

FOP FAQ

1 Questions

- [1. General questions](#)
 - [What is FOP?](#)
 - [What can I do with FOP?](#)
 - [What does "FOP" stand for?](#)
 - [How does FOP interact with other Apache Projects?](#)
 - [What is XSL?](#)
 - [What is XSLFO?](#)
 - [What is XSLT?](#)
 - [How can I contribute?](#)
- [2. Common stumbling blocks](#)
 - [Why does FOP insert a blank page between my page sequences?](#)
 - [I get the error: \[ERROR\]: 'master-reference' for 'fo:page-sequence' matches no 'simple-page-master' or 'page-sequence-master'](#)
 - [My PNG images don't work.](#)
 - [I get a NoClassDefFound exception.](#)
 - [I get a NoSuchMethodException or a NoSuchFieldException exception.](#)
 - [I get an OutOfMemoryException.](#)
 - [I get a MalformedURLException.](#)
 - [I get an "\[ERROR\]: null", or a NullPointerException.](#)
 - [FOP hangs. FOP does not exit.](#)
 - [FOP runs forever, writing lots of ">" to the log.](#)
 - [FOP cannot find a file for fo:external-graphics.](#)
 - [FOP does not find my fonts.](#)
 - [Keep-with-next, keep-with-previous, keep-together don't work.](#)
 - [My tables are missing, or missing their content.](#)
 - [Text overflowing table cells and the like is not clipped. Long text flows into adjacent cells/block, obscuring stuff there.](#)
 - [Page numbers are not properly right aligned.](#)
 - [A graphic is not displayed.](#)
 - [Hyphenation does not work.](#)
- [3. Embedding FOP. Using FOP in a servlet.](#)
 - [How do I use FOP in a servlet?](#)

- [How do I use FOP in a servlet with an XSLT transformation?](#)
- [How do I pass parameters to the XSLT transformation?](#)
- [How do I use my own fonts when running FOP from a servlet?](#)
- [How do I set the baseDir property in a servlet environment?](#)
- [How do I use a user configuration file from a servlet?](#)
- [I keep getting NoClassDefFound and other exceptions. How do I get FOP working for various servlet engines?](#)
- [FOP in IBM Websphere 3.5](#)
- [Can FOP be used in multithreaded environments?](#)
- [4. Batik/SVG specific questions](#)
 - [SVG text rendered in bad quality. How do I put SVG text as text into PDF?](#)
 - [How do I use FOP with SVG on headless servers?](#)
 - [FOP does not exit if a SVG is included.](#)
 - [I have problems with SVG referring to gradients etc. using "uri\(#stuff\)". I get a MalformedURLException.](#)
- [5. PDF specific \(includes Acrobat peculiarities\)](#)
 - [How do I embed fonts in PDF?](#)
 - [Some characters are not displayed, or displayed incorrectly, or displayed as "#".](#)
 - [What tools are available for post-processing my PDF document?](#)
 - [How do I add security features \(encryption, disable printing\) to my PDF document?](#)
 - [How do I add document properties \(title, author, etc.\) to my PDF document?](#)
 - [How do I add watermarks to my PDF document?](#)
 - [The PDF is printed contorted!](#)
 - [How do I control the Acrobat bookmark display?](#)
- [6. IEx specific stuff](#)
 - [The FOP servlet is called multiple times!](#)
 - [How do I print PDF directly from the browser?](#)
- [7. More general questions regarding XSLT and XSLFO and basic XML](#)
 - [\(FO\) How do I vertically center an image or a table \(or whatever\)?](#)
 - [\(FO\) How do I center a table horizontally?](#)
 - [\(FO\) How to get page numbers printed on the "outer side" of the page \(for books, for example\)?](#)
 - [\(FO\) How do I use different static content for odd and even pages?](#)
 - [\(FO\) How do I get a special header on the first page?](#)
 - [\(FO\) How do I omit my headers on a blank page? How do I write "This page is left blank" on an intentionally blank page?](#)
 - [\(FO\) How do I print an Euro sign, a checkbox or other some other special symbols?](#)
 - [\(FO\) How do I keep linebreaks and hard spaces? How do I get preformatted text displayed as expected?](#)
 - [\(FO\) How do I print the total number of pages, like in "page 1 of 12"](#)

FOP FAQ

- [\(FO\) The header overlaps body content. The body extends into the footer.](#)
- [\(FO\) How do I get lines in the document, as separators, side bars or folding marks?](#)
- [\(FO\) How do I validate my FO document?](#)
- [\(XML\) There are complaints about ; . How do I get a non-breaking space in FO?](#)
- [\(XML\) There are complaints about undefined entities, for example about ü ; which used to work in HTML. How do I enter special characters like in HTML?](#)
- [\(XML\) There are complaints about illegal characters and entities in the input.](#)
- [\(XML\) There are complaints about illegal bytes or characters in the input. There are odd characters in the result.](#)
- [8. General suggestions. How to solve problems.](#)
 - [Where to post bugs.](#)
 - [Where to post questions.](#)

2 Answers

2.1 1. General questions

2.1.1 1.1. What is FOP?

FOP is a print formatter for [XSL formatting objects](#).

It can be used to render an XML file containing XSL formatting objects into a page layout. The main target is PDF but other rendering targets are supported, such as AWT, PCL, text and direct printing.

2.1.2 1.2. What can I do with FOP?

FOP provides both an application and a library that converts an XSL FO document into paginated output.

The FOP command line application can be directly used to transform XML into PDF, PostScript, PCL and other formats, there is also an AWT based viewer integrated.

The library can be used in servlets and other Java applications.

2.1.3 1.3. What does "FOP" stand for?

It's an acronym for **F**ormating **O**bject **P**rocessor

2.1.4 1.4. How does FOP interact with other Apache Projects?

FOP is distributed with [Cocoon](#) as a PDF serializer for XSL (FO) documents.

[Batik](#) can be used with FOP to [transcode an SVG image](#) into a PDF document.

2.1.5 1.5. What is XSL?

XSL is a W3C standard concerned with publishing XML documents. It consists of two parts: [XSLT](#) and [XSLFO](#). The acronym expands to eXtensible Stylesheet Language.

