XML

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XML : Definitions

- XML = Extensible Markup Language.
- Other Markup Language : HTML.
- XML ≠ HTML
  - XML describes a Markup Language.
  - XML is a Meta-Language.
  - Users can define “tags”.

XML : Browsers

- XML docs can :
  - Exist by themselves.
  - Be embedded in HTML.
- Data island = XML doc within HTML page.

XML : Tags

- <ProductID> 09785 </ProductID>
- <BusStop> Polacksbacken </BusStop>
- <Author> Darrel Ince </Author>

XML : Attributes

- <Bag colour=“black" brand="decathlon"> The bag I take to school </Bag>

- <father name=“George">
- <son name=“Mike"> That’s me </son>
- My father. </father>

XML : Comments

- Yes you can !
- Begin with “<!--”.
- Finish with “-->”.
- Ex :

```
<!-- Shopping List -->
<Product> Salad </Product>
<Product> Egg </Product>
<!-- End of List -->
```

XML : CDATA sections

- To distinguish a series of characters from tags.

- <example>
- <![CDATA[<aaa>bb&cc<<<]]>
- </example>

XML : Name Conflicts

- Suppose we have :

```
<table><tr>
<td>Apples</td>
<td>Bananas</td>
</tr></table>
```

- But also :

```
<table>
<name>African Coffee Table</name>
<width>80</width>
<length>120</length>
</table>
```

- How does an XML application know how to process “<table>” ?

XML : Solving Name Conflicts

We use name prefixes :

```
<h:table> <h:tr>
<h:td>Apples</h:td>
<h:td>Bananas</h:td>
</h:tr></h:table>

<f:table>
<f:name>African Coffee Table</f:name>
<f:width>80</f:width>
<f:length>120</f:length>
</f:table>
```

XML : XMLNS

- XMLNS = XML Namespaces
- Ex :
- <h:html xmlns:xdc="http://www.xml.com/books"
  xmlns:h="http://www.w3.org/HTML/1998/html4">
  …
  </h:html>

XML : XMLNS

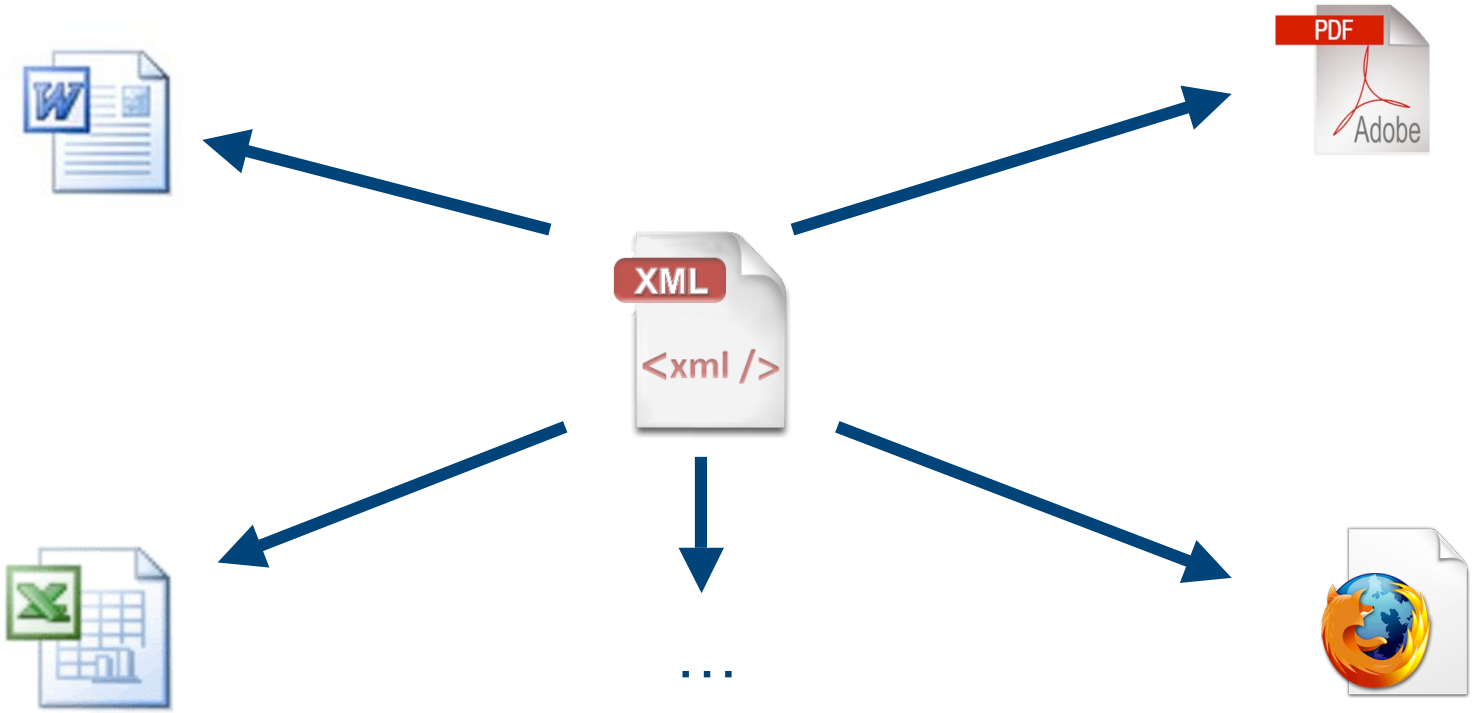
- Elements prefixed with :
  - xdc, associated with **http://www.xml.com/books** namespace.
  - h, associated with **http://www.w3.org/HTML/1998/html4.**
- Q : Why ? A : Unique tag names.

