XML Design

Week 9 Session1

To-do for today:

- XML Design Documents Slide deck
- XML Design Documents exercise

- Advanced Canvas concepts Slide deck
- Advanced Canvas exercise

Contents of This session

- Source Data Schema
- XML Document Structure
- Document Validation
  - Document Type Definition (DTD)
  - XML Schema Definition (XSD)
- Creating XML Design Documents for Group Project Part 1

XML - Refresher

- XML stands for Extensible Markup Language.
- XML is a document structure standard similar to HTML.
- No predefined tags – all user defined.
- Powerful and flexible way to store data.
- Languages based on XML:
  - XHTML
  - SVG
  - RSS

XML - Refresher

- XML Document structure
  - Document type definition
  - Tree-structured tags
  - Element contents wrapped
    - Open tag
    - Close tag

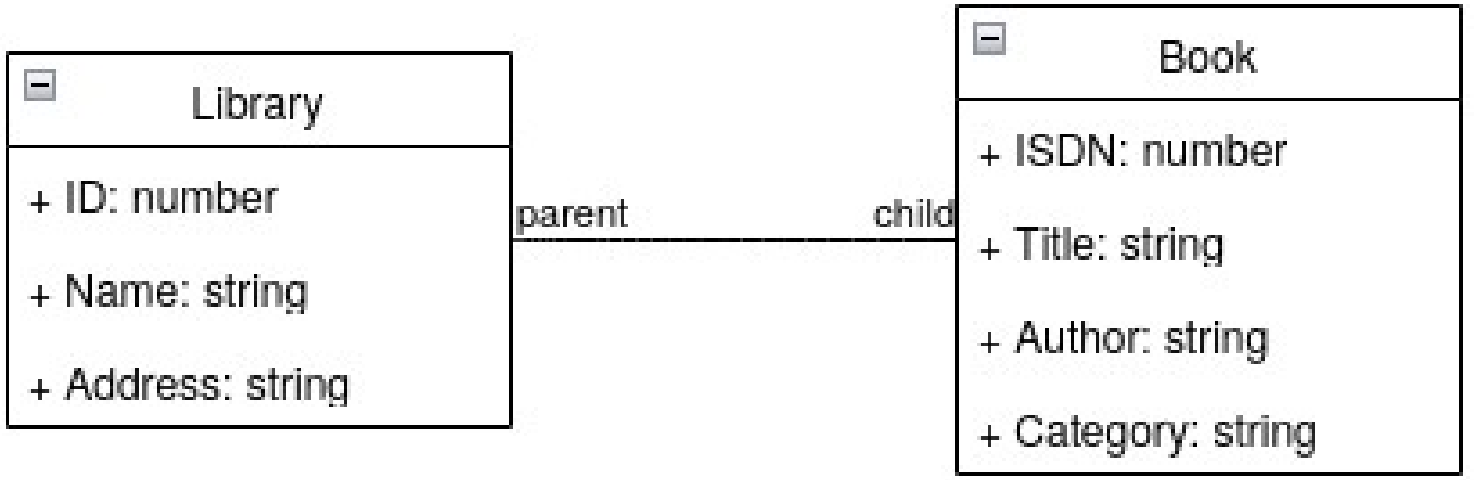
```
<?xml version="1.0" encoding="UTF-8"?>
<library>
    <ID>00001</ID>
    <Name>The Library</Name>
    <address>458 Literature Way</address>
    <books>
        <book>
            <ISDN>
                123456790
            </ISDN>
            <author>
                John Smith
            </author>
            <title>
                XML Examples
            </title>
            <category>
                Markup Languages
            </category>
        </book>
    </books>
</library>
```

Source Data

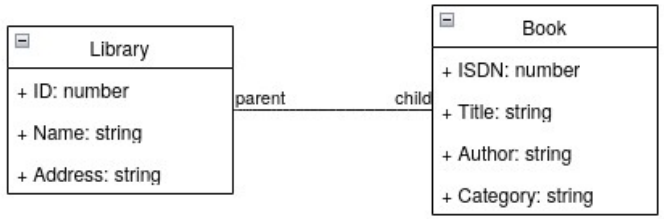
- To create an XML document we need to know the structure of the data being stored inside.
- Source data design documents provide information that informs the XML structure design.
- Typical data design documents:
  - Class Diagram
  - Entity Relation Diagram
  - DB Schema

