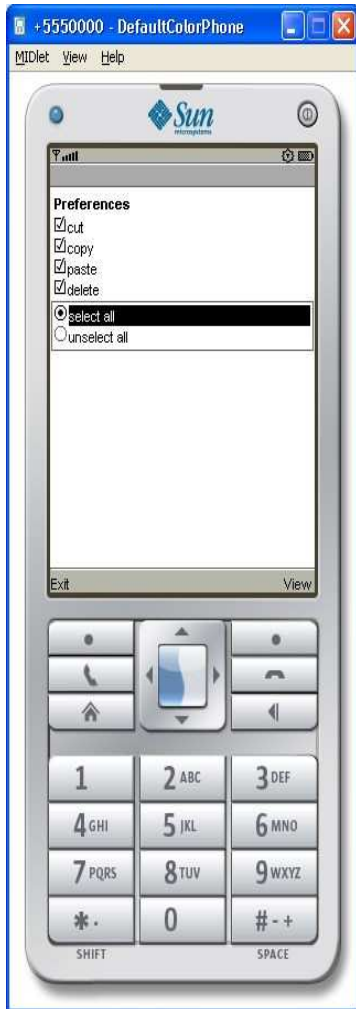
lse if(displayable==form1)
{
if(command==Back)
{
display.setCurrent(form);
options.setText("");
}
}
}

public void itemStateChanged(Item item)
{
if(item==ch1)
{
int i=0;
int size=ch.size();
while(i<size)< p=""> </size><>
{
if(ch1.getSelectedIndex()==0)
ch.setSelectedIndex(i, true);
else
ch.setSelectedIndex(i, false);
i++;
}
}
}
}
}
}

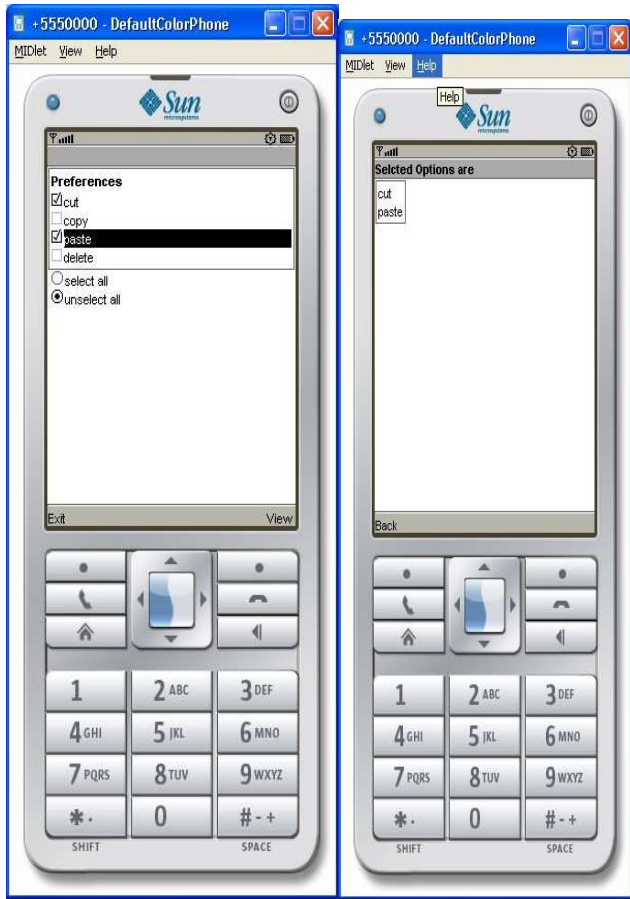
```

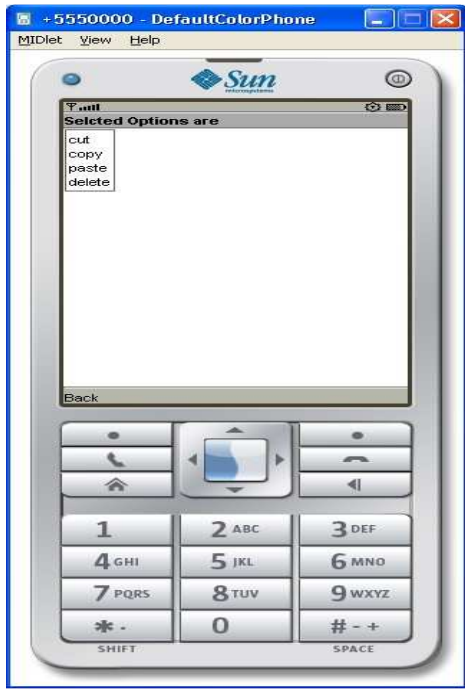
Output:

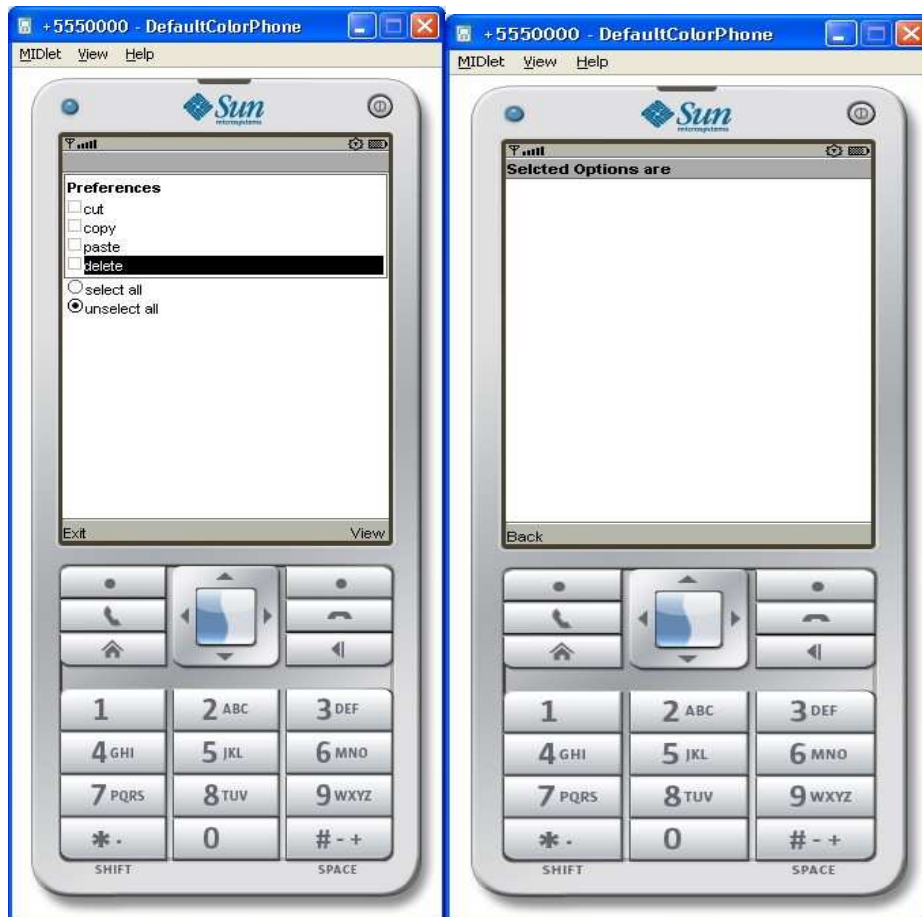












### 2.3. Input checking

Create an MIDP application which examine, that a phone number, which a user has entered is in the given format.

\* Area code should be one of the following: 040, 041, 050, 0400, 044

\* There should 6-8 numbers in telephone number (+ area code)



Program:

