

How to adapt your existing XSLT stylesheet to the specificities of XMLmind XSL-FO Converter

Hussein Shafie

XMLmind Software

October 16, 2020

Table of Contents

General recommendations	1
Make <code>fo:list-blocks</code> behave like proper lists	2
Workaround the problem of <code>fo:block</code> divisions having background colors and/or borders	5
Workaround the problem of <code>fo:leaders</code>	6
Mark your headings	7
Do not forget about the spell checker	9

General recommendations

All XSL-FO processors (e.g. [Apache FOP](#), [RenderX XEP](#), [Antenna House XSL Formatter](#) or our own [XMLmind XSL-FO Converter](#)) have their limitations and their specificities. For example, Apache FOP does not support `table-layout="auto"` in `fo:tables`. This implies that you'll always have to adapt your existing XSLT stylesheet when you switch to a new XSL-FO processor.

If you want your XSLT stylesheet to work fine whatever the XSL-FO processor being used, please stick to the following recommendations:

1. Pass a `$foProcessor` parameter (value: `FOP`, `XEP`, `AHF` or our own `XFC`)^[1] to your XSLT stylesheet in order to implement code which depends on the XSL-FO processor being used. Example:

```
1 <fo:table xsl:use-attribute-sets="tgroup">
2   <xsl:call-template name="commonAttributes"/>
3   ...
4   <xsl:when test="$foProcessor eq 'FOP'">
5     <xsl:attribute name="table-layout">fixed</xsl:attribute>
6     ...
```

2. Keep the XSL-FO you generate with your XSLT stylesheet as simple as possible.
3. Stick to [XSL-FO version 1.0](#) as very few XSL-FO processors fully support [XSL-FO version 1.1](#)^[2].
4. When you find something which seems wrong with an XSL-FO processor, refer to its *conformance statement* because it is generally a documented limitation. Ours is found in "[XMLmind XSL-FO Converter Conformance Statement](#)".
5. When really needed to, use an extension to XSL-FO. Our extensions are introduced in the following sections of this document and are extensively documented in "[Implementation specificities](#)".
6. Test the output of your XSLT stylesheet with different XSL-FO processors (e.g. [XMLmind XSL-FO Converter](#) and [Apache FOP](#)). This helps finding validity problems in the XSL-FO you generate.

[1]Or use one XSLT stylesheet parameter per XSL-FO processor: `fop1-extensions=1`, `xep-extensions=1`, `axf-extensions=1`, etc, as done in the [DocBook XSL Stylesheets](#).

[2]XMLmind XSL-FO Converter does not support XSL-FO version 1.1 at all.

Make `fo:list-blocks` behave like proper lists

When your XSLT stylesheet generates a `fo:list-block`, XMLmind XSL-FO Converter (**XFC** for short) translates it to a sequence of styled paragraphs looking like specified list items. However, you'll generally want these list items to behave as expected when edited in the word processor. For example, if a list item starts with a bullet, pressing **ENTER** at the end of this list item creates a new list item also starting with a bullet.

For **XFC**, achieving to generate styled paragraphs having a list item behavior is far from being obvious as a `fo:list-block/fo:list-item/fo:list-item-label` may contain any text you want. For example, a `fo:list-item-label` may contain: "`~1~`", "`~2~`", "`~3~`", etc, or it may contain "`5-A-a`", "`5-A-b`", "`5-A-c`", etc.

By default, **XFC** tries to infer the type of the list by examining its first `fo:list-item-label`. However, this will work only if this first `fo:list-item-label` contains the most common bullets ("`-`", "`*`", "`•`", etc) or the simplest numberings ("`1`", "`1.`", "`1)`", "`A`", "`A.`", "`A)`", etc). For example, **XFC** heuristics fail for "`~1~`" and "`5-A-a`".

