**XPath**

- A Language for Locating Nodes in XML Documents
- *XPath expressions* are written in a syntax that resembles paths in file systems
- The list of nodes located by an *XPath expression* is called a *Nodelist*
- XPath is used in XSL and in XQuery (a query language for XML)
- W3Schools has an XPath tutorial
- XPath includes
  - Axis navigation
  - Conditions
  - Functions

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```xml
<?xml version="1.0" encoding="ISO-8859-1"?>
<catalog>
    <cd country="UK">
        <title>Dark Side of the Moon</title>
        <artist>Pink Floyd</artist>
        <price>10.90</price>
    </cd>
    <cd country="UK">
        <title>Space Oddity</title>
        <artist>David Bowie</artist>
        <price>9.90</price>
    </cd>
    <cd country="USA">
        <title>Aretha: Lady Soul</title>
        <artist>Aretha Franklin</artist>
        <price>9.90</price>
    </cd>
</catalog>
```

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An XML document
The Main Idea in the Syntax of XPath Expressions

- `/` at the beginning of an XPath expression represents the root of the document.
- `//` represents a parent-child relationship.
- `@` marks an attribute.
- `*[condition]` specifies a condition.

Finding child nodes:

Finding descendent nodes:
Relative Navigation Using Axes

- Starts with the current node and not with the root (/)
- A . marks the current node (e.g., ./title)
- A .. marks the parent node (e.g., title/../../../)
- There are also other axes, e.g., child, descendant, ancestor, parent, following-sibling, etc.
Functions

• Many functions that are included in XPath
• Some examples:
  – count() – returns the number of nodes in a nodelist
  – last() – returns the last node in a nodelist
  – name() – returns the name of a node
  – position() – returns the position of the node in the nodelist

Additional Examples of XPath Expressions

These examples use element names that are not necessarily from the XML document that was shown previously

Examples of XPath Expressions

• para
  – Selects the para children elements of the context node
• *
  – Selects all element children of the context node
• text()
  – Selects all text node children of the context node
• @name
  – Selects the name attribute of the context node

More Examples of XPath Expressions

• @*
  – Selects all the attributes of the context node
• para[1]
  – Selects the first para child of the context node
• para[last()]
  – Selects the last para child of the context node
• */para
  – Selects all para grandchildren of the context node
More Examples of XPath Expressions

• `/doc/chapter[5]/section[2]`
  – Selects the second section of the fifth chapter of the doc

• `chapter//para`
  – Selects the para element descendants of the chapter element children of the context node

• `//para`
  – Selects all the para descendants of the document root and thus selects all para elements in the same document as the context node

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More Examples of XPath Expressions

• `//olist/item`
  – Selects all the item elements that have an olist parent and are in the same document as the context node

• `.`
  – Selects the context node

• `./para`
  – Selects the para descendants of the context node

• `../`
  – Selects the parent of the context node

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More Examples of XPath Expressions

• `../@lang`
  – Selects the lang attribute of the parent of the context node

• `para[@type="warning"]`
  – Selects the para children of the context node that have a type attribute with value warning

• `chapter[title]`
  – Selects the chapter children of the context node that have one or more title children

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More Examples of XPath Expressions

• `para[@type="warning"][5]`
  – Selects the fifth para child among the children of the context node that have a type attribute with value warning

• `para[5][@type="warning"]`
  – Selects the fifth para child of the context node if that child has a type attribute with value warning
More Examples of XPath Expressions

• chapter[@title="Introduction"]
  – Selects the chapter children of the context node that have one or more title children with string-value equal to Introduction

• employee[@secretary and @assistant]
  – Selects employee children of the context node that have both a secretary attribute and an assistant attribute

Location Paths

• The previous examples are abbreviations of location paths
  – See XPath tutorial in W3Schools
  – For example, // is short for /descendant-or-self::node()//.

More Examples of Xpath Expressions

• /university/department/course
  – This Xpath expression matches any path that starts at the root, which is a university element, passes through a department element and ends in a course element

• /department/course[@year=2002]
  – This Xpath expression matches any path that starts at the current element, continues to a child which is a department element and ends at a course element with a year attribute that is equal to 2002

//para is short for /descendant-or-self::node()/child::para