MIDlets:
1. Probar en NetBeans-Microedition todos los ejercicios.
2. Ejecutar todos los ejercicios en un dispositivo m□.

//**

EJEMPLO 1. Hola MIDlet con el API de alto nivel.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class AltoNivelME extends MIDlet implements CommandListener {
      private Display  d;
      private Form     f;
      private Command  c;
      private Alert    a;
      public AltoNivelME(  ) {
            d = Display.getDisplay(this);
            f = new Form ("Hola MIDlet");
            f.append("Hola MIDlet!\n");
            c = new Command("Salir", Command.EXIT, 3);
            f.addCommand(c);
            f.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(f);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == c) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando...", null,
AlertType.ERROR));    }
}
```

//**

EJEMPLO 2. Ejemplo de Form y Command.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class FormCommandME extends MIDlet implements CommandListener {
    private Display   d;
    private Form f;
    private Command   c;
    public FormCommandME(  ) {
        d = Display.getDisplay(this);
        f = new Form ("Form y Command");
        f.append("Hola MIDlet\n");
        c = new Command("Salir", Command.EXIT, 3);
        f.addCommand(c);
        f.setCommandListener(this);
    }
    protected void startApp(  ) {
        d.setCurrent(f);
    }
```

```
    protected void pauseApp(  ) {    }
    protected void destroyApp(boolean b) {    }
    public void commandAction(Command co, Displayable di) {
        if (co == c) {
            destroyApp(true);
            notifyDestroyed();
        } else d.setCurrent(new Alert("", "Otro comando...", null,
AlertType.ERROR));
    }
}
//************************************************************
```

EJEMPLO 3. Ejemplo de StringItem.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class StringItemME extends MIDlet implements CommandListener {
private Display  d;
      private Form     f;
      private Alert    a;
      private Command  cs;
      private Command  cc;
      private StringItem si;
      private int n;
      public StringItemME( ) {
            n  = 0;
            d  = Display.getDisplay(this);
            f  = new Form ("StringItem");
            f.append("Ejemplo de StringItem\n");
            si = new StringItem("Cadena: ", "Contador = " + n);
            f.append(si);
            cs = new Command("Salir", Command.EXIT, 3);
            cc = new Command("Contar", Command.SCREEN, 1);
            f.addCommand(cs);
            f.addCommand(cc);
            f.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(new Alert("", "MIDlet activo...", null,
AlertType.ERROR));
            d.setCurrent(f);
      }
      protected void pauseApp(  ) {
            d.setCurrent(new Alert("", "MIDlet pausado...", null,
AlertType.ERROR));
      }
      protected void destroyApp(boolean b) {
            d.setCurrent(new Alert("", "MIDlet terminado.", null,
AlertType.ERROR));
      }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else if (co == cc) {
```

```
                n++;
                si.setText("Contador = " + n);
            } else d.setCurrent(new Alert("", "MIDlet activo...", null,
AlertType.ERROR));
      }
}
//************************************************************
```

EJEMPLO 4. La imagen java.png se coloca en el directorio res en la carpeta de aplicaciones del dispositivo.
Para probar las imگnes, crear una nueva carpeta llamada resources en miproyecto/Source Packages/resources, y alluardar las imگnes:

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class MiImagenME extends MIDlet implements CommandListener {
    private Display   d;
    private Form f;
    private Image     i;
    private ImageItem  ii;
    private Command   c;
    public MiImagenME (  ) {
        d = Display.getDisplay(this);
      f = new Form ("ImageItem");
      try {
            ii = new ImageItem("",
Image.createImage("resources/java.png"), ImageItem.LAYOUT_CENTER, "Logo
de Java");
            f.append(ii);
      } catch (java.io.IOException e) {
            f.append(" Error al leer el archivo java.png: " + e);
      }
      c = new Command("Salir", Command.EXIT, 3);
      f.addCommand(c);
      f.setCommandListener(this);
    }
    protected void startApp(  ) {
        d.setCurrent(f);
    }
    protected void pauseApp(  ) {    }
    protected void destroyApp(boolean b) {    }
    public void commandAction(Command co, Displayable di) {
        if (co == c) {
            destroyApp(true);
            notifyDestroyed();
      } else d.setCurrent(new Alert("", "Otro comando...", null,
AlertType.ERROR));
    }
}
//************************************************************
```

