Methods and Tools for Management Information Systems

Lecture 7

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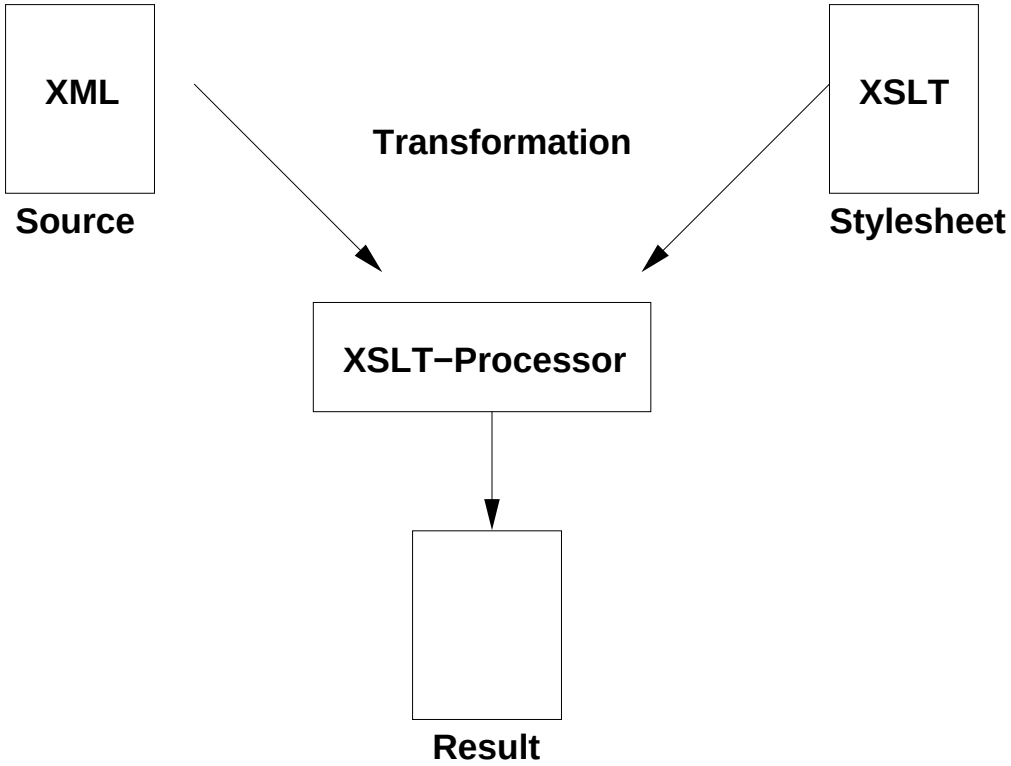
Otto-von-Guericke-Universität Magdeburg
Arbeitsgruppe Wirtschaftsinformatik - Managementinformationssysteme - Dipl.-Kfm. Henner Graubitz

XSLT

- XSLT (Extensible Stylesheet Language Transformations) is a standardised, declarative transformation language to describe and control the transformation of XML documents into other formats, such as HTML, XHTML or text via an XSLT processor
- The XSLT processor converts a source XML document into a result document using an XSL stylesheet document (a sort of template) $\Rightarrow$ the XSL document is written in XML too


Transformation



XSLT Processors

- MS IE 6.0 or higher
  - Includes one
- Oxygen XML editor and debugger for Eclipse
  - http://www.oxygenxml.com/
- Apache Cocoon (including Xalan XSLT processor)
  - http://cocoon.apache.org/
- PHP / Sablotron XSLT support
  - http://at.php.net/xslt
- Saxon XSLT / XQuery processor
  - http://saxon.sourceforge.net/


Resources

- XSLT reference
  - http://www.w3schools.com/xsl/xsl_w3celementref.asp
- Specifications
  - http://www.w3.org/Style/XSL/
  - http://www.w3.org/TR/xslt20/
- Literature
  - Bongers, F. (2004): XSLT 2.0 -Das umfassende Handbuch zu XSLT 2.0, XPath 2.0 und Saxon 7. Galileo Press.
  - Skulschus, M. / Wiederstein, M. (2005): XSLT und XPath für HTML, Text und XML. Mitp.

Flexibility

- The content of the XML document can be re-structured
- Elements, attributes, processing directives, namespaces and comments can be accessed
- The data can be filtered or sorted
- Variables and loops can be used
- CSS formatting is available when transforming to HTML / XHTML
- Because of many functions XSL is a very complex language


Integrating XML and XSL

- Remember the processing directive used for integrating CSS files into XML documents:

```
<?xml-stylesheet type="text/css" href="filename"?>
```

- For XSL files a similar processing directive is set within the XML file:
  - `<?xml-stylesheet type="text/xsl" href="filename"?>`
  - When declaring several XSL stylesheets only the first one is used
  - When declaring XSL and CSS stylesheets only the XSL stylesheet is used


- The components of an XML document are then represented in XSLT by a tree structure (similar to the DOM's node structure); the whole XML document has its equivalent in the XSLT root node


XPath

- For navigation within the tree and accessing the included information XPath (XML Path Language) is used
- XPath is a path description language for XML documents and a derived subset of XQuery
  - http://www.w3.org/TR/xpath
  - http://www.w3.org/TR/xquery
- XSLT 1.0 only works with XPath 1.0; XSLT 2.0 only works with XPath 2.0
- XPath is mainly used within XSLT


XSL Stylesheet Structure (I)

- File structure
  - ```
    <?xml version="1.0"?>
    <xsl:stylesheet version="1.0"
    xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
    <xsl:template match="/">
    <!-- (corresponds to the XSLT root node) -->
    ... content ...
    </xsl:template>
    </xsl:stylesheet>
    ```
    ```

XSL Stylesheet Structure (II)

- Content structure (transforming to HTML / XHTML)
  - ```
    <html>
    <head>
    ....
    </head>
    <body>
    <span optional_CSS_instructions>optional_content
    <xsl:value-of select="element_name"/>

