

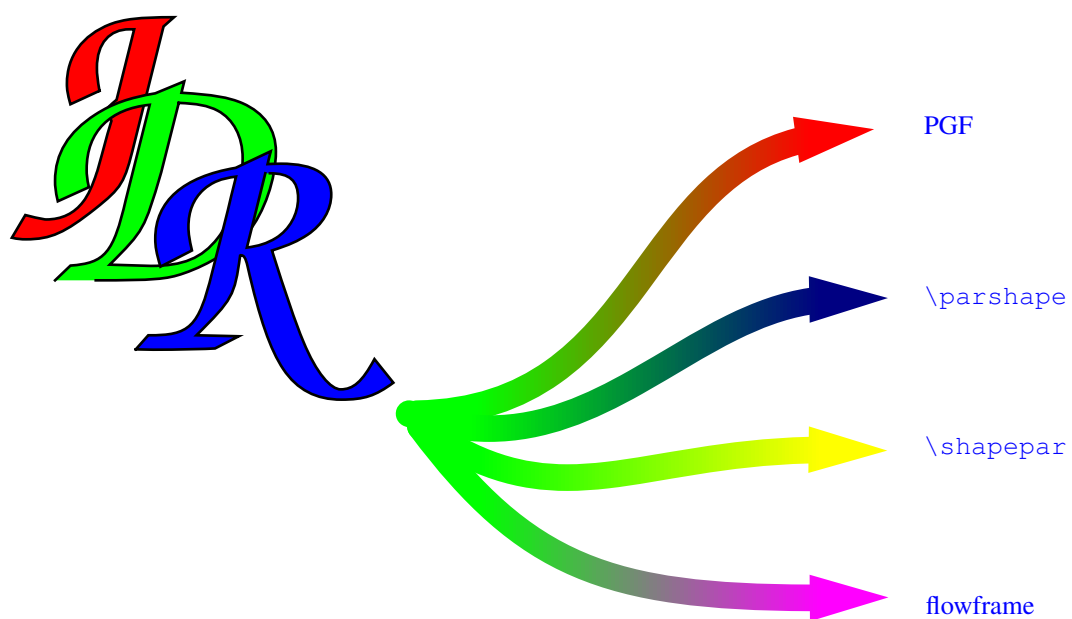
# Jpgfdraw User Manual

## Version 0.5.5b

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1<sup>st</sup> October, 2009



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This is a beta release: it has [known bugs](#) and may be liable to change. **It is strongly recommended that you frequently save your work.**

Please note that versions prior to 0.5b didn't correctly render some [text areas](#), so images created in earlier versions may appear slightly different when you upgrade.

This document is a user manual for Jpgfdraw. For information about Jdrview or jdrutils, see [jdrview.pdf](#) or [jdrutils.pdf](#), respectively.

The latest version of Jpgfdraw can be downloaded from <http://theoval.cmp.uea.ac.uk/jpgfdraw/>



Paragraphs starting with this icon indicate general  $\text{T}_{\text{E}}\text{X}$  or  $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$  related information. If you have no interest in using  $\text{T}_{\text{E}}\text{X}$  or  $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$ , you can ignore these paragraphs.



Paragraphs starting with this icon indicate information related to using the pgf package. If you have no interest in using this package, you can ignore these paragraphs.



Paragraphs starting with this icon indicate information related to using the flowfram package. If you have no interest in using this package, you can ignore these paragraphs. Note that information about the pgf package is also relevant as the style file that Jpgfdraw creates also uses the pgf package.

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# 1 Introduction

Jpgfdraw is a [vector graphics](#) application written in [Java™](#), with a [graphical user interface \(GUI\)](#). In order to run the application you must have the [Java™2 Platform, Standard Edition Runtime Environment \(JRE\)](#) installed (at least version 1.5). Jpgfdraw is based in part on Acorn's `!Draw` application, but was tailored specifically to produce files containing `pgfpicture` environments for use with Till Tantau's `pgf` [L<sup>A</sup>T<sub>E</sub>X](#) package. In Jpgfdraw, you can:

- [Construct shapes](#) using line, move and cubic Bézier segments.
- [Edit paths](#) by modifying the defining [control points](#).
- Incorporate [text](#) and [bitmap images](#) (for annotating and background effects).
- Text and paths can be [combined](#) to form a text along path effect.
- Extract the parameters for [T<sub>E</sub>X's \parshape](#) command and for the `\shapepar` command defined in Donald Arseneau's `shapepar` package.
- [Construct frames](#) for use with the `flowfram` package.
- Pictures can be [saved](#) as or [loaded](#) from Jpgfdraw's native [JDR](#) (binary) or [AJR](#) (ascii) file formats.
- Pictures can be [exported](#) as:
  - a [L<sup>A</sup>T<sub>E</sub>X](#) file containing a `pgfpicture` environment for inclusion in a [L<sup>A</sup>T<sub>E</sub>X](#) document;
  - a single-paged [L<sup>A</sup>T<sub>E</sub>X](#) document containing the image;
  - a [L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>](#) package based on the `flowfram` package;
  - an Encapsulated Postscript (EPS) file;
  - a PNG file;
  - a [scalable vector graphics \(SVG\)](#) file.

## 1.1 Installation

1. Ensure that you have the [JRE](#) installed. This can be downloaded from <http://java.sun.com/j2se/>. You must ensure that you use at least version 1.5, as Jpgfdraw does not work with earlier versions.
2. Download one of the following files:
  - `jpgfdraw-0.5.5b-uk.zip` — English (UK)
  - `jpgfdraw-0.5.5b-us.zip` — English (US)
  - `jpgfdraw-0.5.5b-zh.zip` — Menu and dialog items have been translated to Simplified Chinese by Wang Yong-Xian. Documentation is in English.

Sorry, Jpgfdraw does not come with an installation script, you'll have to do it the old fashioned way.

### 1.1.1 Linux and Similar Operating Systems

In the following `jpgfdraw-<version>-<lang>.zip` indicates which version of Jpgfdraw that you downloaded. For example, `jpgfdraw-0.5.5b-uk.zip`. Note that this procedure has changed from versions prior to version 0.3b.

1. Unzip `jpgfdraw-<version>-<lang>.zip`, e.g.:

```
unzip jpgfdraw-0.5.5b-uk -d /usr/share/
```

2. Add the bin sub-directory to your path, e.g.:

```
setenv PATH $PATH:/usr/share/jpgfdraw-0.5.5b-uk/bin
```

or

```
export PATH=$PATH:/usr/share/jpgfdraw-0.5.5b-uk/bin
```

or

```
declare -x PATH=$PATH:/usr/share/jpgfdraw-0.5.5b-uk/bin
```

You can add this line to your login script. (The name varies, but it may be `~/.cshrc`, `~/.bashrc`, `~/.login` or `~/.profile`—check your system’s documentation.)

3. To run Jpgfdraw, type `jpgfdraw` at the command prompt.

### 1.1.2 Windows

In the following `jpgfdraw-<version>-<lang>.zip` indicates which version of Jpgfdraw that you downloaded. For example, `jpgfdraw-0.5.5b-uk.zip`.

1. Unzip the contents of `jpgfdraw-<version>-<lang>.zip` into the folder in which you want it to reside. (Select the file `jpgfdraw-<version>-<lang>.zip`, click with the right mouse button to get the popup menu. Select “Unzip” (or it may say “Extract All”) it should then prompt you for the folder in which to extract the contents.)
2. To run the application, double-click on the file `jpgfdraw.jar` in the `lib` folder. If Windows doesn’t know what to do with a jar file, check that you have installed the [JRE](#). If you have, associate the jar file with `javaw.exe` which will probably be in

```
C:\Program Files\Java\jre1.5.0_07\bin
```

(or something similar).

3. If you want to create a shortcut on the desktop to Jpgfdraw, you need to do the following:
  - (a) Click with the right mouse button on the desktop and select `New` → `Shortcut`. Click on “Browse” and select `jpgfdraw.jar` (contained in the folder you created in step 1).

- (b) You can associate an icon with the shortcut. If you want to do this, select the shortcut you created in the previous step. Use the right mouse button to open up the popup menu, and select Properties. Click on “Change Icon”, click “Browse” and select `jpgfdraw.ico` in the `icons` folder of Jpgfdraw’s home folder.
4. If you want to associate the `.jdr` file extension with Jpgfdraw, you will need to do the following:
- (a) Go to the Start menu, and select “Control Panel”. Click on “Folder Options”. (If it says “Pick a Category”, select “Appearance and Themes”, and then click on “Folder Options”.) This will open up a dialog box.
  - (b) Select “File Types” tab.
  - (c) Click on the “New” button.
  - (d) In the box labelled “file extension” type: `jdr`
  - (e) If the option is available you can set the file type description to: Jpgfdraw Image File (You may have to click on a button marked “Advanced”.)
  - (f) Click “Okay”.
  - (g) Select JDR from the list of registered file types and click on the “Advanced” button.
  - (h) Click on the button labelled “Change Icon”.
  - (i) Click on “Browse”.
  - (j) Go to Jpgfdraw’s home folder then go to the `icons` folder.
  - (k) Select the file `jpdfdraw.ico`
  - (l) Click “Okay”.
  - (m) If the box labelled “Actions” has an item called “open” select it, and click on the “Edit” button, otherwise click on the “New” button. (If you select “New” type `open` in the box labelled “Action” when the New dialog box appears.)
  - (n) In the box labelled “Application used to perform action”, type (all on one line and include the double quotes):

```
"C:\Program Files\Java\jre1.5.0_07\bin\javaw.exe"  
-jar "C:\Program Files\jpgfdraw-0.5.5b-uk\jpgfdraw.jar" "%1"
```

(You may need to change the paths if the [JRE](#) and Jpgfdraw have been installed in different locations.)

- (o) Click “Okay”
- (p) Click “Okay” to close the Folder Options dialog box.

## 2 Accessibility

As from version 0.3b Jpgfdraw has improved support for users who have difficulties with or who are unable to use a mouse. (However please note [known bug 5](#).) Almost all Jpgfdraw's mouse functions can be emulated using the keyboard, however it should be noted that some systems do not permit applications to move the pointer, so keyboard functions that move the pointer are not guaranteed to work on every system. Keyboard accelerators and their menu mnemonic equivalents are listed in [Table 2.1](#). Keyboard accelerators for the [JavaHelp](#) system are listed in [Table 2.2](#).

Within editable text fields, you can use Ctrl-A to select all the text, or Shift followed by the left or right arrow key to select a portion of the text. If some of the text has been selected, you can use Ctrl-C or Ctrl-X to copy or cut the text onto the clipboard, and you can use Ctrl-V to paste text from the clipboard into the text field.

Table 2.1: Keyboard Accelerators and Menu Mnemonics

Accelerator	Function	Menu Mnemonic
Enter	Finish current <a href="#">path/text area</a> <i>or</i> Select Okay button in dialog boxes	Alt-O F Alt-O
Escape	Abandon current <a href="#">path</a> <i>or</i> Select Cancel button in dialog boxes	Alt-O A Alt-C
Delete	Delete selected <a href="#">control point</a>	F3 Alt-D
Insert	Add <a href="#">control point</a> <i>or</i> Display symbol dialog box	F3 Alt-A F3 Alt-I
Tab	Move focus to next focusable component	—
Space	Select component with current focus	—
PageUp	Scroll up by one screen full	—
PageDown	Scroll down by one screen full	—
Ctrl-PageDown	If in a tabbed pane: Move to the next tab Otherwise: Scroll right by one screen full	— —
Ctrl-PageUp	If in a tabbed pane: Move to the previous tab Otherwise: Scroll left by one screen full	— —
Arrow Keys	If left mouse button pressed: † move mouse by one pixel in given direction Otherwise: scroll by one tick mark in given direction	— —
Home	Scroll to the top of the <a href="#">canvas</a>	—
End	Scroll to the bottom of the <a href="#">canvas</a>	—
Ctrl-Home	Scroll leftmost	—
Ctrl-End	Scroll rightmost	—
F1	Display Handbook	Alt-H H
F2	Show/hide <a href="#">grid</a>	Alt-S G S
F3	Show popup menu (if available for current mode)	—

† Functions that move the pointer

*Continued on next page*

Table 2.1: Keyboard Accelerators and Menu Mnemonics (*Continued*)

Accelerator	Function	Mnemonics
F4	Emulate single mouse click in <a href="#">construction mode</a>	—
F5	†Go to coordinate	Alt-N G
F6	Select mode: deselect the <a href="#">back</a> -most selected <a href="#">object</a> , and select next object in the <a href="#">stack</a> Edit mode: select next <a href="#">control point</a>	Alt-N K  F3 Alt-N
F7	Select mode: Move selected <a href="#">objects</a> Edit mode: Move selected <a href="#">control point</a>	Alt-E M  F3 Alt-R
F8	Undo	Alt-E U
F9	Redo	Alt-E R
F10	Writes log file in the <a href="#">configuration directory</a>	
F11	Saves all images to <a href="#">configuration directory</a>	
Shift-F2	Lock/unlock grid	Alt-S G L
Shift-F5	Select next <a href="#">object</a> in the <a href="#">stack</a> (from the <a href="#">front</a> ), and deselect all others	Alt-N S
Shift-F6	Add next <a href="#">object</a> in the <a href="#">stack</a> (from the <a href="#">front</a> ) to selection	Alt-N A
Shift-F7	†Find selected <a href="#">objects</a>	Alt-N F
Alt-F4	Quit	Alt-F Q
Ctrl-A	Select all <a href="#">objects</a>	Alt-E A
Ctrl-B	Move selected <a href="#">objects</a> to the <a href="#">back</a>	Alt-E B
Ctrl-C	Copy selected <a href="#">objects</a> to clipboard	Alt-E C
Ctrl-D	Convert outline to a <a href="#">path</a>	Alt-T C
Ctrl-E	Switch to ellipse tool	Alt-O E
Ctrl-F	Move selected <a href="#">objects</a> to the <a href="#">front</a>	Alt-E F
Ctrl-G	Group selected <a href="#">objects</a>	Alt-T G
Ctrl-H	Shear selected <a href="#">objects</a>	Alt-T H
Ctrl-I	Edit selected <a href="#">path</a>	Alt-E H E
Ctrl-J	Merge selected <a href="#">paths</a>	Alt-T M
Ctrl-K	Switch to open curve tool	Alt-O C
Ctrl-L	Switch to open line tool	Alt-O L
Ctrl-M	Gap function	Alt-O G
Ctrl-N	New child window	Alt-F N
Ctrl-O	Open <a href="#">JDR</a> or <a href="#">AJR</a> file	Alt-F O
Ctrl-P	Switch to select tool	Alt-O S
Ctrl-Q	Quit	Alt-F Q
Ctrl-R	Switch to rectangle tool	Alt-O R
Ctrl-S	Save current image	Alt-F S
Ctrl-T	Switch to text tool	Alt-O T
Ctrl-U	Ungroup selected <a href="#">groups</a>	Alt-T U
Ctrl-V	Paste <a href="#">objects</a> from clipboard	Alt-E P
Ctrl-W	Rotate selected <a href="#">objects</a>	Alt-T R

†Functions that move the pointer

*Continued on next page*

Table 2.1: Keyboard Accelerators and Menu Mnemonics (*Continued*)

Accelerator	Function	Mnemonics
Ctrl-X	Cut selected <a href="#">objects</a>	Alt-E T
Ctrl-Y	Edit the selected paths' line styles	Alt-E H S A
Ctrl-Z	Scale selected <a href="#">objects</a>	Alt-T S
Ctrl+Shift-A	Deselect all	Alt-E D
Ctrl+Shift-I	Edit selected text	Alt-E X E
Ctrl+Shift-K	Switch to closed curve tool	Alt-O U
Ctrl+Shift-L	Switch to closed line tool	Alt-O I
Alt-1 . . . Alt-8	Linear gradient paint direction selectors	
Alt-1 . . . Alt-9	Radial gradient paint start location selectors	

Table 2.2: JavaHelp Viewer Shortcut Keys

<b>Key</b>	<b>Function</b>
Ctrl-F1	Displays alternative text for the toolbar button that currently has the focus.
F6	Moves the focus between the navigation pane and content pane.
Tab	Traverses through the viewer.
Shift-Tab	Traverses backwards through the viewer.
Space	Activates the toolbar button with the current focus.
Ctrl-Space	Follows a link in the content pane.
F8	Selects the splitter bar between the navigator pane and the content pane.
Left/Right Arrow	If the splitter bar is selected: Moves the splitter bar to the left/right If in the navigator pane: Moves to another navigator tab If in the viewer's toolbar: Moves the focus to the next toolbar button If in the content pane: Moves one character to the left/right.
Up/Down Arrow	If the splitter bar is selected: Moves the splitter bar to the left/right If in the navigator pane: Selects the previous/next item in the list If in the content pane: Moves the focus to the previous/next line.
Home	Selects the first item in the navigator list.
End	Selects the last item in the navigator list.
Ctrl-Home	Selects the first line in the content pane.
Ctrl-End	Selects the last line in the content pane.
Ctrl-T	Shifts focus to the next link in the content pane.
Ctrl+Shift-T	Shifts the focus to the previous link in the content pane.



See also:

- [§11.7 Step-by-Step Example: A House With No Mouse](#)

## 3 Settings

You can customise the appearance of Jpgfdraw's main window either using the [command line arguments](#) or using the [settings menu](#).

### 3.1 Command Line Arguments

Jpgfdraw can be invoked from a command prompt using:

```
jpgfdraw <option-list> <filename>
```

Note that *<option-list>* and *<filename>* may be omitted. Only one filename is permitted, and it must be either a [JDR](#) or an [AJR](#) file. This script uses the environment variable `JDR_JVMOPTS` to pass options to the [Java Virtual Machine \(JVM\)](#). For example, if you want to run Jpgfdraw with a maximum size of 128Mb for the memory allocation pool, you can set `JDR_JVMOPTS` to `-Xmx128m`:

```
setenv JDR_JVMOPTS -Xmx128m
```

This script also uses the environment variable `JPGFDRAW_OPTS` to pass options to Jpgfdraw. For example, if you always want Jpgfdraw to start up with the grid showing, you can set `JPGFDRAW_OPTS` to `-show_grid`:

```
setenv JPGFDRAW -show_grid
```

Note that these environment variables only have an effect if you use the `jpgfdraw` script to run the [JRE](#).

If you can't use the `jpgfdraw` script, you can invoke Jpgfdraw from the command line using (no line breaks):

```
java <java options> -jar jpgfdraw.jar <jpgfdraw options>  
<filename>
```

(You may need to include the full pathname to `jpgfdraw.jar`.)

The following options are provided:

- show\_grid** Show the [grid](#).
- noshow\_grid** Don't show the [grid](#).
- grid\_lock** Set the [grid](#) lock on.
- nogrid\_lock** Don't set the [grid](#) lock.
- toolbar** Show the [toolbars](#).
- notoolbar** Don't show the [toolbars](#).
- statusbar** Show the [status bar](#).
- nostatusbar** Don't show the [status bar](#).
- rulers** Show the [rulers](#).
- norulers** Don't show the [rulers](#).

**-paper** Set the paper size. This option must be followed by a string identifying the paper size. Known paper sizes are listed in [Table 3.1](#). Custom sizes can be specified using `-paper user <width> <height>`, where *<width>* and *<height>* must be positive dimensions. Recognised units: `pt`, `bp`, `in`, `mm`, `cm`, `pc`, `dd` and `cc`. If the unit is omitted, `bp` is assumed. Examples:

- `-paper a4r`
- `-paper user 8.5in 12in`
- `-paper user 600 1000`

**-debug** Enables the debug menu. This menu provides the functions: Debug → Object info (which displays diagnostic information about the currently selected objects), Debug → Write Log (which writes diagnostic information for all currently open images to a log file in the [configuration directory](#)) and Debug → Dump All (which saves all current images to a subdirectory of the configuration directory).

**-nodebug** Disables the debug menu (default). However you can still use F10 and F11 to do the same action as Debug → Write Log and Debug → Dump All, respectively.

**-version** Prints the current version to standard output.

**-help** Prints available command line options to standard output.

## 3.2 The Settings Menu

While `Jpgfdraw` is running, you can change the current settings using the Settings menu. Most of the settings will be remembered next time you use `Jpgfdraw`, but may be overridden either by [command line arguments](#) or by settings specified in any [JDR](#) or [AJR](#) file that you load.

### 3.2.1 Styles

Settings → Styles... can be used to set the current [path](#) and [text area](#) attributes. New paths and text areas will use these attributes when they are created. The attributes for existing paths and text areas are changed using the Edit menu. These settings are discussed in more detail in [chapter 9](#).

### 3.2.2 Show Tools

Settings → Show Tools will toggle between showing and hiding the [toolbars](#).

### 3.2.3 Show Rulers

Settings → Show Rulers will toggle between showing and hiding the [rulers](#).

### 3.2.4 Show Status Bar

Settings → Show Status Bar will toggle between showing and hiding the [status bar](#).



Table 3.1: Paper size identifiers for use with `-paper` command line switch.

a10	A10 portrait	a10r	A10 landscape
a9	A9 portrait	a9r	A9 landscape
a8	A8 portrait	a8r	A8 landscape
a7	A7 portrait	a7r	A7 landscape
a6	A6 portrait	a6r	A6 landscape
a5	A5 portrait	a5r	A5 landscape
a4	A4 portrait	a4r	A4 landscape
a3	A3 portrait	a3r	A3 landscape
a2	A2 portrait	a2r	A2 landscape
a1	A1 portrait	a1r	A1 landscape
a0	A0 portrait	a0r	A0 landscape
b10	B10 portrait	b10r	B10 landscape
b9	B9 portrait	b9r	B9 landscape
b8	B8 portrait	b8r	B8 landscape
b7	B7 portrait	b7r	B7 landscape
b6	B6 portrait	b6r	B6 landscape
b5	B5 portrait	b5r	B5 landscape
b4	B4 portrait	b4r	B4 landscape
b3	B3 portrait	b3r	B3 landscape
b2	B2 portrait	b2r	B2 landscape
b1	B1 portrait	b1r	B1 landscape
b0	B0 portrait	b0r	B0 landscape
c10	C10 portrait	c10r	C10 landscape
c9	C9 portrait	c9r	C9 landscape
c8	C8 portrait	c8r	C8 landscape
c7	C7 portrait	c7r	C7 landscape
c6	C6 portrait	c6r	C6 landscape
c5	C5 portrait	c5r	C5 landscape
c4	C4 portrait	c4r	C4 landscape
c3	C3 portrait	c3r	C3 landscape
c2	C2 portrait	c2r	C2 landscape
c1	C1 portrait	c1r	C1 landscape
c0	C0 portrait	c0r	C0 landscape
letter	Letter portrait	letterr	Letter landscape
legal	Legal portrait	legalr	Legal landscape
executive	Executive portrait	executiver	Executive landscape

### 3.2.5 Grid

The Settings → Grid submenu allows you to change the [grid](#) settings:

- Settings → Grid → Show Grid will toggle between displaying the [grid](#) on the [canvas](#) and hiding it. If there is enough memory available, the grid will be stored as a bitmap in order to improve redraw speed.
- Settings → Grid → Lock Grid will toggle between locking and unlocking the grid. If the grid is locked, mouse clicks will be translated to the nearest tick mark. This means that if you use a mouse click to set the location of a [control point](#) when constructing a [path](#), the point will be placed at the nearest tick mark. This also means that when you move a point while in [edit mode](#), the point will be moved in intervals of the gap between tick marks. Note that locking the grid does not affect the keyboard or menu driven functions, such as Navigate → Go To... (F5) or emulate a mouse click (F4).

When the grid is locked, the [status bar](#) will show the image  otherwise it will show the image .

**Warning:** if you lock the grid, you will be unable to use the mouse to select narrow [paths](#) that lie between tick marks as mouse clicks will be translated to the nearest tick mark, unless you use the drag rectangle (which may select other objects as well). Similarly, if the size of the control points is less than the gap between the tick marks, you will not be able to select control points using the mouse whilst in [edit mode](#). (You will however be able to select them using the Next Control (F6) popup menu item.)

- Settings → Grid → Grid Settings... will produce a dialog box in which you can specify the position of the tick marks and the units used.

### 3.2.6 Zoom

The Settings → Zoom submenu allows you to change the magnification. You can choose one of the predefined settings or you can specify an arbitrary setting using Settings → Zoom → User Defined... This dialog box should have the actual magnification factor entered, not the percentage. For example, 300% magnification should be entered as 3.

### 3.2.7 Paper

The Settings → Paper submenu allows you to change the paper size and orientation. In addition, Settings → Paper → Show Margins toggles between showing and hiding the printer margins, but note that this facility is only available if Jpgfdraw detects a printer, so you will need to ensure that the printer is switched on and connected to the computer for this setting to have any effect.

The predefined paper sizes A0 to A5, letter, legal and executive can be selected from the Settings → Paper menu. Other paper sizes can be selected from the dialog box displayed using Settings → Paper → Other... Select the radio button labelled Predefined to enable a list of additional known paper sizes or select the radio button labelled User to enter a custom size.

### 3.2.8 Configuration Dialog

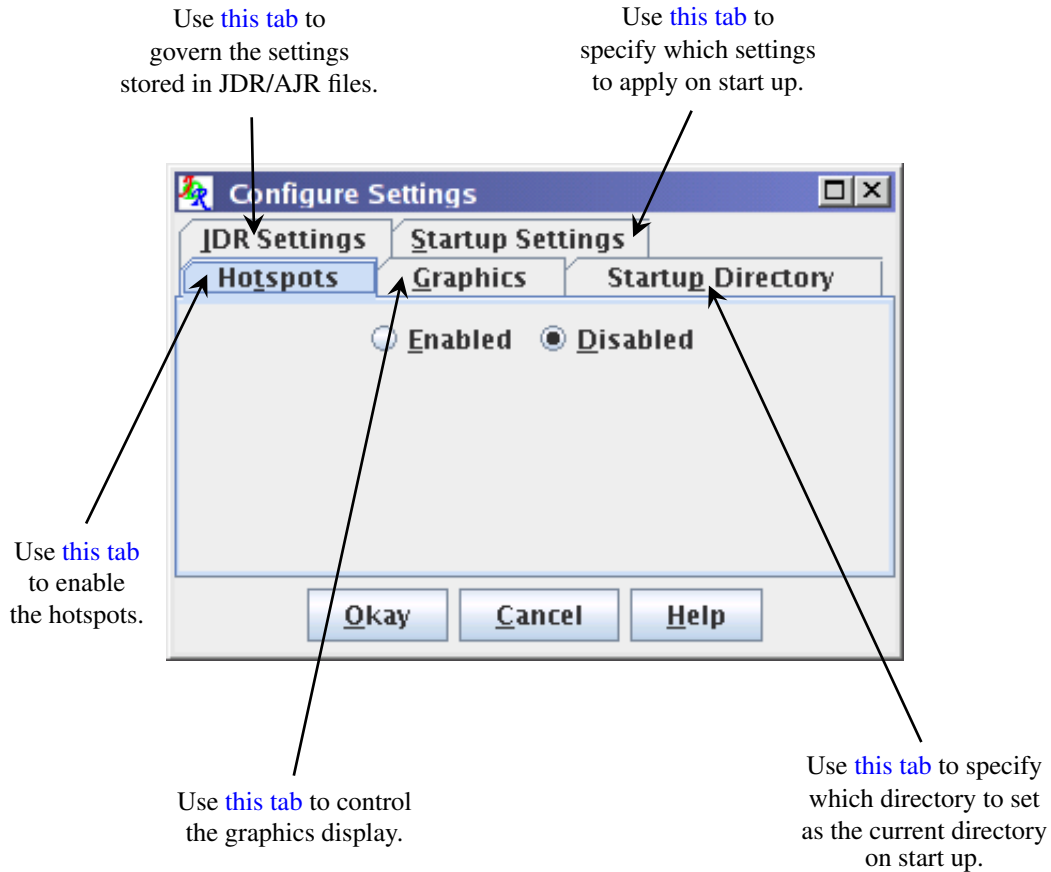


Figure 3.1: Configuration Dialog Box

The menu item Settings → Configure... will open up a dialog box (Figure 3.1) in which you can specify the following:

#### Graphics Tab

This tab allows you to:

- Choose between using or not using anti-aliasing to display the graphics.
- Choose between speed or quality in the rendering.
- Set the size of the [control points](#) in the Control Size field.

#### Hotspots Tab

Choose between enabling and disabling hotspots along the [bounding boxes](#). If hotspots are enabled, you can scale, rotate or shear [objects](#) by dragging the appropriate hotspot. You may want to disable this option when you want to move small objects, or you may end up transforming them instead of moving them.

When this option is enabled, the cursor will change shape<sup>1</sup> when you move it over the edge of the bounding box. Figure 3.2(a) shows how the bounding box is displayed when hotspots are enabled and Figure 3.2(b) shows how the bounding box is displayed when the hotspots have been disabled. Each hotspot is represented by a small square. The following functions are available:

Hotspot	Function	Cursor Appearance
Bottom left	rotate	hand
Bottom centre	scale vertically	South arrow
Bottom right	scale both directions	South-East arrow
Middle right	scale horizontally	East arrow
Top right	shear vertically	North arrow
Top left	shear horizontally	West arrow

Note that even if you have more than one object selected, only the object whose hotspot you are dragging will be transformed. As may be predicted, using hotspots is not as precise as using the transformation dialog boxes described in chapter 8.

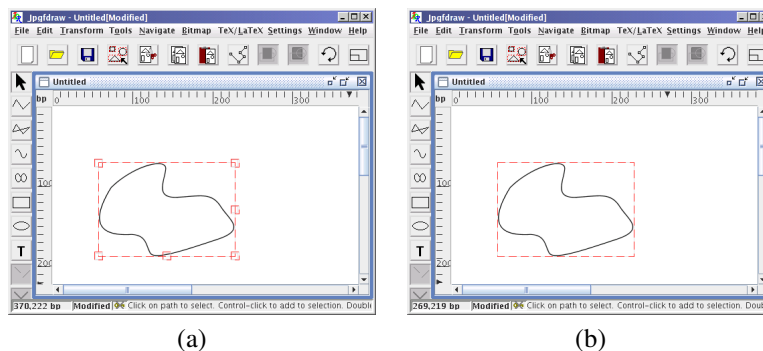


Figure 3.2: Hotspots: (a) enabled; (b) disabled.

### Startup Directory Tab

Use this tab to choose which directory Jpgfdraw should use as the current working directory when it starts up. You have a choice of:

1. The current working directory that you were in when you started up Jpgfdraw.
2. The directory you were using when you last used Jpgfdraw.
3. A specific directory. In this case, type in the path in the box labelled Use this directory: or use the Browse button to select the required directory.

### JDR Settings tab

Use this tab to choose whether or not you want the current canvas settings stored

<sup>1</sup>The actual cursor appearance depends on the look and feel of the platform you are using. On some systems the South and North arrows may look the same, and similarly for the East and West arrows.

in the [JDR](#) or [AJR](#) file when you save your image. You can also choose whether or not you want to apply any canvas settings information stored in any JDR or AJR file that you load.

#### Startup Settings Tab

Use this tab to choose whether you want Jpgfdraw to start with its default settings, or whether to restore the settings from the last time you used Jpgfdraw, or whether to use the settings that are currently in use.

### 3.3 Configuration Directory

When you quit Jpgfdraw, the current settings will be saved in Jpgfdraw's configuration directory.<sup>2</sup> This directory is determined (and created if necessary) as follows: if the environment variable `JDRSETTINGS` exists and is a directory, that directory is used, otherwise if the operating system supports hidden directories starting with a dot and the environment variable `HOME` exists, the directory `$HOME/.jpgfdraw` will be used, otherwise the directory `$HOME/jpgfdraw-settings` will be used. If the environment variable `HOME` does not exist, then the directory `$HOMEPATH/jpgfdraw-settings` will be used, if `HOMEPATH` is defined, otherwise it will attempt to create a subdirectory called `settings/$USER` or `settings/$USERNAME` (or just `settings` if the environment variables `USER` or `USERNAME` are not defined) in Jpgfdraw's installation directory and use that.

The configuration directory may also contain the list of [recent files](#) (this file is created by Jpgfdraw) as well as the  $\text{\LaTeX}$  font mappings (which you can create in any text editor). For more information on the font mappings, see [subsection 9.5.1](#).

In addition, the configuration directory is used to save the log file, `jpgfdraw.log`, in the event that F10 is used (or Debug  $\rightarrow$  Write Log if the command line option `-debug` is used). The emergency save all function F11 (or Debug  $\rightarrow$  Dump All if the command line option `-debug` is used) will create a subdirectory (using the current date and time to construct the name) and will save all open images to that directory with filenames of the form `image<n>.jdr`.

---

<sup>2</sup>unless you have selected the use current settings option in the Startup Settings panel, in which case it will save the current settings at that point.



## 4 The Basics

The main Jpgfdraw window is shown in [Figure 4.1](#).

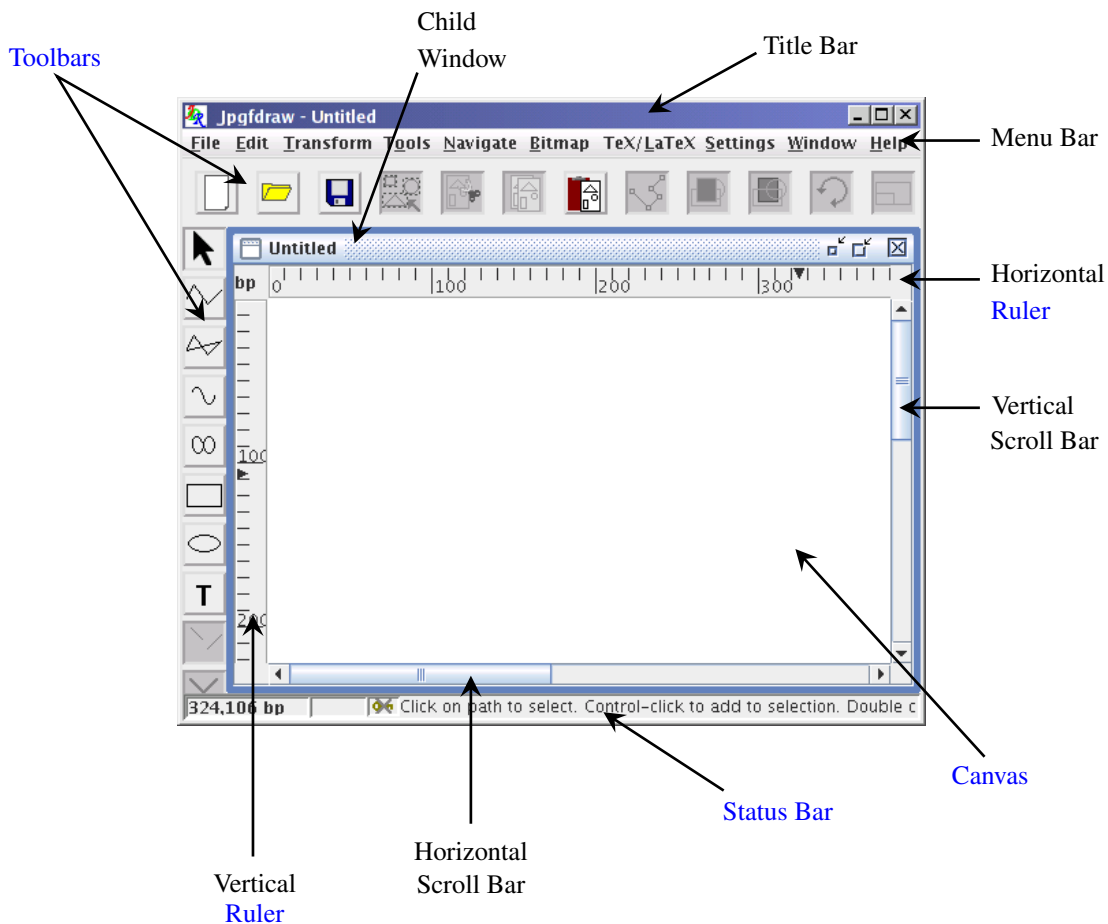


Figure 4.1: The Main Window

Jpgfdraw uses a [multiple-document interface \(MDI\)](#). This means that you can have multiple images loaded in separate child windows, without having to start up new instances of Jpgfdraw. Most of the buttons and menu items will only be applied to the child window that currently has the focus. If there are no child windows, or if they have all been minimized, then the relevant buttons and menu items will be disabled. The only exceptions are the items in the Window menu, the Help menu, and the [new](#), [open](#), [quit](#) functions and the non-canvas specific items of the Settings menu.

### 4.1 The Canvas

The [canvas](#) is the white area in each of Jpgfdraw's child windows on which you create your picture.

## 4.2 The Toolbars

There are two **toolbars**. The horizontal toolbar positioned at the top of the main window, which allows you to manipulate **objects** on the **canvas** (as well as the save, load and new buttons) and the vertical toolbar positioned to the left of the main window, which you can use to create new **paths** and **text areas**.



You can show or hide the **toolbars** using the menu item Settings → Show Tools.

## 4.3 The Rulers

There are two **rulers**. The horizontal ruler positioned above the **canvas** which marks out the  $x$ -ticks, and the vertical ruler positioned to the left of the canvas which marks out the  $y$ -ticks. Note that the origin starts at the top left of the canvas. The gap between tick marks can be changed using the Settings → Grid → Grid Settings... menu item.

You can show or hide the rulers using the menu item Settings → Show Rulers.

## 4.4 The Status Bar

The **status bar** is positioned along the bottom of the main window. The left hand corner shows the current position of the pointer (or the pointer's last position before it was moved away from the **canvas**). Next to that is the file status area. If the current picture has been modified, it will display the word "Modified", otherwise it will be blank. Next to that is an image that indicates whether the grid lock is on  or off  and next to that there is some brief information as to what you can do with the currently selected tool.

You can show or hide the **status bar** using the menu item Settings → Show Status Bar.

## 5 The File Menu

You can use the File menu to create a [new](#) picture, [load](#) a picture from a [JDR](#) or [AJR](#) file, [save](#) the current picture, [export](#) the current picture to a supported format (such as a  $\LaTeX$  file), [assign a description](#) to the current picture, [print](#) the current picture or [quit](#) Jpgfdraw.

### 5.1 New

To start a new picture, select File → New. This will open a new child window. You can switch between child windows using the Window menu.

### 5.2 Open

To load a [JDR](#) or [AJR](#) file, select File → Open. . . . If there is already a picture in the current child window, a new child window will open to display the file. Note that although Jpgfdraw can export to other formats, it can only load [JDR](#) and [AJR](#) files.<sup>1</sup>

If you load an image that contains a link to a [bitmap](#) and the bitmap is no longer in the same location, you will be prompted for a new link or you can discard the link. Note that if you select a new link, the  $\LaTeX$  link will also be updated to the full path name. If you want a relative path name in the  $\LaTeX$  link, you will need to edit it using the [bitmap properties dialog](#). If there is insufficient memory in the [JRE](#) to load a bitmap, Jpgfdraw will revert to draft mode for that bitmap.

### 5.3 Recent Files

To load a recently used [JDR](#) or [AJR](#) file, use the sub menu File → Recent Files. A maximum of ten files, starting with the most recently used are listed. Note that loading a file from this list will change the open file dialog box directory to that file's directory.

### 5.4 Image Description

You can use the File → Image Description. . . dialog box to give the image a description. The description is not visible in the image, but is saved when you export the image to other formats: as a comment in a  $\LaTeX$  file, enclosed in a `<desc>` tag in an [SVG](#) file, or a `%%Title: DSC` in an EPS file.

### 5.5 Save and Save As

You can save the current picture in Jpgfdraw's native [JDR](#) or [AJR](#) format using either File → Save (if it already has a name) or File → Save As. . . (if you want to specify the

---

<sup>1</sup>The jdrutils suite comes with an application called `eps2jdr` which can convert some EPS files to JDR files, but it is still in development and only works on fairly simple EPS files. See the jdrutils manual for further details. (Using Jpgfdraw's debug mode will enable an import menu item, but this is still experimental.)

filename). It is recommended that you save your work frequently, particularly given that the current version of Jpgfdraw is still a beta release.

See also:

- [§5.6 Export](#)

## 5.6 Export

The File → Export... menu allows you to export your image as:

- A  $\LaTeX$  2 $\epsilon$  file containing a pgfpicture environment (limitations apply, see below).
- A single-paged  $\LaTeX$  document containing the image. (Note that you may need to add additional packages or command definitions if you use commands in your text area that aren't part of the basic  $\LaTeX$  distribution. Again, the limitations below apply.)
- A PNG file. (All colours are converted to RGB.)
- An encapsulated postscript (EPS) file. (Transparency is not implemented.)
- An SVG file. (CMYK colours are converted to RGB.)
- A  $\LaTeX$  2 $\epsilon$  package based on the flowfram package. The pgf package is also used to create borders and backgrounds, so the limitations that apply to exporting to a pgfpicture environment also apply (see below).

Note that Jpgfdraw can't load the files that it can export, so it is recommended that you first save the picture as a [JDR](#) file before exporting it, in case you wish to edit it later.



To save your picture as a pgfpicture environment, select the pgf environment (\*.tex, \*.ltx) file filter. You can include the image into your  $\LaTeX$  document using `\input`, but remember to specify the pgf package using:

```
\usepackage{pgf}
```

Alternatively, you can save the image (including paper dimensions) to a single-paged  $\LaTeX$  document using the LaTeX document (\*.tex, \*.ltx) file filter.

Jpgfdraw was tested with version 1.10 of the pgf package. Files created by Jpgfdraw may not work with earlier versions of the pgf package. Note that some DVI viewers may not understand PGF specials. It is strongly recommended that you read the PGF user manual.

**Limitations:** Gradient paint is not available for text areas and outlines—only the start colour will be used. The gradient shading for fill colours has limited functionality and the gradient paint transparency settings are ignored when exporting to a pgfpicture environment. [Text-paths](#) only have limited support.



If you have used Jpgfdraw to create frames for use with the [flowfram package](#), you can export the information to a  $\LaTeX$  package. To do this, select the flowframe (\*.sty) file filter, but note that only the [objects](#) that have been

identified as static, flow or dynamic frames will be saved. You must set the typeblock before you can export the flowframe information.

See also:

- [§10.4 Creating Frames for Use with the flowfram Package](#)
- [§11.1 Step-by-Step Example: A House](#)
- [§11.4 Step-by-Step Example: An Artificial Neuron](#)
- [§11.6 Step-by-Step Example: A Poster](#)
- [§11.8 Step-by-Step Example: A Newspaper](#)

## 5.7 Print

You can print the current image using File → Print... which will open the printer dialog box. If no printer is found, the error message “No printer services found” will be displayed. If this happens, check that the printer is switched on and connected to the computer.

## 5.8 Close

You can close the current child window, either by clicking on the child window’s close icon or by selecting File → Close. If there is any unsaved data, Jpgfdraw will ask for confirmation before discarding the window. An image will only be marked as unmodified if it has been saved as a [JDR](#) or [AJR](#) file. If you have [exported](#) your image to another file type, it is recommended that you also [save](#) it as a [JDR](#) file as well, in case you want to edit it later.

Note that you must finish or discard any [path](#) that is under [construction](#) before you can close an image.

## 5.9 Quit

To quit Jpgfdraw either use the menu item File → Quit or click on the close icon on the main window. All child frames will be closed. If any child frame contains unsaved data, you will be asked for confirmation before the window is discard.

See also:

- [§5.8 Close](#)

## 6 Creating New Objects

New [paths](#) and [text areas](#) can be created using Jpgfdraw's [construction mode](#), which can be obtained using any tool except the select tool. The tools can be selected using either the vertical [toolbar](#) or the Tools menu. Once paths and text areas have been created they can then be edited or transformed or combined to form a [text-path](#) object.

Whilst constructing a [line path](#) or [curve path](#), you can:



Finish the path by pressing the Enter key or by double-clicking (instead of single-clicking) on the final vertex or by selecting Tools → Finish or by clicking on the finish button. Note that transferring the focus to another Jpgfdraw child window or selecting a new tool whilst you are constructing a [path](#), will complete the current path.



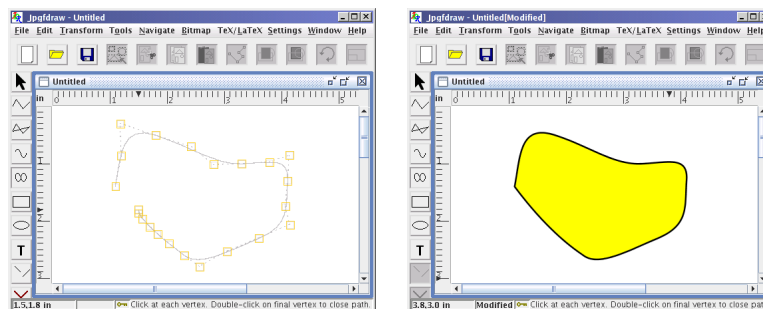
Cancel the current path by pressing the Escape key or by selecting Tools → Abandon or by clicking on the cancel button.



Make a gap in the current path: once you have clicked on the vertex where you want the gap to start, select Tools → Gap or click on the gap button or press Ctrl-M, then click on the [canvas](#) where you want the gap to end.

Note that Jpgfdraw won't allow you to create a [path](#) whose total width and height are both less than 1.002bp. This is to prevent accidentally creating a tiny path that can't be seen but contributes to the total image dimensions. This restriction only applies when creating paths and does not apply to editing paths.

Note that the [path attributes](#) will only be set once the path has been completed. Whilst the path is under construction you will only see a draft version (see [Figure 6.1](#)). If you want a path with a mixture of line and curve segments, first construct a path with only one type of segment (e.g. lines), and then use the [edit path function](#) to convert the required segments.



(a)

(b)

Figure 6.1: Path attributes are only set once the path is completed: (a) path under construction; (b) path completed.

If you are unable to use the mouse, you can move the pointer using **Navigate** → **Go To...** which will display the dialog box shown in [Figure 6.2](#). Enter the *xx* and *y* co-ordinates in the *x* and *y* fields. The function key **F4** will emulate a single mouse click in [construction mode](#).



Figure 6.2: Go To Co-ordinate Dialog Box

## 6.1 Line Paths



To construct an open line [path](#), select the open line tool, either by clicking on the open line button or by selecting **Tools** → **Open Line** (**Ctrl-L**).



To construct a closed line [path](#), select the closed line tool, either by clicking on the closed line button or by selecting **Tools** → **Closed Line** (**Ctrl+Shift-L**).

Use the left mouse button to click on each vertex defining the path. To complete the path, do one of the following:

- Double-click instead of single-clicking on the final vertex: this performs the combined function of defining the vertex and finishing the path. If you use this method, be careful not to accidentally create two coincident vertices at the end point, or it will cause a problem for any mid or end [marker](#) that you apply.
- Single-click on the final vertex and then complete the path by pressing the **Enter** key or by clicking on the finish button or by selecting **Tools** → **Finish**.

If you have used the closed line tool, the path will automatically be closed by inserting a line between the end vertex and the initial vertex.

See also:

- [§6.3 Rectangles](#)
- [§9.1 Line Colour](#)
- [§9.2 Fill Colour](#)
- [§9.3 Line Style](#)
- [§8.6 Editing Control Points](#)
- [§11.1 Step-by-Step Example: A House](#)
- [§11.7 Step-by-Step Example: A House With No Mouse](#)

## 6.2 Curve Paths



To construct an open curve [path](#), select the open curve tool, either by clicking on the open curve button or by selecting Tools → Open Curve (Ctrl-K).



To construct a closed curve [path](#), select the closed curve tool, either by clicking on the closed curve button or by selecting Tools → Closed Curve (Ctrl+Shift-K).

Use the left mouse button to click on each vertex in the path. There is no way to specify the location of the [control points](#) defining the curvature of the path whilst the path is under construction, however, once the path has been completed, it is possible to move these control points using the [edit path function](#).

To complete the path, do one of the following:

- Double-click instead of single-clicking on the final vertex: this performs the combined function of defining the vertex and finishing the path. If you use this method, be careful not to accidentally<sup>1</sup> create two coincident vertices at the end point, or it will cause a problem for any mid or end [marker](#) that you apply.
- Single-click on the final vertex and then complete the path by pressing the Enter key or by clicking on the finish button or by selecting Tools → Finish.

If you have used the closed curve tool, the path will automatically be closed by inserting a curve between the end vertex and the initial vertex.

See also:

- [§6.4 Ellipses](#)
- [§9.1 Line Colour](#)
- [§9.2 Fill Colour](#)
- [§9.3 Line Style](#)
- [§8.6 Editing Control Points](#)
- [§11.4 Step-by-Step Example: An Artificial Neuron](#)

## 6.3 Rectangles



To construct a rectangle, select the rectangle tool either by clicking on the rectangle button or by selecting Tools → Rectangle (Ctrl-R).

Use the left mouse button to click where you want the first corner to go, then move (not drag) the mouse to the opposite corner, and click or press the Enter key to complete the [path](#).

---

<sup>1</sup>You may, of course, want to do this intentionally, in which case ignore this caveat.



Note that this function is just a shortcut to using the closed line function. Once the rectangle is created, it is simply another closed path, and can be edited in exactly the same way.

See also:

- [§6.1 Line Paths](#)
- [§9.1 Line Colour](#)
- [§9.2 Fill Colour](#)
- [§9.3 Line Style](#)
- [§8.6 Editing Control Points](#)
- [§11.1 Step-by-Step Example: A House](#)
- [§11.4 Step-by-Step Example: An Artificial Neuron](#)

## 6.4 Ellipses



To construct an ellipse, select the ellipse tool either by clicking on the ellipse button or by selecting Tools → Ellipse (Ctrl-E).

Use the left button to click on the centre point of the ellipse, and then move (not drag) the mouse until the ellipse has reached the desired dimension, and click or press the Enter key to complete the [path](#). If you want to create a circle, it is recommended that you first [lock the grid](#) or use the Navigate → Go To... menu item.

Note that this function is just a shortcut to using the closed curve function. Once the ellipse is created, it is simply another closed path, and can be edited in exactly the same way.

See also:

- [§6.2 Curve Paths](#)
- [§9.1 Line Colour](#)
- [§9.2 Fill Colour](#)
- [§9.3 Line Style](#)
- [§8.6 Editing Control Points](#)
- [§11.3 Step-by-Step Example: Cheese and Lettuce on Toast](#)

## 6.5 Text

**T** To create a [text area](#), select the text tool either by clicking on the text button or by selecting **Tools** → **Text** (Ctrl-T). Click with the left mouse button at the position where you want the text to start. This will produce a shaded area with a cursor in which you can type no more than a single line of text. Clicking inside this shaded area will move the cursor around the text area under construction.

When you want to complete a [text area](#), either press Enter (which will start a new text area on the line below) or click anywhere on the canvas outside of the current text area (which will start a new text area at the new location). Selecting another tool whilst a text area is under construction will finish the current text area. Once a text area has been completed, the only way to edit it is via the [edit text function](#). If you click the mouse on the location of a completed text area (while the text tool is selected) you will simply create a new overlapping text area.

Whilst a text area is under construction, you can activate the text area [popup menu](#), illustrated in [Figure 6.3](#). (This is usually done with a right mouse click but depends on your system. The function key F3 has the same effect.)

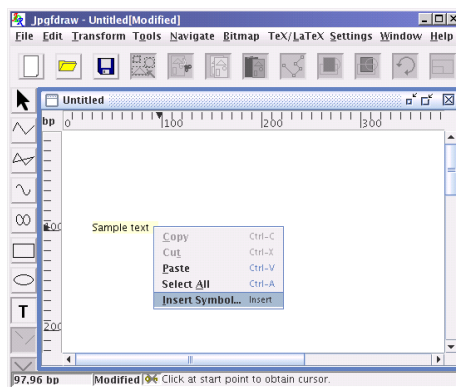


Figure 6.3: Text Area Popup Menu

The text area popup menu provides the following functions:

**Copy (Ctrl-C)**

Copies selected text to the clipboard.

**Cut (Ctrl-X)**

Cuts selected text to the clipboard.

**Paste (Ctrl-V)**

Pastes text from the clipboard.

**Select All (Ctrl-A)**

Selects all the text.

**Insert Symbol... (Insert)**

Opens the Insert Symbol dialog box if you want to enter a symbol that doesn't appear on your keyboard.

The Insert Symbol dialog box (see [Figure 6.4](#)) has a field at the top which contains the text currently in the text area. If you know the hexadecimal **unicode** value for the character you want to insert, you can type the number into the Unicode box and press the Select button to insert it into the text area. Alternatively, you can use the scroll box on the left to select the character you want to insert in the text field. On the right hand panel below the Unicode field there is an enlarged image of the selected character.

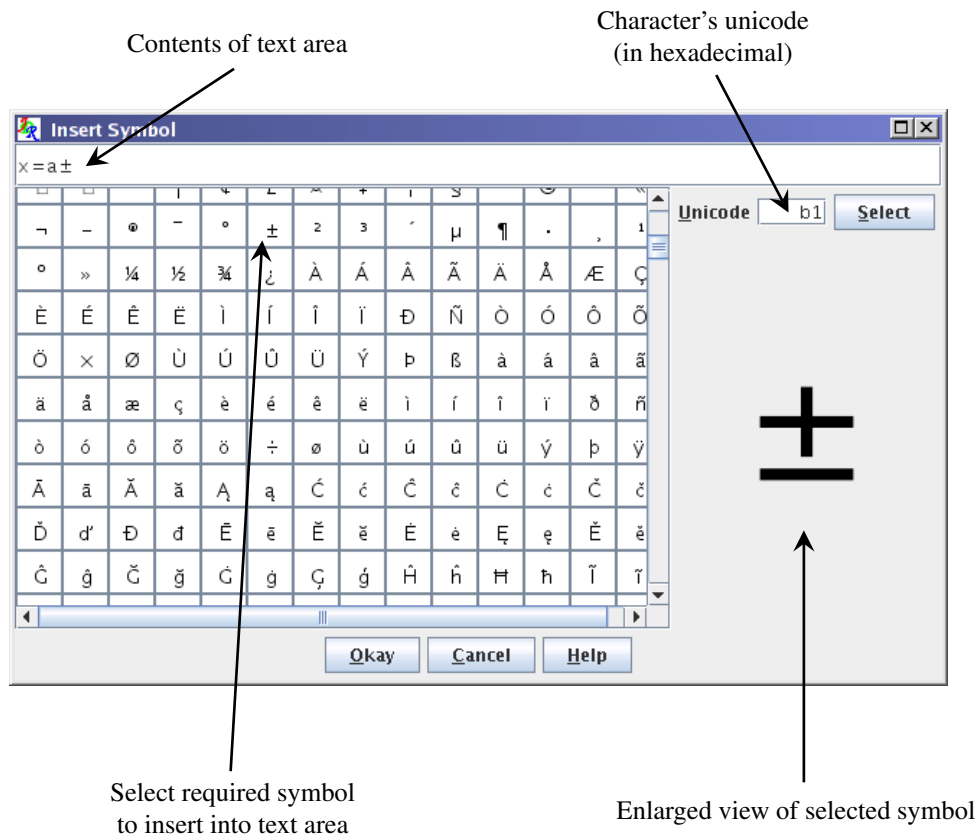



Figure 6.4: Insert Symbol Dialog Box

 If you intend to save your picture as a `pgfpicture` environment, by default the text will be placed in the file “as is”. This means you should take care using  $\TeX$ 's special characters, unless the [auto escape special characters facility](#) is enabled. For example,  $\$100$  will cause a problem. However, you can specify an alternative to appear in the  $\LaTeX$  file using the [edit text dialog box](#). Similarly, if you select a symbol from the Insert Symbol dialog box, you will most likely need to specify alternative text to appear in the  $\LaTeX$  file that uses the relevant command to produce the required symbol. (For example, in [Figure 6.4](#) the plus or minus symbol has been selected, but this would need to be specified as `\pm` in the  $\LaTeX$  file, and the text would need to be placed in maths mode.)

Note also that text in your `pgfpicture` environment may not look exactly the same as in `Jpgfdraw` due to font differences as well as the translation of  $\LaTeX$  commands. See

[subsection 9.5.6](#) for more details.

