Ch. 9: XML Schema Basics

Seoul National University, Internet Database Laboratory

July, 2015

Contents

- XML Schema
- Working with XML Schema
- Beginning a Simple XML Schema
- Associating an XML Schema with an XML Document
- Annotating Schemas

XML Schema

- W3C developed it to address many of the shortcomings of DTD
- It is occasionally called
  - XML Schema Definition (XSD)
  - XML Schema Definition Language (XSDL) (with version 1.1)
- It is deeper and more powerful than a DTD
  - Data types
  - Namespaces
  - …
- It gives you much more control over the contents of an XML document

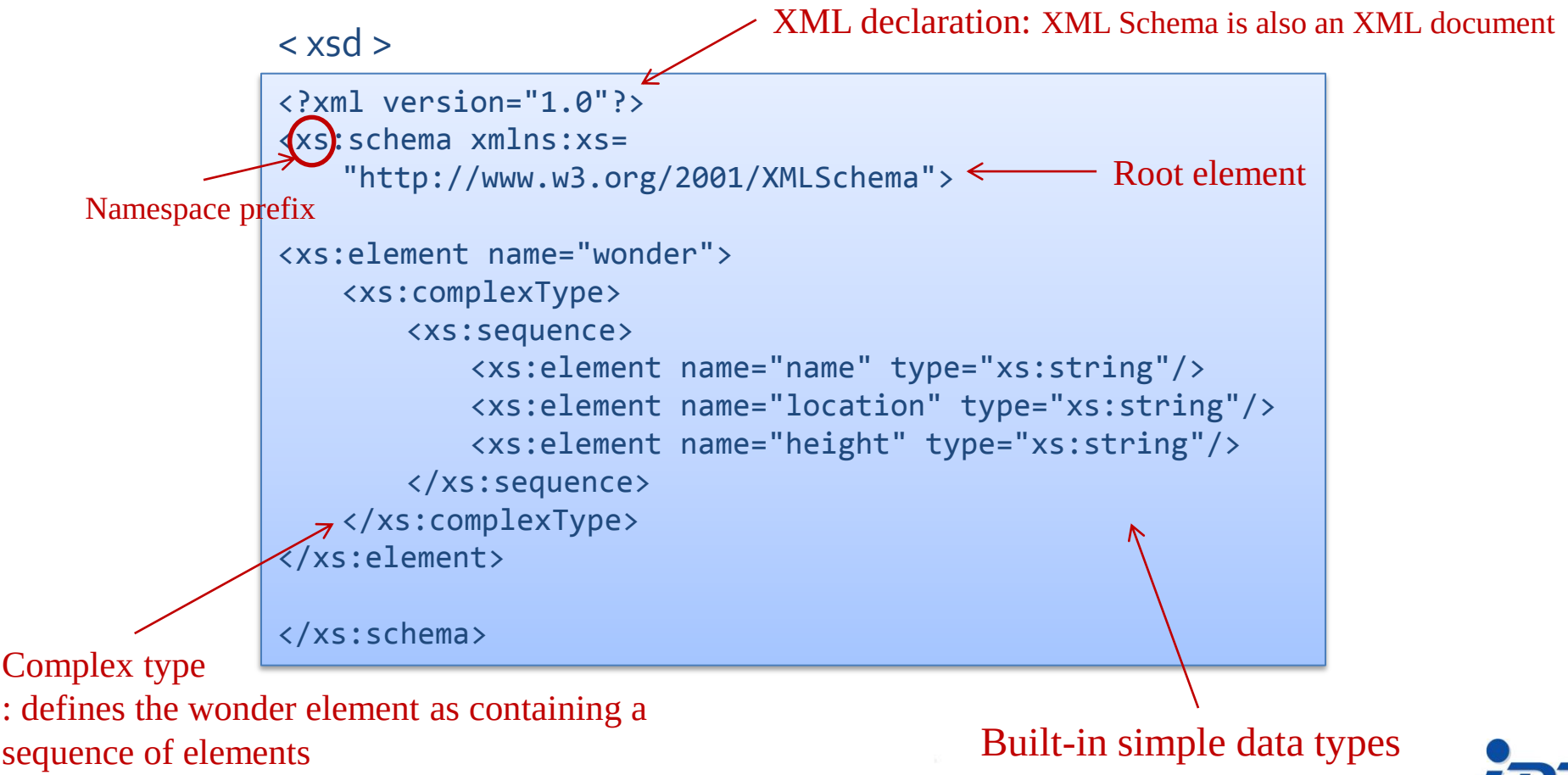
Working with XML Schema

- XML Schema specifies the structure of valid XML documents by defining
  - Elements
  - Relationships
  - Attributes
- XML element types
  - Simple type : describes the *text*
    - string, integer, date, …
  - Complex type : describes its structure
    - Contains child elements
    - Contains both child elements and text
    - Contains only text
    - Contains nothing(empty)