```
import javax.microedition.midlet.*;
```

```
import javax.microedition.lcdui.*;
```

```

public class InputChecking extends MIDlet implements CommandListener {

    public Form form1;
    public TextField textfield1;
    public Command exitCommand;
    public Command okCommand;
    public StringItem st;
    public Display display;

    public InputChecking()
    {

        display=Display.getDisplay(this);
        form1=new Form("Insert the Phone number");
        exitCommand=new Command("Exit",Command.EXIT,1);
        okCommand=new Command("Ok",Command.OK,1);
        st=new StringItem("Phone Number is ","");
        textfield1=new TextField("Phone;","",30,TextField.ANY);
        form1.append(textfield1);
        form1.addCommand(okCommand);
        form1.addCommand(exitCommand);
        form1.setCommandListener(this);

    }
    public void startApp() {
        display.setCurrent(form1);
    }

    public void pauseApp() {
    }

    public void destroyApp(boolean unconditional) {
    }

    public void commandAction(Command cmd,Displayable displayable)
    {
        if(cmd==exitCommand)
            notifyDestroyed();
        else if(cmd==okCommand)
        {

            String s=textfield1.getString();
            s=s.replace(' ','');

            int len=s.length();
            int i=0;
            int c=0;

            String s1="";

```

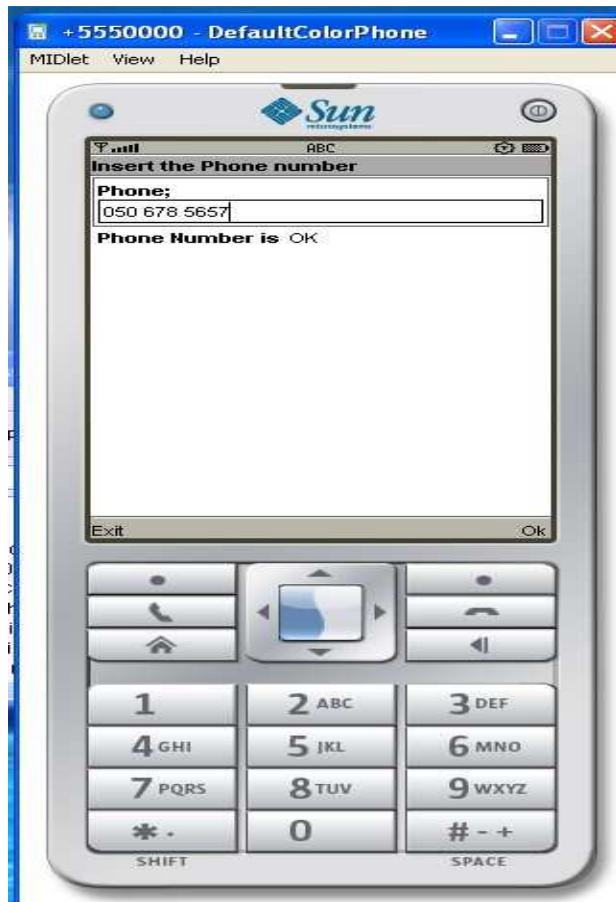
```

while(i<len)      {
    if(s.charAt(i)=='.')
    {
        if(c==0)
        {
            if(s1.equals("040") || s1.equals("041") || s1.equals("050") || s1.equals("0400") ||
s1.equals("044"))
            {
                c++;
                s1="";
            }
        }
        if(c==1)
        {
            if(s1.length()-1==3)
            {
                c++;
                s1="";
            }
        }
        s1=s1+s.charAt(i);
        i++;
    }

    if(s1.length()-1==3 || s1.length()-1==4 || s1.length()-1==5)
        c++;
    if(c==3)
        st.setText("OK");
    else
    {
        st.setText("wrong\n Phone Number Format is xxx xxx xxxx\nArea code must be
040|050|041|0400|044");
    }
    form1.append(st);
} }
}

```

Output:



### High-level UI

Create a MIDP application, which show to the user 5-10 quiz questions. All questions have 4 possible options and one right option exactly. Application counts and shows to the user how many right answers were right and shows them to user.



```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
import javax.microedition.rms.*;
import java.io.*;
public class Quiz extends MIDlet implements CommandListener {
public Form form1;
public Form form2;
public Form form3;
public Form form4;
public Form form5;
public Form form6;
public Form form7;
public ChoiceGroup ch1;
public ChoiceGroup ch2;
public ChoiceGroup ch3;
public ChoiceGroup ch4;
public ChoiceGroup ch5;
public Command nextCommand;
```

```

public Command backCommand;
public Command MenuCommand;
public Command OkCommand;
public Command ExitCommand;
public Command sCommand;
public Display display;
public StringItem st;
public TextField textfield;
public int count;
public RecordStore recordstore=null;
public RecordEnumeration re=null;
public Alert alert;
public StringItem st1;
public Quiz()
{
count=0;
display=Display.getDisplay(this);
nextCommand=new Command("Next",Command.OK,1);
backCommand=new Command("Back",Command.BACK,1);
st1=new StringItem("", "");
textfield=new TextField("EnterName", "",20,TextField.ANY);
form1=new Form("J2ME Stands for");
form2=new Form("a+b=");
form3=new Form("5*5");
form4=new Form("Who is AP CM");
form5=new Form("How many Districts in AP");
form6=new Form("Score");
ch1=new ChoiceGroup("",Choice.EXCLUSIVE);
ch1.append("Java 2 Mobile Edition", null);
ch1.append("Java 2 Macro Edition", null);
ch1.append("Java 2 Micro Edition", null);
ch1.append("Java 2 Music Edition", null);
form1.append(ch1);
form1.addCommand(nextCommand);
form1.setCommandListener(this);
ch2=new ChoiceGroup("",Choice.EXCLUSIVE);
ch2.append("b+a", null);
ch2.append("b*a", null);
ch2.append("b/a", null);
ch2.append("b-a", null);
form2.append(ch2);
form2.addCommand(nextCommand);
form2.addCommand(backCommand);
form2.setCommandListener(this);
ch3=new ChoiceGroup("",Choice.EXCLUSIVE);
ch3.append("20", null);
ch3.append("30", null);
ch3.append("10", null);
ch3.append("25", null);
form3.append(ch3);

```



