```
// java.applet.Applet - page 234 Nutshell 1.ed - 275 Nutshell 2.ed
extern public class Applet extends Panel in "java.applet" {
  public Applet();
  public void destroy(); // empty
  public AppletContext getAppletContext();
  public String getAppletInfo();
  public AudioClip getAudioClip(URL url,String name);
  public URL getCodeBase();
  public URL getDocumentBase();
  public Image getImage(URL url, String name);
  public String getParameter(String name);
  public void init(); // empty
  public boolean isActive();
  public void play(URL url, String name);
  public void resize(int width, int height); // overrides Component.resize()
  public final void setStub(AppletStub stub);
  public void showStatus(String msg);
  public void start(); // empty
  public void stop();  // empty
}

// java.applet.AppletContext - page 235 Nutshell 1.ed - 277 Nutshell 2.ed
//   should be an interface
extern public abstract class AppletContext in "java.applet" {
  public AppletContext();
  public abstract Applet getApplet(String name);
  // public abstract Enumeration getApplets();
  public abstract AudioClip getAudioClip(URL url);
  public abstract Image getImage(URL url);
  public abstract void showDocument(URL url);
  public abstract void showStatus(String status);
}

// java.applet.AppletStub - page 235 Nutshell 1.ed - 277 Nutshell 2.ed
// should be an interface
extern public abstract class AppletStub in "java.applet" {
  public AppletStub();
  public abstract void appletResize(int width, int height);
  public abstract AppletContext getAppletContext();
  public abstract URL getCodeBase();
  public abstract URL getDocumentBase();
  public abstract String getParameter(String name);
  public abstract boolean isActive();
}

// java.applet.AudioClip  - page 236 Nutshell 1.ed - 277 Nutshell 2.ed
// should be an interface
extern public abstract class AudioClip in "java.applet" {
  public AudioClip();
  public abstract void loop();
  public abstract void play();
  public abstract void stop();
}
```

```
// ----------------------------------------------------------------
// The following classes are defined in the standard java awt class
//   libraries,  and are described in the book:
//   "Java in a Nutshell", by David Flanagan.
// ----------------------------------------------------------------

// java.awt.BorderLayout -  page 240 Nutshell 1.ed - page 286 Nutshell 2.ed
extern public class BorderLayout extends LayoutManager in "java.awt" {
// should be extends Object implements LayoutManager
  public BorderLayout();
  public BorderLayout(int hgap, int vgap);
  public void addLayOutComponent(String name, Component comp);
  public void layoutContainer(Container target);
  public Dimension minimumLayoutSize(Container target);
  public Dimension perferredLayoutSize(Container target);
  public void removeLayoutComponent(Component comp);
  public String toString(); // overrides Object.toString()
}

// java.awt.Button - page 240 Nutshell 1.ed - 287 Nutshell 2.ed
extern public class Button extends Component in "java.awt" {
  public Button();
  public Button(String label);
  public synchronized void addNotify(); // overrides Component.addNotify();
  public String getLabel();
  public void setLabel(String label);
}

// java.awt.Canvas - page 240 Nutshell 1.ed - 287 Nutshell 2.ed
extern public class Canvas extends Component in "java.awt" {
  public Canvas();
  public synchronized void addNotify(); // overrides Component.addNotify();
  public void paint(Graphics g); // overrides Component.paint()
}

// java.awt.CardLayout - page 241 Nutshell 1.ed - 288 Nutshell 2.ed
extern public class CardLayout extends LayoutManager in "java.awt" {
// should be extends Object implements LayoutManager
  public CardLayout();
  public CardLayout(int hgap, int vgap);
  public void addLayoutComponent(String name, Component comp);
  public void first(Container parent);
  public void last(Container parent);
  public void layoutContainer(Container parent);
  public Dimension minimumLayoutSize(Container parent);
  public void next(Container parent);
  public Dimension preferredLayoutSize(Container parent);
  public void previous(Container parent);
  public void removeLayoutComponent(Component comp);
  public void show(Container parent, String name);
  public String toString(); // overrides Object.toString();
}

// java.awt.Checkbox - page 241 Nutshell 1.ed - 288 Nutshell 2.ed
extern public class Checkbox extends Component in "java.awt" {
  public Checkbox();
  public Checkbox(String label);
  public Checkbox(String label, boolean state);
  public Checkbox(String label, boolean state, CheckboxGroup group);
  public Checkbox(String label, CheckboxGroup group, boolean state);
  public synchronized void addNotify(); // overrides Component.addNotify();
  public CheckboxGroup getCheckboxGroup();
  public String getLabel();
  public boolean getState();
  public void setCheckboxGroup(CheckboxGroup g);
  public void setLabel(String label);
  public void setState(boolean state);
}

// java.awt.CheckboxGroup - page 242 Nutshell 1.ed - 289 Nutshell 2.ed
extern public class CheckboxGroup extends Object in "java.awt" {
```



```
  public CheckboxGroup(); // empty
  public Checkbox getCurrent();
  public synchronized void setCurrent(Checkbox box);
  public String toString(); // overrides Object.toString()
}

// java.awt.CheckboxMenuItem - page 242 Nutshell 1.ed - 290 Nutshell 2.ed
extern public class CheckboxMenuItem extends MenuItem in "java.awt" {
  public CheckboxMenuItem();
  public CheckboxMenuItem(String label);
  public CheckboxMenuItem(String label, boolean state);
  public synchronized void addNotify(); // overrides Component.addNotify();
  public boolean getState();
  public String paramString(); // overrides MenuItem.paramString()
  public void setState(boolean t);
}

// java.awt.Choice - page 243 Nutshell 1.ed - 290 Nutshell 2.ed
extern public class Choice extends Component in "java.awt" {
  public Choice();
  public synchronized void addItem(String item);
  public synchronized void addNotify(); // overrides Component.addNotify();
  public int countItems();
  public String getItem(int index);
  public int getSelectedIndex();
  public String getSelectedItem();
  public synchronized void select(int pos); // throws IllegalArgumentException
  // public void select(String str);
}


// java.awt.Color - page 243 Nutshell 1.ed - 291 Nutshell 2.ed
// see also joos.lib.JoosConstants for color constants
extern public class Color in "java.awt" {
  public Color(int r, int g, int b);
  public Color(int rgb);
  public Color brighter();
  public Color darker();
  public boolean equals(Object obj); // overrides Object.equals()
  public int getBlue();
  public int getGreen();
  public int getRGB();
  public int getRed();
  public String toString(); // overrides Ojbect.toString();
}

// java.awt.Component - page 244 Nutshell 1.ed - 292 Nutshell 2.ed
// should be extends Object, but need to stick in ImageObserver
extern public abstract class Component extends ImageObserver in "java.awt" {
  public Component();
  public void addNotify();
  public Rectangle bounds();
  public int checkImage(Image image, ImageObserver observer);
  public Image createImage(int width, int height);
  public void deliverEvent(Event e);
  public synchronized void disable();
  public synchronized void enable();
  // public void enable(boolean cond);
  public Color getBackground();
  // public synchronized ColorModel getColorModel();
  public Font getFont();
  public FontMetrics getFontMetrics(Font font);
  public Color getForeground();
  public Graphics getGraphics();
  public Container getParent();
  // public ComponentPeer getPeer();
  public Toolkit getToolkit();
  public boolean gotFocus(Event evt, Object what);
  public boolean handleEvent(Event evt);
  public synchronized void hide();
