The file format

Overall structure

Xournal stores its data in gzipped XML-like files. The gzipped data consists of a succession of XML tags describing the document. By convention, the file header and trailer look like this:
<?xml version="1.0" standalone="no"?>
<xournal version="...">
<title>Xournal document - see http://math.mit.edu/~auroux/software/xournal/</title>
... sequence of pages ...
</xournal>

The <title> and <xournal> tags may only appear within the file header (not within the pages of the document). The *version* attribute of the <xournal> tag indicates which version of Xournal was used to create the document; it is currently ignored, but may be used in a later release if the file format changes in an incompatible manner. (Following a suggestion of Matteo Abrate, starting with version 0.4 the <xournal> tag is the document's root tag, and encloses all other tags).
The rest of the file is a sequence of pages, specified by a <page> tag, whose attributes *width* and *height* specify the physical size of the page in points (1/72 in). The width and height parameters are floating point values. The format of a page is therefore:
<page width="..." height="...">
... page contents ...
</page>

Page background

The first entry within a page describes the page background. It consists of a <background> tag followed by several mandatory XML attributes. The first attribute is always *type*, which can take three possible values: "solid" for a solid background, "pixmap" for a bitmap background, and "pdf" if the background is a page of a PDF document. The rest of the attributes depends on the type of background.

- Solid background: <background type="solid" color="..." style="..." />
- The *color* attribute takes one of the standard values "white", "yellow", "pink", "orange", "blue", "green", or can specify a hexadecimal RGBA value in the format "#rrggbbaa". The *style* attribute takes one of the standard values "plain", "lined", "ruled", or "graph".
- Bitmap background: <background type="pixmap" domain="..." filename="..." />
- The *domain* attribute takes one of the standard values "absolute", "attach", or "clone". A value of "absolute" indicates that the bitmap is found in the file specified by *filename*. The bitmap can be in any format recognized by the gdk-pixbuf library; this includes most of the common bitmap formats (JPEG, PNG, BMP, GIF, PCX, PNM, TIFF, ...).
- A value of "attach" indicates that the bitmap is an attachment to the Xournal file. The bitmap is in PNG format, and resides in a file whose name is derived from that of the main Xournal file by appending to it a dot and the contents of the *filename* attribute. For example, if the Xournal file is in file.xoj and the *filename* attribute is "bg_1.png" then the bitmap file is file.xoj.bg_1.png(Xournal saves attached bitmaps sequentially in files ...bg_1.png, ...bg_2.png, etc.)
- A value of "clone" indicates that the bitmap is identical to the background of a previous page of the journal; the *filename* attribute then specifies the page number, starting with 0 for the first

page. For example, if a *filename* value of "1" indicates that the background bitmap is identical to that of the second page.

- PDF background: <background type="pdf" domain="..." filename="..." pageno="..." /> or <background type="pdf" pageno="..." />
- The *domain* and *filename* attributes must be specified for the first page of the journal that uses a PDF background, and must be omitted subsequently for every other page that uses a PDF background. The *domain* attribute takes one of the standard values "absolute" and "attach"; the PDF document is to be found in the file specified by *filename* (if *domain* is "absolute"), or in the file whose name is obtained by appending a dot and the contents of the *filename* attribute to the name of the main Xournal file (if*domain* is "attach"). The *pageno* attribute specifies which page of the PDF file is used as background, starting with 1 for the first page of the PDF file.

Layers and strokes

After the line specifying the background, the remainder of a <page> section is occupied by one or more layer sections
<layer> ... </layer>
describing the various items within a layer. Every page must contain at least one layer; a layer may be empty. The successive layers are listed in their stacking order, from bottom to top.
A layer consists of a collection of items, listed in the order in which they should be drawn (from bottom-most to top-most). Up to version 0.3.3, the only legal contents within a layer are strokes. The modified format of a stroke is:
<stroke tool="..." color="..." width="...">
... list of coordinates …
<time = ... list of delta_times …/>
</stroke>N

The *tool* attribute can take the values "pen", "highlighter", or "eraser" depending on the tool used to create the stroke (pen, highlighter, or whiteout eraser); a value of "highlighter" indicates that the stroke should be painted in a partially transparent manner (Xournal uses an alpha coefficient of 0.5).
The *color* attribute can take one of the standard values "black", "blue", "red", "green", "gray", "lightblue", "lightgreen", "magenta", "orange", "yellow", "white", or can specify a hexadecimal RGBA value in the format "#rrggbbaa".
The *width* attribute is a floating-point number (or a sequence of floating-point numbers starting with version 0.4.2), and specifies the width of the stroke in points (1/72 in). (For a variable-width stroke, the *width* attribute contains a whitespace-separated succession of floating-point values: first the nominal brush width, and then the width of each successive segment forming the stroke.)
The list of coordinates is simply a succession of floating-point values, separated by whitespace. The number of given values must be even; consecutive pairs of values give the *x* and *y* coordinates of each point along the stroke. These values are expressed in points (1/72 in). The coordinates (0,0) represent the top-left corner of the page: hence x is measured from the left of the page, and y is measured from the top of the page.
Every stroke must contain at least two points (four floating point values). Moreover, two consecutive points on the stroke should be spaced no more than 5 units apart or so; longer line segments should be subdivided as appropriate (otherwise the eraser tool will not interact properly with the stroke). The default precision used by Xournal for the x,y coordinates is 0.01 unit (1/7200 in).

Similarly, the list of delta_times is a succession of floating-point values, separated by whitespace. The number of delta_time values must be equal to the number of coordinates, because each time value is associated with a coordinate. These time values represent the time differences, in milliseconds, between the instantiation time of the current point and that of the point drawn just before it. So the first delta_time value

represents the time period between the end of the last activity and the start of the current stroke. The second value represent the time taken to draw from the first point to the second point of the stroke and so on.

Starting with version 0.4, layers also contain text items. The format of a text item is:
<text font="..." size="..." x="..." y="..." color="...">... text ...</text>

The *font* attribute contains the font name, for example "Serif Bold Italic"; if the font is not available, another font will be substituted. The *size*attribute specifies the font size in points. The *x* and *y* attributes specify the coordinates of the top-left corner of the text box in page coordinates (measured in points from the top-left corner of the page). Finally, the *color* attribute contains either the name of a standard color or a hexadecimal RGBA value (see above).
The contents of the text are encoded in UTF-8, with the characters '&', '<', '>' replaced by &, <, >. Whitespace and linefeeds are preserved (in particular, no extraneous whitespace should be inserted between the enclosing tags and the text itself).
Starting with version 0.4.7, layers can also contain image items. The format of an image item is:
<image left="..." top="..." right="..." bottom="...">... data ...</image>

The *left*, *top*, *right* and *bottom* attributes specify the bounding box to which the image is scaled, in page coordinates (measured in points from the top-left corner). The data is in base64-encoded PNG format (though any other base64-encoded format that can be loaded by gdk-pixbuf is currently accepted).