FFTLab (1A)

this document is based on
http://sepwww.stanford.edu/oldsep/hale/FftLab.html

Please send corrections (or suggestions) to youngwlim@hotmail.com.

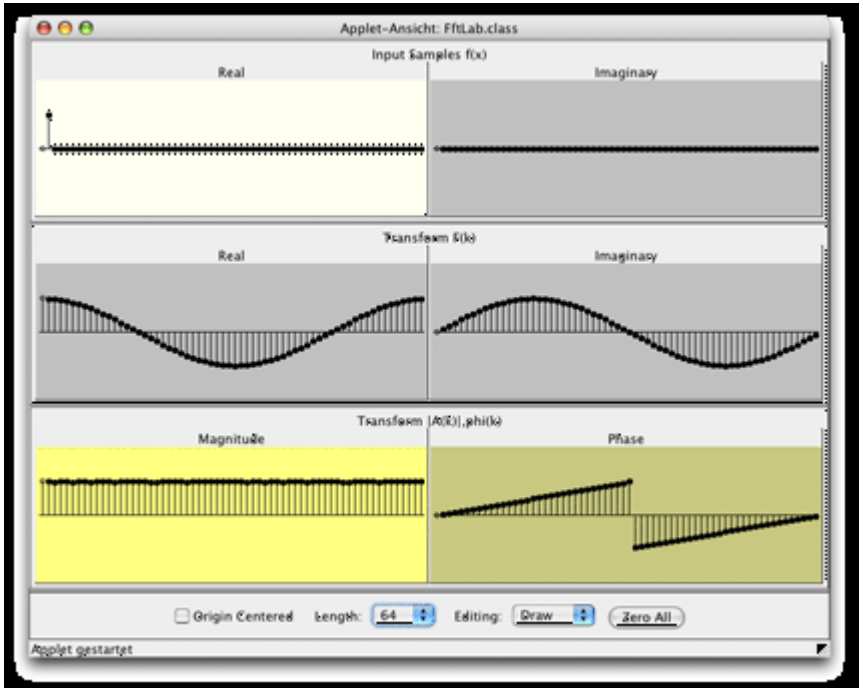
This document was produced by using OpenOffice.

Class Structure

- FftLab
-

Class Structure

class **FftLab**	extends java.applet.Applet
class **MainPanel**	extends Panel
class **ComplexSamplesPanel**	extends Panel
class **SamplesPanel**	extends Panel
class **ControlPanel**	extends Panel
class **LabeledChoice**	extends Panel
class **FftLabController**	implements Observer
class **SamplesView**	extends Canvas
class **Samples**	extends Observable
class **Fft**	



http://oldsite.dspdimension.com/dspdimension.com/index.html?fftlab.html

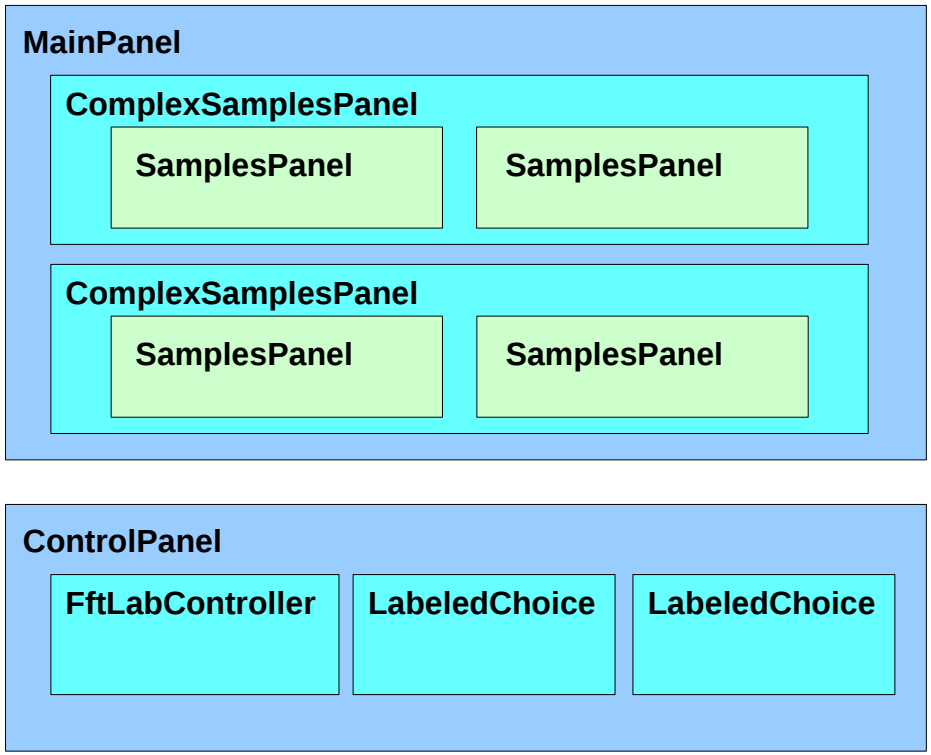
FftLab

```
public class FftLab extends java.applet.Applet {
   MainPanel           mainPanel;
   ControlPanel        controlPanel;

   public void         init() {
      FftLabController controller = new FftLabController();
       setLayout(new BorderLayout());
       mainPanel = new MainPanel(      controller.fRealView, controller.fImagView,
                                       controller.gRealView, controller.gImagView    );
       add("Center",mainPanel);
       controlPanel = new ControlPanel(controller);
       add("South",controlPanel);
   }

   public void         start() {
   public void         stop() {
   public boolean      handleEvent(Event e) {

   public static void  main(String args[]) {
       Frame frame = new Frame("FFT Laboratory");
       FftLab fftLab = new FftLab();
       frame.add("Center",fftLab);
   }

}
```

