The term “XML” is used to mean
- An open standard (a W3C Recommendation) that provides
  - a data format
  - a data modeling language
- The use of XML-formatted data in an application (like a browser)
- A meta-language for creating markup languages
- A set of associated recommendations and specifications (style, transformation, query, link, APIs, etc.)

XML Is Not
- A programming language (does not replace C++, Java, Perl, Python, ...)
- A user interface
- A presentation format
- A formatting or processing system
- A standard set of tags
- A recommended set of tags

Why Use XML?
- Encode (mark up) data only once
- Produce many products from that markup
- Enable semantically complex searching
- Reuse data (in whole or part) many times
- Interchange data freely
- Enable machine-to-machine communication
- Let whole communities agree on data content
- Preserve data for a long time

XML Elements
- An element is an identifiable, named component of a document (paragraph, author’s name, article title, unit price, bulleted list)
- Can have content (data, other elements)
- Can be a pointer to information (hypertext link, table reference)
- Must be contiguous (one start and one end)

Elements Identify Content
(No limit to the number of possible elements)

<table>
<thead>
<tr>
<th>Structure</th>
<th>What part of the document? (article, title, paragraph, list, footnote)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metadata</td>
<td>About the document (issue number, first page, article title, DOI, journal abbreviation)</td>
</tr>
<tr>
<td>Named content</td>
<td>What is this text/data? (genus-species, surname, glossary, gene, question and answer)</td>
</tr>
<tr>
<td>Navigation/Links</td>
<td>Value-added for searching/linking (bibliographic citations; links to other articles, index terms, related material; figure references)</td>
</tr>
<tr>
<td>Presentation</td>
<td>How text should look (typographic emphasis, superscript, forced line breaks)</td>
</tr>
</tbody>
</table>

XML Documents
- In XML jargon, your data (no matter what form) is called a “document”, “document instance” or just “instance”
- A document is a coherent, ordered collection of information, such as
  - journal article
  - invoice
  - reference book
  - chapter in a reference book
  - sales catalog
  - drug monograph

Editing XML Documents
XML Files are
- “plain text” underneath
  - use any text editor or any word processor that can handle plain text
  - built on Unicode (represents all major scripts of the world)
- “human readable”
- machine processable

XML separates content from format/behavior
XML does not say
- how it looks (16 point Helvetica Bold)
- what it does (starts a Javascript)
A specification must provide format mapping (usually called a stylesheet, display specification, or output spec)

Stylesheets
- One stylesheet, many documents
  - maintains consistency of format (“look and feel”) across documents
  - is easy to develop, maintain, and apply (house style)
- One document, many stylesheets
  - allows for different media types: print, on-line, etc.
  - is easy to produce derivative documents: selections, summaries, indexes, catalogs, ...

You (and Your Software) Can Do a Lot with XML
- Make formatted documents
- Make web sites
- Make spin-off, sub-set, and superset documents
- Make rich search and discovery tools, such as detailed indices and navigable tables of contents
- Archive content for re-use
- Internationalization and localization
Example of MEI XML

```xml
<score>
  <scoredef>
    <staffgrp>
      <staffdef n="1" lines="5"
        clef.line="2" clef.shape="G" ppq="4"
        key.sig="1f" key.mode="major"/>
      <staffdef n="2" lines="5"
        clef.line="4" clef.shape="F" ppq="4"
        key.sig="1f" key.mode="major"/>
    </staffgrp>
  </scoredef>
  <section>
    <scoredef meter.count="2"
      meter.unit="4" key.sig="1f"
      key.mode="major"/>
    <measure n="1" xml:id="d1e67">
      <staff n="1">
        <layer n="1">
          <beam>
            <note xml:id="d1e113" tstamp="0"
              pname="c" oct="6" dur="16" dur.ges="1"
              stem.dir="up"/>
            <note xml:id="d1e133" tstamp="1"
              pname="a" oct="5" dur="16" dur.ges="1"
              stem.dir="up"/>
            <note xml:id="d1e153" tstamp="2"
              pname="g" oct="5" dur="16" dur.ges="1"
              stem.dir="up"/>
            <note xml:id="d1e173" tstamp="3"
              pname="f" oct="5" dur="16" dur.ges="1"
              tie="i" stem.dir="up"/>
          </beam>
          <beam>
            <note xml:id="d1e196" tstamp="4"
              pname="f" oct="5" dur="16" dur.ges="1"
              tie="t" stem.dir="up"/>
            <note xml:id="d1e219" tstamp="5"
              pname="a" oct="5" dur="16" dur.ges="1"
              stem.dir="up"/>
            <note xml:id="d1e239" tstamp="6"
              pname="g" oct="5" dur="16" dur.ges="1"
              stem.dir="up"/>
            <note xml:id="d1e259" tstamp="7"
              pname="f" oct="5" dur="16" dur.ges="1"
              stem.dir="up"/>
          </beam>
        </layer>
      </staff>
    </measure>
  </section>
</score>
```

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