2.1.6 1.6. What is XSLFO?

XSLFO is an XML vocabulary that is used to specify a pagination and other styling for page layout output. The acronym “FO” stands for **F**ormatting **O**bjects. XSLFO can be used in conjunction with [XSLT](#) to convert from any XML format into a paginated layout ready for printing or displaying.

XSLFO defines a set of elements in XML that describes the way pages are set up. The contents of the pages are filled from flows. There can be static flows that appear on every page (for headers and footers) and the main flow which fills the body of the page.

Synonyms: XSL FO, XSL (FO), XSL:FO, XSL-FO, Formatting Objects

2.1.7 1.7. What is XSLT?

XSLT describes the transformation of arbitrary XML input into other XML (like XSLFO), HTML or plain text. The “T” comes from **T**ransformation. For historical reasons, a transformation is often also called a “style sheet”.

Synonyms: XSL transformation, XSL:T, XSL style sheet.

2.1.8 1.8. How can I contribute?

There is always plenty of things to do. See [getting involved](#).

2.2 2. Common stumbling blocks

2.2.1 2.1. Why does FOP insert a blank page between my page sequences?

This is because spec conformance has been improved.

The [force-page-count property](#) controls how a FO processor pads page sequences in order to get certain page counts or last page numbers. The default is "auto". With this setting, if the next page sequence begins with an odd page number because you set the initial-page-number, and the current page sequence also ends with an odd page number, the processor inserts a blank page to keep odd and even page numbers alternating (similar for the case the current page sequence ends with an even page number and the next page sequence starts with an

FOP FAQ

even page number.

If you don't want to have this blank page, use `force-page-count="no-force"`.

2.2.2 2.2. I get the error: [ERROR]: 'master-reference' for 'fo:page-sequence' matches no 'simple-page-master' or 'page-sequence-master'

FOP was changed to be in accordance with the latest standard (see [XSL standard](#)). The page master for a `fo:page-sequence` is now refereced by the `master-reference` attribute. Replace the `master-name` attributes of your `fo:page-sequence` elements by `master-reference` attributes. You have to do this also for `fo:single-page-master-reference`, `fo:repeatable-page-master-reference` and `fo:conditional-page-master-reference` elements in you page master definitions.

See also [release notes](#).

2.2.3 2.3. My PNG images don't work.

The Jimi image library, which is by default used for processing images in PNG and other formats, was removed from the distribution for licensing reasons. You have to download and install it by yourself.

Extract the file "JimiProClasses.zip" from the archive you've downloaded, rename it to "jimi-1.0.jar" and move it to FOP's lib directory.

An alternative to Jimi is to use Sun's JAI. It is much faster, but not available for all platforms.

2.2.4 2.4. I get a NoClassDefFound exception.

This is typically a problem with your classpath.

If you are running FOP from the command line:

- Use the `fop.bat` or `fop.sh` command file from the FOP distribution. Ensure the directory where FOP and these files have been installed is the current working directory.
- If this doesn't help, check whether still all the jar files mentioned in the classpath in the `fop.bat` file are in their respective places.

If you run FOP embedded in your servlet, web application or other Java application, check the classpath of the application.

2.2.5 2.5. I get a NoSuchMethodException or a NoSuchFieldException exception.

This is usually caused by an older version of one of the FOP jars or old XML tools in the classpath. Check in particular for `parser.jar`, `jaxp.jar`, `xml4j.jar` or `lotusxsl.jar`.

Incompatible versions of Batik may also cause this problem. Use the version of Batik that comes with FOP. It is not always possible to use a more recent version of Batik.

2.2.6 2.6. I get an OutOfMemoryException.

FOP can consume quite a bit of memory, even though this has been continually improved. The memory consumption is partially inherent to the formatting process and partially caused by implementation choices. For certain layouts, all FO processors currently on the market have memory problems.

Some hints regarding your document structure:

- Increase memory settings of the JVM, see for example [the -Xmx option](#). Be aware that it is usually unwise to increase the memory allocated to the JVM beyond the amount of physical RAM, it will significantly slow down. YMMV.
- Avoid forward references, that is page number citations to pages to places on pages which follow the citation. Forward references cause all pages from the page with the reference on to be held in memory until the page with the referenced element is encountered. Common forward references are table of contents at the beginning of the document and the "[page N of TOTAL](#)" in footers. Forward references may be required by the task, however, if you are getting a memory overflow you should at least check whether this is really as necessary as claimed. A TOC, for example, could often be placed at the end of the document without diminishing its value too much, the paper can be reshuffled after printing, and you can use bookmarks in PDF.
- Avoid large images, especially if they are scaled down. Scale them outside of FOP and use the already scaled images for the FOP run. For many image formats it is mainly the size of the image file which matters, not width*height, so you can try other means like using a higher compression rate.
- Use multiple page sequences. FOP starts rendering after the end of a page sequence is encountered. While the actual rendering is done page by page, some additional memory allocated for other purposes could be freed after the page sequence has been rendered.
- Break down large tables. If you don't use table headers and footers, just start a new table every N rows. With headers and footers, consider integrating them as normal table rows, or, if they are used at page breaks, try to put the information into static content. You can use markers to change them.

There are also some bugs which cause FOP to go into a nonterminating loop, which also often results in a memory overflow. A characteristic symptom are continuous [box overflows](#). Most of them are triggered by elements not fitting in the available space, like big images and improperly specified width of nested block elements. Look for such stuff and correct it.

Reducing memory consumption in general and squishing bugs is an ongoing effort, partially addressed in the redesign.

2.2.7 2.7. I get a MalformedURLException.

What you probably think of as "file names" are usually URLs, in particular the src attribute of fo:external-graphic.

Because usage of URLs is growing, you should make yourself familiar with it. The relevant specification is [RFC 2396](#).

In a nutshell, the correct syntax for an absolute file URL is file:///some/path/file.ext on Unix and file:///z:/some/path/file.ext on Windows systems. Note the triple slash, and also that only forward slashes are used, even on windows.