EJEMPLO 5. Ejemplo de DateField y TextField.

```
import java.util.Date;
import java.util.Calendar;
import javax.microedition.midlet.*;
```

```
import javax.microedition.lcdui.*;
public class DateTextFieldME extends MIDlet implements CommandListener {
      private Display  d;
      private Form     f;
      private TextField tf;
      private DateField df;
      private StringItem si;
      private Command  cc;
      private Command  cs;
      public DateTextFieldME (  ) {
            d  = Display.getDisplay(this);
            tf = new TextField("Nombre:","", 10, TextField.ANY);
            df = new DateField("Cumplea□", DateField.DATE);
            si = new StringItem("", "");
            f  = new Form ("TextField y DateField");
            f.append(tf);
            f.append(df);
            f.append(si);
            cc = new Command("Continuar", Command.OK, 0);
            cs = new Command("Salir", Command.EXIT, 3);
            f.addCommand(cc);
            f.addCommand(cs);
            f.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(f);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else if (co == cc) {
                  Calendar c1 = Calendar.getInstance();
                  Calendar c2 = Calendar.getInstance();
                  Date date = df.getDate();
                  if ((date == null) || (tf.getString().equals(""))) {
                        si.setText("Favor de ingresar su nombre");
                        return;
                  }
                  c2.setTime(date);
                  int edad = c1.get(Calendar.YEAR)-c2.get(Calendar.YEAR);
                  f.delete(0);
                  f.delete(0);
                  f.removeCommand(cc);
                  si.setText("Hola " + tf.getString() + "\nTu edad es = "
+ edad + " a□);
            } else d.setCurrent(new Alert("", "Otro comando...", null,
AlertType.ERROR));
      }
}
//*************************************************************
```