```

form3.addCommand(nextCommand);
form3.addCommand(backCommand);
form3.setCommandListener(this);
ch4=new ChoiceGroup("",Choice.EXCLUSIVE);
ch4.append("Rosiah", null);
ch4.append("Jagan", null);
ch4.append("ChandaBabu", null);
ch4.append("Kiran", null);
form4.append(ch4);
form4.addCommand(nextCommand);
form4.addCommand(backCommand);
form4.setCommandListener(this);
ch5=new ChoiceGroup("",Choice.EXCLUSIVE);
ch5.append("8", null);
ch5.append("4", null);
ch5.append("11", null);
ch5.append("23", null);
form5.append(ch5);
form5.addCommand(backCommand);
form5.addCommand(nextCommand);
form5.setCommandListener(this);
form6.addCommand(ExitCommand);
}
public void startApp() {
display.setCurrent(form1);
}
public void pauseApp() {
}
public void destroyApp(boolean unconditional) {
}
public void commandAction(Command cmd,Displayable displayable)
{
if(displayable==form1)
{
if(cmd==nextCommand)
display.setCurrent(form2);
}
else if(displayable==form2)
{
if(cmd==nextCommand)
display.setCurrent(form3);
else if(cmd==backCommand)
display.setCurrent(form1);
}
else if(displayable==form3)
{
if(cmd==nextCommand)
display.setCurrent(form4);
else if(cmd==backCommand)
display.setCurrent(form2);
}
}
}

```

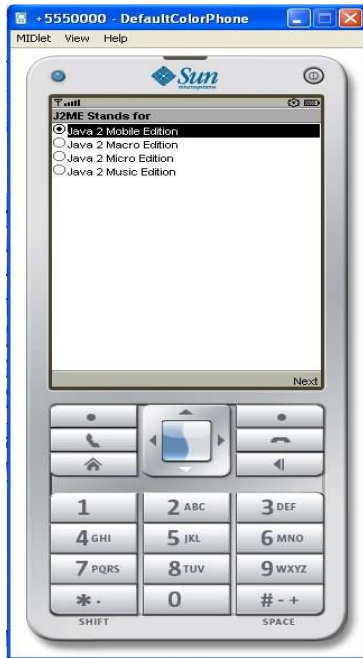
```

}
else if(displayable==form4)
{
if(cmd==nextCommand)
display.setCurrent(form5);
else if(cmd==backCommand)
display.setCurrent(form3);
}
else if(displayable==form5)
{
if(cmd==nextCommand)
{
if(ch1.getSelectedIndex()==2)
count++;
if(ch2.getSelectedIndex()==0)
count++;
if(ch3.getSelectedIndex()==3)
count++;
if(ch4.getSelectedIndex()==3)
count++;
if(ch5.getSelectedIndex()==3)
count++;
st.setText(String.valueOf(count));
form6.append(st);
form6.append(textfield);
display.setCurrent(form6);
}
}
}
}
}

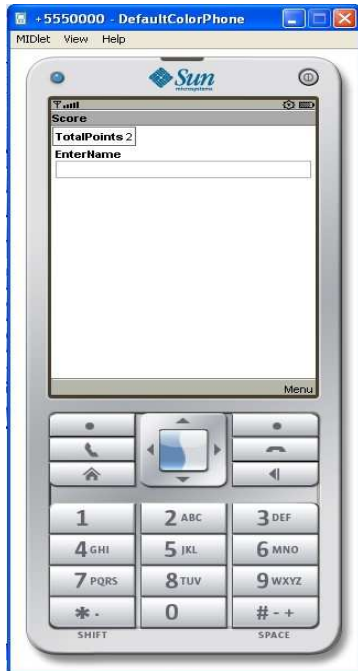
```

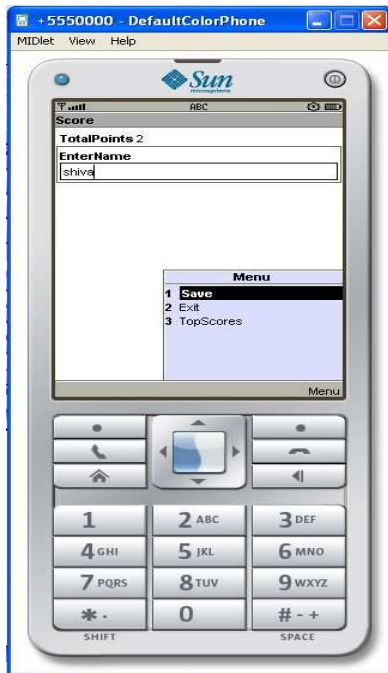
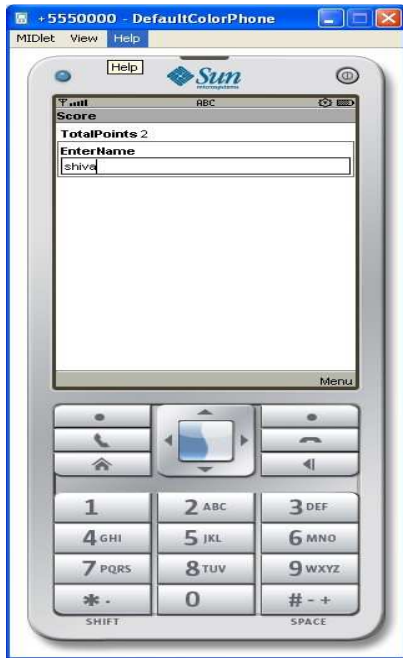
Output:

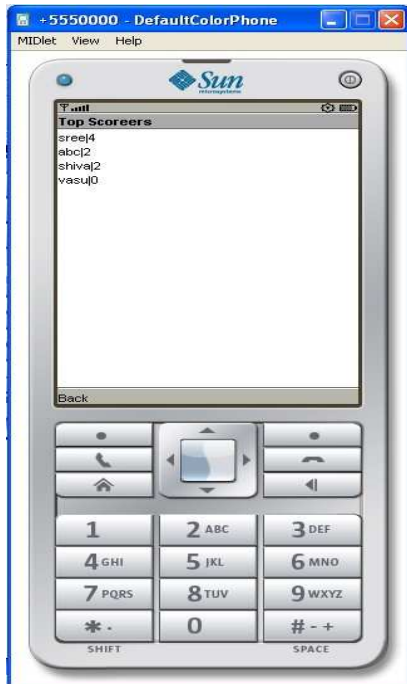












**Create a MIDP application, where the user can enter player name and points. The program saves the information to the record using RMS at MIDP device. Program should also print out the top 10 player list to the end user. You can use this class in your game if you made own class for saving and reading record sets.**



```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
import javax.microedition.rms.*;
import java.io.*;
```

```
public class QuizMidlet extends MIDlet implements CommandListener {
```

```
    public Form form1;
    public Form form2;
    public Form form3;
    public Form form4;
    public Form form5;
    public Form form6;
    public Form form7;
    public ChoiceGroup ch1;
    public ChoiceGroup ch2;
    public ChoiceGroup ch3;;
    public ChoiceGroup ch4;;
    public ChoiceGroup ch5;;
    public Command nextCommand;
    public Command backCommand;
    public Command MenuCommand;
    public Command OkCommand;
    public Command ExitCommand;
    public Command sCommand;
    public Display display;
    public StringItem st;
    public TextField textfield;
```