  public boolean ImageUpdate(Image img, int flags, int x, int y, int w, int h);
```

```
  public synchronized boolean inside(int x, int y);
  public void invalidate();
  public boolean isEnabled();
  public boolean isShowing();
  public boolean isValid();
  public boolean isVisible();
  public boolean keyDown(Event evt, int key);
  public boolean keyUp(Event evt, int key);
  public void layout();  // empty
  public void list();
  public Component locate(int x, int y);
  public Point location();
  public boolean lostFocus(Event evt, Object what);
  public Dimension minimumSize();
  public boolean mouseDown(Event evt, int x, int y);
  public boolean mouseDrag(Event evt, int x, int y);
  public boolean mouseEnter(Event evt, int x, int y);
  public boolean mouseExit(Event evt, int x, int y);
  public boolean mouseMove(Event evt, int x, int y);
  public boolean mouseUp(Event evt, int x, int y);
  public void move(int x, int y);
  public void nextFocus();
  public void paint(Graphics g); // empty
  public void paintAll(Graphics g);
  public boolean postEvent(Event e);
  public Dimension preferredSize();
  // public boolean prepareImage(Image image,ImageObserver observer);
  public void print(Graphics g);
  public void printAll(Graphics g);
  public synchronized void removeNotify();
  public void repaint();
  public void requestFocus();
  public synchronized void reshape(int x, int y, int width, int height);
  public void resize(int width, int height);
  public synchronized void setBackground(Color c);
  public synchronized void setCursor(Cursor cursor);
  public synchronized void setFont(Font f);
  public synchronized void setForeground(Color c);
  public synchronized void show();
  // public void show(boolean cond);
  public Dimension size();
  public String toString(); // overrides Object.toString()
  public void update(Graphics g);
  public void validate();
}

// java.awt.Container - page 246 Nutshell 1.ed - 295 Nutshell 2.ed
// see also joos.lib.JoosContainer for add(Sring name, Component comp)
extern public abstract class Container extends Component in "java.awt" {
  public Container();
  public Component add(Component comp);
  // public Component add(String name, Component comp);
  // public Component add(Component comp, int pos);
  public synchronized void addNotify(); // overrides Component.addNotify()
  public int countComponents();
  public void deliverEvent(Event e);
  public synchronized Component getComponent(int n);
  public LayoutManager getLayout();
  public Insets insets();
  public synchronized void layout(); // overrides Component.layout()
  //public void list(PrintStream out, int indent);// overrides Component.list()
  public Component locate(int x, int y); // overrides Component.locate()
  public synchronized Dimension minimumSize(); // overrides Component
  public void paintComponents(Graphics g);
  public synchronized Dimension preferredSize(); // overrrides Component
  public void printComponents(Graphics g);
  public synchronized void remove(Component comp);
  public synchronized void removeAll();
  public synchronized void removeNotify(); // overrides Component
  public void setLayout(LayoutManager mgr);
  public synchronized void validate(); // overrides Component
```



```
}

// java.awt.Cursor - not in java 1.0 - 297 Nutshell 2.ed
extern public class Cursor extends Object in "java.awt" {
// see also joos.lib.JoosConstants,   C_DEFAULT_CURSOR;
//                                    C_CROSSHAIR_CURSOR
//                                    C_HAND_CURSOR
//                                    C_MOVE_CURSOR
//                                    C_TEXT_CURSOR
//                                    C_WAIT_CURSOR
//                                    C_N_RESIZE_CURSOR
//                                    C_S_RESIZE_CURSOR
//                                    C_W_RESIZE_CURSOR
//                                    C_E_RESIZE_CURSOR
//                                    C_NE_RESIZE_CURSOR
//                                    C_NW_RESIZE_CURSOR
//                                    C_SE_RESIZE_CURSOR
//                                    C_SW_RESIZE_CURSOR
  public Cursor(int type);
  public Cursor getDefaultCursor();
  public Cursor getPredefinedCursor(int type);
  public int getType();
}


// java.awt.Dialog - page 247 Nutshell 1.ed - 298 Nutshell 2.ed
extern public class Dialog extends Window in "java.awt" {
  public Dialog(Frame parent);
  public Dialog(Frame parent, boolean modal);
  public Dialog(Frame parent, String title);
  public Dialog(Frame parent, String title, boolean modal);
  public synchronized void addNotify(); // overrides Window
  public String getTitle();
  public boolean isModal();
  public boolean isResizable();
  public void setResizable(boolean resizable);
  public void setTitle(String title);
}

// java.awt.Dimension - page 248 Nutshell 1.ed - 299 Nutshell 2.ed
// see also joos.lib.Dimension
extern public class Dimension extends Object in "java.awt" {
  public Dimension();
  public Dimension(Dimension d);
  public Dimension(int width, int height);
  public Dimension getSize();
  public void setSize(int width, int height);
  public String toString(); // overrides Object.toString()
}

// java.awt.Event - page 248 Nutshell 1.ed - 299 Nutshell 2.ed
// see also java.lib.JoosConstants
// see also java.lib.JoosEvent
extern public class Event extends Object in "java.awt" {

  public Event(Object target, int id, Object arg);
  public boolean controlDown();
  public boolean metaDown();
  public boolean shiftDown();
  public String toString(); // overrides Object.toString()
  public void translate(int x, int y);
}

// java.awt.FileDialog - page 250 Nutshell 1.ed - 301 Nutshell 2.ed
// see also java.lib.JoosConstants
extern public class FileDialog extends Dialog in "java.awt" {
  public FileDialog(Frame parent);
  public FileDialog(Frame parent, String title);
  public FileDialog(Frame parent, String title, int mode);
  public synchronized void addNotify(); // overrides Dialog.addnotify()
  public String getDirectory();
```

```
  public String getFile();
  // public FilenameFilter getFilenameFilter();
  public int getMode();
  public void setDirectory(String dir);
  public void setFile(String file);
  // public void setFilenameFilter(FilenameFilter filter);
  public void setMode(int mode);
}

// java.awt.FlowLayout - page 250 Nutshell 1.ed - 302 Nutshell 2.ed
// see also java.lib.JoosConstants
extern public class FlowLayout extends LayoutManager in "java.awt" {
// should be extends Object implements LayoutManager
  public FlowLayout();
  public FlowLayout(int align);
  public FlowLayout(int align, int hgap, int vgap);
  public void addLayoutComponent(String name, Component comp);
  public void layoutContainer(Container target);
  public Dimension minimumLayoutSize(Container target);
  public Dimension preferredLayoutSize(Container target);
  public void removeLayoutComponent(Component comp); // empty
  public void setVgap(int vgap);
  public void setHgap(int hgap);
  public String toString(); // overrides Object.toString()
}

// java.awt.Font - page 251 Nutshell 1.ed - 303 Nutshell 2.ed
//   also see joos.lib.JoosConstants
extern public class Font extends Object in "java.awt" {
  public Font(String name, int style, int size);
  public boolean equals(Object obj); // overrides Object.equals()
  public String getFamily();
  public String getName();
  public int getSize();
  public int getStyle();
  public boolean isBold();
  public boolean isItalic();
  public boolean isPlain();
  public String toString(); // overrides Object.toString();
}

// java.awt.FontMetrics - page 252 Nutshell 1.ed - 304 Nutshell 2.ed
extern public class FontMetrics extends Object in "java.awt" {
  public FontMetrics(Font font);  // should be protected
  public int charWidth(int ch);
  public int getAscent();
  public int getDescent();