EJEMPLO 6. Ejemplo de ChoiceGroup.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class ChoiceGroupME extends MIDlet implements CommandListener {
      private Display       d;
      private Form          f;
      private TextField     tf;
      private ChoiceGroup   cg;
      private ChoiceGroup   ch;
      private Command       cs;
      public ChoiceGroupME(  ) {
            d  = Display.getDisplay(this);
            tf = new TextField("Nombre:", "", 10, TextField.ANY);
            cg = new ChoiceGroup("Sexo:", ChoiceGroup.EXCLUSIVE);
            cg.append("Masculino", null);
            cg.append("Femenino", null);
            ch = new ChoiceGroup("Lenguajes:", ChoiceGroup.MULTIPLE);
            ch.append("Java", null);
            ch.append("C++", null);
            ch.append("Prolog", null);
            ch.append("Otros", null);
            f  = new Form ("ChoiceGroup");
            f.append(tf);
            f.append(cg);
            f.append(ch);
            cs = new Command("Salir", Command.EXIT, 3);
            f.addCommand(cs);
            f.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(f);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando...", null,
AlertType.ERROR));
      }
}
//************************************************************
```

EJEMPLO 7. Ejemplo de Gauge.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class GaugeME extends MIDlet implements CommandListener {
      private Display d;
      private Form    f;
      private Gauge   g;
      private Command c;
      public GaugeME(  ) {
            d = Display.getDisplay(this);
```

```
            g = new Gauge("Amplitud", true, 10, 5);
            f = new Form ("Gauge");
            f.append(g);
            c = new Command("Salir", Command.EXIT, 3);
            f.addCommand(c);
            f.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(f);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == c) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando...", null,
AlertType.ERROR));
      }
}
//*************************************************************

EJEMPLO 8. Ejemplo de Alert.
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class AlertME extends MIDlet implements CommandListener,
ItemStateListener  {
      private Display       d;
      private Alert         a;
      private Form          f;
      private TextField     tt;
      private TextField     tx;
      private ChoiceGroup   ct;
      private ChoiceGroup   cg;
      private Gauge         g;
      private Command       cc;
      private Command       cs;
      private int      s=2;
      public AlertME(  ) {
            d  = Display.getDisplay(this);
            tt = new TextField("Titulo:", "Un tlo", 10, TextField.ANY);
            tx = new TextField("", "...texto del Alert...", 50,
TextField.ANY);
            ct =new ChoiceGroup("Seleccionar tipo:",
ChoiceGroup.EXCLUSIVE);
            ct.append("ALARM", null);
            ct.append("CONFIRMATION", null);
            ct.append("ERROR", null);
            ct.append("INFO", null);
            ct.append("WARNING", null);
            ct.setSelectedIndex(0, true);
            cg=new ChoiceGroup("Tiempo:", ChoiceGroup.EXCLUSIVE);
            cg.append("Forever", null);
            cg.append("Temporal", null);
```

```
            cg.setSelectedIndex(0, true);
            g = new Gauge("Gauge (min=0 max=20)", true, 20, s);
            f = new Form ("Ejemplo Alert");
            f.append(tt);
            f.append(tx);
            f.append(ct);
            f.append(cg);
            f.append(g);
            cc=new Command("Continuar", Command.OK, 0);
            cs=new Command("Salir", Command.EXIT, 3);
            f.addCommand(cc);
            f.addCommand(cs);
            f.setCommandListener(this);
            f.setItemStateListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(new Alert("", "En estado Activo", null,
AlertType.ERROR));
            d.setCurrent(f);
      }
      protected void pauseApp(  ) {
             d.setCurrent(new Alert("", "En estado pausado...", null,
AlertType.ERROR));
      }
      protected void destroyApp(boolean b) {
             d.setCurrent(new Alert("", "En estado terminado.", null,
AlertType.ERROR));
      }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else if (co == cc) {
                  switch (ct.getSelectedIndex()) {
                        case 0: a = new Alert(tt.getString(),
tx.getString(), null, AlertType.ALARM); break;
                        case 1: a = new Alert(tt.getString(),
tx.getString(), null, AlertType.CONFIRMATION); break;
                        case 2: a = new Alert(tt.getString(),
tx.getString(), null, AlertType.ERROR); break;
                        case 3: a = new Alert(tt.getString(),
tx.getString(), null, AlertType.INFO); break;
                        case 4: a = new Alert(tt.getString(),
tx.getString(), null, AlertType.WARNING); break;
                        default:a = new Alert(tt.getString(),
tx.getString(), null, AlertType.INFO);
                  }
                  if ((cg.getSelectedIndex() == 0) || (g.getValue()==0) )
                        a.setTimeout(Alert.FOREVER);
                  else
                        a.setTimeout(g.getValue()*1000);
                  d.setCurrent(a);
            } else d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
```

```
      }
      public void itemStateChanged(Item item) {
            if (item == cg) {
                  if (cg.getSelectedIndex() == 0) {
                        s=g.getValue();
                        g.setValue(0);
                  } else
                        g.setValue(s);
            } else if (item == g) {
                  if (g.getValue() == 0)
                        cg.setSelectedIndex(0,true);
                  else
                        cg.setSelectedIndex(1,true);
            } else d.setCurrent(new Alert("", "Otro item seleccionado...",
null, AlertType.ERROR));
      }
}
//************************************************************
```

EJEMPLO 9. Ejemplo de List.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class ComponentesME extends MIDlet implements CommandListener {
      public static final int CONECTAR = 0;
      public static final int ESTADO = 1;
      public static final int INSERTAR = 2;
      public static final int DESCONECTAR = 3;
      public static final int MENU = 4;
      private Display     d;
      private List        l;
      private TextBox     tb;
      private Form        f;
      private TextField   ts;
      private TextField   tf;
      private ChoiceGroup cr;
      private Command     cs;
      private Command     cc;
      private int         n;
      public ComponentesME(  ) {
            n  = MENU;
            d  = Display.getDisplay(this);
            ts = new TextField("Servidor:", "", 10, TextField.URL);
            tb = new TextBox("Estado", "Sin Conexion", 400,
TextField.ANY);
            tf = new TextField("Area ID", "0", 10, TextField.NUMERIC);
            cr= new ChoiceGroup("Riesgo:", ChoiceGroup.EXCLUSIVE);
            cr.append("Bajo", null);
            cr.append("Normal", null);
            cr.append("Alto", null);
            l  = new List ("Seleccionar opci□, List.EXCLUSIVE);
            l.append("Conectar", null);
            l.append("Solicitar Datos", null);
            l.append("Ingresar Datos", null);
            l.append("Desconectar", null);
```