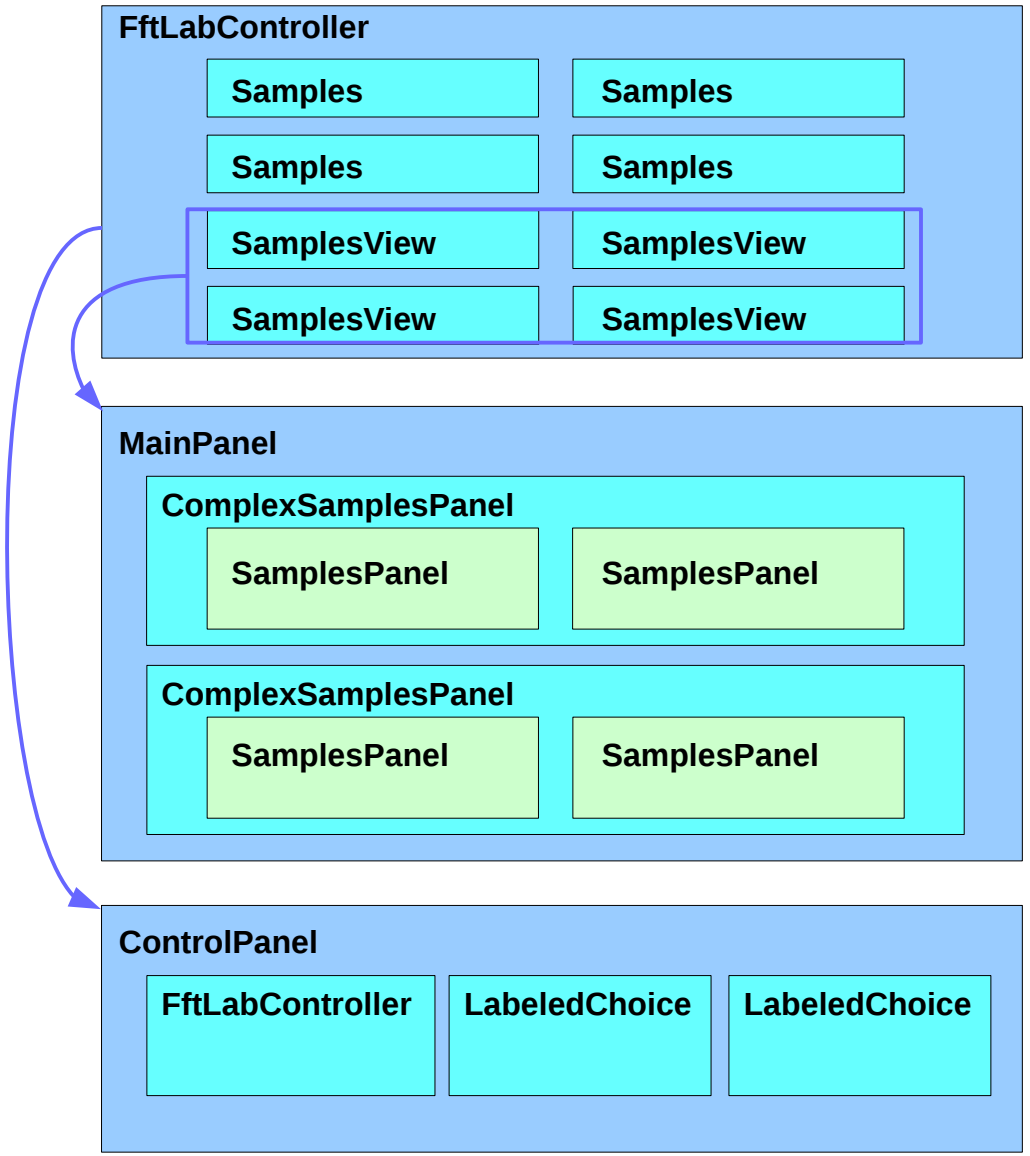
class **FftLab**	extends java.applet.Applet
class **MainPanel**	extends **Panel**
class **ComplexSamplesPanel**	extends **Panel**
class **SamplesPanel**	extends **Panel**
class **ControlPanel**	extends **Panel**
class **FftLabController**	implements **Observer**
class **LabeledChoice**	extends **Panel**
class **SamplesView**	extends **Canvas**
class **Samples**	extends **Observable**
class **Fft**	