Therefore it is recommended no to rely on **XFC** heuristics and instead, explicitly specify the *label format* used for all the items of a `fo:list-block`. This is done using `fo:list-block` extension attribute `xfc:label-format`^[3]. Examples:

```
xfc:label-format="~%{decimal}~"
```

Corresponding labels are: "`~1~`", "`~2~`", "`~3~`", etc.

```
xfc:label-format="%{decimal;start=5}-"
```

Corresponding labels are: "`5-`", "`6-`", "`7-`", etc.

```
xfc:label-format="%{upper-alpha;inherit}-"
```

Corresponding labels for nested `fo:list-block` are: "`5-A-`", "`5-B-`", "`5-C-`", etc.

```
xfc:label-format="%{lower-alpha;inherit})"
```

Corresponding labels for nested `fo:list-block` are: "`5-A-a)`", "`5-A-b)`", "`5-A-c)`", etc.



Note

Specified extension attribute `xfc:label-format` supersedes whatever text is found in the `fo:list-item-label` elements of a `fo:list-block`.

Actual XSLT code making use of extension attribute `xfc:label-format`: excerpts from the [DocBook XSL Stylesheets](#) as modified by XMLmind Software:

```
1 <fo:list-block id="{ $id}" xsl:use-attribute-sets="orderedlist.properties">
2   <xsl:attribute name="provisional-distance-between-starts">
3     <xsl:value-of select="$label-width"/>
4   </xsl:attribute>
5
6   <xsl:call-template name="xfcLabelFormat">
```

[3]The "xfc" prefix is bound to the "<http://www.xmlmind.com/foconverter/xsl/extensions>" namespace.

```
7     <xsl:with-param name="userLabelWidth" select="$label-width"/>
8 </xsl:call-template>
9 ...
```

where XSLT named template "xfcLabelFormat" is defined as:

```
1 <xsl:template name="xfcLabelFormat">
2   <xsl:param name="userLabelWidth" select="$orderedlist.label.width"/>
3
4   <xsl:if test="$xfc.extensions = 1 or
5     contains($xfc.extensions, 'label-format')">
6     <xsl:variable name="labelFormat">
7       <xsl:variable name="num">
8         <xsl:choose>
9           <xsl:when test="@numeration = 'arabic'">decimal</xsl:when>
10          <xsl:when test="@numeration = 'loweralpha'">lower-alpha</xsl:when>
11          <xsl:when test="@numeration = 'lowerroman'">lower-roman</xsl:when>
12          <xsl:when test="@numeration = 'upperalpha'">upper-alpha</xsl:when>
13          <xsl:when test="@numeration = 'upperroman'">upper-roman</xsl:when>
14          <xsl:otherwise>decimal</xsl:otherwise>
15        </xsl:choose>
16      </xsl:variable>
17
18      <xsl:variable name="start">
19        <xsl:if test="@continuation = 'continues'">
20          <xsl:variable name="startNum">
21            <xsl:call-template name="orderedlist-starting-number"/>
22          </xsl:variable>
23
24          <xsl:if test="$startNum > 1">
25            <xsl:value-of select="concat(';start=', $startNum)"/>
26          </xsl:if>
27        </xsl:if>
28      </xsl:variable>
29
30      <xsl:variable name="inherit">
31        <xsl:if test="@inheritnum = 'inherit'">
32          <xsl:value-of select="';inherit'"/>
33        </xsl:if>
34      </xsl:variable>
35
36      <xsl:value-of select="concat('%{', $num, $start, $inherit, '}.')"/>
37    </xsl:variable>
38
39    <xsl:attribute name="xfc:label-format"
40      xmlns:xfc="http://www.xmlmind.com/foconverter/xsl/extensions">
41      <xsl:value-of select="$labelFormat"/>
```

```
42     </xsl:attribute>  
43 </xsl:if>  
44     ...  
45 </xsl:template>
```

More information about extension attribute `xfc:label-format`.

Workaround the problem of fo:block divisions having background colors and/or borders

An XSLT stylesheet often translates a note, admonition or sidebar, that is, a *division* possibly containing paragraphs, lists and tables, to a fo:block possibly containing fo:blocks, fo:list-blocks and fo:tables. The problem is that this easy and straightforward approach is not compatible with the document model of most word processors.