XML : Well-formed documents

- Have a root element.
- Elements have a closing tag.
- Tags are case sensitive.
- Attributes must be quoted.
- Elements must be properly nested.

XML : Conversions

- We can convert XML docs to other formats.



XML : DTD

- DTD = Document Type Definition
- Purpose of DTD is to define :
  - The structure of XML document.
  - The list of legal elements.
- A DTD can be declared :
  - Inline = in the xml document.
  - External = in another file.

XML : DTD Inline

```
<?xml version="1.0"?>
<!DOCTYPE note [
<!ELEMENT note (to,from,heading,body)>
<!ELEMENT to (#PCDATA)>
<!ELEMENT from (#PCDATA)>
<!ELEMENT heading (#PCDATA)>
<!ELEMENT body (#PCDATA)> ]>

<note>
<to>Tove</to>
<from>Jani</from>
<heading>Reminder</heading>
<body>Don't forget me this weekend!</body>
</note>
```

DTD : External

In note.dtd file :

```
<?xml version="1.0"?>
<!ELEMENT note (to,from,heading,body)>
<!ELEMENT to (#PCDATA)>
<!ELEMENT from (#PCDATA)>
<!ELEMENT heading (#PCDATA)>
<!ELEMENT body (#PCDATA)>
```

The rest in the .xml file with header :

```
<?xml version="1.0"?>
<!DOCTYPE note SYSTEM "note.dtd">
```

XML : Why use DTD ?

- Describe the file's format.
- Create a standard to exchange data.
- Verify the correctness of a received file.

XML : Parsing and DTD

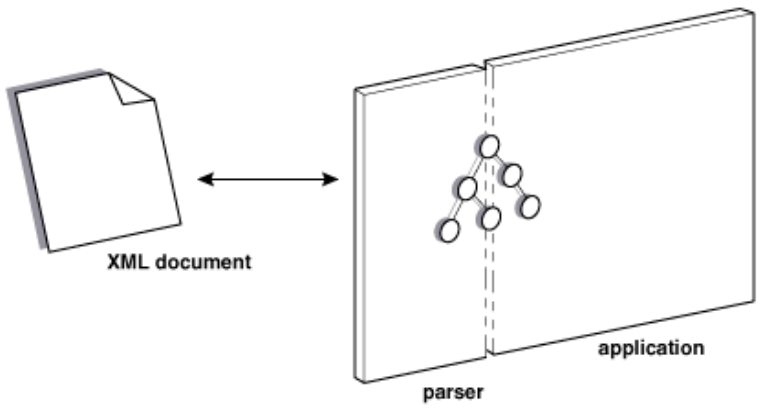
- XML parser : check XML doc against its DTD.
- 2 types of XML parsers :
  - Validating
  - Non-Validating
- Validating : checks doc conforms with DTD’s rules.
- Non-Validating : checks doc is well-formed.