See also:

- [§9.4 Text Colour](#)
- [§9.5 Text Style](#)
- [§8.7 Editing Text Areas](#)
- [§8.24.1 Converting a Text Area or Text-Path to a Path](#)
- [§8.25 Splitting Text Areas](#)
- [§10.1.1 Setting the Normal Font Size](#)
- [§10.1.3 Automatically Escaping T<sub>E</sub>X's Special Characters](#)
- [§11.4 Step-by-Step Example: An Artificial Neuron](#)
- [§11.7 Step-by-Step Example: A House With No Mouse](#)

## 7 Bitmaps

Jpgfdraw is primarily a [vector graphics](#) application, however it is possible to insert a [raster graphics](#) image (bitmap) into your picture for background effects or if you want to annotate a [bitmap](#) (as was done in [Figure 4.1](#)). Note that Jpgfdraw does not save the actual raster graphics data in either the [JDR](#) or the [AJR](#) file, but instead it creates a link to the original file. You can't edit the actual bitmap data in Jpgfdraw. However you can scale, rotate or shear the link. If you change the location of the file containing the bitmap, when Jpgfdraw reloads the JDR or AJR file it will prompt you for the new location or discard the link.

If you use another application to edit the bitmap whilst you have a picture with a link to it displayed in Jpgfdraw, you will need to select [Bitmap](#) → [Refresh](#) to update the image.

To insert a bitmap into your picture, first make sure you are using the [select tool](#), and then select the menu item [Bitmap](#) → [Insert Bitmap...](#) and a dialog box will appear in which you can choose the required bitmap. The bitmap will initially appear in the top left hand corner of the [canvas](#) but can be [moved](#) to a new location.

If there is insufficient memory in the [JRE](#) to load a bitmap, Jpgfdraw will revert to draft mode to display that bitmap. For example, in [Figure 7.1](#) several photos have been inserted into an image. Since photos tend to be quite large, there is insufficient memory to load the final photo, so it is displayed in draft mode instead. Note that draft mode will also be used when printing or exporting to PNG, and a bitmap in draft mode will be ignored when exporting to EPS. Since [LaTeX](#) and [SVG](#) files only contain a link to the bitmap, draft mode should not affect exporting to those formats.

Note that the amount of memory available to any Java application is set at startup. The default maximum value is usually around 64Mb but can be changed via the [JRE](#) command line options. If you run Jpgfdraw from the shell script `jpgfdraw`, then you can set the environment variable `JDR_JVMOPTS` to change the default configuration. See [section 3.1](#) for further details. If you are running Jpgfdraw from Windows, you will need to check the [JRE](#) documentation.

### 7.1 Properties

To change a bitmap's properties, [select](#) the required bitmap and select the [Bitmap](#) → [Properties...](#) menu item. This will open up a dialog box in which you can change the path name to the bitmap file or the transformation matrix applied to the bitmap.



If you want to export your picture to a [LaTeX](#) file, you can change the link to the [bitmap](#) using the [LaTeX](#) image path field. The file extension will be omitted when included in a [LaTeX](#) file. (Note that if your operating system uses a backslash `\` as a directory divider, you must use a forward slash `/` in the [LaTeX](#) link name.) The bitmap will be included using the command specified in the [LaTeX](#) Command field (for example `\pgfimage`) but remember to use a driver that can parse the bitmap.

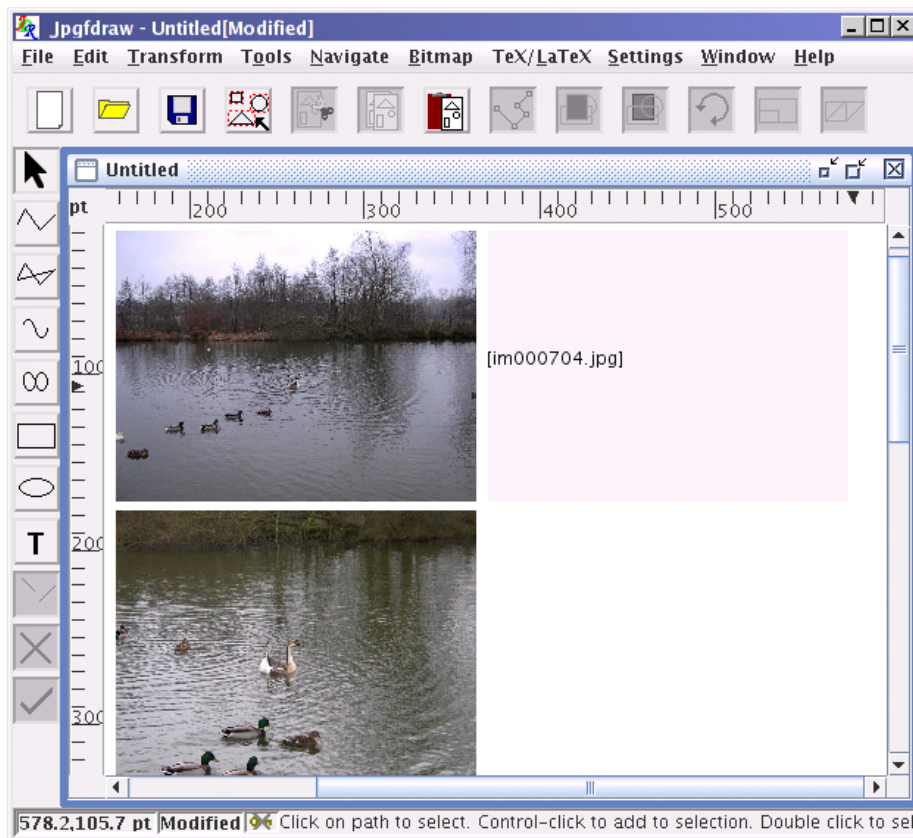


Figure 7.1: Bitmaps are displayed in draft mode when there is insufficient memory in the JRE. The area taken up by the image is displayed as a semi-transparent light grey rectangle with the bitmap's file name in square brackets.

## 8 Selecting and Editing Objects



In order to edit an [object](#), you must be in select mode. To do this either click on the select button or use the menu item Tools → Select (Ctrl-P). An object can be selected using any of the following methods:

- Click on it with the left mouse button.
- Double-click the left mouse button to select the object behind the current object.
- Use Control-click (i.e. click whilst holding down the control key) if you want to add an object to the current selection.
- Click on an empty part of the [canvas](#) and drag. A dashed rectangle will appear. When you release the mouse button, any objects within that region will be selected. (If you have the shift key depressed, only those objects which are completely inside the dashed rectangle will be selected, but make sure you release the mouse button before releasing the shift key.)
- Use Navigate → Select (Shift-F5) to select the next object in the [stack](#). (Starting from the [frontmost object](#) and heading towards the [back](#).) This will cycle back to the start when it reaches the end of the stack.
- Use Navigate → Skip (F6) to deselect the selected object closest to the [backmost object](#), and select the next object in the [stack](#) (heading towards the [back](#)). This will cycle back to the start when it reaches the end of the stack.
- Use Navigate → Add Next (Shift-F6) to add the next object in the [stack](#) to the selection (starting from the [front](#) and heading towards the [back](#)). This will cycle back to the start when it reaches the end of the stack.
- Use Navigate → Find By Description... or Navigate → Add By Description... to select an object by its [description](#). (If an object hasn't been given a description, a generic description will be supplied instead.) The former will deselect all other objects, the latter will add the object to the current selection.
- Use Edit → Select All (Ctrl-A) to select all [objects](#).

When an [object](#) is selected, a dashed red/grey rectangle will be displayed around it. (This rectangle may optionally have [hotspot](#) regions.) Note that individual elements of a [group](#) can not be selected independently of the group. When you select a group, you will only see a dashed red/grey rectangle around the [bounding box](#) of the group, not around the individual elements of the group.

To deselect an individual object, click on that object whilst depressing the shift key. To deselect all objects, click on an empty part of the [canvas](#), or use Edit → Deselect All (Ctrl+Shift-A). Selecting another tool will also deselect all objects.

In select mode, you can also use the select [popup menu](#). (This is usually done with a right mouse click, but depends on your system. The function key F3 has the same effect.) The contents of this menu vary according to what types of objects have been selected, if any (see [Figure 8.1](#)).

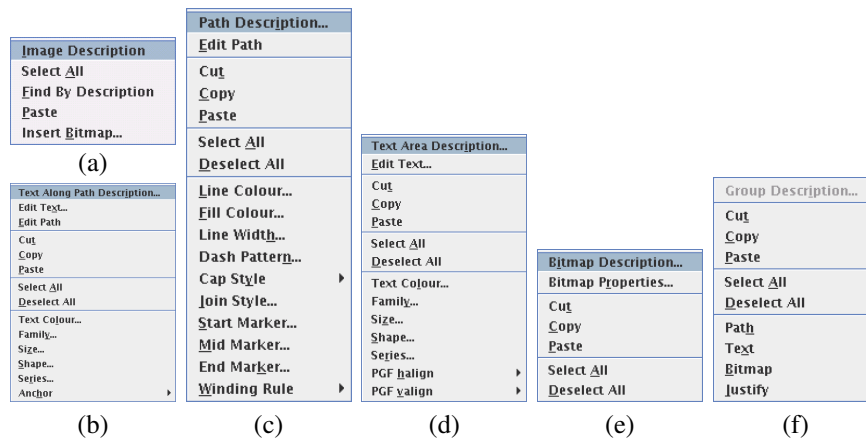


Figure 8.1: Popup menus in select mode depend on what objects have been selected: (a) no objects selected; (b) only text-paths have been selected; (c) only paths have been selected; (d) only text areas have been selected; (e) only bitmaps have been selected; (f) groups or a selection of different object types have been selected.

## 8.1 Moving an Object

To move an **object** or objects, first **select** the objects you want to move and then do one of the following:

- Depress the left mouse button somewhere inside the selection, and drag the mouse. Release the mouse button when the objects have reached their required location. If you only want to move the object by a very small amount, and your mouse is very sensitive or you have difficulties with fine motor co-ordination, depress the mouse button and instead of dragging use the arrow keys to move the pointer.
- Use Edit → Move By... to show the Move By dialog box (Figure 8.2). In the field marked x enter the horizontal displacement, and in the field marked y enter the vertical displacement. For example, to move the selected objects 10 units to the right and 20 units down, type 10 in the x field and 20 in the y field. To move left or up, use a negative value.

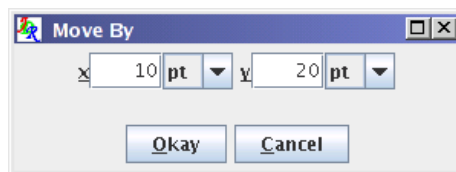


Figure 8.2: Move Selected Objects Dialog Box



## 8.2 Cut

To cut a selection of [objects](#) to the clipboard, use Edit → Cut. Note that it will be stored on the clipboard as a `JDRGroup` Java object, not as text or [raster graphics](#), so you won't be able to paste it into a different application. If you want to cut a piece of text from a [text area](#), you will need to use the [edit text area](#) function.

## 8.3 Copy

To copy a selection of [objects](#) to the clipboard, use Edit → Copy. Note that it will be stored on the clipboard as a `JDRGroup` Java object, not as text or [raster graphics](#), so you won't be able to paste it into a different application. If you want to copy a piece of text from a [text area](#), you will need to use the [edit text area](#) function.

## 8.4 Paste

To paste a selection of [objects](#) from the clipboard, use Edit → Paste. If you want to copy text from another application, and paste it into a [text area](#) in `Jpgfdraw`, you will have to [create a new text area](#), and use the text area [popup menu](#) to paste the text into the text area. If you want to paste plain text into an existing text area, you will need to use the [edit text area](#) function.

## 8.5 Object Description

You can assign a description to an [object](#) using the Edit → Object Description... menu item. This will display the dialog box shown in [Figure 8.3](#). Type the description into the text field, and click on Okay or press Enter.

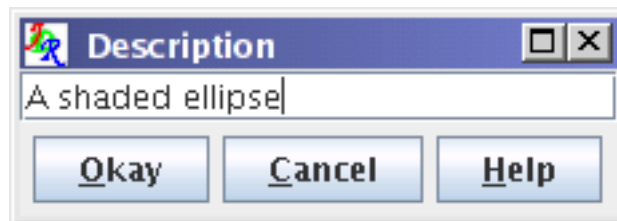


Figure 8.3: Setting an Object's Description

The description will not appear in the image, but it can be used to locate and select objects on the canvas using the Navigate → Find By Description... or Navigate → Add By Description... menu items. The description may also be used as a comment when [exporting images](#), depending on the file type. Note that if you assign a description to a [group](#), you will lose the description if you later ungroup it.

## 8.6 Editing Control Points



To move, delete or add [control points](#), open or close [paths](#), or to convert segments from one form (line, gap, cubic Bézier) to another, first [select](#) the path, and then either click on the edit path icon or select Edit → Path → Edit Path (Ctrl-I). (Note that you should not have any other [objects](#) selected.) The path will then be displayed in draft format. The currently selected control point and the currently selected segment will appear in red. The other control points will be orange.

A [text-path](#) object can have its underlying path edited in the same way as a normal [path](#), but in edit mode you will also see the text (without anti-aliasing).

Use one of the following methods to select a control point:

- Click on the control point. (If two or more points coincide with the location of the mouse, the point with the lowest [index](#) will be selected.) Remember that if the [grid](#) lock is on, mouse clicks will be translated to the nearest tick mark, so even if the pointer is positioned over a control point, the nearest tick mark may be outside the control point. In which case the required control point won't be selected, and you will either select a neighbouring point or exit edit mode.
- Press F6 until the required control point is selected. (You will need to use this method if two or more control points are in the same location and you don't want the one with the lowest index. You will also need to use this method if the grid lock is on and the control point's bounding box doesn't lie on a tick mark.)

Use one of the following methods to move a control point:

- Use the mouse to drag the point to its new location.
- Use the edit path [popup menu](#) (F3) and select Co-ordinates... (F7). Enter the new co-ordinates in the dialog box. (You will need to use this method if two or more control points are in the same location and you don't want to move the one with the lowest [index](#). You will also need to use this method if the [grid](#) lock is on and the control point's bounding box doesn't lie on a tick mark or if you want to move the point by an interval that is not a multiple of the gap between tick marks.)
- Use the edit path [popup menu](#) and select Snap To Grid to move the control point to the nearest tick mark.

To exit edit mode either deselect the edit path tool (Ctrl-I) or click on the [canvas](#) somewhere outside of the control points. Note that you can not edit a [path](#) if it belongs to a [group](#); you must first [ungroup](#) it.

Whilst a path is in edit mode, you can use the edit path [popup menu](#) which provides functions to select or edit control points or the segments that they define. The following functions are available:

### Next Control (F6)

Select the next [control point](#). This is an alternative to using the mouse to select the point.

### Delete Point (Delete)

Delete the currently selected control point. (This function is not available for

control points that govern the curvature of Bézier segments.) If the control point is the first or last point in an open path it will delete the corresponding segment, otherwise it will replace two adjacent segments with a single segment. If the path is open and only has one segment, or if the path is closed and has two segments, deleting a control point will delete the path or the [text-path](#) object.<sup>1</sup>

**Add Point (Insert)**

Add a new control point in the middle of a segment (thus replacing a single segment with two segments). This will actually add three new points if the segment is a Bézier curve as it will also create the required curvature [control points](#).

**Convert To Line**

Convert a curve segment or a gap to a line segment.

**Convert To Curve**

Convert a line segment or a gap to a curve segment. The curvature control points will be positioned so that the segment forms a straight line. These can then be moved as required.

**Convert To Move**

Convert a line or curve segment to a gap.

**Make Continuous**

If the currently selected segment is a Bézier segment, this function will move the curvature control point so that the gradient at the join is continuous. For example, in [Figure 8.4](#) the path was originally an open line path with three line segments. The middle segment was selected and converted to a Bézier curve using the Convert To Curve function ([Figure 8.4\(a\)](#)). The Make Continuous function was then used to change the starting gradient of the Bézier segment to make a smooth join between the first two segments ([Figure 8.4\(b\)](#)). The Bézier curve's third control point, which governs the end curvature, was selected, and the Make Continuous function was again used to change the end gradient of the Bézier segment to make a smooth join between the last two segments ([Figure 8.4\(c\)](#)).

**Open Path**

Open a closed [path](#) (the last segment is removed).

**Close Path**

Close an open path (a new segment is added between the last and first control points).

**Co-ordinates... (F7)**

This menu item will display a dialog box in which you can set the [control point's](#) *x* and *y* values (instead of dragging the point to the required location).

**Snap To Grid**

Move the currently selected control point to the nearest tick mark.

**Break path**

Break the path into two separate paths at the *end* of the currently selected segment (not at the currently selected control point). If the object is a [text-path](#), the new [text-paths](#) will both have the same text (that is, the text is not broken between them).

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<sup>1</sup>The text will also be lost.

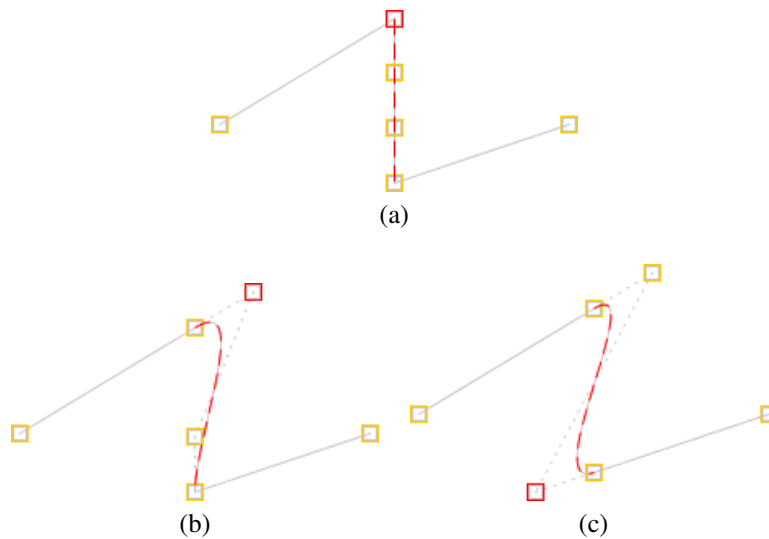


Figure 8.4: Making the join between segments continuous: (a) the middle segment of an open line path has been converted into a Bézier curve; (b) the gradient at the start of the curve is now the same as the gradient at the end of the previous segment; (c) the gradient at the end of the curve is now the same as the gradient at the start of the next segment.

See also:

- [§8.16 Reversing a Path's Direction](#)
- [§8.17 Merging Paths](#)
- [§8.18 Path Union](#)
- [§8.19 Exclusive Or Function](#)
- [§8.20 Path Intersection](#)
- [§8.21 Path Subtraction](#)
- [§8.24 Converting to a Path](#)
- [§9.1 Line Colour](#)
- [§9.2 Fill Colour](#)
- [§9.3 Line Style](#)
- [§11.2 Step-by-Step Example: Lettuce on Toast](#)
- [§11.5 Step-by-Step Example: Bus](#)
- [§11.7 Step-by-Step Example: A House With No Mouse](#)

## 8.7 Editing Text Areas

To insert or delete characters from a [text area](#) or [text-path](#) first [select](#) the text area or text-path, and then select Edit → Text → Edit text... (Ctrl+Shift-I). (Note that you should not have any other [objects](#) selected.) This will display the Edit Text dialog box ([Figure 8.5](#)) in which you can modify the text as appropriate. The text area [popup menu](#) is available in the top text field allowing you to Select All the text, Cut or Copy selected text to the clipboard, Paste text from the clipboard, or insert a symbol using the Insert Symbol... menu item. This is the same as the popup menu used when [creating a new text area](#).

Note that you can not edit a text area or text-path if it belongs to a [group](#). Deleting all the characters within a text area or text-path isn't permitted and will result in the error message "Empty string".



If you want to specify alternative text to appear in a  $\LaTeX$  document, click on the button marked Different, and enter the alternative in the bottom field (see [Figure 8.5](#)). The text area [popup menu](#) is not available in this field, but you can still use Ctrl-A, Ctrl-C, Ctrl-X and Ctrl-V to select all the text, copy to the clipboard, cut to the clipboard or paste from the clipboard, respectively. Note that the text may occupy a larger or smaller area in the  $\LaTeX$  document than it does in Jpgfdraw, so you may also need to change the [anchor](#).

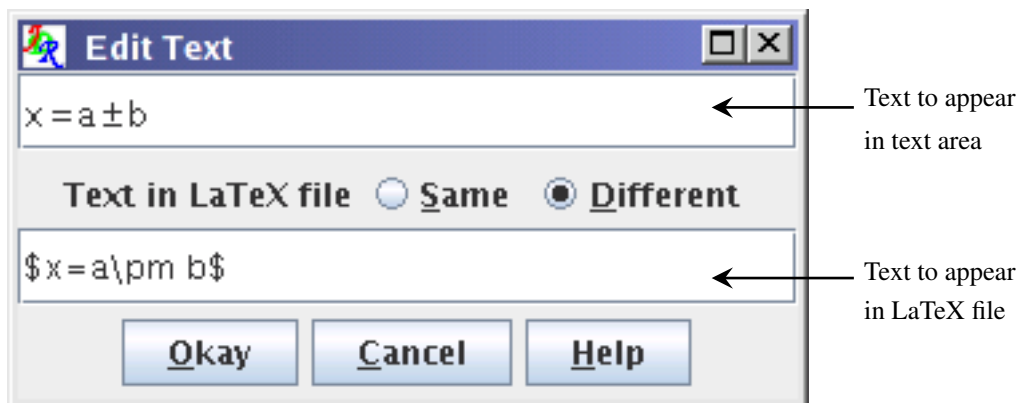


Figure 8.5: Edit Text Dialog Box

See also:

- [§9.4 Text Colour](#)
- [§9.5 Text Style](#)
- [§8.25 Splitting Text Areas](#)
- [§8.24.1 Converting a Text Area or Text-Path to a Path](#)
- [§10.1.1 Setting the Normal Font Size](#)
- [§11.4 Step-by-Step Example: An Artificial Neuron](#)

## 8.8 Reducing to Grey Scale

Line colours, fill colours and text colours can be reduced to grey scale using Edit → Reduce to Grey Scale. Only selected [paths](#) and [text areas](#) will be affected. If you want to reduce a [bitmap](#) to grey scale you will need to use a bitmap editor.

See also:

- [§9.1 Line Colour](#)
- [§9.2 Fill Colour](#)
- [§9.4 Text Colour](#)

## 8.9 Moving an Object to the Front



[Objects](#) are painted on the page according to the [stacking order](#). This means that objects can partially or wholly obscure other objects in the same location. Each new object is automatically added to the [front](#) when it is created, but objects can also be moved to the front either using the move to front button or by selecting Edit → Move to Front (Ctrl-F).

See also:

- [§8.10 Moving an Object to the Back](#).

## 8.10 Moving an Object to the Back



A selected [object](#) can be moved to the [back](#) of the [stack](#) (so that other objects in the same location obscure it) either by clicking the move to back button or by selecting Edit → Move to Back (Ctrl-B).

See also:

- [§8.9 Moving an Object to the Front](#).

## 8.11 Rotating Objects



Selected [objects](#) can be rotated either by clicking on the rotate button or by selecting Transform → Rotate... (Ctrl-W). This will display a dialog box in which you can specify the angle of rotation.

Notes:

- Individual objects will be rotated relative to the centre of the object.
- Objects within a [group](#) will be rotated relative to the centre of the group.

- Rotating a [text-path](#) will rotate the path and the text will adjust to follow the transformed path.
- Rotating a text area and path and then combining them to form a text-path is not the same as first combining and then rotating.

To illustrate this, in [Figure 8.6\(a\)](#) there are three objects selected. The selection is then rotated  $90^\circ$ . The result is shown in [Figure 8.6\(b\)](#).

In [Figure 8.7](#), the three objects in [Figure 8.6](#) were first [grouped](#) ([Figure 8.7\(a\)](#)) and then rotated  $90^\circ$  ([Figure 8.7\(b\)](#)).

In [Figure 8.8](#), the path and text area in [Figure 8.8\(a\)](#) are combined into a text-path, shown in [Figure 8.8\(b\)](#). This text-path is then rotated by  $90^\circ$  resulting in [Figure 8.8\(c\)](#). Note that this is different from first rotating the original path and text area, shown in [Figure 8.8\(d\)](#), and then combining them to form a text-path, shown in [Figure 8.8\(e\)](#).

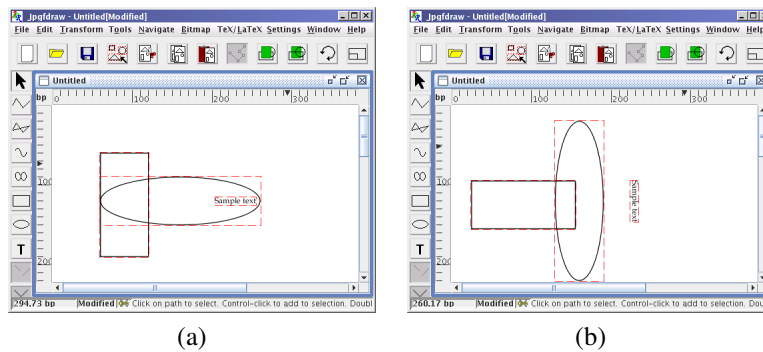


Figure 8.6: Three selected objects rotated by 90 degrees: (a) before, (b) after.

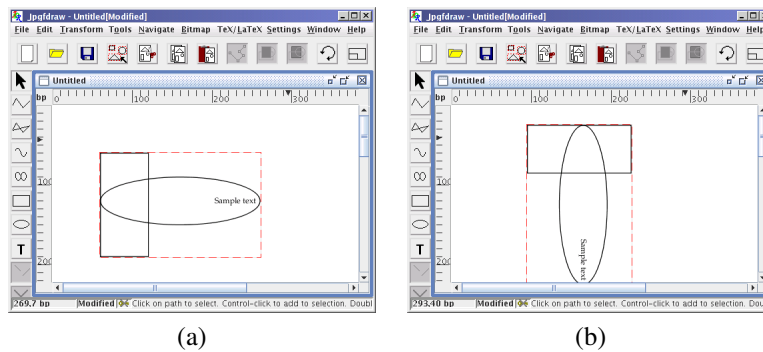


Figure 8.7: A group consisting of three objects rotated by 90 degrees: (a) before, (b) after.

If you prefer to rotate an [object](#) using the mouse, you first need to [enable the hotspots](#). Then drag the bottom left hotspot to rotate. Note that even if you have more than one object selected, only the object whose hotspot you are dragging will be transformed.

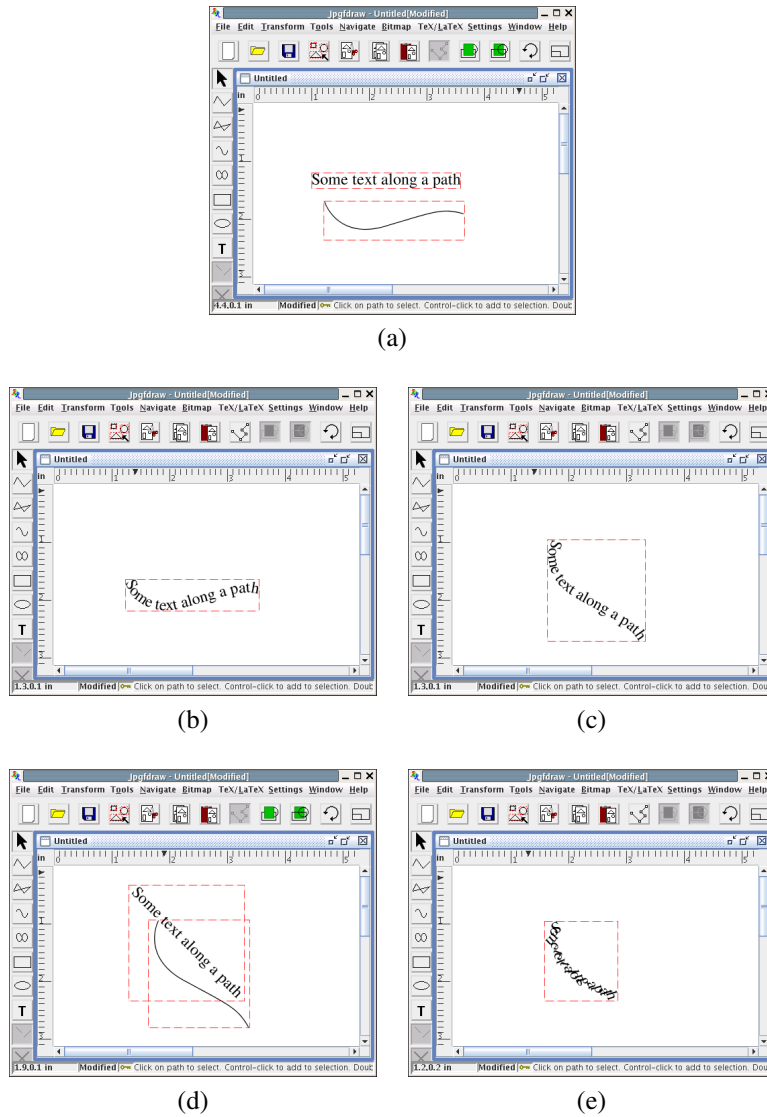


Figure 8.8: Rotating a text-path: (a) original text area and path; (b) text area and path in (a) combined to form a text-path; (c) text-path in (b) rotated by 45 degrees; (d) text area and path in (a) rotated by 45 degrees; (e) rotated text area and path in (d) combined to form a text-path.



See also:

- [§8.14 Grouping and Ungrouping Objects](#)
- [§8.12 Scaling Objects](#)
- [§8.13 Shearing Objects](#)
- [p12 Enabling Hotspots](#)
- [p58 Combining a Text Area and Path to Form a Text-Path](#)

## 8.12 Scaling Objects



Selected [objects](#) can be scaled either by clicking on the scale button or by selecting **Transform → Scale...** (Ctrl-Z). This will open up a dialog box in which you can specify the scale factor. (There is a choice of scaling just the *x* dimension, just the *y* dimension or both dimensions.)

Notes:

- Individual objects will be scaled relative to the top left corner of the object's [bounding box](#).
- Objects within a [group](#) will be scaled relative to the top left corner of the group's bounding box.
- Scaling a [text-path](#) will scale the path and the text will adjust to follow the transformed path. Note that the text itself will not be scaled.
- Scaling a text area and path and then combining them to form a text-path is not the same as first combining and then scaling.

To illustrate this, in [Figure 8.9\(a\)](#) there are three objects selected. The selection is then scaled by a factor of 2. The result is shown in [Figure 8.9\(b\)](#).

In [Figure 8.10](#), the three objects in [Figure 8.9](#) were first [grouped](#) ([Figure 8.10\(a\)](#)) and then scaled by a factor of 2 ([Figure 8.10\(b\)](#)).

In [Figure 8.11](#), the path and text area in [Figure 8.11\(a\)](#) are combined into a text-path, shown in [Figure 8.11\(b\)](#). This text-path is then scaled by a factor of 2 resulting in [Figure 8.11\(c\)](#). Note that this is different from first scaling the original path and text area, shown in [Figure 8.11\(d\)](#), and then combining them to form a text-path, shown in [Figure 8.11\(e\)](#).

If you prefer to scale an [object](#) using the mouse, you first need to [enable the hotspots](#). Then drag the bottom centre hotspot to scale vertically, the bottom right hotspot to scale in both directions or the middle right hotspot to scale horizontally. Note that even if you have more than one object selected, only the object whose hotspot you are dragging will be transformed.

See also:

- [§8.14 Grouping and Ungrouping Objects](#)
- [§8.11 Rotating Objects](#)

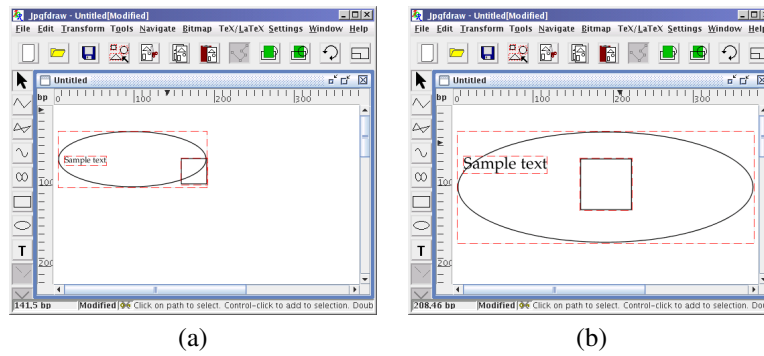


Figure 8.9: Three selected objects scaled by a factor of 2: (a) before, (b) after.

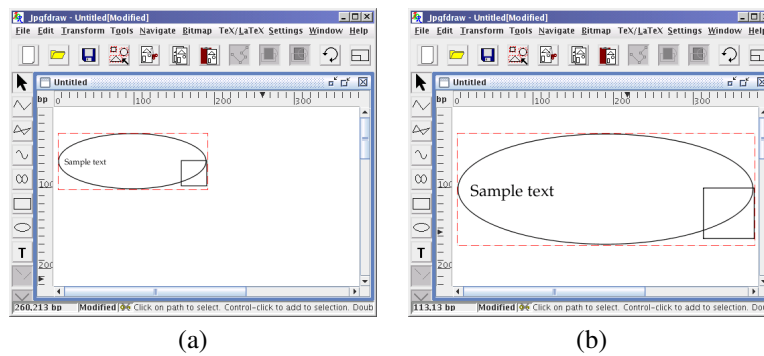


Figure 8.10: A group consisting of three objects scaled by a factor of 2: (a) before, (b) after.

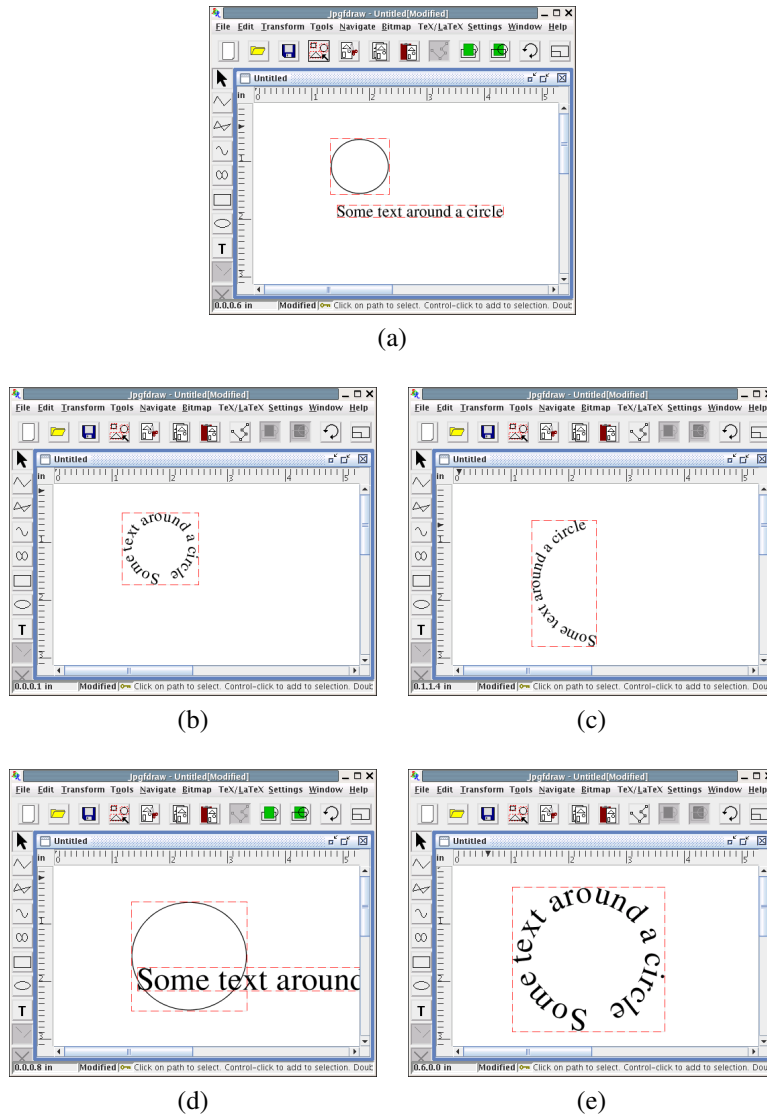


Figure 8.11: Scaling a text-path: (a) original text area and path; (b) text area and path in (a) combined to form a text-path; (c) text-path in (b) scaled by a factor of 2; (d) text area and path in (a) scaled by a factor of 2; (e) scaled text area and path in (d) combined to form a text-path.

- [§8.13 Shearing Objects](#)
- [p12 Enabling Hotspots](#)
- [§8.22 Combining a Text Area and Path to Form a Text-Path](#)

## 8.13 Shearing Objects



Selected [objects](#) can be sheared either by clicking on the shear button or by selecting Transform → Shear... (Ctrl-H). This will open up a dialog box in which you can specify the shear factors. The shearing transformation is given by:

$$\begin{pmatrix} 1 & s_x \\ s_y & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x + s_x y \\ y + s_y x \end{pmatrix}$$

Notes:

- Individual objects will be sheared relative to the bottom left corner of the object's [bounding box](#).
- Objects within a [group](#) will be sheared relative to the bottom left corner of the group's bounding box.
- Shearing a [text-path](#) will shear the path and the text will adjust to follow the transformed path. Note that the text itself will not be sheared.
- Shearing a text area and path and then combining them to form a text-path is not the same as first combining and then shearing.

To illustrate this, in [Figure 8.12\(a\)](#) there are three objects selected. The selection is then sheared with shear factors  $s_x = 1$  and  $s_y = 0$ . The result is shown in [Figure 8.12\(b\)](#).

In [Figure 8.13](#), the three objects in [Figure 8.12](#) were first [grouped](#) ([Figure 8.13\(a\)](#)) and then sheared with shear factors  $s_x = 1$  and  $s_y = 0$  ([Figure 8.13\(b\)](#)).

In [Figure 8.14](#), the path and text area in [Figure 8.14\(a\)](#) are combined into a text-path, shown in [Figure 8.14\(b\)](#). This text-path is then sheared with shear factors  $s_x = 1$  and  $s_y = 0$  [Figure 8.14\(c\)](#). Note that this is different from first shearing the original path and text area, shown in [Figure 8.14\(d\)](#), and then combining them to form a text-path, shown in [Figure 8.14\(e\)](#).

If you prefer to shear an [object](#) using the mouse, you first need to [enable the hotspots](#). Then drag the top right hotspot to shear vertically or the top left hotspot to shear horizontally. Note that even if you have more than one object selected, only the object whose hotspot you are dragging will be transformed.

See also:

- [§8.14 Grouping and Ungrouping Objects](#)
- [§8.11 Rotating Objects](#)
- [§8.12 Scaling Objects](#)
- [p12 Enabling Hotspots](#)
- [§8.22 Combining a Text Area and Path to Form a Text-Path](#)

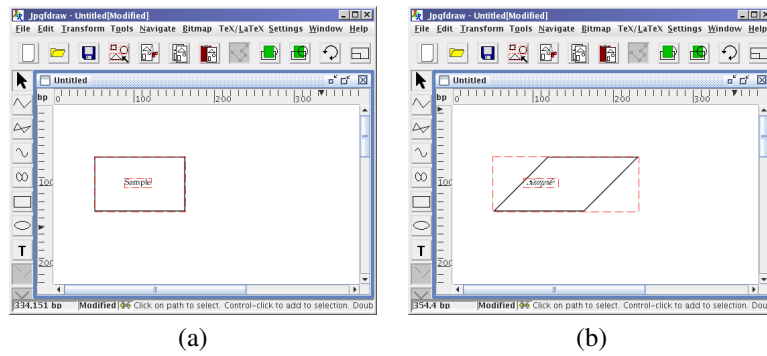


Figure 8.12: Two selected objects sheared horizontally: (a) before, (b) after.

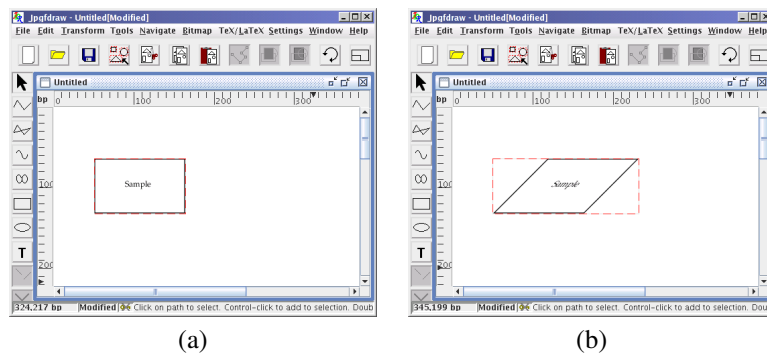


Figure 8.13: A group consisting of two objects sheared horizontally: (a) before, (b) after.

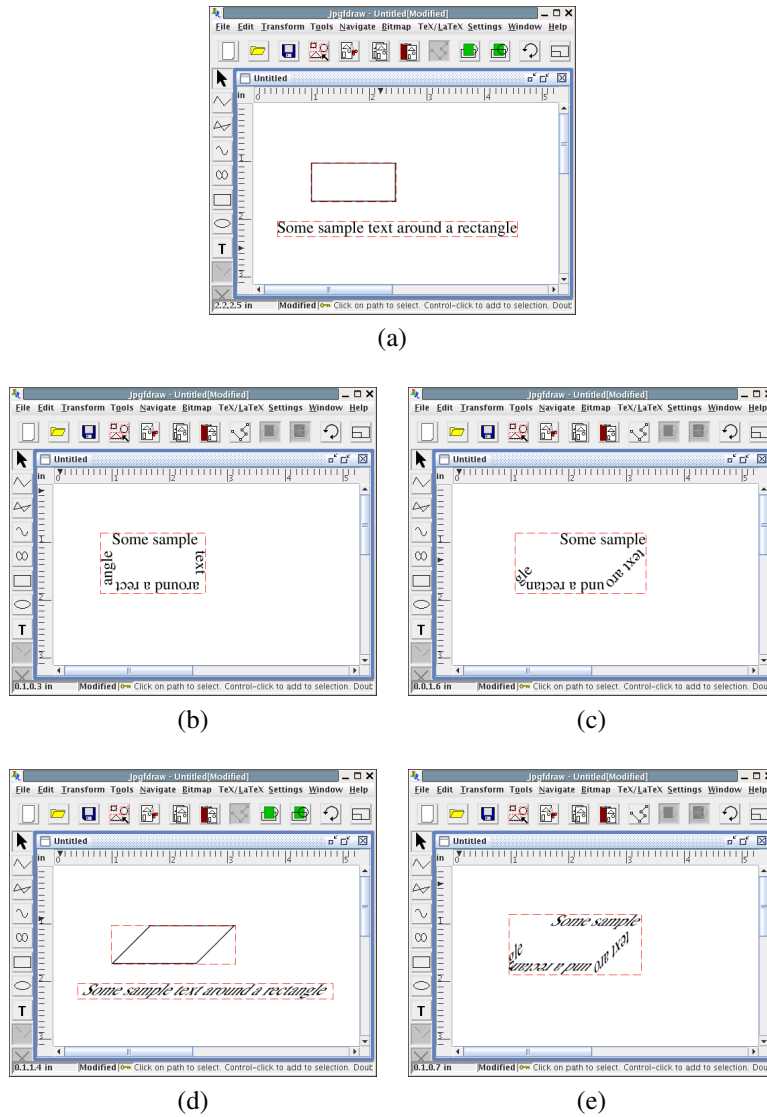


Figure 8.14: Shearing a text-path: (a) original text area and path; (b) text area and path in (a) combined to form a text-path; (c) text-path in (b) sheared horizontally; (d) text area and path in (a) sheared horizontally; (e) sheared text area and path in (d) combined to form a text-path.

## 8.14 Grouping and Ungrouping Objects

A group is a collection of [objects](#) that are treated as though they are a single entity. When you select a group, you will only see the [bounding box](#) of the entire group, not the bounding boxes of each individual object within the group. If a group is [rotated](#), [scaled](#) or [sheared](#), each object within the group will maintain its relative position. Objects within a group may also be [aligned](#). Note that a group can not be edited. Grouping and ungrouping objects may change the [stacking order](#).



To group objects, first [select](#) all the objects you want in the group, and then either click on the group button or select the menu item Transform → Group.



To ungroup a group, first [select](#) the group, and then either click on the ungroup button or select the menu item Transform → Ungroup. Note that this function is not recursive: if a group contains other groups when you ungroup the outer group, the inner groups will remain. Any description assigned to a group will be lost when it's ungrouped.



Note that if you ungroup an object containing [flowframe](#) related data, the flowframe information will be lost. If you group objects containing flowframe data, and then assign that group flowframe data, any flowframe data assigned to the contents of that group will be removed.

See also:

- [§8.11 Rotating Objects](#)
- [§8.12 Scaling Objects](#)
- [§8.13 Shearing Objects](#)
- [§8.15 Aligning Objects](#)

## 8.15 Aligning Objects

It is only possible to align [objects](#) that form part of a [group](#). Objects within a group can be aligned vertically or horizontally using the sub menu Transform → Justify.

### Transform → Justify → Left

Move all objects within the group so that the left edge of each object's [bounding box](#) lies along the left edge of the group's bounding box. (See [Figure 8.15\(b\)](#).)

### Transform → Justify → Centre

Move all objects within the group so that they are centred horizontally within the group's bounding box. (See [Figure 8.15\(c\)](#).)

### Transform → Justify → Right

Move all objects within the group so that the right edge of each object's [bounding box](#) lies along the right edge of the group's bounding box. (See [Figure 8.15\(d\)](#).)

**Transform → Justify → Top**

Move all objects within the group so that the top of each object's bounding box lies along the top of the group's bounding box.

**Transform → Justify → Middle**

Move all objects within the group so that they are centred vertically within the group's bounding box.

**Transform → Justify → Bottom**

Move all objects within the group so that the bottom of each object's bounding box lies along the bottom of the group's bounding box.

Note that alignment is not recursive: if a group contains another group, the contents of the sub group will not be aligned, each element in the sub group will be moved by the same amount.



If the menu item TeX/LaTeX → Settings → Auto Adjust Anchor is selected, any [text areas](#) that are contained in a group that is justified will automatically have their [anchors](#) changed. For example, in [Figure 8.15](#) one of the objects is a text area. If the auto anchor update facility is enabled, the text area in [Figure 8.15\(b\)](#) will have its horizontal anchor changed to Left, in [Figure 8.15\(c\)](#) it will have its horizontal anchor changed to Centre and in [Figure 8.15\(d\)](#) it will have its horizontal anchor changed to Right. Similarly, applying a vertical alignment will change the vertical anchor to one of: Top, Centre or Bottom. Note that there is no way of aligning text areas along their baseline.<sup>2</sup>

**Tip:** Sometimes you might want to centre an [object](#) relative to another thinner object. In this case it's better to create a [rectangle](#) centred on the thin object that encompasses all the objects you want to justify. Include this rectangle in the group, justify, ungroup and then delete the rectangle. For example, the image shown in [Figure 8.16\(a\)](#) has a [text area](#) below the middle line. It would look better if the text was centred below the line, so I grouped the middle line and text area and justified them using Transform → Justify → Centre. The result is shown in [Figure 8.16\(b\)](#). Although the text and line are now centred relative to each other, the line was moved to the centre of the text area, not the other way round. This was not what was intended. Instead, in [Figure 8.16\(c\)](#), I created a new rectangle that is centred on the line. Since the line is on a tick mark and the grid lock is on, it is relatively easy to create this rectangle (much easier than trying to move the text area to manually align it). I then grouped the rectangle, the middle line and the text area and justified them using Transform → Justify → Centre. The result is shown in [Figure 8.16\(d\)](#). The justified objects were then ungrouped and the rectangle was deleted to produced [Figure 8.16\(e\)](#).

See also:

- [§8.14 Grouping and Ungrouping Objects](#)
- [§10.1.2 Automatically Updating the Text Anchor](#)
- [§11.4 Step-by-Step Example: An Artificial Neuron](#)

<sup>2</sup>However it is possible that the baseline may coincide with the bottom of the text area if the text area doesn't contain any characters with descenders.



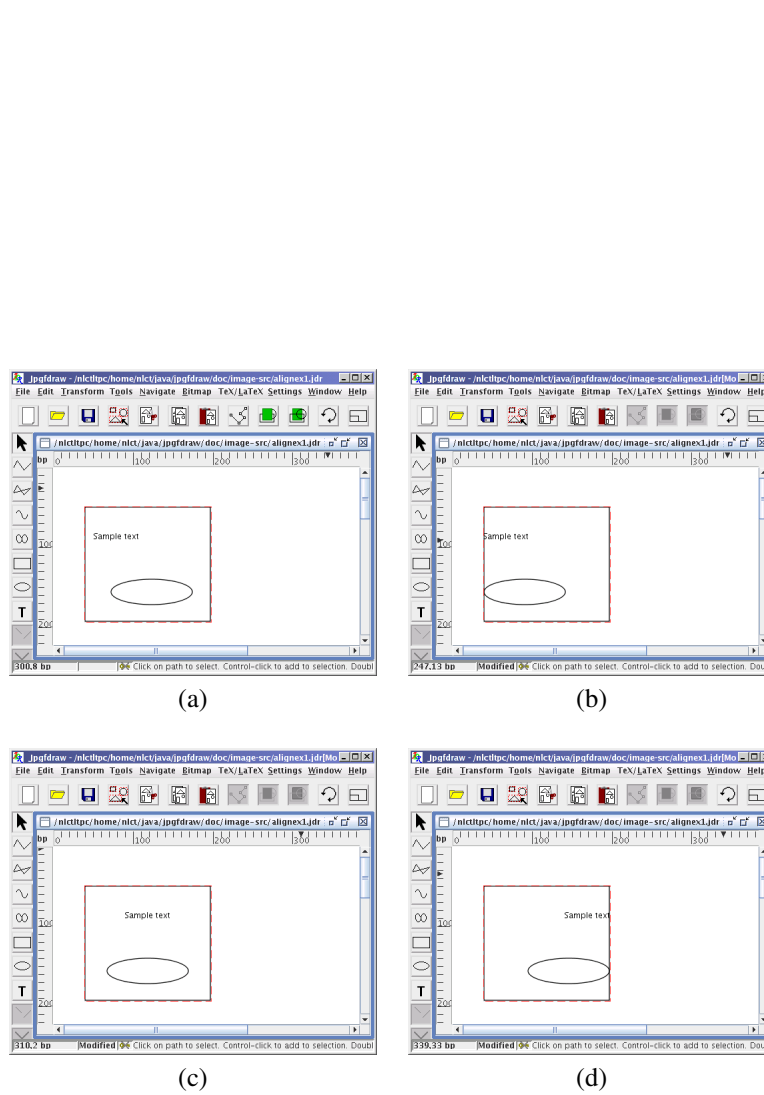


Figure 8.15: Aligning a group consisting of three objects: (a) before; (b) left justified; (c) centre justified; (d) right justified.

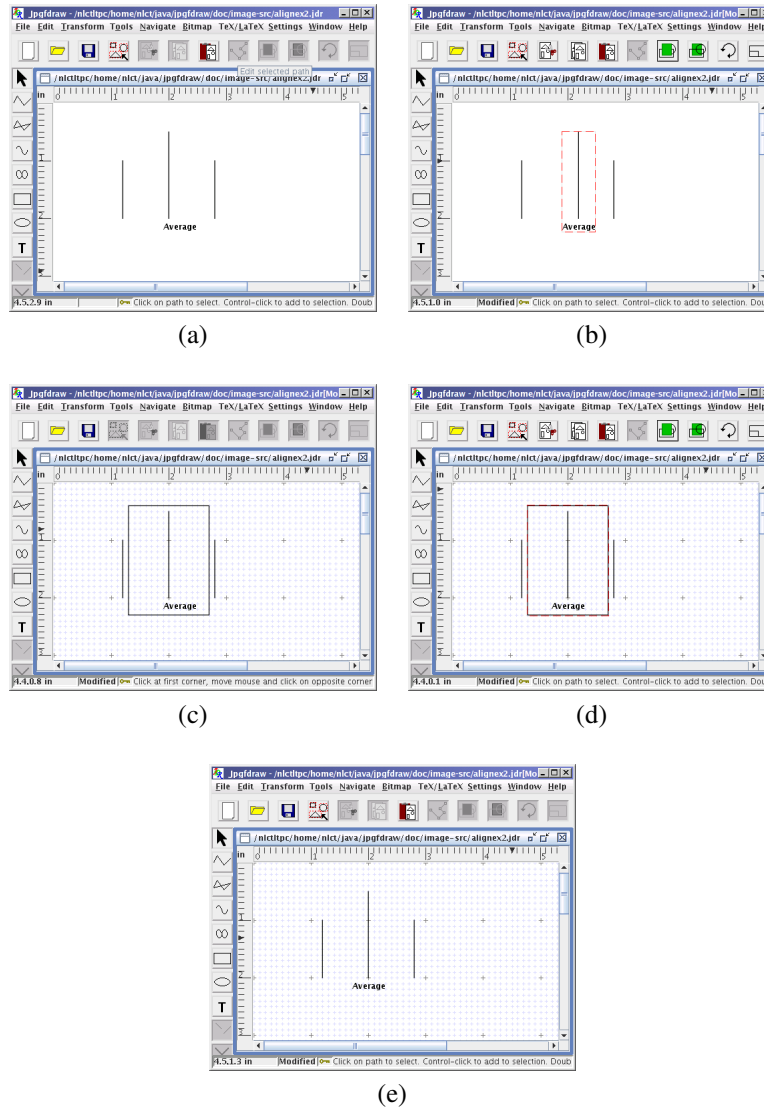


Figure 8.16: Aligning a wider object relative to a thinner object: (a) original image; (b) middle line and text area have been grouped and justified; (c) rectangle added to original image centred on the middle line; (d) rectangle, middle line and text area have been grouped and justified; (e) justified objects have been ungrouped and the rectangle has been deleted.

## 8.16 Reversing a Path's Direction

The direction of a [path](#) or [text-path](#) can be reversed using Transform → Reverse Path. For example, the path in [Figure 8.17](#) has a bar start marker, pointed arrow mid-markers and a  $\LaTeX$  style arrow end marker. [Figure 8.17\(a\)](#) shows the original path, and [Figure 8.17\(b\)](#) shows the reversed path. Note that all the [control points](#) are in the same place, but their ordering has changed.

In [Figure 8.18](#), the text-path in [Figure 8.18\(a\)](#) is reversed to form [Figure 8.18\(b\)](#). Note that the text now starts from the right instead of the left, since the first control point is now on the right, and it is upside-down.

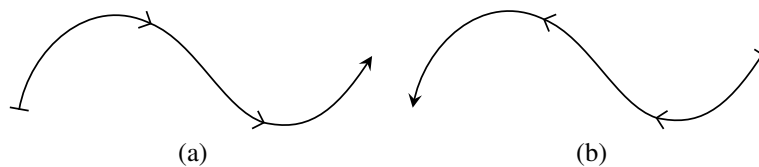


Figure 8.17: Reversing the direction of a path: (a) original path; (b) reversed path—the vertices are in the same location, but the order has been reversed.

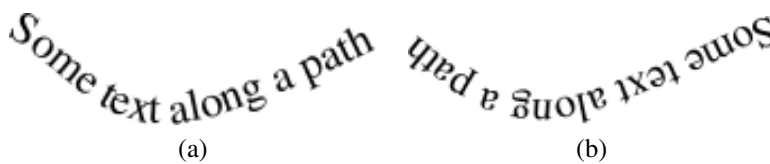


Figure 8.18: Reversing the direction of a text-path: (a) original text-path; (b) reversed text-path—the vertices are in the same location, but the order has been reversed so the text starts from the other end.

## 8.17 Merging Paths

Multiple [paths](#) can be merged into a single [path](#) using the menu item Transform → Merge Paths. Note that this is not the same as [grouping](#). Moves (gaps) will be placed between the last [control point](#) of one path and the first control point of the next path. Once the path has been merged, it can then be edited. If the paths had different styles, the new path will retain the style of the first path (the lowest one in the [stack](#)). For example, in [Figure 8.19\(a\)](#) there are two paths with different styles. [Figure 8.19\(b\)](#) shows the single path created from merging the two original paths. Since the first path used the even-odd winding rule, the new shape has a hole in it.