For a word processor like MS-Word, a document is a *flat list*^[4] of styled paragraphs and styled tables. Of course it's the job of XMLmind XSL-FO Converter (**XFC** for short) to cope with the specificities of its output formats. However when the fo:block division is given a background color and/or borders (which is often the case), this gives very poor results.

A workaround for this **XFC** limitation is to modify the XSLT stylesheet to make it translate a note, admonition or sidebar to a fo:table containing a single fo:table-cell^[5]. This workaround works well but is tedious to implement "by hand".

Enters fo:block extension attribute xfc:render-as-table. This boolean extension attribute simply instructs **XFC** to process a fo:block having attribute xfc:render-as-table="true" to as if it were a fo:table containing a single fo:table-cell. In other words, it makes the above workaround very easy to implement.

Actual XSLT code making use of extension attribute xfc:render-as-table: excerpts from the XSLT 2.0 stylesheets of XMLmind DITA Converter:

```
1 <fo:block xsl:use-attribute-sets="note note-with-borders">
2   <xsl:if test="$foProcessor eq 'XFC'">
3     <xsl:attribute name="xfc:render-as-table"
4       select="if ($xfcRenderAsTable = 'note')
5         then 'true'
6         else 'false'"/>
7   </xsl:if>
8
9   <xsl:call-template name="commonAttributes"/>
10
11  <fo:block xsl:use-attribute-sets="note-head">
12    <xsl:value-of select="$label" />
13  </fo:block>
14  ...
```

More information about extension attribute xfc:render-as-table.

[4]A paragraph may *not* contain sub-paragraphs and tables.

[5]A table cell may, of course, contain paragraphs and sub-tables.

Workaround the problem of fo:leaders

XSLT stylesheets often automatically generate a table of content, a list of figures, a back of the book index, etc. These lists always reference page numbers and these page numbers are generally aligned to the right by the means of fo:leader elements. Example:

```
1 <fo:block ...>
2   <fo:inline>Part I. </fo:inline>
3   <fo:basic-link internal-destination="part1">Part 1</fo:basic-link>
4   <fo:leader leader-pattern="dots" keep-with-next.within-line="always" />
5   <fo:page-number-citation ref-id="part1" />
6 </fo:block>
7
8 <fo:block ...>
9   <fo:inline>Chapter 1. </fo:inline>
10  <fo:basic-link internal-destination="chapter1">Chapter 1</fo:basic-link>
11  <fo:leader leader-pattern="dots" keep-with-next.within-line="always" />
12  <fo:page-number-citation ref-id="chapter1" />
13 </fo:block>
```

The RTF, WML, DOCX and ODT file formats do not support leader objects. That's why XMLmind XSL-FO Converter (**XFC** for short) implements fo:leaders by means of tab stops. *This implies that you'll have to help XFC position these tab stops.* This is done using fo:leader extension attributes xfc:tab-position and xfc:tab-align.

Actual XSLT code making use of these extension attributes: excerpts from the XSLT 2.0 stylesheets of XMLmind DITA Converter:

```
1 <xsl:template match="ditac:tocEntry" mode="fmbmTOC">
2   ...
3     <fo:leader leader-pattern="dots"
4       keep-with-next.within-line="always">
5       <xsl:if test="$foProcessor eq 'XFC'">
6         <xsl:attribute name="xfc:tab-position">-30pt</xsl:attribute>
7         <xsl:attribute name="xfc:tab-align">right</xsl:attribute>
8       </xsl:if>
9     </fo:leader>
10    <xsl:text> </xsl:text>
11    <fo:page-number-citation ref-id="{ $id }" />
```

- xfc:tab-position="-30pt" specifies that the tab position is 30pt before to the right margin. (A positive value specifies the tab position relative to the left margin.)
- xfc:tab-align="right" specifies that the content following the tab, that is, fo:page-number-citation, is right-aligned. (By default, the content following a tab is left aligned.)

More information about extension attributes xfc:tab-position and xfc:tab-align.

Mark your headings

The RTF, WML, DOCX or ODT document you'll generate using XMLmind XSL-FO Converter will be nicer to edit and navigate for the user of the word processor if you mark chapter and section titles as being *headings*. This is done using `fo:block` extension attribute `xfc:outline-level`.

