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XML



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Chapter 11 XML LINKING LANGUAGE



XML Linking Language

- XML Linking Language (XLink) Version 1.0
 - W3C Recommendation 27 June 2001
 - http://www.w3.org/TR/xlink/
 - Current version 1.1: http://www.w3.org/TR/xlink11/
 - Motivation w.r.t. open systems and data linking: Need to combine resources, which are not under control of a single person/organization (such combination is uni-directional or multi-directional)
- XLink is a tool, which makes description of resource combinations possible
 - Tool is based on the attribute approach
 - XLink describes how combinations are defined
 - XLink describes the types of combinations that can occur between resources



XML Linking Language – Concepts

- XLink Goals and concepts
 - XLinks shall be human-readable
 - XLinks shall be placeable both inside and outside of the respective resource
 - XLink shall reflect the structure and significance of relationships
- Link (XLink) Link is an explicit relationship between resources or resource parts
- Participation Link is associated with a set of resources; these resources contribute to the link
- Resource Any addressable unit of information or service (see IETF RFC 3986).
- Hyperlink Link mainly intended for meaningful representation to a human user
 - Example: HTML link



XML Linking – Element

• Linking Element – (Any) element annotated with the xlink:type attribute. The XLink attribute specifies the link type, which the linking element represents.

- There exist two types:
 - Simple Link
 - Extended Link



Simple Links

- Simple Link –Link associated with exactly two resources
 - Thereby, the local and remote resources are connected by an arc
 - xlink:type="simple"
 - Is also called outbound link (outgoing connection)

```
Example
```

```
<MyElement
    xmlns:xlink="http://www.w3.org/1999/xlink"
    xlink:type="simple"
    xlink:href="remoteURI">
    ...
</MyElement>
```



Linking Element by Example DTDs

DTD for Linking Element "MyElement"

<!ELEMENT MyElement(#PCDATA)>

<!ATTLIST MyElement

xmlns:xlink CDATA #FIXED

"http://www.w3.org/1999/xlink"

xlink:type CDATA #FIXED "simple"

xlink:href CDATA #REQUIRED>

Example:

<MyElement xlink:href="http://example.org">
 Example of simple XLink syntax





Extended Links

- Extended Link A link that links to an arbitrary number of resources (sets them into association with each other). Those associated resources can be local or remote.
 - xlink:type = "extended"
 - Enables inbound, outbound, third-party arcs
 - Further XLinks in this context are (specified by xlink:type):
 - Resource, Locator, Arc, Title



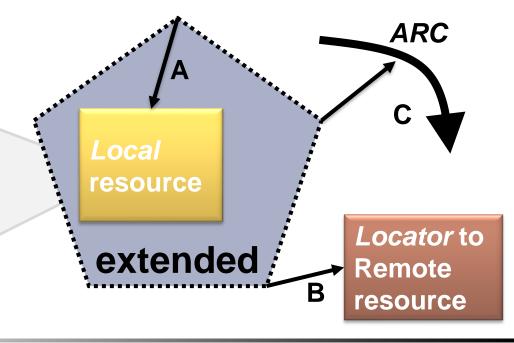
Extented and Simple-Type...

Extended-Version

```
<MyLink
xlink:type="extended">
 <A
   xlink:type="resource"
   xlink:label="local">...</A>
 <B
   xlink:type="locator" xlink:label="remote"
   xlink:href="remoteURI"/>
 <C
   xlink:type="arc"
   xlink:from="local"
   xlink:to="remote"/>
</MyLink>
```

Simple-Version

<MyLink xlink:type="simple" xlink:href="remoteURI"/>





Local Resource

- Local Resource Link element defining the participating local resources, which lie within the Extended Link.
 - xlink:type="resource"
 - Example
 <myElement</p>
 xlink:type="resource"
 xlink:label="MyLocalE">...
 /MyElement>
 - Useful in terms of arcs (see xlink:from)



Remote Resource

- Remote Resource Link element defining participating remote resources of an Extended Link, where those are addressed via URI references.
 - xlink:type="locator"
 - Example

<B

xlink:type="locator"

xlink:label="remotelabel"

xlink:href="remoteURI"/>

Important for arcs (xlink:from, xlink:to attribute)



Traversal Rules (1)

- Traversal Expression describes the usage or following of a link for any purpose
 - Traversal always involves an interconnection of two resources from a starting resource to an ending resource
- Arc Information describing how two resources should be traversed; it includes the traversal direction and, possibly, application behaviour.
- Multidirectional Link If two arcs in a link specify the same resources as A —> B and B —> A.
 - Warning: Multidirectional link is not the same as traversal from A —>
 B and then "back" to A!



