Extensible Markup Language

- nested data

XML (Extensible Markup Language)

- **XML Data Model**
  - Meta language to define specific exchange formats
  - Document format for semi-structured data
  - Well formedness
  - XML schema / DTD

```
<?xml version="1.0" encoding="UTF-8"?>
<data>
  <student id="1">
    <course id="INF.01017UF" name="DM"/>
    <course id="706.550" name="AMLS"/>
  </student>
  <student id="5">
    <course id="706.520" name="DIA"/>
  </student>
</data>
```

- **XPath** (XML Path Language)
  - Query language for accessing collections of nodes of an XML document
  - Axis specifies for ancestors, descendants, siblings, etc

```
/data/student[@id='1']/course/@name
```

↓

"DM"
"AMLS"

- **XSLT** (XML Stylesheet Language Transformations)
  - Schema mapping (transformation) language for XML documents
- **XQuery**
  - Query language to extract, transform, and analyze XML documents

- more verbose than [[JSON]]

XML in [[SQL]]

- XML can be used as datatype
- various built-in functions to parse documents/create attributes/elements

```
INSERT INTO Students
  (Fname,Lname,Doc)
  VALUES('John','Smith',
  xmlparse(<source_doc>));
```

- execution of XML expressions on XML attributes
  - Execute XPath expressions on XML types
  - XMLEXIST with XPath instead of XQuery
  - XPATH with optional namespace handling

```
SELECT Fname, Lname,
  xpath('/student/@id',Doc)
  FROM Students
```