A relative file URL starts with anything but a slash, and doesn't have the file: prefix, for example file.ext, path/file.ext or ../file.ext. The string file:path/file.ext is *not* a relative URL, in fact, it isn't a valid URL at all. A relative URL is subject to a resolving process, which transforms it into an absolute URL.

2.2.8 2.8. I get an "[ERROR]: null", or a NullPointerException.

This is often caused by an invalid FO document. Currently only very common errors are intercepted and produce a comprehensible error message. If you forgot container elements like fo:page-sequence or fo:flow and put blocks and inline elements directly as children of fo:root or fo:page-sequence, you'll only get a NullPointerException. Check whether your FO file has a proper structure. In some cases there are mandatory properties, like the master-reference in fo:conditional-page-master-reference, check also whether you got them right.

You may find it helpful to use the [validation tools](#) to validate your FO document. This will catch most problems, but should not be relied upon to catch all.

If you use XSLT, problems in your style sheet and in your source XML also often produce a NullPointerException. Run the transformation separately to check for this, usually you'll get a detailed error message from the XSLT processor.

If you turn on debugging with the "-d" option you may be able to see more detailed information.

2.2.9 2.9. FOP hangs. FOP does not exit.

The most likely reason is a known problem with the Java run time environment which is triggered by rendering SVGs. Suns JDK 1.4 does not have this problem. See also [FOP does not exit if a SVG is included](#).

Another possibility is that FOP went into a non terminating loop. Usually this is indicated by lots of log messages of the form "[INFO]: [NNNN]" which indicate a new page has been started or [box overflows](#). After some time, FOP will crash with an OutOfMemoryException.

If you called the FOP command line application from some other program, for example from Java using `Runtime.exec()`, it may hang while trying to write log entries to the output pipe. You have to read the FOP output regularly to empty the pipe buffer. It is best to avoid exec'ing FOP, use the library interface instead.

2.2.10 2.10. FOP runs forever, writing lots of ">" to the log.

There is something too large to fit into the intended place, usually a large image, a table whose rows are kept together or a block with a space-before or space-after larger than the page size. Catch the first page showing this phenomenon and check it. If it is not obvious which element causes the trouble, remove stuff until the problem goes away. Decrease the dimensions of the offending element or property, or increase the dimension of the enclosing element or container, or remove keep-with-* properties.

2.2.11 2.11. FOP cannot find a file for fo:external-graphics.

The src attribute of the fo:external-graphics element takes an URI, not a file name.

Relative URLs are resolved against the baseDir property of FOP. For the command line FOP application, the baseDir is the directory of the input file, either the FO file or the XML source. If FOP is used embedded in a servlet, [baseDir can be set explicitly](#). If it's not set, it is usually the current working directory of the process which runs FOP.

2.2.12 2.12. FOP does not find my fonts.

Did you get: «Failed to read font metrics file C:\foo\arial.xml : File "C:\foo\arial.xml" not found»? The value for the metrics-file attribute in the user config file is actually an URL, not a file name. Use "file:///C:/foo/arial.xml" instead.

If you used a relative URL, make sure your application has the working directory you expect. Currently FOP does not use the baseDir for resolving relative URLs pointing to font metric files.

2.2.13 2.13. Keep-with-next, keep-with-previous, keep-together don't work.

These properties are not implemented, except on table rows. In order to take advantage of them, you have to nest stuff to be kept together in a table.

The concept is called "blind table". The table is used for pure layout reasons and not obvious in the output.

FOP FAQ

An example of an image and the image caption to be kept together:

```
<fo:table table-layout="fixed" width="100%">
  <fo:table-column column-width="proportional-column-width(1)"/>
  <fo:table-body>
    <fo:table-row keep-with-next="always">
      <fo:table-cell>
        <fo:block>
          <fo:external-graphic src="foo.jpg"/>
        </fo:block>
      </fo:table-cell>
    </fo:table-row>
    <fo:table-row>
      <fo:table-cell>
        <fo:block>Image Caption</fo:block>
      </fo:table-cell>
    </fo:table-row>
  </fo:table-body>
</fo:table>
```

2.2.14 2.14. My tables are missing, or missing their content.

Check for fo:table-body around the rows. FOP up to 0.20.4 doesn't raise an error if it is omitted, it just drops the content. More recent releases will catch this problem.

Also, the fo:table-with-caption element is not implemented, tables within such an element are dropped too. FOP generates an error message for this problem. The DocBook style sheets generate fo:table-with-caption elements, so watch out.

2.2.15 2.15. Text overflowing table cells and the like is not clipped. Long text flows into adjacent cells/block, obscuring stuff there.

Clipping as specified by the overflow="hidden" is not yet implemented. If you have long words overflowing table cells, try to get them hyphenated. Artificial names like product identifications or long numbers usually aren't hyphenated. You can try special processing at XSLT level, like

- clip long text,
- explicit wrapping+clipping,
- insert zero width spaces (U+200B or ​) to allow FOP to wrap.

Check the [XSL FAQ](#) and the [XSL list archive](#) for how to perform these tasks.

2.2.16 2.16. Page numbers are not properly right aligned.

This happens for fo:page-number-citation elements if the citation occurs before FOP formatted the requested page, usually in TOC or index pages.

It is caused by the problem that FOP has to guess how much space the yet unknown page

number will occupy, and usually the guesses are somewhat off. You can try to use a non-proportional font like Courier to remedy this. However, this is likely to look ugly, and wont fix the problem completely.

2.2.17 2.17. A graphic is not displayed.

The most common reason is that the file is not found because of an empty or wrong baseDir setting, spelling errors in the file name, in particular using the wrong case, or, if the image is retrieved over HTTP, the image was not delivered because of security settings in the server, missing cookies or other authorization information, or because of server misconfigurations. One way to check this is to cut&paste the source URL from the fo:external-graphic into the Location field of a browser **on the machine where the FOP process will be running**.

Several other possibilities:

- The graphic is too large to fit into the intended space.
- Some image format subclasses can't be handled, try to convert the graphic to a format subclass known to work. (Sorry, no list of formats known to work)
- Something else obscures the graphic, for example stuff from a static content (very rare, but has happened).

2.2.18 2.18. Hyphenation does not work.