  public Font getFont();
  public int getHeight();
  public int getLeading();
  public int getMaxAdvance();
  public int getMaxAscent();
  public int getMaxDecent();
  public int getMaxDescent();
  public int stringWidth(String str);
  public String toString(); // overrides Object
}

// java.awt.Frame - page 252 Nutshell 1.ed - 305 Nutshell 2.ed
//   also see joos.lib.JoosConstants
extern public class Frame extends Window in "java.awt" {
// implements MenuContainer
  public Frame();
  public Frame(String title);
  public synchronized void addNotify(); // overrides Window.addNotify()
  public synchronized void dispose();   // overrides Window.dispose()
  public int getCursorType();
  public Image getIconImage();
  public MenuBar getMenuBar();
  public String getTitle();
  public boolean IsResizable();
```



```
  // public synchronized void remove(MenuComponent m); // problem with override
                                                      // of remove in Container
  public void SetCursor(int cursorType);
  public void setIconImage(Image image);
  public synchronized void setMenuBar(MenuBar mb);
  public void setResizable(boolean resizable);
  public void setTitle(String title);
}

// java.awt.Graphics - page 254 Nutshell 1.ed - 306 Nutshell 2.ed
extern public abstract class Graphics extends Object in "java.awt" {
  public Graphics();
  public abstract void clearRect(int x, int y, int width, int height);
  public abstract void clipRect(int x, int y, int width, int height);
  public abstract void copyArea(int x, int y, int width, int height,
                                                          int dx, int dy);
  public Graphics create(int x, int y, int width, int height);
  public abstract void dispose();
  public void draw3DRect(int x, int y, int width, int height, boolean raised);
  public abstract void drawArc(int x, int y, int width, int height,
                                int startAngle, int arcAngle);
  public abstract boolean drawImage(Image img, int x, int y,
                                      ImageObserver observer);
  public abstract void drawLine(int x1, int y1, int x2, int y2);
  public abstract void drawOval(int x, int y, int width, int height);
  public void drawPolygon(Polygon p);
  public void drawRect(int x, int y, int width, int height);
  public abstract void drawRoundRect(int x, int y, int width, int height,
                               int arcWidth, int arcHeight);
  public abstract void drawString(String str, int x, int y);
  public void fill3DRect(int x, int y, int width, int height, boolean raised);
  public abstract void fillArc(int x, int y, int width, int height
                               int startAngle, int arcAngle);
  public abstract void fillOval(int x, int y, int width, int height);
  public void fillPolygon(Polygon p);
  public abstract void fillRect(int x, int y, int width, int height);
  public abstract void fillRoundRect(int x, int y, int width, int height,
                                 int arcWidth, int arcHeight);
  public void finalize();
  public abstract Rectangle getClipRect();
  public abstract Color getColor();
  public abstract Font getFont();
  public abstract FontMetrics getFontMetrics(Font f);
  public abstract void setColor(Color c);
  public abstract void setFont(Font font);
  public abstract void setPaintMode();
  public abstract void setXORMode(Color c1);

  public String toString(); // overrides Object
  public abstract void translate(int x, int y);
}

// java.awt.GridBagConstraints - page 255 Nutshell 1.ed - 307 Nutshell 2.ed
//    see also joos.lib.JoosConstants
//    see also joos.lib.JoosGridBagConstraints
extern public class GridBagConstraints extends Object in "java.awt" {
// implements Cloneable
  public GridBagConstraints();
}

// java.awt.GridBagLayout - page 256 Nutshell 1.ed - 309 Nutshell 2.ed
//      see also joos.lib.JoosConstants
extern public class GridBagLayout extends LayoutManager in "java.awt" {
// implements LayoutManager
  public GridBagLayout();
  public void addLayOutComponent(String name, Component comp);
  public GridBagConstraints getConstraints(Component comp);
  public Point getLayoutOrigin();
  public void layoutContainer(Container target);
  public Point location(int x, int y);
  public Dimension minimumLayoutSize(Container target);
```

```
  public Dimension perferredLayoutSize(Container target);
  public void removeLayoutComponent(Component comp); // empty
  public void setConstraints(Component comp, GridBagConstraints constraints);
  public String toString(); // overrides Object.toString()
}

// java.awt.GridLayout - page 257 Nutshell 1.ed - 310 Nutshell 2.ed
extern public class GridLayout extends LayoutManager in "java.awt" {
  // implements LayoutManager
  public GridLayout();
  public GridLayout(int rows, int cols);
  public GridLayout(int rows, int cols, int Hgap, int Vgap);
  public void addLayOutComponent(String name, Component comp);
  public int getColumns();
  public int getHgap();
  public int getRows();
  public int getVgap();
  public void layoutContainer(Container parent);
  public Dimension minimumLayoutSize(Container parent);
  public Dimension perferredLayoutSize(Container parent);
  public void removeLayoutComponent(Component comp); // empty
  public void setColumns(int cols);
  public void setHgap(int hgap);
  public void setRows(int rows);
  public void setVgap(int vgap);
  public String toString(); // overrides Object.toString();
}

// java.awt.Image - page 258 Nutshell 1.ed - 311 Nutshell 2.ed
// see also joos.lib.JoosConstants
extern public abstract class Image extends Object in "java.awt" {
  public Image();
  public abstract void flush();
  public abstract Graphics getGraphics();
  public abstract int getHeight(ImageObserver observer);
  public abstract Object getProperty(String name, ImageObserver obs);
  public abstract ImageProducer getSource();
  public abstract int getWidth(ImageObserver observer);
}

// java.awt.image.ImageConsumer - page 275 Nutshell 1.ed - 365 Nutshell 2.ed
// should be an interface - Do not try to extend this in a JOOS program
extern public abstract class ImageConsumer extends Object in "java.awt.image" {
  public ImageConsumer();
  public abstract void imageComplete(int status);
  // public abstract void setColorModel(ColorModel m);
  public abstract void setDimensions(int width, int height);
  public abstract void setHints(int hintflags);
}

// java.awt.image.ImageObserver - page 276 Nutshell 1.ed - 367 Nutshell 2.ed
// should be an interface - DO not try to extend this in a JOOS program
extern public abstract class ImageObserver extends Object in "java.awt.image" {
  public ImageObserver();
  public abstract boolean imageUpdate(Image img, int infoflags,
                                      int x, int y, int w, int h);
}

// java.awt.image.ImageProducer - page 276 Nutshell 1.ed - 367 Nutshell 2.ed
// should be an interface - do not try to extend this in a JOOS program
extern public abstract class ImageProducer extends Object in "java.awt.image" {
  public ImageProducer();
  public abstract void addConsumer(ImageConsumer ic);
  public abstract boolean isConsumer(ImageConsumer ic);
  public abstract void removeConsumer(ImageConsumer ic);
  public abstract void requestTopDownLeftRightResend(ImageConsumer ic);
  public abstract void startProduction(ImageConsumer ic);
}

// java.awt.Insets - page 258 Nutshell 1.ed - 312 Nutshell 2.ed
extern public class Insets extends Object in "java.awt" {
```



```
  // implements Cloneable
  public Insets(int top, int left, int bottom, int right);
  public String toString(); // overrides Object.toString()
}

// java.awt.Label - page 259 Nutshell 1.ed - 313 Nutshell 2.ed
//    see also joos.lib.JoosConstants (note that you must use
//            LABEL_CENTER() instead of CENTER,  same for LEFT and RIGHT.
