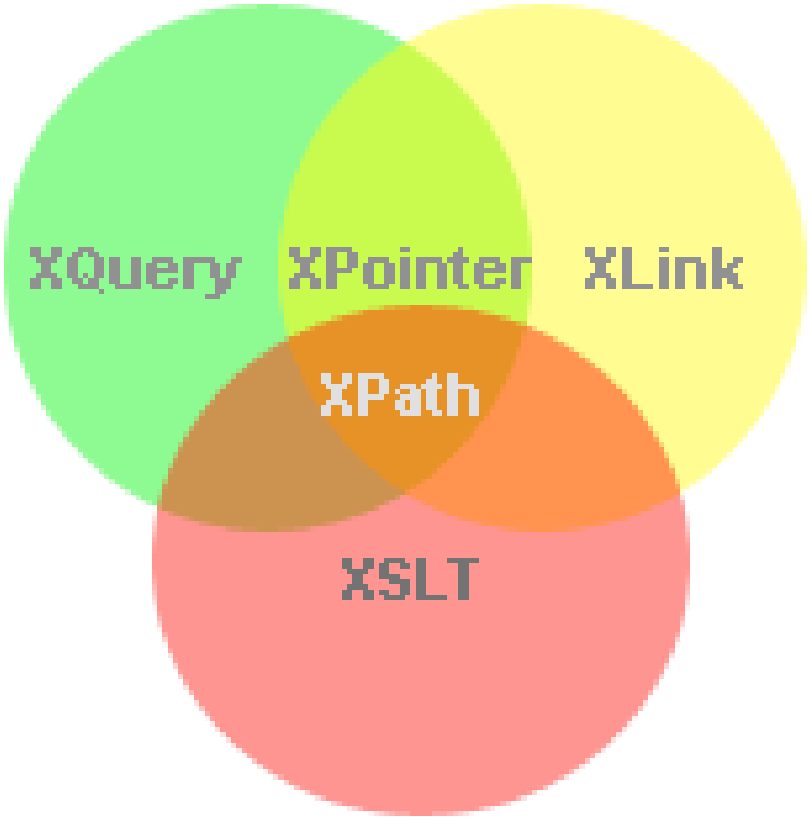
Xpath
Xlink Xpointer Xquery

Sources:

http://www.brics.dk/~amoeller/XML

http://www.w3schools.com

Overlapping domains



XPath

- XPath is a syntax for defining parts of an XML document
- XPath uses path expressions to navigate in XML documents
- XPath contains a library of standard functions
- XPath is a major element in XSLT
- XPath is a W3C Standard

Terminology

- Element
- Attribute
- text,
- namespace,
- processing-instruction,
- comment,
- document (root) nodes

expressions

The most useful path expressions:

- nodename Selects all child nodes of the named node
- / Selects from the root node
- // Selects nodes in the document from the current node that match the selection no matter where they are
- . Selects the current node
- .. Selects the parent of the current node
- @ Selects attributes

Wildcards

Path wildcards can be used to select unknown XML elements.

- * Matches any element node
- @* Matches any attribute node
- node() Matches any node of any kind

Axis: a node-set relative to the current node.

AxisName	Result
ancestor	Selects all ancestors (parent, grandparent, etc.) of the current node
ancestor-or-self	Selects all ancestors (parent, grandparent, etc.) of the current node and the current node itself
attribute	Selects all attributes of the current node
child	Selects all children of the current node
descendant	Selects all descendants (children, grandchildren, etc.) of the current node
descendant-or-self	Selects all descendants (children, grandchildren, etc.) of the current node and the current node itself
following	Selects everything in the document after the closing tag of the current node
following-sibling	Selects all siblings after the current node
namespace	Selects all namespace nodes of the current node
parent	Selects the parent of the current node
preceding	Selects everything in the document that is before the start tag of the current node
preceding-sibling	Selects all siblings before the current node
self	Selects the current node

Opera

Operator	Description	Example	Return value
|	Computes two node-sets	//book | //cd	Returns a node-set with all book and cd elements
+	Addition	6 + 4	10
-	Subtraction	6 - 4	2
*	Multiplication	6 * 4	24
div	Division	8 div 4	2
=	Equal	price=9.80	true if price is 9.80 false if price is 9.90
!=	Not equal	price!=9.80	true if price is 9.90 false if price is 9.80
<	Less than	price<9.80	true if price is 9.00 false if price is 9.80
<=	Less than or equal to	price<=9.80	true if price is 9.00 false if price is 9.90
>	Greater than	price>9.80	true if price is 9.90 false if price is 9.80
>=	Greater than or equal to	price>=9.80	true if price is 9.90 false if price is 9.70
or	or	price=9.80 or price=9.70	true if price is 9.80 false if price is 9.50
and	and	price>9.00 and price<9.90	true if price is 9.80 false if price is 8.50
mod	Modulus (division remainder)	5 mod 2	1

Xpath functions

- See

http://www.w3schools.com/xpath/xpath_functions.asp

XQuery

- http://www.brics.dk/~amoeller/XML/querying/index.html

XQuery engines and APIs

- XQuery API for Java
  - http://www.datadirect.com/developer/xquery/topics/xqj_tutorial/index.ssp
  - http://www.ibm.com/developerworks/xml/library/x-xjavaxquery/

- Xquery engines
  - http://www.sqlsummit.com/XQueryProv.htm#Engine

XLink XPointer

- XLink defines a standard way of creating hyperlinks in XML documents.
- XPointer allows the hyperlinks to point to more specific parts (fragments) in the XML document.