Set the language attribute somewhere. Check whether you use a language for which hyphenation is supported. Supported languages can be deduced from the files in the hyp directory of the FOP source distribution.

2.3 3. Embedding FOP. Using FOP in a servlet.

2.3.1 3.1. How do I use FOP in a servlet?

Look at the servlet example.

A rather minimal code snippet to demonstrate the basics:

```
response.setContentType("application/pdf");
Driver driver=new Driver( new InputSource("foo.fo"),
                        response.getOutputStream());
driver.setRenderer(Driver.RENDER_PDF);
driver.run();
```

Caveat: Internet Explorer will not automatically show the PDF. Thats a well known IEx problem, not with the servlet. You can download the PDF with IEx and view it later. There are other problems with this code.

Please look into [Embedding FOP](#) for all kinds of details.

2.3.2 3.2. How do I use FOP in a servlet with an XSLT transformation?

Use the TraxInputHandler if both the source XML and XSL are read from files.

A demonstration:

```
response.setContentType("application/pdf");
XSLTInputHandler input
    =new XSLTInputHandler(new File("foo.xml"), new File("foo.xsl"));
Driver driver=new Driver();
driver.setOutputStream(response.getOutputStream());
driver.setRenderer(Driver.RENDER_PDF);
driver.render(input.getParser(), input.getInputSource());
```

This minimal code snippet has the same problems as the one from the question above. Please inform yourself about the details.

If your source XML is generated on the fly, for example from a database, a web service, or another servlet, you have to create a transformer object explicitly and use a SAX event stream to feed the transformation result into FOP.

A demonstration:

```
response.setContentType("application/pdf");
Driver driver =new Driver();
driver.setOutputStream(response.getOutputStream());
driver.setRenderer(Driver.RENDER_PDF);
Transformer transformer=TransformerFactory.newInstance()
    .newTransformer(new StreamSource("foo.xsl"));
transformer.transform(xmlsource, new SAXResult(driver.getContentHandler()));
```

You don't have to call run() or render() on the driver object.

The xmlsource is a placeholder for your actual XML source. You can supply a new StreamSource(new StringReader(xmlstring)) if you have to read the XML from a string. Constructing an XML string and reparse it is not always a good idea, consider to use a SAXSource if you generate your XML. You can, of course, supply a DOMSource or whatever you like. You can also use dynamically generated XSL if you want to.

Because you have an explicit transformer object, you can set parameters for the transformation run too.

2.3.3 3.3. How do I pass parameters to the XSLT transformation?

See the end of the answer for the question above.

2.3.4 3.4. How do I use my own fonts when running FOP from a servlet?

Declare the fonts in the userconfig.xml file as usual. See [loading the user configuration](#)

[file](#) for further steps.

2.3.5 3.5. How do I set the baseDir property in a servlet environment?

Use:

```
org.apache.fop.configuration.Configuration.put("baseDir", "/my/base/dir");
```

or

```
org.apache.fop.configuration.Configuration.put("baseDir", "C:\\my\\base\\dir");
```

See [using a user configuration file](#) for caveats.

2.3.6 3.6. How do I use a user configuration file from a servlet?

Use:

```
org.apache.fop.apps.Options options = new Options(new File("userconfig.xml"));
```

No further reference to the `options` variable is necessary. It is recommended to load the user configuration file only once, preferably in the `init()` method of the servlet. If you have multiple servlets running FOP, or if you have to change the configuration often, it is best to place the configuration changing code and the FOP driver call into a synchronized method, or perhaps a singleton class, in order to avoid problems in multithreaded environments.

2.3.7 3.7. I keep getting NoClassDefFound and other exceptions. How do I get FOP working for various servlet engines?

There are various classpath issues, and possible conflicts with existing XML/XSLT libraries. Because servlet containers often use their own classloaders for loading webapps, bugs and security problems can be bothersome as well.

Tomcat comes with detailed instructions for installing FOP and Cocoon, check the documentation. There are known bugs to be circumvented, in particular in Tomcat 4.0.3.

Websphere 3.5: See next question.

2.3.8 3.8. FOP in IBM Websphere 3.5

Put a copy of a working parser in some directory where WebSphere can access it, for example, if `/usr/webapps/yourapp/servlets` is the classpath for your servlets, copy the Xerces jar into it (any other directory would also be fine). Do not add the jar to the servlet classpath, but add it to the classpath of the application server which contains your web application. In the WebSphere administration console, click on the "environment" button in the "general" tab. Fill CLASSPATH in the "variable name" box and `/usr/webapps/yourapp/servlets/Xerces.jar` (or whatever your complete path is) in the value

FOP FAQ

box, press "OK", then apply the change and restart the application server.

2.3.9 3.9. Can FOP be used in multithreaded environments?

FOP is not completely thread safe. At the very least you'll have to create a Driver object for every thread unless you prefer your threads being blocked.

Even though the relevant methods of the Driver object are synchronized, there are still problems because FOP uses static variables for configuration data and loading images. Be sure not to change the configuration data while there is a Driver object rendering. It is recommended to setup the configuration only once while initialising the servlet. If you have to change the configuration data more often, or if you have several servlets within the same webapp using FOP, consider implementing a singleton class encapsulating both the configuration settings and running FOP in synchronized methods.

2.4 4. Batik/SVG specific questions

2.4.1 4.1. SVG text rendered in bad quality. How do I put SVG text as text into PDF?

The svg text is rendered as shapes, the Acrobat viewer displays it with bad quality unless you turn on smooth line art in the Acrobat preferences. The printout is always ok, it's only the screen view which is of bad quality by default.

You can force Batik not to render SVG text by setting the strokeSVGText property to false. You can do this in the user configuration file:

```
<entry>
  <key>strokeSVGText</key>
  <value>>false</value>
</entry>
```

In a servlet environment, you can set it directly:

```
org.apache.fop.configuration.Configuration.put("strokeSVGText", Boolean.FALSE);
```

See also [using a user configuration file](#) in a servlet.

This does not work for other renderers.

2.4.2 4.2. How do I use FOP with SVG on headless servers?