The same applies if one or more of the selected objects is a [text-path](#). For example, in [Figure 8.20\(a\)](#) there are two text-paths. These are merged to form a single text-path shown in [Figure 8.20\(b\)](#). Note that the text from the second [text-path](#) is lost. The resulting path is shown in edit mode in [Figure 8.20\(c\)](#) to illustrate the underlying

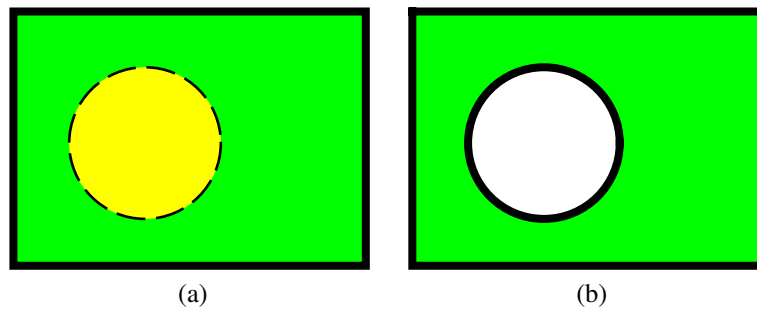


Figure 8.19: Merging two paths: (a) the first path has a solid line pattern, a green fill colour and even-odd winding rule, and the second path has a dashed line pattern and a yellow fill colour; (b) resulting merged path has a solid line pattern, green fill colour and even-odd winding rule.

path. A mixture of paths and text-paths can be merged. The resulting object will be a text-path if the first object to be merged is a text-path, otherwise it will be a path.

Paths are merged according to their [stacking order](#). For example, in [Figure 8.21\(a\)](#) there are two paths, both with a bar start marker, and an arrow end marker. The path on the right is further back in terms of the stacking order.<sup>3</sup> [Figure 8.21\(b\)](#) shows the result of merging the two paths — the left hand path has been appended to the right hand path. [Figure 8.21\(c\)](#) shows the same two paths as in [Figure 8.21\(a\)](#) except that now the left path is the [backmost object](#). There is no visible difference between [Figure 8.21\(a\)](#) and [Figure 8.21\(c\)](#), but the result of merging the paths in [Figure 8.21\(c\)](#) (see [Figure 8.21\(d\)](#)) is different to [Figure 8.21\(b\)](#) — the right hand path has been appended to the left hand path.

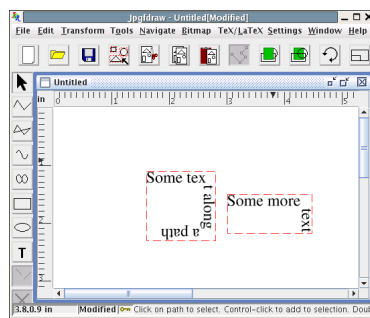
See also:

- [§8.18 Path Union](#)
- [§8.19 Exclusive Or Function](#)
- [§8.20 Path Intersection](#)
- [§8.21 Path Subtraction](#)
- [p33 Breaking a Path](#)
- [§8.16 Reversing a Path's Direction](#)
- [§11.3 Step-by-Step Example: Cheese and Lettuce on Toast](#)

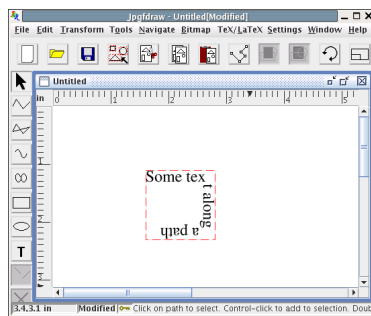
## 8.18 Path Union

Multiple [paths](#) or [text-paths](#) can be combined into a single path or text-path by performing a union on all the selected objects using the menu item Transform → Path Union. At

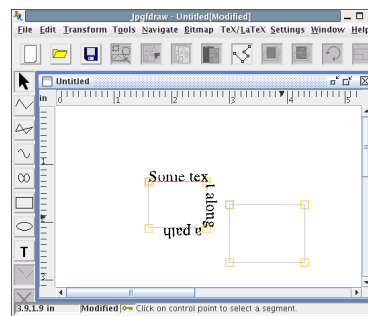
<sup>3</sup>i.e. it gets painted on the canvas before the other path.



(a)



(b)



(c)

Figure 8.20: Merging two text-paths: (a) the first path is on the left and the second path is on the right; (b) resulting merged path; (c) resulting merged path in edit mode to illustrate the underlying path.

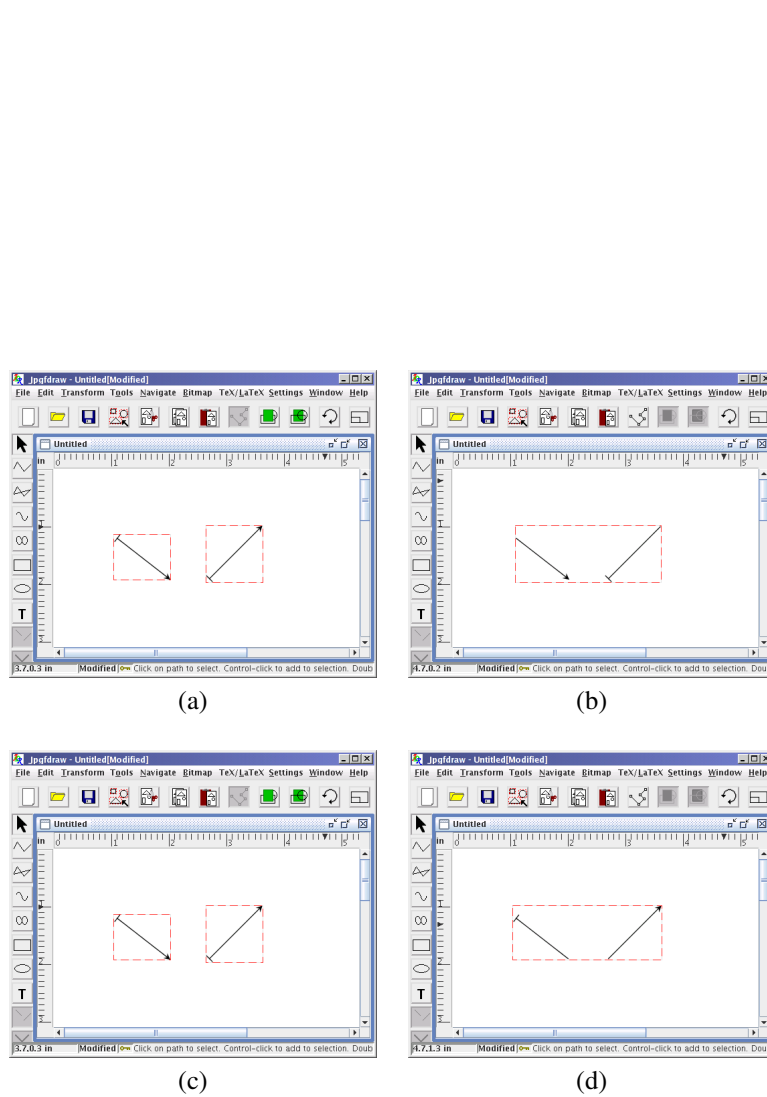


Figure 8.21: Paths are merged according to the stacking order: (a) two straight line paths where the path on the right is at the back of the stack; (b) new single path resulting from merging the two paths in (a); (c) same as (a) but the path on the left is at the back of the stack; (d) new single path resulting from merging the two paths in (c).

least two paths or text-paths must be selected to perform this function (or one of each). As with the [merge path function](#), the new path has the same styles as the [backmost](#) path in the selection. For example, in [Figure 8.22\(a\)](#), there are three overlapping paths. In [Figure 8.22\(b\)](#) the paths have been replaced by a single path created using the path union function. For comparison, the same three paths in [Figure 8.22\(a\)](#) were replaced using the [merge function](#). The result is shown in [Figure 8.22\(c\)](#).

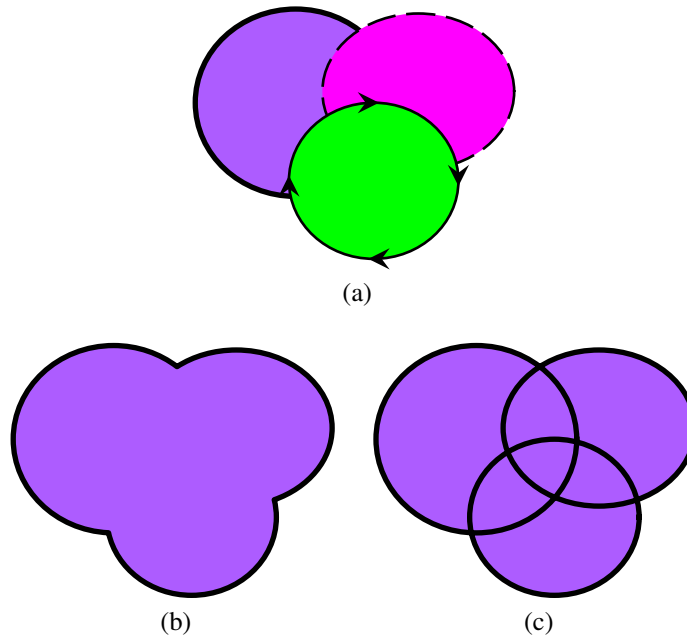


Figure 8.22: Path union: (a) original paths (the rear path has an orchid fill colour, 2bp line width and round join style); (b) the three paths in (a) have been replaced by a single path using the path union function; (c) for comparison, the three paths in (a) have been replaced by a single path using the merge paths function.

In [Figure 8.23](#), a text-path and a path are combined: [Figure 8.23\(a\)](#) shows the original objects and [Figure 8.23\(b\)](#) shows the resulting object. In this case, the resulting object is a text-path since the [backmost](#) path in [Figure 8.23\(a\)](#) was the text-path object.

See also:

- [§8.17 Merging Paths](#)
- [§8.19 Exclusive Or Function](#)
- [§8.20 Path Intersection](#)
- [§8.21 Path Subtraction](#)
- [p33 Breaking a Path](#)
- [§8.16 Reversing a Path's Direction](#)
- [§11.5 Step-by-Step Example: Bus](#)

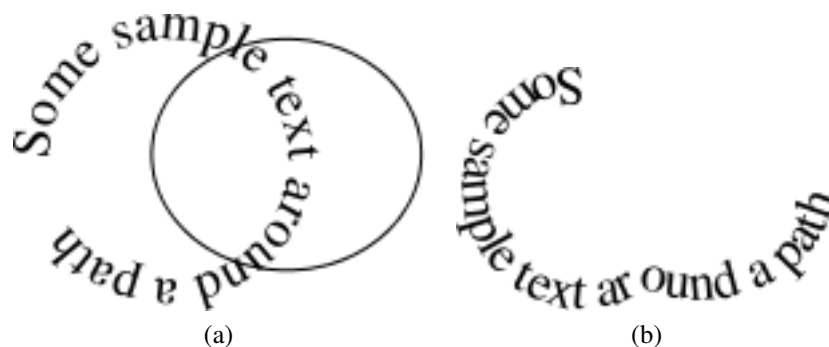


Figure 8.23: Text-path union: (a) original text-path and path; (b) objects in (a) have been replaced with text-path.

## 8.19 Exclusive Or Function

Multiple [paths](#) or [text-paths](#) can be combined into a single path by performing an exclusive OR operation on all the selected objects using the menu item Transform → XOR Paths. At least two paths or text-paths must be selected to perform this function (or one of each). As with the [merge path function](#), the new path or [text-path](#) has the same styles as the [backmost](#) path in the selection. For example, in [Figure 8.24\(a\)](#), there are three overlapping paths. The rear path has a non-zero winding rule. In [Figure 8.24\(b\)](#) the paths have been replaced by a single path created using the exclusive OR function. For comparison, the same three paths in [Figure 8.24\(a\)](#) were replaced using the [merge function](#). The result is shown in [Figure 8.24\(c\)](#). Both paths in [Figure 8.24\(b\)](#) and [Figure 8.24\(c\)](#) use a non-zero winding rule, since that was used by the rear path in [Figure 8.24\(a\)](#).

See also:

- [§8.17 Merging Paths](#)
- [§8.18 Path Union](#)
- [§8.20 Path Intersection](#)
- [§8.21 Path Subtraction](#)
- [p33 Breaking a Path](#)
- [§8.16 Reversing a Path's Direction](#)

## 8.20 Path Intersection

Multiple [paths](#) or [text-paths](#) can be combined into a single path or text-path by performing an intersection on all the selected objects using the menu item Transform → Path Intersect. At least two paths or text-paths must be selected to perform this function (or one of each), and at least two of the paths<sup>4</sup> must overlap. As with the [merge](#)

<sup>4</sup>or underlying path in the case of a text-path



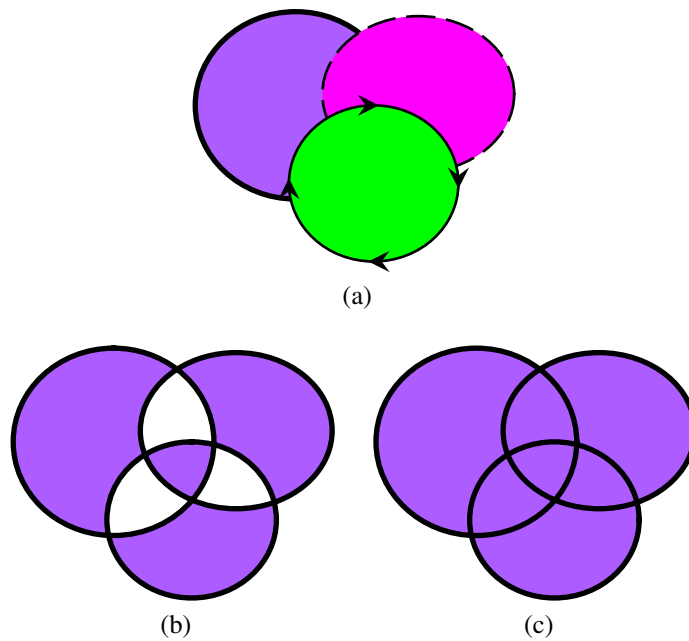


Figure 8.24: Exclusive OR function: (a) original paths (the rear path has a non-zero winding rule, orchid fill colour and round join style); (b) the three paths in (a) have been replaced by a single path using the exclusive OR function; (c) for comparison, the three paths in (a) have been replaced by a single path using the merge paths function.

[path function](#), the new path has the same styles as the [backmost](#) path in the selection. For example, in [Figure 8.25\(a\)](#), there are three overlapping paths. In [Figure 8.25\(b\)](#) the paths have been replaced by a single path created using the path intersect function.

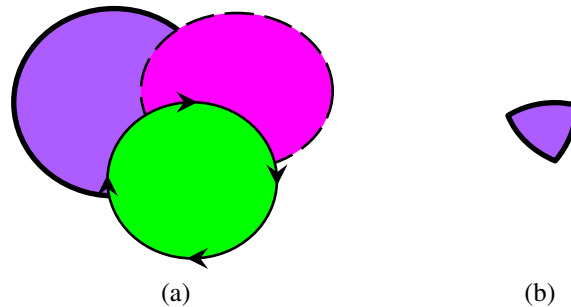


Figure 8.25: Path intersection function: (a) original paths (the rear path has an orchid fill colour and round join style); (b) the three paths in (a) have been replaced by a single path using the path intersect function.

See also:

- [§8.17 Merging Paths](#)
- [§8.18 Path Union](#)
- [§8.19 Exclusive Or Function](#)
- [§8.21 Path Subtraction](#)
- [p33 Breaking a Path](#)
- [§8.16 Reversing a Path's Direction](#)

## 8.21 Path Subtraction

Multiple [paths](#) or [text-paths](#) can be combined into a single path by performing a subtraction on all the selected paths or text-paths using the menu item Transform → Subtract Paths. At least two paths or text-paths (or one of each) must be selected to perform this function. The new path is the [backmost](#) selected path with the other selected paths subtracted from it. For example, in [Figure 8.26\(a\)](#), there are three overlapping paths. In [Figure 8.26\(b\)](#) the paths have been replaced by a single path created using the path subtraction function.

The new path will be a text-path if the backmost selected object was a text-path and the text will adjust to fit the new underlying path. For example, in [Figure 8.27\(a\)](#), there is a text-path and a path. The text-path is the backmost path. In [Figure 8.27\(b\)](#), the two objects have been replaced by a single text-path using the path subtraction function.

See also:

- [§8.17 Merging Paths](#)

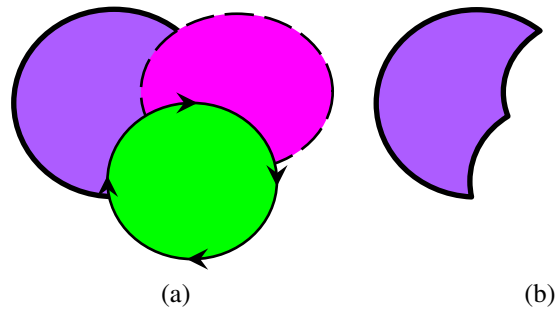


Figure 8.26: Path subtraction function: (a) original paths (the rear path has an orchid fill colour and round join style); (b) the three paths in (a) have been replaced by a single path using the path subtraction function.

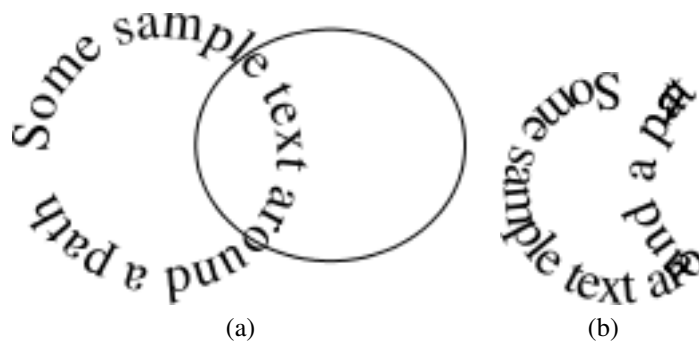


Figure 8.27: Subtracting from a text-path: (a) original text-path and path; (b) the path has been subtracted from the underlying path of the text-path.

- [§8.18 Path Union](#)
- [§8.19 Exclusive Or Function](#)
- [§8.20 Path Intersection](#)
- [p33 Breaking a Path](#)
- [§8.16 Reversing a Path's Direction](#)
- [§11.5 Step-by-Step Example: Bus](#)

## 8.22 Combining a Text Area and Path to Form a Text-Path

A [text area](#) and a [path](#) can be combined to form a [text-path](#). The underlying path will not be visible (except in path edit mode) and the text will run along the path. The horizontal [anchor](#) determines whether the text should start at the first [control point](#) of the underlying path or if it should be centred along the path or if it should be right aligned at the end control point. The vertical anchor determines whether the base, bottom, top or middle of the text should be aligned on the path. Note that if the text is longer than the path, the text will be truncated to fit.

For example, the text area and path in [Figure 8.28\(a\)](#) are combined to form a text-path. The original text area's horizontal anchor was set to left, so the text along the path starts at the first [control point](#) in [Figure 8.28\(b\)](#). In [Figure 8.28\(c\)](#) the horizontal anchor has been changed to centre, and in [Figure 8.28\(c\)](#) the horizontal anchor has been changed to right.

Once a path has been combined with a text area, the path line style attributes are lost as the path is only used as a guide to position the text. Most path functions, such as [path union](#), are applied to the underlying path and the text is adjusted to follow the new path. Transformations using the [rotate](#), [scale](#) and [shear](#) functions are applied to the underlying path not the text. You can either transform the text using the transformation functions before combining it with a path or transform it after combining by changing the [text transformation matrix](#).



Version 2.0 of the pgf package has limited text along a path support provided by the `decorations.text` library. This only supports the (left, base) anchor and doesn't support the font transformation. If you export an image containing a text-path to a `pgfpicture` environment, you must include the `decorations.text` library:

```
\usepackage{pgf}
\usepgflibrary{decorations.text}
```

Alternatively, you can either [convert the text to a path](#) or [split the text](#) before you export the image. See the pgf manual for further details on text along a path decorations.

See also:

- [§8.23 Separating a Text-Path into a Text Area and Path](#)

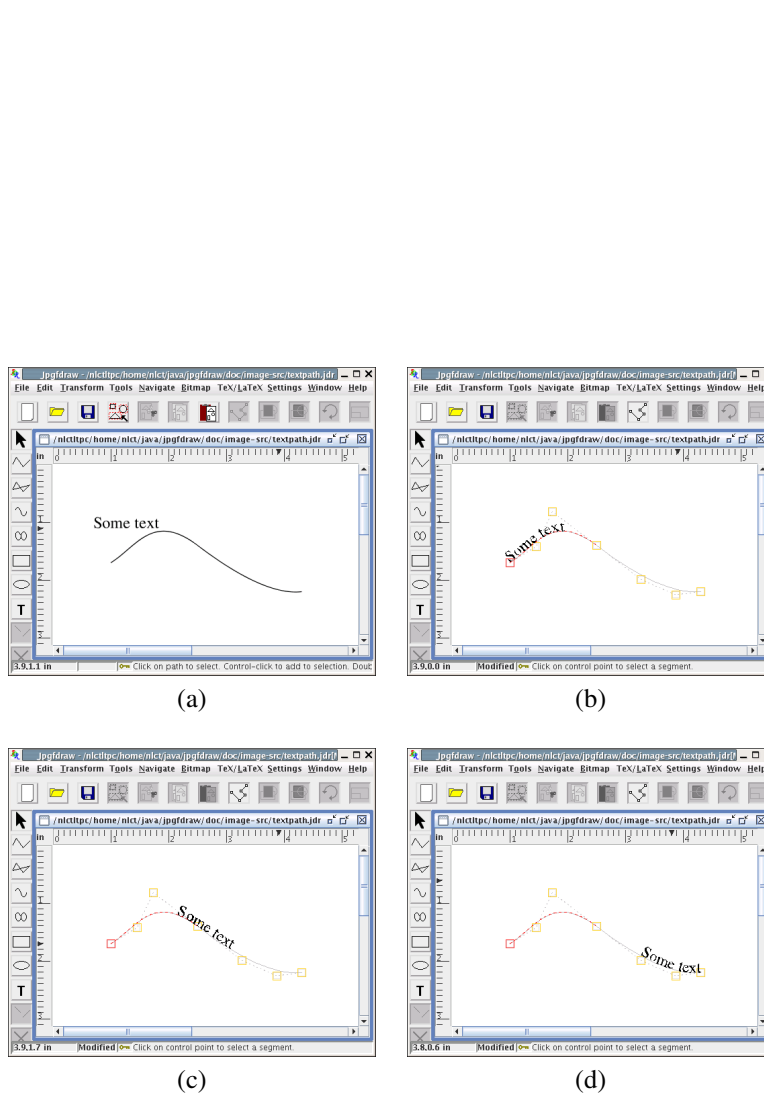
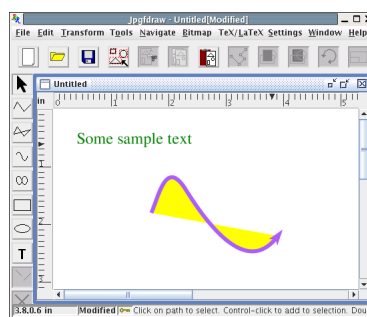


Figure 8.28: Combining a text area and path to form a text-path: (a) the original text area and path; (b) the resulting text-path with left horizontal anchor; (c) centred anchor; (d) right anchor. (The text-paths are in edit mode to show the underlying path.)

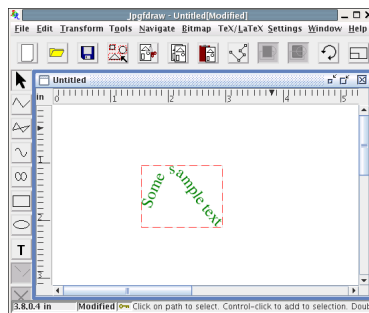
## 8.23 Separating a Text-Path into a Text Area and Path

A [text-path](#) can be separated into a group containing the [text area](#) and [path](#) that made up the text-path. Note that any line styles that were applied to the path before combining it with the text area will be lost, and the resulting path will use the default styles with the line colour the same as the text colour from the text-path and no fill colour.

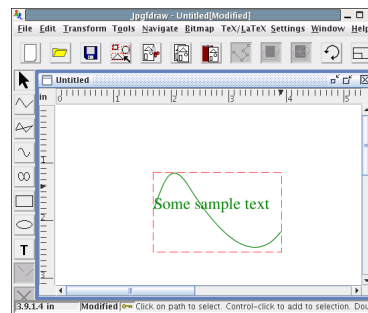
For example, in [Figure 8.29](#) the text area and path in [Figure 8.29\(a\)](#) are combined to form the text-path in [Figure 8.29\(b\)](#). The text-path is the separated into a group containing a text area and a path. Note that the new path has lost the line style shown in [Figure 8.29\(a\)](#) and is now the same colour as the text.



(a)



(b)



(c)

Figure 8.29: Separating the text and path from a text-path: (a) original path and text area; (b) path and text area in (a) combined to form a text-path; (c) text-path in (b) separated into a group containing a text area and a path.

See also:

- [§8.22 Combining a Text Area and Path to Form a Text-Path](#)
- [§8.25 Splitting Text Areas](#)
- [§8.24.1 Converting a Text Area or Text-Path to a Path](#)

## 8.24 Converting to a Path

It is possible to convert the outline of a [path](#), [text area](#) or [text-path](#) to a path using the menu item Transform → Convert Outline To Path. Note that the convert to path function can not be applied to [groups](#) or [bitmaps](#).

### 8.24.1 Converting a Text Area or Text-Path to a Path

To convert the outline of a [text area](#) or [text-path](#) to a [path](#), first [select](#) the text area or text-path and select the menu item Transform → Convert Outline To Path. The text will then be converted to a [group](#) of paths where each path approximates the shape of the corresponding character. Converting a text area or text-path to a path allows you to:

- Apply a line/fill colour to the text (so that the text outline is a different colour to the text’s interior).
- Include the image in  $\LaTeX$  document when you don’t have the equivalent  $\LaTeX$  font.
- Make a `\parshape` or `\shapepar` from the text’s outline.
- Use a gradient text colour when you want to [export](#) to a format that doesn’t support this.

Note that you will have to [ungroup](#) the paths before you can [edit](#) them. If you had a gradient paint text colour, the gradient will be applied to each path. You can however, [merge](#) the paths, which will apply a single gradient resembling the original text area (see [Figure 8.30](#)).



Figure 8.30: Converting a text area to a path: (a) original text area; (b) converted to a path; (c) ungroup and merge paths.

### 8.24.2 Converting an Outline to a Path

To convert the outline of a [path](#) to a path, first [select](#) the path and select the menu item Transform → Convert Outline To Path. For example, consider the path in [Figure 8.31\(a\)](#). This has a line width of 10bp, a circle start marker, a triangle end arrow, a gradient line colour and a yellow fill colour. [Figure 8.31\(b\)](#) shows this path in edit mode to show the path’s defining [control points](#). In [Figure 8.31\(c\)](#), the path’s outline has been converted to a path. This new path now has a gradient fill colour with a line width of 1bp and no start or end arrows. The new path’s defining control points are shown in [Figure 8.31\(d\)](#).

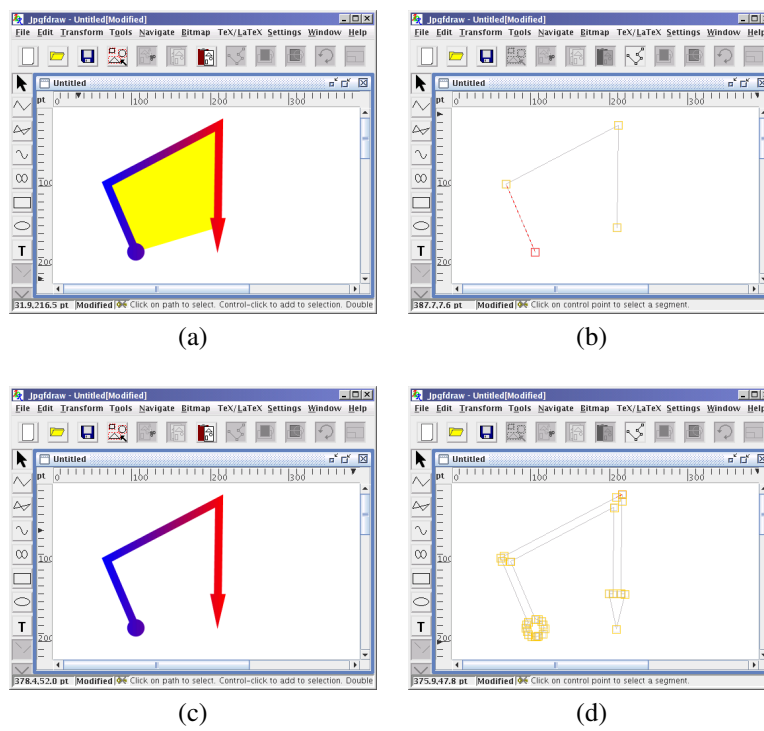


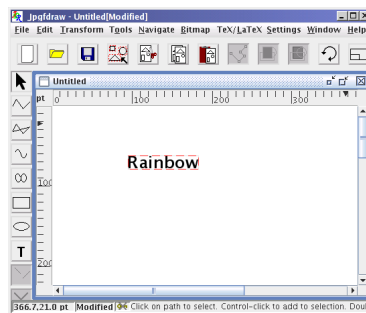
Figure 8.31: Converting an outline to a path: (a) the original path; (b) the original path's defining control points; (c) the new path; (d) the new path's defining control points.



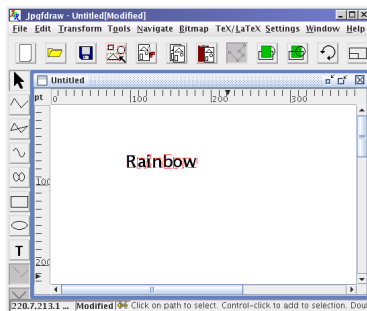
## 8.25 Splitting Text Areas

A [text area](#) or [text-path](#) can be split into a [group](#) containing text areas each consisting of a single character. For example, in [Figure 8.32\(a\)](#) there is a single text area containing the seven characters that make up the word “Rainbow”. This text area was then converted into a group of seven text areas using Transform → Split Text. The group was then ungrouped (see [Figure 8.32\(b\)](#)) and each text area was then given a different text colour resulting in the image shown in [Figure 8.32\(c\)](#).

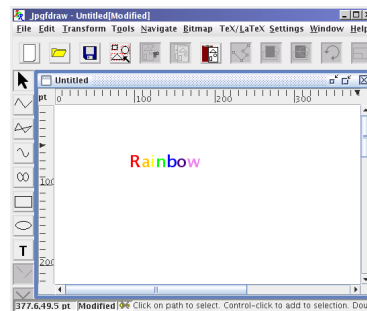
Note that if you split a text-path, you will lose the underlying path.



(a)



(b)



(c)

Figure 8.32: Splitting a text area: (a) original text area; (b) split and ungroup; (c) apply separate colours to each of the new text areas.

## 9 Path and Text Styles

The way a [path](#) is displayed is governed by the line colour, the fill colour, the line styles (such as pen width and markers) and the winding rule. The way a [text area](#) is displayed is governed by the text colour, font, transformation matrix and (if exporting to a  $\text{\LaTeX}$  file) the anchor. The way a [text-path](#) is displayed is governed by the text colour, font, anchor, transformation matrix and the underlying path.

The current path colours and styles can be set using the Settings → Styles... dialog box. This dialog box has a tabbed pane with five tabs. The tabs for setting the current path attributes are labelled: Line Colour, Fill Colour and Line Style. There is a sample panel on the right hand side illustrating the effects of the path settings you choose. The tabs for setting the current text area attributes are labelled: Text Colour and Font. There is a sample panel along the top illustrating the effects of the text area attributes you choose. Any subsequent new paths or text areas will be given the styles specified by the Settings → Styles... dialog box. The current styles are saved when you exit Jpgfdraw, and will be in effect next time you use Jpgfdraw, unless you change the startup settings (see [subsection 3.2.8](#)). To restore the default settings, click on the Default button.

To change the style of an existing path, first [select](#) the path, and then use the Edit → Path sub menu: the line colour can be changed using the Edit → Path → Line Colour... dialog box. The fill colour can be changed using the Edit → Path → Fill Colour... dialog box. The line style can be changed using the Edit → Path → Line Styles sub menu. If you have more than one path selected, the chosen attributes will be applied to all the paths in the selection. This is applied recursively through all paths within each selected [group](#). Note that the Edit → Path dialog boxes only affect selected paths and do not affect new paths. You must use the Settings → Styles... dialog box to set the current styles.

To change the style of an existing [text area](#), first [select](#) the text area, and then use the Edit → Text sub menu: the text colour can be changed using Edit → Text → Text Colour... and the text attributes can be changed using the Edit → Text → Font Style sub menu. If you have more than one text area selected, the chosen attributes will be applied to all the text areas in the selection. This is applied recursively through all text areas within each selected [group](#). Note that the Edit → Text dialog boxes only affect selected text areas and do not affect new text areas. You must use the Settings → Styles... dialog box to set the current styles.

### 9.1 Line Colour

The line colour is the colour used to draw the [path's](#) outline. You can specify one of the following:

**Transparent** No colour (the outline is not drawn).

**Colour** A single colour is used for the outline. This can be specified as RGB (red green blue), CMYK (cyan magenta yellow black), HSB (hue saturation brightness) or grey scale. The alpha value changes the opacity (maximum value is solid, zero is completely transparent and a value in between produces a semi-transparent effect).

**Gradient** A two-tone gradient is used for the outline. This requires a start colour and an end colour. The shading may be linear or radial: if linear, you need to specify

a direction using one of the direction buttons; if radial, you need to specify the starting location using one of the buttons provided.

Note that the colours you see on the screen may not exactly match colours produced by your printer due to the non-invertible mapping between colour spaces. The colours are specified as integer values between 0 and 100, or between 0 and 359 in the case of hue. You can type in the number in the appropriate box or use the slider bars or you can click on one of the predefined colour buttons.

When [exporting](#) your image, note that:

- Gradient paint line colour is not implemented when exporting to a  $\LaTeX$  file: only the start colour will be used.
- The alpha value will be ignored if you export your image as an EPS file. Similarly, if you export your image as a `pgfpicture` environment, and then use  $\LaTeX$  and `dvips`, the resulting PostScript file will not implement any semi-transparent effects.
- All colours will be converted to RGB when exporting to a PNG file, and the background will be set to white.

## 9.2 Fill Colour

The fill colour is the colour used to fill the [path's](#) interior (the interior is defined by the [winding rule](#)). You can specify one of the following:

**Transparent** No colour (the path is not filled).

**Colour** A single colour is used to fill the path. This can be specified as RGB (red green blue), CMYK (cyan magenta yellow black), HSB (hue saturation brightness) or grey scale. The alpha value changes the opacity (maximum value is solid, zero is completely transparent and a value in between produces a semi-transparent effect).

**Gradient** A two-tone gradient is used for the outline. This requires a start colour and an end colour. The shading may be linear or radial: if linear, you need to specify a direction using one of the direction buttons; if radial, you need to specify the starting location using one of the buttons provided.

Note that the colours you see on the screen may not exactly match colours produced by your printer due to the non-invertible mapping between colour spaces. The colours are specified as integer values between 0 and 100, or between 0 and 359 in the case of hue. You can type in the number in the appropriate box or use the slider bars or you can click on one of the predefined colour buttons.



Note that the gradient paint fill colour has limitations if you [export](#) your image as a `pgfpicture` environment. The alpha values will be ignored, and there may be differences in the resulting shading. See the `pgf` user manual for further details on the shading mechanism.

See also:

- [§11.1 Step-by-Step Example: A House](#)

## 9.3 Line Style

The line style is made up of the following attributes: line thickness, dash pattern, cap style, join style, markers and winding rule.

### 9.3.1 Line Thickness (or Pen Width)

The line thickness is the width of the line defining the [path's](#) border. This value is specified in the Pen Width box.

### 9.3.2 Dash Pattern

A [path](#) can be drawn either as a solid line or with a dash pattern. Select the Solid Line button for a solid line or select the Dashed Line button for a dash pattern. The latter will enable the Offset, Dash and Gap fields. The offset is the distance from the starting vertex of the path to the start of the first dash. The dash pattern will then repeat line and gap pairs, where the line length is given by the Dash field and the gap length is given by the Gap field.

A dash-dot pattern can be obtained by selecting the Secondary checkbox and entering the secondary dash length and gap length. For example, in [Figure 9.1](#) path (a) has a solid line; path (b) has a dash pattern with an offset of 0bp, dash length of 10bp and gap length of 5bp; path (c) is the same as path (b) except that the dash pattern has an offset of 10bp; path (d) has no offset, a primary pair of dash length 10bp and gap length 5bp, and a secondary pair of dash length 1bp and gap length 5bp which gives a dash-dot pattern.

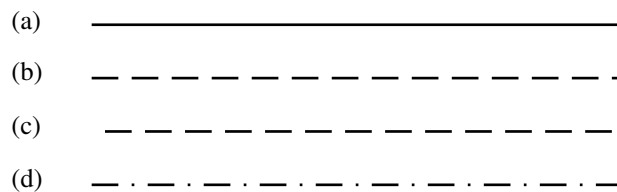


Figure 9.1: Example dash patterns: (a) solid line; (b) dash length 10bp and gap length 5bp; (c) dash length 10bp, gap length 5bp and 10bp offset; (d) primary dash length 10bp with gap length 5bp and secondary dash length 1bp with gap length 5bp.

### 9.3.3 Cap Style

The cap style can be one of: butt, round or square. (See [Figure 9.2](#).)

Note that the cap is affected by whether the [path](#) is open or closed. In [Figure 9.3\(a\)](#) the path is an open path where the end points happen to coincide; in [Figure 9.3\(b\)](#) the path is a closed path.

See also:

- [§9.3.5 Markers](#)



Figure 9.2: Cap styles: (a) butt, (b) round, (c) square. Note that the round and square caps protude from the start and end vertices.

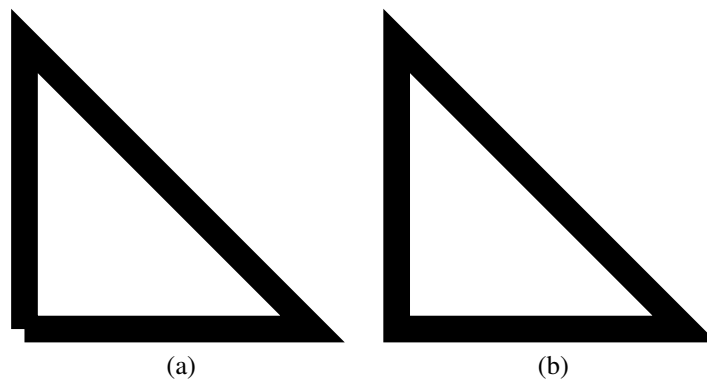


Figure 9.3: The cap style is affected by whether the path is open or closed: (a) butt cap applied to an open path; (b) butt cap applied to a closed path.

### 9.3.4 Join Style

The join style can be one of: mitre, round or bevel. (See [Figure 9.4.](#)) If a mitre join style is selected, you can also specify the mitre limit, which must be a value greater than or equal to 1.0.

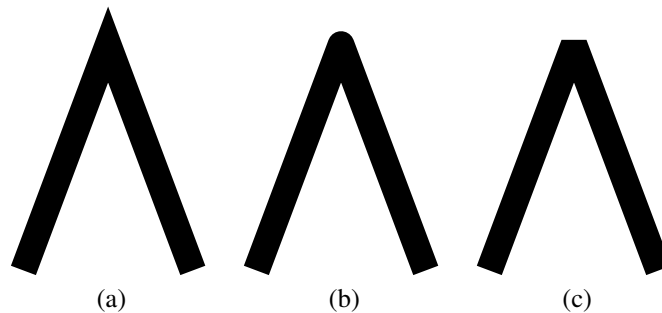


Figure 9.4: Join styles: (a) mitre, (b) round, (c) bevel.

### 9.3.5 Markers

The start, mid and end markers are placed on the start, mid-point and end vertices, respectively. Some of the markers require a size, some of them are dependent on the line width and some of them require a size as well as being dependent on the line width.

Markers on existing [paths](#) can be set using the menu item Edit → Path → Line Styles → All Styles..., and clicking on the Select... button next to the appropriate marker label. This will open up the marker dialog box. Alternatively, if the start, mid and end markers all need to be the same, the menu item Edit → Path → Line Styles → All Markers... can be used to set them all at the same time.

#### Enabling or Disabling a Marker

To enable a marker, select the Use Marker radio button, or to disable a marker, select the No Marker radio button. Selecting the Use Marker radio button will enable the marker type selector.

#### Marker Types

Marker types are divided into six categories: arrow style markers, partial arrow markers, data point style markers, bracket style markers, decorative markers and cap style markers. Note that the cap style markers do not replace the line cap style, but are in addition to the line cap style. However the cap style markers generally look best in combination with the butt cap line style.

Available markers are listed in [Table 9.1](#) (arrow style markers), [Table 9.2](#) (partial arrow markers), [Table 9.3](#) (data point style markers), [Table 9.4](#) (bracket style markers), [Table 9.5](#) (cap style markers) and [Table 9.6](#) (decorative markers).



Jpgfdraw no longer uses the pgf arrow commands for the markers, as Jpgfdraw's markers are too complicated, since they allow for user specific ori-

entation and include provision for mid-markers. Therefore, from version 0.4.0b, Jpgfdraw now sets all markers as individual paths when exporting to a  $\text{\LaTeX}$  file.

### Marker Size

The Size box will be enabled for only the resizable markers. This box can be used to vary the marker size, but some markers also depend on the line width, so the size box is only meant as a general guide.

### Repeating Markers

Markers can be doubled or tripled by selecting the Double or Triple radio boxes. To go back to a single marker, select the Single radio box. [Figure 9.5](#) illustrates single, double and triple repeat markers for a path with a  $\text{\LaTeX}$  style end arrow. Note that the markers are placed along the gradient vector which means that they may not lie on the actual path. (See [Figure 9.6](#).)

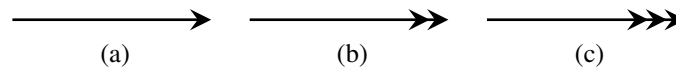


Figure 9.5: Repeat markers: (a) single, (b) double, (c) triple.



Figure 9.6: Repeat markers are placed along the gradient vector.

### Reversing Markers

Markers can be reversed by selecting the Reversed checkbox. (See [Figure 9.7](#).)

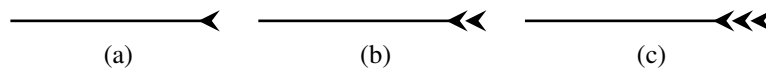


Figure 9.7: Reversed markers: (a) single reversed, (b) double reversed, (c) triple reversed.

### Composite Markers

A marker can be combined with another marker by selecting the Composite checkbox which will enable the secondary marker tab. If the Overlay checkbox is selected, the

Table 9.1: Available marker styles and dependencies for arrow style markers. (Line width=2bp, marker size=8bp, butt cap style.) Markers are shown in red to distinguish them from the line.

Marker	Size?	Line Width Dependent?	Centred on Vertex?	Sample
Pointed	Required	Dependent	No	
Pointed 60	Required	Dependent	No	
Pointed 45	Required	Dependent	No	
Cusp	Required	Dependent	No	
LaTeX	N/A	Dependent	No	
Alt LaTeX	N/A	Dependent	No	
Alt LaTeX Open	N/A	Dependent	No	
Triangle	Required	Dependent	No	
Triangle Open	Required	Dependent	No	
Equilateral Filled	Required	Independent	No	
Equilateral Open	Required	Independent	No	
Hooks	Required	Dependent	No	

Table 9.2: Available marker styles and dependencies for partial arrow style markers. (Line width=2bp, marker size=8bp, butt cap style.) Markers are shown in red to distinguish them from the line.

Marker	Size?	Line Width Dependent?	Centred on Vertex?	Sample
Hook Up	Required	Dependent	No	
Hook Down	Required	Dependent	No	
Half Pointed Up	Required	Dependent	No	
Half Pointed Down	Required	Dependent	No	
Half Pointed 60 Up	Required	Dependent	No	
Half Pointed 60 Down	Required	Dependent	No	
Half Pointed 45 Up	Required	Dependent	No	
Half Pointed 45 Down	Required	Dependent	No	
Half Cusp Up	Required	Dependent	No	
Half Cusp Down	Required	Dependent	No	



Table 9.3: Available marker styles and dependencies for data point style markers. (Line width=2bp, marker size=8bp, butt cap style.) Markers are shown in red to distinguish them from the line.

Marker	Size?	Line Width Dependent?	Centred on Vertex?	Sample
Dot Filled	Required	Independent	Yes	
Dot Open	Required	Independent	Yes	
Box Filled	Required	Independent	Yes	
Box Open	Required	Independent	Yes	
Cross	Required	Independent	Yes	
Plus	Required	Independent	Yes	
Star	Required	Independent	Yes	
Asterisk	Required	Independent	Yes	
Open 5 Pointed Star	Required	Independent	Yes	
Filled 5 Pointed Star	Required	Independent	Yes	
Open 6 Pointed Star	Required	Independent	Yes	
Filled 6 Pointed Star	Required	Independent	Yes	
Triangle Up Filled	Required	Independent	Yes	
Triangle Up Open	Required	Independent	Yes	
Triangle Down Filled	Required	Independent	Yes	
Triangle Down Open	Required	Independent	Yes	
Rhombus Filled	Required	Independent	Yes	
Rhombus Open	Required	Independent	Yes	
Pentagon Filled	Required	Independent	Yes	
Pentagon Open	Required	Independent	Yes	
Hexagon Filled	Required	Independent	Yes	
Hexagon Open	Required	Independent	Yes	
Octagon Filled	Required	Independent	Yes	
Octagon Open	Required	Independent	Yes	
Filled Semicircle	Required	Independent	No	
Open Semicircle	Required	Independent	No	

Table 9.4: Available marker styles and dependencies for bracket style markers. (Line width=2bp, marker size=8bp, butt cap style.) Markers are shown in red to distinguish them from the line.

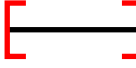
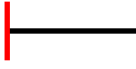


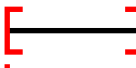
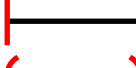


Marker	Size?	Line Width Dependent?	Centred on Vertex?	Sample
Square Bracket	N/A	Dependent	No	
Bar	N/A	Dependent	Yes	
Round Bracket	N/A	Dependent	No	
Brace	N/A	Dependent	No	
Alt Square	Required	Dependent	No	
Alt Bar	Required	Dependent	Yes	
Alt Round	Required	Dependent	No	
Alt Brace	Required	Dependent	No	

Table 9.5: Available marker styles and dependencies for cap style markers. (Line width=10bp, marker size=5bp, butt cap style.) The cap style markers are designed to be flush against the line, so they are only clearly visible for thick lines. Markers are shown in red to distinguish them from the line.









Marker	Size?	Line Width Dependent?	Centred on Vertex?	Sample
Rectangle Cap	Required	Dependent	No	
Round Cap	Required	Dependent	No	
Triangle Cap	Required	Dependent	No	
Inverted Triangle Cap	Required	Dependent	No	
Chevron Cap	Required	Dependent	No	
Inverted Chevron Cap	Required	Dependent	No	
Fast Cap	Required	Dependent	No	
Inverted Fast Cap	Required	Dependent	No	

Table 9.6: Available marker styles and dependencies for decorative markers. (Line width=2bp, marker size=8bp, butt cap style.) Markers are shown in red to distinguish them from the line.

Marker	Size?	Line Width Dependent?	Centred on Vertex?	Sample
Circle	Required	Dependent	No	
Diamond	N/A	Dependent	No	
Circle Open	Required	Dependent	No	
Diamond Open	N/A	Dependent	No	
Scissors Up Filled	Required	Dependent	No	
Scissors Down Filled	Required	Dependent	No	
Scissors Up Open	Required	Dependent	No	
Scissors Down Open	Required	Dependent	No	
Right Heart Filled	Required	Independent	No	
Right Heart Open	Required	Independent	No	
Heart Filled	Required	Independent	No	
Heart Open	Required	Independent	No	
Snowflake	Required	Independent	Yes	
Star Chevron Open	Required	Independent	Yes	
Star Chevron Filled	Required	Independent	Yes	

primary and secondary markers will be positioned so that their origins coincide, otherwise the secondary marker will be offset from the primary marker (see also [Marker Offset](#) below). [Figure 9.8](#) shows two examples of composite markers: in [Figure 9.8\(a\)](#) the start and end markers are formed from a pointed arrow primary marker of size 5bp and a composite bar secondary marker, while in [Figure 9.8\(b\)](#) the start and end markers are formed from an open semicircle primary marker of size 5bp with an overlaid reversed filled semicircle secondary marker of size 5bp.

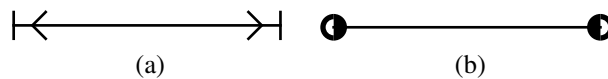


Figure 9.8: Examples of composite markers: (a) a bar primary marker with a pointed secondary marker of size 5bp; (b) an open semicircle primary marker of size 5bp overlaid with a reversed filled semicircle secondary marker of size 5bp.

### Marker Orientation

If the Auto Orientation box is checked, the marker will be rotated so that the marker's  $x$ -axis lies along the [path's](#) gradient vector (start markers point in the opposite direction). If this box is not checked, the marker will be rotated according to the angle specified (in degrees) in the box next to the Auto Orientation box.

### Marker Offset

If the Auto Offset box is checked, the marker's offset from the vertex will be computed automatically. (The primary marker will be placed with its origin coinciding with the vertex, but the secondary marker will be offset from the primary marker according to whether any duplicate markers have been specified and according to the line width.) If this box is not checked, the marker will be offset according to the length specified in the adjoining box. Examples: in [Figure 9.9\(a\)](#) both the start and end markers have been set to the  $\LaTeX$  style marker with an offset of  $-10\text{bp}$ , and in [Figure 9.9\(b\)](#) both the start and end markers are composite markers formed from a bar primary marker and a pointed secondary marker, where the secondary marker's offset has been set to 2bp. Note that setting the secondary marker's offset to 0 is equivalent to using the overlay function.

Note that markers are placed along the [path's](#) gradient vector, so the marker may not necessarily lie on the path. For example, in [Figure 9.10](#), a marker with offset 10bp has been placed at the end of a Bézier curve. The marker's offset has moved it along the gradient vector, away from the curve.

### Repeat Gap

If the Auto Repeat Gap box is checked, the gap between repeat markers is given by 7 times the line width. If this box is not selected, the gap will be given by the length specified in the adjoining box. For example, in [Figure 9.11\(a\)](#) a line has an end marker with a triple arrow with the auto repeat function selected. Since the line width is 1bp, the gap between the markers is 7bp. In [Figure 9.11\(b\)](#) the line width is 2bp, so the gap between the markers is 14bp. In [Figure 9.11\(c\)](#), the line width is 1bp and the repeat

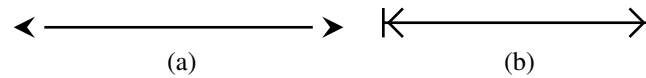


Figure 9.9: Disabling the marker auto offset: (a) a negative offset makes the marker protrude off the end of the line; (b) the secondary marker has an offset of 2bp so that it is only slightly behind the primary marker.



Figure 9.10: Changing a marker's offset moves it along the gradient vector.

gap has been set to 10bp and in [Figure 9.11\(d\)](#) the line width is 2bp again with a repeat gap of 10bp.

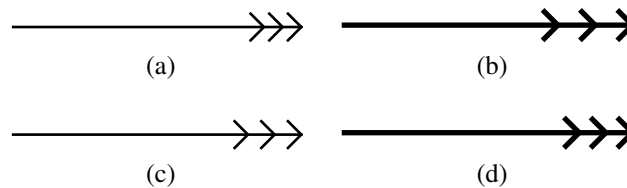


Figure 9.11: Repeat gap: (a) line width of 1bp and auto repeat gap; (b) line width of 2bp and auto repeat gap; (c) line width of 1bp and repeat gap set to 10bp; (d) line width of 2bp and repeat gap set to 10bp.

### Marker Colour

If the Colour As Path box is checked, the marker will have the same colour as the [path](#). If you want the marker to have a specific colour, you should check the Specific Colour box, which will enable the colour panel. Note that if the marker has been assigned a specific colour, it will remain unchanged if you change the line colour of the path, otherwise it will change with the path. For example, [Figure 9.12](#) shows a path with a transparent line colour and blue start, mid and end markers.

Primary and secondary marker colour settings are independent of each other. For example, in [Figure 9.13](#) the start and end markers are composite markers formed from a filled yellow pentagon primary marker and an open pentagon secondary marker. The secondary marker colour is set to the line colour, so if the line colour is changed the pentagon outline will change accordingly, but the filled pentagon will remain yellow.

### 9.3.6 Winding Rule

The winding rule describes how a [path](#) is filled (if it has a fill colour). The winding rule can be either even-odd or non-zero. [Figure 9.14](#) illustrates the difference between

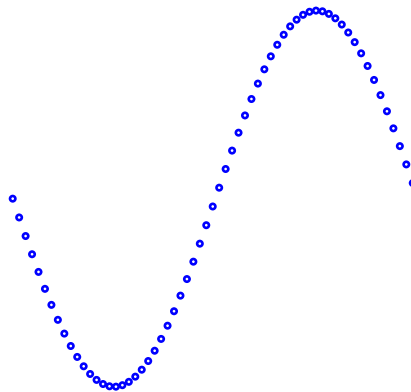


Figure 9.12: Marker colour may be independent of the line colour: this path has a transparent line colour and blue start, mid and end markers.

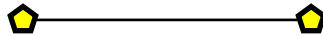


Figure 9.13: Primary and Secondary Markers are Independent

the two winding rules. A path was constructed with a gap between the outer and inner rectangles. Figure 9.14(a) shows the effect using the even-odd winding rule and Figure 9.14(b) shows the effect using the non-zero winding rule. The winding rule is also used when extracting the parameters for `\parshape` and `\shapepar`.

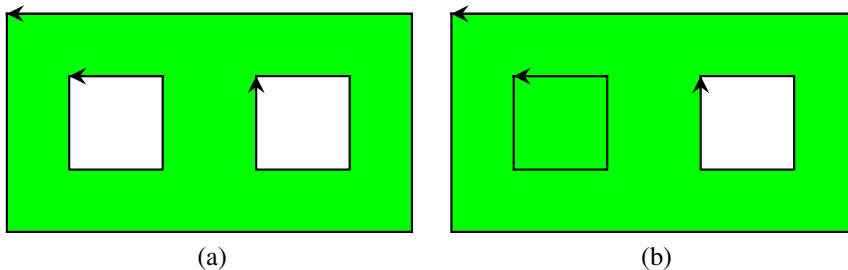


Figure 9.14: Winding rules (arrows indicate direction of path): (a) even-odd, (b) non-zero.

See also:

- §11.3 Step-by-Step Example: Cheese and Lettuce on Toast

## 9.4 Text Colour

The text colour can be one of the following:

**Transparent** No colour. A transparent [text area](#) is not painted on the canvas, but it does have a [bounding box](#). When exporting to a  $\LaTeX$  document, transparent text areas have their text set in the argument of `\phantom`.

**Colour** A single colour. This can be specified as RGB (red green blue), CMYK (cyan magenta yellow black), HSB (hue saturation brightness) or grey scale. The alpha value changes the opacity (maximum value is solid, zero is completely transparent, and a value in between produces a semi-transparent effect).

**Gradient** A two-tone gradient is used for the outline. This requires a start colour and an end colour. The shading may be linear or radial: if linear, you need to specify a direction using one of the direction buttons; if radial, you need to specify the starting location using one of the buttons provided.



If you intend to save your picture as a `pgfpicture` environment, there is no implementation of gradient colour for text. If you have a [text area](#) with a gradient text colour, then when you save it to a  $\LaTeX$  file, the starting colour will be applied as a single colour. If you want gradient coloured text in your `pgfpicture` environment, you can achieve an approximate effect by doing the following:

1. [Convert the text area to a path](#)
2. [Ungroup the object](#)
3. [Merge the paths into a single path](#)

Note that the colours you see on the screen may not exactly match colours produced by your printer due to the non-invertible mapping between colour spaces. The colours are specified as integer values between 0 and 100, or between 0 and 359 in the case of hue. You can type in the number in the appropriate box, or use the slider bars, or you can click on one of the predefined colour buttons.

## 9.5 Text Style

The text style consists of the font attributes and (if you are exporting to a  $\LaTeX$  file) an anchor. The current text styles can be set via the `Settings`  $\rightarrow$  `Styles...` menu. The style for existing [text areas](#) can be set via the `Edit`  $\rightarrow$  `Text`  $\rightarrow$  `Font Style` submenu.

