A Brief Introduction to RDF/Linked Data and RDA Registered Properties

Kimmy Szeto
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We built ISBD, AACR2 and MARC when most libraries kept their own set of catalog cards.

Today, library users expect online searches to reach everywhere in the world instantaneously.
Problems with ISBD, AACR2 and MARC:

- form their own separate bibliographic universe
- not enough globally unique identifiers
- fosters inconsistencies due to insufficient control

Solution?

- design a structure that is part of the data universe
- build standards and practices around networked users
- build in increased consistency, comprehensibility and extensibility
Resource Description Framework is

- an abstract data model
- domain-neutral and application-neutral
- provides structure to draw relationships between things
In RDF…

- a statement, a “triple” is made of three ordered parts
- triples are “directed” and “labeled”
- triples are best visualized as directed, labeled graphs
The RDF Triple

Each thing and each relationship has a “name” in the form of

- a “reference” – uniform resource identifier (URI)
- a blank / placeholder
- a “literal” – a actual character string, only used in objects for convenience

Sample URIs

- http://www.w3.org/1999/02/22-rdf-syntax-ns
- http://RDVocab.info/roles/author
- urn:isbn:0-8389-3594-X
URI references can refer to a thing, a class of things, or a property

- http://id.loc.gov/authorities/names/n79107741.html refers to the name authority file for “Beethoven, Ludwig van, 1770-1827”
- http://rdvocab.info/uri/schema/FRBRentitiesRDA/Manifestation refers to the FRBR class of objects “Manifestation”
- http://rdvocab.info/uri/schema/FRBRentitiesRDA/Name refers to the FRBR class of objects “Name”
- http://rdvocab.info/uri/schema/FRBRentitiesRDA/Name refers to RDA property “Name”
- http://marc21rdf.info/elements/1XX/M10_01_a refers to the MARC 21 property labeled “Personal name in Main Entry-Personal Name (Surname)” i.e. Field 100 1# subfield a
The RDF Triple

URIs have human-readable “Labels”

Ludwig van Beethoven refers to the name authority file for “Beethoven, Ludwig van, 1770-1827”

Manifestation refers to the FRBR class of objects “Manifestation”

Name refers to the FRBR class of objects “Name”

Name refers to RDA property “Name”

Personal name in Main Entry-Personal Name (Surname) refers to the MARC 21 property labeled “Personal name in Main Entry-Personal Name (Surname)” i.e. Field 100 1# subfield a
The RDF Triple

Actual data values – “literals”

“Romeo and Juliet”

“Lugwig van Beethoven”

TRUE
Imagine a spreadsheet with information about books.

The rows and columns represent classes of things.

Each row is a “resource”

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Standard ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romeo et Juliette</td>
<td>Peter Ilich Tchaikovsky</td>
<td>0-4862-5217-5</td>
</tr>
<tr>
<td>The holy sonnets of John Donne</td>
<td>Benjamin Britten</td>
<td>028941742827</td>
</tr>
<tr>
<td>Romeo and Juliet</td>
<td>William Shakespeare</td>
<td>0-4864-7573-5</td>
</tr>
</tbody>
</table>

Each column header is a “property” followed by a list of “values”

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Each cell is a RDF triple

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<tr>
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<tr>
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<td>William Shakespeare</td>
<td>0-4864-7573-5</td>
</tr>
</tbody>
</table>

This work

has title

“The holy sonnets of John Donne”

has author

“Benjamin Britten”
RDF graph for a work, showing labels:

- Work
- Has preferred title: "The holy sonnets of John Donne"
- Has author
- Person
- Has name: "Britten, Benjamin"
- Has birth date: "1913"
The holy sonnets of John Donne

Britten, Benjamin

1913
Some more properties added, using labels

- has preferred title: “The holy sonnets of John Donne”
- has name: “Britten, Benjamin”
- has birth date: “1913”
- has language: “en”
- has content type: “performed music”
- has media type: “audio”
- has carrier type: “audio disc”
Yet more properties added – involving other works