Batik uses AWT classes for rendering SVG, which in turn needs an X server on Unixish systems. If you run a server without X, or if you can't connect to the X server due to security restrictions or policies, SVG rendering will fail.

There are still several options:

- If you are using JDK 1.4, start it with the `-Djava.awt.headless=true` command line option.

- Install a X server which provides an in-memory framebuffer without actually using a screen device or any display hardware, like Xvfb.
- Use a toolkit which emulates AWT without the need of an underlying X server, like [PJA](#). The PJA toolkit is free and comes with detailed installation instructions.

2.4.3 4.3. FOP does not exit if a SVG is included.

Applies to older FOP versions and JDK 1.3 and older. That's because there is an AWT thread hanging around. The solution is to put a `System.exit(0)` somewhere.

2.4.4 4.4. I have problems with SVG referring to gradients etc. using "uri(#stuff)". I get a MalformedURLException.

This is really a "resolving relative URI" problem with some twists. The problem is that the `#stuff` URL fragment identifier is resolved within the current SVG document. So the reference must be valid within the XML subset and it cannot reference other SVG documents in the same XML file. Some options to try:

- Put the SVG into a separate file and use it with `fo:external-graphics`.
- Use a separate SVG file which contains only the gradient (and perhaps other SVG stuff you want to reference) and point an absolute URL to it:
`fill="url(file:///c:/refstuff/grad.svg#PurpleToWhite)"`.
- Same as above but use a relative URL:
`fill="url(grad.svg#PurpleToWhite)"`. This may be easier to deploy.
- Make sure that the reference is valid in the current SVG document.

In any case, the referenced stuff has to be pointed to by an URL. It doesn't necessarily have to be a file URL, HTTP should also work. Also, expect a performance hit in all cases, because another XML file has to be retrieved and parsed.

Ultimately, both FOP and especially Batik should be fixed to make your code work as expected, but this will not only take some time but also some effort by a standard committee in order to make the semantics of this kind of references in embedded SVG clearer.

See also [MalformedURLException](#)

2.5 5. PDF specific (includes Acrobat peculiarities)

2.5.1 5.1. How do I embed fonts in PDF?

See the [Fonts](#) page for information about embedding fonts.

2.5.2 5.2. Some characters are not displayed, or displayed incorrectly, or displayed as "#".

FOP FAQ

There are a few fonts supplied with Acrobat Reader. If you use other fonts, the font must be available on the machine where the PDF is viewed or it must have been embedded in the PDF file. See [embedding fonts](#).

Furthermore, if you select a certain font family, the font must contain glyphs for the desired character. There is an [overview](#) available for the default PDF fonts. For most symbols, it is better to select the symbol font explicitly, for example in order to get the symbol for the mathematical empty set, write:

```
<fo:inline font-family="Symbol">&#x2205;</fo:inline>
```

The "#" shows up if the selected font does not define a glyph for the required character, for example if you try:

```
<fo:inline font-family="Helvetica">&#x2205;</fo:inline>
```

2.5.3 5.3. What tools are available for post-processing my PDF document?

- The most popular one that we are aware of is [iText](#), which has tools for adding security features, document properties, watermarks, and many other features to PDF files. FOP and iText can be integrated into one Java application, see sample code for [encryption](#). The bad news is that iText swallows PDF bookmarks.
- You can use Adobe Acrobat (the full version, not the Reader) to process the file manually or with scripting that it supports.

2.5.4 5.4. How do I add security features (encryption, disable printing) to my PDF document?

FOP does not currently support this feature. Possible workarounds include those mentioned in the [PDF Post-Processing FAQ](#).

Some sample code for encrypting a FOP generated PDF with iText to get you started:

```
public static void main(String args[]) {
    try {
        ByteArrayOutputStream fopout=new ByteArrayOutputStream();
        FileOutputStream outfile=new FileOutputStream(args[2]);
        Driver driver =new Driver();
        driver.setOutputStream(fopout);
        driver.setRenderer(Driver.RENDER_PDF);
        Transformer transformer=TransformerFactory
            .newInstance().newTransformer(new StreamSource(new File(args[1])));
        transformer.transform(new StreamSource(new File(args[0])),
            new SAXResult(driver.getContentHandler()));
        PdfReader reader = new PdfReader(fopout.toByteArray());
        int n = reader.getNumberOfPages();
        Document document = new Document(reader.getPageSizeWithRotation(1));
        PdfWriter writer = PdfWriter.getInstance(document, outfile);
        writer.setEncryption(PdfWriter.STRENGTH40BITS, "pdf", null,
            PdfWriter.AllowCopy);
        document.open();
    }
}
```

```

PdfContentByte cb = writer.getDirectContent();
PdfImportedPage page;
int rotation;
int i = 0;
while (i < n) {
    i++;
    document.setPageSize(reader.getPageSizeWithRotation(i));
    document.newPage();
    page = writer.getImportedPage(reader, i);
    rotation = reader.getPageRotation(i);
    if (rotation == 90 || rotation == 270) {
        cb.addTemplate(page, 0, -1f, 1f, 0, 0,
            reader.getPageSizeWithRotation(i).height());
    }
    else {
        cb.addTemplate(page, 1f, 0, 0, 1f, 0, 0);
    }
    System.out.println("Processed page " + i);
}
document.close();
}
catch( Exception e) {
    e.printStackTrace();
}
}

```

Check the iText tutorial and documentation for setting access flags, password, encryption strength and other parameters.

2.5.5 5.5. How do I add document properties (title, author, etc.) to my PDF document?

FOP does not currently support this feature. Possible workarounds include those mentioned in the [PDF Post-Processing FAQ](#).

2.5.6 5.6. How do I add watermarks to my PDF document?

FOP does not currently support this feature. Possible workarounds:

- Use a background image for the body region.
- See the [PDF Post-Processing FAQ](#).
- (submitted by Trevor_Campbell@kaz.com.au) Place an image in a region that overlaps the flowing text. For example, make region-before large enough to contain your image. Then include a block (if necessary, use an absolutely positioned block-container) containing the watermark image in the static-content for the region-before. Note that the image will be drawn on top of the normal content.

2.5.7 5.7. The PDF is printed contorted!