```

public int count;
public RecordStore recordstore=null;
public RecordEnumeration re=null;
public Alert alert;
public Compare comp;
public StringItem st1;
public QuizMidlet()
{
    count=0;
    display=Display.getDisplay(this);
    nextCommand=new Command("Next",Command.OK,1);
    backCommand=new Command("Back",Command.BACK,1);
    OkCommand=new Command("Save",Command.SCREEN,1);
    ExitCommand=new Command("Exit",Command.SCREEN,1);
    sCommand=new Command("TopScores",Command.SCREEN,1);
    st=new StringItem("TotalPoints","0");
    st1=new StringItem("", "");
    textfield=new TextField("EnterName","",20,TextField.ANY);
    form1=new Form("J2ME Stands for");
    form2=new Form("a+b=");
    form3=new Form("5*5");
    form4=new Form("Who is AP CM");
    form5=new Form("How many Districts in AP");
    form6=new Form("Score");
    form7=new Form("Top Scoreers");
    ch1=new ChoiceGroup("",Choice.EXCLUSIVE);
    ch1.append("Java 2 Mobile Edition", null);
    ch1.append("Java 2 Macro Edition", null);
    ch1.append("Java 2 Micro Edition", null);
    ch1.append("Java 2 Music Edition", null);
    form1.append(ch1);
    form1.addCommand(nextCommand);
    form1.setCommandListener(this);

    ch2=new ChoiceGroup("",Choice.EXCLUSIVE);
    ch2.append("b+a", null);
    ch2.append("b*a", null);
    ch2.append("b/a", null);
    ch2.append("b-a", null);
    form2.append(ch2);
    form2.addCommand(nextCommand);
    form2.addCommand(backCommand);
    form2.setCommandListener(this);

    ch3=new ChoiceGroup("",Choice.EXCLUSIVE);
    ch3.append("20", null);
    ch3.append("30", null);
    ch3.append("10", null);
    ch3.append("25", null);

```

```

form3.append(ch3);
form3.addCommand(nextCommand);
form3.addCommand(backCommand);
form3.setCommandListener(this);
ch4=new ChoiceGroup("",Choice.EXCLUSIVE);
ch4.append("Rosiah", null);
ch4.append("Jagan", null);
ch4.append("ChandaBabu", null);
ch4.append("Kiran", null);
form4.append(ch4);
form4.addCommand(nextCommand);
form4.addCommand(backCommand);
form4.setCommandListener(this);
ch5=new ChoiceGroup("",Choice.EXCLUSIVE);
ch5.append("8", null);
ch5.append("4", null);
ch5.append("11", null);
ch5.append("23", null);
form5.append(ch5);
form5.addCommand(backCommand);
form5.addCommand(nextCommand);
form5.setCommandListener(this);
form6.addCommand(OkCommand);
form6.addCommand(ExitCommand);
    form6.addCommand(sCommand);
form6.setCommandListener(this);
form7.addCommand(backCommand);
form7.setCommandListener(this);
try
{
recordstore=RecordStore.openRecordStore("Quiz", true);
}
catch(Exception ex)
{
}
}
public void startApp() {
    display.setCurrent(form1);
}

public void pauseApp() {
}

public void destroyApp(boolean unconditional) {
}
public void commandAction(Command cmd,Displayable displayable)
{

    if(displayable==form1)
    {

```

```

        if(cmd==nextCommand)
            display.setCurrent(form2);
    }
else if(displayable==form2)
    {

        if(cmd==nextCommand)
            display.setCurrent(form3);
        else if(cmd==backCommand)
            display.setCurrent(form1);
    }
    else if(displayable==form3)
        {
        if(cmd==nextCommand)
            display.setCurrent(form4);
        else if(cmd==backCommand)
            display.setCurrent(form2);
        }
    else if(displayable==form4)
        {
        if(cmd==nextCommand)
            display.setCurrent(form5);
        else if(cmd==backCommand)
            display.setCurrent(form3);
        }
    else if(displayable==form5)
        {
        if(cmd==nextCommand)
        {

            if(ch1.getSelectedIndex()==2)
                count++;
            if(ch2.getSelectedIndex()==0)
                count++;
            if(ch3.getSelectedIndex()==3)
                count++;
            if(ch4.getSelectedIndex()==3)
                count++;
            if(ch5.getSelectedIndex()==3)
                count++;

            st.setText(String.valueOf(count));

            form6.append(st);
            form6.append(textfield);
            display.setCurrent(form6);
        }
    else if(cmd==backCommand)
        display.setCurrent(form4);

```

```

}
else if(displayable==form6)
{

if(cmd==OkCommand)
{
try
{

String Pname=textfield.getString();
int Points=Integer.parseInt(st.getText());
byte[] bytes;
ByteArrayOutputStream ostream=new ByteArrayOutputStream();
DataOutputStream dstream =new DataOutputStream(ostream);
dstream.writeUTF(Pname);
dstream.writeInt(Points);
dstream.flush();
bytes=ostream.toByteArray();
recordstore.addRecord(bytes, 0,bytes.length );
ostream.reset();
ostream.close();
dstream.close();
alert =new Alert("Message","Saved",null,AlertType.INFO);
alert.setTimeout(Alert.FOREVER);
display.setCurrent(alert);
}
catch(Exception ex)
{
alert =new Alert("Message",ex.toString(),null,AlertType.INFO);
alert.setTimeout(Alert.FOREVER);
display.setCurrent(alert);
}
}
else if(cmd==ExitCommand)
{
try
{
recordstore.closeRecordStore();
notifyDestroyed();
}
catch(Exception ex)
{
}
}
else if(cmd==sCommand)
{
try
{
byte[] bytes=new byte[300];
ByteArrayInputStream bstream=new ByteArrayInputStream(bytes);

```

```

        DataInputStream dstream=new DataInputStream(bstream);
        StringBuffer sb=new StringBuffer();
        comp=new Compare();
        re=recordstore.enumerateRecords(null, comp,false);
st1.setText("");
        while(re.hasNextElement())
        {
            recordstore.getRecord(re.nextRecordId(), bytes, 0);
            sb.append(dstream.readUTF()+"|"+dstream.readInt());
            sb.append("\n");
            dstream.reset();
        }
        bstream.close();
        dstream.close();

        st1.setText(sb.toString());
        form7.append(st1);
    }
    catch(Exception ex)
    {
        alert =new Alert("Msg",ex.toString(),null,AlertType.INFO);
        alert.setTimeout(Alert.FOREVER);
        display.setCurrent(alert);
    }

    display.setCurrent(form7);
}

}
else if(displayable==form7)
{
    if(cmd==backCommand)
        display.setCurrent(form6);
} }}

class Compare implements RecordComparator
{
    public byte[] bytedata=new byte[300];
    public ByteArrayInputStream bstream=null;
    public DataInputStream dstream=null;
    public int compare(byte[] r1,byte[] r2)
    {
        int r1int,r2int;
        int or=0;
        try
        {

            int maxlen=Math.max(r1.length, r2.length);

```

```

    if(maxlen>bytedata.length)
    {
        bytedata=new byte[maxlen];
    }
    bstream=new ByteArrayInputStream(r1);
    dstream=new DataInputStream(bstream);
    dstream.readUTF();
    r1int=dstream.readInt();
    bstream=new ByteArrayInputStream(r2);
    dstream=new DataInputStream(bstream);
    dstream.readUTF();
    r2int=dstream.readInt();
    if(r1int==r2int)
    {
        or= RecordComparator.EQUIVALENT;
    }
    else if(r1int>r2int)
    {
        or= RecordComparator.PRECEDES;
    }
    else if(r1int<r2int)
    {
        or= RecordComparator.FOLLOWS;
    }
    return or;
}
catch(Exception ex)
{
    return RecordComparator.EQUIVALENT;
}
}

public void compareClose()
{
    try
    {
        if(bstream!=null)
        {
            bstream.close();
        }
        if(dstream!=null)
        {
            dstream.close();
        }
    }
    catch(Exception ex)
    {
    }
} }

```

}

Output:-



#### Week - 4 Working on Drawing and Images

Create a slide show which has three slides, which includes pictures at PNG format. Program should change to the new slide other 5 seconds.