    ....
    </body>
    </html>
    ```
    ```

Example – XML Document

- XML document
  - ```
    <library>
    <book>
    <author>Mark Twain</author>
    <title>Huckleberry Finn</title>
    <pages>334</pages>
    </book>
    ....
    </library>
    ```
    ```

Example – XSL Stylesheet

- XSL document
  - ```
    Author:
    <xsl:value-of select="library/book/author"/>
    <br />
    Title:
    <xsl:value-of select="library/book/title"/>

    ```
- The element path must start with the template match node (unless the XSLT processor already moved to another node (the so-called context node) while processing the stylesheet)
    ```

Loops (I)

- To show all elements of a data set
  - ```
    <xsl:for-each select="library/book" >
    Author: <xsl:value-of select="author"/>
    <br />
    Title: <xsl:value-of select="title"/>
    <br />
    Pages: <xsl:value-of select="pages"/>

    </xsl:for-each>
    ```
- Now the actual node (context node) is library/book, selected in the xsl:for-each-statement, therefore only the path from that node onwards has to be specified
    ```

Loops (II)

- Loops can also be created by defining more than one template in a stylesheet
  - ```
    <xsl:template match="/">
    <body>
    <xsl:apply-templates select="library/book"/>
    </body>
    </xsl:template>
    <xsl:template match="book">

    Author: <xsl:value-of select="author"/>
    <br />
    Title: <xsl:value-of select="title"/>

    </xsl:template>
    ```



    ```

Select-& Match-Terms (I)

Path	Meaning	Example
name	the element with the specified name	book
/ (within a path)	separates the levels of a path	book/title
/ (at the beginning of a path)	the XSLT root node	/library

Select-& Match-Terms (II)

Path	Meaning	Example
//	recursion; the following term means all subordinated elements on any level	*library//author* (means all authors in the library)
. (select only)	the actual context node	<xsl:value-of select=" ." /> (returns the context node)
.. (select only)	the superordinated node to a context node	../author (each author-element on the same level as

Select-& Match-Terms (II)

Path	Meaning	Example
*	each element	book/* (each element subordinated to book)
@name	the attribute with the specified name	book/@available (each attribute with the specified name belonging to a book element)
|	combines more than one path in a path	* | @* (all element and attribute nodes)


Functions

- A function is an XSLT module that performs a task and then returns a value
  - `<xsl:value-of select="sum(library/books/pages)"/>`
- If at least one of the corresponding nodes returns a value not being a number the function returns "NaN" meaning "not a number"
- For a list of all available functions see:
  - http://www.w3.org/TR/xquery-operators/

Filtering (I)

- A filter defines a condition to narrow down the number of selected nodes
  - ```
    <xsl:for-each select="library/book[author='Mark Twain']">
    Title: <xsl:value-of select="title"/>

    </xsl:for-each>
    ```
- What about this one?
  - ```
    <xsl:apply-templates
    select="library/book[author='Mark Twain']"/>
    <xsl:template match="book">
    <span>Title: <xsl:value-of select="title"/>
    </span>
    </xsl:template>
    ```


Filtering (II)

- And what about this one?
  - ```
    <xsl:apply-templates select="library/book"/>
    ...
    <xsl:template match="book[author='Mark Twain']">
    Title: <xsl:value-of select="title"/>

    </xsl:template>
    ```
    ```

Operators To Compare

Operator	Meaning
=	is
!=	is not
<	smaller than
<=	smaller than or same as
>	bigger than
>=	bigger than or same as

- Remember: < and <= must be used as < is not a valid character within an attribute's value

Special Filterings

- If there is more than one subordinated element with the same name
  - `<xsl:for-each select="catalog/trousers[colour[2]='blue']">`
- If all subordinated elements of a specific element are to be selected
  - `<xsl:for-each select="library/book[5]/*">`
- A set of subelements may only be selected if it includes a certain subelement
  - `<xsl:for-each select="library/book[pages]">`


Sorting

- Controls the order of the nodes
  - ```
    <xsl:for-each select="library/book">
    <xsl:sort select="author" data-type="text" order="ascending"/>
    <xsl:sort select="title" data-type="text" order="ascending"/>
    Author (alphabetically): <xsl:value-of select="author"/>

    Title: <xsl:value-of select="title"/>

    </xsl:for-each>
    ```
- Values for data-type: text and number
- Values for order: ascending and descending



    ```

Accessing Attributes

- Displaying a specific attribute of an element
  - `<xsl:value-of select="element/@attribute_name"/>`
- Displaying all attributes of an element
  - `<xsl:value-of select="element/@*"/>`
- Filtering using an attribute (without its value)
  - `<xsl:for-each select="element[@attribute_name]">`
- Filtering using an attribute (with its value)
  - `<xsl:for-each select="element[@attribute_name='value']">`


Conditions (I)

- If-condition
  - ```
    <xsl:for-each select="library/book">

    <xsl:value-of select="title"/>
    <xsl:if test="@available='no'">Not available!</xsl:if>

    <br />
    </xsl:for-each>
    ```



    ```

Conditions (II)

- Choose-condition
  - ```
    <xsl:for-each select="library/book">

    <xsl:choose>
    <xsl:when test="pages <=300">*</xsl:when>
    <xsl:when test="pages <=500">**</xsl:when>
    <xsl:otherwise>***</xsl:otherwise>
    </xsl:choose>
    <xsl:value-of select="title"/>

    <br />
    </xsl:for-each>
    ```
    ```