Check the paper size in Acrobat settings and the "fit to page" print setting. Contorted printing is often caused by a mismatched paper format, for example if the setting is "US Letter" but the PDF was made for A4. Sometimes also the printer driver interferes, check its settings too.

2.5.8 5.8. How do I control the Acrobat bookmark display?

FOP does not currently support this feature. Possible workarounds include those mentioned in the [PDF Post-Processing FAQ](#).

2.6 6. IEx specific stuff

2.6.1 6.1. The FOP servlet is called multiple times!

This is a problem of Internet Explorer requesting the content several times. Some suggestions:

- Use an URL ending in `.pdf`, like `http://myserver/servlet/stuff.pdf`. Yes, the servlet can be configured to handle this. If the URL has to contain parameters, try to have both the base URL as well as the last parameter end in `.pdf`, if necessary append a dummy parameter, like `http://myserver/servlet/stuff.pdf?par1=a&par2=b&d=.pdf`. The effect may depend on IEx version.
- Give IEx the opportunity to cache. In particular, ensure the server does not set any headers causing IEx not to cache the content. This may be a real problem if the document is sent over HTTPS. Consult your server manual.
- Cache in the server. Including a parameter in the URL which has a timestamp as the value may help you to decide whether a request is repeated. IEx is reported to retrieve a document up to three times, but never more often.

2.6.2 6.2. How do I print PDF directly from the browser?

It depends whether you mean "printing to a printer under control of the server" or "printing on the client's printer".

For the first problem, look at the print servlet in the FOP examples. You'll have to gather any printer settings in a HTML form and send it to the server.

For the second task, you can use some client side script to start Acrobat Reader in print mode, or use a Java applet based on the FOP print servlet. This depends heavily on the client installation and should not be relied on except in tightly controlled environments.

See also <http://marc.theaimsgroup.com/?l=fop-dev&m=101065988325115&w=2>

2.7 7. More general questions regarding XSLT and XSLFO and basic XML

2.7.1 7.1. (FO) How do I vertically center an image or a table (or whatever)?

Use `display-align="center"`. FOP implements this for block containers and table cell. A small

self-contained document centering an image on a page:

```
<?xml version="1.0"?>
<fo:root xmlns:fo="http://www.w3.org/1999/XSL/Format">
  <fo:layout-master-set>
    <fo:simple-page-master master-name="content"
      page-width="210mm" page-height="297mm">
      <fo:region-body/>
    </fo:simple-page-master>
  </fo:layout-master-set>
  <fo:page-sequence master-reference="content">
    <fo:flow flow-name="xsl-region-body">
      <fo:table table-layout="fixed" width="100%">
        <fo:table-column column-width="proportional-column-width(1)"/>
        <fo:table-body>
          <fo:table-row height="297mm">
            <fo:table-cell display-align="center">
              <fo:block text-align="center">
                <fo:external-graphic src="fop.jpg"/>
              </fo:block>
            </fo:table-cell>
          </fo:table-row>
        </fo:table-body>
      </fo:table>
    </fo:flow>
  </fo:page-sequence>
</fo:root>
```

2.7.2 7.2. (FO) How do I center a table horizontally?

You can add a column left and right with pad the table so that the visible part is centered.

```
<?xml version="1.0"?>
<fo:root xmlns:fo="http://www.w3.org/1999/XSL/Format">
  <fo:layout-master-set>
    <fo:simple-page-master master-name="content"
      page-width="210mm" page-height="297mm">
      <fo:region-body/>
    </fo:simple-page-master>
  </fo:layout-master-set>
  <fo:page-sequence master-reference="content">
    <fo:flow flow-name="xsl-region-body">
      <fo:table table-layout="fixed" width="100%">
        <fo:table-column column-width="proportional-column-width(1)"/>
        <fo:table-column column-width="100mm"/>
        <fo:table-column column-width="proportional-column-width(1)"/>
        <fo:table-body>
          <fo:table-row>
            <fo:table-cell/>
            <fo:table-cell>
              <fo:block>foo</fo:block>
            </fo:table-cell>
            <fo:table-cell/>
          </fo:table-row>
        </fo:table-body>
      </fo:table>
    </fo:flow>
  </fo:page-sequence>
</fo:root>
```

FOP FAQ

```
</fo:table>
</fo:flow>
</fo:page-sequence>
</fo:root>
```

If your table is more complicated, or if defining borders on individual cells becomes too much work, use the code above and nest your table within the middle cell.

2.7.3 7.3. (FO) How to get page numbers printed on the "outer side" of the page (for books, for example)?

Place different static content on [odd and even pages](#).

2.7.4 7.4. (FO) How do I use different static content for odd and even pages?

There are examples in the FO distribution and in the [XSL FAQ FO section](#).

Define a page master with alternating pages masters for odd and even pages, specify appropriate regions in these page masters, and be sure to give them different names. You use these names to put different static content in these regions. A self contained document demonstrating this:

```
<?xml version="1.0"?>
<fo:root xmlns:fo="http://www.w3.org/1999/XSL/Format">
  <fo:layout-master-set>
    <fo:simple-page-master master-name="even"
      page-height="297mm" page-width="210mm"
      margin-top="20mm" margin-bottom="20mm"
      margin-left="25mm" margin-right="25mm">
      <fo:region-body margin-bottom="20mm"/>
      <fo:region-after region-name="footer-even" extent="20mm"/>
    </fo:simple-page-master>
    <fo:simple-page-master master-name="odd"
      page-height="297mm" page-width="210mm"
      margin-top="20mm" margin-bottom="20mm"
      margin-left="25mm" margin-right="25mm">
      <fo:region-body margin-bottom="20mm"/>
      <fo:region-after region-name="footer-odd" extent="20mm"/>
    </fo:simple-page-master>
  </fo:layout-master-set>
  <fo:page-sequence-master master-name="document">
    <fo:repeatable-page-master-alternatives>
      <fo:conditional-page-master-reference odd-or-even="even"
        master-reference="even"/>
      <fo:conditional-page-master-reference odd-or-even="odd"
        master-reference="odd"/>
    </fo:repeatable-page-master-alternatives>
  </fo:page-sequence-master>
  <fo:page-sequence master-reference="document">
    <fo:static-content flow-name="footer-even">
      <fo:block text-align="start"><fo:page-number/></fo:block>
    </fo:static-content>
```

```

<fo:static-content flow-name="footer-odd">
  <fo:block text-align-last="end"><fo:page-number/></fo:block>
</fo:static-content>
<fo:flow flow-name="xsl-region-body">
  <fo:block/>
  <fo:block break-before="page"/>
</fo:flow>
</fo:page-sequence>
</fo:root>

```

2.7.5 7.5. (FO) How do I get a special header on the first page?

