Introduction to Digital Libraries

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The Library Perspective

The Metadata Bottleneck

- Historically, libraries have created metadata by hand for each item – manual.
  - Expensive
  - Time-consuming
  - Human-intensive
- Computer scientists argue for automatic metadata extraction.
  - Cheaper and faster
  - Lower quality
  - Based on heuristics instead of human experts

The Search Dilemma

- Searching has traditionally been based on carefully selected keywords.
  - A good keyword
    - does not appear in the title or abstract
    - is specific and descriptive but not obscure
- Modern users expect to use Google-like search engines based on automatic indexing of full-text rather than keywords.
- Have you ever been asked for keywords when writing a document?

Direct or Indirect Retrieval

- Information retrieval in libraries often involves an intermediary (e.g., subject librarian) who performs the search on your behalf. The hypotheses are:-
  - Search engines, like ALEPH, are too complicated and cannot be used effectively by users!
  - Most users cannot construct effective queries to obtain the best possible results.
- Knowing what you know about IR, how does one construct an effective query?

Quality Control

- Librarians obtain material from publishers, who have a network of book/journal editors/reviewers to maintain quality.
- How is quality control enforced online?
- How valid is an online reference compared to a reference to a published document?
- Why publish electronic pre-prints if the quality is lower? How do we maintain a high standard of pre-prints?
- How does an establishment like a library decide what electronic material to vet?

Authority Control

- What if two people share the same name – how do you "search for other books by the same author"?
  - Use dates of birth
  - Use unique/global identity numbers
  - Assign authority numbers
  - Use email addresses?
- How important is this?

Another hussein?

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Surgeries:
Evington Valley Renewal Office, 166 Evington Road (near Co-op), 2nd Friday each month, 6.00pm - 7.00pm.

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Library Consortia

- Cataloguing is cooperative – why should two institutions catalogue the same book in a networked environment?
- UCT is part of CALICO (Cape Library Cooperative), to coordinate and broaden services and reduce costs.
- OCLC's WorldCat contains 52 million resource descriptions that are developed cooperatively.
  - UCT is a member!
- SABINET runs SACat – a local equivalent.

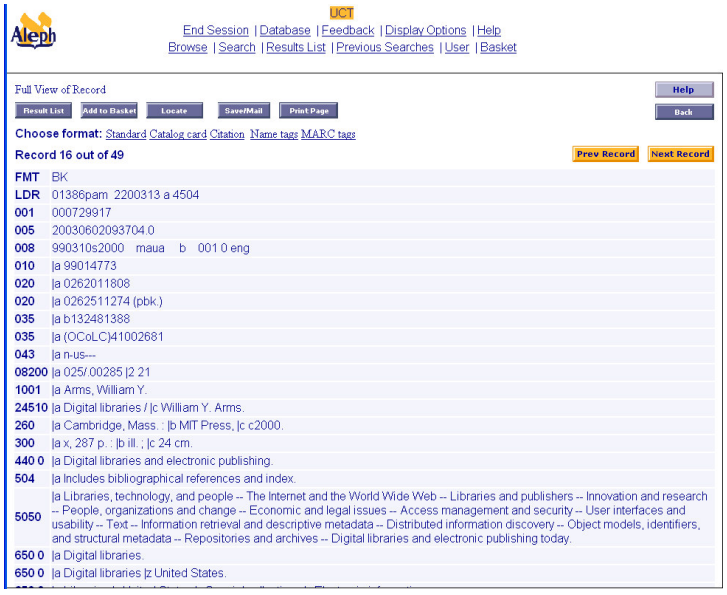
Classification Systems

- Classifications are used to organise collections of information into categories (usually hierarchically).
- Dewey Decimal System (OCLC)
  - Based on decimal numbers. e.g., 004.67
  - Computer Science is in 001 (000=Information)? 520 (500=Sciences)? 620 (600=Technology)?
- Library of Congress Classification
  - Based on alphanumeric/decimal codes e.g., QA76.76
  - Computer Science is in QA76 (QA=Mathematics)

Metadata Standards - MARC

- MAchine-Readable Cataloguing is an abstract metadata format to describe library items, where each field and subfield is specified by a number.
- Format used by library catalogue software, such as ALEPH.
- Various different standards – USMARC, UKMARC, CAN/MARC, etc.
- Current standard version – MARC21
- XML encoding used in OAI data providers.