extern public class Label extends Component in "java.awt" {
  public Label();
  public Label(String label);
  public Label(String label, int alignment);
  public synchronized void addNotify(); // overrides Component.addNotify()
  public int getAlignment();
  public void setAlignment(int alignment); // throws IllegalArgument Exc
  public String getText();
  public void setText(String s);
}

// java.awt.LayoutManager - page 259 Nutshell 1.ed - 313 Nutshell 2.ed
//    should be public abstract interface LayoutManager
//    do NOT try to extend this is a JOOS program
extern public abstract class LayoutManager extends Object in "java.awt" {
  public LayoutManager();
  public abstract void addLayoutComponent(String name, Component comp);
  public abstract void layoutContainer(Container parent);
  public abstract Dimension minimumLayoutSize(Container parent);
  public abstract Dimension preferredLayoutSize(Container parent);
  public abstract void removeLayoutComponent(Component comp);
}

// java.awt.List - page 260 Nutshell 1.ed - Nutshell 2.ed 314
extern public class List extends Component in "java.awt" {
  public List();
  public List(int rows);
  public List(int rows, boolean multipleSelections);
  public synchronized void addItem(String item);
  //public synchronized void addItem(String item, int index);
  public synchronized void addNotify(); // overrides Component.addNotify()
  public boolean allowsMultipleSelections();
  public synchronized void clear();
  public int countItems();
  public synchronized void delItem(int position);
  public synchronized void delItems(int start, int end);
  public synchronized void deselect(int index);
  public String getItem(int index);
  public int getRows();
  public synchronized int getSelectedIndex();
  public synchronized int getSelectedItem();
  public int getVisibleIndex();
  public synchronized boolean isSelected(int index);
  public void makeVisible(int index);
  public Dimension mimimumSize(); // overrides Component.minimumSize()
  public Dimension preferredSize(); // overrides Component.preferredSize()
  public synchronized void removeNotify(); // overrides Component.removeNotify()
  public synchronized void replaceItem(String newValue, int index);
  public synchronized void select(int index);
  public void setMultipleSelections(boolean v);
}

// java.awt.MediaTracker - page 261 Nutshell 1.ed - 316 Nutshell 2.ed
// see also joos.lib.JoosConstants
// see also joos.lib.JoosMediaTracker that gives new versions
//            of waitForAll and waitForId that return bools instead
//            of throwing InterruptedException
extern public class MediaTracker extends Object in "java.awt" {
  public MediaTracker(Component comp);
  public void addImage(Image image, int d);
  // public void addImage(Image image, int d, int w, int h);
  // public boolean checkAll();
  public synchronized boolean checkAll(boolean load);
```

```
  // public boolean checkID(int id);
  public synchronized boolean checkID(int id,boolean load);
  public synchronized boolean isErrorAny();
  public synchronized boolean isErrorID(int id);
  public int statusAll(boolean load);
  public int statusID(int id, boolean load);
  // public void waitForAll() throws InterruptedException;
  // public void waitForID(int id) throws InterruptedException;
}

// java.awt.Menu - page 262 Nutshell 1.ed - 317 Nutshell 2.ed
extern public class Menu extends MenuItem in "java.awt" {
  // implements MenuContainer
  public Menu();
  public Menu(String label);
  public Menu(String label, boolean tearOff);
  public synchronized MenuItem add(MenuItem mi);
  // public void add(String label);
  public synchronized void addNotify(); // overrides MenuItem.addNotify()
  public void addSeparator();
  public int countItems();
  public MenuItem getItem(int index);
  public boolean isTearOff();
  public synchronized void remove(int index);
  // public synchronized void remove(MenuComponent item);
  public synchronized void removeNotify(); // overrides MenuComponent.removeNotify
()
}

// java.awt.MenuBar - page 262 Nutshell 1.ed - 317 Nutshell 2.ed
extern public class MenuBar extends MenuComponent in "java.awt" {
  // implements MenuContainer
  public MenuBar(); // empty
  public synchronized Menu add(Menu m);
  public synchronized void addNotify();
  public int countMenus();
  public Menu getHelpMenu();
  public Menu getMenu(int i);
  public synchronized void remove(int index);
  // public synchronized void remove(MenuComponent m);
  public void removeNotify(); // overrides MenuComponent.removeNotify()
  public synchronized void setHelpMenu(Menu m);
}

// java.awt.MenuComponent - page 263 Nutshell 1.ed - 318 Nutshell 2.ed
extern public abstract class MenuComponent extends Object in "java.awt" {
  public MenuComponent(); // empty
  public Font getFont();
  //public MenuContainer getParent();
  //public MenuComponentPerr getPeer();
  public boolean postEvent(Event evt);
  public void removeNotify();
  public void setFont(Font f);
  public String toString(); // overrides Object.toString()
}

// java.awt.MenuContainer - page 263 Nutshell 1.ed - 319 Nutshell 2.ed
// public abstract interface MenuContainer {
//   public abstract Font getFont();
//   public abstract boolean postEvent(Event evt);
//   public abstract void remove(MenuComponent comp);
// }

// java.awt.MenuItem - page 264 Nutshell 1.ed - 319 Nutshell 2.ed
extern public class MenuItem extends MenuComponent in "java.awt" {
  public MenuItem();
  public MenuItem(String label);
  public MenuItem(String label, MenuShortcut s);
  public synchronized void addNotify();
  public void disable();
  // public void enable();
```



```
  public void enable(boolean cond);
  public String getLabel();
  public boolean isEnabled();
  // public String paramString(); // overrides MenuComponent.paramString()
  public void setLabel(String label);
}

// java.awt.MenuShortcut - Not in Java 1.0 - Nutshell 2.ed 320
extern public class MenuShortcut extends Object in "java.awt" {
  public MenuShortcut(int key);
  public MenuShortcut(int key, boolean useShiftModifier);
  public boolean equals(Object obj);
  public int getKey();
  public String toString();
  public boolean usesShiftModifier();
}

// java.awt.Panel - page 264 Nutshell 1.ed - 321 Nutshell 2.ed
extern public class Panel extends Container in "java.awt" {
  public Panel();
  public Panel(LayoutManager layout);
  public synchronized void addNotify(); // overrides Container.addNotify()
}

// java.awt.Point - page 265 Nutshell 1.ed - 321 Nutshell 2.ed
extern public class Point extends Object in "java.awt" {
  public Point();
  public Point(Point p);
  public Point(int x, int y);
  public boolean equals(Object obj); // overrides Object.equals()
  public Point getLocation();
  public void setLocation(int x, int y);
  public void move(int x, int y);
  public String toString(); // overrides Object.toString()
  public void translate(int x, int y);
}

// java.awt.Polygon - page 265 Nutshell 1.ed - 322 Nutshell 2.ed
extern public class Polygon extends Object in "java.awt" {
  public Polygon();