### 9.5.1 Font Family

Use `Edit`  $\rightarrow$  `Text`  $\rightarrow$  `Font Style`  $\rightarrow$  `Family...` to change just the font family for selected [text areas](#). To change the current font family to apply to new text areas, use `Settings`  $\rightarrow$  `Styles...` and select the tab labelled `Font`.

The [drop-down list](#) labelled `Font Family` (see [Figure 9.15](#)) provides a list of locally available fonts. You can select the required font from this list.



When you select a font family, `Jpgfdraw` guesses at the appropriate  $\LaTeX$  font family declaration. This is used if you save your image as a  $\LaTeX$  file. If `Jpgfdraw` has guessed incorrectly, you can select a different command from the [combo box](#) on the right, or you can edit it if you require a font family declaration that is not listed. Alternatively you can clear the value (by deleting the family declaration) to use the current document font family.

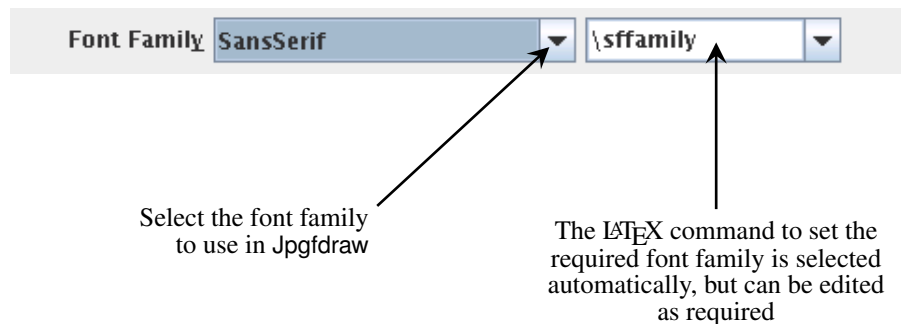


Figure 9.15: Setting the Font Family

Note that Jpgfdraw only guesses at a  $\text{\LaTeX}$  alternative when you select a new font family from the Font Family [drop-down list](#). If there is a particular mapping that you always want, you can create a file called `latexfontmap`<sup>1</sup> in Jpgfdraw’s [configuration directory](#). Each line in this file should be in the form:

```
<font name>=<LaTeX declaration>
```

where *<font name>* is the name of the font family (e.g. URW Chancery L) and *<LaTeX declaration>* is the code<sup>2</sup> used to set the font in a  $\text{\LaTeX}$  document. Blank lines or lines starting with a hash (#) are ignored. For example, on my laptop I have the font “URW Chancery L”. If I select this font, the  $\text{\LaTeX}$  equivalent will default to `\rmfamily`. However, it would be more appropriate for the  $\text{\LaTeX}$  declaration to select the PSNFSS chancery font. Therefore, I can use my favourite text editor to create a file called `latexfontmap` with the line

```
URW Chancery L=\fontfamily{pzc}\selectfont
```

and save it in Jpgfdraw’s configuration directory. Next time I start Jpgfdraw, it will load this mapping and use it whenever I select “URW Chancery L” from the font name selector. Alternatively, you can use a regular expression. For example:

```
.*[Cc]hancery.*=\fontfamily{pzc}\selectfont
```

This will select `\fontfamily{pzc}\selectfont` for any font that contains either “Chancery” or “chancery” in its name. It is however faster to use the exact name.

See also:

- [§9.5.6 Anchor](#)

## 9.5.2 Font Size

Use Edit → Text → Font Style → Size... to change just the font size for selected [text areas](#). To change the current font size to apply to new text areas, use Settings → Styles... and select the tab labelled Font.

<sup>1</sup>Note that the file `latexfontmap` does not have an extension, so be careful if your text editor automatically appends an extension (such as `.txt`).

<sup>2</sup>This code should be in the form of a declaration (sets the font “from this point onwards”) not a text block command (a command that sets its argument in the given font).



You can enter the font size in the field labelled Font Size (see [Figure 9.16](#)).

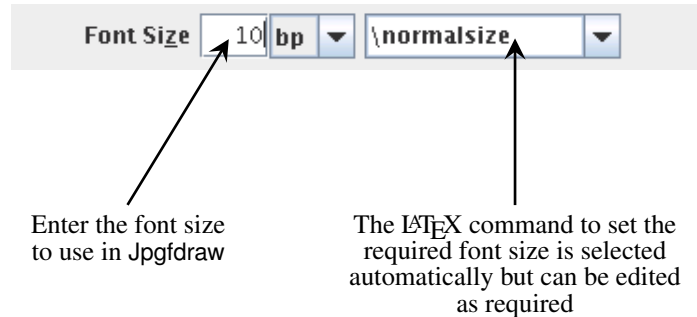



Figure 9.16: Setting the Font Size

 When you specify a font size, Jpgfdraw guesses at the appropriate  $\LaTeX$  font size declaration. The normal size is taken from the value given in the [TeX/LaTeX Settings](#) dialog box. This is used if you save your image as a  $\LaTeX$  file. If Jpgfdraw has guessed incorrectly, you can select a different command from the [combo box](#) on the right, or you can edit it if you require a font size declaration that is not listed. Alternatively you can clear the value (by deleting the size declaration) to use the current document font size. Note that `\veryHuge`, `\VeryHuge` and `\VERYHuge` are not standard commands, but are defined in the `a0poster` class file. Jpgfdraw will only select these commands if the normal font size is 25pt. Remember that if you want to use very large sizes in your  $\LaTeX$  document, you will need to use scalable fonts, such as PostScript fonts, rather than the default Computer Modern.

Note that if you change the `\normalsize` value, you will need to reselect the font size for each of the [text area's](#) already present unless the check box marked Update all LaTeX font size declarations in current image is selected in the [TeX/LaTeX Settings](#) dialog box.


See also:

- [§9.5.6 Anchor](#)
- [§10.1.1 Setting the Normal Font Size](#)

### 9.5.3 Font Series

Use Edit → Text → Font Style → Series... to change just the font series for selected [text areas](#). To change the current font series to apply to new text areas, use Settings → Styles... and select the tab labelled Font.

You can set the font series to medium (normal) or bold by selecting the appropriate item from the [drop-down list](#) labelled Font Series (see [Figure 9.17](#)).

 When you select a font series, Jpgfdraw guesses at the appropriate  $\LaTeX$  font series declaration. This is used if you save your image as a  $\LaTeX$  file. If Jpgfdraw has guessed incorrectly, you can select a different command from the [combo box](#) on the right, or you can edit it if you require a font series declaration that

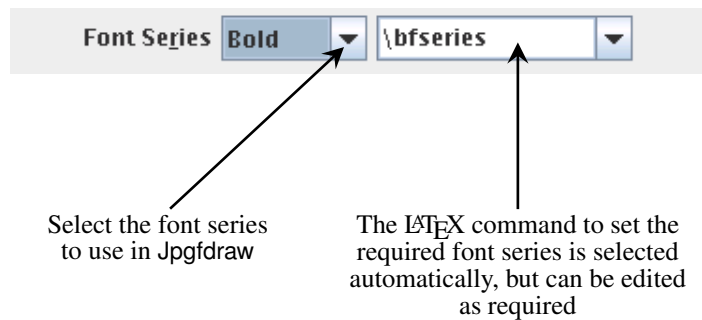


Figure 9.17: Setting the Font Series

is not listed. Alternatively you can clear the value (by deleting the series declaration) to use the current document font series.

### 9.5.4 Font Shape

Use `Edit` → `Text` → `Font Style` → `Shape...` to change just the font shape for selected [text areas](#). To change the current font shape to apply to new text areas, use `Settings` → `Styles...` and select the tab labelled `Font`.

You can set the font shape to upright (normal) or italic by selecting the appropriate item from the [drop-down list](#) labelled `Font Shape` (see [Figure 9.18](#)).

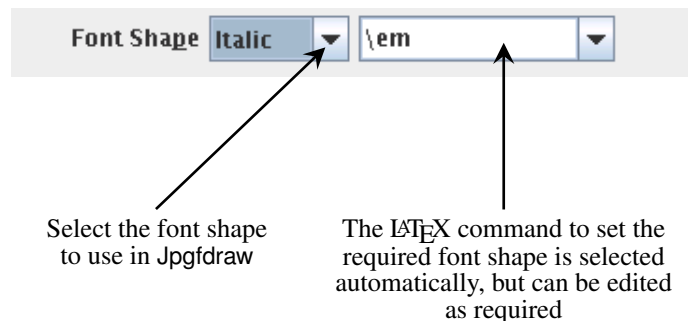


Figure 9.18: Setting the Font Shape



When you select a font shape, Jpgfdraw guesses at the appropriate  $\LaTeX$  font shape declaration. This is used if you save your image as a  $\LaTeX$  file. If Jpgfdraw has guessed incorrectly, you can select a different command from the [combo box](#) on the right, or you can edit it if you require a font shape declaration that is not listed. Alternatively you can clear the value (by deleting the shape declaration) to use the current document font shape.

### 9.5.5 Text Transformation Matrix

In addition to [scaling](#), [rotating](#) and [shearing](#) a [text area](#), you can also directly modify the transformation matrix using `Edit → Text → Transformation Matrix...`. The transformation matrix for a text area is applied relative to the top left corner of the [canvas](#). The transformation matrix for a [text-path](#) is applied relative to the point along the underlying path where each character should be positioned.

Once a text area has been combined with a [path](#) to form a text-path, the text can only be transformed by editing the transformation matrix. For example, [Figure 9.19](#) shows a text-path in edit mode (so that you can see the underlying path) with different values of the transformation matrix. In [Figure 9.19\(a\)](#), the transformation matrix is set to the identity matrix, shown in [Figure 9.19\(b\)](#). In [Figure 9.19\(c\)](#), the transformation matrix is set as shown in [Figure 9.19\(d\)](#), (the vertical translation has been set to 10). The text is no longer flush against the path. In [Figure 9.19\(e\)](#), the transformation matrix has been set as shown in [Figure 9.19\(f\)](#), (the horizontal shear element has been set to  $-1$ ).

### 9.5.6 Anchor

For a [text-path](#), the anchor is used to determine where the text should be positioned along the underlying path. Changing the anchor for a text-path will change the way it is displayed in `Jpgfdraw` (as illustrated in [Figure 8.28](#) on page 59). For a [text area](#), the anchor is only used when you export the image to a  $\LaTeX$  file and changing it will not change the way the text area is displayed in `Jpgfdraw`.

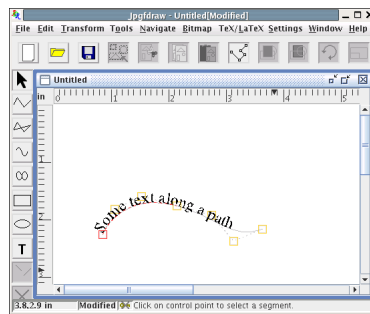
If you export your image to a  $\LaTeX$  file, the font used in the document is unlikely to completely match the font used in `Jpgfdraw`. As a result, text may appear wider or narrower in the resulting  $\LaTeX$  document than in the image displayed in `Jpgfdraw`. This may result in the text appearing as though it has shifted position. (Particularly when the [text area](#) contains  $\LaTeX$  commands.) To reduce this effect, you can specify what part of the text should be considered as the anchor. To illustrate this, consider the image shown in [Figure 9.20](#). An image was created in `Jpgfdraw` containing some text bordered by a rectangle with an additional line along the text area's baseline: [Figure 9.20\(a\)](#) shows how the image appears in `Jpgfdraw`. The font used is the generic Java serif font and the text takes up the entire box. The image was then exported to a  $\LaTeX$  file with various anchor settings. The  $\LaTeX$  document set the Roman font via:

```
\usepackage{mathptmx}
```

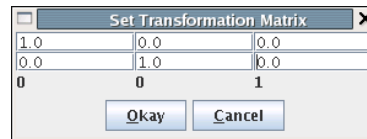
This is a slightly narrower font than the Java font used in `Jpgfdraw`, so the text no longer fills the box. In [Figure 9.20\(b\)](#), the anchor was set to (left, base); in [Figure 9.20\(c\)](#), the anchor was set to (centre, base); in [Figure 9.20\(d\)](#), the anchor was set to (right, base). Notice that the base line for the text remains as it was in `Jpgfdraw`, but the horizontal placement of the text varies.

In this example, the height of the text in the  $\LaTeX$  document is only slightly smaller than that of the Java font, so the vertical anchor setting does not make that much difference, but there is still a slight shift: in [Figure 9.20\(e\)](#), the anchor was set to (left, bottom); in [Figure 9.20\(f\)](#), the anchor was set to (left, centre); in [Figure 9.20\(g\)](#), the anchor was set to (left, top).

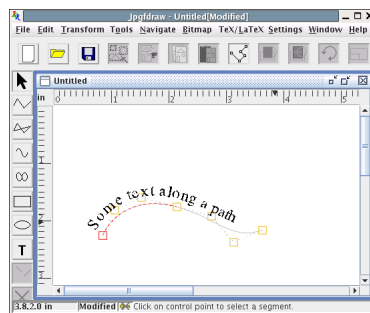
Note that in the above example, the  $\LaTeX$  document used a scalable font (via the `mathptmx` package). The default Computer Modern font is not scalable. It is therefore possible that the required size is not available, in which case  $\TeX$  will substitute the



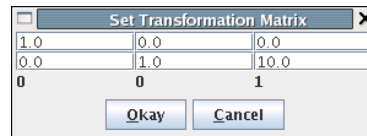
(a)



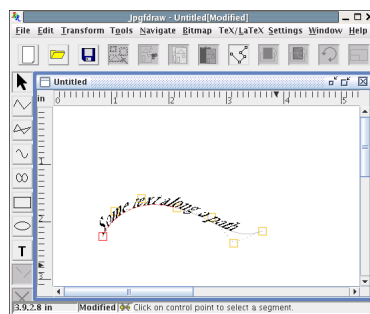
(b)



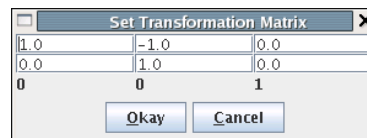
(c)



(d)



(e)



(f)

Figure 9.19: Text-path transformation matrix: (a) the text-path with transformation matrix shown in (b); (c) the text-path with transformation matrix shown in (d); (e) the text-path with transformation matrix shown in (f).

closest available font size. For example, in [Figure 9.21](#), the image created in the previous example is again illustrated with anchor at (left, base). [Figure 9.21\(a\)](#) shows the original image in Jpgfdraw using the Java generic serif font; [Figure 9.21\(b\)](#) shows the image exported to a L<sup>A</sup>T<sub>E</sub>X document that uses the mathptmx package; [Figure 9.21\(c\)](#) shows the image exported to a L<sup>A</sup>T<sub>E</sub>X document that uses the default Computer Modern font. The large font size (40) is not available in the Computer Modern font, so the closest available font size is used instead, which in this example has resulted in a significant change in size.

As mentioned earlier, if a [text area](#) contains L<sup>A</sup>T<sub>E</sub>X commands, this may also result in a horizontal or vertical shift. Consider an image that contains some maths. [Figure 9.22\(a\)](#) shows the image as it appears in Jpgfdraw. The red line path is aligned along the left edge and along the baseline of the text. The text area has been assigned the following alternative text to be used when exporting to a L<sup>A</sup>T<sub>E</sub>X file:

```
$f(x) = \frac{(x-a_1)^2}{a_2}$
```

[Figure 9.22\(b\)](#) shows how the image appears in a L<sup>A</sup>T<sub>E</sub>X document when the anchor is set to (left, base), and [Figure 9.22\(c\)](#) shows how the image appears in a L<sup>A</sup>T<sub>E</sub>X document when the anchor is set to (left, bottom).

The default anchor is (left, base). This can be changed using the Edit → Text → Font Style → Anchor menu. The sample panel will display a small red dot to indicate the position of the anchor. If you enable the [automatic anchor update facility](#), the anchor will be changed when you [align](#) groups containing [text areas](#).

Note that if the text area is transformed then the anchor will have the same transformation. See, for example, [Figure 9.23](#).

See also:

- [§10.1.2 Automatically Updating the Text Anchor](#)
- [§11.4 Step-by-Step Example: An Artificial Neuron](#)
- [§11.7 Step-by-Step Example: A House With No Mouse](#)

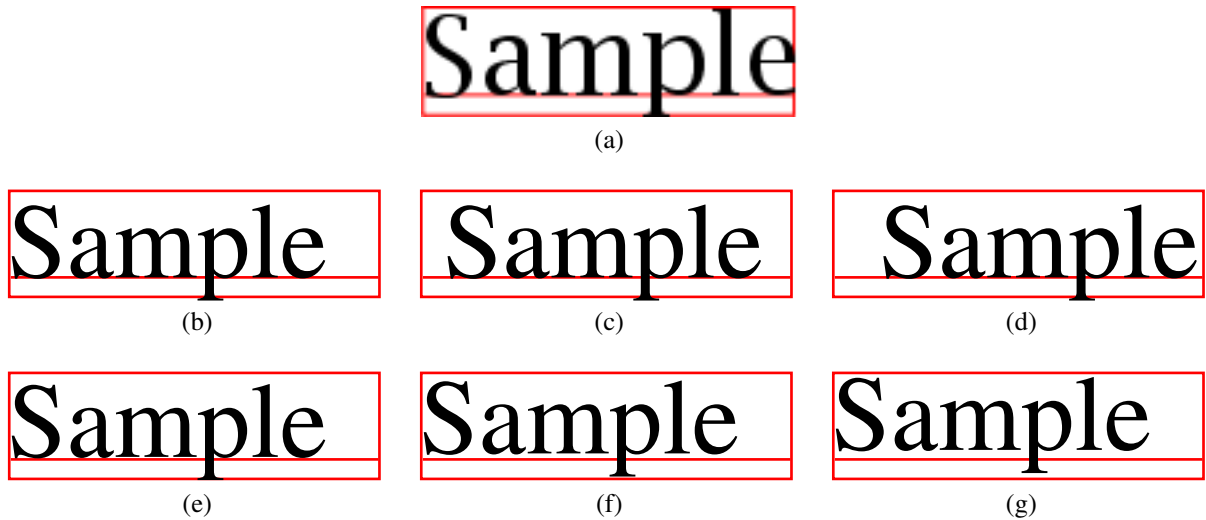


Figure 9.20: The effect of converting from Java fonts to  $\text{\TeX}$  fonts: (a) image in Jpgfdraw using the generic Java serif font. The image was then exported to a  $\text{\LaTeX}$  document with the anchor set to: (b) left, base; (c) centre, base; (d) right, base; (e) left, bottom; (f) left, centre; (g) left, top.

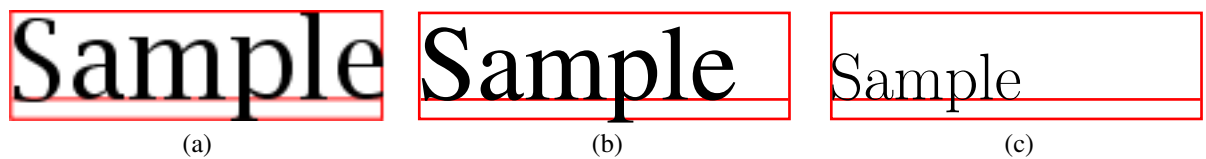
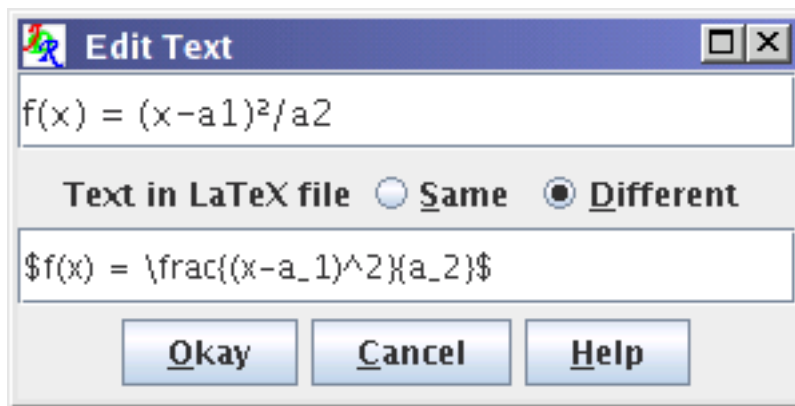


Figure 9.21: The font used by the  $\text{\LaTeX}$  document may result in considerable differences from the original image: (a) image in Jpgfdraw; (b) image in  $\text{\LaTeX}$  document using mathptmx package; (c) image in  $\text{\LaTeX}$  document using non-scalable Computer Modern font.

(a)  $f(x) = (x-a_1)^2/a_2$       (b)  $f(x) = \frac{(x-a_1)^2}{a_2}$       (c)  $f(x) = \frac{(x-a_1)^2}{a_2}$



(d)

Figure 9.22: Text area containing maths: (a) image in Jpgfdraw; (b) image as it appears in a  $\LaTeX$  document with anchor set to (left, base); (c) image as it appears in a  $\LaTeX$  document with the anchor set to (left, bottom); (d) text area contents.

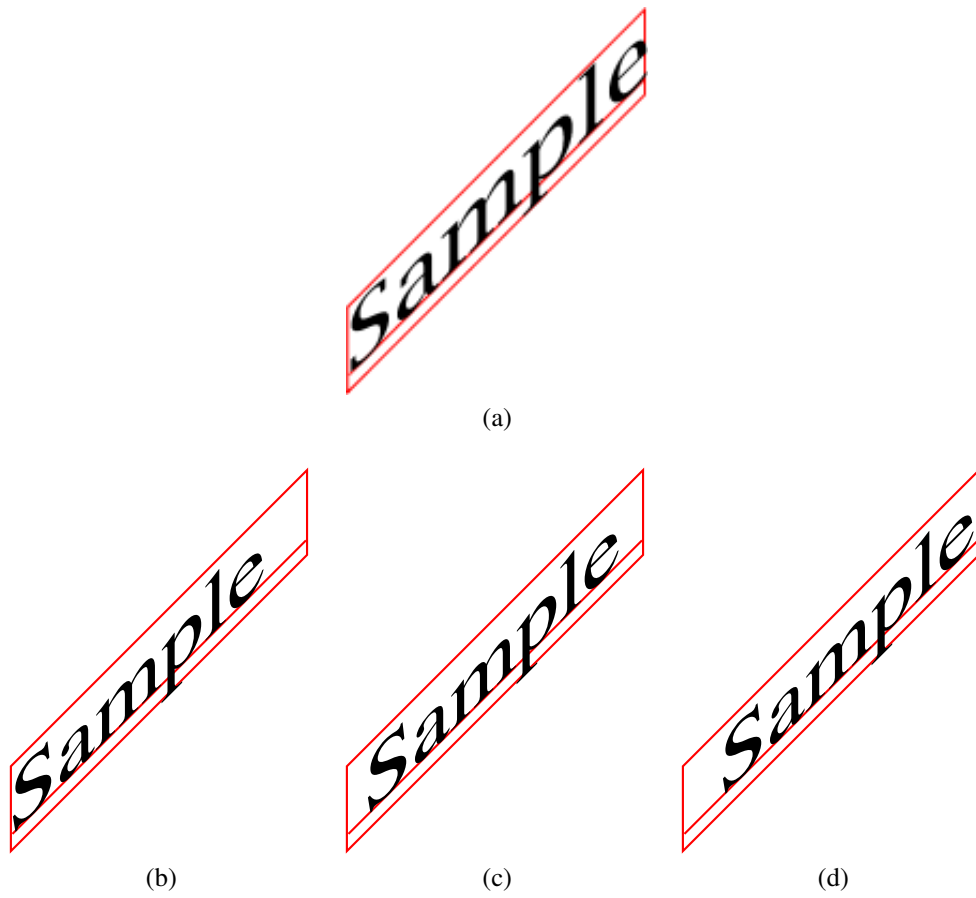


Figure 9.23: The text area's transformation matrix will also be applied to the anchor: (a) original image in Jpgfdraw. The image was then exported to a  $\text{\LaTeX}$  file with anchor: (b) left, base; (c) centre, base; (d) right, base.



## 10 T<sub>E</sub>X/L<sup>A</sup>T<sub>E</sub>X

This chapter covers functions that are specific to T<sub>E</sub>X or L<sup>A</sup>T<sub>E</sub>X users. These functions can be obtained via the TeX/LaTeX menu. The only functions that are relevant to Plain T<sub>E</sub>X users are those relating to `\parshape` and `\shapepar`. The `flowfram` package is a L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> package. Although the `pgf` package is available for T<sub>E</sub>X formats other than L<sup>A</sup>T<sub>E</sub>X, `Jpgfdraw` currently only exports images using L<sup>A</sup>T<sub>E</sub>X syntax.

### 10.1 Settings

The TeX/LaTeX → Settings menu allows you to control the settings that affect the T<sub>E</sub>X/L<sup>A</sup>T<sub>E</sub>X related functions available in `Jpgfdraw`.

#### 10.1.1 Setting the Normal Font Size

Most of `Jpgfdraw`'s T<sub>E</sub>X/L<sup>A</sup>T<sub>E</sub>X related functions (including the [export function](#)) require a value corresponding to `\normalsize` (the L<sup>A</sup>T<sub>E</sub>X command that sets the normal font size). As mentioned in [subsection 9.5.2](#), a [text area](#) needs to know the normal font size to determine the appropriate font size declaration. In addition, both the [parshape](#) and [shapepar](#) functions use the value of `\baselineskip` for the normal font size in order to determine the location of the scan lines used to compute the required parameters. This also means that any static or dynamic [frames](#) that use a non-standard paragraph shape also require this information.

The normal font size can be set using the dialog box obtained via the TeX/LaTeX → Settings → Set Normal Size... menu item. Select the required value from the [drop-down list](#) and select Okay to set it. Note that you must remember to use this value in your document. For example, if you set the normal size as 20, your document will need to use one of the `extsizes` class files, e.g. `extarticle`, and specify `20pt` as one of the optional arguments:

```
\documentclass[20pt]{extarticle}
```

Note that the largest normal size available (25pt<sup>1</sup>) is for use with the `a0poster` class file. Remember that for very large or very small fonts, you will need to use scalable fonts in your document otherwise the required size may not be available. Available values, along with the corresponding value of `\baselineskip` and the file in which they are defined, are listed in [Table 10.1](#).

If the check box labelled Update all LaTeX font size declarations in current image is selected, changing the normal size setting will update the L<sup>A</sup>T<sub>E</sub>X font size settings for all the [text areas](#) in the current image.

#### 10.1.2 Automatically Updating the Text Anchor

If the menu item TeX/LaTeX → Settings → Auto Adjust Anchor is selected, [aligning groups](#) will automatically change the [anchor](#) of any [text areas](#) in the group. (This is not applied recursively to subgroups.)

---

<sup>1</sup> this value is actually 24.88pt, but `Jpgfdraw` lists it as 25pt.

Table 10.1: Available values for the normal font size, the corresponding value and the file in which they are defined (relative to the TEXMF tree).

Normal size value	<code>\baselineskip</code> value	Relevant File
8	9.5	tex/latex/exsizes/size8.clo
9	11	tex/latex/exsizes/size9.clo
10	12	tex/latex/base/size10.clo
11	13.6	tex/latex/base/size11.clo
12	14.5	tex/latex/base/size12.clo
14	17	tex/latex/exsizes/size14.clo
17	22	tex/latex/exsizes/size17.clo
20	25	tex/latex/exsizes/size20.clo
25	30	tex/latex/a0poster/a0poster.sty

### 10.1.3 Automatically Escaping T<sub>E</sub>X's Special Characters

If the menu item TeX/LaTeX → Settings → Auto Escape Special Characters is selected, T<sub>E</sub>X's 10 special characters (`\ $ & % # { } _ ^ ~`) will automatically be substituted with appropriate commands in the L<sup>A</sup>T<sub>E</sub>X text equivalent when you [create new text areas](#). Note that this facility only applies when creating [text areas](#). It is not applied to existing text areas (either in the current image or loaded from a file) or when editing a text area.

## 10.2 Computing the Parameters for `\parshape`

T<sub>E</sub>X's `\parshape` command can be used to change a standard rectangular shaped paragraph into a non-rectangular shape. The `\parshape` command has the following format:

$$\backslash\text{parshape}=\langle n \rangle \langle i_1 \rangle \langle l_1 \rangle \dots \langle i_n \rangle \langle l_n \rangle$$

where  $\langle i_1 \rangle$  is the indent for the first line and  $\langle l_1 \rangle$  is the length of the first line, etc. This command should be placed at the start of the paragraph, and is only applied to that paragraph. If there are more than  $\langle n \rangle$  lines in the paragraph, the specification for the  $\langle n \rangle$ th line will be used until the end of the paragraph. If there are less than  $\langle n \rangle$  lines in the paragraph, the shape will be truncated. See *The T<sub>E</sub>Xbook* [1] for further details.

Since each line in the paragraph is constructed from only indent and line width information, only certain types of shapes can be specified by a `\parshape`. If you imagine horizontal scan lines passing through the shape, each scan line should not be able to intersect the boundary of the shape more than twice.

Before you use `Jpgfdraw` to determine the parameters for `\parshape`, you must first ensure that you have set the [normal font size](#) to the value used in your document. See, for example, [Figure 11.91](#) (in [section 11.8](#)) which illustrates what happens when you fail to do this.

To determine the parameters for a `\parshape`, create your shape as a single [path](#). Select this path, and use the menu item TeX/LaTeX → Parshape.... This will open up a dialog box in which you can specify whether you want to use the outline defined by the actual path, or whether you want to use the outline defined by the line style.

For example, [Figure 10.1\(a\)](#) shows a path which consists of a single line segment (shown in [Figure 10.1\(b\)](#)), but with a `line thickness` of 52bp, butt `cap` and an equilateral triangle start `marker` of size 80bp. If you select the Use Path option, `Jpgfdraw` will attempt to construct the parameters from the actual path (ignoring the line style) which it will not be able to do, as the path has no area. If you select the Use Outline option, `Jpgfdraw` will construct the parameters from the outline as seen on the screen. These parameters can be saved to a file, and used in a `TEX` or `LATEX` document to create a shaped paragraph ([Figure 10.1\(c\)](#)).

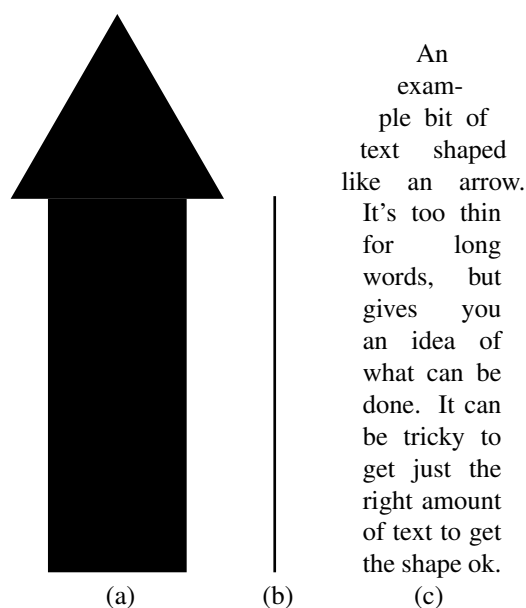


Figure 10.1: Parshape Use Outline: (a) path consisting of single line segment with 52bp line width, butt cap and 80bp filled equilateral triangle start marker; (b) the actual path defined in (a) without the line style applied; (c) `\parshape` parameters constructed from the outline (a) used to create an arrow shaped paragraph in a `LATEX` document.

Another example is shown in [Figure 10.2](#). In this example, the path was constructed using the ellipse tool. If you select the Use Path option, `Jpgfdraw` will compute the parameters used to create the paragraph shown in [Figure 10.2\(b\)](#). In this example, you will not be able to use the Use Outline option as this will attempt to create an annulus defined by the path's border, which can't be done by `\parshape` (but can be done by `\shapepar`, although it is not recommended for such a narrow line width).

Whilst the parameters are being computed, the horizontal scan lines used by `Jpgfdraw` will appear on screen, and if successful, a dialog box will appear for you to save the `\parshape` command to a file. You can then input this file at the start of the appropriate paragraph in your `TEX` or `LATEX` document. For example, if you save the `\parshape` command to a file called, say, `myparshape.tex`, then if you are using plain `TEX` you would need to do:

```
\input myparshape
This is the start of the paragraph...
```

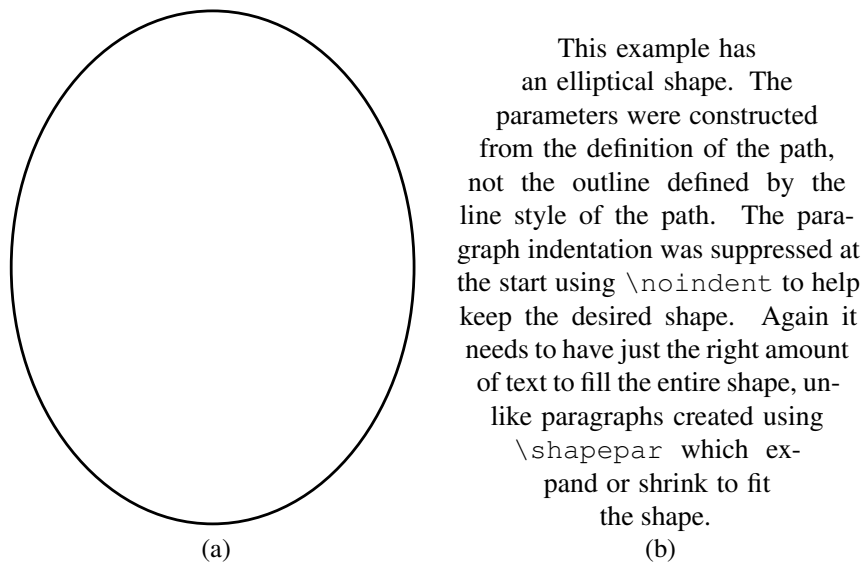


Figure 10.2: Parshape Use Path: (a) the path; (b) `\parshape` parameters constructed from the path (a) used to create an elliptical shaped paragraph in a  $\LaTeX$  document.

or if you are using  $\LaTeX$  you would need to do:

```
\input{myparshape}%
This is the start of the paragraph...
```

You may want to suppress the paragraph indentation using `\noindent`:

```
\input{myparshape}%
\noindent This is the start of the paragraph...
```

The distance between the scanlines is given by the value of `\baselineskip` for the **normal font size**. For example, if the normal font size is `10pt`, `\baselineskip` will be `12pt`, and this will be the distance used between the scanlines. It is therefore important that you set the value for the normal font size before using this function.

### 10.3 Computing the Parameters for `\shapepar`

The `\parshape` command is fairly limited. You need the right amount of text in the paragraph to get the shape right, and you can't have cut out sections. These two things can be overcome using the `\shapepar` command defined in Donald Arsenau's `shapepar` package. The syntax for `\shapepar` is complex; those interested should read the `shapepar` documentation. As with `\parshape`, the shape is constructed using horizontal scan lines. If you want gaps to appear in your shape, make sure to set the **winding rule** to even-odd. If in doubt, give the `path` a fill colour; the area that is filled will contain the text of the paragraph, and the area that isn't filled won't.

To determine the parameters for a `\shapepar`, create your shape as a single path. Select this path, and use the menu item `TeX/LaTeX → Shapepar...` As with

`\parshape`, a dialog box will open allowing you to select whether you want to use the path itself to define the shape or whether you want to use the path’s outline to define the shape. For example, [Figure 10.3\(a\)](#) shows a path with a 40bp line width. The `\shapepar` parameters were constructed first from the path ([Figure 10.3\(b\)](#)) and then from the outline ([Figure 10.3\(c\)](#)).

As with the `parshape` function, the horizontal scan lines used by `Jpgfdraw` will appear on screen, and if successful, a dialog box will appear for you to save the `\shapepar` command to a file. You can then input this file at the start of the appropriate paragraph in your  $\text{\TeX}$  or  $\text{\LaTeX}$  document. For example, if you save the `\shapepar` command to a file called, say, `myshapepar.tex`, then if you are using plain  $\text{\TeX}$  you would need to do:

```
\input myshapepar
This is the start of the paragraph...
```

or if you are using  $\text{\LaTeX}$  you would need to do:

```
\input{myshapepar}%
This is the start of the paragraph...
```

Remember to include the `shapepar` package:

- `\input shapepar.sty` (plain  $\text{\TeX}$ )
- `\usepackage{shapepar}` ( $\text{\LaTeX}$ )

See also:

- [§11.5 Step-by-Step Example: Bus](#)
- [§10.4.3 Defining a Frame](#)

## 10.4 Creating Frames for Use with the `flowfram` Package

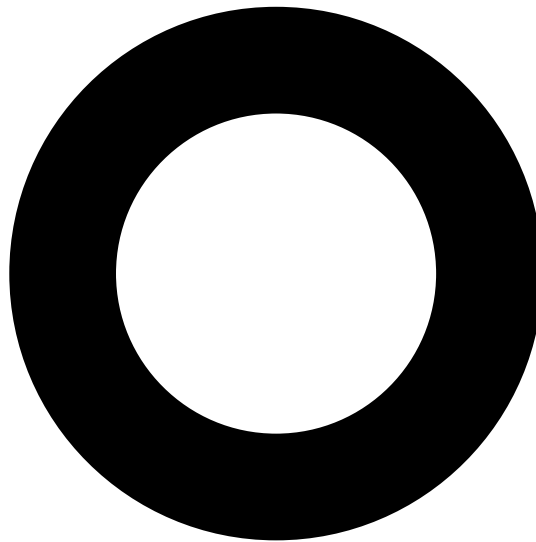
`Jpgfdraw` can be used to help construct frames for use with the `flowfram` package.<sup>2</sup> If you are unfamiliar with this package, please ensure you read the user manual ([ffuser-guide.pdf](#)).

### 10.4.1 The `flowfram` Package: A Brief Summary

The `flowfram` package is a  $\text{\LaTeX} 2_{\epsilon}$  package that allows the user to construct frames in a document, such that the document text flows from one frame to the next in the order that the frames were defined. The mechanism is much the same as that used to create the columns when using the standard two column mode, but the columns are of arbitrary width, height and position.

There are three types of frame: “flow” frames which are the main type of frame. These are the frames in which the document text is placed. The other two types of frame are “static” and “dynamic”. The contents of these frames has to be set explicitly

<sup>2</sup>The `flowfram` package can be downloaded from [CTAN](#).



(a)

This example has a circular shape and uses the `\shapepar` command defined in the `shapepar` package. The parameters were constructed from the path. Since this uses `\shapepar` rather than `\parshape`, the shape will expand or shrink to fit the text. The resulting paragraph will therefore not necessarily be the same size as the original path.

(b)

Here is a little bit of text as an example. In this example, the parameters came from the path outline, not the path. The lines are quite thin so  $\TeX$  has some problems finding good line breaks.

(c)

Figure 10.3: Shapepar example: (a) the path; (b) parameters constructed from the path and included in a  $\LaTeX$  document to produce a shaped paragraph; (c) parameters constructed from the path's outline and included in a  $\LaTeX$  document to produce a shaped paragraph.

using one of the commands or environments provided by the `flowfram` package. The contents of the static frames are typeset once (when the contents are set) and it remains unchanged until the user explicitly resets the contents. The contents of the dynamic frames are re-typeset on each page for which the frame is defined. So, for example, if on page 1 of your document, you set the contents of a static frame to contain the command `\thepage`, the contents of that frame will always display a 1 (no matter what page it appears on), since that was the value of `\thepage` when the contents were set. If, on the other hand, you use a dynamic frame, the contents will be re-typeset on every page, so it will display the relevant page number.

Each frame has an associated label which uniquely identifies it for a given frame type, and it can optionally have a border. Frames also have an associated page list indicating on which pages the frame should appear. The page list can be one of the keywords `all`, `odd`, `even` or `none`, or it can be a comma separated list of pages or page ranges (e.g. `<4, 7, 9, 10-14, >20`).

The `flowfram` package stacks the frames on the page in the following order: static, flow and dynamic, each in the order that they were defined. For example, if you define a flow frame called `left`, then define a static frame called `title`, then a dynamic frame called `header` and lastly a flow frame defined `right`, then the `flowfram` package will stack the frames in the following order: `title`, `left`, `right` and `header`.

Note that `Jpgfdraw` defines the frames according to its own [stacking order](#), and will allow you to position, say, a static frame above a flow frame,<sup>3</sup> but once the information has been exported to a  $\LaTeX$  package, the frames will be displayed according to the `flowfram` package's stacking order.

To clear all data relating to the `flowfram` package, select the menu item `TeX/LaTeX` → `Flow Frames` → `Clear All`.

See also:

- [§11.6 Step-by-Step Example: A Poster](#)
- [§11.8 Step-by-Step Example: A Newspaper](#)

## 10.4.2 Defining the Typeblock

The typeblock is the main area of the page where the text goes. The dimensions of the typeblock are given by the  $\LaTeX$  lengths `\textwidth` and `\textheight`. In `Jpgfdraw`, you specify the typeblock using the `TeX/LaTeX` → `Flow Frames` → `Set Typeblock...` menu item. This opens up a dialog box in which you should specify the margins between the paper edge and the typeblock. You can specify the lengths as  $\TeX$  points (`pt`), PostScript points (`bp`), inches (`in`) or centimetres (`cm`).

Once you have set the typeblock, it will appear on the screen as a light grey rectangle, labelled typeblock.

## 10.4.3 Defining a Frame

An [object](#) can be identified as a flow, static or dynamic frame as follows: select the [object](#) (it should be the only object selected) then select the `TeX/LaTeX` → `Flow Frames`

<sup>3</sup>This is because the only way to change the stacking order is to move objects to the front, to the back, or by grouping and ungrouping

→ Set Frame... menu item. This will open up a dialog box in which you can specify the frame's attributes.

Once an object has been identified as a frame, a grey rectangle will appear on the screen indicating the area in which the contents of the frame will be typeset, along with the frame's type, identification label and page list.

Note that if the object is a [group](#), the frame information will be applied to the whole group. This means you can construct a frame border by grouping several objects, however, if you later ungroup this object, you will lose the frame information.

### Type

The frame's type is specified using the [drop-down list](#) labelled Type. There is a choice of: Flow, Static, Dynamic or None. None indicates that the [object](#) has no associated flowframe data, which means that the object will not be saved if the image is exported to a  $\LaTeX$  style file.

### Label

Each frame is assigned a label so that it can be referenced in the document. Each label must be unique for its given frame type. To assign a label to this frame, enter the required label in the box marked Label. Note that if a dynamic frame is given the label "header" or "footer"<sup>4</sup> it will be converted into the header or footer frame. This is analogous to the `flowfram` package's `\makedfheaderfooter` command combined with the relevant attribute commands.

### Border

The Border [drop-down list](#) allows you to specify whether the frame has a border. If the option As Shown is set, then the [object](#) will be drawn as the frame's border. If the option None is set, then the frame will not be given a border, and the object will be used only as an indication of the frame's size (or possibly shape) and location.

Note that all [text areas](#) are considered to be a part of the frame's background, not the frame's contents, and will only appear if the border As Shown setting is applied. Likewise for [bitmaps](#).

### Pages

You can specify the page list on which the frame is defined, using the Pages [combo box](#). Either select one of: All, None, Odd or Even, or you can type in a comma separated list of pages or page ranges (e.g. 1-10, 12, 14, >20). Note that the page numbers correspond to the  $\LaTeX$  page counter's Arabic representation, not the way the page number appears on the page (for example, pages i-iv must be indicated as 1-4). See the `flowfram` user guide for further details.

See also:

- [§10.4.4 Only Displaying Objects Defined on a Given Page](#)

---

<sup>4</sup>Note that these labels are hard coded into the `flowfram` package and so should not be translated.



### Margins

The frame may have margins between the border and the area in which the contents are typeset. The margins are usually only relevant if you have specified the As Shown border option. The margins are not available for non-standard [paragraph shapes](#).

### Alignment

You can change the vertical alignment of the contents of a static or dynamic frame using the Alignment [drop-down list](#). This can be one of: Top, Middle or Bottom, which correspond to the settings `valign=t`, `valign=c` and `valign=b`, respectively, provided by `\setdynamicframe` and `\setstaticframe`. This facility is not available for flow frames.

### Shape

The text in flow frames is typeset using the standard rectangular format, but the contents of static or dynamic frames can be shaped using either `\parshape` or `\shapepar`. If you have selected a [path](#), you can enable this by selecting either Parshape or Shapepar from the Shape [drop-down list](#). Note that the shape option is not available for any other type of [object](#).

Note that if you use the Parshape or Shapepar options, it will only check if a set of valid parameters can be extracted from the path when you export the image as a  $\text{\LaTeX}$  package.<sup>5</sup> Note, however, that the paragraph shape in your document may not exactly match the shape you created in Jpgfdraw:

#### `\parshape:`

- If there are not enough words in the paragraph to fill the shape, the shape will be truncated.
- If there are too many words in the paragraph, the dimensions of the final line of the shape will be repeated for each subsequent line.

#### `\shapepar:`

- If there are not enough words in the paragraph to fill the shape, the shape will shrink.
- If there are too many words in the paragraph, the shape will expand.

To illustrate this, consider the layout shown in [Figure 10.4](#). There are six identical circles arranged in two rows. Each circle has been identified as a static frame. Their bounding boxes can be seen as light grey rectangles. The top three circles have all been assigned a shape given by `\parshape`, while the bottom three circles have been assigned a shape given by `\shapepar`.

This layout was exported as a  $\text{\LaTeX}$  package based on the `flowfram` package, and was included into a document. Each of the static frames were filled with a varying amount of text. The leftmost circles do not have enough text to fill the designated area, while the rightmost circles have too much text. (See [Figure 10.5](#).)

<sup>5</sup>Otherwise it would have to re-evaluate the parameters every time you edit the path.

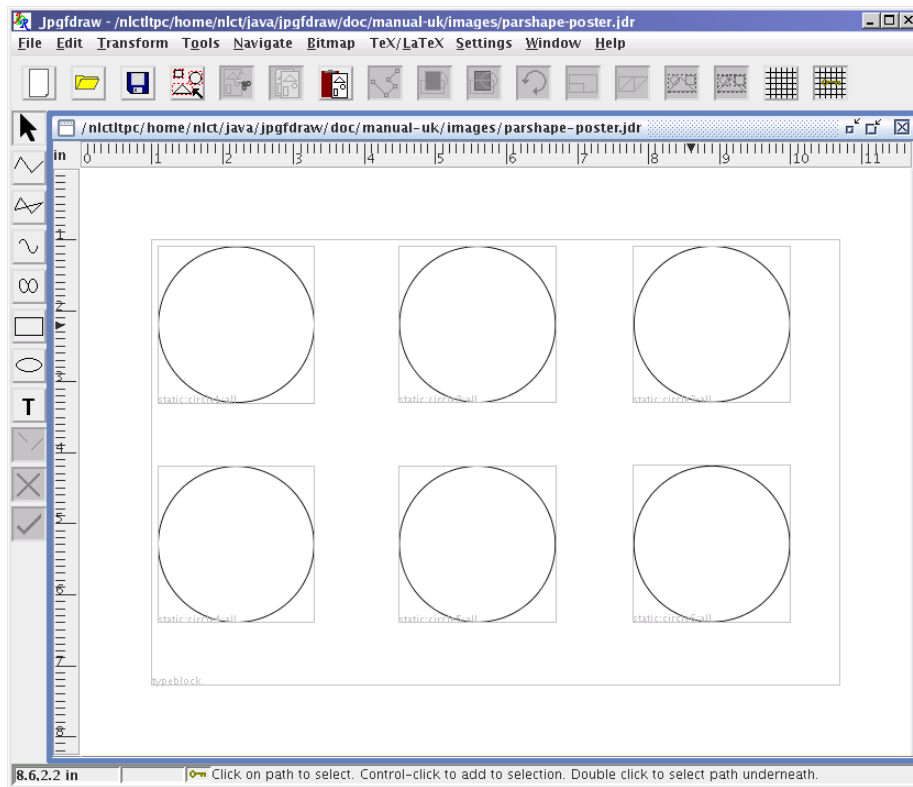


Figure 10.4: Layout containing six circles. All circles have been identified as static frames. The top three circles have been assigned a shape given by `\parshape`. The bottom three circles have been assigned a shape given by `\shapepar`.



Figure 10.5: The effects of too much and too little text. The top row uses `\parshape`: (*top left*) too little text truncates the shape; (*top right*) too much text replicates the dimension of the last line of the shape. The bottom row uses `\shapepar`: (*bottom left*) too little text shrinks the shape; (*bottom right*) too much text expands the shape. (The contents of the static frames were all set to a central vertical alignment.)

Note that when you use a non-standard paragraph shape, you can no longer specify the margins. Since the paragraph shape is defined by the `path`, the margins don't have any meaning. If you want a border effect, you can make a slightly larger object behind, and set the border of the larger object to `As Shown` and the border of the smaller object to `None`, but remember that the overall effect will depend on the amount of text contained in the frame.

#### 10.4.4 Only Displaying Objects Defined on a Given Page

It is possible to display only those frames that are defined on a given page using the TeX/LaTeX `→ Flow Frames → Display Page...` dialog box. You can select to display those frames that are defined on all pages or just those that are defined on odd or even pages or you can specify a particular page number by selecting the `Page` radio button and entering the relevant page number in the text field. If you specify "0", only those frames that have the `None` page setting will be displayed. Note that `objects` that have not been assigned flowframe data will always be displayed. The title bar will indicate how many objects have been hidden.

# 11 Step-by-Step Examples

The examples in this section illustrate various aspects of Jpgfdraw.

## §11.1 A House

Illustrates the basics: how to create filled rectangles and a closed line [path](#).

## §11.2 Lettuce on Toast

Illustrates editing paths.

## §11.3 Cheese and Lettuce on Toast

Illustrates merging paths.

## §11.4 An Artificial Neuron

Illustrates line styles, text areas and justifying. Also illustrates how to specify different text to use when exporting to a  $\LaTeX$  file.

## §11.5 Bus

Illustrates path functions, and using the `shapepar` function.

## §11.6 A Poster

Illustrates how to use Jpgfdraw to create frames for use with the `flowfram` package.

## §11.7 A House With No Mouse

Illustrates how to create and edit pictures without using the mouse.

## §11.8 A Newspaper

Illustrates how to use Jpgfdraw to create non-standard shaped frames for use with the `flowfram` package.

## 11.1 A House

This example illustrates the basics. The aim is to create a simple image of a house (shown in [Figure 11.3](#)).

1. The main part of the house will be constructed from a rectangle, so select the [rectangle tool](#).
2. Let's make it a yellow brick house, so use `Settings`  $\rightarrow$  `Styles...` to select a yellow [fill colour](#).
3. Click where you want the bottom left hand corner to go, and move (not drag) the mouse to the opposite corner ([Figure 11.1\(a\)](#)). Click to complete the rectangle. You will only see the fill colour once the rectangle has been completed ([Figure 11.1\(b\)](#)).
4. Next do the roof. Let's make the roof using a triangle. For this you will need to use the [closed line path tool](#). Select this tool using either the closed line button or the `Tools`  $\rightarrow$  `Closed Line` menu item.
5. Let's make it a red roof, so use `Settings`  $\rightarrow$  `Styles...` to select a red [fill colour](#).

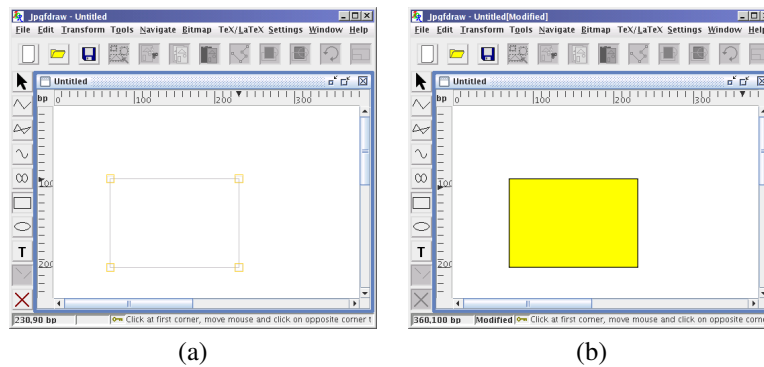


Figure 11.1: House Example — creating a rectangle: (a) rectangle under construction, (b) completed rectangle.

- Click on each of the three vertices that form the triangle (Figure 11.2(a)). To complete the path, double click when you click on the third vertex, or click on the third vertex and then press Enter, or use the finish path button. You will only see the fill colour once the path has been completed (Figure 11.2(b)).

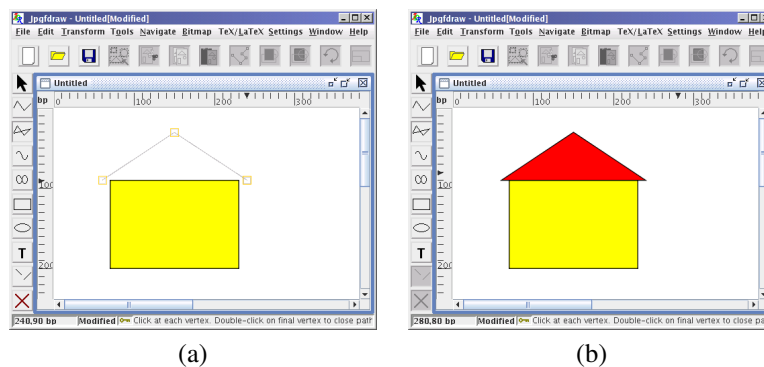


Figure 11.2: House Example — creating a triangle: (a) triangle under construction, (b) completed triangle.

- Lastly comes the door and windows. These are all rectangles, so follow the same procedure as above. Let's make the door black and the windows white. Remember to set the fill colour before creating the rectangles (Figure 11.3).

To save the picture, select the File → Save As... menu item (Figure 11.4).



To include the image in a  $\LaTeX$  document, select the File → Export... menu item, and save it as a  $\LaTeX$  file (click on the File of Type drop-down list and select pgf environment (\*.tex, \*.ltx), and name the file e.g. house.tex (Figure 11.5.) To include it in your  $\LaTeX$  document, remember to use the pgf package:

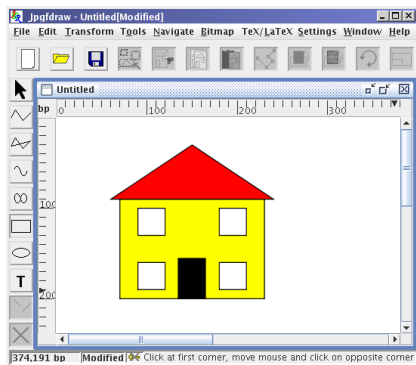


Figure 11.3: House Example—Completed Image

```
\usepackage{pgf}
```

and to include the image use `\input`, e.g.:

```
\begin{figure}
\centering
\input{house}
\caption{A House}
\end{figure}
```

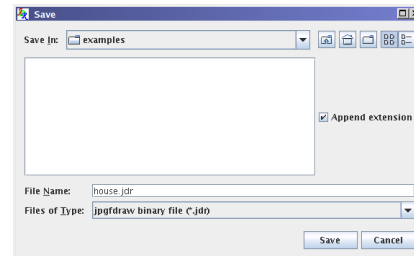


Figure 11.4: House Example—Saving the Image

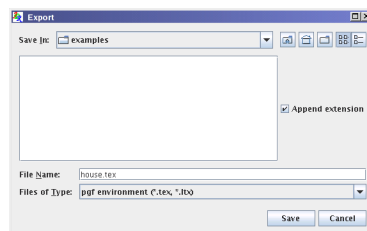


Figure 11.5: House Example—exporting the image to a  $\LaTeX$  file.

## 11.2 Lettuce on Toast

This example illustrates how to edit paths. The aim is to create the picture illustrated in Figure 11.11.

1. Let's start with the toast first. To begin with create a **rectangle** with a brown **fill colour**. (If you are using the CMYK model, you can get brown from 0% Cyan, 81% Magenta, 100% Yellow and 60% Black. If you are using the RGB model, you can get brown from 40% Red, 8% Green and 0% Blue.) Create the rectangle shown in Figure 11.6.

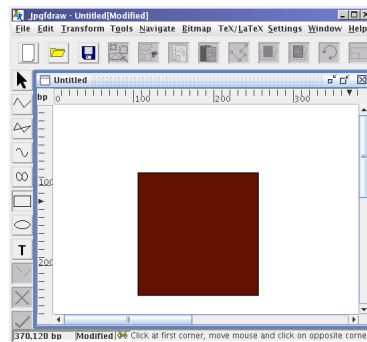


Figure 11.6: Lettuce on Toast Example — Brown Rectangle

2. Bread quite often has a curved top, so let's **edit** the rectangle so that the top is slightly curved. To do this, **select** the rectangle, and then either click on the edit path button or select the Edit → Path → Edit Path menu item. This will display the **path** in edit mode (Figure 11.7(a).) Select the top segment, this will then be highlighted in red (Figure 11.7(b)).