Traversal Rules (2)

- Outbound Relationship defined by an arc, where a local resource defines a starting point and a remote resource – an endpoint.
 - xlink:type="resource" —> xlink:type=" locator"
- Inbound Relationship defined by an arc, where a local resource defines an endpoint and a remote resource – a starting point.
 - xlink:type="locator" —> xlink:type="resource"
- Third-Party Arc Relationship defined by an arc, in which neither the start nor the end point is determined by a local resource.
 - xlink:type="locator" —> xlink:type="locator"



Traversal Rules (3)

- Traversal Rules (Arc Element) Link Element defining the traversal rules of participating resources of Extended Link Elements.
 - xlink:type="arc"
 - Example<Cxlink:type="arc"xlink:from="local"xlink:to="remote"
 - [xlink:arcrole="uri"]>
 - xlink:from and xlink:to forward to labels (see Locator or Resource)
 - Further, a conceptual name xlink:αrcrole in form of an absolute URI can be used (arcrole is comparable to an RDF Predicate or Property, cf. W₃C/RDF)



Example Extended Link

- Link database / Linkbase Document containing a set of inbound and Third-Party Links (ARCs).
- <ERPLinkBase xlink:type="extended">
 - <ltem xlink:type="locator" xlink:label="TVSet" xlink:href="URI1"/>
 - <ltem xlink:type="locator" xlink:label="Radio" xlink:href="URI2"/>
 - <Room xlink:type="locator" xlink:label="Room42" xlink:href="URI2"/>
 - <Room xlink:type="locator" xlink:label="Room48" xlink:href="URI2"/>
 - <Feature xlink:type="arc" xlink:from="Room42" xlink:arcrole="urn:contains" xlink:to="TVSet"/>
 - < Feature xlink:type="arc" xlink:from="Room42" xlink:arcrole="urn:contains" xlink:to="Radio"/>
 - < Feature xlink:type="arc" xlink:from="Room48" xlink:arcrole="urn:contains" xlink:to="Radio"/>
- </ ERPLinkBase>

Global XLink Attribute

- Behavioural attributes In combination with Simple and Arc elements:
 - xlink:show= new, replace, embed, other, none
 - xlink:actuate= onLoad, onRequest, other, none
 - Provide information for element processing and representation
- Semantics The following attributes can be used for description of resources in context of a link:
 - xlink:title, xlink:role sowie xlink:arcrole (cf. ARC)



Chapter 12 XML INCLUSIONS (XINCLUDE)



XML Inclusions (XInclude)

XML Inclusions (XInclude)

- W3C Recommendation 15 November 2006 xmlns:xi="http://www.w3.org/2001/XInclude"
- Tool for dynamically inserting XML data, text and XML fragments in an XML resource, which
 uses the Xinclude directive
- Similar to <include> directives in many programming languages
- Defines two elements xi:include and xi:fallback

xi:include

- Loads resources marked with href (or their nodes provided by xpointer) and inserts them in place of xi:include (in case of parse="text") or leads to creation of a new XML document (with XML information set properties)
- Attributes
 - href URI to an external resource
 - parse "xml" or "text"
 - **XPointer** cf. W₃C/Xpointer Framework, e.g. #xpointer(XPath-Ausdruck)

xi:fallback

- Content of Fallback is inserted in place of xi:include if the resource referenced by xi:include can't be loaded
- DTD:
 - <!ELEMENT xi:fallback ANY>
 <!ATTLIST xi:fallback xmlns:xi CDATA
 #FIXED "http://www.w3.org/2001/XInclude">