```

import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class imageSlideShow extends MIDlet implements CommandListener {
public Form slide1;
public Form slide2;
public Form slide3;
public Display display;
public Image image1;
public Image image2;
public Image image3;
public ImageItem imageitem1;
public ImageItem imageitem2;
public ImageItem imageitem3;
public imageSlideShow()
{
display=Display.getDisplay(this);
try
{
image1=Image.createImage("/1.png");
image2=Image.createImage("/2.png");
image3=Image.createImage("/3.png");
imageitem1=new ImageItem(null,image1,ImageItem.LAYOUT_CENTER,"image1");
imageitem2=new ImageItem(null,image2,ImageItem.LAYOUT_CENTER,"image2");
imageitem3=new ImageItem(null,image3,ImageItem.LAYOUT_CENTER,"image3");
}
catch(Exception ex)
{
}
Exit=new Command("Exit",Command.EXIT,1);
slide1=new Form("Slide1");
slide1.append(imageitem1);
slide1.addCommand(Exit);
slide2=new Form("Slide2");
slide2.append(imageitem2);
slide2.addCommand(Exit);
slide3=new Form("Slide3");
slide3.append(imageitem3);
slide3.addCommand(Exit);
slide1.setCommandListener(this);
slide2.setCommandListener(this);
slide3.setCommandListener(this);
}
public void startApp() {
Thread runner = new Thread(new ThreadRunner(display,slide1,slide2,slide3));
runner.start();
}
public void pauseApp() {
}
public void destroyApp(boolean unconditional) {

```



```

public void commandAction(Command command,Displayable displayable)
{
if(displayable==slide1)
{
if(command==Exit)
notifyDestroyed();
}
else if(displayable==slide2)
{
if(command==Exit)
notifyDestroyed();
}
else if(displayable==slide3)
{
if(command==Exit)
notifyDestroyed();
}
}
}
}
class ThreadRunner implements Runnable {
Display display;
public int c=0;
public Form slide1;
public Form slide2;
public Form slide3;
public ThreadRunner(Display display,Form slide1,Form slide2,Form slide3) {
this.display = display;
this.slide1=slide1;
this.slide2=slide2;
this.slide3=slide3;
}
public void run() {
while(true)
{
c++;
if(c==1)
display.setCurrent(slide1);
else if(c==2)
display.setCurrent(slide2);
else if(c==3)
display.setCurrent(slide3);
else if(c==4)
c=0;
try
{
Thread.sleep(1500);
}
catch(Exception ex)
{

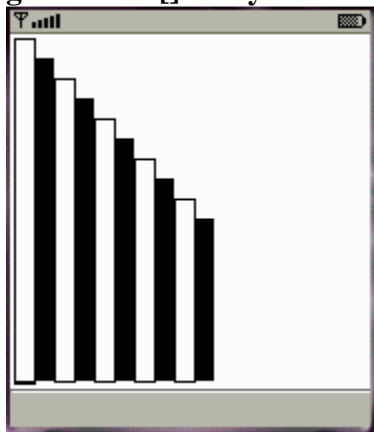
```

}  
}  
}

Output:-



**Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array.**



Source Code:

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class BarGraph extends MIDlet implements CommandListener{
public Form form;
public Command exitCommand;
public Command OkCommand;
public Command backCommand;
public Displayable d;
```

```

public Display display;
public TextField textfield1;
public TextField textfield2;
public TextField textfield3;
public TextField textfield4;
public TextField textfield5;
public BarGraph ()
{
display=Display.getDisplay(this);
form=new Form("BarGraph");
textfield1=new TextField("Value1:-", "",30,TextField.ANY);
textfield2=new TextField("Value2:-", "",30,TextField.ANY);
textfield3=new TextField("Value3:-", "",30,TextField.ANY);
textfield4=new TextField("Value4:-", "",30,TextField.ANY);
textfield5=new TextField("Value5:-", "",30,TextField.ANY);
form.append(textfield1);
form.append(textfield2);
form.append(textfield3);
form.append(textfield4);
form.append(textfield5);
OkCommand=new Command("Ok",Command.OK,1);
exitCommand=new Command("Exit",Command.EXIT,1);
backCommand=new Command("Back",Command.BACK,1);
form.addCommand(OkCommand);
form.addCommand(exitCommand);
form.setCommandListener(this);
}
public void startApp() {
display.setCurrent(form);
}
public void pauseApp() {
}
public void destroyApp(boolean unconditional) {
}
public void commandAction(Command command,Displayable displayable)
{
if(displayable==form)
{
if(command==OkCommand)
{
int[] data=new int[5];
data[0]=Integer.parseInt(textfield1.getString());
data[1]=Integer.parseInt(textfield2.getString());
data[2]=Integer.parseInt(textfield3.getString());
data[3]=Integer.parseInt(textfield4.getString());
data[4]=Integer.parseInt(textfield5.getString());
d=new BarCanvas(data);
d.addCommand(backCommand);
d.setCommandListener(this);
display.setCurrent(d);
}
}
}
}