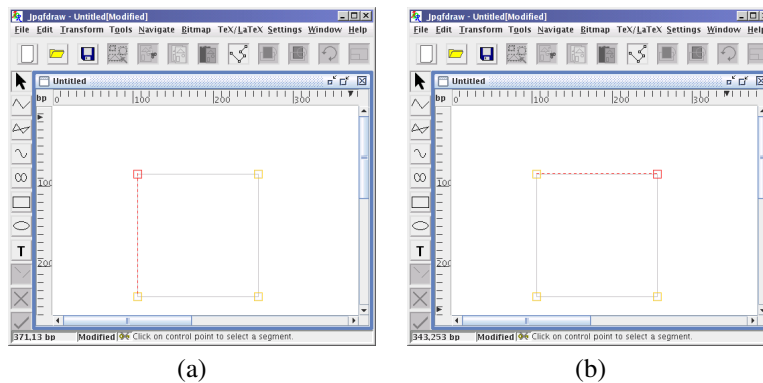


Figure 11.7: Lettuce on Toast Example—editing the rectangle: (a) edit mode; (b) select top segment.

3. Use the edit path **popup menu** to convert the line segment to a curve (Figure 11.8).
4. The segment now has two extra **control points**, these need to be moved to change the curvature (Figure 11.9(a)). Click anywhere outside the **control points** to exit the edit path mode (Figure 11.9(b)). Note that if you have the grid lock enabled, you may find it easier to temporarily disable it while you are editing the curvature control points.
5. To make the lettuce, select the **closed curve tool**, and set the **fill colour** to green. Make a rough outline of the lettuce leaf, clicking on each vertex, and double-

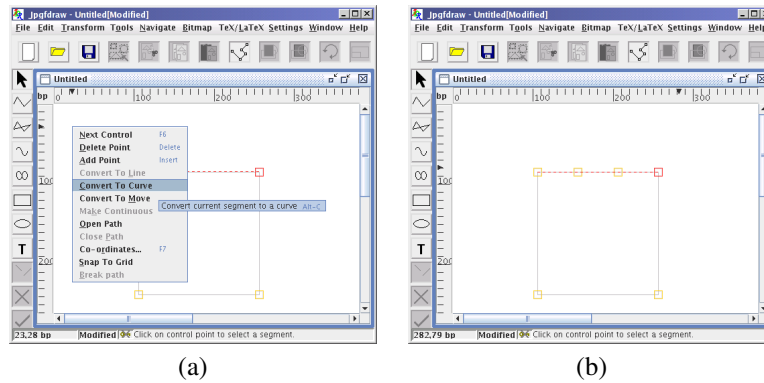


Figure 11.8: Lettuce on Toast Example —converting the top segment to a curve: (a) edit path popup menu; (b) segment converted to a curve.

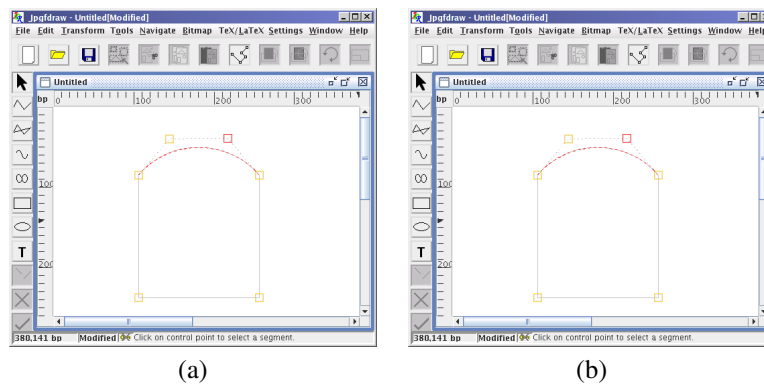


Figure 11.9: Lettuce on Toast Example —finish editing the curve: (a) changing the curvature by moving the control points; (b) exit edit path mode.



click to close the path. Then, if necessary, edit the path to modify the [control points](#) ([Figure 11.10](#)).

6. Set the [fill colour](#) to transparent, and using the [open curve](#) tool, add in some [paths](#) to give the lettuce leaf some creases and edit as appropriate ([Figure 11.11](#)).

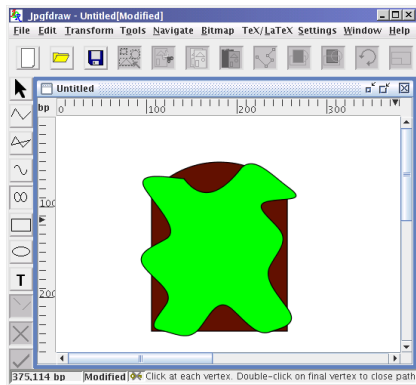


Figure 11.10: Lettuce on Toast Example — Adding a Closed Curve Path

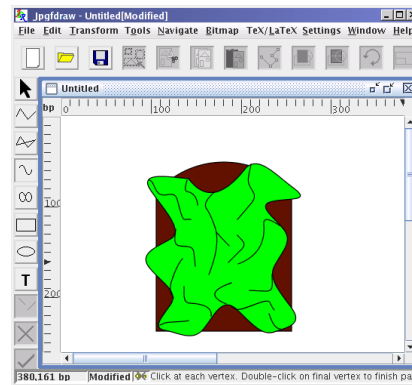


Figure 11.11: Lettuce on Toast Example — Completed Image

To save the picture, select the File → Save As... menu item, and enter the filename.



To include the image in a  $\text{\LaTeX}$  document, select the File → Export... menu item, and save it as a  $\text{\LaTeX}$  file (click on the File of Type [drop-down list](#) and select [pgf environment \(\\*.tex, \\*.ltx\)](#), and name the file e.g. `lettuce.tex`).

To include it in your  $\text{\LaTeX}$  document, remember to use the `pgf` package:

```
\usepackage{pgf}
```

and to include the image use `\input`, e.g.:

```
\begin{figure}
\centering
\input{lettuce}
\caption{Lettuce on Toast}
\end{figure}
```

## 11.3 Cheese and Lettuce on Toast

This example illustrates how to merge paths. It extends the previous example [Lettuce on Toast](#). The aim is to create the image shown in [Figure 11.15](#).

1. Load the image you created in the [lettuce on toast example](#), using the File → Open... menu item, or clicking on the load image button.
2. To create the slice of cheese, select the [rectangle tool](#), and set the [fill colour](#) to yellow. Make a rectangle, as illustrated in [Figure 11.12](#).

- This slice of cheese is going to have holes in it, and we need to be able to see the lettuce and toast through the holes. Since this is not a uniform colour, we can't just, say, put green ellipses on top of the cheese as this won't look right. Instead, we are going to create some ellipses, and then merge them into the yellow rectangle. To do this, first select the [ellipse tool](#), and create some ellipses on top of the yellow rectangle ([Figure 11.13](#)).

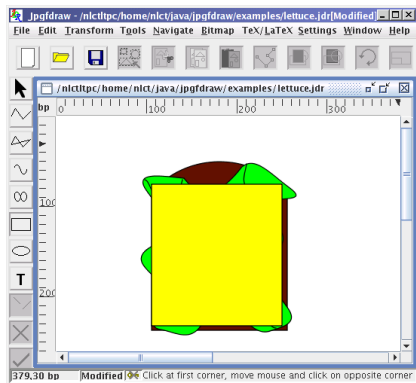


Figure 11.12: Cheese and Lettuce on Toast Example — A Filled Rectangle

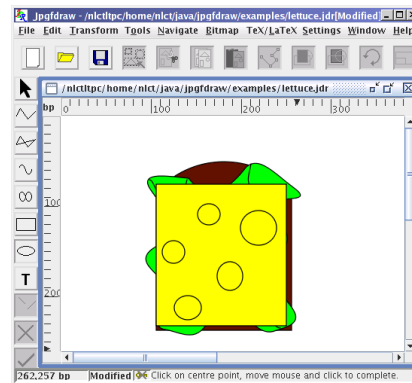
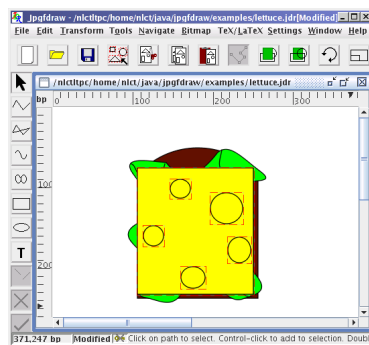
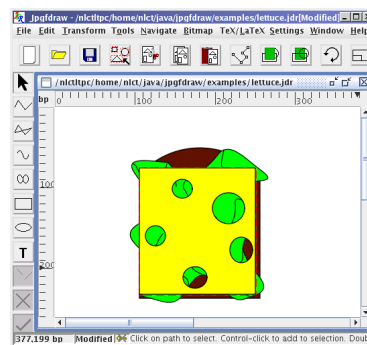


Figure 11.13: Cheese and Lettuce on Toast Example — Adding Ellipses

- Now [select](#) all the ellipses you created in the previous step and the yellow rectangle ([Figure 11.14\(a\)](#)) and [merge](#) them using the Transform → Merge Paths menu item ([Figure 11.14\(b\)](#)). If the ellipses remain filled, check to make sure you have the [winding rule](#) set to even-odd. (Alternatively, you can use the Transform → Subtract Paths menu item, in which case you don't need to worry about the winding rule.)



(a)



(b)

Figure 11.14: Cheese and Lettuce on Toast Example — merging paths: (a) paths selected; (b) paths merged into a single path.

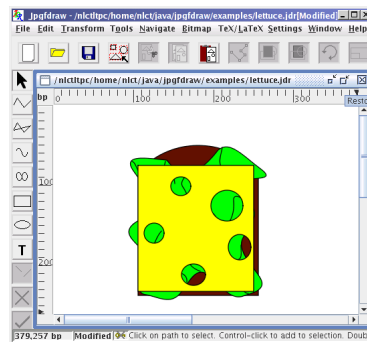


Figure 11.15: Cheese and Lettuce on Toast Example — Completed Image

## 11.4 An Artificial Neuron

This example illustrates setting line styles and adding text. The final image looks best as a pgf picture included in a  $\text{\LaTeX}$  document, as then you can use maths fonts with subscripts.

1. Select the [rectangle tool](#), and create a rectangle, as shown in [Figure 11.16](#).
2. Select the [ellipse tool](#), and create a circle, as shown in [Figure 11.17](#).

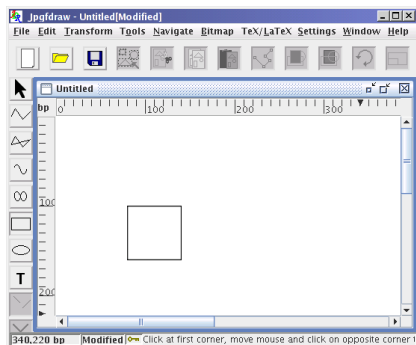


Figure 11.16: Artificial Neuron Example — Adding a Rectangle

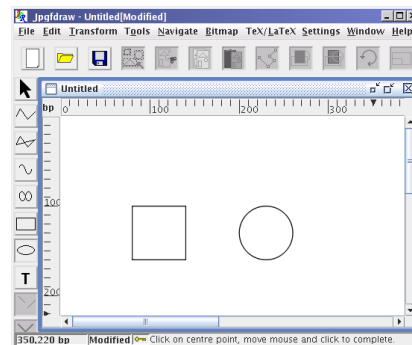


Figure 11.17: Artificial Neuron Example — Adding a Circle

3. To make the logistic function symbol, select the [open curve tool](#), and do a single segment ([Figure 11.18\(a\)](#)). Then use the [edit path tool](#) to adjust the curvature, as shown in [Figure 11.18\(b\)](#). (If you have enabled the grid lock, you may find it easier to disable it while you are editing the curvature control points.)
4. Next set the current line style to have an end arrow. Note that lines with end markers look best with a butt cap style, so this should also be set. This can be done as follows:

Use the Settings  $\rightarrow$  Styles... menu item to display the current styles dialog box. Select the tab labelled Line Style to display the line style panel. Select Butt

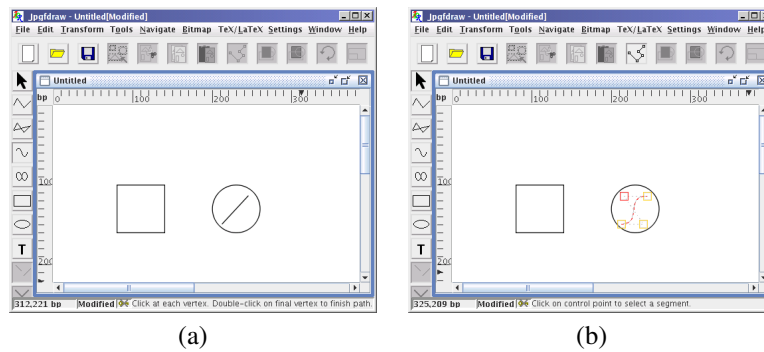


Figure 11.18: Artificial Neuron Example — creating a sigmoidal curve: (a) adding an open curve segment; (b) edit segment to adjust curvature.

from the [drop-down list](#) labelled Cap Style (see [Figure 11.19](#)). Next select the button labelled Select... located on the same row as End Marker to open the end marker dialog box (illustrated in [Figure 11.20](#)). Select the radio button labelled Use Marker. This will enable the marker chooser panel. Select the tab labelled Arrows and select Pointed 60. Select Okay to close the end marker dialog box and select Okay to close the styles dialog box.

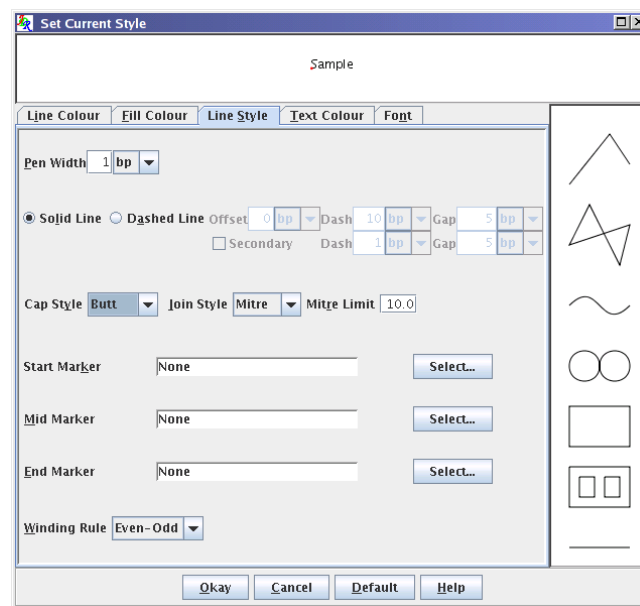


Figure 11.19: Artificial Neuron Example — Setting the Current Line Style

5. Select the [open line tool](#), and add in the arrows as illustrated in [Figure 11.21](#).
6. Use Settings → Styles... to open the current styles selector, and set the font fam-

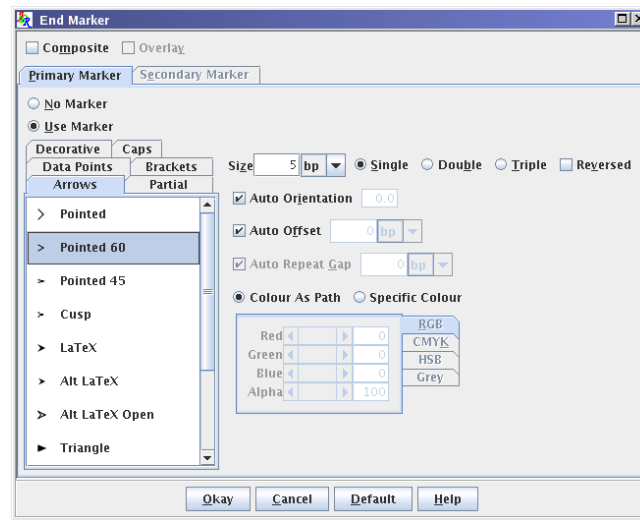


Figure 11.20: Artificial Neuron Example — End Marker Dialog Box

ily to “Serif” and press Okay. Select the [text tool](#), and add in the text, as illustrated in [Figure 11.22](#).

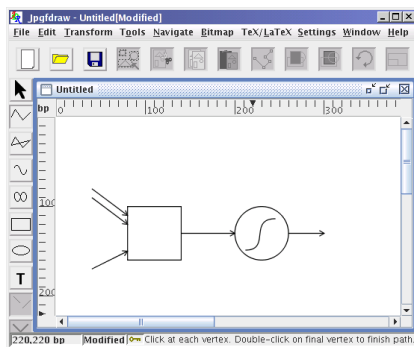


Figure 11.21: Artificial Neuron Example — Adding Arrows

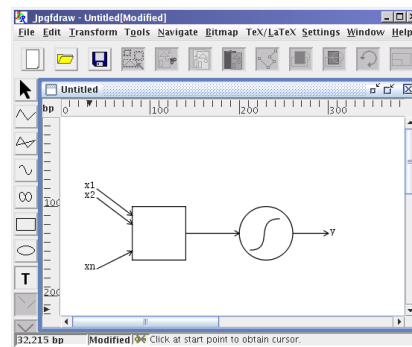


Figure 11.22: Artificial Neuron Example — Adding Text



If you want to include your image into a  $\text{\LaTeX}$  document as a `pgfpicture` environment, it would look better if you put the text into maths mode, and use subscripts. To do this first select the [text area](#), and then select `Edit` → `Text` → `Edit text...` This will open up the edit text dialog box. Click on the `Different` button, and enter the text as it should be in the  $\text{\LaTeX}$  file ([Figure 11.23](#).) Do this for each [text area](#). In addition, select all of the text on the left (“ $x_1$ ”, “ $x_2$ ” and “ $x_n$ ”) and use the `Edit` → `Text` → `Font Style` → `All Styles...` dialog box to change the horizontal anchor parameter to `Right`. (Note that you will not see any difference to the image in Jpgfdraw.)

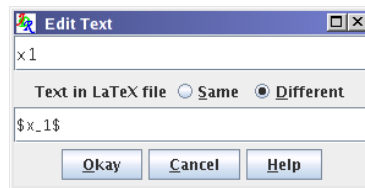


Figure 11.23: Artificial Neuron Example — Editing Text

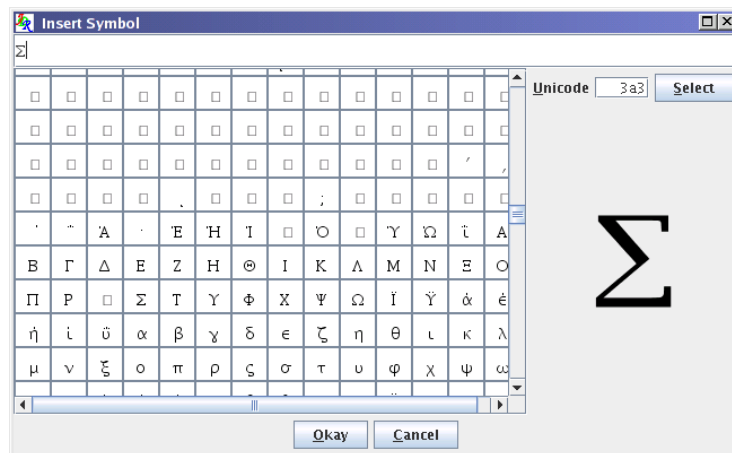


Figure 11.24: Artificial Neuron Example — Insert Symbol Dialog Box

7. Select the [text tool](#) and start a text area in the rectangle. I want to use a capital sigma to indicate a summation, and as I don't know the magic combination of characters to access that symbol, I used the Insert Symbol dialog box. To do this, either use the popup menu and select Insert Symbol..., or press the Ins key. The required symbol can now be selected from the dialog box (illustrated in [Figure 11.24](#)).
8. Use the Edit → Text → Font Style → All Styles... to change the font size to 25 and change both the anchor settings to Centre, see [Figure 11.25](#). (You don't need to change the anchor settings if you have the [automatic anchor update](#) setting enabled, as it will change when you justify the [text area](#) in step 9.)



If you want to export your image into a  $\text{\LaTeX}$  document, you will need to set the  $\text{\LaTeX}$  equivalent text to  $\text{\$}\backslash\text{\Sigma}\text{\$}$ . As before, this is done by selecting the [text area](#) and using the Edit → Text → Edit text... menu item to open the Edit Text dialog box ([Figure 11.26\(b\)](#)).

9. The  $\Sigma$  would look much better if it was centred inside the rectangle. To do this [select](#) the  $\Sigma$  and the rectangle, then [group](#) them either by clicking on the group objects button or by using the Transform → Group menu item. Then select the Transform → Justify → Centre menu item, and then the Transform → Justify → Middle menu item. The [text area](#) should now be centred inside the rectangle

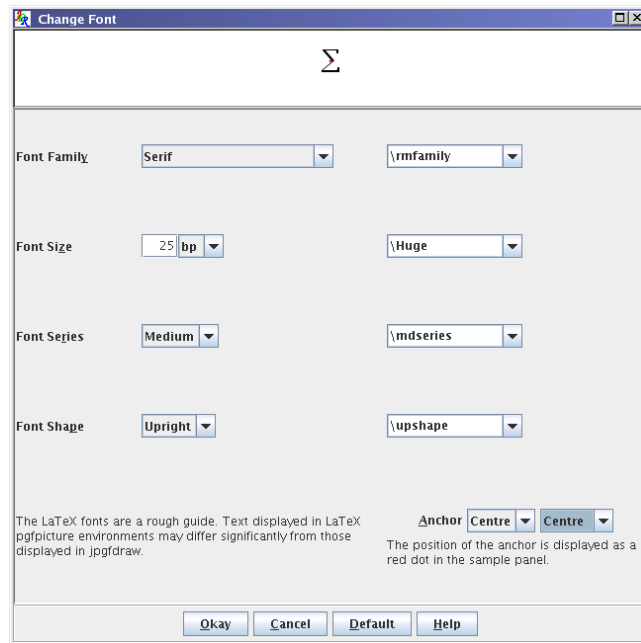
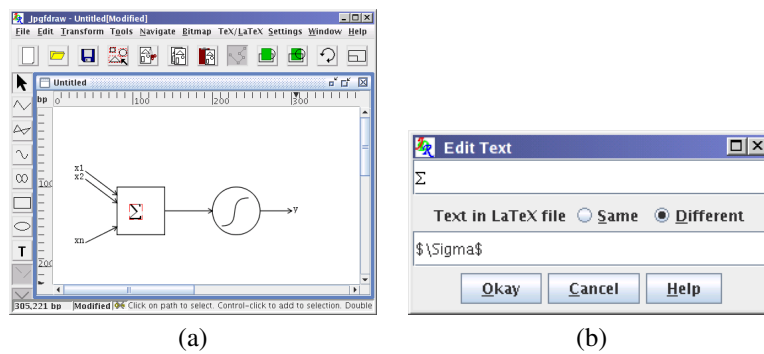


Figure 11.25: Artificial Neuron Example — Setting the Font Style

Figure 11.26: Artificial Neuron Example — setting the equivalent  $\LaTeX$  symbol: (a) selected text; (b) setting  $\LaTeX$  equivalent.

(Figure 11.27).

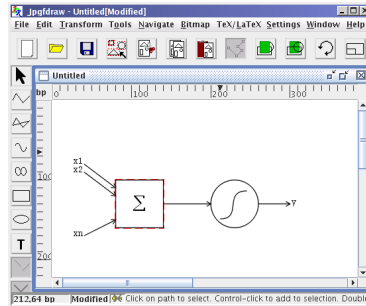


Figure 11.27: Artificial Neuron Example — Justifying Objects



To include the image inside a  $\LaTeX$  document, save the image to a  $\LaTeX$  file using the File → Export... menu item, and then include it in your document (assuming the file was called `neuron.tex`):

```
\begin{figure}
\centering
\input{neuron}
\caption{An Artificial Neuron}
\end{figure}
```

(Remember to use the `pgf` package.) The image will appear in the  $\LaTeX$  document as illustrated in Figure 11.28. (For best results use either  $\text{PDF}\LaTeX$  or  $\LaTeX$  and `dvips` as some `dvi` viewers may not be able to interpret the `pgf` specials.)

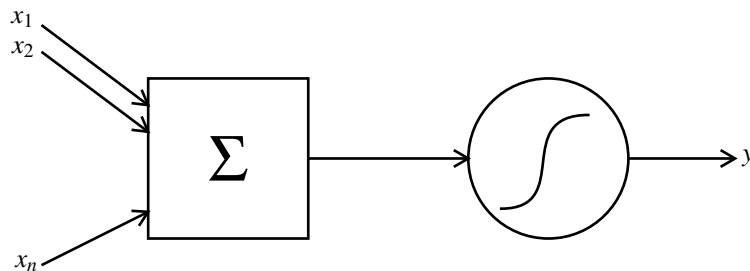


Figure 11.28: Artificial Neuron Example — Image as it Appears in a  $\LaTeX$  Document

## 11.5 Bus

This example illustrates how to:

- [break a path](#)



- create a path union
  - subtract paths
  - Use the `shapepar` function to create a shaped paragraph in a  $\text{T}_\text{E}_\text{X}$  or  $\text{L}^{\text{A}}\text{T}_\text{E}_\text{X}$  document.
1. If you have not already done so, enable the grid lock via Settings → Grid → Lock Grid.
  2. Use TeX/LaTeX → Settings → Set Normal Size... to display the TeX/LaTeX Settings dialog box and set the normal font size to the value that you will be using in your document (see Figure 11.29). In my document, I have used 10pt.
  3. To create the bus outline, start with the ellipse tool, and create a circle (Figure 11.30).

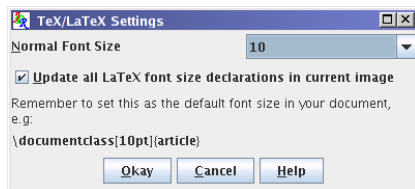


Figure 11.29: Bus Example — Setting the Normal Font Size

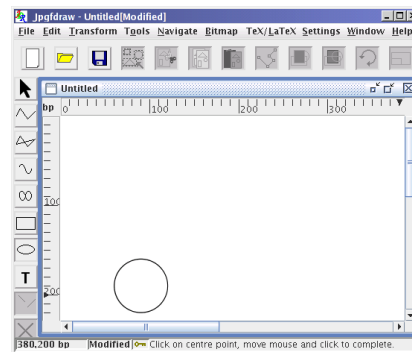


Figure 11.30: Bus Example — Create a Circle

4. Select the circle, and select the `edit path` tool. The `control point` at the start of the `path` is always the first selected `control point` when you select the edit tool (Figure 11.31(a)). Select the second segment in the path (Figure 11.31(b)).
5. `Break the path` using the edit path `popup menu` and selecting `Break path` (Figure 11.32(a)). You should now have two separate semi-circles (Figure 11.32(b)). If you find that the circle has been split unevenly (i.e. you have a quadrant and a three-quarters of a circle) then you selected the wrong segment. Don't panic, just select `Edit` → `Undo` and try again.
6. Exit edit path mode. Move and rotate the top semi-circle so that it looks like Figure 11.33.
7. Select the `open line tool` and add in the two lines as shown in Figure 11.34.
8. Select all paths and use `Transform` → `Path Union`. You should now have just a single path.
9. Select this new `path`, and use the `edit path` tool to give the front end of the bus a slightly curved outline, as shown in Figure 11.35. (You may find it easier to temporarily disable the grid lock while you edit the path.)

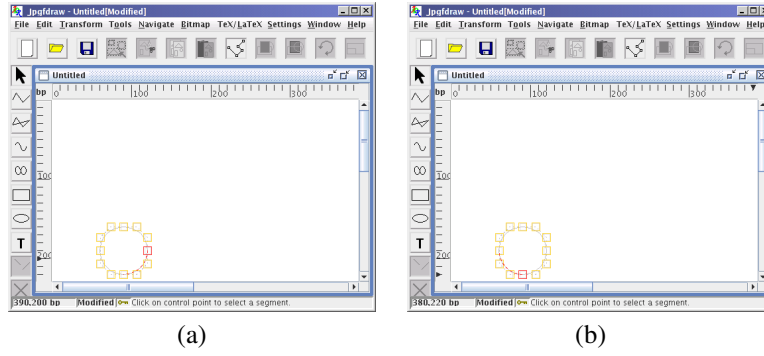


Figure 11.31: Bus Example — Editing the Path

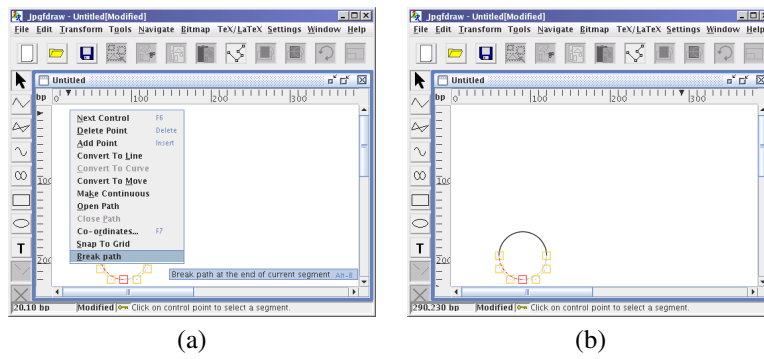


Figure 11.32: Bus Example — Break the Path

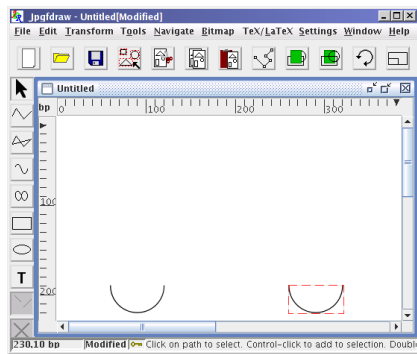


Figure 11.33: Bus Example — Move and Rotate Top Semi-Circle

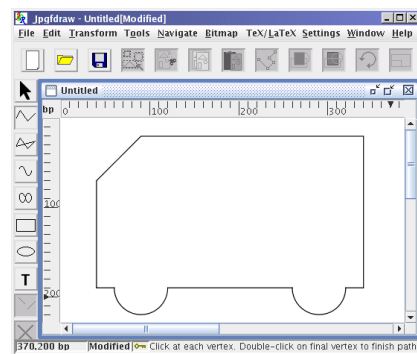


Figure 11.34: Bus Example — Adding Lines

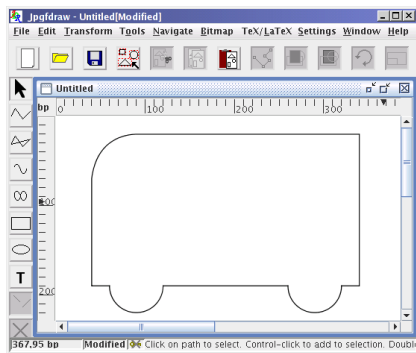


Figure 11.35: Bus Example — Convert Line Segment to a Curve

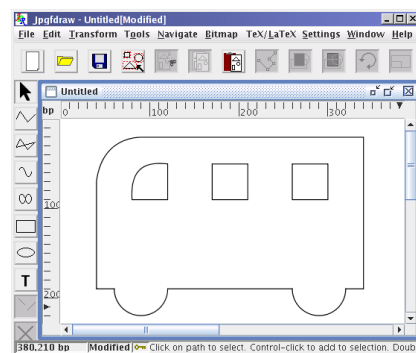


Figure 11.36: Bus Example — Add Windows

10. Add the windows, as shown in [Figure 11.36](#).
11. This next operation assumes that you haven't changed the [stacking order](#). The main outline of the bus must be at the rear. To ensure this, select the bus outline and use the [move to back function](#).
12. Select all paths, and apply Transform → Subtract Paths. Set the fill colour to red using the Edit → Path → Fill Colour... dialog box. The windows should appear as holes. See [Figure 11.37](#).

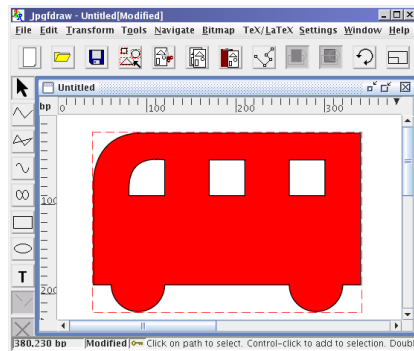


Figure 11.37: Bus Example — Subtract Windows from Bus Outline and Set Fill Colour

13. Make sure that the bus is selected. Select the TeX/LaTeX → Shapepar... menu item. A dialog box will appear: select the Use Path option and click Okay. Scan lines will appear as Jpgfdraw works out the parameters. Once completed a file dialog box will appear. Give the file a name, e.g. busshape.tex.
14. If you are using L<sup>A</sup>T<sub>E</sub>X, create a document that looks something like:

```
\documentclass{article}
\usepackage{shapepar}
```

```

\begin{document}
\input{busshape}\frenchspacing
The wheels on the bus go round and round...

\end{document}

```

15. If you are using plain  $\text{\TeX}$ , create a document that looks something like:

```

\input shapepar.sty

\input busshape.tex
\frenchspacing
The wheels on the bus go round and round...

\bye

```

16. The resulting shaped paragraph is shown in [Figure 11.38](#).

The wheels on the bus go round and round, round and round, round and round. The wheels on the bus go round and round all day long. The wipers on the bus go swish swish swish, swish swish swish, swish, swish swish swish swish. The wipers on the bus go swish swish swish all day long. The horn on the bus goes beep beep beep, beep beep beep, beep beep beep. The horn on the bus goes beep beep beep all day long. The conductor on the bus says “any more fares?” “any more fares?” “any more fares?” The conductor on the bus says “any more fares?” all day long. The mummies on the bus go natter natter natter, natter natter natter, natter natter natter. The mummies on the bus go natter natter natter all day long. The children on the bus make too much noise, too much noise, too much noise. The children on the bus make too much noise all day long. The dogs on the bus go woof woof woof, woof woof woof, woof woof woof. The dogs on the bus go woof woof woof all day long.

Figure 11.38: Bus Example — Resulting Shaped Paragraph

## 11.6 A Poster

This example illustrates how to use `Jpgfdraw` to help construct frames for use with the `flowfram` package. The aim is to create a  $\text{\LaTeX} 2_{\epsilon}$  package based on the `flowfram` package that defines frames for use with a poster. For this example, I used the A4 landscape paper setting, but it can just as easily be applied to other paper sizes.

1. Set the grid to the unit of your choice using the Settings  $\rightarrow$  Grid  $\rightarrow$  Grid Settings... dialog box. For example, I set the grid settings to major divisions of 1in, with 10 subdivisions.

2. I recommend that you set the grid lock on (using Settings → Grid → Lock Grid), to help prevent having frames with slightly different widths, which will result in warnings from the flowfram package.
3. Set the typeblock, using the TeX/LaTeX → Flow Frames → Set Typeblock... menu item. I used 1in margins. You should now see the typeblock appear as a light grey rectangle on the page. (Note that you can not select or move the typeblock, you can only modify it using the TeX/LaTeX → Flow Frames → Set Typeblock... dialog box.) See [Figure 11.39](#).

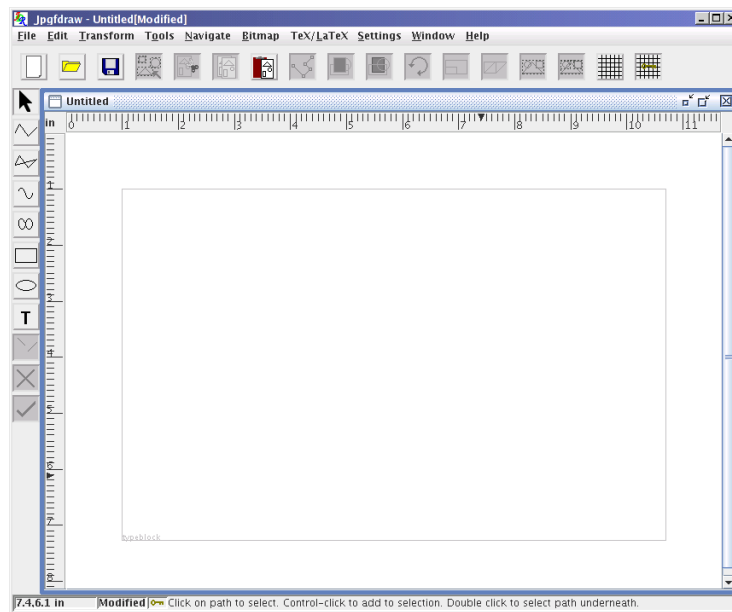


Figure 11.39: Poster Example — The Typeblock

4. Select the rectangle tool, and create the rectangles shown in [Figure 11.40](#). The top rectangle is going to be the title frame, the two tall rectangles on the left will be flow frames containing the main text for the poster, and the two short rectangles on the right will be dynamic frames that will contain a table and a figure. (To ensure that the two tall rectangles are the same size, you may prefer to use the copy and paste function.)
5. Switch to the select tool, and add a [bitmap](#) using Bitmap → Insert Bitmap..., to give the poster a logo, and move it to the location shown ([Figure 11.41](#)).
6. Garish posters are not recommended, but to illustrate how to liven up the poster, set the fill colours for the rectangles using the Edit → Path → Fill Colour... dialog box. I also added two extra smaller rectangles on top of the right hand rectangles, to give a double border effect ([Figure 11.42](#)).
7. Select the top rectangle and the [bitmap](#), and [group](#) them. Select the bottom right hand rectangles (green) and group them. Select the middle right hand rectangles (magenta) and group them.

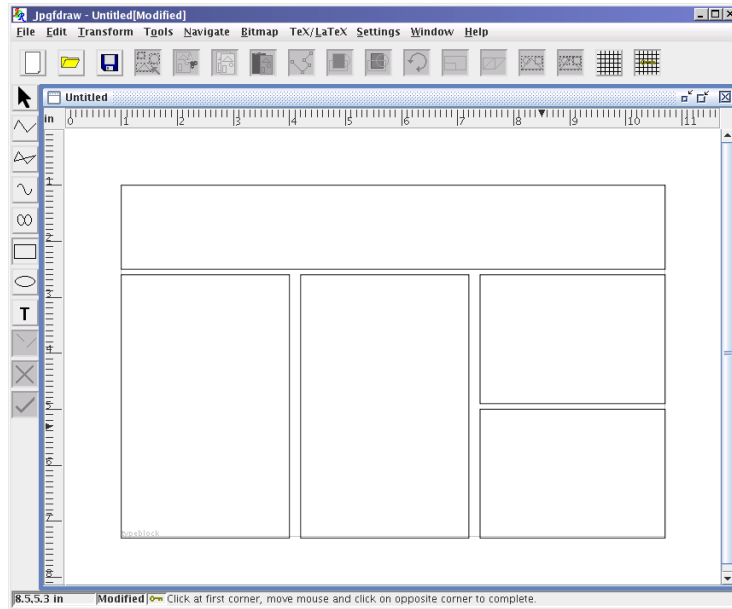


Figure 11.40: Poster Example — Adding Rectangles

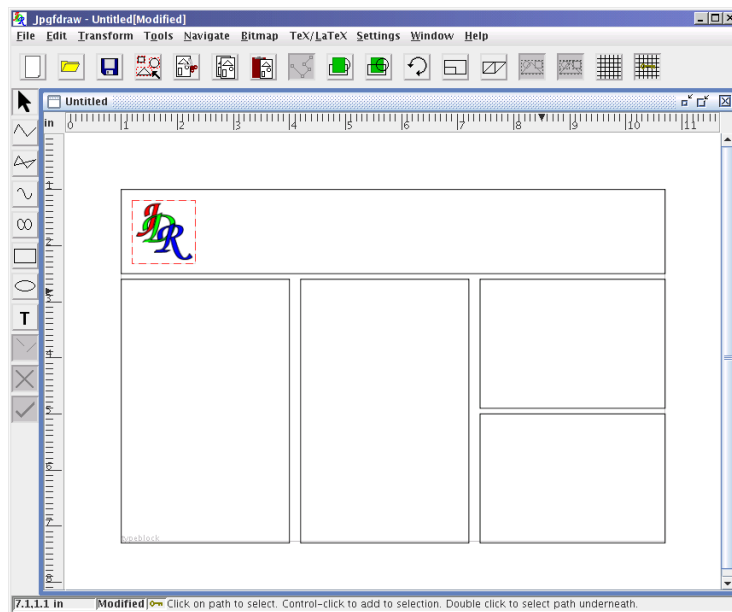


Figure 11.41: Poster Example — Adding a Bitmap

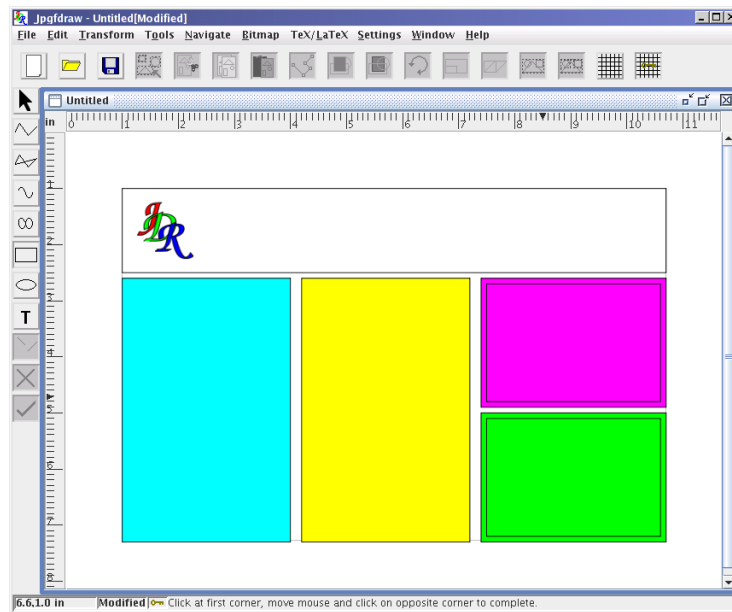


Figure 11.42: Poster Example — Adding Some Colour

8. Select the top group, and select the TeX/LaTeX → Flow Frames → Set Frame... menu item. This will open up the dialog box shown in Figure 11.43. Set the type to Static, and call it “title”. Set the margins as desired. (I used 10pt for all the margins, but you may want to use different values to ensure that the logo is inside the margins so that the frame’s text doesn’t overlap the image.)

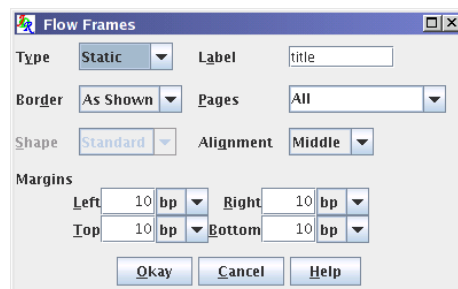


Figure 11.43: Poster Example — assigning frame information. (Note that the shape option is not available because the selected object is a group not a path.)

9. Similarly, make the left hand rectangle a flow frame with label “left” and the middle rectangle a flow frame with label “middle”.
10. Make the two remaining groups dynamic frames with labels “figure” and “table”. For these two, I used larger margins (20pt) to compensate for the double border (Figure 11.44).

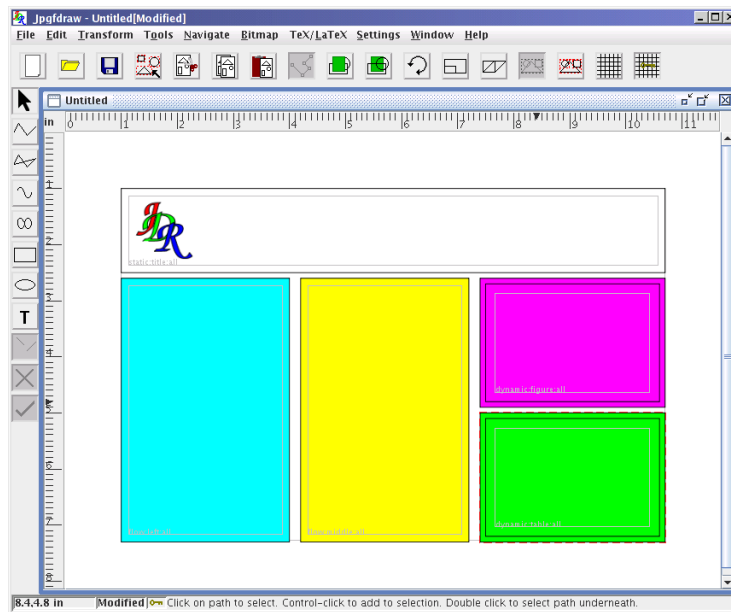
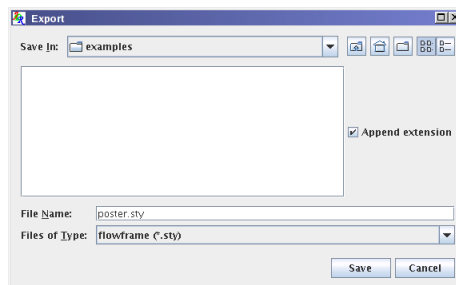


Figure 11.44: Poster Example — Frame Information Assigned

11. Use the menu item File → Export... to create a new  $\text{\LaTeX}$  package that defines these frames. Remember to select the flowframe (\*.sty) file filter. I called my file poster.sty (Figure 11.45).

Figure 11.45: Poster Example — Export Frame Information to a  $\text{\LaTeX}$  Package

12. Create a  $\text{\LaTeX}$  document that uses this package. Since I used A4 landscape paper, I'm going to use the article class file. If you use a larger size (e.g. A0), it would be more appropriate to use the a0poster class file.

I created the following file called poster.tex:

```
\documentclass{article}

% use new package created in this example:
\usepackage{poster}
```



```

\begin{document}
% set the contents of the static frame called ``title''
\setstaticcontents*{title}{
\title{A Sample Poster}
\author{Nicola Talbot}
\maketitle
% page numbers not appropriate for a poster:
\thispagestyle{empty}
}

```

This is the main body of the poster. This text will appear in the first of the two flow frames. Once it has reached the end of the first flow frame, it will then continue in the second flow frame.

```
% Lots of text omitted
```

```
% Now set the contents of the two dynamic frames
% For this example, they could just as easily have
% been static frames
```

```

% set the contents for the frame labelled ``figure''
\setdynamiccontents*{figure}{%
\begin{staticfigure}
\centering
Insert figure here!
\caption{A Sample Figure}
\label{fig:sample}
\end{staticfigure}}

```

```

% set the contents for the frame labelled ``table''
\setdynamiccontents*{table}{%
\begin{statictable}
\caption{A Sample Table}
\label{tab:sample}
\begin{center}
Insert table here!
\end{center}
\end{statictable}}

```

```
\end{document}
```

13. To make the poster a PDF document, do:

```
pdflatex poster.tex
```

(Note that the `pgf` package is used to create the borders, so you will need to use a driver that understands the `\special` commands used by the `pgf` package, such as `PDFLATEX` or `LATEX` and `dvips`.) The final document is illustrated in [Figure 11.46](#).

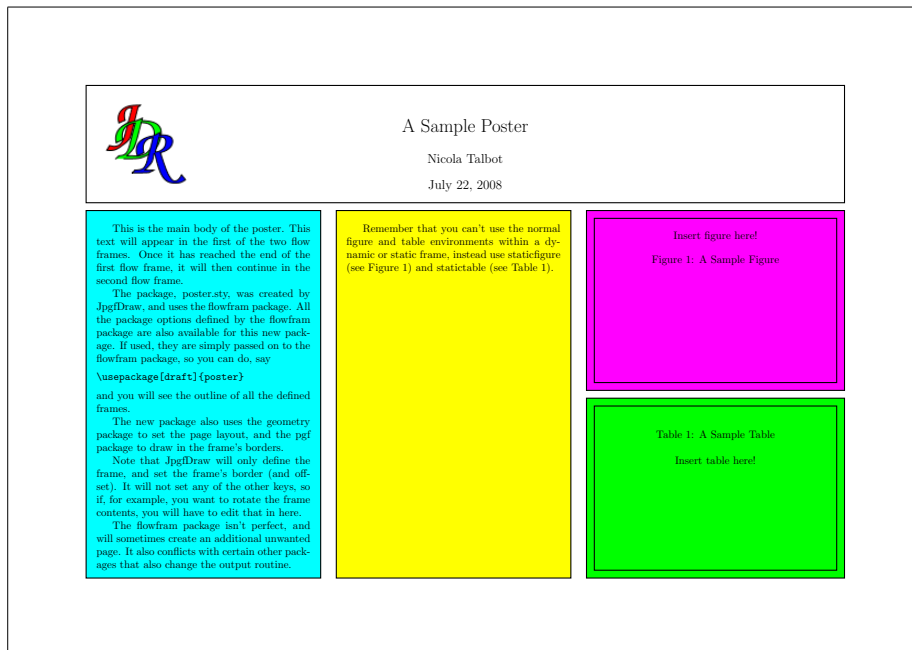


Figure 11.46: Poster Example — Final Document

## 11.7 A House With No Mouse

This example illustrates how to create and edit pictures without using the mouse.

1. For this example I'm going to use `bp` units. To do this, use the menu mnemonics `Alt-S G G`. This will open up the Grid Settings dialog box shown in Figure 11.47. The Major Divisions field should already have the focus, but if not, you can do `Alt-M`. Set this value to 100. Press the `Tab` key to move to the unit `drop-down list`. Press the `b` key to select `bp`. Press `Tab` or `Alt-S` to select the Sub-Divisions field. Set this value to 10. Then press either `Enter` or `Alt-O` to apply these settings and close the dialog box.

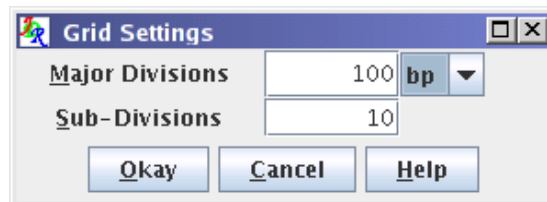


Figure 11.47: No Mouse Example — Grid Settings Dialog Box

2. Make sure that you don't have the grid lock on as some of the co-ordinates that this example uses lie between tick marks. `Shift-F2` or `Alt-S G L` toggles between

setting the grid lock on and off.

3. Select the [rectangle tool](#), using either Ctrl-R or Alt-O R.
4. The rectangle forming the main part of the house will go from (100bp, 100bp) to (250bp, 200bp). To move the mouse either press F5 or use the menu mnemonic Alt-N G. This will open up the dialog box shown in [Figure 11.48](#). Set the x field to 100bp and the y field to 100bp. (You can use the Tab key to move to the next focusable component, or you can use Alt-X to select the x field and Alt-Y to select the y field.) Then press Enter or Alt-O.



Figure 11.48: No Mouse Example — Go To Co-Ordinate Dialog Box

5. Press F4 to emulate a mouse click. This will anchor the rectangle at (100bp, 100bp). Then use either F5 or Alt-N G to display the Go To dialog box. Set the x field to 250bp and the y field to 200bp. Then press Enter or Alt-O.
6. To complete the rectangle, press either Enter or F4. (See [Figure 11.49](#).)

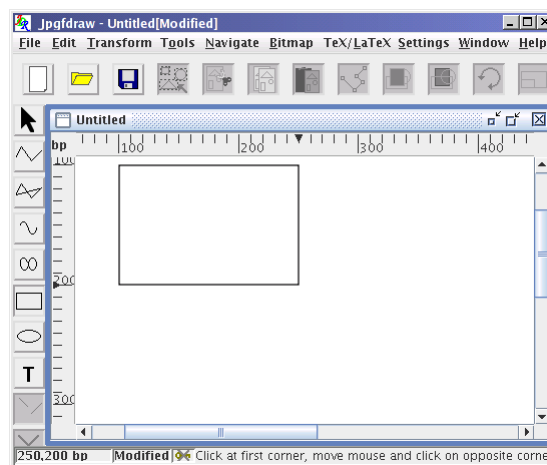


Figure 11.49: No Mouse Example — Completed Rectangle

7. Let's make it a yellow brick house. To change the rectangle's fill colour, we first need to switch to the select tool. To do this either use Ctrl-P or use the menu mnemonic Alt-O S.

8. To select the rectangle, use either F6 or Alt-N K.<sup>1</sup> Alternatively, you can use Alt-N D which will show a dialog box with a [drop-down list](#) that you can use to select an object.
9. To change the fill colour use the menu mnemonic Alt-E H F. This will open up the dialog box shown in [Figure 11.50](#).

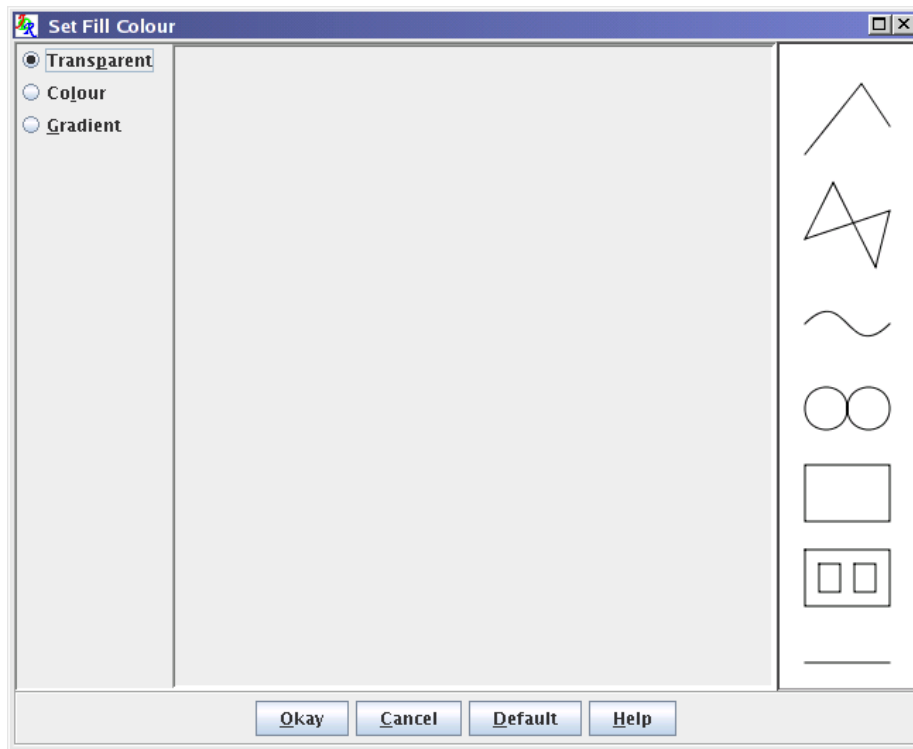


Figure 11.50: No Mouse Example — Set Fill Colour Dialog Box

10. To select the Colour radio button, either do Alt-L or press Tab until the Colour button has the focus, and then press Space.
11. The single colour selector will now be enabled. To change the colour to yellow, you can do one of the following:
  - Press Tab until the yellow swatch is selected, and then press Space.
  - Press Alt-R to select the RGB panel and set the Red field to 100, the Green field to 100, the Blue field to 0 and the Alpha field to 100.
  - Press Alt-K to select the CMYK panel and set the Cyan field to 0, the Magenta field to 0, the Yellow field to 100, the Black field to 0 and the Alpha field to 100.

Then press Enter or Alt-O to apply the fill colour and close the dialog box (see [Figure 11.51](#)).

<sup>1</sup>Since there is only one object on the canvas, you could use any of the other select functions in the Navigate menu, but F6 is easier to type.

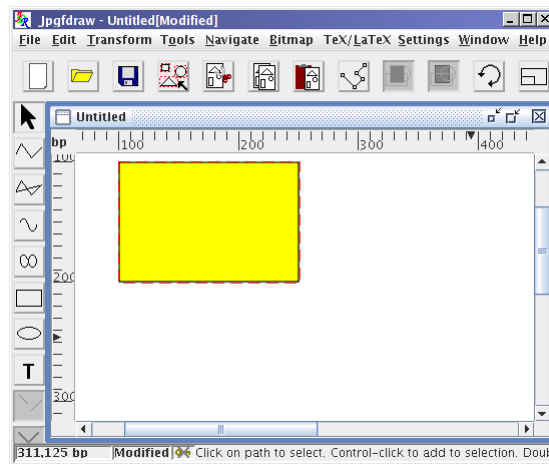


Figure 11.51: No Mouse Example — Fill Colour Set

12. Next we need to construct a triangle for the roof. The [closed line path tool](#) is needed for this, so either use `Ctrl+Shift-L` or use the menu mnemonic `Alt-O I`.
13. The triangle vertices will be at (80bp, 100bp), (175bp, 50bp) and (270bp, 100bp). Move to the first co-ordinate using either `F5` or `Alt-N G`, and set the x field to 80bp and the y field to 100bp in the `Go To...` dialog box. Press `Enter` or `Alt-O` to close the dialog box and move the mouse to the required location, and press `F4` to set the first vertex.
14. Repeat the process for the second and third vertices, and press `Enter` to complete the path. The path will automatically close. (See [Figure 11.52](#).)