    → more information in Chapter 11

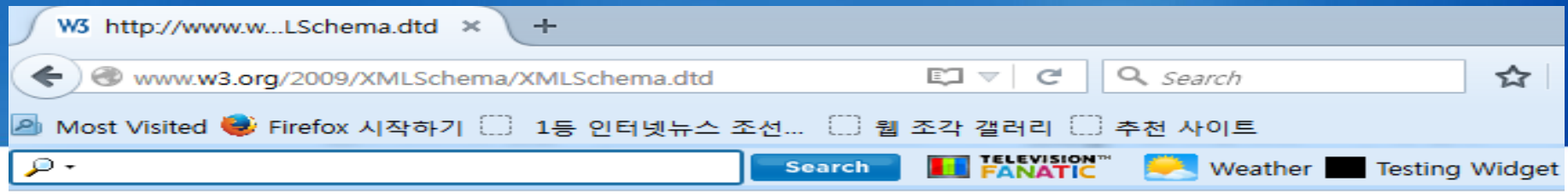
Beginning a Simple XML Schema

- Be saved with an .xsd
- Root element must be schema



This XML file does not appear to have any style information associated with it. The document tree is shown below.


```
- <xs:schema elementFormDefault="qualified" xml:lang="EN" targetNamespace="http://www.w3.org/2001/XMLSchema"
  version="1.0">
  - <xs:annotation>
    - <xs:documentation>
        Part 1 version: structures.xsd (rec-20120405) Part 2 version: datatypes.xsd (rec-20120405)
      </xs:documentation>
    </xs:annotation>
  - <xs:annotation>
    - <xs:documentation source="../structures/structures.html">
        The schema corresponding to this document is normative, with respect to the syntactic constraints it expresses in the XML Schema
        Definition Language. The documentation (within 'documentation' elements) below, is not normative, but rather highlights important
        aspects of the W3C Recommendation of which this is a part. See below (at the bottom of this document) for information about the
        revision and namespace-versioning policy governing this schema document.
      </xs:documentation>
    </xs:annotation>
  - <xs:annotation>
    - <xs:documentation>
        The simpleType element and all of its members are defined towards the end of this schema document.
      </xs:documentation>
    </xs:annotation>
  - <xs:import namespace="http://www.w3.org/XML/1998/namespace" schemaLocation="http://www.w3.org/2001/xml.xsd">
    - <xs:annotation>
      - <xs:documentation>
          Get access to the xml: attribute groups for xml:lang as declared on 'schema' and 'documentation' below
        </xs:documentation>
      </xs:annotation>
    </xs:import>
  - <xs:complexType name="openAttrs">
    - <xs:annotation>
      - <xs:documentation>
          This type is extended by almost all schema types to allow attributes from other namespaces to be added
```




```
<!-- DTD for XML Schema Definition Language Part 1: Structures
     Public Identifier: "-//W3C//DTD XSD 1.1//EN"
     Official Location: http://www.w3.org/2009/XMLSchema/XMLSchema.dtd -->
<!-- Id: structures.dtd,v 1.1 2003/08/28 13:30:52 ht Exp  -->
<!-- With the exception of cases with multiple namespace
     prefixes for the XSD namespace, any XML document which is
     not valid per this DTD given redefinitions in its internal subset of the
     'p' and 's' parameter entities below appropriate to its namespace
     declaration of the XSD namespace is almost certainly not
     a valid schema document. -->

<!-- See below (at the bottom of this document) for information about
      the revision and namespace-versioning policy governing this DTD. -->
<!-- The simpleType element and its constituent parts
     are defined in XML Schema Definition Language Part 2: Datatypes -->