FftLab

```
public class FftLab extends java.applet.Applet {
    MainPanel mainPanel;
    ControlPanel controlPanel;
    public void init() {
        FftLabController controller = new FftLabController();
        setLayout(new BorderLayout());
        mainPanel = new MainPanel(
                            controller.fRealView,
                            controller.fImagView,
                            controller.gRealView,
                            controller.gImagView        );
        add("Center", mainPanel);
        controlPanel = new ControlPanel(controller);
        add("South", controlPanel);
    }

    public void start() {
          mainPanel.enable();
          controlPanel.enable();
    }

    public void stop() {
          mainPanel.disable();
          controlPanel.disable();
    }

    public boolean handleEvent(Event e) {
        if (e.id==Event.WINDOW_DESTROY) {
            System.exit(0);
        }
        return false;
    }
    public static void main(String args[]) {
        Frame frame = new Frame("FFT Laboratory");
        FftLab fftLab = new FftLab();
        fftLab.init();
        fftLab.start();
        frame.add("Center",fftLab);
        frame.resize(600,400);
        frame.show();
    }
}
```



FftLab


FftLabController
Samples
Samples
Samples
Samples
SamplesView
SamplesView
SamplesView
SamplesView
MainPanel
ComplexSamplesPanel
SamplesPanel
SamplesPanel
ComplexSamplesPanel
SamplesPanel
SamplesPanel
ControlPanel
FftLabController
LabeledChoice
LabeledChoice

MainPanel, ControlPanel

```
class MainPanel extends Panel {
   public MainPanel(  SamplesView fRealView, SamplesView fImagView,
                      SamplesView gRealView, SamplesView gImagView) {
      add(new ComplexSamplesPanel(fRealView, fImagView,   "f(x)"));
      add(new ComplexSamplesPanel(gRealView, gImagView,  "F(k)"));
   }
   public void          paint(Graphics g) {
   public Insets        insets() {
}
```

```
add(new ComplexSamplesPanel(fRealView, fImagView,    "f(x)"));
add(new ComplexSamplesPanel(gRealView, gImagView,  "F(k)"));
```

```
class ControlPanel extends Panel {
   public ControlPanel(FftLabController c) {
   public void          paint(Graphics g) {
   public Insets        insets() {
   public boolean       handleEvent(Event e) {
   private FftLabController       c;
   private LabeledChoice          length;
   private LabeledChoice          mode;
}
```

ComplexSamplesPanel

```
class ComplexSamplesPanel extends Panel {
   public ComplexSamplesPanel( SamplesView realView,
                               SamplesView imagView,
                               String label ) {
      setLayout(new BorderLayout());
      add("North",new Label(label,Label.CENTER));

      Panel panel = new Panel();
      panel.setLayout(new GridLayout(1,2,1,1));
      panel.add(new SamplesPanel(realView,  "Real"));
      panel.add(new SamplesPanel(imagView, "Imaginary"));

      add("Center", panel);
   }

   public void    paint(Graphics g) {
   public Insets  insets() {
}
```

```
panel.add(new SamplesPanel(realView, "Real"));
panel.add(new SamplesPanel(imagView, "Imaginary"));
add("Center",panel);
```