MARC Example 1



MARC Example 2

```
<marc:record xmlns:marc="http://www.loc.gov/MARC21/slim"
   type="Bibliographic">
<marc:leader>01476ckm 22003737a 4500</marc:leader>
<marc:controlfield tag="001"> 2002722378</marc:controlfield>
<marc:controlfield tag="003">DLC</marc:controlfield>
<marc:controlfield tag="005">20030220135251.0</marc:controlfield>
<marc:controlfield tag="007">kj bo </marc:controlfield>
<marc:controlfield tag="007">cr ||||||||||||</marc:controlfield>
<marc:controlfield tag="008">021113s1785 stknnn ||
   kneng</marc:controlfield>
<marc:datafield tag="035" ind1=" " ind2=" ">
   <marc:subfield code="a">(DLC)13000786</marc:subfield>
</marc:datafield>
<marc:datafield tag="100" ind1="1" ind2=" ">
   <marc:subfield code="a">Kay, John,</marc:subfield>
   <marc:subfield code="d">1742-1826,</marc:subfield>
   <marc:subfield code="e">artist.</marc:subfield>
</marc:datafield>
<marc:datafield tag="520" ind1="0" ind2=" ">
   <marc:subfield code="a">Scottish cartoon shows a group of men conversing
   as balloons sail overhead. Possibly Scottish balloonist James Tytler and
   Italian balloonist Vincent Lunardi.</marc:subfield>
</marc:datafield>   ...
```

(excerpt from LoC American Memory OAI Data Provider)

Search Protocols

- Z39.50 is the traditional remote search protocol for library systems.
  - ANSI/NISO/ISO standard
  - Comparatively complicated syntax/operation
  - Based on older standards (1998)
- ZING (Z39.50 International Next Generation) is the latest updated version.
  - SRW – Search/Retrieve for the Web
  - SRU – Search/Retrieve URL mechanism?
    - `http://myserver.com/myurl/searchRetrieve?query=dc.title=cat&maximumRecords=10&recordSchema=http%3a//www.loc.gov/mods/&sortKeys=title,dc&startRecord=1` (excerpt from ZING website)

SRW Request

```
SOAPAction: "searchRetrieve"

<SOAP:Envelope>
   <SOAP:Body>
      <SRW:searchRetrieveRequest
   xmlns:SRW="http://www.loc.gov/zing/srw/v1.0/">
      <SRW:query>(dc.author exact "jones" prox///5 title >=
   "smith")</SRW:query>
   <SRW:sortKeys>/record/title,"http://www.loc.gov/zing/srw/dcsche
   ma/v1.0/",1,0,highValue
   /record/datafield[@tag="100"]/subfield[@code="a"],"http://www.l
   oc.gov/marcxml/",,,"Smith"</SRW:sortKeys>
      <SRW:startRecord>1</SRW:startRecord>
      <SRW:maximumRecords>10</SRW:maximumRecords>

   <SRW:recordSchema>http://www.loc.gov/mods/</SRW:recordsSchema>
      </SRW:searchRetreiveRequest>
   </SOAP:Body>
</SOAP:Envelope>

(excerpt from ZING website)
```

SRW Response

```
<SOAP:Envelope>
<SOAP:Body>
<SRW:searchRetrieveResponse xmlns:SRW="http://www.loc.gov/zing/srw/v1.0/"
   xmlns:DIAG="http://www.loc.gov/zing/srw/v1.0/diagnostic/">
<SRW:numberOfRecords>2</SRW:numberOfRecords>
<SRW:resultSetId>8c527d60-c3b4-4cec-a1de-1ff80a5932df</SRW:resultSetId>
<SRW:resultSetIdleTime>600</SRW:resultSetIdleTime>
<SRW:records>
   <SRW:record>
      <SRW:recordSchema>http://www.loc.gov/mods/</SRW:recordSchema>
      <SRW:recordData> &lt;?xml version=&quot;1.0&quot; encoding=&quot;UTF-
   8&quot;?&gt; &lt;mods xmlns:xlink=&quot;http://www.w3.org/TR/xlink&quot;
   xmlns:xsi=&quot;http://www.w3.org/2001/XMLSchema-instance&quot;
   xmlns=&quot;http://www.loc.gov/mods/&quot;
   xsi:schemaLocation=&quot;http://www.loc.gov/mods/
   http://www.loc.gov/standards/mods/mods.xsd&quot;&gt; &lt;titleInfo&gt;
   &lt;title&gt;Sound and fury : the making of the punditocracy
   /&lt;/title&gt; &lt;/titleInfo&gt; &lt;name type=&quot;personal&quot;&gt;
   &lt;namePart&gt;Alterman, Eric.&lt;/namePart&gt;
   &lt;role&gt;creator&lt;/role&gt; &lt;/name&gt; ...
      </SRW:recordData>
      <SRW:recordPosition>1</SRW:recordPosition>
   </SRW:record>
...
(excerpt from ZING website)
```

Library Catalogue Systems

- Indexes MARC records.
- Provides OPAC (Online Public Access Catalogue) services to users.
- Provides library-library connections using protocols such as Z39.50.

- Examples: ALEPH (Ex Libris), Virtua (VTLS), Unicorn (Sirsi) …