  public void addPoint(int x, int y);
  public boolean contains(int x, int y);
  public Rectangle getBoundingBox();
  public boolean Inside(int x, int y);
  public void translate(int deltaX, int deltaY);
}

// java.awt.PopupMenu - not in Java 1.0 - 322 Nutshell 2.ed
extern public class PopupMenu extends Menu in "java.awt" {
  public PopupMenu();
  public PopupMenu(String label);
  public synchronized void addNotify();
  public void show(Component origin, int x, int y);
}


// java.awt.Rectangle - page 265 Nutshell 1.ed - 324 Nutshell 2.ed
// see also JoosRectangle to get at instance variables
extern public class Rectangle extends Object in "java.awt" {
  public Rectangle();
  public Rectangle(Rectangle r);
  public Rectangle(int x, int y, int width, int height);
  public Rectangle(int width, int height);
  public Rectangle(Point p,Dimension d);
  public Rectangle(Point p);
  public Rectangle(Dimension d);
  public void add(Rectangle r);
  public boolean equals(Object obj); // overrides Object.equals()
  public void grow(int h, int v);
  public boolean inside(int x, int y);
  public Rectangle intersection(Rectangle r);
```

```
  public boolean intersects(Rectangle r);
  public boolean isEmpty();
  public void move(int x, int y);
  public void reshape(int x, int y, int width, int height);
  public void resize(int width, int height);
  public void setBounds(int x, int y, int width, int height);
  public void setLocation(int x, int y);
  public void setSize(int width, int height);
  public String toString(); // Overrides Object.toString()
  public void translate(int x, int y);
  public Rectangle union(Rectangle r);
}

// java.awt.ScrollPane - Not in Java 1.0 - 325 Nutshell 2.ed
// see also joos.lib.JoosConstants, SCROLLBARS_ALWAYS
//                                  SCROLLBARS_AS_NEEDED
//                                  SCROLLBARS_NEVER
extern public class ScrollPane extends Container in "java.awt" {
  public ScrollPane();
  public ScrollPane(int scrollbarDisplayPolicy);
  public void addNotify();
  public void doLayout();
  public int getHScrollbarHeight();
  public Point getScrollPosition();
  public int getScrollbarDisplayPolicy();
  public int getVScrollbatWidth();
  public Dimension getViewportSize();
  public void printComponents(Graphics g);
  public void setLayout(LayoutManager mgr);
  public void setScrollPosition(int x, int y);
}

// java.awt.Scrollbar - page 266 Nutshell 1.ed - 327 Nutshell 2.ed
//     see also joos.lib.JoosConstants, SCROLLBAR_HORIZONTAL
//                                      SCROLLBAR_VERTICAL
extern public class Scrollbar extends Component in "java.awt" {
  public Scrollbar();
  public Scrollbar(int orientation);
  public Scrollbar(int orientation, int value, int visible, int minimum, int maxim
um);
  // public Scrollbar(int orientation, int value, int visible,
  //                  int minimum, int maximum);
  public synchronized void addNotify(); // overrides Component.addNotify()
  public int getLineIncrement();
  public int getMaximum();
  public int getMinimum();
  public int getOrientation();
  public int getPageIncrement();
  public int getValue();
  public int getVisible();
  public void setLineIncrement(int l);
  public void setPageIncrement(int l);
  public void setValue(int value);
  public void setValues(int value, int visible, int min, int max);
}

// java.awt.TextArea - page 267 Nutshell 1.ed - 329 Nutshell 2.ed
extern public class TextArea extends TextComponent in "java.awt" {
  public TextArea();
  public TextArea(String text);
  public TextArea(int rows, int cols);
  public TextArea(String text, int rows, int cols);
  // other constructors possible
  public synchronized void addNotify(); // Overrides Component.addNotify()
  public void appendText(String str);
  public int getColumns();
  public int getRows();
  public void InsertText(String str,int pos);
  public Dimension mimimumSize(); // overrides Component.mimimumSize()
  public Dimension preferredSize(); // overrides Component.preferredSize()
  public void replaceText(String str, int start, int end);
```



```
}

// java.awt.TextComponent - page 268 Nutshell 1.ed - 330 Nutshell 2.ed
extern public class TextComponent extends Component in "java.awt" {
  public TextComponent();  // doesn't have a constructor
  public String getSelectedText();
  public int getSelectionEnd();
  public int getSelectionStart();
  public String getText();
  public boolean isEditable();
  public synchronized void removeNotify(); // overrides Component.removeNotify()
  public void select(int selStart, int selEnd);
  public void selectAll();
  public void setEditable(boolean t);
  public void setText(String t);
}

// java.awt.TextField - page 268 Nutshell 1.ed - 331 Nutshell 2.ed
extern public class TextField extends TextComponent in "java.awt" {
  public TextField();
  public TextField(String text);
  public TextField(int columns);
  public TextField(String text, int cols);
  public synchronized void addNotify(); // overrides Component.addNotify()
  public boolean echoCharIsSet();
  public int getColumns();
  public int getEchoChar();
  public Dimension minimumSize(); // overrides Component.mimimumSize()
  public Dimension preferredSize(); // overrides Component.preferredSize()
  public void setColumns(int columns);
  public void setEchoChar(char c);
}

// java.awt.Toolkit - page 269 Nutshell 1.ed - 331 Nutshell 2.ed
extern public abstract class Toolkit extends Object in "java.awt" {
  public Toolkit();
  public abstract int checkImage(Image image, int width, int height,
                                 ImageObserver observer);
  public abstract Image createImage(ImageProducer producer);
  // public abstract ColorModel getColorModel();
  public abstract FontMetrics getFontMetrics(Font font);
  // public abstract Image getImage(String filename);
  public abstract Image getImage(URL url);
  public abstract int getScreenResolution();
  public abstract Dimension getScreenSize();
  public abstract boolean prepareImage(Image image, int width,
                                       int height, ImageObserver observer);
  public abstract void sync();
}

// java.awt.Window - page 270 Nutshell 1.ed - 333 Nutshell 2.ed
extern public class Window extends Container in "java.awt" {
  public Window(Frame parent);
  public synchronized void AddNotify(); // overrides Container.addNotify()
  public synchronized void dispose();
  public Toolkit getToolkit(); // overrides Component.getToolkit()
  public boolean isShowing();
  public final String getWarningString();
  public synchronized void pack();
  public synchronized void show(); // overrides Component.show()
  public void toBack();
  public void toFront();
}
```

```
// ----------------------------------------------------------------
// The following classes are defined in the standard java class
//   libraries,  and are described in the book:
//   "The Java(tm) Language Specification", by Gosling, Joy and Steele,
//   published by Addison-Wesley.   On-line copies of the book are
//   available via <http://java.sun.com/doc/language_specification.html>.