```

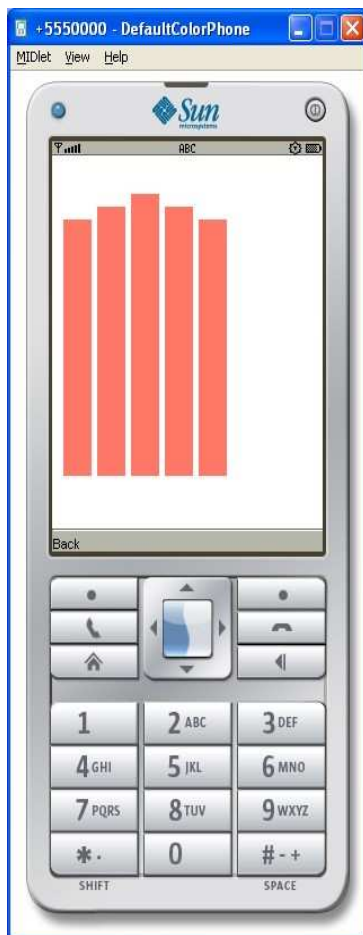
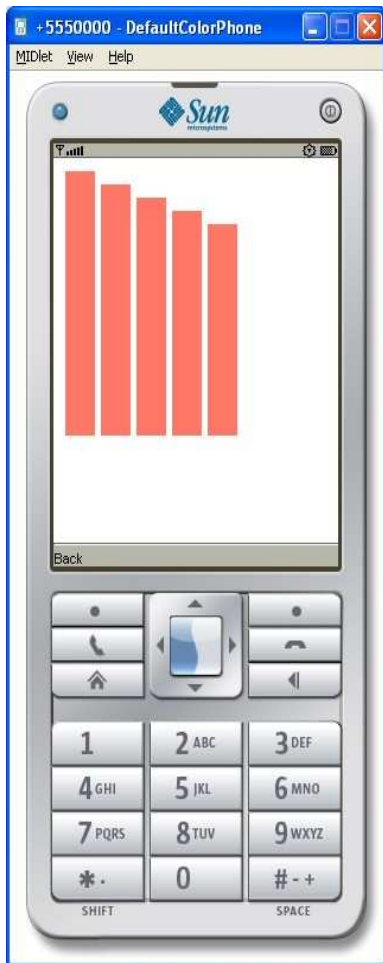
```

}
else if(command==exitCommand)
notifyDestroyed();
}
else if(displayable==d)
{
if(command==backCommand)
display.setCurrent(form);
}
}
}
class BarCanvas extends Canvas{
int[] data;
public int x;
public int y;
public int y1;
public int h;
public BarCanvas(int[] data)
{
this.data=data;
x=10;
}
public void paint(Graphics g)
{
g.setColor(255, 255, 255);
g.fillRect(0, 0, this.getWidth(), this.getHeight());
g.setColor(255, 125, 100);
int i=0;
y1=data[0];
h=200;
while(i<data.length)
{
y=data[i];
h=200+y1-y;
g.fillRect(x, y,25 , h);
x+=30;
i++;
}
}
}
}
}

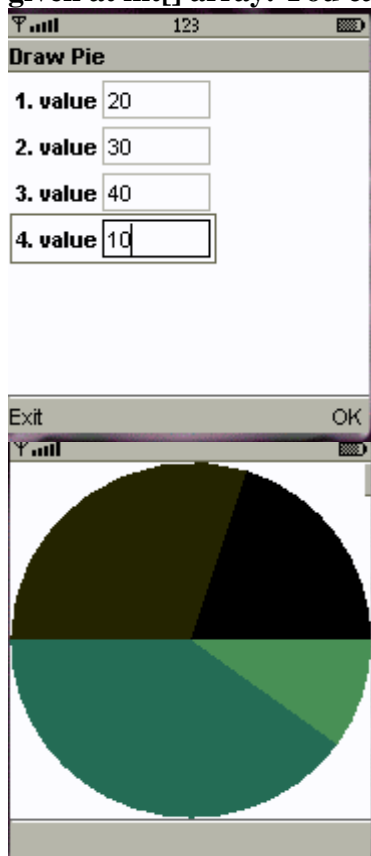
```

Output:





Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.



Program:

```
import javax.microedition.midlet.MIDlet;
import javax.microedition.lcdui.*;
public class PieChart extends MIDlet implements CommandListener {
public Form form;
public Command exitCommand;
public Command OkCommand;
public Display display;
public TextField textfield1;
public TextField textfield2;
public TextField textfield3;
public TextField textfield4;
public TextField textfield5;
public Displayable d;
public void startApp() {
display = Display.getDisplay(this);
form=new Form("Draw Pie");
textfield1=new TextField("Value1:-","",30,TextField.ANY);
textfield2=new TextField("Value2:-","",30,TextField.ANY);
textfield3=new TextField("Value3:-","",30,TextField.ANY);
textfield4=new TextField("Value4:-","",30,TextField.ANY);
textfield5=new TextField("Value5:-","",30,TextField.ANY);
```

```

form.append(textfield1);
form.append(textfield2);
form.append(textfield3);
form.append(textfield4);
form.append(textfield5);
exitCommand = new Command("exit", Command.EXIT, 1);
OkCommand=new Command("Ok",Command.OK,1);
form.addCommand(OkCommand);
form.addCommand(exitCommand);
form.setCommandListener(this);
display.setCurrent(form);
}
public void pauseApp() {
}
public void destroyApp(boolean unconditional) {
}
public void commandAction(Command c, Displayable s) {
if(s==form)
{
if(c==exitCommand)
notifyDestroyed();
else if(c==OkCommand)
{
int[] data = new int[5];
data[0]=Integer.parseInt(textfield1.getString());
data[1]=Integer.parseInt(textfield2.getString());
data[2]=Integer.parseInt(textfield3.getString());
data[3]=Integer.parseInt(textfield4.getString());
data[4]=Integer.parseInt(textfield5.getString());
d = new PieChartCanvas(data);
d.addCommand(exitCommand);
d.setCommandListener(this);
display.setCurrent(d);
}
}
else if(s==d)
{
if(c==exitCommand)
display.setCurrent(form);
}
}
}
class PieChartCanvas extends Canvas {
int[] data;
int colors[] = { 0xFF0000, 0xA9E969, 0x00FFFF, 0xC675EC, 0x008800, 0x00C400 };
public PieChartCanvas(int[] data) {
this.data = data;
}
public void paint(Graphics g) {
int width = this.getWidth();

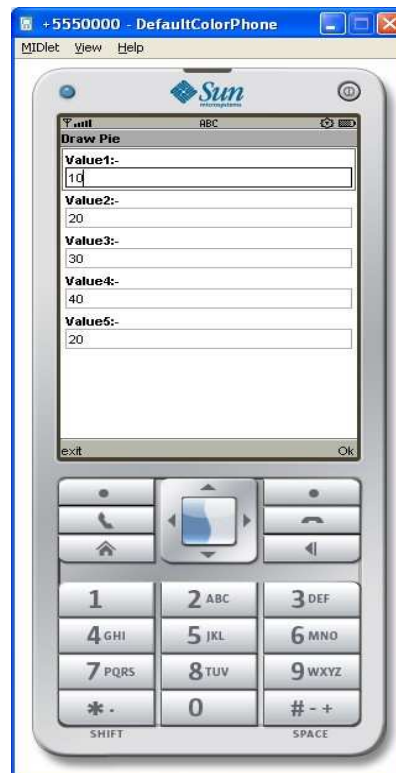
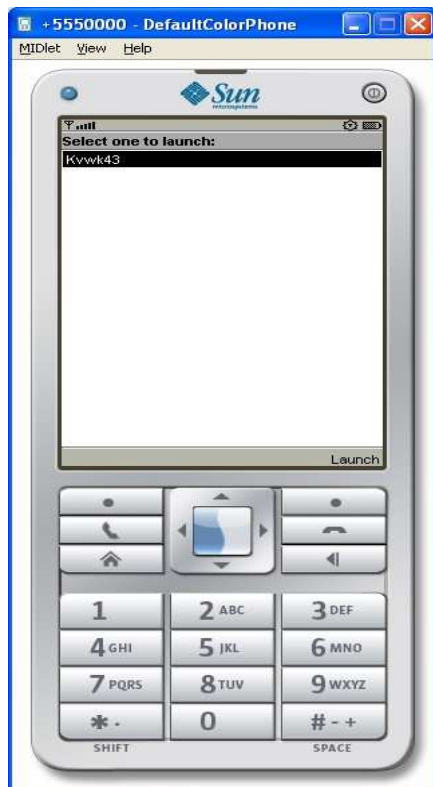
```

```

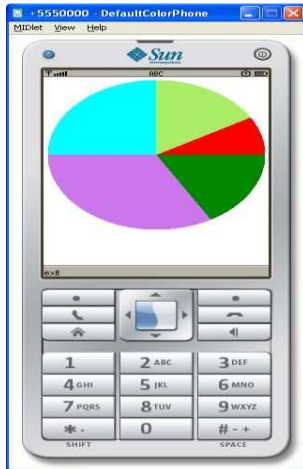
int height = this.getHeight();
g.setColor(255, 255, 255);
g.fillRect(0, 0, width, height);
int sum = 0;
for (int i = 0; i < data.length; i++) {
    sum += data[i];
}
int deltaAngle = 360 * 100 / sum / 100;
int x = 4;
int y = 4;
int diameter;
if (width > height)
    diameter = height - y * 2;
else
    diameter = width - x * 2;
int startAngle = 0;
for (int i = 0; i < data.length; i++) {
    g.setColor(colors[i]);
    g.fillArc(x, y, diameter, diameter, startAngle, deltaAngle * data[i]);
    startAngle += deltaAngle * data[i];
}
}
}
}