<!ENTITY % xs-datatypes PUBLIC '-//W3C//DTD XSD 1.1 Datatypes//EN' 'datatypes.dtd' >

<!ENTITY % p 'xs:'> <!-- can be overridden in the internal subset of a
                         schema document to establish a different
                         namespace prefix -->
<!ENTITY % s ':xs'> <!-- if %p is defined (e.g. as foo:) then you must
                         also define %s as the suffix for the appropriate
                         namespace declaration (e.g. :foo) -->
<!ENTITY % nds 'xmlns%s;'>

<!-- Define all the element names, with optional prefix -->
<!ENTITY % schema "%p;schema">
<!ENTITY % defaultOpenContent "%p;defaultOpenContent">
<!ENTITY % complexType "%p;complexType">
<!ENTITY % complexContent "%p;complexContent">
<!ENTITY % openContent "%p;openContent">
<!ENTITY % simpleContent "%p;simpleContent">
<!ENTITY % extension "%p;extension">
<!ENTITY % element "%p;element">
<!ENTITY % alternative "%p;alternative">
<!ENTITY % unique "%p;unique">
<!ENTITY % key "%p;key">
<!ENTITY % keyref "%p;keyref">
<!ENTITY % selector "%p;selector">
<!ENTITY % field "%p;field">
<!ENTITY % group "%p;group">
<!ENTITY % all "%p;all">
<!ENTITY % choice "%p;choice">
<!ENTITY % sequence "%p;sequence">
<!ENTITY % any "%p;any">
<!ENTITY % anyAttribute "%p;anyAttribute">
```

Beginning a Simple XML Schema

- **xmlns:xs = "http://www.w3.org/2001/XMLSchema"**
  - Declares the XML Schema namespace (xmlns)
    - Namespace : a "space" in which names reside
    - **xs:**
      - W3C created a namespace
      - Contains all XML Schema elements and data types

< xsd >

```
<?xml version="1.0"?>
<xs:schema xmlns:xs= "http://www.w3.org/2001/XMLSchema">

...

</xs:schema>
```

Namespace prefix

Associating an XML Schema with an XML Document

< xml >

XML declaration

```
<?xml version="1.0"?>
<wonder xmlns:xsi="http://
    www.w3.org/2001/XMLSchema-instance"
    xsi:noNamespaceSchemaLocation = "09-06.xsd">

    <name>Colossus of Rhodes</name>
    <location>Greece</location>
    <height>107</height>

</wonder>
```

Defines the location of XML Schema

xsd.uri
: The location of the XML Schema file against which you want to validate your XML file

- **xsi:**
  - XML Schema Instance namespace
  - Includes **xsi:noNamespaceSchemaLocation** attribute

- **xsd.uri**
  - Can refer to a xsd file on the Internet, local area network, or local computer

Annotating Schemas

- Standard XML comments in XML Schema documents
  - *<!-- comments -->*
  - Since an XML Schema is an XML document
- More structured comments
  - **<xs:annotation>** can create annotations anywhere after the root element
  - **<xs:documentation>** for comments

< xsd >

```
<?xml version="1.0"?>
<xs:schema xmlns=  "http://www.w3.org/2001/XMLSchema">

<xs:annotation>
    <xs:documentation> This XML Schema
        will be used to validate the set
        of XML documents for the Wonders
        of the World project.
    </xs:documentation>
</xs:annotation>
...
```