// ----------------------------------------------------------------

// java.lang.Object - Section 20.1, page 458
// see also joos.lib.JoosObject to get the wait method
extern public class Object in "java.lang" {
  public Object();
  public String toString();
  public final void notify(); // throws IllegalMonitorStateException
  public final void notifyAll(); // throws IllegalMonitorStateException
  public boolean equals(Object obj);
}

// java.lang.Boolean - Section 20.4, page 469 - page 445 Nutshell 2.ed
extern public final class Boolean in "java.lang" {
  public Boolean(boolean value);
  public Boolean(String s);
  public String toString();
  public boolean equals(Object obj);
  public boolean booleanValue();
}

// java.lang.Character - page 445 Nutshell 2.ed
extern public final class Character in "java.lang" {
  public Character(char value);
  public boolean isDefined(char ch);
  public boolean isDigit(char ch);
  public boolean isISOControl(char ch);
  public boolean isLetter(char ch);
  public boolean isLetterOrDigit(char ch);
  public boolean isLowerCase(char ch);
  public boolean isSpaceChar(char ch);
  public boolean isTitleCase(char ch);
  public boolean isUpperCase(char ch);
  public boolean isWhitespace(char ch);
  public char toLowerCase(char ch);
  public char toTitleCase(char ch);
  public char toUpperCase(char ch);
  public char charValue();
  public boolean equals(Object obj);
  public String toString();
}

// java.lang.Integer - Section 20.6, page 487 - page 459 Nutshell 2.ed
extern public final class Integer in "java.lang" {
  public Integer(int value);
  public Integer(String s);
  public String toString();
  public boolean equals(Object obj);
  public int intValue();
}

// java.lang.Runnable - page 467 Nutshell 2.ed
//   should be an interface, don't extend it in Joos programs, rather
//     extend JoosRunnable which is a real class - see joos.lib.JoosRunnable
extern public abstract class Runnable extends Object in "java.lang" {
 public Runnable();
 public abstract void run();
}

// java.lang.String - Section 20.12, page 531 - page 472 Nutshell 2.ed
extern public final class String in "java.lang" {
  public String();
  public String(String value);
  public String(StringBuffer buffer);
  public String vlaueOf(boolean b);
```



```
  public char charAt(int index);
  public int compareTo(String anotherString);
  public boolean endsWith(String suffix);
  public boolean equals(Object obj);
  public boolean equalsIgnoreCase(String anotherString);
  public int indexOf(String str, int fromIndex);
  public int lastIndexOf(String str, int fromIndex);
  public int length();
  public boolean regionMatches(boolean ignoreCase, int toffset,
                      String other, int ooffset, int len);
  public boolean startsWith(String prefix, int toffset);
  public String substring(int beginIndex, int endIndex);
  public String concat(String str);
  public String toLowerCase();
  public String toUpperCase();
  public String toString();
  public String trim();
}

// java.lang.StringBuffer - Section 20.13 - page 473 Nutshell 2.ed
extern public class StringBuffer in "java.lang" {
  public StringBuffer();
  public StringBuffer(int length);
  public StringBuffer(String str);
  public String toString();
  public int length();
  public void setLength(int newLength);
  public int capacity();
  public void ensureCapacity(int minimumCapacity);
  public StringBuffer append(Object obj);
  public StringBuffer insert(int offset, Object obj);
  public StringBuffer reverse();
}

// java.lang.Thread - page 325 in Java in a Nutshell 1.ed - page 476 Nutshell 2.ed
// should be extends Object implements Runnable
// see also joos.lib.JoosThread
extern public class Thread extends Runnable in "java.lang" {
  public Thread();
  public Thread(Runnable target);
  public Thread(String name);
  public Thread(Runnable target,String name);
  public void checkAccess(); // throws SecurityException (runtime)
  public int countStackFrames(); // throws IllegalThreadStateException (runtime)
  public final String getName();
  public final int getPriority();
  public final boolean isAlive();
  public final boolean isDaemon();
  public final void resume();
  public void run();
  public final void setDaemon(boolean on); // throws IllegalThreadStateException
  public final void setName(String name);
  public final void setPriority(int Priority); // throws IllegalArgumentExc
  public synchronized void start(); // throws IllegalThreadStateException
  public final void stop();
  public final void suspend();
  public String toString(); // overrides Object.toString()
}

// java.util.BitSet - Section 21.2 - page 618 - page 445 Nutshell 2.ed
extern public class BitSet in "java.util" {
  public BitSet();
  public BitSet(int nbits);
  public String toString();
  public boolean equals(Object obj);
  public boolean get(int bitIndex);
  public void set(int bitIndex);
  public void clear(int bitIndex);
  public void and(BitSet set);
  public void or(BitSet set);
  public void xor(BitSet set);
```

```
  public int size();
}

// java.util.Date - Section 21.3, page 622 - page 531 Nutshell 2.ed
extern public class Date in "java.util" {
  public Date();
  public Date(int year, int month, int date,
              int hours, int minutes, int seconds);
  public String toString();
  public boolean equals(Object obj);
  public int getYear();
  public void setYear(int year);
  public int getMonth();
  public void setMonth(int month);
  public int getDate();
  public void setDate(int date);
  public int getDay();
  public int getHours();
  public void setHours(int hours);
  public int getMinutes();
  public int setMinutes(int minutes);
  public int getSeconds();
  public int setSeconds(int seconds);
  public boolean before(Date when);
  public boolean after(Date when);
  public String toLocaleString();
  public String toGMTString();
  public int getTimezoneOffset();
}

// java.util.Random - Section 21.9, page 646 - page 541 Nutshell 2.ed
extern public class Random in "java.util" {
  public Random();
  public int nextInt();
}

// java.util.Stack - page 543 Nutshell 2.ed
extern public class Stack in "java.util" {
  public Stack();
  public boolean empty();
  public synchronized Object peek();
  public synchronized Object pop();
  public Object push(Object item);