XInclude Example (1)

```
11-01.xml K11-02.xml K11-04.xml
 <?xml version="1.0" encoding="utf-8"?>
Ein erster Abschnitt
   <xi:include href="K11-02.xml"/>
   Ein letzter Abschnitt
 </meindokument>
 K11-01.xml K11-02.xml* K11-04.xml
   <?xml version="1.0" encoding="utf-8"?>
   <test>
     Ein Abschnitt von Datei K11-02.xml.
   </test>
           http://www.example.org/K11-02.xml
```

XInclude Example (2)

```
11-01.xml K11-02.xml K11-04.xml
 <?xml version="1.0" encoding="utf-8"?>
∃<meindokument xmlns:xi="http://www.w3.org/2001/XInclude">
   Ein erster Abschnitt
   <xi:include href
(11-01.xml)</pre>
                           K11-02.xml K11-04.xml
   Ein letzter A
                    <?xml version="1.0" encoding="utf-8"?>
 </meindokument>
                    <meindokument xmlns:xi="http://www.w3.org/2001/XIp</pre>
                      Ein erster Abschnitt
                       <test xml:base="http://www.example.org/K11-02.xml">
                         Ein Abschnitt von Datei K11-02.xml.
                      </test>
                       Ein letzter Abschnitt
                    -</meindokument>
 K11-01.xml K11-02.xml*
   <?xml version="1.0" encoding="utf-8"?>
  ∃<test>
     Ein Abschnitt von Datei K11-02.xml.
   </test>
            http://www.example.org/K11-02.xml
```

WS19/20

Chapter 13 TYPICAL XML DIALECTS



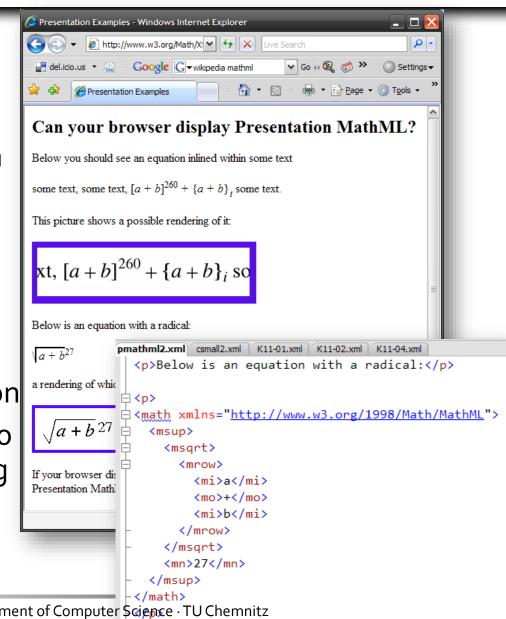
XML Dialects

- XML is used in many domains (industry, science, education etc.) used for description of domain-specific data/issues – these languages (XML applications) are often called XML dialects
 - Thereby, both pure XML and XML+DTD or XML Schema solutions are applied
 - In some cases there are multiple developments for the same domain
 - In many domains XML dialects have developed into de-facto standards
 - Important: Before creating a new XML dialect look for existing first, i.e. at XML.org, OASIS, W₃C
- Sample domains and sample dialects:
 - Mathematics, chemistry
 - i.e. Mathematical Markup Language (MathML), Chemical Markup Language (CML)
 - E-Commerce / E-Business
 - i.e. Amazon with AWS, Electronic Business using XML (ebXML) from OASIS account in particular to data transport methods (for example, per Web Services)
 - Content Provider and Content Consumer
 - i.e. NewsML, Open Archives Initiative (OAI) operator of document servers, syndications with RSS
 - And many further domains



XML Dialect: MathML

- Mathematical Markup Language (MathML)
 - W3C Recommendation
 - http://www.w3.org/Math/
- Consists of two languages:
 - Presentation Markup –
 ~30 elements for formulae representation
 - Content Markup ~120 elements for describing structure of a formula