SamplesPanel

```
class SamplesPanel extends Panel {

    public SamplesPanel(SamplesView view, String label) {
        setLayout(new BorderLayout());
        add("North",new Label(label,Label.CENTER));
        add("Center",view);
    }


    public void         paint(Graphics g) {
    public Insets       insets() {
}
```

```
add("North",new Label(label,Label.CENTER));
add("Center",view);
```

SamplesView

```
class SamplesView extends Canvas {
    public static int       EDIT_NONE     = 0;
    public static int       EDIT_DRAW     = 1;
    public static int       EDIT_ZERO     = 2;
    public static int       EDIT_NEGATE   = 3;
    public static int       EDIT_SHIFT    = 4;

    public Samples          samples;
    public SamplesView (Samples s) ;

    public void             setSampleValue    (float v) ;
    public void             setEditMode       (int mode) ;
    public void             paint             (Graphics g) ;
    public Dimension        minimumSize       () ;
    public Dimension        preferredSize     () ;
    public boolean          mouseDown         (Event e, int x, int y) ;
    public boolean          mouseDrag         (Event e, int x, int y) ;
    public boolean          mouseUp           (Event e, int x, int y) ;

    private int             editMode          = EDIT_DRAW;
    private int             sampleStart, sampleBase, sampleWidth, sampleRadius;
    private float           sampleScale, sampleValue;
    private int             lastDrag;

    private void            drawOneSample     (Graphics g, int i) ;
    private void            drawSamples       (Graphics g) ;
    private void            updateDrawingSizes () ;
}
```

```
public Samples          samples;
```

Samples

```
class Samples extends Observable {

    public float      values[];
    public int        origin;

    public Samples(int length, int origin) {
        this.origin = origin;
        values = new float[length];
        zero();
    }

    public void setLength           (int length) {
    public void zero                () {
    public void rotate              (int n) {
    public void notifyObservers     () {

}
```

LabeledChoice

```
class LabeledChoice extends Panel {
    public Choice choice;
    public LabeledChoice(String label) {
}
```

class **FftLab**	extends java.applet.Applet
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class **FftLabController**	implements Observer
class **SamplesView**	extends Canvas
class **Samples**	extends Observable
class **Fft**	

FftLabController

```
class FftLabController implements Observer {
  public Samples      fReal,     fImag,     gReal,     gImag;
  public SamplesView  fRealView, fImagView, gRealView, gImagView;

  public          FftLabController      () ;
  public int      getEditMode           () ;
  public void     setEditMode           (int mode) ;
  public int      getLength             () ;
  public void     setLength             (int length) ;
  public boolean  getOriginCentered     () ;
  public void     setOriginCentered     (boolean centered) ;
  public void     zeroAll               () ;
  public void     update                (Observable o, Object arg) ;

  private int     editMode              = SamplesView.EDIT_DRAW;
  private int     length                = 32;
  private boolean originCentered        = false;

  private float   computeSampleValue    (Samples real, Samples imag) ;
  private void    updateSampleValues    (SamplesView realView,
                                         SamplesView imagView) ;
  private void    transform             (...);
  private void    initSamples           () ;
  private void    updateLengths         () ;
  private void    updateOrigins         () ;
  private void    repaintViews          () ;
  private void    shiftSamples          (Samples s, int shift) ;
}
```

FftLabController()

```
public FftLabController() {

    int origin = (originCentered)?length/2:0;
    fReal       = new Samples(length,origin);
    fImag       = new Samples(length,origin);
    gReal       = new Samples(length,origin);
    gImag       = new Samples(length,origin);

    initSamples();

    fReal.addObserver(this);
    fImag.addObserver(this);
    gReal.addObserver(this);
    gImag.addObserver(this);

    fRealView   = new SamplesView(fReal);
    fImagView   = new SamplesView(fImag);
    gRealView   = new SamplesView(gReal);
    gImagView   = new SamplesView(gImag);

    updateSampleValues(  fRealView,       fImagView);
    updateSampleValues(  gRealView,       gImagView);
}
```

Fft,Samples

```
class Fft {
    public static void complexToComplex(int sign, int n, float ar[], float ai[]) ;
}


class Samples extends Observable {
    public float        values[];
    public int          origin;
    public Samples      (int length, int origin) ;
    public void         setLength           (int length) ;
    public void         zero                () ;
    public void         rotate              (int n) ;
    public void         notifyObservers     () ;
}
```

References

[1] Java in a nutshell, 4th ed, David Flanagan
[2] An Introduction to Object-Oriented Programming with Java, C. Thomas, Wu
[3] Power Java, I. K. Chun (in Korean)
[4] http://sepwww.stanford.edu/oldsep/hale/FftLab.html