  public synchronized int search(Object o);
}

// java.util.StringTokenizer - Section 21.10, page 651 - 544 Nutshell 2.ed
extern public class StringTokenizer in "java.util" {
  public StringTokenizer(String str, String delim, boolean returnTokens);
  public StringTokenizer(String str, String delim);
  public StringTokenizer(String str);
  public boolean hasMoreTokens();
  public String nextToken(String delim);
  public boolean hasMoreElements();
  public Object nextElement();
  public int countTokens();
}

// java.util.Vector - Section 21.11, page 654 - page 545 Nutshell 2.ed
extern public class Vector in "java.util" { // implements Cloneable
  public Vector(int initialCapacity, int capacityIncrement);
  public Vector(int initialCapacity);
  public Vector();
  public final String toString(); // overrides Object.toString()
  public final Object elementAt(int index);
  public final void setElementAt(Object obj, int index);
  public final Object firstElement();
  public final Object lastElement();
  public final void addElement(Object obj);
  public final void insertElementAt(Object obj, int index);
  public final boolean removeElement(Object obj);
```



```
  public final void removeElementAt(int index);
  public final void removeAllElements();
  public final boolean isEmpty();
  public final int size();
  public final void setSize(int newSize);
  public final int capacity();
  public final void ensureCapacity(int minCapacity);
  public final void trimToSize();
  public final boolean contains(Object elem);
  public final int indexOf(Object elem);
  public final int lastIndexOf(Object elem);
}
```

```
// -----------------------------------------------------------------
// The following external classes have been written in Java and
//   compiled to make a directory of class files that can be
//   accessed from JOOS programs.
// -----------------------------------------------------------------

extern public class JoosObject in "joos.lib" {
  public JoosObject(Object myObject);
  // returns true if interrupted
  public final boolean wait(int timeout);
}

extern public class JoosString in "joos.lib" {
  public JoosString(String value);
  public boolean string2Bool();
  public int string2Int();
  public String valueOf();
}

extern public class JoosIO in "joos.lib" {
  public JoosIO();
  public void print(String str);
  public void println(String str);
  public void flush();
  public int readInt();
  public boolean readBoolean();
  public String readLine();
}

extern public class JoosRandom in "joos.lib" {
  public JoosRandom();
  public JoosRandom(int seed);
  public int nextInt();
  public synchronized void setSeed(int seed);
}

extern public class JoosRandomAccessFile in "joos.lib" {
  public JoosRandomAccessFile (String name, String mode ) ;
  public void close();
  public int length ();
  public int read ();
  public boolean readBoolean();
  public int readInt();
  public String readLine();
  public String readUTF ();
  public int readUnsignedByte();
  public int readUnsignedShort();
  public void seek(int pos);
  public int skipBytes(int n);
  public void write(int b);
  public void writeBoolean(boolean v);
  public void writeByte(int v);
  public void writeBytes(String s);
  public void writeChar(int v);
  public void writeChars(String s);
  public void writeInt(int v);
  public void writeShort(int v);
  public void writeUTF(String str);
}


extern public abstract class JoosRunnable extends Runnable in "joos.lib" {
  public JoosRunnable();
  public abstract void run();
}

extern public class JoosThread in "joos.lib" {
  public JoosThread(Thread t);
  // get at constants
  public int MAX_PRIORITY();
  public int MIN_PRIORITY();
```



```
  public int NORM_PRIORITY();
  // get at static methods
  public int activeCount();
  public Thread currentThread();
  public void dumpStack();
  public boolean sleep(int millis);  // returns true if interrupted
  public void yield();
  // make a join that takes an int argument and returns bool
  public synchronized boolean join(int millis); //  returns true if
                                    // interrupted
}

extern public class JoosFraction in "joos.lib" {
  public JoosFraction(int top, int bot);
  public int top();
  public int bot();
  public void setTop(int t);
  public void setBot(int b);
}

extern public class JoosConstants in "joos.lib" {
  public JoosConstants();

  // from java.awt.Color
  public Color black();
  public Color blue();
  public Color cyan();
  public Color darkGray();
  public Color gray();
  public Color green();
  public Color lightGray();
  public Color magenta();
  public Color orange();
  public Color pink();
  public Color red();
  public Color white();
  public Color yellow();

  // from java.awt.Event
  public int ACTION_EVENT();
  public int GOT_FOCUS();
  public int LOST_FOCUS();
  public int KEY_ACTION();
  public int KEY_ACTION_RELEASE();
  public int KEY_PRESS();
  public int KEY_RELEASE();
  public int LIST_SELECT();
  public int LIST_DESELECT();
  public int LOAD_FILE();
  public int SAVE_FILE();
  public int MOUSE_DOWN();
  public int MOUSE_UP();
  public int MOUSE_DRAG();
  public int MOUSE_MOVE();
  public int MOUSE_ENTER();
  public int MOUSE_EXIT();
  public int SCROLL_ABSOLUTE();
  public int SCROLL_LINE_UP();
  public int SCROLL_LINE_DOWN();
  public int SCROLL_PAGE_UP();
  public int SCROLL_PAGE_DOWN();
  public int WINDOW_EXPOSE();
  public int WINDOW_ICONIFY();
  public int WINDOW_DEICONIFY();
  public int WINDOW_DESTROY();
  public int WINDOW_MOVED();

  public int ALT_MASK();
  public int CTRL_MASK();
  public int META_MASK();
  public int SHIFT_MASK();
```

```
  public int F1();
  public int F2();
  public int F3();
  public int F4();
  public int F5();
  public int F6();
  public int F7();
  public int F8();
  public int F9();
  public int F10();
  public int F11();
  public int F12();

  public int LEFT();
  public int RIGHT();
  public int UP();
  public int DOWN();
  public int HOME();
  public int END();
  public int PGUP();
  public int PGDN();

  // from java.awt.Font
  public int BOLD();
  public int ITALIC();
  public int PLAIN();

  // from java.awt.Frame
  public int CROSSHAIR_CURSOR();
  public int DEFAULT_CURSOR();
  public int E_RESIZE_CURSOR();
  public int HAND_CURSOR();
  public int MOVE_CURSOR();