```
            f  = new Form ("Menu Conectar");
            cs = new Command("Salir", Command.EXIT, 3);
            cc = new Command("Continuar", Command.OK, 1);
            l.addCommand(cc);
            l.addCommand(cs);
            l.setCommandListener(this);
            f.addCommand(cc);
            f.addCommand(cs);
            f.setCommandListener(this);
            tb.addCommand(cs);
            tb.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(l);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (n == MENU ) {
                  if (co == cs) {
                        destroyApp(true);
                        notifyDestroyed();
                  } else if (co == cc) {
                        switch ( l.getSelectedIndex() ){
                              case CONECTAR:      conectar(); break;
                              case ESTADO:        listar();break;
                              case INSERTAR:      insertar();break;
                              case DESCONECTAR:   desconectar();break;
                        }
                  } d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
            } else {
                  if (co == cs) {
                        muestraMenu();
                  } else if (co ==cc) {
                        switch ( n ){
                              case CONECTAR:   listar();break;
                              case ESTADO:     muestraMenu();break;
                              case INSERTAR:   listar();break;
                              case DESCONECTAR: muestraMenu();break;
                        }
                  } d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
            }
       }
      public void conectar(){
            n = CONECTAR;
            f.setTitle("Menu Conectar");
            while (f.size()>0) f.delete(0);
            f.append(ts);
            d.setCurrent(f);
      }
      public void insertar(){
            n = INSERTAR;
```

```
            f.setTitle("Menu Insertar");
            while (f.size()>0) f.delete(0);
            f.append(tf);
            f.append(cr);
            d.setCurrent(f);
      }
      public void desconectar(){
            d.setCurrent(new Alert("Desconectar","No est conectado a un
servidor.", null, AlertType.ERROR));
            n = DESCONECTAR;
            n = MENU;
      }
      public void listar(){
            n = ESTADO;
            d.setCurrent(tb);
      }
      public void muestraMenu(){
            n = MENU;
            d.setCurrent(l);
      }
}
//*************************************************************

EJEMPLO 10. Ejemplo de Canvas.
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class CanvasME extends MIDlet implements CommandListener {
      private Display  d;
      private Command  cs;
      private Canvas   ca;
      public CanvasME(  ) {
            d  = Display.getDisplay(this);
            ca = new Canvas() {
                  private int w;
                  private int h;
                  public void paint (Graphics g){
                        w = getWidth();
                        h = getHeight();
                        g.setColor(255, 0, 0); g.fillRect(0, 0, w, h);
                        g.setColor(0, 0, 0); g.drawLine(0, 0, 50, 50);
                  }
            };
            cs = new Command("Salir", Command.EXIT, 3);
            ca.addCommand(cs);
            ca.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(ca);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
```

```
                notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
      }
}
//*************************************************************
```

EJEMPLO 11. Ejemplo de Arcos.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class ArcoME extends MIDlet implements CommandListener {
      private Display d;
      private Command cs;
      private Canvas  ca;
      public ArcoME(  ) {
            d  = Display.getDisplay(this);
            ca = new Canvas() {
                  private int w;
                  private int h;
                  public void paint (Graphics g){
                        w = getWidth();
                        h = getHeight();
                        g.setColor(0, 0, 0);
                        g.fillRect(0, 0, w, h);
                        g.setColor(255, 255, 255);
                                  g.setStrokeStyle(Graphics.SOLID);
                        g.fillArc(0, 0, h-100, w-100, 0, 360);
                        g.setColor(255, 0, 0);
                        g.drawArc(60, 20, 97, 97, -90, 180);
                        g.setColor(0, 255, 0);
                        g.drawArc(60, 20, 97, 97, 90, 180);
                                  g.drawString("w:"+w+" h:"+h, 50, 50, 0);
                          }
            };
            cs = new Command("Salir",Command.EXIT, 3);
            ca.addCommand(cs);
            ca.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(ca);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
      }
}
//*************************************************************
```