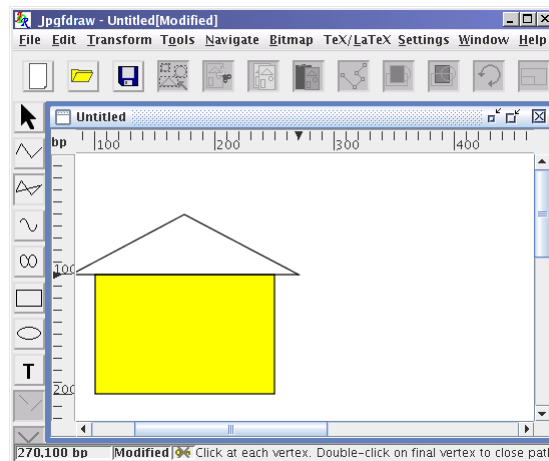


Figure 11.52: No Mouse Example — Completed Triangle

15. Let's make the roof red. First switch to the select tool using either `Ctrl-P` or `Alt-O`

S.

16. Select the triangle using F6 or Alt-N K.
17. Open the fill colour dialog box using the menu mnemonic Alt-E H F.
18. Use Alt-L to select the Colour radio button.
19. To set the colour to red either use the Tab key to move the focus to the red colour swatch and press Space or use Alt-R to select the RGB tab and set the Red field to 100, the Green and Blue fields to 0 and the Alpha field to 100.
20. Press Enter or Alt-O to set the fill colour and close the dialog box. (See [Figure 11.53](#)).

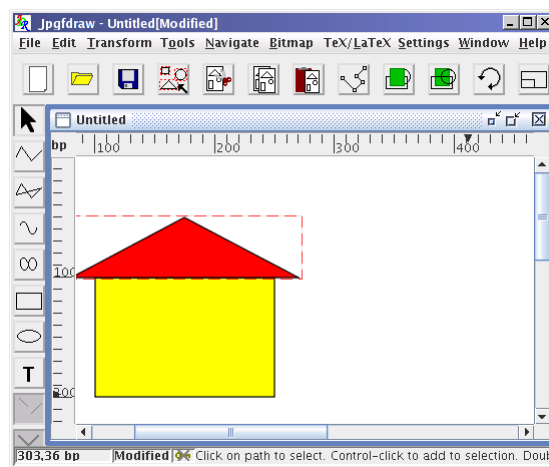


Figure 11.53: No Mouse Example — Triangle Fill Colour Set to Red

21. Now for the windows: press Ctrl-R or use the menu mnemonic Alt-O R to select the rectangle tool.
22. Create four rectangles using the method described above with opposing vertices at:
  - Window 1: (120bp, 180bp), (145bp, 155bp)
  - Window 2: (120bp, 135bp), (145bp, 110bp)
  - Window 3: (205bp, 135bp), (230bp, 110bp)
  - Window 4: (205bp, 180bp), (230bp, 155bp)

See [Figure 11.54](#).

23. To change the fill colour of the window rectangles, you will first need to switch to the select tool using either Ctrl-P or Alt-O S.
24. It's more efficient to select all four of the window rectangles and change their fill colour simultaneously, rather than setting the fill colour individually. Since the four small rectangles are at the **front** of the **stack**, pressing Shift-F6 four times will select these four rectangles.

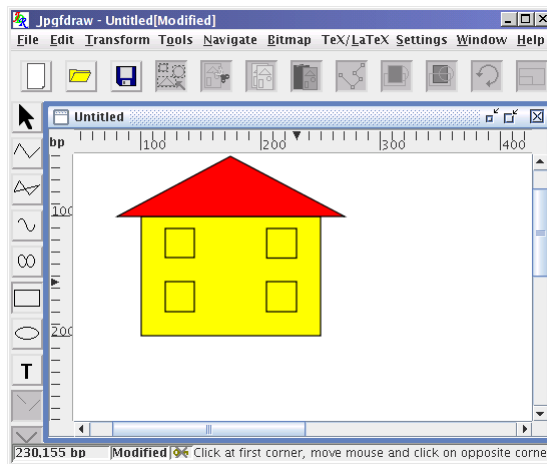


Figure 11.54: No Mouse Example — Windows Added

25. Now use the menu mnemonic Alt-E H F to set the fill colour to white, following the same process as before to produce the image shown in [Figure 11.55](#).

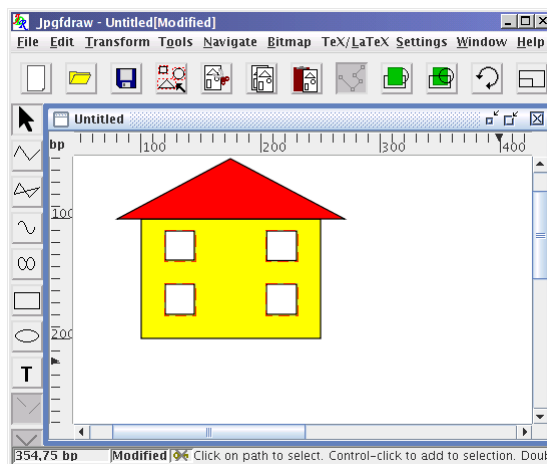


Figure 11.55: No Mouse Example — Window Fill Colour Set

26. Now make a black rectangle with opposing corners at (160bp, 200bp) and (190bp, 160bp) using the same method as above, to produce the image shown in [Figure 11.56](#).
27. To illustrate how to move objects using the keyboard, let's now shift the house 100bp to the right and 50bp down. First make sure you are using the select tool. Then select all the objects using either Ctrl-A or Alt-E A.
28. Then either press F7 or use the menu mnemonic Alt-E M. This will open up the dialog box shown in [Figure 11.57](#). Set the x field to 100bp and the y field to

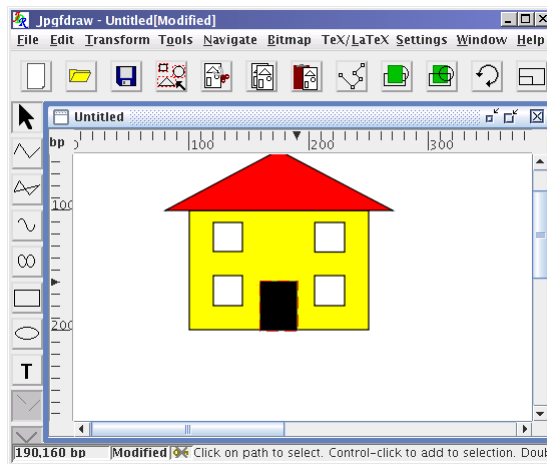


Figure 11.56: No Mouse Example — Completed House

50bp.

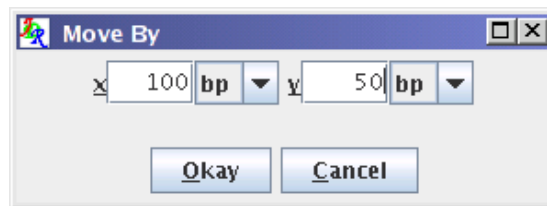


Figure 11.57: No Mouse Example — Move Dialog Box

29. To illustrate how to edit a path using only the keyboard, let's make the roof a bit shallower. First deselect all the objects using `Ctrl+Shift-A` or `Alt-E D`.
30. Press `F6` repeatedly until the triangle is selected.
31. To enter edit mode, use either `Ctrl-I` or `Alt-E H E`. You should now see the path in edit mode. (See [Figure 11.58](#).)
32. Press `F6` until the highest vertex is selected.
33. Press `F3` to popup the edit path menu ([Figure 11.59](#)).
34. Press `Alt-R` to display the dialog box shown in [Figure 11.60](#).
35. Set the `y` field to `120bp`, and press `Enter`.
36. Press `Ctrl-I` to exit edit path mode. The image should now look like [Figure 11.61](#).
37. To illustrate how to create a [text area](#) using the keyboard, let's add a label. First select the text tool using either `Ctrl-T` or `Alt-O T`.



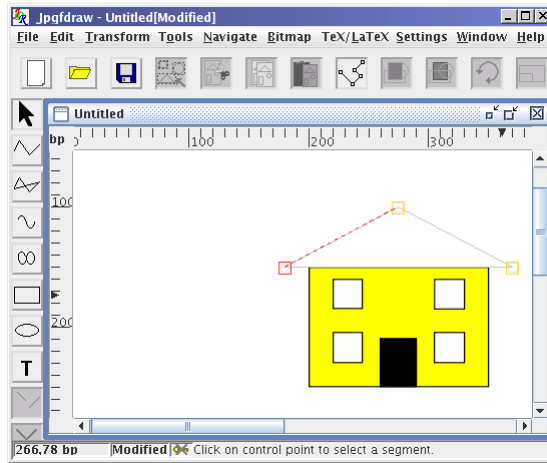


Figure 11.58: No Mouse Example — Edit Mode

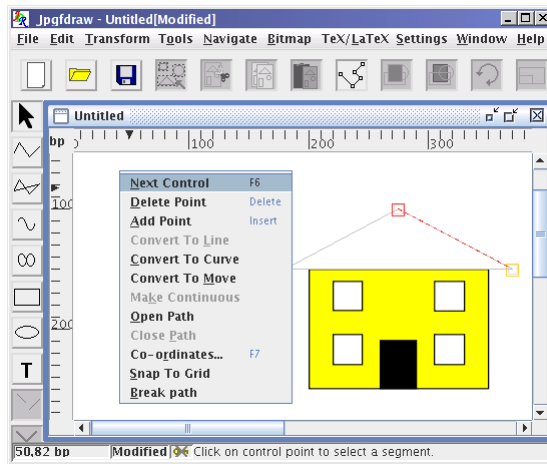


Figure 11.59: No Mouse Example — Edit Path Menu

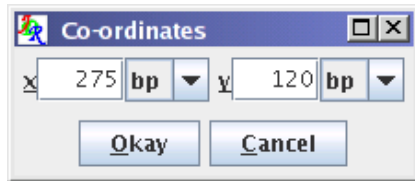


Figure 11.60: No Mouse Example—  
Control Point Co-Ordinates Dialog  
Box

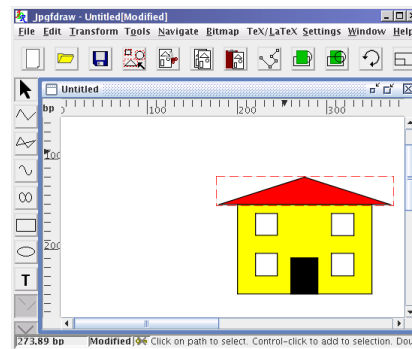


Figure 11.61: No Mouse Example—  
Editing Finished

38. Press F5 or Alt-N G to display the Go To... dialog box. Set the x field to 200bp and the y field to 100bp.
39. Press F4 to start the [text area](#). You should now see a small pale rectangle with a cursor, as illustrated in [Figure 11.62](#). Whilst this rectangle contains a cursor, you can type in text or press F3 to display the text area [popup menu](#).

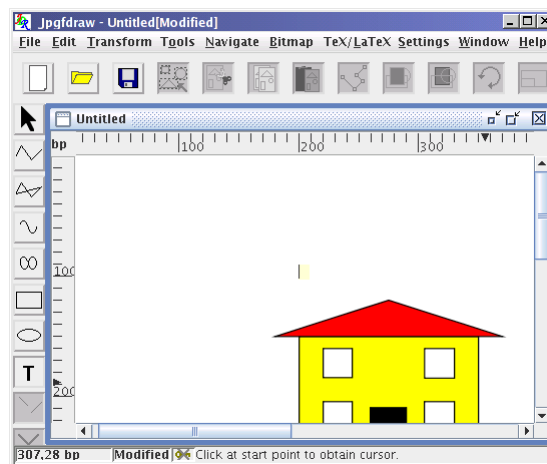


Figure 11.62: No Mouse Example—Creating a New Text Area

40. Type in the text House #1, then switch to the select tool (using Ctrl-P or Alt-O S.)
41. The [text area](#) contains one of TeX's special characters, namely the hash (#) character. This will cause a problem if you want to save your image as a pgfpicture environment if the [auto escape special characters facility](#) is not enabled. If so, you will need to modify the [text area](#) so that it has an alternative text to be used if the image is saved in a L<sup>A</sup>T<sub>E</sub>X file. You can do this as follows:

- (a) Press F6 to select the [text area](#).
- (b) Press Ctrl+Shift-I or Alt-E X E to display the Edit Text dialog box. Select the Different button (either Tab to it and press Space or use Alt-D.) This will enable the alternate text field. Change the text to `House \#1` ([Figure 11.63](#)).

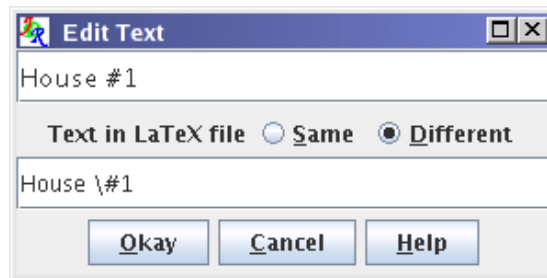


Figure 11.63: No Mouse Example — Editing Text Area

- (c) Press Enter or Alt-O to update the [text area](#), and close the dialog box.
42. It would look better if the label was centred over the house. In order to use the align function, it is necessary to group all the objects that make up the house. This is done as follows:
  43. Assuming you created all the objects in the same order as listing in this example, the [text area](#) should be at the front of the [stack](#), then the door, the four windows, the roof and lastly the body of the house. You should still have the [text area](#) selected, and nothing else. If not, deselect all objects (Ctrl+Shift-A) and press F6 to select the [text area](#).
  44. Press F6 to deselect the [text area](#) and select the next object in the [stack](#) (the door).
  45. Press Shift-F6 to add the next object to the selection. Keep pressing Shift-F6 until everything has been selected except the [text area](#).
  46. Press Ctrl-G or Alt-T G to group the selected objects.
  47. Press Shift-F6 to add the [text area](#) to the selection.
  48. Press Ctrl-G or Alt-T G to group the selected objects.
  49. Use the menu mnemonic Alt-T J C to centre the objects.
  50. Press Ctrl-U or Alt-T U to ungroup the objects. The image should now look like [Figure 11.64](#). Note that the house had to be grouped and that group then grouped with the [text area](#) to ensure that the individual house components maintained their position relative to each other.
  51. If you want to save your image as a `pgfpicture` environment, you will need to change the [anchor](#) settings to ensure that the [text area](#) in the  $\LaTeX$  file remains centred. (Otherwise font differences may cause the text to appear slightly off centre.) To do this:

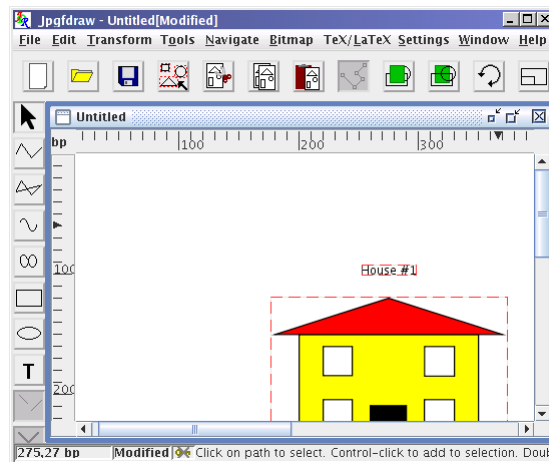


Figure 11.64: No Mouse Example — Text is Now Centred

- (a) Ensure that the **text area** is selected.
- (b) Use the menu mnemonic Alt-E X F A H to display the Horizontal Anchor Setting dialog box.
- (c) If the **drop-down list** doesn't already have the focus, press Alt-A.
- (d) Press c or use the arrow keys to set the horizontal setting to Centre.
- (e) Press Enter or Alt-O to apply the settings and close the dialog box.

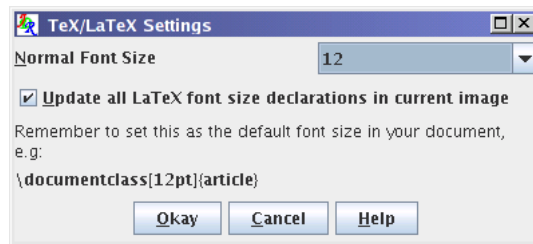
(Note that you don't need to do this if the menu item TeX/LaTeX → Settings → Auto Adjust Anchor is selected as it will automatically update the anchor when you align the text area.)

## 11.8 A Newspaper

This example illustrates how to use Jpgfdraw to create a  $\text{\LaTeX} 2_{\epsilon}$  package based on the flowfram package, using non-standard shaped frames. The aim is to produce the document shown in Figure 11.90 on page 146.

1. In this example, my newspaper is going to be on A4 portrait paper, with a normal font size of 12pt, so the first thing to do is to select the paper size and orientation using Settings → Paper → A4 and Settings → Paper → Portrait, and set the value of the  $\text{\LaTeX}$  **normal size font**, using the TeX/LaTeX → Settings → Set Normal Size... dialog box (see Figure 11.65). Select 12 from the **drop-down list**.
2. The 12pt font size has a corresponding `\baselineskip` of 14.5pt. For this example, it is more practical to have a grid that has intervals of this size, as it gives a guide as to how many lines there will be in each frame.<sup>2</sup> Therefore I set the grid to have 145pt major divisions with 10 subdivisions. This means that

<sup>2</sup>This is of course only an approximate guide, as larger or smaller font sizes may be used in a frame, which will affect the total number of lines in the frame.

Figure 11.65: Newspaper Example — Setting the L<sup>A</sup>T<sub>E</sub>X Normal Font Size

each minor tick mark is at a distance of 14.5pt (one `\baselineskip`) from its neighbour. To do this select Settings → Grid → Grid Settings..., and enter the values as shown in Figure 11.66.

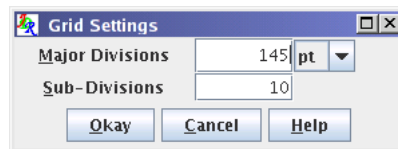


Figure 11.66: Newspaper Example — Setting the Grid

- Next set the typeblock. This nominally defines the paper margins, although it is possible to define frames outside this area. I used 58pt margins on all sides. To do this, select TeX/LaTeX → Flow Frames → Set Typeblock... which will display the dialog box shown in Figure 11.67. Enter the values shown and click on Okay or press Enter to continue. You should now see a pale grey rectangle displayed on the canvas denoting the typeblock.

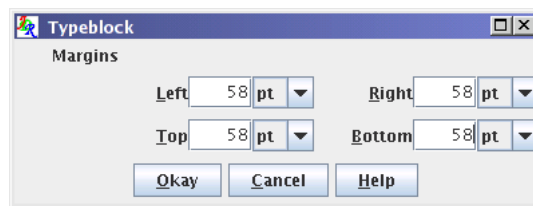


Figure 11.67: Newspaper Example — Setting the Typeblock

- The newspaper is going to have a static frame along the top of the typeblock that will contain the title of the paper. This isn't going to have a border, but we will need to draw a rectangle to define the frame's bounding box. So select the [rectangle tool](#) and draw a rectangle with opposing corners at (58pt,58pt) and (536.5pt,145pt). You should now see something like Figure 11.68.
- Switch to the [select tool](#), and select this rectangle. Select TeX/LaTeX → Flow Frames → Set Frame... and enter the values shown in Figure 11.69. Note that the Border field has been set to None.

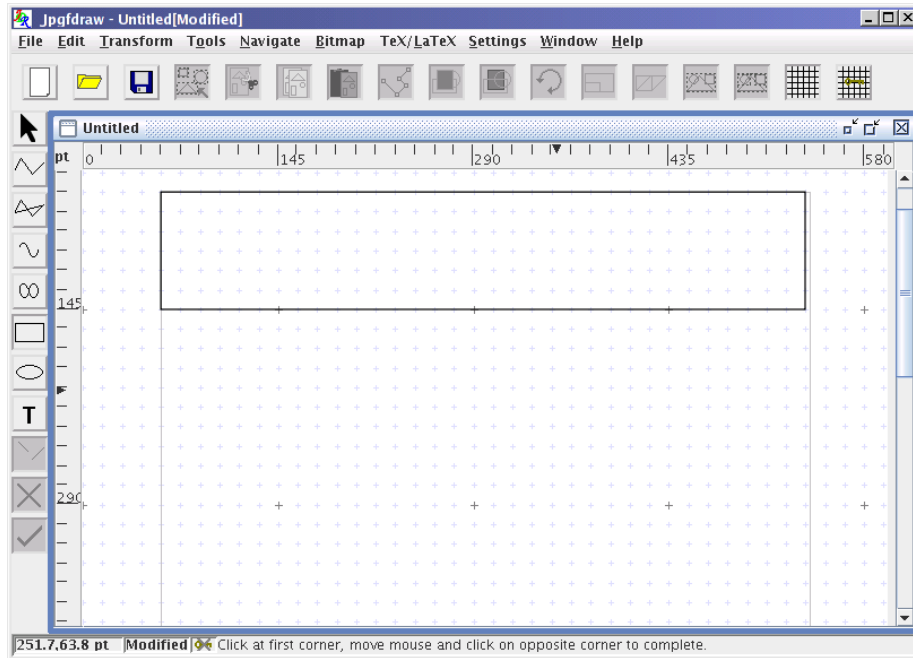


Figure 11.68: Newspaper Example — Title Frame

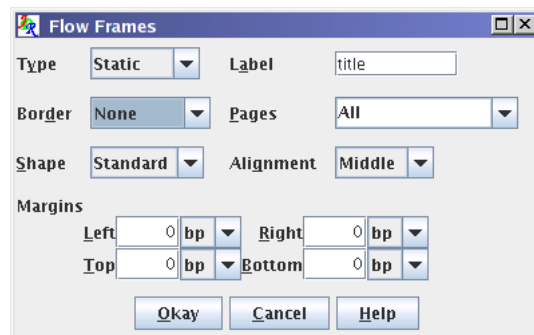


Figure 11.69: Newspaper Example — Assigning Flowframe Data to Title Frame

6. Below the title, there will be two columns each with its own heading. I am going to make separate frames for the headings, and since the headings will be in a larger font, I shall give their frames a height of twice the `\baselineskip`. Select the [rectangle tool](#), and make two rectangles with opposing corners at:

- (58pt, 159.5pt) and (290pt, 188.5pt)
- (304.5pt, 159.5pt) and (536.5pt, 188.5pt)

You should now see something like [Figure 11.70](#).

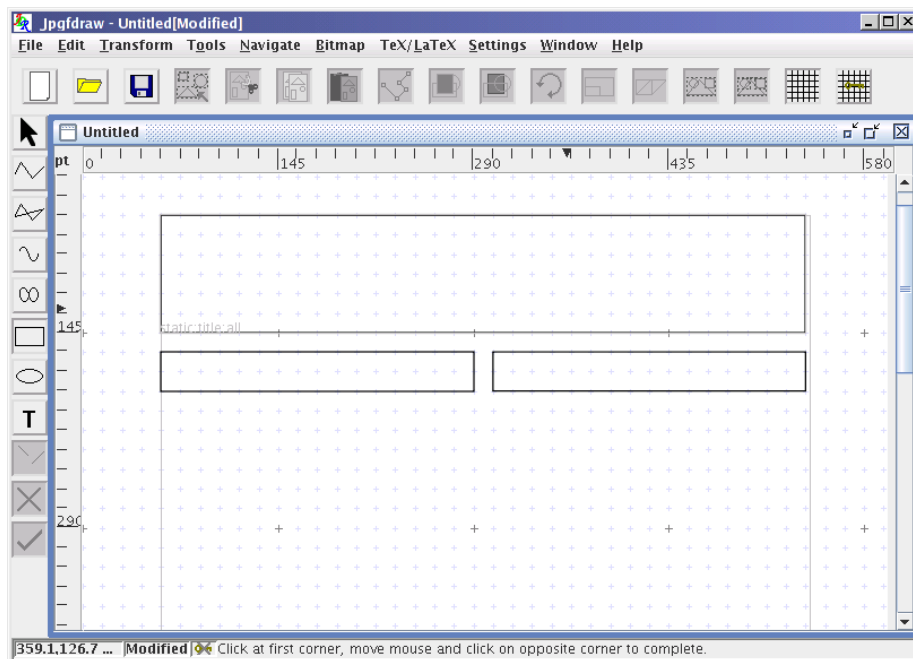


Figure 11.70: Newspaper Example — Left and Right Heading Frames Added

7. Switch to the [select tool](#), and select the left hand frame, and assign the flowframe data shown in [Figure 11.71](#). Do the same for the right hand rectangle, but call it `rihtheading`.
8. The left hand column is going to angle around underneath the right hand column, as it will have more text in it. Select the [closed line tool](#) and make a polygon with vertices at (58pt, 203pt), (58pt, 507.5pt), (536.5pt, 507.5pt), (536.5pt, 420.5pt), (290pt, 420.5pt) and (290pt, 203pt) as shown in [Figure 11.72](#).
9. Switch to the [select tool](#), and select this L shaped polygon, and assigned the flowframe data shown in [Figure 11.73](#). Note that the Alignment field has been set to Top to ensure that if there is insufficient text to fill the frame, all blank space will go at the bottom of the frame, and thus help to keep the frame's shape. I used `Parshape` rather than `Shapepar` to define the frame's shape as I don't want it to shrink and grow to fit the text.

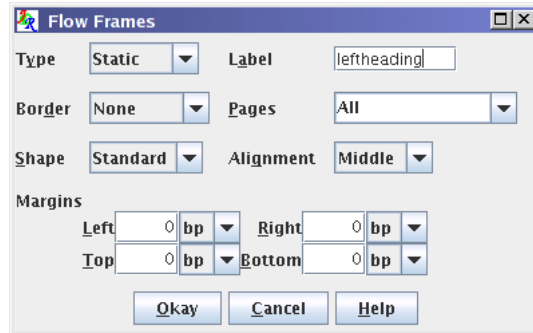


Figure 11.71: Newspaper Example — Assigning Flowframe Data to Left Heading Frame

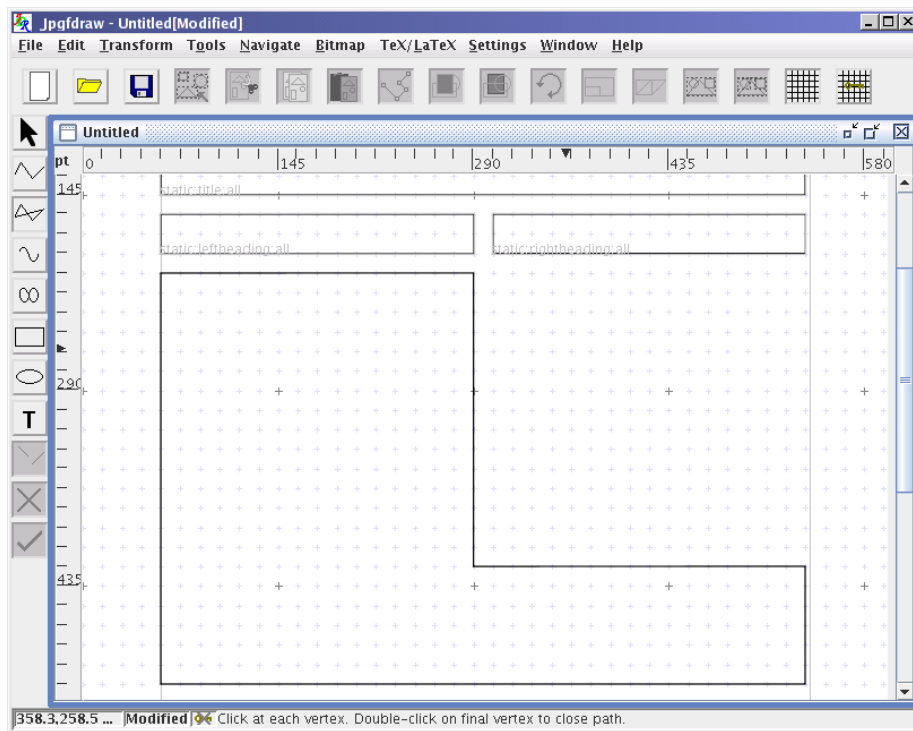


Figure 11.72: Newspaper Example — Added L Shaped Frame



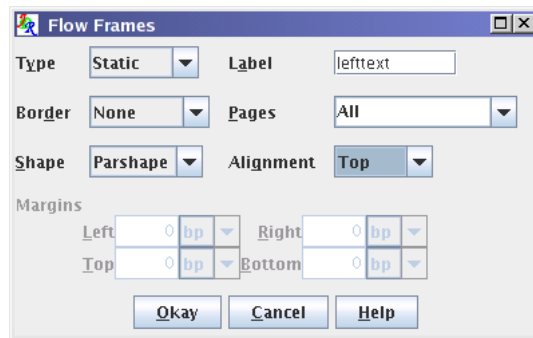


Figure 11.73: Newspaper Example — Assigning Flowframe Data to L Shaped Frame

10. I'm going to illustrate the story in the right hand column. The image `egg.png` is supplied with the `flowfram` package but is also available in the examples sub-directory of `Jpgfdraw`'s installation directory. Use `Bitmap → Insert Bitmap...` to insert the bitmap on the `canvas`. This will initially appear in the top left hand corner of the `canvas`. Move it over to the location shown in [Figure 11.74](#), either by dragging it or by using `Edit → Move By...` and specifying a horizontal (x) displacement of 472.8pt and a vertical (y) displacement of 206pt.
11. Set the flowframe data shown in [Figure 11.75](#) to this bitmap. Note that you must set the `Border` setting to `As Shown`, otherwise the bitmap will not appear in the document.
12. Next comes the right hand frame. This is a polygon with a stepped area that goes around the bitmap. Select the `closed line tool`, and construct a polygon with vertices at: (304.5pt, 203pt), (304.5pt, 406pt), (536.5pt, 406pt), (536.5pt, 290pt), (478.5pt, 290pt), (478.5pt, 261pt), (464pt, 261pt), (464pt, 232pt), (478.5pt, 232pt), (478.5pt, 217.5pt), (493pt, 217.5pt) and (493pt, 203pt) as shown in [Figure 11.76](#).
13. Switch to the `select tool`, select this polygon and assign the flowframe data shown in [Figure 11.77](#). Note that the `Shape` field has been set to `Parshape` and the `Alignment` field has been set to `Top`.
14. I'm going to add an L-shaped segment between the left and right blocks to clearly delineate them. Switch to the `open line tool`, and construct a `path` with vertices at: (297.25pt, 159.5pt), (297.25pt, 413.25pt) and (536.5pt, 413.25pt) as shown in [Figure 11.78](#).
15. Switch to the `select tool`, select this new path and assign the flowframe data shown in [Figure 11.79](#). Make sure that you have set the `Border` field to `As Shown`.
16. Next comes a horizontal divider to separate the top two columns from the bottom columns (which will be created later). Select the `open line tool`, and construct a line with end points at: (58pt, 514.75pt) and (536.5pt, 514.75pt) as shown in [Figure 11.80](#).
17. Switch to the `select tool`, select this line and assign the flowframe data shown in [Figure 11.81](#).

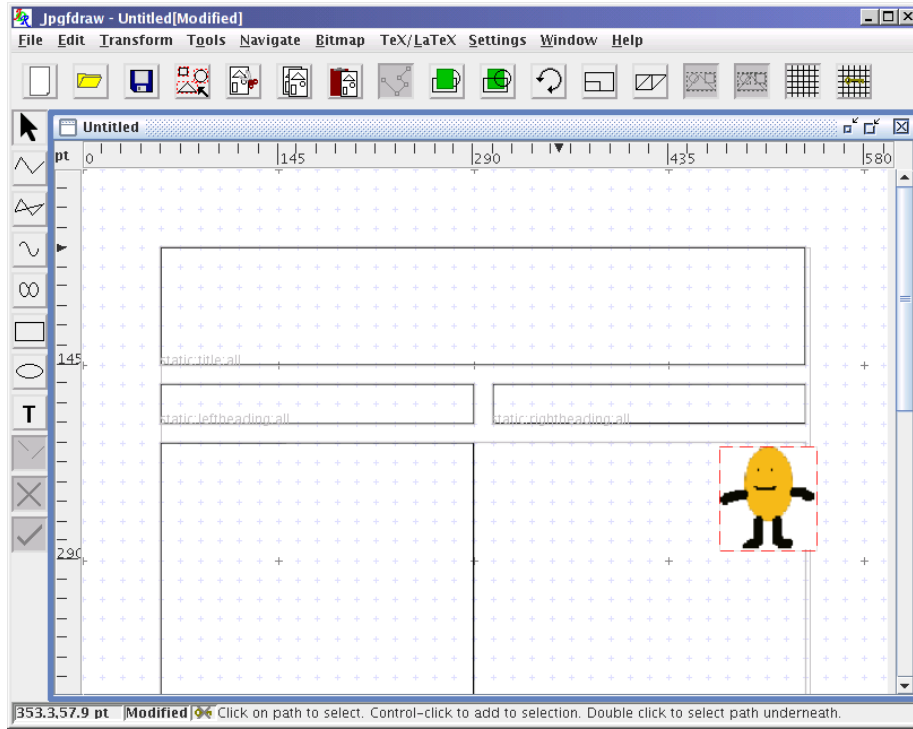


Figure 11.74: Newspaper Example — Added Image

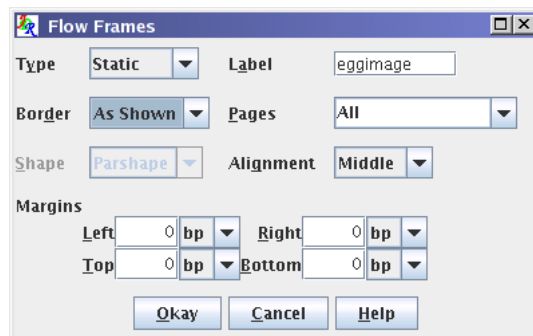


Figure 11.75: Newspaper Example — Assigning Flowframe Data to Bitmap

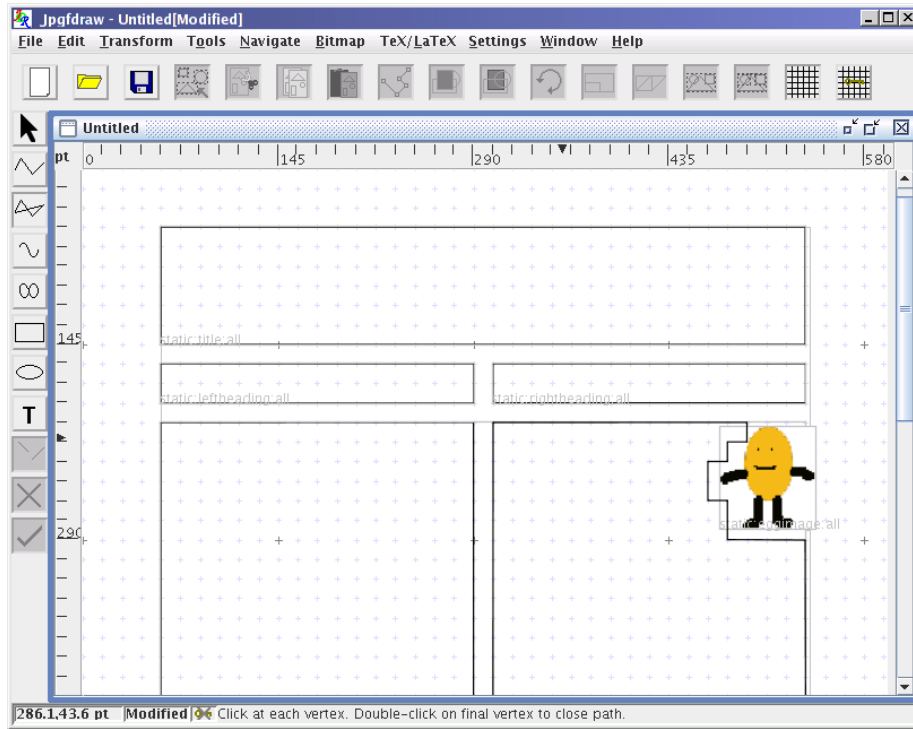


Figure 11.76: Newspaper Example— Added Right Hand Polygon

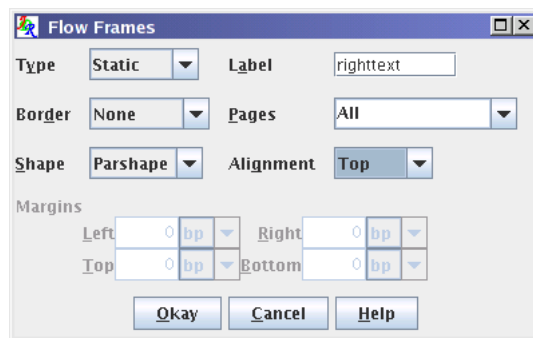


Figure 11.77: Newspaper Example— Assigning Flowframe Data to Right Hand Polygon

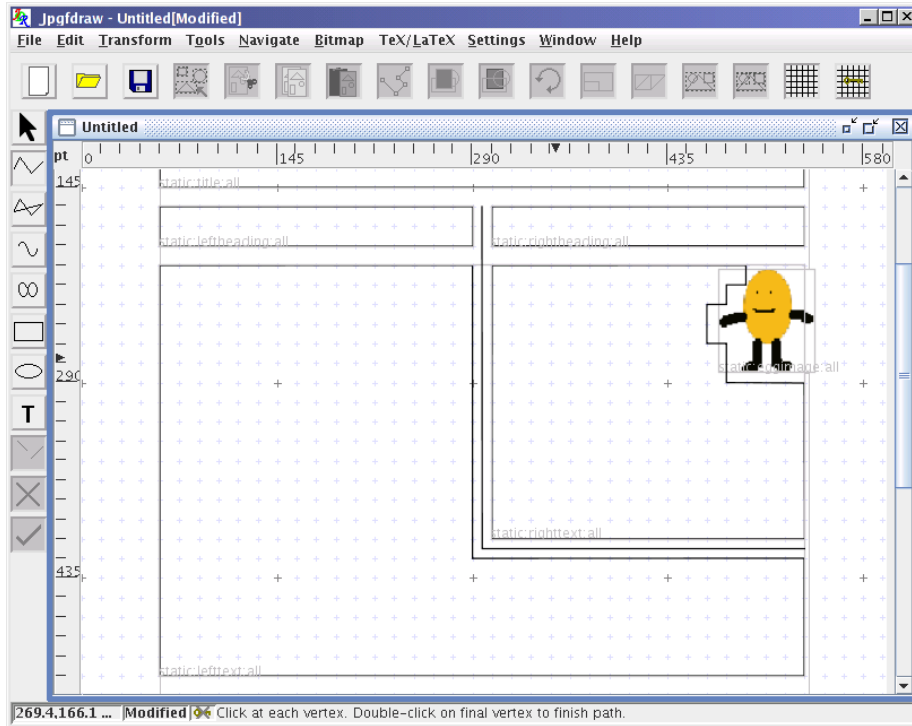


Figure 11.78: Newspaper Example — Added L Shaped Divider

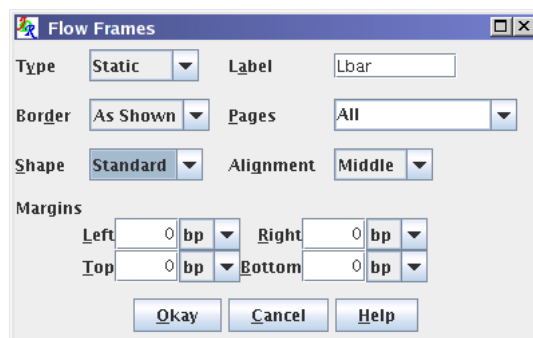


Figure 11.79: Newspaper Example — Assigning Flowframe Data to L Shaped Divider

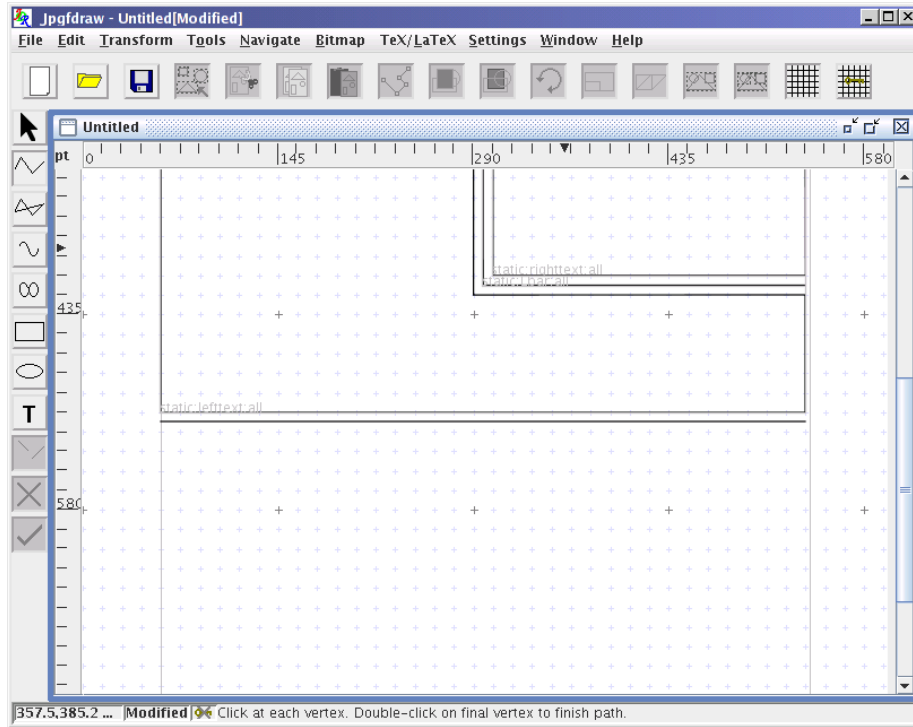


Figure 11.80: Newspaper Example — Added Horizontal Divider

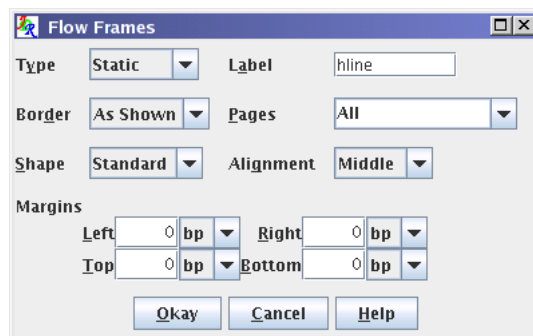


Figure 11.81: Newspaper Example — Assigning Flowframe Data to Horizontal Divider

18. Next comes another header frame. Select the [rectangle tool](#), and construct a rectangle with opposing corners at: (58pt, 522pt) and (536.5pt, 551pt) as shown in [Figure 11.82](#).

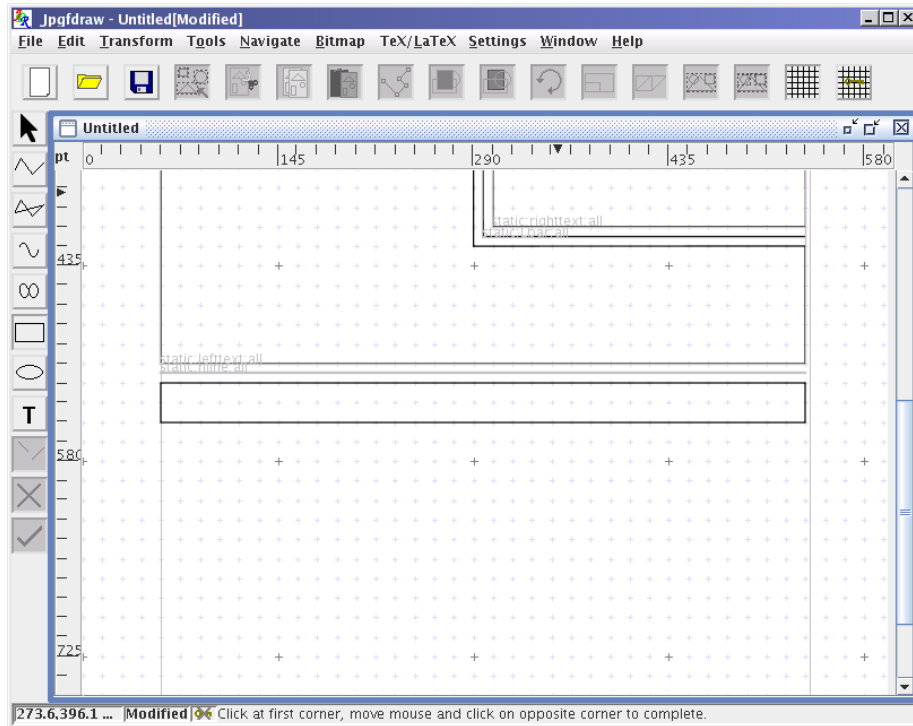


Figure 11.82: Newspaper Example — Added Lower Header

19. Switch to the [select tool](#), select this rectangle, and assign the flowframe data as shown in [Figure 11.83](#).
20. At the bottom of the page, I want to have two columns, with the text flowing from the left hand column into the right hand column. This means that these frames need to be flow frames. Select the [rectangle tool](#), and construct two rectangles with opposing corners at:
- (58pt, 565.5pt) and (290pt, 783pt)
  - (304.5pt, 565.5pt) and (536.5pt, 783pt)
- as shown in [Figure 11.84](#).
21. Switch to the [select tool](#), select the left lower rectangle and assign the flowframe data shown in [Figure 11.85](#). Similarly for the right hand lower rectangle.
22. I also want to have an image in the lower left hand frame. This is going to be slightly more complicated as flow frames can not be assigned a shape like the static and dynamic frames. The image I'm going to use is called `sheep.png` and is provided with the `flowfram` package, but it is also available in the `examples`

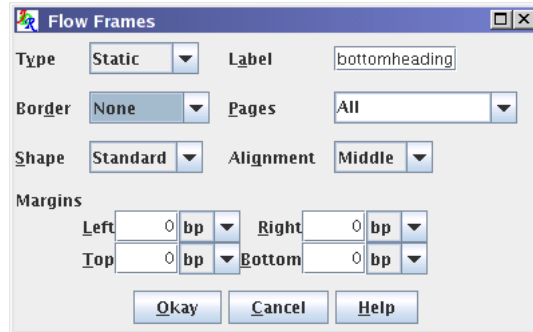


Figure 11.83: Newspaper Example — Assigning Flowframe Data to Lower Header

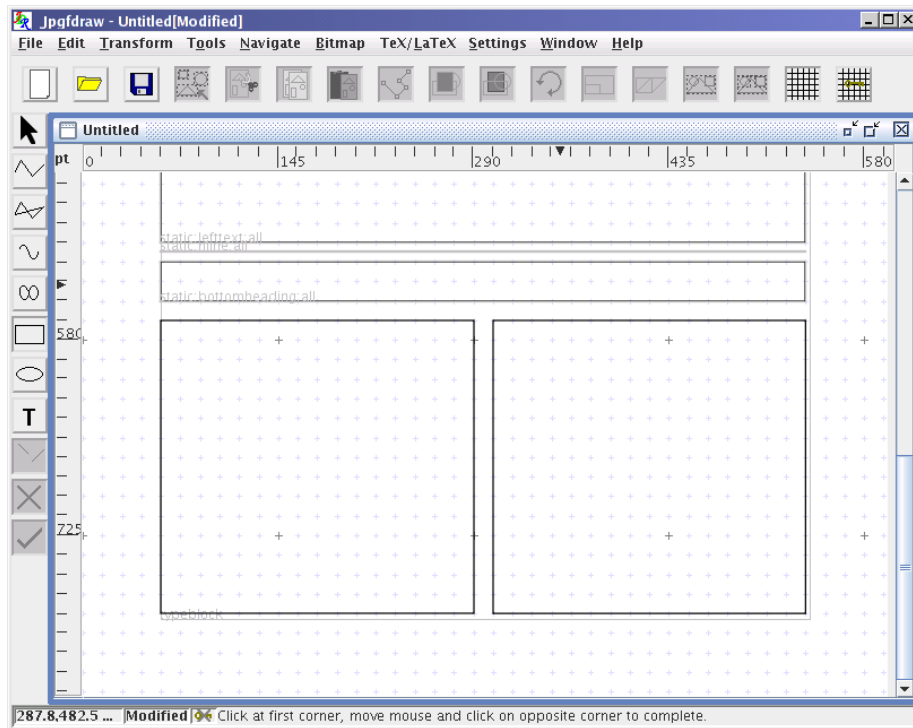


Figure 11.84: Newspaper Example — Added Lower Left and Right Rectangles

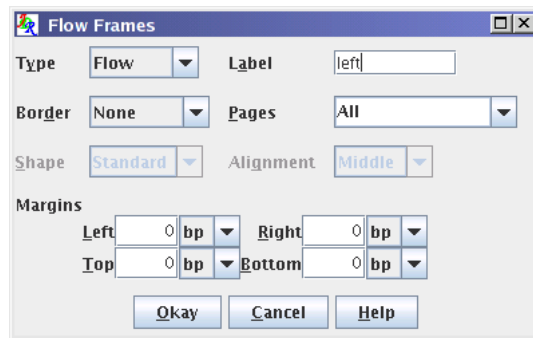


Figure 11.85: Newspaper Example — Assigning Flowframe Data to Lower Left Rectangle

- subdirectory of Jpgfdraw's installation directory. Use `Bitmap → Insert Bitmap...` to insert this image, and then either drag it with the mouse or use the `Edit → Move By...` dialog box to move it by (50pt, 556pt) to the location shown in [Figure 11.86](#).
23. Assign this bitmap the flowframe data shown in [Figure 11.87](#).
  24. As it stands, any text in the left flow frame will overlap the sheep image, so I'm going to construct a new polygon to go around the sheep image. This polygon will not form a frame, but will be used to construct the parameters of the `\parshape` command, which can then be input at the start of the flow frame. To do this, select the [closed line tool](#), and construct a polygon with vertices at: (116pt, 565.5pt), (116pt, 580pt), (101.5pt, 580pt), (101.5pt, 609pt), (58pt, 609pt), (58pt, 783pt), (290pt, 783pt) and (290pt, 565.5pt) as shown in [Figure 11.88](#).
  25. Select this polygon, and select the `TeX/LaTeX → Parshape...` menu item. This will open the dialog box shown in [Figure 11.89\(a\)](#). Select the `Use Path` option and click `Okay`. Save to a file named `sheepcutout.tex` ([Figure 11.89\(b\)](#)).
  26. Save the image as `newspaper.jdr` and then select the `File → Export...` menu item. Select the `flowframe (*.sty)` filter, and save as `newspaper.sty`.
  27. Use your favourite text editor to create a file called `news.tex` that looks like:

```
\documentclass[12pt]{article}

\usepackage{newspaper}

% suppress section numbering
\setcounter{secnumdepth}{0}

% set the paragraph indentation for static
% and dynamic frames
\setlength{\sdfparindent}{\parindent}
```



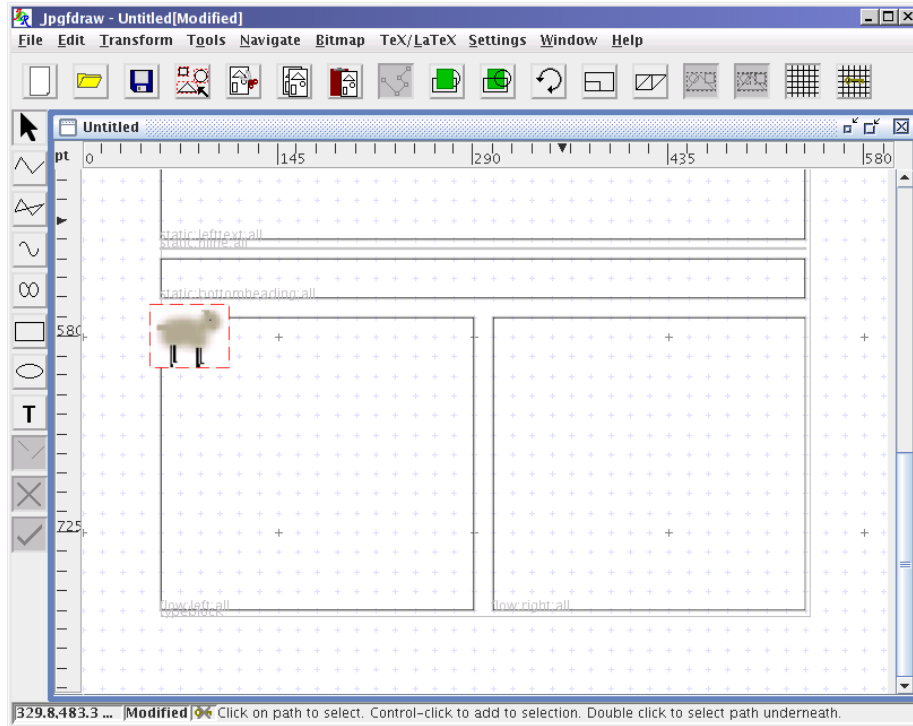


Figure 11.86: Newspaper Example — Added Sheep Bitmap

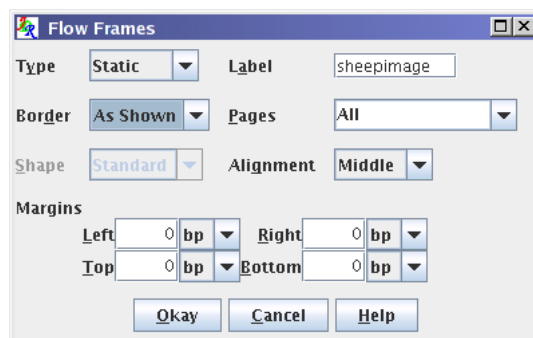


Figure 11.87: Newspaper Example — Assigning Flowframe Data to Sheep Bitmap

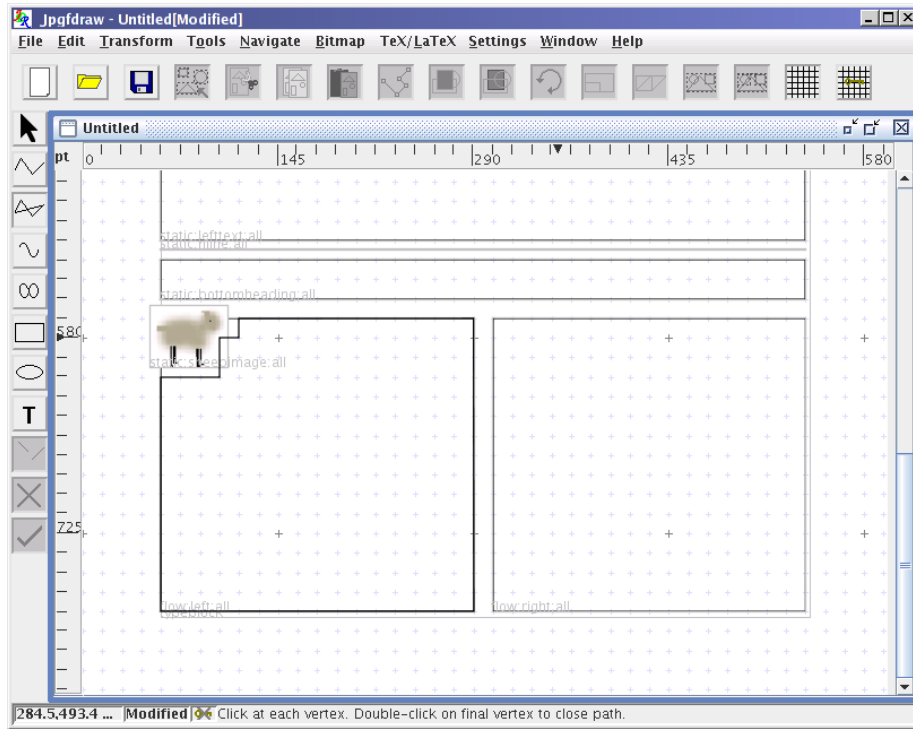


Figure 11.88: Newspaper Example — Added Polygon Defining Text Region

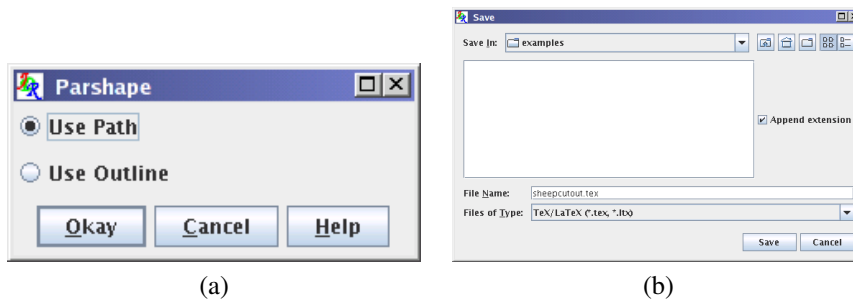


Figure 11.89: Newspaper Example — computing `\parshape` parameters: (a) select “Use Path” option; (b) export dialog.

```

\begin{document}
\begin{staticcontents*}{title}
\begin{center}
\bfseries\Huge
Fairy Tale Times
\end{center}
\hfill Issue 2. 7 December 2005.
\end{staticcontents*}

\begin{staticcontents*}{leftheadings}
\section{Killer Wolf on the Loose}
\end{staticcontents*}

\begin{staticcontents*}{lefttext}
The authorites are warning of a killer wolf on the
% lots of text omitted
\end{staticcontents*}

\begin{staticcontents*}{righthedings}
\section{Tragic Wall Accident}
\end{staticcontents*}

\begin{staticcontents*}{righttext}
An egg person tragically fell from a six foot wall
% lots of text omitted
\end{staticcontents*}

\begin{staticcontents*}{bottomhedings}
\section{Relief as Missing Sheep Finally Return Home}
\end{staticcontents*}

% set the paragraph shape
\input{sheepcutout}
% suppress paragraph indentation
\noindent
There was much celebration yesterday morning when
% lots of text omitted
\end{document}

```

This file is also available in the `examples` subdirectory of Jpgfdraw's installation directory.