- Sonnets (work)
  - has derivative
  - has agent
  - is realized through
  - Notated music (expression)
  - is embodied in
    - Score (manifestation)
    - A heritage of 20th century British song

- The holy sonnets of John Donne
  - has derivative
  - has agent
  - is realized through
  - Performed music (expression)
  - is embodied in
    - computer file (manifestation)

- Benjamin Britten (person)
  - has agent

- Songs and proverbs of William Blake
  - has derivative
  - has agent
  - is realized through
  - Performed music (expression)
  - is embodied in
    - audio disc (CD) (manifestation)
    - audio disc (LP) (manifestation)

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Linked Data

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RDA …

- is a descriptive standard
- standardizes how metadata contents are identified, transcribed, and structured
- provides for the use of controlled vocabulary
- is independent of metadata encoding

MARC and RDF…

- are encoding standards
- both can be used to encode, or “express” RDA
RDA elements are expressed in RDF as “properties”
RDA properties are designed to work with FRBR entities

Some FRBR entities for RDA

<table>
<thead>
<tr>
<th>FRBR</th>
<th>RDF Label</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td><a href="http://rdvocab.info/uri/schema/FRBRentitiesRDA/Work">http://rdvocab.info/uri/schema/FRBRentitiesRDA/Work</a></td>
<td></td>
</tr>
<tr>
<td>Expression</td>
<td><a href="http://rdvocab.info/uri/schema/FRBRentitiesRDA/Expression">http://rdvocab.info/uri/schema/FRBRentitiesRDA/Expression</a></td>
<td></td>
</tr>
<tr>
<td>Manifestation</td>
<td><a href="http://rdvocab.info/uri/schema/FRBRentitiesRDA/Manifestation">http://rdvocab.info/uri/schema/FRBRentitiesRDA/Manifestation</a></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td><a href="http://rdvocab.info/uri/schema/FRBRentitiesRDA/Item">http://rdvocab.info/uri/schema/FRBRentitiesRDA/Item</a></td>
<td></td>
</tr>
<tr>
<td>Subject</td>
<td><a href="http://rdvocab.info/uri/schema/FRBRentitiesRDA/Subject">http://rdvocab.info/uri/schema/FRBRentitiesRDA/Subject</a></td>
<td></td>
</tr>
<tr>
<td>etc…</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Some RDA properties are specific to the FRBR entity

Note correspondence with MARC

<table>
<thead>
<tr>
<th>MARC</th>
<th>RDF Property</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>245a</td>
<td>Title (Manifestation)</td>
<td><a href="http://rdvocab.info/Elements/titleManifestation">http://rdvocab.info/Elements/titleManifestation</a></td>
</tr>
<tr>
<td>245a</td>
<td>Title of the work</td>
<td><a href="http://rdvocab.info/Elements/titleOfTheWork">http://rdvocab.info/Elements/titleOfTheWork</a></td>
</tr>
<tr>
<td>240a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>245b</td>
<td>Parallel title proper (Manifestation)</td>
<td><a href="http://rdvocab.info/Elements/parallelTitleProperManifestation">http://rdvocab.info/Elements/parallelTitleProperManifestation</a></td>
</tr>
<tr>
<td>245c</td>
<td>Statement of responsibility relating to title proper</td>
<td><a href="http://rdvocab.info/Elements/statementOfResponsibilityRelatingToTitleProper">http://rdvocab.info/Elements/statementOfResponsibilityRelatingToTitleProper</a></td>
</tr>
<tr>
<td>246a</td>
<td>Variant title (Manifestation)</td>
<td><a href="http://rdvocab.info/Elements/variantTitleManifestation">http://rdvocab.info/Elements/variantTitleManifestation</a></td>
</tr>
</tbody>
</table>
Some are more straightforward …