  public int NE_RESIZE_CURSOR();
  public int NW_RESIZE_CURSOR();
  public int N_RESIZE_CURSOR();
  public int SE_RESIZE_CURSOR();
  public int SW_RESIZE_CURSOR();
  public int S_RESIZE_CURSOR();
  public int TEXT_CURSOR();
  public int WAIT_CURSOR();
  public int W_RESIZE_CURSOR();

  // from java.awt.Label
  public int LABEL_CENTER();
  public int LABEL_LEFT();
  public int LABEL_RIGHT();

  // from java.awt.ScrollPane
  public int SCROLLBRS_ALWAYS();
  public int SCROLLBRS_AS_NEEDED();
  public int SCROLLBRS_NEVER();

  // from java.awt.Scrollbar
  public int SCROLLBAR_HORIZONTAL();
  public int SCROLLBAR_VERTICAL();

  // from java.awt.FileDiaglog
  public int LOAD();
  public int SAVE();

  // from java.awt.FlowLayout
  public int FLOWLAYOUT_CENTER();
  public int FLOWLAYOUT_LEFT();
  public int FLOWLAYOUT_RIGHT();

  // from java.awt.GridBagConstraints
  public int GRIDBAGCONSTRAINTS_CENTER();
  public int EAST();
  public int NORTH();
```



```
  public int NORTHEAST();
  public int NORTHWEST();
  public int SOUTH();
  public int SOUTHEAST();
  public int SOUTHWEST();
  public int WEST();
  public int GRIDBAGCONSTRAINTS_HORIZONTAL();
  public int GRIDBAGCONSTRAINTS_VERTICAL();
  public int BOTH();
  public int NONE();
  public int RELATIVE();
  public int REMAINDER();

  // from java.awt.Image
  public Object UndefinedProperty();

  // from java.awt.MediaTracker
  public int ABORTED();
  public int COMPLETE();
  public int ERRORED();
  public int LOADING();

}


// to get at several things in java.lang.System
extern public final class JoosSystem in "joos.lib" {
  public JoosSystem();
  public int currentTimeMillis(); // is long in java
  public void gc();
  public void runFinalization();
  public void exit(int value);
}

// to get at public instant variables in a Dimension
extern public class JoosDimension extends Object in "joos.lib" {
  // Constructor
  public JoosDimension(Dimension d);

  // get values
  public int height();
  public int width();

  // set values
  public void setWidth(int width);
  public void setHeight(int height);

  // get Dimension
  public Dimension getDimension();

}

// to get at public instance variables in an Event
extern public class JoosEvent extends Object in "joos.lib" {
  // Constructor
  public JoosEvent(Event e);

  // get values
  public Object arg();
  public int clickCount();
  public Event evt();
  public int id();
  public int key();
  public int modifiers();
  public Object target();
  public int when();  // is long in java
  public int x();
  public int y();

  // set values
  public void setArg(Object arg);
```

```
  public void setClickCount(int count);
  public void setEvent(Event e);
  public void setId(int id);
  public void setKey(int key);
  public void setModifiers(int modifiers);
  public void setTarget(Object target);
  public void setWhen(int when);
  public void setX(int x);
  public void setY(int y);

  public Event getEvent();
}

// to get at methods add(String name, Component comp);
//   and             add(Componenet comp, int pos);
extern public class JoosContainer extends Object in "joos.lib" {
  public JoosContainer(Container c);
  public Component addString(String name, Component comp);
  public Component addPosition(Component comp, int pos);
}

// to get at public instance variables in a GridBagConstraints
extern public class JoosGridBagConstraints extends Object
                      in "joos.lib" {

  // Constructor
  public JoosGridBagConstraints(GridBagConstraints c);

  // getting the values from fields
  public int anchor();
  public int fill();
  public int gridheight();
  public int gridwidth();
  public int gridx();
  public int gridy();
  public Insets insets();
  public int ipadx();
  public int ipady();

  // setting the fields
  public void setAnchor(int i);
  public void setFill(int i);
  public void setGridHeight(int i);
  public void setGridWidth(int i);
  public void setGridX(int i);
  public void setGridY(int i);
  public void setInsets(Insets i);
  public void setIpadX(int i);
  public void setIpadY(int i);
  public void setWeightX(JoosFraction f);
  public void setWeightY(JoosFraction f);

  // getting back the GridBagConstraints
  public GridBagConstraints getConstraints();
}

extern public class JoosMediaTracker extends Object in "joos.lib" {
  public JoosMediaTracker (MediaTracker myTracker);
  public boolean waitForAll();
  public boolean waitForID(int id);
  public MediaTracker getMediaTracker();
}

// to get at public instance variables in Rectangle
extern public class JoosRectangle extends Rectangle in "joos.lib" {
  // Constructor
  public JoosRectangle(int x, int y, int w, int h);
  public int x();
  public int y();
  public int width();
  public int height();
```



```
  public void setX(int x);
  public void setY(int y);
  public void setWidth(int w);
  public void setHeight(int h);
}


extern public class JoosURL extends Object in "joos.lib" {
  public JoosURL(URL context, String spec);
  public Object getContent();
  public URL getURL();
  public boolean openConnection();
  public boolean openOutputStream();
  public boolean println(String s);
  public boolean print(String s);
  public boolean closeOutputStream();
  public boolean openInputStream();
  public String readLine();
  public boolean closeInputStream();
  public String getErrorLog();
}

extern public class WigApplet extends Applet in "joos.lib" {
  public WigApplet();
  public void addResult(String name, String value);
  public boolean openURL();
  public boolean returnResults();
  public void getResponse();
}
```

```
// see also joos.lib.JoosURL
extern public final class URL extends Object in "java.net" {
  public URL(String protocol, String host, int port, String file); // throws Malfo
rmedURLException
  public URL(String protocol, String host, String file); // throws MalformedURLExc
eption
  public URL(String spec); // throws MalformedURLException
  public URL(URL context,String spec); // throws MalformedURLException
  public boolean equals(Object obj); // overrides Object.equals();
  public String getFile();
  public String getHost();
  public int getPort();
  public String getProtocol();
  public String getRef();
  public boolean sameFile(URL other);
  public String toExternalForm();
  public String toString(); // overrides Object.toString();
}
```