Diagram – Library Example

- Library
  - ID
  - Name
  - Address
  - Books (list)
    - Book
      - ISDN
      - Title
      - Author
      - Category



XML – Library Example



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  - ID
  - Name
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```
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                John Smith
            </author>
            <title>
                XML Examples
            </title>
            <category>
                Markup Languages
            </category>
        </book>
        <book>
            ...
        </book>
    </books>
</library>
```

https://www.w3schools.com/xml/xml_tree.asp

XML Document Validation

- XML files should be validated to check if document structure complies with expectations. This includes checking:
  - Tag names, syntax, open-close pairs
  - Nested element structure
  - Data type and size
  - Version and encoding
- This is done to ensure integrity and expectation parity when:
  - Sending or receiving XML files
  - Reading or writing XML files

Document Type Definition (DTD)

- A DTD file is an optional separate document used to declare rules for XML file contents. It is linked to the XML document in a meta tag, and is expected to be referenced when reading or writing an XML file.
- DTD files are written using syntax derived from SGML
- DTD file must be accessible to receivers of linked XML documents, so both files must be sent if the receiver does not have a copy of the DTD.

DTD Example

- DTD Document contents:

```
<!ELEMENT email (to,from,subject,body)>
<!ELEMENT to (#PCDATA)>
<!ELEMENT from (#PCDATA)>
<!ELEMENT subject (#PCDATA)>
<!ELEMENT body (#PCDATA)>
```

- XML Document with DTD linked:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE email SYSTEM "Email.dtd">
<email>
    <to>Receiver</to>
    <from>Sender</from>
    <subject>Upcoming appointment</subject>
    <body>Reminder: Dentist 2024/02/30@14:30:00</body>
</email>
```


https://www.w3schools.com/xml/xml_dtd_building.asp

XML Schema Definition (XSD)

- XSD is similar to DTD, but is written using XML instead of SGML.
- XSD is newer, more powerful, better supported, and the recommeded validation schema for XML.
- XSD supports data types and standardised field formats
  - Resolves region-centric layouts like date-time
  - Greater control of data rules

XSD Elements

- Declare file type as XML version 1, encoding UTF-8

```
<?xml version="1.0" encoding="UTF-8"?>
```

- Define the root xs:schema element with namespace

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

- Define data elements inside the schema

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="email">…
  </xs:element>
</xs:schema>
```

XSD Elements

- Declare a single data element

```
<xs:element name="myInteger" type="xs:integer" />
<xs:element name="myString" type="xs:string" />
<xs:element name="myDate" type="xs:date" />
```

- Declare an element that has more than one child element

```
<xs:element name="myObject">
    <xs:complexType>
        <xs:sequence>
            <xs:element name="myInteger" type="xs:integer" />
            <xs:element name="myString" type="xs:string" />
            <xs:element name="myDate" type="xs:date" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
```

XSD Example

- XSD Document contents:

```
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="email">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="to" type="xs:string"/>
      <xs:element name="from" type="xs:string"/>
      <xs:element name="subject" type="xs:string"/>
      <xs:element name="body" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:schema>
```

- XML Document with XSD:

```
<?xml version="1.0" encoding="UTF-8"?>
<email
    xmlns:xsi="https://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="server-uri/ Email.xsd">
    <to>Receiver</to>
    <from>Sender</from>
    <subject>Upcoming appointment</subject>
    <body>Reminder: Dentist 2024/02/30@14:30:00</body>
</email>
```

XML XSD validator: http://syssgx.github.io/xml.js/

Group Project Part 1

No	Item	Criteria
	Part 1 (45 marks)	
1.	Provide documentation for your application. (5 marks) • XML data design (two files) • User booking design page(s) wireframe(s) for booking system with steps to outline how user will proceed with booking. • Link on the landing page	5 marks = both the design are in Pdf format and link(s) to the landing page is working. Clear explanation of presented data for XML data dictionary and wireframe provided for User booking design page, which has all details required for booking. 2-4 marks = one or two details in documents are missing or link(s) not working or quality of documentation is not up to standard. 1 mark = one of the documents is submitted with number of errors, second document is not

Your two data design files should be:

- XML File (populated with lodge data)

  +

- DTD File or XSD File

Group Project Part 1

- Your project submission should contain PDF design documents AND XML + [XSD or DTD]
- Your XML file does NOT need to have a validation file linked.

Exercise

- XML Design Documents Exercise

End of Session 1

Week 9