The value of this attribute is an integer between 1 and 9. A top-level heading, for example, the title of the chapter of a book must be given `xfc:outline-level="1"`. The title of a section directly contained in a chapter must be given `xfc:outline-level="2"`. The title of a sub-section must be given `xfc:outline-level="3"` and so forth.

Actual XSLT code making use of extension attribute `xfc:outline-level`: excerpts from XMLmind's XSLT 2.0 stylesheets converting XHTML to XSL-FO:

```
1 <xsl:template match="html:h1">
2   <fo:block xsl:use-attribute-sets="h1">
3     ...
4     <xsl:call-template name="commonAttributes"/>
5     <xsl:call-template name="xfcOutlineLevel"/>
6   <xsl:apply-templates/>
7 </fo:block>
8 </xsl:template>
```

where XSLT template "xfcOutlineLevel" is defined as:

```
1 <xsl:template name="xfcOutlineLevel">
2   <xsl:if test="$foProcessor eq 'XFC' and $set-outline-level eq 'yes'">
3     <xsl:variable name="sectioningRoot"
4       select="(ancestor::*[self::html:body or
5         self::html:blockquote or
6         self::html:details or
7         self::html:dialog or
8         self::html:fieldset or
9         self::html:figure or
10        self::html:td])[last()]" />
11
12     <!-- Ignore headings which are contained in sectioning roots
13          other than the body (e.g. a legend). -->
14     <xsl:variable name="isHeading"
15       select="exists($sectioningRoot/self::html:body) or
16         ($root-id ne '' and
17         exists($sectioningRoot/descendant-or-self::*[@id eq $root-id])" />
18
19     <xsl:if test="$isHeading">
20       <!-- This a gross simplification as the type of heading being used
21            (h1, h2, ..., h6) does not always specify the outline level. -->
22       <xsl:attribute name="xfc:outline-level"
23         select="substring-after(local-name(), 'h')"/>
```

```
24     </xsl:if>
25     </xsl:if>
26 </xsl:template>
```

More information about extension attribute `xfc:outline-level`.

Do not forget about the spell checker

Do not forget that word processors always have spell checkers. Therefore if you don't want the user see zillions of errors after opening in a word processor a document created using XMLmind XSL-FO Converter, please make sure to follow these recommendations:

1. Attribute `xml:lang` (or equivalently attribute `language` AND attribute `country`) *must be specified at least on the `fo:root` element.*
2. Your XSLT stylesheet must process `xml:lang` attributes or `lang` attributes found on the source XML elements by adding equivalent `xml:lang` attributes to the target XSL-FO elements.

Excerpts from the XSLT 2.0 stylesheets of [XMLmind Ebook Compiler](#):

```
1 <xsl:template match="html:html">
2   <fo:root>
3     <xsl:call-template name="localizationAttributes"/>
4   ...
```

and (for *all* the templates matching an XHTML element; below is just the template matching HTML span):

```
1 <xsl:template match="html:span">
2   <fo:inline xsl:use-attribute-sets="span">
3     ...
4     <xsl:call-template name="commonAttributes"/>
5     <xsl:apply-templates/>
6   </fo:inline>
7 </xsl:template>
```

where XSLT templates "localizationAttributes" and "commonAttributes" are defined as:

```
1 <xsl:template name="commonAttributes">
2   <xsl:call-template name="idAttribute"/>
3   <xsl:call-template name="localizationAttributes"/>
4   <xsl:call-template name="xmlSpaceAttribute"/>
5 </xsl:template>
6
7 <xsl:template name="localizationAttributes">
8   <xsl:choose>
9     <xsl:when test="exists(@lang)">
10      <xsl:attribute name="xml:lang" select="string(@lang)"/>
11    </xsl:when>
12    <xsl:otherwise>
13      <xsl:copy-of select="@xml:lang"/>
14    </xsl:otherwise>
15  </xsl:choose>
16 </xsl:template>
```

More information in "[Adding language information to the files created by XFC](#)".