You can insert it into the flow instead of the static content. Alternatively, use a page master referring to different page masters for the first page and the rest. It is quite similar to the odd/even page mechanism. A code sample:

```

<?xml version="1.0"?>
<fo:root xmlns:fo="http://www.w3.org/1999/XSL/Format">
  <fo:layout-master-set>
    <fo:simple-page-master master-name="first"
      page-height="297mm" page-width="210mm"
      margin-top="20mm" margin-bottom="20mm"
      margin-left="25mm" margin-right="25mm">
      <fo:region-body margin-bottom="20mm"/>
      <fo:region-after region-name="footer-first" extent="20mm"/>
    </fo:simple-page-master>
    <fo:simple-page-master master-name="rest"
      page-height="297mm" page-width="210mm"
      margin-top="20mm" margin-bottom="20mm"
      margin-left="25mm" margin-right="25mm">
      <fo:region-body margin-bottom="20mm"/>
      <fo:region-after region-name="footer-rest" extent="20mm"/>
    </fo:simple-page-master>
    <fo:page-sequence-master master-name="document">
      <fo:repeatable-page-master-alternatives>
        <fo:conditional-page-master-reference page-position="first"
          master-reference="first"/>
        <fo:conditional-page-master-reference page-position="rest"
          master-reference="rest"/>
      </fo:repeatable-page-master-alternatives>
    </fo:page-sequence-master>
  </fo:layout-master-set>
  <fo:page-sequence master-reference="document">
    <fo:static-content flow-name="footer-first">
      <fo:block text-align="center">First page.</fo:block>
    </fo:static-content>
    <fo:static-content flow-name="footer-rest">
      <fo:block text-align-last="center">Other page.</fo:block>
    </fo:static-content>
    <fo:flow flow-name="xsl-region-body">
      <fo:block/>
      <fo:block break-before="page"/>
      <fo:block break-before="page"/>
    </fo:flow>
  </fo:page-sequence>
</fo:root>

```

```
</fo:page-sequence>
</fo:root>
```

2.7.6 7.6. (FO) How do I omit my headers on a blank page? How do I write "This page is left blank" on an intentionally blank page?

A blank page can be forced by a `break-before="page-even"` or similar properties, or by a `force-page-count="end-on-odd"` on a page sequence, which ensures a new chapter or something starts on the preferred page.

You can define a conditional page master with a page master specific for blank pages. This allows you to specify static content for blank pages (by definition, a page is blank if no content from a flow is rendered on the page). You can omit your normal headers and footers, and use for example an extended header to print the ".left blank" statement.

```
<?xml version="1.0"?>
<fo:root xmlns:fo="http://www.w3.org/1999/XSL/Format">
  <fo:layout-master-set>
    <fo:simple-page-master master-name="normal"
      page-height="297mm" page-width="210mm"
      margin-top="20mm" margin-bottom="20mm"
      margin-left="25mm" margin-right="25mm">
      <fo:region-body margin-bottom="20mm"/>
      <fo:region-after region-name="footer-normal" extent="20mm"/>
    </fo:simple-page-master>
    <fo:simple-page-master master-name="blank"
      page-height="297mm" page-width="210mm"
      margin-top="20mm" margin-bottom="20mm"
      margin-left="25mm" margin-right="25mm">
      <fo:region-body/>
      <fo:region-before region-name="header-blank" extent="297mm"/>
    </fo:simple-page-master>
  </fo:layout-master-set>
  <fo:page-sequence-master master-name="document">
    <fo:repeatable-page-master-alternatives>
      <fo:conditional-page-master-reference blank-or-not-blank="not-blank"
        master-reference="normal"/>
      <fo:conditional-page-master-reference blank-or-not-blank="blank"
        master-reference="blank"/>
    </fo:repeatable-page-master-alternatives>
  </fo:page-sequence-master>
  <fo:page-sequence master-reference="document" force-page-count="end-on-even">
    <fo:static-content flow-name="footer-normal">
      <fo:block text-align="center">Normal footer</fo:block>
    </fo:static-content>
    <fo:static-content flow-name="header-blank">
      <fo:block space-before="100mm" text-align-last="center">
        Intentionally left blank.</fo:block>
    </fo:static-content>
    <fo:flow flow-name="xsl-region-body">
      <fo:block/>
    </fo:flow>
```

```
</fo:page-sequence>
</fo:root>
```

2.7.7 7.7. (FO) How do I print an Euro sign, a checkbox or other some other special symbols?

Try to look the character up in the Unicode reference at the [Unicode Consortium](#), in particular search the [reference by name](#).

Use [XML character references](#) to put the character into your source XML, XSLT or FO.

For example, the following will result in an Euro sign:

```
&#x20AC;
```

The selected font family must have a glyph for the character you want to show. This is actually a somewhat tricky issue, especially for symbol characters.

Some environments provide also a character table utility (like Win2K or WinXP), which can also help you to get an idea what glyphs are available in a certain font.

Alternative: Use an embedded graphic: GIF, PNG, SVG, whatever.

2.7.8 7.8. (FO) How do I keep linebreaks and hard spaces? How do I get preformatted text displayed as expected?

The specification provides some properties for this: [white space collapsing](#) and [line feed treatment](#). In FOP, use `white-space-collapse="false"` on an enclosing block. This will also preserve line breaks (which is actually a bug, expect this to be changed).

2.7.9 7.9. (FO) How do I print the total number of pages, like in "page 1 of 12"

This is an XSL FAQ.