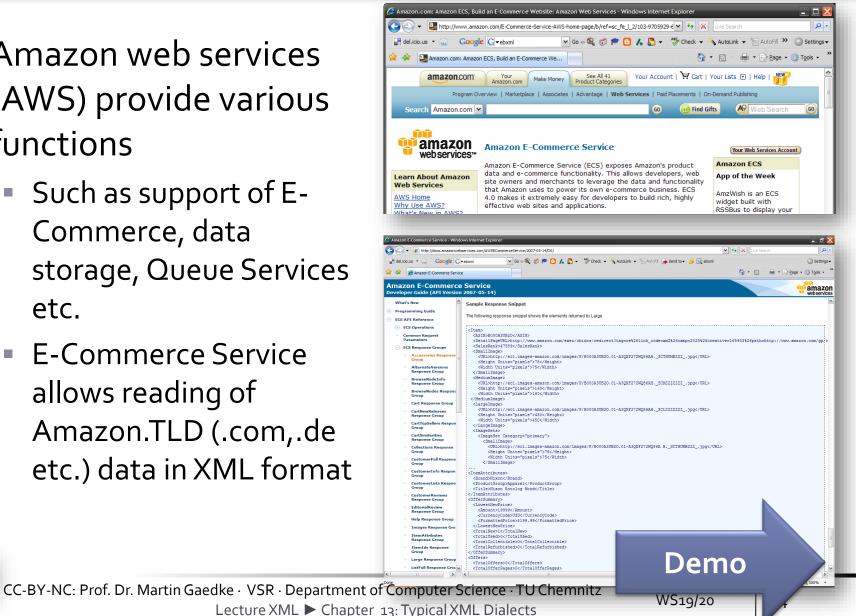




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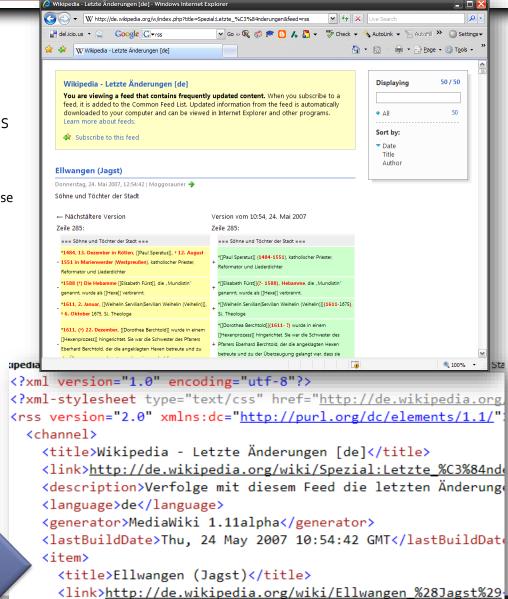
XML Dialect: Amazon/AWS

- Amazon web services (AWS) provide various functions
 - Such as support of E-Commerce, data storage, Queue Services etc.
 - E-Commerce Service allows reading of Amazon.TLD (.com,.de etc.) data in XML format





- Really Simple Syndication
 - XML-based message format
 - Provides message blocks (so-called items) with possible links to related web pages as a so-called RSS feed
 - Enables subscribing RSS feeds with RSS readers (as opposed to email, one gets the messages only upon his own initiative (Pull-Modell) – Provider can't choose the readers)
 - Heavily used and ideally applied to information integration in various areas
- Development goes back to Netscape and Userland
 - RSS 0.90: Originally, format to manage news about website changes in Netscape (see *News-Pattern*)
 - RSS 0.91: Further development via UserLand Software (founded by *Dave Winer*) → Radio UserLand for Weblogs
 - RSS 1.0: RDF Site Summary (independent parallel development at W₃C)
 - RSS 2.0: Further development of RSS 0.9x of Dave Winer (not backward compatible)
 - One can find all versions of RSS Feeds
 - Warning: Don't confuse with ATOM (Atom Syndication Format)