XPointer

```
URI
  ------------------------------------------------------------------
 /                                                                  \
 http://www.foo.org/bar.xml#xpointer(article/section[position()<=5])
                            |         \                            /|
                            |          ----------------------------- |
                             \              XPointer expression    /
                              \                                   /
                               -----------------------------------
                                  XPointer fragment identifier
```

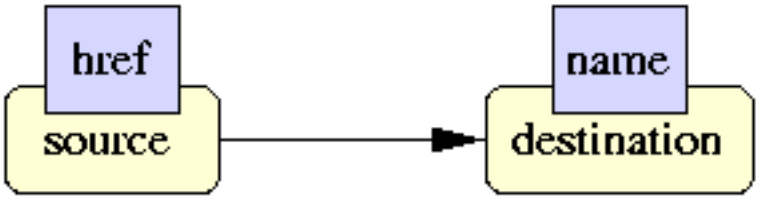
* an extension of XPath which is used by XLink to locate remote link resources
* relative addressing: allows links to places with no anchors
* flexible and robust: XPointer/XPath expressions often survive changes in the target document
* can point to substrings in character data and to whole tree fragments

Xlink: the HTML link model

Construction of a hyperlink:

<a name="here"> is placed at the destination

<a href="URL#here"> is placed at the source



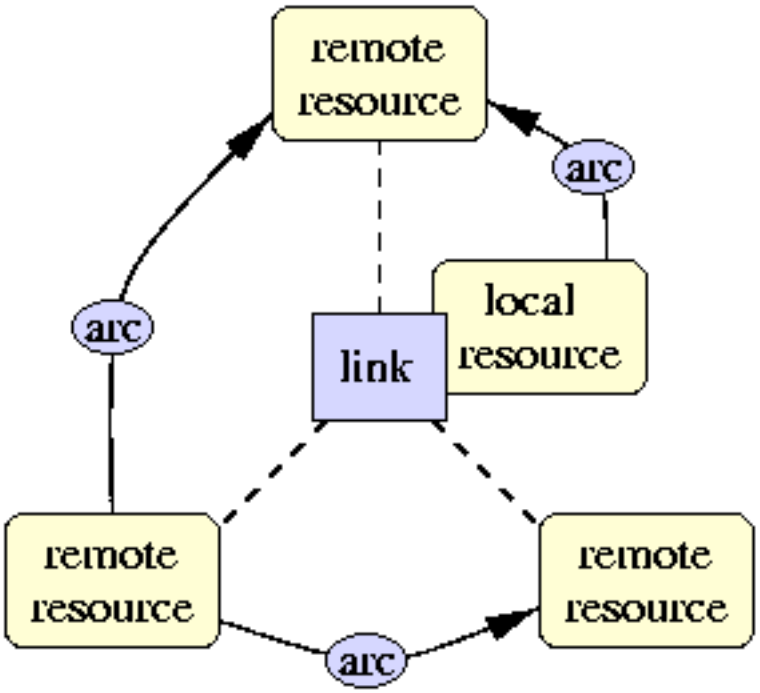
HTML link problems

* in HTML, links are recognized by element names (a, img, ..)
  - we want a generic XML solution
* the "semantics" of a link is defined in the HTML specification
  - we want to identify abstract semantic features, e.g. link actuation

Limitations:

* an anchor must be placed at every link destination (problem with read-only documents)
  - we want to express relative locations (XPointer!)
* the link definition must be at the same location as the link source (outbound)
  - we want inbound and third-party links
* only individual nodes can be linked to
  - we want links to whole tree fragments
* a link always has one source and one destination
  - we want links with multiple sources and destinations

XLink linking model



XLink – simple

```
<?xml version="1.0"?>

<homepages xmlns:xlink="http://www.w3.org/1999/xlink">

  <homepage xlink:type="simple"
  xlink:href="http://www.w3schools.com">Visit
    W3Schools</homepage>

  <homepage xlink:type="simple"
  xlink:href="http://www.w3.org">Visit W3C</homepage>

</homepages>
```

simple vs extended

```
<mylink xlink:type="simple" xlink:href="..."
  xlink:show="..." .../>

<mylink xlink:type="extended">
   <myresource xlink:type="resource"
            xlink:role="local"/>
   <myresource xlink:type="locator"
            xlink:role="remote" xlink:href="..."/>
   <myarc xlink:type="arc"
         xlink:from="local" xlink:to="remote"
  xlink:show="..." .../>
 </mylink>
```

Local resource

remote resource

Using two remote resources

```
<mylink xmlns:xlink="http://www.w3.org/1999/xlink"
  xlink:type="extended">
  <myresource xlink:type="locator"
          xlink:href="students.xml#Fred"
  xlink:label="student"/>
  <myresource xlink:type="locator"
          xlink:href="teachers.xml#Joe" xlink:label="teacher"/>
  <myarc xlink:type="arc"
       xlink:from="student" xlink:to="teacher"/>
 </mylink>
```

Possible uses

A powerful example application of general XLinks:

Using third-party links and a smart browser, a group of people can annotate Web pages with "post-it notes" for discussion - without having write access to the pages. They simply need to agree on a set of URIs to XLink link bases defining the annotations. The smart XLink-aware browser lets them select parts of the Web pages (as XPointer ranges), comment the parts by creating XLinks to a small XHTML documents, view each other's comments, place comments on comments, and perhaps also aid in structuring the comments.

Simple with more features:

```
<?xml version="1.0" encoding="ISO-8859-1"?>

<bookstore xmlns:xlink="http://www.w3.org/1999/xlink">

<book title="Harry Potter">
  <description
  xlink:type="simple"
  xlink:href="http://book.com/images/HPotter.gif"
  xlink:show="new">
  As his fifth year at Hogwarts School of Witchcraft and
  Wizardry approaches, 15-year-old Harry Potter is.....
  </description>
</book>
```