28. The included images are PNG files, which means that if you are not using PDF $\LaTeX$  you will have to convert them to Encapsulated Postscript (EPS) to use  $\LaTeX$  and `dvips`. Run `news.tex` through  $\LaTeX$ , e.g.

```
pdflatex news
```

The resulting document is shown in [Figure 11.90](#).

Things to note:

## Fairy Tale Times

Issue 2. 7 December 2005.

### Killer Wolf on the Loose

The authorities are warning of a killer wolf on the loose. He has so far devoured an old grandmother and two pig brothers. He is described as being furry with big eyes and big teeth.

On Monday this week he broke into a house, and devoured an old lady. He then disguised himself as the old lady in order to deceive her granddaughter. Luckily for the little girl a woodsman arrived in time to rescue her. Parents are being cautioned not to let their children wander about on their own, and to remind them not to talk to strangers.

The next day the wolf struck again, this time targeting two pig brothers who had most incautiously made their dwellings on the cheap using inadequate materials. The wolf also made an attempt on the third pig brother, but was unable to break into his house.

Police are appealing to the public for witnesses, and remind people to keep their doors securely fastened at all times.

“Always ask to see identification,” said one police advisor, “and invest in improving the general security of your property.”

### Tragic Wall Accident

An egg person tragically fell from a six foot wall yesterday afternoon and was smashed to pieces. The king’s cavalry rushed to the scene, but regretted that they were unable to help him.



Humpty Dumpty was believed to be sitting on the wall when he fell. Police have ruled out foul play, but are advising people not to play on high walls, particularly those vulnerable members of the population suffering from eggshell syndrome.

*Exclusive interview with one of the King’s men on page 6*

### Relief as Missing Sheep Finally Return Home



There was much celebration yesterday morning when Little Bo Peep’s sheep finally returned home. They had been missing for more than a week.

“I just didn’t know where to find them,” the shepherdess stated, “but I was told to leave them alone and they’d come home.”

Unusual advice perhaps, but it seems to have worked as they did indeed come home. Eye witnesses reported that their tails were wagging behind them. “I’m just so happy they’ve come home,” Little Bo Peep said in a press conference yesterday afternoon. The sheep themselves made no comment, and police are still trying to determine what hap-

pened to them. The big bad wolf is reportedly helping them with their inquiries.

This is a sample document illustrating the flowfram package. It uses TeX’s `\parshape` command to create irregularly shaped paragraphs. This can be a complicated and somewhat tiresome task, but is made easier using JpgfDraw. The paragraph breaks in the static frames are actually simulated breaks to ensure the `\parshape` stays in effect until the end of the frame. This is done behind the scenes by the flowfram package, but is something that you need to be aware of in case it causes a problem with other commands.

Figure 11.90: Newspaper Example — Final Document

- Jpgfdraw uses `bp` units as its internal unit, and rounding errors may occur when converting from `pt` to `bp`. This may result in warnings from the `flowfram` package about moving to a flow frame of unequal width. For example, the two flow frames defined in this example may end up being saved in the style file as:

```
\newflowframe[all]{232.571716bp}{217.523743bp}
{-0.599379bp}{3.620695bp}[left]
\newflowframe[all]{231.735718bp}{217.523743bp}
{245.184339bp}{3.620695bp}[right]
```

The difference between the two frames is less than `1bp`, but from the point of view of the `flowfram` package, the second frame is wider than the first, and so warrants a warning. You may therefore want to edit these two lines to ensure that the two frames have identical widths.

- You may have noticed that I had the page list for all my frames set to All. Naturally if you want more pages in your document, you will need to change this. However on your final page you will need to specify an open ended range. For example, if you have a 4 page document, then at least one flow frame defined on page 4 should have a page list like `>3`. This is because the `flowfram` package looks ahead for the next flow frame before it ships out the page. If there are no more flow frames defined, it will automatically create a new flow frame, and you will end up with an unwanted page.
- If you use Jpgfdraw to create `\parshape'd` paragraphs for your document, you must make sure that the normal font size setting in Jpgfdraw's TeX/LaTeX Settings dialog box is the same as that used by your document, otherwise it will affect the shape of the paragraph (see Figure 11.91). Likewise, if your paragraph contains larger or smaller than normal lines this will also adversely affect the paragraph shape, and you will need to adjust the shape of the `path` accordingly.

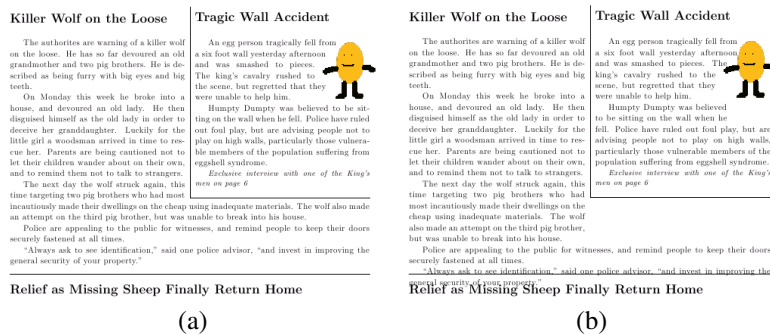


Figure 11.91: The normal font size setting affects paragraph shapes: (a) both the  $\text{\LaTeX}$  document and Jpgfdraw have been set to use a normal size font of 12pt — the paragraph follows the correct shape; (b) the  $\text{\LaTeX}$  document used 12pt as the normal font size, but Jpgfdraw had the normal font size set to 10pt — the paragraph has too many narrow lines and spills over the bottom of the frame.

# A JDR Binary Format

Jpgfdraw's native **JDR** file format is a binary format written in the big-endian fashion. Since all **Java™** binary data files are platform independent, there should be no problems transferring the files between processors<sup>1</sup>. Integers are stored as 32-bit integers, single precision numbers are stored as 32-bit floats, double precision numbers are stored as 64-bit doubles and characters are stored as 16-bit Unicode characters. (For more details see [2, Chapter 12] or <http://java.sun.com/j2se/1.5.0/docs/api/java/io/DataInput.html>)

The current JDR file format version is 1.5.

If you use the `uk.ac.uea.comp.nlct.jdr` package, you can load and save a **JDR** file using the `JDR.load()` and `JDR.save()` methods, otherwise the **JDR** file format is as follows:

1. To read a data stream in **Java™** (where `filename` is a string containing the file name):

```
DataInputStream din =
    new DataInputStream(new FileInputStream(filename));
```

or to write a data stream:

```
DataOutputStream dout =
    new DataOutputStream(new FileOutputStream(filename));
```

2. At the start of the file, there must be the three characters `JDR` stored as 16-bit Unicode characters. To write:

```
dout.writeChars("JDR");
```

To read:

```
char[] str = new char[3];
for (int i = 0; i < 3; i++) str[i] = din.readChar();
if (!(new String(str)).equals("JDR"))
{
    // not a JDR file error code
}
```

3. The **JDR** file format version comes next. This may be 1.0, 1.1, 1.2, 1.3, 1.4 or 1.5. The file version number is stored as a string not a number. First the length of the string (`fileVersion`) is stored, then follows the string itself. To write:

```
dout.writeInt(fileVersion.length())
dout.writeChars(fileVersion)
```

To read:

---

<sup>1</sup>although some fonts may not be available, and links to bitmaps may be unresolved

```
int n = din.readInt();
char[] version = new char[n];
for (int i = 0; i < n; i++) version[i] = din.readChar();
```

4. Next is a value indicating whether or not the Jpgfdraw [settings](#) are stored.

JDR1.3 onwards

In version 1.3 onwards, this value is a byte, and may take one of three values: 0 (no settings), 1 (all settings) or 2 (paper size only). To omit the settings information:

```
dout.writeByte((byte)0);
```

To save all the settings:

```
dout.writeByte((byte)1);
// code to save the settings (see below)
```

To save only the paper size:

```
dout.writeByte((byte)2);
// code to save the paper size (see below)
```

To read:

```
switch (din.readByte())
{
    case 0:
        // do nothing
        break;
    case 1:
        // read settings (see below)
        break;
    case 2:
        // read paper size (see below)
        break;
    default
        // throw exception
}
```

JDR1.3 onwards

JDR1.0–1.2

In versions prior to 1.3, this value is a boolean value. To save the settings:

```
dout.writeBoolean(true);
// code to save the settings (see below)
```

To omit the settings information:

```
dout.writeBoolean(false);
```

To read:

```
if (din.readBoolean())
{
    // read settings (see below)
}
```

JDR1.0-1.2

5. The settings information is stored as follows:

- (a) A boolean variable (`grid`) indicating whether or not to display the grid.

To write:

```
dout.writeBoolean(grid);
```

To read:

```
boolean grid = din.readBoolean();
```

- (b) A boolean variable (`gridLock`) indicating whether or not to lock the grid.

To write:

```
dout.writeBoolean(gridLock);
```

To read:

```
boolean gridLock = din.readBoolean();
```

- (c) A boolean variable (`showRulers`) indicating whether or not to show the rulers. To write:

```
dout.writeBoolean(showRulers);
```

To read:

```
boolean showRulers = din.readBoolean();
```

- (d) A 32-bit integer indicating which tool to select. This must be an integer between 0 and 7 (inclusive). Table A.1 indicates the integer ID for each tool. To write (where `tool` is an integer):

```
dout.writeInt(tool);
```

To read:

```
int tool = din.readInt();
if (tool < 0 || tool > 7)
{
    // insert invalid tool id error
}
```

- (e) A 32-bit integer indicating the normal font size. (This is used as the default in the font settings dialog box, and as the normal size font for the L<sup>A</sup>T<sub>E</sub>X font size conversions.) To write:

```
dout.writeInt(normalSize);
```

To read:



Table A.1: Tool Identifiers

ID	Tool
0	Select
1	Open Line Path
2	Closed Line Path
3	Open Curve Path
4	Closed Curve Path
5	Rectangle
6	Ellipse
7	Text

```
int normalSize = din.readInt();
```

(f) The paper size (see [below](#)).

(g) An 8-bit byte representing the unit used for the rulers and grid. This should be one of: 0 ([TeX pt](#)), 1 (inches), 2 (centimetres) or 3 ([PostScript points](#)). To write:

```
dout.writeByte(unitType);
```

To read:

```
byte unitType = din.readByte();
```

(h) Two 32-bit integers representing the major grid divisions and the subdivisions, respectively. To write:

```
dout.writeInt(majorDivisions);
dout.writeInt(subdivisions);
```

To read:

```
int majorDivisions = din.readInt();
int subdivisions = din.readInt();
```

6. The paper size is specified as an 8-bit byte. For versions before 1.3, this must be an integer in the range 0 to 18 (inclusive), otherwise it must be in the range 0 to 72 (inclusive). [Table A.2](#) indicates the integer ID for each paper size, and [Table A.3](#) shows additional values for version 1.3. If the paper size has an ID of 18 (user defined), then there must follow the paper width (64-bit double in points), height (64-bit double in points). For versions prior to 1.3, the user defined setting must also be followed by a boolean variable to indicate whether or not the orientation is portrait (`true`) or landscape (`false`).

JDR1.0–1.2
------------

To write:

```
dout.writeByte(paperSize);
if (paperSize == 18) // user defined paper size
{
    dout.writeDouble(paperWidth);
    dout.writeDouble(paperHeight);
}
```

```

        dout.writeBoolean(isPortrait);
    }

```

To read:

```

byte paperSize = din.readByte();
if (paperSize < 0 || paperSize > 18)
{
    // insert invalid paper size id code
}
else if (paperSize == 18) // user defined paper size
{
    double paperWidth  = din.readDouble();
    double paperHeight = din.readDouble();
    boolean isPortrait = din.readBoolean();
}

```

JDR1.0–1.2

JDR1.3 onwards

To write:

```

dout.writeByte(paperSize);
if (paperSize == 18) // user defined paper size
{
    dout.writeDouble(paperWidth);
    dout.writeDouble(paperHeight);
}

```

To read:

```

byte paperSize = din.readByte();
if (paperSize < 0 || paperSize > 72)
{
    // insert invalid paper size id code
}
else if (paperSize == 18) // user defined paper size
{
    double paperWidth  = din.readDouble();
    double paperHeight = din.readDouble();
}

```

JDR1.3 onwards

- The **objects** that constitute the picture are now stored. When saving to a file, an outer grouping is implied that is not evident whilst using Jpgfdraw. This means that there should always be a single group structure saved to file which contains all the **objects** that constitute the picture. Each **object** is then recursively stored. For example, if a picture contains a **path**, a **group** and a **text area**, in the **JDR** file these three objects will be stored as a single group structure containing the three objects. If in Jpgfdraw you explicitly **group** all the objects, then in the **JDR**

Table A.2: Paper Size Identifiers

<b>ID</b>	<b>Paper Size</b>	<b>ID</b>	<b>Paper Size</b>
0	A0 (portrait)	9	A0 (landscape)
1	A1 (portrait)	10	A1 (landscape)
2	A2 (portrait)	11	A2 (landscape)
3	A3 (portrait)	12	A3 (landscape)
4	A4 (portrait)	13	A4 (landscape)
5	A5 (portrait)	14	A5 (landscape)
6	letter (portrait)	15	letter (landscape)
7	legal (portrait)	16	legal (landscape)
8	executive (portrait)	17	executive (landscape)
18	user defined		

Table A.3: Additional Paper Size Identifiers (JDR v1.3 onwards)

<b>ID</b>	<b>Paper Size</b>	<b>ID</b>	<b>Paper Size</b>
19	A6 (portrait)	46	A6 (landscape)
20	A7 (portrait)	47	A7 (landscape)
21	A8 (portrait)	48	A8 (landscape)
22	A9 (portrait)	49	A9 (landscape)
23	A10 (portrait)	50	A10 (landscape)
24	B0 (portrait)	51	B0 (landscape)
25	B1 (portrait)	52	B1 (landscape)
26	B2 (portrait)	53	B2 (landscape)
27	B3 (portrait)	54	B3 (landscape)
28	B4 (portrait)	55	B4 (landscape)
29	B5 (portrait)	56	B5 (landscape)
30	B6 (portrait)	57	B6 (landscape)
31	B7 (portrait)	58	B7 (landscape)
32	B8 (portrait)	59	B8 (landscape)
33	B9 (portrait)	60	B9 (landscape)
34	B10 (portrait)	61	B10 (landscape)
35	C0 (portrait)	62	C0 (landscape)
36	C1 (portrait)	63	C1 (landscape)
37	C2 (portrait)	64	C2 (landscape)
38	C3 (portrait)	65	C3 (landscape)
39	C4 (portrait)	66	C4 (landscape)
40	C5 (portrait)	67	C5 (landscape)
41	C6 (portrait)	68	C6 (landscape)
42	C7 (portrait)	69	C7 (landscape)
43	C8 (portrait)	70	C8 (landscape)
44	C9 (portrait)	71	C9 (landscape)
45	C10 (portrait)	72	C10 (landscape)

file, the outermost implicit group will contain only one [object](#) which will be this [group](#).

Each [object](#) has the following format:

JDR1.0 & 1.1	
$\langle id-char \rangle \langle object-specs \rangle \langle fflag \rangle [ \langle flowframe-specs \rangle ]$	
	JDR1.0 & 1.1
JDR1.2 onwards	
$\langle id-char \rangle \langle object-specs \rangle \langle fflag \rangle [ \langle flowframe-specs \rangle ] \langle description-specs \rangle$	
	JDR1.2 onwards

where  $\langle id-char \rangle$  is a character determining the object type: G — [group](#), P — [path](#), T — [text area](#), I — [bitmap](#). JDR version 1.5 includes the new [text-path](#) object type that is identified by X.

The object specifications  $\langle object-specs \rangle$  vary according to the object type and are described below.  $\langle fflag \rangle$  is a boolean variable indicating whether or not this object has flowframe data associated with it. If true, then the flowframe specifications  $\langle flowframe-specs \rangle$  should follow ([see below](#)), otherwise  $\langle flowframe-specs \rangle$  should be omitted. Note that JDR version 1.2 and above contains  $\langle description-specs \rangle$ , which was omitted in earlier versions. To write:

```

if (/* test to see if object is a group */)
{
    dout.writeChar('G');
    // save group specification (see below)
}
else if (/* test to see if object is a path */)
{
    dout.writeChar('P');
    // save path specification (see below)
}
else if (/* test to see if object is a text area */)
{
    dout.writeChar('T');
    // save text area specification (see below)
}
else if (/* test to see if object is a bitmap */)
{
    dout.writeChar('I');
    // save bitmap specification (see below)
}
else if (/* test if object is text-path and version > 1.4 */)
{
    dout.writeChar('X');
    // save text-path specification (see below)
}

```

```

// boolean fflag indicates object has flow frame data
dout.writeBoolean(fflag);
if (fflag)
{
    // save flow frame data (see below)
}

// if version 1.2 or above save description (see below)

```

To read:

```

char c = din.readChar();
if (c == 'G')
{
    // read group data (see below)
}
else if (c == 'P')
{
    // read path data (see below)
}
else if (c == 'T')
{
    // read text area data (see below)
}
else if (c == 'I')
{
    // read bitmap data (see below)
}
else if (c == 'X')
{
    // read text-path data (see below)
}
else
{
    // insert invalid object id code
}

if (din.readBoolean())
{
    // read flow frame data (see below)
}

// if version 1.2 or above read description (see below)

```

(a) Group data, G, is stored as follows:

$\langle n \rangle \langle \text{object data} \rangle +$

where  $\langle n \rangle$  is an integer indicating the number of **objects** within the **group**, there should then follow  $\langle n \rangle$  lots of  $\langle \text{object data} \rangle$ , where  $\langle \text{object data} \rangle$  is the

data for each **object** within the group, where the object data is as [described above](#). To write:

```
// int n is the number of objects in the group
dout.writeInt(n);
for (int i = 0; i < n; i++)
{
    // save the ith object in the group (see above)
}
```

To read:

```
int n = din.readInt();
for (int i = 0; i < n; i++)
{
    // read in the ith object in the group (see above)
}
```

(b) Path data, P, is stored as follows:

JDR1.0–1.2 $\langle \text{line colour} \rangle \langle \text{fill colour} \rangle \langle \text{line style} \rangle \text{O C} \langle n \rangle \langle \text{segment data} \rangle +$	JDR1.0–1.2
JDR1.3 onwards $\langle \text{line colour} \rangle \langle \text{fill colour} \rangle \langle \text{line style} \rangle \text{O C} \langle n \rangle \langle \text{start point} \rangle \langle \text{segment data} \rangle +$	JDR1.3 onwards

where  $\langle \text{line colour} \rangle$  and  $\langle \text{fill colour} \rangle$  contain the line and fill colour data ([see below](#)),  $\langle \text{line style} \rangle$  is the line style data ([see below](#)). The character O or C indicates whether the path is open or closed,  $\langle n \rangle$  is an integer indicating the number of segments that constitute the path. This should be followed by  $\langle n \rangle$  lots of  $\langle \text{segment data} \rangle$  ([described below](#)). Version 1.3 has removed the redundancy present in earlier versions.

JDR1.0–1.2 To write: <pre>// save line colour data (see below) // save fill colour data (see below) // save line style data (see below) // boolean closed indicates whether or not the path // is closed dout.writeChar(closed ? 'C' : 'O'); // int n is the number of segments in the path dout.writeInt(n); for (int i = 0; i &lt; n; i++) {     // save data for segment i (see below) }</pre>
---

To read:

```

// read line colour data (see below)
// read fill colour data (see below)
// read line style data (see below)
char c = din.readChar();
if (c == 'O')
{
    // make it an open path
}
else if (c == 'C')
{
    // make it a closed path
}
else
{
    // insert invalid identifier code
}
int n = din.readInt();
for (int i = 0; i < n; i++)
{
    // read data for segment i (see below)
}

```

JDR1.0–1.2
------------

JDR1.3 onwards
----------------

JDR v1.3 onwards requires that the starting point *⟨start point⟩* follows the number of segments (*⟨n⟩*). The starting point is stored as two double precision numbers. To write:

```

// save line colour data (see below)
// save fill colour data (see below)
// save line style data (see below)
// boolean closed indicates whether or not the path
// is closed
dout.writeChar(closed ? 'C' : 'O');
// int n is the number of segments in the path
dout.writeInt(n);
// double x, y is the starting position of the path
dout.writeDouble(x);
dout.writeDouble(y);
for (int i = 0; i < n; i++)
{
    // save data for segment i (see below)
}

```

To read:

```

// read line colour data (see below)
// read fill colour data (see below)
// read line style data (see below)
char c = din.readChar();
if (c == 'O')

```

```

{
    // make it an open path
}
else if (c == 'C')
{
    // make it a closed path
}
else
{
    // insert invalid identifier code
}
int n = din.readInt();
double x = din.readDouble();
double y = din.readDouble();
for (int i = 0; i < n; i++)
{
    // read data for segment i (see below)
}

```

JDR1.3 onwards

- i. Colour data is stored as follows:  $\langle col-id \rangle [\langle colour-specs \rangle]$ , where  $\langle col-id \rangle$  is a character representing the colour type. Available types are listed in Table A.4. Note that if  $\langle col-id \rangle$  is T (transparent)  $\langle colour-specs \rangle$  is omitted.

Table A.4: Available Colour Types

Type	ID	Version
Transparent	T	1.0 onwards
RGB	R	1.0 onwards
CMYK	C	1.0 onwards
Linear Gradient	G	1.0 onwards
Radial Gradient	D	1.3 onwards
Grey	Y	1.4 onwards
HSB	S	1.4 onwards

To write

```

if (/* test if transparent */)
{
    dout.writeChar('T');
}
else if (/* test if single RGB colour */)
{
    dout.writeChar('R');
    // save single RGB colour data (see below)
}
else if (/* test if single CMYK colour */)
{
    dout.writeChar('C');
    // save single CMYK colour data (see below)
}

```



```

}
else if (/* test if linear gradient colour */)
{
    dout.writeChar('G');
    // save linear gradient colour data (see below)
}
else if (/* test if radial and JDR version >= 1.3 */)
{
    dout.writeChar('D');
    // save radial gradient colour data (see below)
}
else if (/* test if HSB colour and JDR version >= 1.4 */)
{
    dout.writeChar('S');
    // save HSB colour data (see below)
}
else if (/* test if grey and JDR version >= 1.4 */)
{
    dout.writeChar('Y');
    // save grey data (see below)
}

```

**To read:**

```

char c = din.readChar();
if (c == 'T')
{
    // set to transparent
}
else if (c == 'R')
{
    // read single RGB colour data (see below)
}
else if (c == 'C')
{
    // read single CMKY colour data (see below)
}
else if (c == 'G')
{
    // read linear gradient colour data (see below)
}
else if (c == 'D' /* and JDR version >= 1.3 */)
{
    // read radial gradient colour data (see below)
}
else if (c == 'S' /* and JDR version >= 1.4 */)
{
    // read HSB colour data (see below)
}
else if (c == 'Y' /* and JDR version >= 1.4 */)
{

```

```

    // read grey data (see below)
}
else
{
    // insert invalid colour identifier code
}

```

A. Single RGB colour data is specified as:

$\langle R \rangle \langle G \rangle \langle B \rangle \langle A \rangle$

where each element is a 32-bit single precision floating point number between 0 and 1 (inclusive), and  $\langle R \rangle$  represents the red value,  $\langle G \rangle$  represents the green value,  $\langle B \rangle$  represents the blue value, and  $\langle A \rangle$  represents the alpha (transparency) value. To write:

```

dout.writeFloat(red);
dout.writeFloat(green);
dout.writeFloat(blue);
dout.writeFloat(alpha);

```

To read:

```

float red    = din.readFloat();
// check lies in range [0,1]
float green  = din.readFloat();
// check lies in range [0,1]
float blue   = din.readFloat();
// check lies in range [0,1]
float alpha  = din.readFloat();
// check lies in range [0,1]

```

B. Single CMYK colour data is specified as:

$\langle C \rangle \langle M \rangle \langle Y \rangle \langle K \rangle \langle A \rangle$

where each element is a 32-bit floating point value between 0 and 1 (inclusive), and  $\langle C \rangle$  represents the cyan value,  $\langle M \rangle$  represents the magenta value,  $\langle Y \rangle$  represents the yellow value,  $\langle K \rangle$  represents the black value, and  $\langle A \rangle$  represents the alpha (transparency) value. To write:

```

dout.writeFloat(cyan);
dout.writeFloat(magenta);
dout.writeFloat(yellow);
dout.writeFloat(black);
dout.writeFloat(alpha);

```

To read:

```

float cyan   = din.readFloat();
// check lies in range [0,1]
float magenta = din.readFloat();
// check lies in range [0,1]
float yellow  = din.readFloat();
// check lies in range [0,1]
float black   = din.readFloat();

```

```
// check lies in range [0,1]
float alpha = din.readFloat();
// check lies in range [0,1]
```

C. As from version 1.4, HSB colour data is specified as:

$\langle H \rangle \langle S \rangle \langle B \rangle \langle A \rangle$

where each element is a 32-bit single precision floating point number and all except  $\langle H \rangle$  lie in the range 0–1 (inclusive).  $\langle H \rangle$  represents the hue value in the range  $[0, 360)$ ,  $\langle S \rangle$  represents the saturation value,  $\langle B \rangle$  represents the brightness value, and  $\langle A \rangle$  represents the alpha (transparency) value. To write:

```
dout.writeFloat(hue);
dout.writeFloat(saturation);
dout.writeFloat(brightness);
dout.writeFloat(alpha);
```

To read:

```
float hue = din.readFloat();
// check lies in range [0,360)
float saturation = din.readFloat();
// check lies in range [0,1]
float brightness = din.readFloat();
// check lies in range [0,1]
float alpha = din.readFloat();
// check lies in range [0,1]
```

D. As from version 1.4, grey data is specified as:

$\langle G \rangle \langle A \rangle$

where each element is a 32-bit single precision floating point number between 0 and 1 (inclusive), and  $\langle G \rangle$  represents the grey value, and  $\langle A \rangle$  represents the alpha (transparency) value. To write:

```
dout.writeFloat(grey);
dout.writeFloat(alpha);
```

To read:

```
float grey = din.readFloat();
// check lies in range [0,1]
float alpha = din.readFloat();
// check lies in range [0,1]
```

E. Linear gradient colour data is specified as:

$\langle start-col-id \rangle \langle start-col-specs \rangle \langle end-col-id \rangle \langle end-col-specs \rangle \langle direction \rangle$

where  $\langle start-col-id \rangle$  is the colour identifier for the starting colour and  $\langle start-col-specs \rangle$  is the colour specification, and  $\langle end-col-id \rangle$  is the colour identifier for the end colour and  $\langle end-col-specs \rangle$  is the colour specification. The colour identifiers may be any of those listed in [Table A.4](#) except the linear or radial gradient types. The colour specifications are as described above. The gradient direction,  $\langle direction \rangle$ , is a 32-bit integer and may only take one of the

following values: 0 (North), 1 (North East), 2 (East), 3 (South East), 4 (South), 5 (South West), 6 (West) and 7 (North West). To write:

```
if (/* start colour RGB */)
{
    dout.writeChar('R');
    // save RGB single colour data (see above)
}
else if (/* start colour CMYK */)
{
    dout.writeChar('C');
    // save CMYK single colour data (see above)
}
else if (/* start colour HSB and version >= 1.4 */)
{
    dout.writeChar('S');
    // save HSB single colour data (see above)
}
else if (/* start colour grey and version >= 1.4 */)
{
    dout.writeChar('Y');
    // save HSB single grey data (see above)
}
else
{
    // insert invalid colour type code
}

if (/* end colour RGB */)
{
    dout.writeChar('R');
    // save RGB single colour data (see above)
}
else if (/* end colour CMYK */)
{
    dout.writeChar('C');
    // save CMYK single colour data (see above)
}
else if (/* end colour HSB and version >= 1.4 */)
{
    dout.writeChar('S');
    // save HSB single colour data (see above)
}
else if (/* end colour grey and version >= 1.4 */)
{
    dout.writeChar('Y');
    // save HSB single grey data (see above)
}
else
```

```
{
    // insert invalid colour type code
}

dout.writeInt(direction);
To read:
char c = din.readChar();

if (c == 'R')
{
    // read RGB single colour data (see above)
}
else if (c == 'C')
{
    // read CMYK single colour data (see above)
}
else if (c == 'S')
{
    // read HSB single colour data (see above)
}
else if (c == 'Y')
{
    // read grey data (see above)
}
else
{
    // insert invalid start colour identifier code
}

c = din.readChar();

if (c == 'R')
{
    // read RGB single colour data (see above)
}
else if (c == 'C')
{
    // read CMYK single colour data (see above)
}
else if (c == 'S')
{
    // read HSB single colour data (see above)
}
else if (c == 'Y')
{
    // read grey data (see above)
}
else
{
```

```

    // insert invalid end colour identifier code
}

```

```

int direction = din.readInt();
// check direction is in range [0,7]

```

- F. Radial gradient colour data is not available for versions prior to JDR v1.3. The radial colour data is specified as:

$\langle start-col-id \rangle \langle start-col-specs \rangle \langle end-col-id \rangle \langle end-col-specs \rangle \langle start location \rangle$

where  $\langle start-col-id \rangle$  is the colour identifier for the starting colour and  $\langle start-col-specs \rangle$  is the colour specification, and  $\langle end-col-id \rangle$  is the colour identifier for the end colour and  $\langle end-col-specs \rangle$  is the colour specification. The colour identifiers may be any of those listed in [Table A.4](#) except the linear or radial gradient types. The colour specifications are as described above. The starting location,  $\langle start location \rangle$ , is a 32-bit integer and may only take one of the following values: 0 (North), 1 (North East), 2 (East), 3 (South East), 4 (South), 5 (South West), 6 (West), 7 (North West) and 8 (Centre). To write:

```

if (/* start colour RGB */)
{
    dout.writeChar('R');
    // save RGB single colour data (see above)
}
else if (/* start colour CMYK */)
{
    dout.writeChar('C');
    // save CMYK single colour data (see above)
}
else if (/* start colour HSB and version >= 1.4 */)
{
    dout.writeChar('S');
    // save HSB single colour data (see above)
}
else if (/* start colour grey and version >= 1.4 */)
{
    dout.writeChar('Y');
    // save HSB single grey data (see above)
}
else
{
    // insert invalid colour type code
}

if (/* end colour RGB */)
{
    dout.writeChar('R');
    // save RGB single colour data (see above)
}

```

```

}
else if (/* end colour CMYK */)
{
    dout.writeChar('C');
    // save CMYK single colour data (see above)
}
else if (/* end colour HSB and version >= 1.4 */)
{
    dout.writeChar('S');
    // save HSB single colour data (see above)
}
else if (/* end colour grey and version >= 1.4 */)
{
    dout.writeChar('Y');
    // save HSB single grey data (see above)
}
else
{
    // insert invalid colour type code
}

dout.writeInt(startLocation);
To read:
char c = din.readChar();

if (c == 'R')
{
    // read RGB single colour data (see above)
}
else if (c == 'C')
{
    // read CMYK single colour data (see above)
}
else if (c == 'S')
{
    // read HSB single colour data (see above)
}
else if (c == 'Y')
{
    // read grey data (see above)
}
else
{
    // insert invalid start colour identifier code
}

c = din.readChar();

if (c == 'R')

```

```

{
    // read RGB single colour data (see above)
}
else if (c == 'C')
{
    // read CMYK single colour data (see above)
}
else if (c == 'S')
{
    // read HSB single colour data (see above)
}
else if (c == 'Y')
{
    // read grey data (see above)
}
else
{
    // insert invalid end colour identifier code
}

int startLocation = din.readInt();
// check startLocation is in range [0,8]

```

- ii. The line style data has changed from file version 1.0 to 1.1 to take into account the inclusion of mid point markers, and is stored as follows:

JDR1.0 $\langle linewidth \rangle \langle dash \rangle \langle cap \rangle \langle join \rangle [ \langle mitre-limit \rangle ] \langle winding \rangle \langle start\ arrow \rangle \langle end\ arrow \rangle$	JDR1.0
JDR1.1 and above $\langle linewidth \rangle \langle dash \rangle \langle cap \rangle \langle join \rangle [ \langle mitre-limit \rangle ] \langle winding \rangle \langle start\ arrow \rangle \langle mid\ marker \rangle \langle end\ arrow \rangle$	JDR1.1 and above

where:

- A.  $\langle linewidth \rangle$  the line width (in points) stored as a 32-bit floating point number. To write:

```
dout.writeFloat(linewidth);
```

To read:

```
float linewidth = din.readFloat();
// check linewidth isn't negative
```

- B.  $\langle dash \rangle$  is the dash pattern. This is stored as:

```
 $\langle n \rangle [ \langle pattern \rangle + \langle offset \rangle ]$ 
```

where  $\langle n \rangle$  is 0 if there is no dash pattern (i.e. a solid line) or the number of patterns. There should be an even number of patterns, the odd numbered patterns represent the dash length, the even number of patterns represent the dash gap. The patterns should be stored as a 32-bit floating point number (in points). Lastly, the offset should be a 32-bit float (in points). Note that if  $\langle n \rangle$  is 0,



there should be no *<pattern>* or *<offset>*. To write:

```
dout.writeInt(n);
for (int i = 0; i < n; i++)
{
    dout.writeFloat(pattern[i]);
}
if (n > 0) dout.writeFloat(offset);
```

To read:

```
int n = din.readInt();
if (n < 0)
{
    // insert invalid pattern length code
}
else if (n > 0)
{
    float[] pattern = new float[n];
    for (int i = 0; i < n; i++)
    {
        pattern[i] = din.readFloat();
    }
    float offset = din.readFloat();
}
else
{
    // solid line
}
```

- C. *<cap>* is the cap style, this is an 8-bit byte. It may only have one of the following values: 0 (butt), 1 (round) or 2 (square). To write:

```
dout.writeByte(cap);
```

To read:

```
byte cap = din.readByte();
// check cap is in the range [0,2]
```

- D. *<join>* is the join style, this is an 8-bit byte. It may only have one of the following values: 0 (mitre), 1 (round) or 2 (bevel). To write:

```
dout.writeByte(join);
```

To read:

```
byte join = din.readByte();
// check join is in the range [0,2]
```

- E. *<mitre-limit>* is the mitre-limit, this is a 32-bit float, and should only be stored if the join style is a mitre. To write:

```
if (join == 0)
{
    dout.writeFloat(mitreLimit);
}
```

To read:

```
if (join == 0)
{
    float mitreLimit = din.readFloat();
```

```
}

```

- F.  $\langle winding \rangle$  is the winding rule, this is an 8-bit byte. It may only have one of the following values: 0 (Even-Odd) or 1 (Non Zero).

To write:

```
dout.writeByte(windingRule);
```

To read:

```
byte windingRule = din.readByte();
// check it's either 0 or 1
```

- G.  $\langle start\ arrow \rangle$  and  $\langle end\ arrow \rangle$  are the starting and ending arrow styles. The  $\langle mid\ marker \rangle$  is the style for the mid-point markers. Each marker type (start/mid/end) has the same format, but the file format varies as follows:

JDR1.0 $\langle id \rangle [ \langle size \rangle \langle is\ double \rangle \langle is\ reversed \rangle ]$
---

where  $\langle id \rangle$  is an 8-bit byte identifying the arrow type. This may be one of: 0 (none), 1 (pointed), 2 (triangle), 3 (circle), 4 (diamond), 5 (square), 6 (bar) or 7 (single).  $\langle size \rangle$  is 32-bit float representing the arrow size. (Some arrows only have a fixed size, but a size must still be present.)  $\langle is\ double \rangle$  is a boolean value indicating whether the arrow head is a double arrow ( $\langle true \rangle$ ) or a single arrow ( $\langle false \rangle$ ).  $\langle is\ reversed \rangle$  is a boolean value indicating whether the arrow head has been reversed. The values  $\langle size \rangle \langle is\ double \rangle \langle is\ reversed \rangle$  are omitted if  $\langle id \rangle$  equals 0 (no arrow head). To write:

```
dout.writeByte(arrowType);
if (arrowType != 0)
{
    dout.writeFloat(arrowSize);
    dout.writeBoolean(arrowDouble);
    dout.writeBoolean(arrowReversed);
}
```

To read:

```
byte arrowType = din.readByte();
// omitted code to check arrowType is in range [0,7]
if (arrowType != 0)
{
    float arrowSize = din.readFloat();
    boolean arrowDouble = din.readBoolean();
    boolean arrowReversed = din.readBoolean();
}
```

JDR1.0
--------

JDR1.1–1.3 $\langle id \rangle [ \langle marker\ data \rangle ]$
---

where  $\langle id \rangle$  is an 8-bit byte identifying the marker type. If  $\langle id \rangle$  is 0, then  $\langle marker\ data \rangle$  should be omitted, otherwise it should be present. Valid  $\langle id \rangle$  values are listed in [Table A.5](#). To write:

```
dout.writeByte(markerType);
```

To read:

```
byte markerType = din.readByte();
// omitted code to check markerType has valid value
if (markerType != 0)
{
    // read in marker data
}
```

The *marker data* is stored as follows:

*<size><repeat><is reversed><orient data><colour data><overlay><composite data>*

where:

- *<size>* is a 32-bit float representing the marker size (some markers will ignore this attribute, but it must still be present in the file.) To write:

```
dout.writeFloat(markerSize);
```

To read:

```
float markerSize = din.readFloat();
```

- *<repeat>* is an 8-bit byte identifying the repeat factor (a value of 1 indicates a single marker, a value of 2 indicates a double marker, a value of 3 indicates a triple marker.) To write:

```
dout.writeByte(markerRepeat);
```

To read:

```
byte markerRepeat = din.readByte();
// check lies in range [1-3]
```

- *<is reversed>* is a boolean value indicating whether or not the marker has been reversed. To write:

```
dout.writeBoolean(markerReversed);
```

To read:

```
boolean markerReversed = din.readBoolean();
```

- *<orient data>* is the marker orientation data. This has the form *<auto-orient>[<angle>]* where *<auto-orient>* is a boolean value indicating whether the marker should be oriented along the path. If *<auto-orient>* is true, *<angle>* should be omitted, otherwise *<angle>* should be a float representing the orientation angle (in Radians). To write:

```
dout.writeBoolean(autoOrient);
if (!autoOrient) dout.writeFloat(angle);
```

To read:

```
boolean autoOrient = din.readBoolean();
float angle = 0.0f;
if (!autoOrient) angle = din.readFloat();
```

- *<colour data>* is the marker colour. This has the same form as the line/fill/text colour data [defined earlier](#), except a transparent value indicates the colour should be derived from the path to which the marker is attached, and there is no provision for gradient paint markers.

- *overlay* is a boolean value indicating whether to overlay composite markers. To write:

```
dout.writeBoolean(overlay);
```

To read:

```
boolean overlay = din.readBoolean();
```

- *composite data* is the data for composite markers. This has the same format as the *marker data*. If the *composite data* has a marker id of 0, then the marker is not a composite marker. Although the format allows for nested composite markers, Jpgf-draw's marker settings dialog boxes do not allow for it.

Table A.5: Marker IDs

0	No marker	11	Box Filled
1	Pointed	12	Box Open
2	Triangle	13	Cross
3	Circle	14	Plus
4	Diamond	15	Star
5	Square bracket	16	Triangle Up Filled
6	Bar	17	Triangle Up Open
7	Single	18	Triangle Down Filled
8	Round bracket	19	Triangle Down Open
9	Dot Filled	20	Rhombus Filled
10	Dot Open	21	Rhombus Open

Table A.6: Additional Marker IDs (JDR 1.4)

22	Pentagon Filled	41	Half Cusp Down	60	Open Semicircle
23	Pentagon Open	42	Alt Single	61	Filled Semicircle
24	Hexagon Filled	43	Alt Single Open	62	Open 5 Pointed star
25	Hexagon Open	44	Triangle Open	63	Filled 5 Pointed star
26	Octagon Filled	45	Circle Open	64	Asterisk
27	Octagon Open	46	Diamond Open	65	Scissors Down Filled
28	Pointed 60	47	Brace	66	Scissors Up Filled
29	Pointed 45	48	Rectangle Cap	67	Scissors Down Open
30	Hooks	49	Chevron Cap	68	Scissors Up Open
31	Hook up	50	Fast Cap	69	Heart Right Filled
32	Hook Down	51	Round Cap	70	Heart Right Open
33	Half Pointed Up	52	Triangle Cap	71	Heart Filled
34	Half Pointed Down	53	Inverted Triangle Cap	72	Heart Open
35	Half Pointed 60 Up	54	Inverted Chevron Cap	73	Snowflake
36	Half Pointed 60 Down	55	Inverted Fast Cap	74	Star Chevron Open
37	Half Pointed 45 Up	56	Alt Bar	75	Star Chevron Filled
38	Half Pointed 45 Down	57	Alt Round	76	Star 6 Filled
39	Cusp	58	Alt Square	77	Star 6 Open
40	Half Cusp Up	59	Alt Brace	78	Equilateral Filled
				79	Equilateral Open

JDR1.1–1.3
JDR1.4 $\langle id \rangle$ [ $\langle marker\ data \rangle$ ]

where  $\langle id \rangle$  is an 8-bit byte identifying the marker type. If  $\langle id \rangle$  is 0, then  $\langle marker\ data \rangle$  should be omitted, otherwise it should be present. Valid  $\langle id \rangle$  values are listed in [Table A.5](#) and [Table A.6](#).  
 To write:

```
dout.writeByte(markerType);
```

To read:

```
byte markerType = din.readByte();
// omitted code to check markerType has valid value
if (markerType != 0)
{
    // read in marker data
}
```

The  $\langle marker\ data \rangle$  is stored as follows:

$\langle size \rangle$   $\langle repeat \rangle$   $\langle is\ reversed \rangle$   $\langle orient\ data \rangle$   $\langle colour\ data \rangle$   $\langle overlay \rangle$   
 [ $\langle user\ offset\ flag \rangle$  [ $\langle user\ offset \rangle$ ]  $\langle repeat\ offset\ flag \rangle$  [ $\langle repeat\ offset \rangle$ ]]  $\langle composite\ data \rangle$

where:  $\langle user\ offset\ flag \rangle$  [ $\langle user\ offset \rangle$ ]  $\langle repeat\ offset\ flag \rangle$  [ $\langle repeat\ offset \rangle$ ] are only specified if  $\langle overlay \rangle$  is false.  $\langle user\ offset \rangle$  and  $\langle repeat\ offset \rangle$  are only specified if  $\langle user\ offset\ flag \rangle$  or  $\langle repeat\ offset\ flag \rangle$  are true, respectively. The remaining values are as for JDR versions 1.1–1.3 described above.

- $\langle user\ offset\ flag \rangle$  is a boolean value indicating whether the marker offset is specified by the user (true) or determined automatically (false).
- $\langle user\ offset \rangle$  is a 32-bit float indicating the marker offset from the vertex.
- $\langle repeat\ offset\ flag \rangle$  is a number indicating whether the repeat offset (i.e. gap between repeat markers) is specified by the user (true) or determined automatically (false).
- $\langle repeat\ offset \rangle$  is a 32-bit float indicating the gap between repeat markers.

To write:

```
if (overlay)
{
    dout.writeBoolean(userOffsetFlag);

    if (userOffsetFlag)
    {
        dout.writeFloat(userOffset);
    }

    dout.writeBoolean(repeatOffsetFlag);
```

```

        if (repeatOffsetFlag)
        {
            dout.writeFloat(repeatOffset);
        }
    }
To read:
    if (overlay)
    {
        boolean userOffsetFlag = din.readBoolean();

        if (userOffsetFlag)
        {
            float userOffset = din.readFloat();
        }

        boolean repeatOffsetFlag = din.readBoolean();

        if (repeatOffsetFlag)
        {
            float repeatOffset = din.readFloat();
        }
    }

```

JDR1.4

iii. Segments are stored as follows:

$\langle id \rangle \langle specs \rangle$

where  $\langle id \rangle$  is a character representing the segment type. This can be one of: B (cubic Bézier), L (line) or M (move). To write:

```

if (/* test if Bézier */)
{
    dout.writeChar('B');
    // save Bézier data (see below)
}
else if (/* test if line */)
{
    dout.writeChar('L');
    //save line data (see below)
}
else
{
    dout.writeChar('M');
    // save move to data (see below)
}

```

**To read:**

```

char c = din.readChar();

if (c == 'B')
{

```

```

    // read Bézier data (see below)
}
else if (c == 'L')
{
    // read line data (see below)
}
else if (c == 'M')
{
    // read move to data (see below)
}
else
{
    // insert invalid segment identifier code
}

```

A. Bézier segments are stored as follows:

JDR1.0–1.2 $\langle c0x \rangle \langle c0y \rangle \langle c1x \rangle \langle c1y \rangle \langle c2x \rangle \langle c2y \rangle \langle c3x \rangle \langle c3y \rangle$	JDR1.0–1.2
JDR1.3 onwards $\langle c1x \rangle \langle c1y \rangle \langle c2x \rangle \langle c2y \rangle \langle c3x \rangle \langle c3y \rangle$	JDR1.3 onwards

where  $\langle c0x \rangle$  and  $\langle c0y \rangle$  are the  $x$  and  $y$  co-ordinates of the starting point,  $\langle c1x \rangle$  and  $\langle c1y \rangle$  are the  $x$  and  $y$  co-ordinates of the first curvature control point,  $\langle c2x \rangle$  and  $\langle c2y \rangle$  are the  $x$  and  $y$  co-ordinates of the second curvature control point, and  $\langle c3x \rangle$  and  $\langle c3y \rangle$  are the  $x$  and  $y$  co-ordinates of the end point. All values are stored as 64-bit doubles. To write:

JDR1.0–1.2
<pre> for (int i = 0; i &lt; 4; i++) {     dout.writeDouble(x[i]);     dout.writeDouble(y[i]); } </pre>
JDR1.0–1.2

To read:

```

double[] x = new double[4];
double[] y = new double[4];
for (int i = 0; i < 4; i++)
{
    x[i] = din.readDouble();
    y[i] = din.readDouble();
}

```

JDR1.3 onwards
----------------

```

for (int i = 0; i < 3; i++)
{
    dout.writeDouble(x[i]);
    dout.writeDouble(y[i]);
}

```

To read:

```
double[] x = new double[3];
double[] y = new double[3];
for (int i = 0; i < 3; i++)
{
    x[i] = din.readDouble();
    y[i] = din.readDouble();
}
```

JDR1.3 onwards

## B. Line and move to (gap) segments are stored as follows:

```
JDR1.0-1.2
<x0><y0><x1><y1>
```

JDR1.0-1.2

```
JDR1.3 onwards
<x1><y1>
```

JDR1.3 onwards

where  $\langle x0 \rangle$  and  $\langle y0 \rangle$  are the  $x$  and  $y$  co-ordinates of the starting point and  $\langle x1 \rangle$  and  $\langle y1 \rangle$  are the  $x$  and  $y$  co-ordinates of the end point.

```
JDR1.0-1.2
```

To write:

```
for (int i = 0; i < 2; i++)
{
    dout.writeDouble(x[i]);
    dout.writeDouble(y[i]);
}
```

To read:

```
double[] x = new double[2];
double[] y = new double[2];
for (int i = 0; i < 2; i++)
{
    x[i] = din.readDouble();
    y[i] = din.readDouble();
}
```

JDR1.0-1.2

```
JDR1.3 onwards
```

To write:

```
dout.writeDouble(x1);
dout.writeDouble(y1);
```

To read:

```
x1 = din.readDouble();
y1 = din.readDouble();
```

JDR1.3 onwards

(c) **Text area** data is stored as follows:

```
<fam-length><family><shape><series><size><transformation><latex-flag>[<latex-specs>]<text colour><text-length><text>
```

where:



- i.  $\langle fam\text{-}length \rangle$  is a 32-bit integer that is the length of the font family name, and  $\langle family \rangle$  is the font family name. To write:

```
// String family contains the name of the font family
dout.writeInt(family.length());
dout.writeChars(family);
```

To read:

```
int n = din.readInt();
char[] fam = new char[n];
for (int i = 0; i < n; i++)
{
    fam[i] = din.readChar();
}
```

```
String family = new String(fam);
```

- ii.  $\langle shape \rangle$  is an 8-bit byte representing the font shape. This can have one of two values: 0 (upright) or 1 (italic). To write:

```
dout.writeByte(shape);
```

to read:

```
byte shape = din.readByte();
// check shape is either 0 or 1
```

- iii.  $\langle series \rangle$  is an 8-bit byte representing the font series. This can have one of two values: 0 (medium) or 1 (bold). To write:

```
dout.writeByte(series);
```

To read:

```
byte series = din.readByte();
// check series is either 0 or 1
```

- iv.  $\langle size \rangle$  is the font size stored as a 32-bit integer. To write:

```
dout.writeInt(size);
```

To read:

```
int size = din.readInt();
// check size is not negative
```

- v.  $\langle transformation \rangle$  is the transformation. The origin is taken to be the leftmost point along the baseline of the text. The transformation is stored as:

$$\langle m0 \rangle \langle m1 \rangle \langle m2 \rangle \langle m3 \rangle \langle m4 \rangle \langle m5 \rangle$$

where each element is stored as a 64-bit double precision number. The transformation matrix used is given by:

$$\begin{pmatrix} m_0 & m_2 & m_4 \\ m_1 & m_3 & m_5 \\ 0 & 0 & 1 \end{pmatrix}$$

To write:

```
for (int i = 0; i < 6; i++)
{
    dout.writeDouble(matrix[i]);
}
```

To read:

```
double[] matrix = new double[6];
for (int i = 0; i < 6; i++)
{
    matrix[i] = din.readDouble();
}
```

- vi.  $\langle latex-flag \rangle$  is a boolean variable indicating whether or not the  $\langle latex-specs \rangle$  are present. To write:

```
dout.writeBoolean(latexFlag)
if (latexFlag)
{
    // save LaTeX specs (see below)
}
```

To read:

```
boolean latexFlag = din.readBoolean();
if (latexFlag)
{
    // read LaTeX specs (see below)
}
```

- vii.  $\langle latex-specs \rangle$  contains the  $\text{\LaTeX}$  information, and has the format:

```
 $\langle lfam-length \rangle[\langle lfamily \rangle]\langle lseries-length \rangle[\langle lseries \rangle]\langle lshape-length \rangle[\langle lshape \rangle]\langle lsize-length \rangle[\langle lsize \rangle]\langle halign \rangle\langle valign \rangle\langle ltext-length \rangle[\langle ltext \rangle]$ 
```

where:

- A.  $\langle lfam-length \rangle$  is an integer indicating the number of characters in  $\langle lfamily \rangle$  where  $\langle lfamily \rangle$  is a string containing the  $\text{\LaTeX}$  family declaration (e.g.  $\text{\rmfamily}$ ). If  $\langle lfam-length \rangle$  is zero,  $\langle lfamily \rangle$  is omitted. ( $\langle lfam-length \rangle$  must not be negative.) To write:

```
// String lfamily contains the LaTeX family declaration
dout.writeInt(lfamily.length());
dout.writeChars(lfamily);
```

To read:

```
int n = din.readInt();
if (n < 0)
{
    // insert code to throw error if n is negative
}
else if (n > 0)
{
    char[] fam = new char[n];
    for (int i = 0; i < n; i++)
    {
        fam[i] = din.readChar();
    }
    String lfamily = new String(fam);
}
```

- B.  $\langle lseries-length \rangle$  is an integer indicating the number of characters in  $\langle lseries \rangle$  where  $\langle lseries \rangle$  is a string containing the  $\text{\LaTeX}$  se-

ries declaration (e.g. `\bfseries`). If  $\langle lseries-length \rangle$  is zero,  $\langle lseries \rangle$  is omitted. ( $\langle lseries-length \rangle$  must not be negative.) To write:

```
// String lseries contains the LaTeX series declaration
dout.writeInt(lseries.length());
dout.writeChars(lseries);
```

To read:

```
int n = din.readInt();
if (n < 0)
{
    // insert code to throw error if n is negative
}
else if (n > 0)
{
    char[] str = new char[n];
    for (int i = 0; i < n; i++)
    {
        str[i] = din.readChar();
    }
    String lseries = new String(str);
}
```

- C.  $\langle lshape-length \rangle$  is an integer indicating the number of characters in  $\langle lshape \rangle$  where  $\langle lshape \rangle$  is a string containing the  $\LaTeX$  shape declaration (e.g. `\itshape`). If  $\langle lshape-length \rangle$  is zero,  $\langle lshape \rangle$  is omitted. ( $\langle lshape-length \rangle$  must not be negative.) To write:

```
// String lshape contains the LaTeX shape declaration
dout.writeInt(lshape.length());
dout.writeChars(lshape);
```

To read:

```
int n = din.readInt();
if (n < 0)
{
    // insert code to throw error if n is negative
}
else if (n > 0)
{
    char[] str = new char[n];
    for (int i = 0; i < n; i++)
    {
        str[i] = din.readChar();
    }
    String lshape = new String(str);
}
```

- D.  $\langle lsize-length \rangle$  is an integer indicating the number of characters in  $\langle lsize \rangle$  where  $\langle lsize \rangle$  is a string containing the  $\LaTeX$  size declaration (e.g. `\large`). If  $\langle lsize-length \rangle$  is zero,  $\langle lsize \rangle$  is omitted. ( $\langle lsize-length \rangle$  must not be negative.) To write:

```
// String lsize contains the LaTeX size declaration
dout.writeInt(lsize.length());
```

```
dout.writeChars(lsize);
```

**To read:**

```
int n = din.readInt();
if (n < 0)
{
    // insert code to throw error if n is negative
}
else if (n > 0)
{
    char[] str = new char[n];
    for (int i = 0; i < n; i++)
    {
        str[i] = din.readChar();
    }
    String lsize = new String(str);
}
}
```

- E.  $\langle \text{halign} \rangle$  is an 8-bit byte indicating the horizontal alignment of the `\pgfbox` command. It may only take one of the following values: 0 (left), 1 (centre) or 2 (right). To write:

```
dout.writeByte(halign);
```

**To read:**

```
byte halign = din.readByte();
if (halign < 0 || halign > 2)
{
    // insert code to throw invalid halign exception
}
}
```

- F.  $\langle \text{valign} \rangle$  is an 8-bit byte indicating the vertical alignment of the `\pgfbox` command. It may only take one of the following values: 0 (top), 1 (centre), 2 (base) or 3 (bottom). To write:

```
dout.writeByte(valign);
```

**To read:**

```
byte valign = din.readByte();
if (valign < 0 || valign > 3)
{
    // insert code to throw invalid valign exception
}
}
```

- G.  $\langle \text{ltext-length} \rangle$  is an integer indicating the number of characters in  $\langle \text{ltext} \rangle$  where  $\langle \text{ltext} \rangle$  is a string containing the  $\LaTeX$  alternative to  $\langle \text{text} \rangle$ . If  $\langle \text{ltext-length} \rangle$  is zero,  $\langle \text{ltext} \rangle$  is omitted. ( $\langle \text{ltext-length} \rangle$  must not be negative.) To write:

```
// String ltext contains the alternative LaTeX text
dout.writeInt(ltext.length());
dout.writeChars(ltext);
```

**To read:**

```
int n = din.readInt();
if (n < 0)
{
    // insert code to throw error if n is negative
}
```

```

    }
    else if (n > 0)
    {
        char[] str = new char[n];
        for (int i = 0; i < n; i++)
        {
            str[i] = din.readChar();
        }
        String ltext = new String(str);
    }

```

viii.  $\langle \text{text colour} \rangle$  is the text colour. This has the same format as the path line and fill colours [described above](#).

ix.  $\langle \text{text length} \rangle$  is the number of characters contained in the [text area](#) (stored as a 32-bit integer) and  $\langle \text{text} \rangle$  are the characters contained in the [text area](#).  $\langle \text{text length} \rangle$  must be strictly positive. To write:

```

// String text contains the text
dout.writeInt(text.length());
dout.writeChars(text);

```

To read:

```

int n = din.readInt();
if (n <= 0)
{
    // insert code to throw invalid length exception
}
char[] str = new char[n];
for (int i = 0; i < n; i++)
{
    str[i] = din.readChar();
}
String text = new String(str);

```

(d) [Text-paths](#) are not available for versions below 1.5. For newer versions, the specifications are stored as follows:

$\langle \text{text colour} \rangle \langle \text{fam-length} \rangle \langle \text{family} \rangle \langle \text{shape} \rangle \langle \text{series} \rangle \langle \text{size} \rangle \langle \text{transformation} \rangle \langle \text{latex-flag} \rangle [ \langle \text{latex-specs} \rangle ] \langle \text{text-length} \rangle \langle \text{text} \rangle \text{O} | \text{C} \langle n \rangle \langle \text{start point} \rangle \langle \text{segment data} \rangle +$

where the text information ( $\langle \text{text colour} \rangle$  to  $\langle \text{text} \rangle$ ) is as [described above](#) for [text areas](#). The remaining information is as [described above](#) for [paths](#).