EJEMPLO 12. Ejemplo de textos.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class FiguraBasicaME extends MIDlet implements CommandListener {
      private Display d;
      private Command cs;
      private Canvas  ca;
      public FiguraBasicaME(  ) {
            d  = Display.getDisplay(this);
            ca = new Canvas() {
                  private int w, h;
                  public void paint (Graphics g){
                        w = getWidth();
                        h = getHeight();
                        g.setColor(0, 0, 0);
                        g.fillRect(0, 0, w, h);
                        g.setColor(255, 255, 255);
                        g.setStrokeStyle(Graphics.SOLID);
                        g.drawString("...Una carta...", w/2, h/2,
(Graphics.BASELINE| Graphics.HCENTER));
                  }
            };
            cs = new Command("Salir", Command.EXIT, 3);
            ca.addCommand(cs);
            ca.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(ca);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
      }
}
//************************************************************
```

EJEMPLO 13. Ejemplo de mostrar una imagen en un Canvas.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class Imagen2ME extends MIDlet implements CommandListener {
      private Display d;
      private Command c;
      private Canvas  ca;
      public Imagen2ME( ) {
            d  = Display.getDisplay(this);
            ca = new Canvas() {
                  private int w, h;
                  public void paint (Graphics g){
                        w = getWidth();
                        h = getHeight();
```

```
                        g.setColor(0, 0, 0);
                        g.fillRect(0, 0, w, h);
                        try {
                              Image i= Image.createImage("/java.png");
                              g.drawImage(i, w/2, h/2,(Graphics.VCENTER|
Graphics.HCENTER));
                        } catch (java.io.IOException e) {
                              g.setColor(255, 255, 255);
                              g.setStrokeStyle(Graphics.SOLID);
                              g.drawString("Error al leer java.png", 0,
h/2, (Graphics.BASELINE|Graphics.LEFT));
                        }
                  }
            };
            c = new Command("Salir", Command.EXIT, 3);
            ca.addCommand(c);
            ca.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(ca);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == c) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
      }
}
//************************************************************
```

EJEMPLO 14. Ejemplo para mover un cuadro.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class MueveTeclaME extends MIDlet implements CommandListener {
      private Display d;
      private Command cs;
      private Canvas ca;
      public MueveTeclaME(  ) {
            d = Display.getDisplay(this);
            ca = new Canvas() {
                  private int x=0, y=0;
                  public void paint (Graphics g){
                        g.setColor(255, 255, 255);
                        g.fillRect(0, 0, getWidth(), getHeight());
                        g.setColor(255, 0, 0);
                        g.setStrokeStyle(Graphics.SOLID);
                                    g.fillArc(x, y, 50, 50, 0, 360);
                                    g.drawString("x="+x+", y="+y,
getWidth()/2, getHeight()/2, 0);
                  }
                  protected void keyPressed(int k) {
```

```
                        int up = getKeyCode(UP);
                        int dn = getKeyCode(DOWN);
                        int lf = getKeyCode(LEFT);
                        int rt = getKeyCode(RIGHT);
                        if (k == up)      { if(y>0) y-=1; repaint(); }
                        else if (k == dn) { if(y<getWidth()) y+=1;
repaint(); }
                        else if (k == lf) { if(x>0) x-=1; repaint(); }
                        else if (k == rt) { if(x<getHeight()) x+=1;
repaint(); }
                  }
            };
            cs = new Command("Salir",Command.EXIT, 3);
            ca.addCommand(cs);
            ca.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(ca);
      }
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co == cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
      }
}
//*************************************************************

EJEMPLO 15. Una animaci□e una pelota con un objeto fillArc().
import javax.microedition.lcdui.*;
import javax.microedition.midlet.*;
import javax.microedition.lcdui.game.GameCanvas;
public class RebotaBallME extends MIDlet {
      Display d;
      Pantalla p;
      public RebotaBallME() {
            d = Display.getDisplay(this);
            p = new Pantalla();
      }
      protected void destroyApp(boolean b) throws
MIDletStateChangeException{ }
      protected void pauseApp() { }
      protected void startApp() throws MIDletStateChangeException {
            d.setCurrent(p);
      }
}
class Pantalla extends GameCanvas implements Runnable{
      int x = 0, y = 0;
      int velx = 6, vely = 4;
      public Pantalla(){
            super(true);
```