XML : Parsing and Processing XML

- Parsing XML document (files or text) to do something with XML.
- Approaches in XML processing
  - Event based interface **SAX**
  - Object based interface **DOM**
  - eXtensible Style Language **XSL** (aka **XSLT** – XSLTransformations)

Parsing : Motivation

- Parsers shield developers from the intricacies of XML syntax
- Converting to relational tables.
- Converting to objects in programming language (class, attribute, method).
- Collecting data.
- Transforming to other formats



Parsing : SAX

- SAX stands for Simple API XML
- SAX is an event processing.

There are events for

- Element opening and closing tags
- Content of elements
- Entities
- Parsing errors

When event is triggered, the method associated with this event is executed.

Parsing : SAX

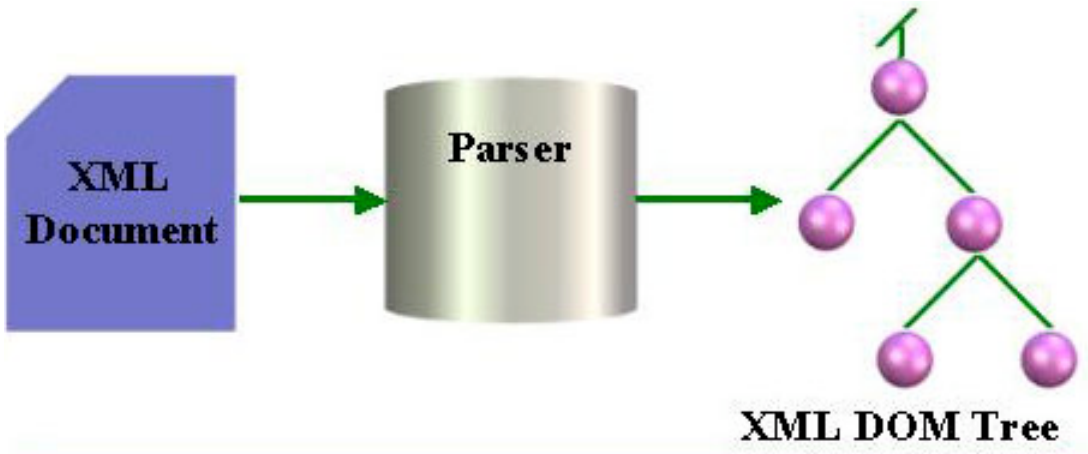
- SAX contains number of methods:
  - startDocument() - endDocument()
  - startElement() - endElement()
  - startPrefixMapping() - endPrefixMapping()
  - characters() - ignorableWhitespace()
  - processingInstruction()
  - skippedEntity()
  - …

Parsing : DOM

- DOM = Document Object Model represents a tree view of the XML document.
- XML DOM parser loads the XML document to memory and converts into a tree view (DOM).
- Parser traverses through the document tree

Parsing: DOM

- The DOM tree represents the XML document
- Each node represents a pair of <opening> and </closing> tags.
- Sub elements become children nodes



Parsing: XSLT

- XSLT uses XPath- a language for finding information in an XML document.
- XPath is used to navigate through elements and attributes in an XML document.
- XSLT uses XPath to define parts of the source document that should match one or more predefined templates.
- When a match is found, XSLT will transform the matching part of the source document into the result document.

Parsing: XSLT

- <BOOK>
  <TITLE> An introduction to the saxophon </TITLE>
  </BOOK>

And the XSLT looks like

<xsl:template match = “BOOK”>
  <P>
  <xsl: value-of select = “TITLE”/>
  </P>
</xsl:template>

The transformation that will occur when a BOOK element is encountered.

➔ A paragraph tag is emitted followed by the text associated with TITLE and terminated with the paragraph end tag.


THE END