```

Output:







## Week - 5 Developing Networked Applications using the Wireless Toolkit

### Creating a Simple Client-Server Application

Create, compile and run a basic UDP-based client-server application.

Creating the Datagram Server project

- 1) Click on Wireless Toolkit 2.5.2 under the group: All Programs→Sun Java (TM) Wireless Toolkit 2.5.2.
- 2) Click on 'New Project...' button.
- 3) Enter project name as 'DatagramServer'. Enter MIDlet name as 'DatagramServer'. Note that the Midlet name is the same as the name of the class in the source code, which extends the MIDlet class, otherwise the application won't run.
- 4) Another window pops up where it is required to select a target platform. Select 'MIDP 1.0' from the drop down list.
- 5) After clicking OK, the project is created; and the Wireless Toolkit tells that the name of the folder where source code files are created. The path of the source code folder is displayed in the debug output window.

### Creating and Compiling the DatagramServer source files

The Wireless Toolkit does not come with an IDE by default so Use any IDE or a text editor like Notepad.

- 1) Create a new text file called DatagramServer.java in the source folder of the project. The exact path of this folder is displayed in the Wireless Toolkit window.
- 2) Paste contents DatagramServer.java from into the source file.

### Running your Server application on the Phone simulator

- 1) After compiling the project successfully, click on the Run button in the Wireless Toolkit window.
- 2) A graphical window depicting a phone handset will appear with the name of your application highlighted on its screen as shown below.
- 3) To start the application, click on the right soft-key (marked with a dot) below the 'Launch' command.

- 4) The phone simulator might ask if it is OK to run the network application. Select 'Yes' by clicking on the appropriate soft-key. The server is now up and running.
- 5) Keep the server running during the creation, compilation and running of the Datagram Client application.

#### Creating the DatagramClient project

- 1) Use the same instance of the Wireless Toolkit that is used for creating and compiling the Datagram Server project.
- 2) Click on 'New Project...' button.
- 3) A new window pops up. Enter project name as 'DatagramClient'. Enter MIDlet name as 'DatagramClient'. Note that the Midlet name is the same as the name of the class in the source code, which extends the MIDlet class.
- 4) Another window pops up where one has to select a target platform. Select 'MIDP 1.0' from the drop down list.
- 5) After clicking OK, the project is created and the Wireless Toolkit tells where to place the source code files. The path of the source code folder is displayed in the debug output window as explained before.

#### Creating and Compiling the DatagramClient source files

- 1) Create a new text file called DatagramClient.java in the source folder of the project.
- 2) Paste contents DatagramClient.java into the source file.
- 3) Then click on the Build button in the Wireless Toolkit window. If the compilation is OK, it will say Build Complete in the window's debug output window, otherwise it will show the errors. **Note:** In the source code, use the System.out.println() statement to output debug information to this window.

#### Running your Client application on the Phone simulator

- 1) After compiling the project successfully, click on the Run button in the Wireless Toolkit window.
- 2) A graphical window depicting a phone handset will appear with the name of the application highlighted on its screen.
- 3) To start the application, click on the right soft-key (marked with a dot) below the 'Launch' command.
- 4) The phone simulator might ask if it is OK to run the network application. Select 'Yes' by clicking on the appropriate soft-key. The client is now up and running.
- 5) When the client executes on the phone simulator, one should see a text box with the caption 'Message'. Enter any message and press the right soft-key (corresponding to Send). If the client-server application is working properly, the screen of the server phone will display the message sent by the client and the client screen will now display a message sent by the server in response. The response message from the server is the original client message in reverse.
- 6) Try various features of the phone simulator including the different look-and feel options.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
import javax.microedition.io.*;
```

```

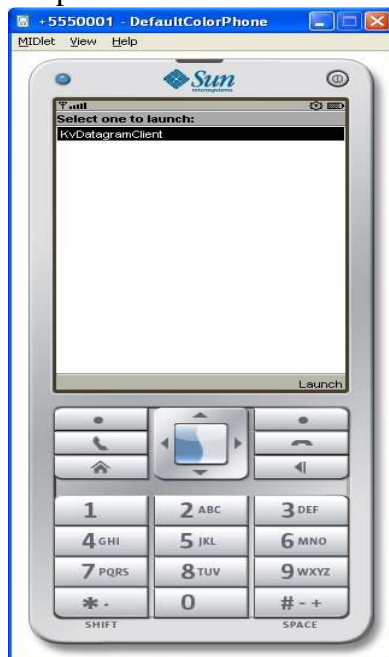
public class DatagramClient extends MIDlet implements CommandListener{
    public Form form1;
    public Display display;
    public TextField textfield;
    public Command sendCommand;
    public DatagramClient()
    {
        display=Display.getDisplay(this);
        form1=new Form("Datagram Client");
        sendCommand=new Command("send",Command.OK,1);
        textfield=new TextField("Enter Text",null,30,TextField.ANY);
        form1.append(textfield);
        form1.addCommand(sendCommand);
        form1.setCommandListener(this);
    }
    public void startApp() {
        display.setCurrent(form1);
    }

    public void pauseApp() {
    }

    public void destroyApp(boolean unconditional) {
    }
    public void commandAction(Command cmd,Displayable d)
    {
        if(cmd==sendCommand)
        {
            try    {
                DatagramConnection dgc = (DatagramConnection)
                Connector.open("datagram://localhost:9001");
                try {
                    while(true)
                    {
                        byte[] payload = textfield.getString().getBytes();
                        Datagram datagram = dgc.newDatagram(payload, payload.length);
                        dgc.send(datagram);
                    }
                } finally {
                    dgc.close();
                }
            } catch (Exception x) {
                x.printStackTrace();
            }
        }
    }
}

```

Output:



```
/*
Creating the datagram Server project

*/
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
import javax.microedition.io.*;

public class DatagramServer extends MIDlet implements CommandListener{
    public Form form1;
    public Form form2;
    public Command startCommand;
    public Command refreshCommand;
    public Command exitCommand;
    public Display display;
    public StringItem st;
    public DatagramServer()
    {
        display=Display.getDisplay(this);
        startCommand=new Command("Start",Command.OK,1);
        refreshCommand=new Command("Refresh",Command.OK,1);
        exitCommand=new Command("Exit",Command.EXIT,1);
        st=new StringItem(" "," ");
        form1 =new Form("DataGramserver");
        form2=new Form("Ready to receive Messages");
        form1.addCommand(startCommand);
        form1.setCommandListener(this);
        form2.addCommand(refreshCommand);
    }
}
```

```

        form2.addCommand(exitCommand);
        form2.setCommandListener(this);
    }
    public void startApp() {
        display.setCurrent(form1);
    }

    public void pauseApp() {
    }

    public void destroyApp(boolean unconditional) {
    }

    public void commandAction(Command cmd, Displayable displayable)
    {
        if(displayable==form1)
        {
            if(cmd==startCommand)
            {
                try {
DatagramConnection dgc = (DatagramConnection)
Connector.open("datagram://:9001");
try {
int size = 100;
Datagram datagram = dgc.newDatagram(size);
dgc.receive(datagram);

        form2.append(datagram.getData().toString());
    } finally {
        dgc.close();
    }
} catch (Exception x){
x.printStackTrace();
}

                display.setCurrent(form2);
            }
        }
        else if(displayable==form2)
        {
            if(cmd==exitCommand)
            {
                notifyDestroyed();
            }
        }
        else if(cmd==refreshCommand)
        {
            st.setText(" ");
        }
    }

```

```

    }
  }
}

```

Output:



### Week - 6 Authentication with a Web Server

Write a sample program to show how to make a **SOCKET** Connection from **j2me** phone.

**This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. shows how to make a SOCKET connection from the phone to port 80.**

```

import javax.microedition.midlet.*;
import javax.microedition.io.*;
import javax.microedition.lcdui.*;
import java.io.*;

public class socket extends MIDlet {
    // StreamConnection allows bidirectional communication
    private StreamConnection streamConnection = null;

    // use OutputStream to send requests
    private OutputStream outputStream = null;
    private DataOutputStream dataOutputStream = null;

    // use InputStream to receive responses from Web server
    private InputStream inputStream = null;
    private DataInputStream dataInputStream = null;

    // specify the connect string

```

```

private String connectString = "socket://www.java-samples.com:80";

// use a StringBuffer to store the retrieved page contents
private StringBuffer results;

// define GUI components
private Display myDisplay = null;
private Form resultScreen;
private StringItem resultField;

public socket() {
    // initializing GUI display
    results = new StringBuffer();
    myDisplay = Display.getDisplay(this);
    resultScreen = new Form("Page Content:");
}

public void startApp() {
    try {
        // establish a socket connection with remote server
        streamConnection =
            (StreamConnection) Connector.open(connectString);

        // create DataOutputStream on top of the socket connection
        outputStream = streamConnection.openOutputStream();
        dataOutputStream = new DataOutputStream(outputStream);

        // send the HTTP request
        dataOutputStream.writeChars("GET /index.htm HTTP/1.0 \n");
        dataOutputStream.flush();

        // create DataInputStream on top of the socket connection
        inputStream = streamConnection.openInputStream();
        dataInputStream = new DataInputStream(inputStream);

        // retrieve the contents of the requested page from Web server
        int inputChar;
        while ( (inputChar = dataInputStream.read()) != -1) {
            results.append((char) inputChar);
        }

        // display the page contents on the phone screen
        resultField = new StringItem(null, results.toString());
        resultScreen.append(resultField);
        myDisplay.setCurrent(resultScreen);

    } catch (IOException e) {
        System.err.println("Exception caught:" + e);
    } finally {
        // free up I/O streams and close the socket connection
    }
}

```

```

try {
    if (dataInputStream != null)
        dataInputStream.close();
    } catch (Exception ignored) {}
try {
    if (dataOutputStream != null)
        dataOutputStream.close();
    } catch (Exception ignored) {}
try {
    if (outputStream != null)
        outputStream.close();
    } catch (Exception ignored) {}
try {
    if (inputStream != null)
        inputStream.close();
    } catch (Exception ignored) {}
try {
    if (streamConnection != null)
        streamConnection.close();
    } catch (Exception ignored) {}
}
}

public void pauseApp() {
}

public void destroyApp(boolean unconditional) {
}
}

```

Output:

### **Login to HTTP Server from a J2ME Program**

**This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server.**

**Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server.**

**Note: Use Apache Tomcat Server as Web Server and Mysql as Database Server.**

```

import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
import javax.microedition.io.*;
import java.io.*;
public class login extends MIDlet implements CommandListener {
    public Form form1;
    public Command okCommand;
    public Display display;
    public HttpConnection ht=null;

```



```

public InputStream ist=null;
public StringItem st;
public TextField t1;
public TextField t2;
public Alert alert;
public Form form2;
public login()
{
    display=Display.getDisplay(this);
    st=new StringItem(" "," Welcome");
    alert =new Alert(" ","Wrong UserName or Password",null,AlertType.INFO);

    t1=new TextField("UserName"," ",30,TextField.ANY);
    t2=new TextField("Password"," ",30,TextField.PASSWORD);
    form1=new Form("Login Here");
    form2=new Form("Welcome");
    okCommand=new Command("Login",Command.OK,1);
    form1.addCommand(okCommand);
    form1.setCommandListener(this);

    form1.append(t1);
    form1.append(t2);
    form2.append(st);
}

public void startApp() {
    display.setCurrent(form1);
}

public void pauseApp() {
}

public void destroyApp(boolean unconditional) {
    notifyDestroyed();
}

public void commandAction(Command cmd,Displayable d)
{
    if(cmd==okCommand)
    {
        try
        {

            //      String
            url="http://192.168.5.19:8080/WebApplication7/index.jsp?t1=101&t2=aaa";
            //      String
            url="http://192.168.5.19:8080/WebApplication7/index.jsp?t1="+t1.getString().trim()+"&t2="
            +t2.getString().trim();

            //ht=(HttpConnection)Connector.open("http://192.168.5.19:8080/WebApplication7/index.jsp
            ");

```

```
        ht=(HttpConnection)Connector.open(url);
        ist=ht.openInputStream();
        byte[] b=new byte[900];
        ist.read(b);
        String s=new String(b);
        s=s.trim();
        if(s.equals("ok"))
            display.setCurrent(form2);
        else
        {

            alert.setTimeout(Alert.FOREVER);
            display.setCurrent(alert);
        }

    }
    catch(Exception ex)
    {
form1.append(ex.toString());
    }

}
}
}
Output:
```