```
            Thread t=new Thread(this);
            t.start();
      }
      public void paint(Graphics g) {
            g.setColor(255, 255, 210);
            g.fillRect(0, 0, getWidth(), getHeight());
            g.setColor(0, 255, 2);
            g.fillArc(x, y, 30, 30, 0, 360);
      }
      public void run() {
            while(true){
                  x = x + velx;
                  y = y + vely;
                  repaint();
                  if( x+30 > getWidth()  || x < 0 ) velx = -velx;
                  if( y+30 > getHeight() || y < 0 ) vely = -vely;
                  try {
                        Thread.sleep(50);
                        flushGraphics();
                  } catch (InterruptedException e) {
                        e.printStackTrace();
                  }
            }
      }
}
//*************************************************************
```

EJEMPLO 16. Hola MIDlet con el API de bajo nivel.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class BajoNivelME extends MIDlet implements CommandListener {
private Display       d;
    private Command   c;
    private Canvas    ca;
    public Maravilloso() {
        d  = Display.getDisplay(this);
        ca = new Canvas() {
            private int w;
            private int h;
            public void paint(Graphics g) {
                w = getWidth();
                h = getHeight();
                g.setColor(0, 0, 0);
                g.fillRect(0, 0, w, h);
                g.setColor(255, 255, 255);
                g.setStrokeStyle(Graphics.SOLID);
                g.drawString("Hola MIDlet", w/2, h/2,
(Graphics.BASELINE|Graphics.HCENTER));
            }
        };
        c = new Command("Salir", Command.EXIT, 3);
        ca.addCommand(c);
        ca.setCommandListener(this);
    }
```

```
    protected void startApp() {
        d.setCurrent(ca);
    }
    protected void pauseApp() {    }
    protected void destroyApp(boolean b) {    }
    public void commandAction(Command co, Displayable di) {
        if (co == c) {
            destroyApp(true);
            notifyDestroyed();
        } else d.setCurrent(new Alert("", "Otro comando...", null,
AlertType.ERROR));
    }
}

//************************************************************
```

EJEMPLO 17. Ejemplo de primitivas gr6cas.

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;
public class PrimitivasME extends MIDlet implements CommandListener {
      private Display  d;
      private Command  cs;
      private Canvas   ca;
      public PrimitivasME(  ) {
            d  = Display.getDisplay(this);
            ca = new Canvas() {
                  private int w;
                  private int h;
                  public void paint (Graphics g){
                        w=getWidth();
                        h=getHeight();
                        g.setColor(0, 0, 0);
                        g.fillRect(0, 0, w, h);
                        g.setColor(255, 255, 255);
                        g.setStrokeStyle(Graphics.SOLID);
                        g.drawLine(0, h/2, w-1, h/2);
                        g.setColor(0, 255, 0);
                        g.setStrokeStyle(Graphics.DOTTED);
                        g.drawLine(0, 0, w-1, h-1);
                        g.setColor(255, 0, 0);
                        g.setStrokeStyle(Graphics.DOTTED);
                        g.drawRect(w/4, 0, w/2, h/4);
                        g.setColor(0, 0, 255);
                        g.setStrokeStyle(Graphics.SOLID);
                        g.drawRoundRect(w/4 + 4, 4, w/2 -8, h/4 -8, 8,8);
                  }
            };
            cs=new Command("Salir",Command.EXIT, 3);
            ca.addCommand(cs);
            ca.setCommandListener(this);
      }
      protected void startApp(  ) {
            d.setCurrent(ca);
      }
```

```
      protected void pauseApp(  ) {    }
      protected void destroyApp(boolean b) {    }
      public void commandAction(Command co, Displayable di) {
            if (co ==cs) {
                  destroyApp(true);
                  notifyDestroyed();
            } else d.setCurrent(new Alert("", "Otro comando digitado...",
null, AlertType.ERROR));
      }
}
//************************************************************
```

EJEMPLO 18. Cargar msica midi.
Investigar, el uso de MMAPI (Mobile Media API):

```
import java.io.*;
import javax.microedition.media.*;
      :
      :
      try {
            InputStream ins = getClass().getResourceStream("jazz.mid");
            Player p = Manager.createPlayer(ins,"audio/midi");
            p.setLoopCount(5);
            p.start();
      } catch (Exception e) { ... }
      :
      :
```