<table>
<thead>
<tr>
<th>MARC</th>
<th>RDF Label</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>336a</td>
<td>Content type (Expression)</td>
<td><a href="http://rdvocab.info/Elements/contentTypeExpression">http://rdvocab.info/Elements/contentTypeExpression</a></td>
</tr>
<tr>
<td>337a</td>
<td>Media type (Manifestation)</td>
<td><a href="http://rdvocab.info/Elements/mediaTypeManifestation">http://rdvocab.info/Elements/mediaTypeManifestation</a></td>
</tr>
<tr>
<td>336a</td>
<td>Carrier type (Manifestation)</td>
<td><a href="http://rdvocab.info/Elements/carrierTypeManifestation">http://rdvocab.info/Elements/carrierTypeManifestation</a></td>
</tr>
</tbody>
</table>
RDA in RDF: Example

010      2011567207
040    DLC ¤e rda ¤b eng ¤c DLC
028 32 5903 ¤b Marjer Publishing
050 00 M482.W55 ¤b 068 2009
100 1 Williams, John, ¤d 1932-
245 10 La Jolla quartet / ¤c John Williams.
260 [Place of publication not identified] : ¤b Marjer Publishing,
 ¤c [2010]
300    1 score (82 pages) ; ¤c 43 cm
336    notated music ¤2 rdaccontent
337    unmediated ¤2 rdamedia
338    volume ¤2 rdacarrier
500 For clarinet, harp, violin, and cello.
546    ¤b Staff notation.
505 0 Introduction -- Aubade -- Scherzo -- Cantando -- Finale.
650 0 Quartets (Clarinet, harp, violin, violoncello) ¤v Scores.
RDA in RDF: Example

- **preferred title**
- **agent**
  - Williams, John, 1932-
  - name
  - birth date: 02-08-1932
- **La Jolla quartet (Work)**
  - is realized through
  - expression
  - is embodied in
  - manifestation

- **content type**
  - corresponding subject term or classification number
  - medium of performance
  - form of musical notation

- **notated music**
  - medium of performance
    - "clarinet, harp, violin, violoncello"
  - staff notation
  - notated music

- **extent**
  - form
    - "1 score (82 pages); 43 cm"

- **manifestation**
  - volume
    - unmediated
    - [2010]
      - "Marjer Publishing"

- **carrier type**
  - "M482.W55"

- **publisher's name**
  - "Williams, John, 1932-"
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RDA in RDF: Example

040 RBN ≡c RBN ≡d OCL ≡d IUL ≡d OCL ≡d JNA ≡d OCL ≡d NZCPL ≡d JTA ≡d BTCTA ≡d ORX ≡d YQU ≡d OCLCG ≡d OCLCA ≡d MTG ≡d OCL ≡d IK2 ≡d EUX
028 00 417 428-2 ≡b London
050 4 M1500.B827 ≡b H6
100 1 Britten, Benjamin, ≡d 1913-1976.
240 10 Vocal music. ≡k Selections
245 14 The holy sonnets of John Donne ≡h [sound recording] ; ≡b Songs and proverbs of William Blake ; Billy Budd / ≡c Britten.
300 3 sound discs : ≡b digital, stereo. ; ≡c 4 3/4 in.
500 Compact discs; analog recordings.
505 0 The holy sonnets of John Donne, op.35 -- Songs and proverbs of William Blake, op.74 -- Billy Budd, op.50.
650 0 Songs (High voice) with piano.
650 0 Songs (Medium voice) with piano.
650 0 Operas.
600 10 Donne, John, ≡d 1572-1631 ≡v Musical settings.
600 10 Blake, William, ≡d 1757-1827 ≡v Musical settings.
700 10 Donne, John, ≡d 1572-1631.
700 10 Blake, William, ≡d 1757-1827.
etc.
RDA in RDF: Example

expression

is embodied in

manifestation

performer

carrier type

Publisher's name

Public date

Publisher's number for music

media type

exte

form of musical notation

performer

expression

is realized through

preferred title

Songs and proverbs of William Blake

“Songs and proverbs of William Blake”

Pears, Peter, Sir

Britten, Benjamin, 1913-1976

Fischer-Dieskau, Dietrich, 1925-
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