WS19/20







```
ikipedia - Le...ungen [de].xml* xml/XPATH-XSLT.xsl Web2-Coding for Fun.txt
                                                     Default.aspx
                                                              xml/amazon.xsl
                                                                          Default5.aspx Default5.aspx.cs
 k?xml version="1.0" encoding="utf-8"?>
!<rss version="2.0" xmlns:dc="http://purl.org/dc/elements/1.1/">
   <channel>
     <title>Wikipedia - Letzte Änderungen [de]</title>
     <link>http://de.wikipedia.org/wiki/Spezial:Letzte %C3%84nderungen</link>
     <description>Verfolge mit diesem Feed die letzten Änderungen in Wikipedia.</description>
     <language>de</language>
     <generator>MediaWiki 1.11alpha/generator>
     <lastBuildDate>Thu, 24 May 2007 10:54:42 GMT</lastBuildDate>
     <item>
       <title>Ellwangen (Jagst)</title>
       <link>http://de.wikipedia.org/wiki/Ellwangen %28Jagst%29</link>
       <description>
            Söhne und Töchter der Stadt
       </description>
       <pubDate>Thu, 24 May 2007 10:54:42 GMT</pubDate>
       <dc:creator>Moggosaurier</dc:creator>
       <comments>http://de.wikipedia.org/wiki/Diskussion:Ellwangen %28Jagst%29</comments>
     </item>
     <item>
       <title>Mauricio Rosenmann Taub</title>
       <link>http://de.wikipedia.org/wiki/Mauricio Rosenmann Taub</link>
       <description>...</description>
       <pubDate>Thu, 24 May 2007 10:54:39 GMT</pubDate>
       <dc:creator>Uriam</dc:creator>
       <comments>http://de.wikipedia.org/wiki/Diskussion:Mauricio_Rosenmann_Taub</comments>
     </item>
   </channel>
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```



- RSS 2.0 Elements
 - Element rss (channel)
 - Simplified: channel (title, link, description, item*)
- <channel> Elements:
 - <title> Channel title
 - Ink> URL to the web site corresponding to the channel
 - <description> Description of channel contents
 - Optionale Elements
 - <item> Story of the channel
 - Further elements such as language, copyright, managingEditor, pubDate, cloud, ttl, image
- <item>
 - Single channel can contain multiple item-elements
 - <title> Story title
 - Ink> URL to the web site with the story
 - <description> Story description (mostly, a summary of the actual stories)



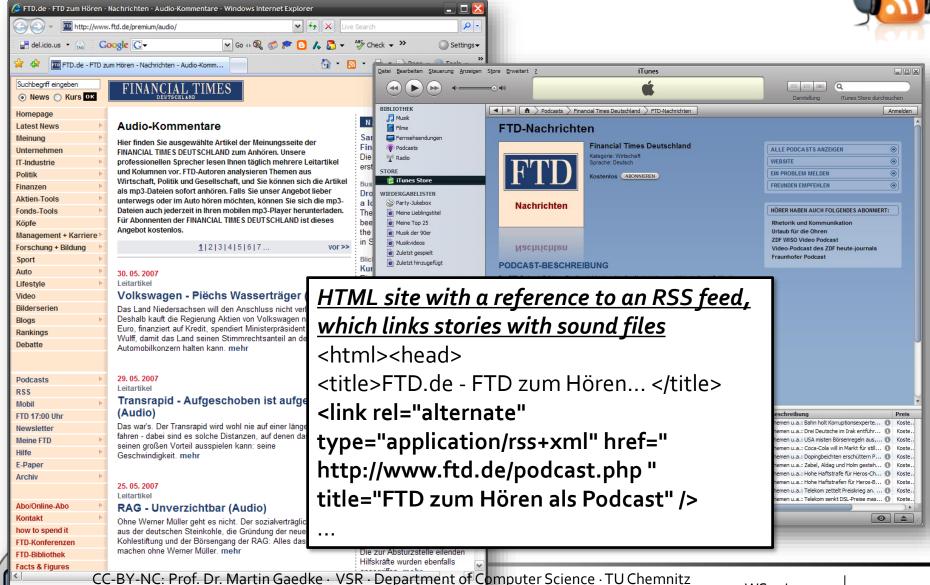


- RSS 2.0 Extensibility
 - Specification allows extension of RSS 2.0 with own elements: "A RSS feed may contain elements not described on this page, only if those elements are defined in a namespace."
 - Extensibility leads to new forms of RSS feeds, such as podcasts
- Example
 - <rss version="2.0" xmlns:myExt="http://example.org/xmlns/iStuff">
 - <channel>
 - <title>News about Web Technology</title>
 - link>http://www.gaedke.com/</link>
 - <description>A Gaedke site.</description>
 - <item>
 - <description>Peter Kilometer erster über 10 Meilen</description>
 -
 - <myExt:File>http://www.gaedke.com/xmlwerkzeuge/file.svg</myExt:File>
 - </item>
 - <item>... </item>
 - ...
 - </channel>
 - </rss>



Example: Podcast (1)





Lecture AML Chapter 13. Typical XML Dialects

Example: Podcast (2)