(e) Bitmap data are stored as follows:

$\langle \text{filename-length} \rangle \langle \text{filename} \rangle \langle \text{latex-flag} \rangle [ \langle \text{latex-bitmap-specs} \rangle ] \langle \text{transformation} \rangle$

where:

i.  $\langle \text{filename-length} \rangle$  is an integer indicating the number of characters in the file name, and  $\langle \text{filename} \rangle$  is the file name. Note that  $\langle \text{filename-length} \rangle$  must be strictly positive. To write:

```

// String filename contains the file name
dout.writeInt(filename.length());
dout.writeChars(filename);

```

To read:

```
int n = din.readInt();
if (n <= 0)
{
    // insert code to throw exception
}
char[] str = new char[n];
for (int i = 0; i < n; i++)
{
    str[i] = din.readChar();
}
```

- ii.  $\langle latex-flag \rangle$  is a boolean variable indicating whether or not the  $\langle latex-bitmap-specs \rangle$  is present. To write:

```
dout.writeBooleanlatexFlag;
if (latexFlag)
{
    // save LaTeX bitmap information (see below)
}
```

To read:

```
boolean latexFlag = din.readBoolean();
if (latexFlag)
{
    // read LaTeX bitmap information (see below)
}
```

- iii.  $\langle latex-bitmaps-specs \rangle$  has the following format:

$\langle lfilename-length \rangle [\langle lfilename \rangle] \langle imgcmd-length \rangle [\langle imgcmd \rangle]$

where  $\langle lfilename-length \rangle$  is an integer indicating the number of characters in  $\langle lfilename \rangle$ , and  $\langle lfilename \rangle$  is the LaTeX link to the bitmap file. If  $\langle lfilename-length \rangle$  is zero,  $\langle lfilename \rangle$  is omitted.  $\langle imgcmd-length \rangle$  is an integer indicating the number of characters in  $\langle imgcmd \rangle$ , where  $\langle imgcmd \rangle$  is a string containing the  $\LaTeX$  command name to include the bitmap (e.g. `\pgfimage`.) If  $\langle imgcmd-length \rangle$  is zero,  $\langle imgcmd \rangle$  is omitted. To write

```
// String lfilename contains the LaTeX link to the bitmap
dout.writeInt(lfilename.length());
dout.writeChars(lfilename);
// String imgcmd contains the LaTeX image command
dout.writeInt(imgcmd.length());
dout.writeChars(imgcmd);
```

To read:

```
int n = din.readInt();
if (n < 0)
{
    // insert code to throw invalid length exception
}
else if (n > 0)
{
```

```

        char[] str = new char[n];
        for (int i = 0; i < n; i++)
        {
            str[i] = din.readChar();
        }
        String lfilename = new String(str);
    }
    n = din.readInt();
    if (n < 0)
    {
        // insert code to throw invalid length exception
    }
    else if (n > 0)
    {
        char[] cmd = new char[n];
        for (int i = 0; i < n; i++)
        {
            cmd[i] = din.readChar();
        }
        String imgcmd = new String(cmd);
    }
}

```

- iv. *transformation* is the transformation matrix, and has the same format as the [text area](#) transformation matrix (see above.) The origin is the bottom left corner of the [bitmap](#).

8. Flow frame data is stored as follows:

- (a) The frame type is stored as an 8-bit byte. This may only take one of the following values: 0 (static), 1 (flow), 2 (dynamic) and 3 (typeblock). There should only be one typeblock and this should belong to the outermost implicit group. To write:

```
dout.writeByte(type)
```

To read:

```
byte type = din.readByte();
// check valid value
```

- (b) If  $\langle type \rangle \neq 3$  (i.e. is not the typeblock), the following information should also be saved: a boolean value (`border`) indicating whether or not the frame should have a border, the identification label (`label`) stored as an integer (the number of characters in `label`) followed by that many characters, and the page list (`pages`) should likewise be stored as an integer (the number of characters in `pages`) followed by that many characters. To write:

```
if (type != 3)
{
    dout.writeBoolean(border);
    dout.writeInt(label.length());
    dout.writeChars(label);
    dout.writeInt(pages.length());
}
```

```

        dout.writeChars(pages);
    }
To read:
if (type != 3)
{
    boolean border = din.readBoolean();
    int n = din.readInt();
    // throw exception if n < 0
    String label = "";
    char[] c;
    if (n > 0)
    {
        c = new char[n];
        for (int i = 0; i < n; i++)
        {
            c[i] = din.readChar();
        }
        label = new String(c);
    }
    n = din.readInt();
    // throw exception if n < 0
    String pages = "";
    if (n > 0)
    {
        c = new char[n];
        for (int i = 0; i < n; i++)
        {
            c[i] = din.readChar();
        }
        pages = new String(c);
    }
}

```

- (c) Store margin information as a 32-bit single precision floating point number, in the following order: top, bottom, left, right. To write:

```

dout.writeFloat(top);
dout.writeFloat(bottom);
dout.writeFloat(left);
dout.writeFloat(right);

```

**To read:**

```

float top    = din.readFloat();
float bottom = din.readFloat();
float left   = din.readFloat();
float right  = din.readFloat();

```

- (d) JDR v1.2 and above contains extra information if the frame type is either 0 (static frame) or 2 (dynamic frame) which relates to the paragraph shape. This is a byte that can be 0 (standard shape), 1 (use `\parshape`) or 2 (use `\shapepar`). To write:



```

if (type == 0 || type == 2)
{
    dout.writeByte(shape);
}

```

To read

```

if (type == 0 || type == 2)
{
    byte shape = din.readByte();
}

```

- (e) JDR v1.3 onwards contains additional information if the frame type is either 0 (static frame) or 2 (dynamic frame) which relates to the vertical alignment of material in the frame. This is a byte that can be 0 (top), 1 (centre) or 2 (bottom). To write:

```

if (type == 0 || type == 2)
{
    dout.writeByte(valign);
}

```

To read

```

if (type == 0 || type == 2)
{
    byte valign = din.readByte();
}

```

9. JDR v1.2 and above also optionally contains the object's description. This is saved in the form:

*<desc-length>*[*<description>*]

where *<desc-length>* is an integer indicating the length of the description string. This may be zero, in which case *<description>* is omitted, otherwise *<description>* is a sequence of *<desc-length>* characters that make up the description. To write:

```

// description is a String
int n = description.length();
dout.writeInt(n);
if (n > 0)
{
    dout.writeChars(description);
}

```

To read:

```

int n = din.readInt();
String description = "";
if (n > 0)
{
    char[] desc = new char[n];
    for (int i = 0; i < n; i++)

```

```
    {
      desc[i] = din.readChar();
    }
    description = new String(desc);
  }
```

## B AJR Format

Jpgfdraw's [AJR](#) file format is an ASCII format written primarily to assist file format conversion.

The current AJR file format version is 1.5.

If you use the `uk.ac.uea.comp.nlct.jdr` package, you can load and save an [AJR](#) file using the `AJR.load()` and `AJR.save()` methods. Notes:

- All elements within the AJR should be separated by white space.
- Tabs and new line characters are treated as a space.
- It is inadvisable to have new lines within a literal string, as a carriage return followed by line feed may be interpreted as two spaces rather than one.
- Multiple spaces are treated as a single space, unless they occur within a literal string.
- Literal strings are not delimited, but are always preceded by a number indicating the length of the string. There should only be a single space between the length and the start of the string. Note that `9 SansSerif` (one space) is not the same as `9 SansSerif` (two spaces). The latter will cause an error as the string will be interpreted as `" SansSeri"`. The only exceptions are strings that are guaranteed never to contain spaces (such as the file type identifier `AJR` and paper size textual identifiers.)
- Take care when editing literal strings, as you will also have to remember to update the string length as well. For example, if you want to change the font family from `SansSerif` to `Lucida Sans`, you will have to change:

```
9 SansSerif
```

```
to
```

```
11 Lucida Sans
```

- The default unit is `bp` unless otherwise stated.

The AJR file format is as follows:

1. The file must start with `AJR` followed by white space and the version. For example:

```
AJR 1.1
```

indicates the [AJR](#) version 1.1 format.

2. Next there must be an integer (followed by white space) indicating whether or not the Jpgfdraw [settings](#) are stored. AJR v1.3 onwards allows 3 possible values: 0 (no settings), 1 (all settings) and 2 (paper size only). Versions prior to that only allow 0 (no settings) and 1 (all settings).

If a 2 is found, it should be followed by the paper size (see [below](#)), otherwise if a 1 is found, all the settings information must follow:

- (a) A 0 or 1 indicating whether or not to display the grid.
- (b) A 0 or 1 indicating whether or not to lock the grid.
- (c) A 0 or 1 indicating whether or not to show the [rulers](#).
- (d) A number indicating which tool to select. This must be an integer between 0 and 7 (inclusive). Table [A.1](#) indicates the integer ID for each tool.
- (e) An number indicating the normal font size. (This is used as the default in the font settings dialog box, and as the normal size font for the  $\LaTeX$  font size conversions.)
- (f) The paper size (see [below](#)).
- (g) A number representing the unit used for the rulers and grid. This should be one of: 0 ([TeX points](#)), 1 (inches), 2 (centimetres) or 3 ([PostScript points](#)).
- (h) Two integers representing the major grid divisions and the subdivisions, respectively.

## 3. AJR1.0–1.2

The paper size is specified by:  $\langle id \rangle$  [ $\langle w \rangle$   $\langle h \rangle$   $\langle orient \rangle$ ] The paper size is indicated by an integer  $\langle id \rangle$  which must be in the range 0 to 18. The corresponding paper sizes are listed in Table [A.2](#). The width  $\langle w \rangle$ , height  $\langle h \rangle$  and orientation  $\langle orient \rangle$  should only be present when  $\langle id \rangle$  is 18. The orientation is indicated 0 (portrait) or 1 (landscape).

AJR1.0–1.2

## AJR1.3 onwards

The paper size is specified by:  $\langle id \rangle$  [ $\langle w \rangle$   $\langle h \rangle$ ] The paper identifier  $\langle id \rangle$  may be either an integer in the range 0 to 72 or a string. Tables [A.2](#) and [A.3](#) list the paper sizes that correspond to an integer  $\langle id \rangle$ . Table [3.1](#) indicate the allowed values where  $\langle id \rangle$  is a string. The width  $\langle w \rangle$  and height  $\langle h \rangle$  should only be present when  $\langle id \rangle$  is 18 or is the string “user”.

AJR1.3 onwards

- (a) an AJR file whose first two lines contains:

```
AJR 1.2
1 0 1 1 0 10 14 3 100 10
```

indicates: AJR v1.2 file (first line), all settings provided (1), don't show the grid (0), lock the grid (1), show rulers (1), select tool (0), the normal font size is 10pt (10), A5 landscape (14), use PostScript points in the rulers and grid (3), with each major division of width 100bp with 10 subdivisions.

- (b) an AJR file whose first two lines contains:

```
AJR 1.3
2 a4r
```

indicates: AJR v1.3 file (first line), only the paper size is specified (2), A4 landscape paper (a4r)

- (c) an AJR file whose first two lines contains:

```
AJR 1.3
2 user 3in 4in
```

indicates: AJR v1.3 file (first line), only the paper size is specified (2), the paper size is a custom size with width 3 inches and height 4 inches.

4. The **objects** that constitute the picture are now stored. When saving to a file, an outer grouping is implied that is not evident whilst using Jpgfdraw. This means that there should always be a single group structure saved to file which contains all the **objects** that constitute the picture. Each **object** is then recursively stored. For example, if a picture contains a **path**, a **group** and a **text area**, in the **AJR** file these three objects will be stored as a single group structure containing the three objects. If in Jpgfdraw you explicitly **group** all the objects, then in the **AJR** file, the outermost implicit group will contain only one **object** which will be this **group**.

Each **object** has the following format:

AJR1.0 & 1.1 $\langle id-char \rangle \langle object-specs \rangle \langle fflag \rangle [ \langle flowframe-specs \rangle ]$	AJR1.0 & 1.1
AJR1.2 onwards $\langle id-char \rangle \langle object-specs \rangle \langle fflag \rangle [ \langle flowframe-specs \rangle ] \langle description-specs \rangle$	AJR1.2 onwards

where  $\langle id-char \rangle$  is a character determining the object type: G — **group**, P — **path**, T — **text area**, I — **bitmap**. AJR version 1.5 includes the new **text-path** object type that is identified by X.

The object specifications  $\langle object-specs \rangle$  vary according to the object type and are described below.  $\langle fflag \rangle$  must be either 1 or 0 indicating whether or not this object has flowframe data associated with it. If 1, then the flowframe specifications  $\langle flowframe-specs \rangle$  should follow (see below), otherwise  $\langle flowframe-specs \rangle$  should be omitted. Note that AJR version 1.2 onwards contains  $\langle description-specs \rangle$ , which was omitted in earlier versions.

- (a) Group data, G, is stored as follows:

$$\langle n \rangle \{ \langle object data \rangle \} +$$

where  $\langle n \rangle$  is an integer indicating the number of **objects** within the **group**, there should then follow  $\langle n \rangle$  lots of  $\langle object data \rangle$ , where  $\langle object data \rangle$  is the data for each **object** within the group, where the object data is as **described above**.

- (b) Path data, P, is stored as follows:

AJR1.0–1.2 $\langle line colour \rangle \langle fill colour \rangle \langle line style \rangle \circ   C \langle n \rangle \langle segment data \rangle +$	AJR1.0–1.2
AJR1.3 onwards $\langle line colour \rangle \langle fill colour \rangle \langle line style \rangle \circ   C \langle n \rangle \langle start point \rangle \langle segment data \rangle +$	AJR1.3 onwards

where  $\langle line colour \rangle$  and  $\langle fill colour \rangle$  contain the line and fill colour data (see below),  $\langle line style \rangle$  is the line style data (see below). The character O

or C indicates whether the path is open or closed,  $\langle n \rangle$  is an integer indicating the number of segments that constitute the path. Note that AJR v1.3 has removed the redundancy in earlier versions. From version 1.3,  $\langle n \rangle$  must be followed by the path's starting point,  $\langle start\ point \rangle$ , which should be two white space separated numbers indicating the  $x$  and  $y$  co-ordinates, respectively, this is then followed by  $\langle n \rangle$  lots of  $\langle segment\ data \rangle$  (described below).

- i. Colour data is stored as follows:  $\langle col-id \rangle [\langle colour-specs \rangle ]$ , where  $\langle col-id \rangle$  is a character representing the colour type. Available types are listed in Table A.4.

A. Single RGB colour data is specified as:

$$\langle R \rangle \langle G \rangle \langle B \rangle \langle A \rangle$$

where each element is a number between 0 and 1 (inclusive), and  $\langle R \rangle$  represents the red value,  $\langle G \rangle$  represents the green value,  $\langle B \rangle$  represents the blue value, and  $\langle A \rangle$  represents the alpha (transparency) value.

B. Single CMYK colour data is specified as:

$$\langle C \rangle \langle M \rangle \langle Y \rangle \langle K \rangle \langle A \rangle$$

where each element is a number between 0 and 1 (inclusive), and  $\langle C \rangle$  represents the cyan value,  $\langle M \rangle$  represents the magenta value,  $\langle Y \rangle$  represents the yellow value,  $\langle K \rangle$  represents the black value, and  $\langle A \rangle$  represents the alpha (transparency) value.

C. As from AJR v1.4, single HSB colour data is specified as:

$$\langle H \rangle \langle S \rangle \langle B \rangle \langle A \rangle$$

where each element is a number with all values except  $\langle H \rangle$  lying between 0 and 1 (inclusive).  $\langle H \rangle$  represents the hue which must be in the range  $[0, 360)$ ,  $\langle S \rangle$  represents the saturation,  $\langle B \rangle$  represents the brightness, and  $\langle A \rangle$  represents the alpha (transparency) value.

D. As from AJR v1.4, single grey scale data is specified as:

$$\langle G \rangle \langle A \rangle$$

where each element is a number between 0 and 1 (inclusive), and  $\langle G \rangle$  represents the grey scale, and  $\langle A \rangle$  represents the alpha (transparency) value.

E. Linear gradient colour data is specified as:

$$\langle start-col-id \rangle \langle start-col-specs \rangle \langle end-col-id \rangle \langle end-col-specs \rangle \langle direction \rangle$$

where  $\langle start-col-id \rangle$  is the colour identifier for the starting colour and  $\langle start-col-specs \rangle$  is the colour specification, and  $\langle end-col-id \rangle$  is the colour identifier for the end colour and  $\langle end-col-specs \rangle$  is the colour specification. The colour identifiers may be any of those listed in Table A.4 except the linear or radial gradient types. The

colour specifications are as described above. The gradient direction,  $\langle direction \rangle$ , is an integer and may only take one of the following values: 0 (North), 1 (North East), 2 (East), 3 (South East), 4 (South), 5 (South West), 6 (West) and 7 (North West).

- F. AJR v1.3 onwards also provides radial gradient colour data which is specified as:

$\langle start-col-id \rangle \langle start-col-specs \rangle \langle end-col-id \rangle \langle end-col-specs \rangle \langle start location \rangle$

where  $\langle start-col-id \rangle$  is the colour identifier for the starting colour and  $\langle start-col-specs \rangle$  is the colour specification, and  $\langle end-col-id \rangle$  is the colour identifier for the end colour and  $\langle end-col-specs \rangle$  is the colour specification. The colour identifiers may be any of those listed in Table A.4 except the linear or radial gradient types. The colour specifications are as described above. The starting location,  $\langle start location \rangle$ , is an integer and may only take one of the following values: 0 (North), 1 (North East), 2 (East), 3 (South East), 4 (South), 5 (South West), 6 (West), 7 (North West) and 8 (Centre).

- ii. The line style data has changed as from AJR v1.1 to take into account the inclusion of mid point markers, and is stored as follows:

AJR1.0	
$\langle linewidth \rangle \langle dash \rangle \langle cap \rangle \langle join \rangle [\langle mitre-limit \rangle] \langle winding \rangle \langle start arrow \rangle \langle end arrow \rangle$	
	AJR1.0
AJR1.1 onwards	
$\langle linewidth \rangle \langle dash \rangle \langle cap \rangle \langle join \rangle [\langle mitre-limit \rangle] \langle winding \rangle \langle start arrow \rangle \langle mid marker \rangle \langle end arrow \rangle$	
	AJR1.1 onwards

where:

- A.  $\langle linewidth \rangle$  the line width (in PostScript points).  
 B.  $\langle dash \rangle$  is the dash pattern. This is stored as:

$\langle n \rangle [\langle pattern \rangle + \langle offset \rangle]$

where  $\langle n \rangle$  is 0 if there is no dash pattern (i.e. a solid line) or the number of patterns. There should be an even number of patterns, the odd numbered patterns represent the dash length, the even numbered patterns represent the dash gap. The patterns should be stored as decimal numbers (in PostScript points). Lastly, the offset should be a decimal number (in PostScript points). Note that if  $\langle n \rangle$  is 0, there should be no  $\langle pattern \rangle$  or  $\langle offset \rangle$ .

- C.  $\langle cap \rangle$  is the cap style, this is an integer. It may only have one of the following values: 0 (butt), 1 (round) or 2 (square).  
 D.  $\langle join \rangle$  is the join style, this is an integer. It may only have one of the following values: 0 (mitre), 1 (round) or 2 (bevel).  
 E.  $\langle mitre-limit \rangle$  is the mitre-limit, this is a decimal number, and should only be stored if the join style is a mitre.  
 F.  $\langle winding \rangle$  is the winding rule, this is an integer. It may only have

one of the following values: 0 (Even-Odd) or 1 (Non Zero).

- G.  $\langle start\ arrow \rangle$  and  $\langle end\ arrow \rangle$  are the starting and ending arrow styles. The  $\langle mid\ marker \rangle$  is the style for the mid-point markers. Each marker type (start/mid/end) has the same format, but the file format varies as follows:

<p>AJR1.0  <math>\langle id \rangle [ \langle size \rangle \langle is\ double \rangle \langle is\ reversed \rangle ]</math></p> <p>where <math>\langle id \rangle</math> is an integer identifying the arrow type. This may be one of: 0 (none), 1 (pointed), 2 (triangle), 3 (circle), 4 (diamond), 5 (square), 6 (bar) or 7 (single). <math>\langle size \rangle</math> is a number representing the arrow size. (Some arrows only have a fixed size, but a size must still be present.) <math>\langle is\ double \rangle</math> is an integer indicating whether the arrow head is a double arrow (2) or a single arrow (1). <math>\langle is\ reversed \rangle</math> indicates whether the arrow head has been reversed, and should be either 1 (reversed) or 0 (not reversed). The values <math>\langle size \rangle</math> <math>\langle is\ double \rangle</math> <math>\langle is\ reversed \rangle</math> are omitted if <math>\langle id \rangle</math> equals 0 (no arrow head).</p>	AJR1.0
--	--------

<p>AJR1.1–1.3  <math>\langle id \rangle [ \langle marker\ data \rangle ]</math></p>
---

where  $\langle id \rangle$  is an integer identifying the marker type. If  $\langle id \rangle$  is 0, then  $\langle marker\ data \rangle$  should be omitted, otherwise it should be present. Valid  $\langle id \rangle$  values are listed in [Table A.5](#).

The  $\langle marker\ data \rangle$  is stored as follows:

$\langle size \rangle \langle repeat \rangle \langle is\ reversed \rangle \langle orient\ data \rangle \langle colour\ data \rangle \langle overlay \rangle$   
 $\langle composite\ data \rangle$

where:

- $\langle size \rangle$  is a decimal number representing the marker size (some markers will ignore this attribute, but it must still be present in the file.)
- $\langle repeat \rangle$  is an integer identifying the repeat factor (a value of 1 indicates a single marker, a value of 2 indicates a double marker, a value of 3 indicates a triple marker.)
- $\langle is\ reversed \rangle$  indicates whether or not the marker has been reversed, it must be either 0 (not reversed) or 1 (reversed).
- $\langle orient\ data \rangle$  is the marker orientation data. This has the form  $\langle auto\ orient \rangle [ \langle angle \rangle ]$  where  $\langle auto\ orient \rangle$  is either 1 or 0, indicating whether the marker should be oriented along the path. If  $\langle auto\ orient \rangle$  is 1,  $\langle angle \rangle$  should be omitted, otherwise  $\langle angle \rangle$  should be a floating point number representing the orientation angle (in Radians).
- $\langle colour\ data \rangle$  is the marker colour. This has the same form as the line/fill/text colour data [defined earlier](#), except a transparent value indicates the colour should be derived from the path to which the marker is attached, and there is no provision for gradient paint markers.



- $\langle overlay \rangle$  is a number indicating whether to overlay composite markers. This may be either 0 (don't overlay) or 1 (overlay).
- $\langle composite data \rangle$  is the data for composite markers. This has the same format as the  $\langle marker data \rangle$ . If the  $\langle composite data \rangle$  has a marker id of 0, then the marker is not a composite marker. Although the format allows for nested composite markers, Jpgf-draw's marker settings dialog boxes do not allow for it.

AJR1.1–1.3

AJR1.4

$\langle id \rangle [ \langle marker data \rangle ]$

where  $\langle id \rangle$  is an integer identifying the marker type. If  $\langle id \rangle$  is 0, then  $\langle marker data \rangle$  should be omitted, otherwise it should be present. Valid  $\langle id \rangle$  values are listed in [Table A.5](#) and [Table A.6](#). The  $\langle marker data \rangle$  is stored as follows:

$\langle size \rangle \langle repeat \rangle \langle is reversed \rangle \langle orient data \rangle \langle colour data \rangle \langle overlay \rangle [ \langle user offset flag \rangle [ \langle user offset \rangle ] \langle repeat offset flag \rangle [ \langle repeat offset \rangle ] ] \langle composite data \rangle$

where:  $\langle user offset flag \rangle [ \langle user offset \rangle ] \langle repeat offset flag \rangle [ \langle repeat offset \rangle ]$  are only specified if  $\langle overlay \rangle$  is 0.  $\langle user offset \rangle$  and  $\langle repeat offset \rangle$  are only specified if  $\langle user offset flag \rangle$  or  $\langle repeat offset flag \rangle$  are 1, respectively. The remaining values are as for AJR versions 1.1–1.3 described above.

- $\langle user offset flag \rangle$  is a number indicating whether the marker offset is specified by the user (1) or determined automatically (0).
- $\langle user offset \rangle$  is a decimal number indicating the marker offset from the vertex.
- $\langle repeat offset flag \rangle$  is a number indicating whether the repeat offset (i.e. gap between repeat markers) is specified by the user (1) or determined automatically (0).
- $\langle repeat offset \rangle$  is a decimal number indicating the gap between repeat markers.

AJR1.4

iii. Segments are stored as follows:

$\langle id \rangle \langle specs \rangle$

where  $\langle id \rangle$  is a character representing the segment type. This can be one of: B (cubic Bézier), L (line) or M (move). The specification  $\langle specs \rangle$  depends on the segment type:

A. Bézier segments are stored as follows:

AJR1.0–1.2

$\langle c0x \rangle \langle c0y \rangle \langle c1x \rangle \langle c1y \rangle \langle c2x \rangle \langle c2y \rangle \langle c3x \rangle \langle c3y \rangle$

AJR1.0–1.2

AJR1.3 onwards

$\langle c1x \rangle \langle c1y \rangle \langle c2x \rangle \langle c2y \rangle \langle c3x \rangle \langle c3y \rangle$

AJR1.3 onwards

where  $\langle c0x \rangle$  and  $\langle c0y \rangle$  are the  $x$  and  $y$  co-ordinates of the starting point,  $\langle c1x \rangle$  and  $\langle c1y \rangle$  are the  $x$  and  $y$  co-ordinates of the first curvature control point,  $\langle c2x \rangle$  and  $\langle c2y \rangle$  are the  $x$  and  $y$  co-ordinates of the second curvature control point, and  $\langle c3x \rangle$  and  $\langle c3y \rangle$  are the  $x$  and  $y$  co-ordinates of the end point. All values are stored as PostScript points.

B. Line and move to (gap) segments are stored as follows:

AJR1.0–1.2 $\langle x0 \rangle \langle y0 \rangle \langle x1 \rangle \langle y1 \rangle$	AJR1.0–1.2
AJR1.3 onwards $\langle x1 \rangle \langle y1 \rangle$	AJR1.3 onwards

where  $\langle x0 \rangle$  and  $\langle y0 \rangle$  are the  $x$  and  $y$  co-ordinates of the starting point and  $\langle x1 \rangle$  and  $\langle y1 \rangle$  are the  $x$  and  $y$  co-ordinates of the end point.

(c) Text area data is stored as follows:

$\langle fam-length \rangle \langle family \rangle \langle shape \rangle \langle series \rangle \langle size \rangle \langle transformation \rangle \langle latex-flag \rangle$   
 $[\langle latex-specs \rangle] \langle text colour \rangle \langle text-length \rangle \langle text \rangle$

where:

- i.  $\langle fam-length \rangle$  is an integer that is the length of the font family name, and  $\langle family \rangle$  is the font family name.
- ii.  $\langle shape \rangle$  is an integer representing the font shape. This can have one of two values: 0 (upright) or 1 (italic).
- iii.  $\langle series \rangle$  is an integer representing the font series. This can have one of two values: 0 (medium) or 1 (bold).
- iv.  $\langle size \rangle$  is the font size stored as an integer.
- v.  $\langle transformation \rangle$  is the transformation matrix. The origin is taken to be the leftmost point along the baseline of the text. The transformation is stored as:

$\langle m0 \rangle \langle m1 \rangle \langle m2 \rangle \langle m3 \rangle \langle m4 \rangle \langle m5 \rangle$

where each element is a floating point number. The transformation matrix used is given by:

$$\begin{pmatrix} m_0 & m_2 & m_4 \\ m_1 & m_3 & m_5 \\ 0 & 0 & 1 \end{pmatrix}$$

- vi.  $\langle latex-flag \rangle$  indicates whether or not the  $\langle latex-specs \rangle$  are present. It may be either 1 (present) or 0 (absent).
- vii.  $\langle latex-specs \rangle$  contains the  $\text{\LaTeX}$  information, and has the format:

$\langle lfam-length \rangle [\langle lfamily \rangle] \langle lseries-length \rangle [\langle lseries \rangle] \langle lshape-length \rangle [\langle lshape \rangle]$   
 $\langle lsize-length \rangle [\langle lsize \rangle] \langle halign \rangle \langle valign \rangle \langle ltext-length \rangle [\langle ltext \rangle]$

where:

- A.  $\langle lfam-length \rangle$  is an integer indicating the number of characters in  $\langle lfamily \rangle$  where  $\langle lfamily \rangle$  is a string containing the L<sup>A</sup>T<sub>E</sub>X family declaration (e.g. `\rmfamily`). If  $\langle lfam-length \rangle$  is zero,  $\langle lfamily \rangle$  is omitted. ( $\langle lfam-length \rangle$  must not be negative.)
  - B.  $\langle lseries-length \rangle$  is an integer indicating the number of characters in  $\langle lseries \rangle$  where  $\langle lseries \rangle$  is a string containing the L<sup>A</sup>T<sub>E</sub>X series declaration (e.g. `\bfseries`). If  $\langle lseries-length \rangle$  is zero,  $\langle lseries \rangle$  is omitted. ( $\langle lseries-length \rangle$  must not be negative.)
  - C.  $\langle lshape-length \rangle$  is an integer indicating the number of characters in  $\langle lshape \rangle$  where  $\langle lshape \rangle$  is a string containing the L<sup>A</sup>T<sub>E</sub>X shape declaration (e.g. `\itshape`). If  $\langle lshape-length \rangle$  is zero,  $\langle lshape \rangle$  is omitted. ( $\langle lshape-length \rangle$  must not be negative.)
  - D.  $\langle lsize-length \rangle$  is an integer indicating the number of characters in  $\langle lsize \rangle$  where  $\langle lsize \rangle$  is a string containing the L<sup>A</sup>T<sub>E</sub>X size declaration (e.g. `\large`). If  $\langle lsize-length \rangle$  is zero,  $\langle lsize \rangle$  is omitted. ( $\langle lsize-length \rangle$  must not be negative.)
  - E.  $\langle halign \rangle$  is an integer indicating the horizontal alignment of the `\pgfbox` command. It may only take one of the following values: 0 (left), 1 (centre) or 2 (right).
  - F.  $\langle valign \rangle$  is an integer indicating the vertical alignment of the `\pgfbox` command. It may only take one of the following values: 0 (top), 1 (centre), 2 (base) or 3 (bottom).
  - G.  $\langle ltext-length \rangle$  is an integer indicating the number of characters in  $\langle ltext \rangle$  where  $\langle ltext \rangle$  is a string containing the L<sup>A</sup>T<sub>E</sub>X alternative to  $\langle text \rangle$ . If  $\langle ltext-length \rangle$  is zero,  $\langle ltext \rangle$  is omitted. ( $\langle ltext-length \rangle$  must not be negative.)
- viii.  $\langle text\ colour \rangle$  is the text colour. This has the same format as the path line and fill colours [described above](#).
  - ix.  $\langle text\ length \rangle$  is the number of characters contained in the [text area](#) and  $\langle text \rangle$  are the characters contained in the [text area](#).  $\langle text\ length \rangle$  must be strictly positive.
- (d) [Text-paths](#) are not available for versions below 1.5. For newer versions, the specifications are stored as follows:

```
 $\langle text\ colour \rangle \langle fam-length \rangle \langle family \rangle \langle shape \rangle \langle series \rangle \langle size \rangle \langle transformation \rangle$ 
 $\langle latex-flag \rangle [\langle latex-specs \rangle] \langle text-length \rangle \langle text \rangle \text{O|C} \langle n \rangle \langle start\ point \rangle \langle segment$ 
 $data \rangle +$ 
```

where the text information ( $\langle text\ colour \rangle$  to  $\langle text \rangle$ ) is as [described above](#) for [text areas](#). The remaining information is as [described above](#) for [paths](#).

- (e) Bitmap data is stored as follows:

```
 $\langle filename-length \rangle \langle filename \rangle \langle latex-flag \rangle [\langle latex-bitmap-specs \rangle] \langle transformation \rangle$ 
```

where:

- i.  $\langle filename-length \rangle$  is an integer indicating the number of characters in the file name, and  $\langle filename \rangle$  is the file name. Note that  $\langle filename-length \rangle$  must be strictly positive.

- ii.  $\langle latex-flag \rangle$  indicates whether or not  $\langle latex-bitmap-specs \rangle$  is present. It may be either 1 (present) or 0 (absent).
- iii.  $\langle latex-bitmaps-specs \rangle$  has the following format:

$$\langle lfilename-length \rangle [\langle lfilename \rangle] \langle imgcmd-length \rangle [\langle imgcmd \rangle]$$

where  $\langle lfilename-length \rangle$  is an integer indicating the number of characters in  $\langle lfilename \rangle$ , and  $\langle lfilename \rangle$  is the LaTeX path to the bitmap file. If  $\langle lfilename-length \rangle$  is 0,  $\langle lfilename \rangle$  is omitted.

$\langle imgcmd-length \rangle$  is an integer indicating the number of characters in  $\langle imgcmd \rangle$ , where  $\langle imgcmd \rangle$  is a string containing the L<sup>A</sup>T<sub>E</sub>X command name to include the bitmap (e.g. `\pgfimage`.) If  $\langle imgcmd-length \rangle$  is 0,  $\langle imgcmd \rangle$  is omitted.

- iv.  $\langle transformation \rangle$  is the transformation matrix, and has the same format as the [text area](#) transformation matrix (see above.) The origin is the bottom left corner of the [bitmap](#).

5. Flow frame data is stored as follows:

- (a) The frame type is stored as an integer. This may only take one of the following values: 0 (static), 1 (flow), 2 (dynamic) and 3 (typeblock). There should only be one typeblock and this should belong to the outermost implicit group.
- (b) If  $\langle type \rangle \neq 3$  (i.e. is not the typeblock), the following information should also be saved:  $\langle border \rangle \langle label-length \rangle \langle label \rangle \langle page\ list-length \rangle \langle page\ list \rangle$  where:
  - i.  $\langle border \rangle$  indicates whether or not the frame should have a border, this may be either 1 (border) or 0 (no border).
  - ii.  $\langle label-length \rangle \langle label \rangle$  is the frame's label where  $\langle label-length \rangle$  is the number of characters in  $\langle label \rangle$ .
  - iii.  $\langle page\ list-length \rangle \langle page\ list \rangle$  is the page list for the frame where  $\langle page\ list-length \rangle$  is the number of characters in  $\langle page\ list \rangle$ .
- (c) The margin information should then be stored in the form:  $\langle top \rangle \langle bottom \rangle \langle left \rangle \langle right \rangle$  where each value is a floating point value.
- (d) As from AJR v1.2 extra information is contained if the frame type is either 0 (static frame) or 2 (dynamic frame) relating to the paragraph shape. This is an integer that can be 0 (standard shape), 1 (use `\parshape`) or 2 (use `\shapepar`).
- (e) As from AJR v1.3 extra information is contained if the frame type is either 0 (static frame) or 2 (dynamic frame) relating to the vertical alignment of material in the frame. This is an integer that can be 0 (top), 1 (centre) or 2 (bottom).

6. AJR v1.2 onwards also contains the object's description. This is saved in the form:

$$\langle desc-length \rangle [\langle description \rangle]$$

where  $\langle desc-length \rangle$  is an integer indicating the length of the description string. This may be zero, in which case  $\langle description \rangle$  is omitted.

## C Multilingual Support

All the language dependent information is stored in the subdirectory `lib/language` of the installation directory. If you want all the menus, tooltips etc in another language, you will need to translate the file `dictionary.txt`. This has a `<key>=<value>` format. Only the `<value>` text should be translated. Note that each `<key>=<value>` pair must be contained on a *single* line, so if `<value>` contains a lot of text, take care if your text editor likes to break lines automatically. Some of the values contain `\1` and `\2`. These represent values that are substituted at runtime. The sequence `\n` indicates to insert a line break when displaying the string at runtime.

There are three keys (`about.translator`, `about.translator_info` and `about.translator_url`) which can be used to identify yourself as the translator. If the `about.translator` value is set, the information will be displayed in the Help → About... dialog box.

If you want to translate the user manual, you can translate all the files in the `helpset` subdirectory<sup>1</sup>, or you may find it easier to download the source code and translate the user manual  $\LaTeX$  source (see next section). The latter option is recommended if you also want to translate the PDF version of the manual. The source for both the PDF manual and the helpset is in  $\LaTeX$ .

If you want to make your translations publicly available, send them to me and I'll add them to Jpgfdraw's home page. Please indicate if you want them distributed under a different licence (in which case they may have to be distributed separately).

---

<sup>1</sup>you will also need to use `jhindexer` (a [JavaHelp](#) utility) to create the on-line index.

## D Source Code

The source code is contained in the file `jpgfdraw-0.5.5b-src.zip`, which is available from <http://theoval.cmp.uea.ac.uk/~nlct/jpgfdraw/>. The source code was written and tested running under Linux. Some of the helper scripts may not run on other operating systems. This archive contains the following directories:

**jpgfdraw/bin** scripts that load the required `jar` files into Java

**jpgfdraw/doc** documentation

**jpgfdraw/lib** required Java libraries

**jpgfdraw/src** the Java source code.

**jpgfdraw/examples** example images

In addition, the archive also contains the following files:

**README** important information about this distribution. Read this file before you try to compile the source.

**BUGS** list of known bugs

**TODO** list of things that need to be implemented

**Makefile** main makefile. Run “make all” to make all the applications

**icons** JDR icons.

**CHANGES** change log

**DICTIONARY-CHANGES** change log for dictionary

The documentation was written in  $\text{\LaTeX}$ , but shares the dictionary file (`dictionary.txt`) used by `Jpgfdraw` to ensure that the documentation uses the correct menu and dialog labels. In addition, the Java code relies on the  $\text{\LaTeX}$  documentation to provide the files required by the helpset (via  $\text{\LaTeX}2\text{HTML}$  and some helper Perl scripts). The labels used in the  $\text{\LaTeX}$  source are also used in the Java code to identify the context dependent information required by the help buttons in many of the dialog boxes.

### D.1 Java Source

Requirements:

- The [Java™2 Platform, Standard Edition SDK \(JDK\)](#) (at least version 1.5.0).
- [JavaHelp](#): this can be downloaded from <http://java.sun.com/products/javahelp/>.

The Java source is contained in subdirectories of `jpgfdraw/src`:

**jpgfdraw/src/uk/ac/uea/cmp/nlct/jdr/**

This contains the source code for `jdr.jar`. This deals with all the information that constitutes an image as well as methods to save and load images. The code that deals with parsing PostScript code (used by `eps2jdr`) is still experimental.

**jpgfdraw/src/uk/ac/uea/cmp/nlct/jdrresources**

This contains the source code for `jdrresources.jar`. This deals with application resources (such as the dictionary).

**jpgfdraw/src/uk/ac/uea/cmp/nlct/jpgfdraw**

This contains the source code for `jpgfdraw.jar`. This deals with the GUI part of `Jpgfdraw`.

**jpgfdraw/src/uk/ac/uea/cmp/nlct/jdrview**

This contains the source code for `jdrview.jar`. This deals with the GUI part of `Jdrview`.

**jpgfdraw/src/uk/ac/uea/cmp/nlct/\*2\***

These directories contain the source code for the command line converters that together form `jdrutils`.

## D.2 Dictionaries

The language dependent files used by `Jpgfdraw` and `Jdrview` are contained in:

**jpgfdraw/doc/english-uk** UK English version

**jpgfdraw/doc/english-us** US English version

Both of these directories contain the following files:

**README** the application README file

**LICENSE** the licence file (which is also loaded by `Jpgfdraw` and `Jdrview`).

**dictionary.txt** The dictionary containing the strings required for menus, dialogs etc. Each line in the dictionary file must be of the form:

`<key>=<value>`

(Blank lines or lines starting with a hash # are ignored.) For some keys, the value should contain `\1, \2, ..., \9`, indicating a value that will be substituted at runtime. (Currently, no more than `\1` and `\2` are used.) In addition, `\n` may be used to indicate a line break. If you want to provide your own dictionary, make sure that your editor does not break overly long lines as all of the `<value>` must be on the same line as its `<key>`. There should be no gaps around the equals sign.

The main makefile `jpgfdraw/Makefile` creates a symbolic link `jpgfdraw/lib/language` that points to one of the above directories, depending on which language option is chosen (default is `jpgfdraw/doc/english-uk`).

The directory `jpgfdraw/doc/zh-Hans` contains the Simplified Chinese dictionary provided by Wang Yong-Xian. This directory only contains the files `dictionary.txt` and `README`. The rest is copied from the US version.

## D.3 L<sup>A</sup>T<sub>E</sub>X Source

The L<sup>A</sup>T<sub>E</sub>X source is contained in `jpgfdraw/doc/manual-uk` (for the UK English version) and `jpgfdraw/doc/manual-us` (for the US English version). The manual is currently not available in any other language. The manual requires the file `jpgfdraw/doc/version.tex` which is created by the main makefile `jpgfdraw/Makefile`. If you are not using `make`, you will need to create this file, which should simply contain the line:

```
\version{0.5.5b}
```

The documentation consists of the following files:

- Makefile** The documentation makefile. Just running “make” will make the PDF version and the Java helpset.
- jpgfdraw.tex** The manual for Jpgfdraw (i.e. this document).
- accelerators.tex** The contents of [Table 2.1](#). This file is input by `jpgfdraw.tex`.
- preamble.tex** The preamble for `jpgfdraw.tex` and `jdrvview.tex`.
- jdrvview.tex** The manual for Jdrvview.
- jdrutils.tex** The manual for the command line converters, such as `jdr2tex`.
- jpgfdraw.sty** Style file used by the documentation.
- transdict.pl** This is a Perl script that converts the dictionary file (`dictionary.txt`) to a file that T<sub>E</sub>X can parse (`dictionary.tex`).
- jpgfdraw.perl** This is the L<sup>A</sup>T<sub>E</sub>X2HTML version of `jpgfdraw.sty`. This also creates temporary files used by `makehelpset` to assist generating the helpset. Note that `jpgfdraw.sty` loads the `glossaries` package, but `jpgfdraw.perl` doesn’t load the equivalent `glossaries.perl` as `jpgfdraw.perl` uses popup windows to display the glossary terms instead of linking them to the glossary section.
- fixpaths** This removes the path names to the images used by the HTML files that form the helpset. This is needed as the HTML files and the images are moved to a different location.
- makehelpset** This is a Perl script that assists making the helpset. It uses the files generated by `jpgfdraw.perl` to create the map and index files required by the [JavaHelp](#) utility `jhindexer`.
- Makefile.jhindexer** The Makefile used to generate the helpset.
- images/** Images specific to this particular language set. Images used by both US and UK manuals are stored in `../sharedimages/`

If you want to translate the manual, please don’t change the labels as they are referenced in the Java code by the help buttons in the various dialog boxes.



## E Troubleshooting

For a more up-to-date list see <http://theoval.cmp.uea.ac.uk/jpgfdraw/faq/>

1. Jpgfdraw's response time is very slow.

The response time has improved with version 0.5b, however the following things can still slow Jpgfdraw's reaction time: setting the anti-aliasing on; setting the rendering to quality instead of speed; using a dash pattern with a zero length gap (use a solid line instead).

In addition, if you don't have much memory available, high magnifications, displaying the grid and having a high number of subdivisions on the grid may also slow response time.

2. Sometimes lines don't show up.

If you have a thin line and the magnification is small or you have low resolution, the line may be too thin to show up on your display. Try either using a thicker line style or increasing the magnification.

3. When I try clicking on the canvas to add a new point, nothing happens.

Make sure that you are actually clicking and not dragging. (Some touch sensitive mouse pads can mistake a click for a move or drag.) Make sure that you have selected the correct tool.

4. I tried changing the line/text style but nothing happened.

Remember to use the Edit → Path and Edit → Text submenus to change the styles for existing objects, and use Settings → Styles... for all subsequent new objects.

5. I tried to create a package based on the flowfram package, but it didn't define some (or all) of my frames.

Remember to identify each **object** as a flow frame, a dynamic frame or a static frame. Any **object** that hasn't been thus identified will not be written to the sty file.

6. I get an error when I try to  $\LaTeX$  a pgfpicture environment created by Jpgfdraw.

Remember to include the pgf package. Jpgfdraw was tested using version 1.01 of the pgf package. It may not work with earlier versions.

7. I changed the screen mode whilst Jpgfdraw was running, and 1in on the canvas no longer displays as 1in on the screen.

The mapping between **bp** and screen pixels is computed on startup to improve Jpgfdraw's reaction time, so it doesn't register the change in screen mode. The Bitmap → Refresh menu item will update the scaling factor.

## E.1 Known Bugs

If for some reason you are unable to access the save dialog box, you can do an emergency save by pressing F11. This will save all currently open images to a subdirectory in the [configuration directory](#). (This works for most, but not all windows used by Jpgf-draw.)

1. Occasionally bits of the screen don't get repainted. The Bitmap → Refresh menu item will redraw the screen (in addition to reloading [bitmaps](#)).
2. Mnemonic will select RGB/CMYK/HSB/Grey tab, but will not give the tab the focus.

You will have to use the Tab key or mouse to change the focus.

3. KDE: When a dialog box is on shade setting, the close button doesn't work. If you attempt to close the window while the shade setting is on, the dialog box won't go away unless you quit or the application is killed.

This is a known Java bug. See: [http://bugs.sun.com/bugdatabase/view\\_bug.do?bug\\_id=6449451](http://bugs.sun.com/bugdatabase/view_bug.do?bug_id=6449451)

If you are able to access Jpgfdraw's main window, save your image, quit and restart.

4. KDE: Sometimes a dialog box will open shaded or full screen. (Sometimes when the dialog box opens shaded, the shading can't be switched off.)

I think this is a Java bug. See [http://bugs.kde.org/show\\_bug.cgi?id=135146](http://bugs.kde.org/show_bug.cgi?id=135146)

5. Sometimes the dialog boxes won't accept keyboard input (including mnemonics) even though they have the focus and the text field has a cursor displayed. Transferring the focus to another application and back again fixes it.
6. Sometimes the status bar throws an exception on start up.

# Bibliography

- [1] Donald E. Knuth. The  $\text{\TeX}$ book. Addison-Wesley Publishing Company. 1986.
- [2] Cay S. Horstmann and Gary Cornell. Core Java. Volume 1 — Fundamentals. Sun Microsystems Press. 1999. ISBN 0-13-081933-6.

# Glossary

## AJR

Jpgfdraw's native ASCII format. Files in this format should have the extension `.ajr`. This format is primarily provided to assist conversion to and from JDR files. [1](#), [5](#), [8](#), [9](#), [14](#), [17](#), [19](#), [27](#), [185](#), [187](#)

## backmost object

The first object to be painted on the canvas. [5](#), [29](#), [36](#), [50](#), [53](#), [54](#), [56](#)

## bitmap

A raster graphics image. [17](#), [27](#), [36](#), [61](#), [94](#), [115](#), [154](#), [181](#), [187](#), [194](#), [200](#)

## bounding box

The smallest rectangle that encompasses the object. [12](#), [13](#), [29](#), [39](#), [42](#), [45](#), [46](#), [77](#)

## bp

T<sub>E</sub>X's "big point". This is the same as a PostScript point. 72bp = 1in. [9](#), [20](#), [61](#), [66](#), [74](#), [89](#), [93](#), [120](#), [147](#), [151](#), [185](#), [186](#), [199](#)

## canvas

The white area on which you construct your picture. [4](#), [11](#), [15](#), [16](#), [20](#), [27](#), [29](#), [32](#), [81](#), [131](#), [135](#)

## combo box

A GUI element similar to a drop-down list, but can be edited if the required value is not in the list. [77](#), [79](#), [80](#), [94](#)

## construction mode

Any of the tools except the select tool. [5](#), [20](#), [21](#)

## control point

The points that define a path. Line segments and gaps have two control points, at the start and end, cubic Bézier segments have four control points: one at the start of the segment, one at the end of the segment, and two others that define the curvature of the segment. Adjacent segments share a common control point. When a path is under construction, or is being edited, the control points are shown as orange or red squares. [1](#), [4](#), [5](#), [11](#), [12](#), [22](#), [32](#), [33](#), [49](#), [58](#), [61](#), [101](#), [103](#), [111](#)

## control point index

Each control point for a given path has an index relative to the initial control point (at the start of the path). Use F6 (in edit path mode) to cycle through the points in increasing order of index. [32](#)

## drop-down list

A GUI element that allows a user to choose one value from a list. When inactive, it only displays the selected value. When activated (usually by pressing an arrow button to on one side) it displays a list of all available values from which the user can select the required value. [77–80](#), [87](#), [94](#), [95](#), [99](#), [103](#), [106](#), [120](#), [122](#), [130](#)

**frontmost object**

The last object to be painted on the canvas. [5](#), [29](#), [36](#), [124](#)

**grid**

Tick marks located at regular intervals on the canvas. The grid can be locked so that new points will be placed at the tick nearest the specified position. [4](#), [8](#), [11](#), [32](#)

**group**

A collection of objects treated as a single entity. [5](#), [29](#), [31](#), [32](#), [35](#), [36](#), [39](#), [42](#), [45](#), [61](#), [63](#), [64](#), [94](#), [152](#), [154](#), [155](#), [187](#)

**Java™**

An object-orientated language. [1](#), [148](#)

**JavaHelp**

An optional package of the JRE enabling applications to use a native browser to display help topics. [4](#), [195](#), [196](#), [198](#)

**JDR**

Jpgfdraw's native binary format. Files in this format should have the extension `.jdr`. [1](#), [5](#), [8](#), [9](#), [14](#), [17–19](#), [27](#), [148](#), [152](#)

**object**

A path, text area, text-path, bitmap or group. [5](#), [6](#), [12](#), [16](#), [18](#), [29–32](#), [35–37](#), [39](#), [42](#), [45](#), [46](#), [49](#), [50](#), [54](#), [93–95](#), [97](#), [152](#), [154–156](#), [187](#), [199](#)

**path**

A shape made up of line segments, moves and cubic Bézier segments. [4](#), [5](#), [9](#), [11](#), [16](#), [19–23](#), [32](#), [33](#), [36](#), [37](#), [39](#), [42](#), [49](#), [50](#), [53](#), [54](#), [56](#), [58](#), [60](#), [61](#), [64–66](#), [68](#), [74–76](#), [81](#), [88–91](#), [95](#), [97–99](#), [101](#), [103](#), [111](#), [135](#), [147](#), [152](#), [154](#), [179](#), [187](#), [193](#)

**path attributes**

The line colour, fill colour and line styles for the path. [20](#)

**popup menu**

A menu whose items vary depending on the context. These menus are usually invoked with the secondary mouse button. In Jpgfdraw it is also possible to invoke popup menus using F3. [24](#), [29](#), [31](#), [32](#), [35](#), [101](#), [111](#), [128](#)

**pt**

TeX's point. Not to be confused with bp (a PostScript point).  $72.27\text{pt}=1\text{in}$ . [9](#), [79](#), [87](#), [90](#), [93](#), [117](#), [130](#), [147](#), [151](#), [186](#)

**raster graphics**

Representing images as a collection of pixels. Also called a bitmap. [27](#), [31](#)

**rulers**

The two panels containing the horizontal and vertical rulers. [8](#), [9](#), [16](#), [150](#), [186](#)

**stacking order**

The order in which objects are painted on the canvas. To determine the reverse stacking order, deselect all objects, then use F6 to cycle through the stack starting from the frontmost object. Reverse this list to obtain the stacking order. Note that the frontmost object is the last object in the stack, not the first. [5](#), [29](#), [36](#), [45](#), [49](#), [50](#), [93](#), [113](#), [124](#), [129](#)

**status bar**

The status bar is the horizontal panel positioned along the bottom of Jpgfdraw's main window. [8](#), [9](#), [11](#), [16](#)

**text area**

An object consisting of a single line of text. The text may be moved, scaled, rotated, sheared or converted to a path. [4](#), [9](#), [16](#), [18](#), [20](#), [24](#), [a](#), [31](#), [35–37](#), [39](#), [42](#), [46](#), [58](#), [60](#), [61](#), [63](#), [64](#), [77–81](#), [83](#), [87](#), [88](#), [94](#), [107](#), [108](#), [126](#), [128–130](#), [152](#), [154](#), [174](#), [179](#), [181](#), [187](#), [192–194](#)

**text-path**

A composite object formed by combining a path and a text area to create a text along a path effect. The underlying path is only visible when editing the text-path object using the edit path function. Transformations (rotating, scaling and shearing) are applied to the path not to the text. [18](#), [20](#), [32](#), [33](#), [35](#), [37](#), [39](#), [42](#), [49](#), [50](#), [53](#), [54](#), [56](#), [58](#), [60](#), [61](#), [63](#), [64](#), [81](#), [154](#), [179](#), [187](#), [193](#)

**toolbars**

The two panels containing buttons, the horizontal toolbar is positioned at the top of Jpgfdraw's main window, the vertical toolbar is positioned along the left edge of the main window. [8](#), [9](#), [16](#), [20](#)

**vector graphics**

A means of describing images through the use of points, lines and curves. [1](#), [27](#)

# Acronyms

## **Graphical user interface (GUI)**

An application with windows in which the user can point and click with the mouse. [1](#), [197](#)

## **Java Virtual Machine (JVM)**

Also known as the Java Runtime Environment. [8](#)

## **Java™2 Platform, Standard Edition Runtime Environment (JRE)**

Allows end-users to run Java™ applications. The JRE can be downloaded from <http://java.sun.com/j2se/>. [1–3](#), [8](#), [17](#), [27](#)

## **Java™2 Platform, Standard Edition SDK (JDK)**

A development environment for building applications, applets and components using the Java™ programming language. [196](#)

## **Multiple-document interface (MDI)**

A main (parent) window containing child windows allowing you to process several documents in parallel. [15](#)

## **Scalable vector graphics (SVG)**

A Modularized language for describing two-dimensional vector and mixed vector/raster graphics in XML. [1](#), [17](#), [18](#), [27](#)

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