Put an empty block with an id at the end of the flow:

```
<fo:flow ...>
  ...
  <fo:block id="last-page"/>
</fo:flow>
```

Get the number of the last page as follows:

```
<fo:page-number-citation ref-id="last-page"/>
```

This does not work for all problems, for example if you have multiple page sequences, an initial page number different from 1, or if you force a certain page count, thereby producing blank pages at the end.

There is no reliable way to get the real total page count with FO mechanisms, you can only get *page numbers*.

FOP FAQ

The FOP library provides a method to get the total page count after a FO document has been rendered. You can implement your own wrapper to do a dummy rendering, inquire the total page count and then perform the real rendering, passing the total page count to the XSLT processor to splice it into the generated FO. A sample code:

```
import org.apache.fop.apps.*;
import org.xml.sax.*;
import java.io.*;
import javax.xml.transform.*;
import javax.xml.transform.sax.*;
import javax.xml.transform.stream.*;

class rendtest {

    public static void main(String args[]) {
        try {
            Driver driver=new Driver();
            driver.setOutputStream(new FileOutputStream(args[2]));
            driver.setRenderer(Driver.RENDER_PDF);
            Transformer transformer=TransformerFactory.newInstance()
                .newTransformer(new StreamSource(new File(args[1])));
            transformer.setParameter("page-count", "#");
            transformer.transform(new StreamSource(new File(args[0])),
                new SAXResult(driver.getContentHandler()));
            String pageCount=Integer.toString(driver.getResults().getPageCount());
            driver=new Driver();
            driver.setOutputStream(new FileOutputStream(args[2]));
            driver.setRenderer(Driver.RENDER_PDF);
            transformer=TransformerFactory.newInstance()
                .newTransformer(new StreamSource(new File(args[1])));
            transformer.setParameter("page-count",pageCount);
            transformer.transform(new StreamSource(new File(args[0])),
                new SAXResult(driver.getContentHandler()));
        }
        catch( Exception e) {
            e.printStackTrace();
        }
    }
}
```

Declare and use the parameter "page-count" in your XSLT. Be aware you may run into convergence problems: replacing the "#" placeholder from the first run by the actual page count may change it.

2.7.10 7.10. (FO) The header overlaps body content. The body extends into the footer.

Contrary to popular opinion, the regions on a page may overlap. Defining a certain body region does not automatically constrain other regions, this has to be done explicitly.

If you have a header region with an extent of 20mm, you should define a margin for the body region of at least 20mm too, otherwise the header content may overwrite some stuff in the

body region. This applies similarly to the extent of the after region and the bottom margin of the body region.

The overlap effect can be used creatively for some purposes.

2.7.11 7.11. (FO) How do I get lines in the document, as separators, side bars or folding marks?

Several possibilities:

- Use fo:leader (look up the details in the [XSLFO specification](#), or use a book). For horizontal lines only.
- Use a solid border on a suitable fo:block. Horizontal and vertical lines only.
- Insert a graphic. GIF, PNG SVG, whatever.

2.7.12 7.12. (FO) How do I validate my FO document?

[RenderX](#) has provided an [Unofficial DTD for FO Documents](#). This document may be helpful in validating general FO issues.

FOP also maintains an [Unofficial FOP Schema](#) in the FOP CVS Repository. This document can be used either to validate against the FO standard, or against the actual FOP implementation. See the notes near the beginning of the document for instructions on how to use it.

2.7.13 7.13. (XML) There are complaints about . How do I get a non-breaking space in FO?

Use everywhere. In your own XML, you could also use a DTD which declares the entity.

2.7.14 7.14. (XML) There are complaints about undefined entities, for example about ü which used to work in HTML. How do I enter special characters like in HTML?

Don't use names as in HTML, use numbers (unless you have a DTD which declares the entities). For predefined HTML entities and their Unicode codepoints see [Character entity references in HTML 4](#)

2.7.15 7.15. (XML) There are complaints about illegal characters and entities in the input.

Make sure ampersands in text and attributes are written as &, "<" is written as < and ">" as >. It's not necessary everywhere but do it just to be sure.

FOP FAQ

The XML parser should give the proper line and possibly column for offending characters.

Refer to the [XML specification](#) or to a good tutorial for details of the XML file format.

2.7.16 7.16. (XML) There are complaints about illegal bytes or characters in the input. There are odd characters in the result.

Usually, this is a character encoding problem. See [XSL FAQ](#). Many software packages producing XML, in particular most XSLT processors, produce by default UTF-8 encoded files. If you view them with something not aware of the encoding, like Notepad for Win95/98/ME/NT, funny characters are displayed. A Å is a giveaway.

2.8 8. General suggestions. How to solve problems.

2.8.1 8.1. Where to post bugs.

See [documentation](#). See also "[where to post questions](#)".

2.8.2 8.2. Where to post questions.

Decide where to post:

- You get exceptions. First, check the FAQ whether the exception is mentioned. `ClassNotFoundException`, `NoSuchMethodException` and `NoSuchFieldException` problems are almost always a problem with the local environment, try to get local help first. Check [bugzilla](#). If still not found, post to fop-dev.
- Something doesn't work with FOP but works with another formatter (AntennaHouse, PassiveTex). Check whether this is already mentioned in the release notes, the FOP limitations document or the FAQ. Post to fop-dev or open a bug on [bugzilla](#).
- Question about how to use FOP, how to perform certain tasks with FOP or how to integrate FOP into another application should be posted to fop-user.
- XSLT specific stuff should go to the [XSL list](#). This includes problems with the language and XSLT HOW-TOs.
- Problems specific to a certain XSLT processor, like Xalan, Saxon or MSXML, should be handled by processor specific lists. This includes problems with deployment, processor specific extensions, suspected bugs and processor specific APIs. Note that JDK 1.4 comes with an XML parser and an XSLT processor which are older versions of Xerces and Xalan, respectively, and both have a number of annoying bugs. See \$\$\$FIXME on how to use more recent versions or other packages instead.
- Problems with servlet containers should be asked on the vendor specific lists for these software packages.
- More general questions regarding Java, including deployment, Java APIs, classpath issues and property definitions should be redirected to some Java specific list.