```
.xml* Program.cs Wikipedia - Le...ungen [de].xml | pmathml2.xml | csmall2.xml | K11-01.xml | K11-02.xml | K11-02.xml | K11-02.xml | K11-04.xml | Start Page
<rss xmlns:itunes="http://www.itunes.com/dtds/podcast-1.0.dtd" vers</pre>
  <channel>
    <title>FTD-Nachrichten</title>
    <link>http://www.ftd.de/podcast</link>
    <description>Der FTD-Podcast: Erfahren Sie die wichtigsten aktue
    <itunes:category text="International"/>
    <itunes:author>Financial Times Deutschland</itunes:author>
    <itunes:owner>
      <itunes:email>webmaster@ftd.de</itunes:email>
      <itunes:name>Financial Times Deutschland</itunes:name>
    </itunes:owner>
    <itunes:subtitle>Der FTD-Podcast - Wissen, was wichtig wird.</i>
    <itunes:summary>Der FTD-Podcast: Erfahren Sie die wichtigsten a
    <itunes:keywords>wirtschaft, finanzen, boerse, politik, nachric
    <itunes:image href="http://www.ftd.de/images/itunes/itunes nach</pre>
    <item>
      <title>FTD-Podcast um 7 Uhr</title>
      <link>http://www.ftd.de/div/podcast/news/206680.mp3?31May0706
      <description>Themen u.a.: Siemens-Spitze schwer belastet. Kan
      <enclosure url="http://www.ftd.de/div/podcast/news/206680.mp3</pre>
      <pubDate>Thu, 31 May 2007 06:14:46 +0200</pubDate>
    </item>
  </channel>
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```



MP3

Chapter 14 INTRODUCTION TO SEMANTIC WEB

Based on Ivan Herman, World Wide Web Consortium

Initial Situation (1)

- The World Wide Web
 - Resources for humans
 - In natural language
 - Graphs, sound, multimedia, layout and design
- Resources for humans
 - Simple (typically) to interpret for humans
 - Partially allows humans to infer/follow facts/knowledge from resources
 - Allow humans to draw associations
 - Might also transport emotions



Initial Situation (2)

- Tasks and The World Wide Web
- Humans use the Web to accomplish a range of tasks
 - Gather facts, browse digital libraries
 - Book trips, exchange holiday photos
 - Buy products
 - Etc.
- Combination of data in the Web is simple for humans
- What about machines?
 - It's hard for machines to process data (understand): Interpret images?, Interpret knowledge from erroneous documents?, dc:Creator = word:Author?
 - Machines are ignorant ;-)



Scenarios and Problems

- "Understanding" of data and relationships leads to better applications
 - Example: Airline booking, knowledge from the past is used to, for instance, find a better seat (aisle or window?)
 - Example: Search the Internet for "Yacht Racing" incorrect interpretation leads to America's Cup not being found
 - Example: Merger of organizations different personal databases must be integrated
- A lot of data is already available via Web technologies its semantics has to be available as well to improve applications
 - Then data can be combined,
 - Machines can draw conclusions,
 - Data can be described, etc.

