XML & the Resource Description Framework (RDF)

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2015 ALA Annual Conference
ALCTS Preconference
25 June 2015
San Francisco, California
A simple RDF Statement

@prefix dcterms: <http://purl.org/dc/terms/> .

Simple RDF in XML

<?xml version="1.0" encoding="utf-8"?>
<?xml-model href="http://www.w3.org/TR/REC-rdf-syntax/rdfxml.rng"
    type="application/xml"
    schematypens=http://relaxng.org/ns/structure/1.0 ?>

<rdf:RDF
    xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns:dc="http://purl.org/dc/terms/" >

    <rdf:Description
        rdf:about="http://hdl.handle.net/10111/UIUCOCA:meditationesembl00voge">
        <dc:creator rdf:resource="http://viaf.org/viaf/54384883"/>
    </rdf:Description>

</rdf:RDF>
RDF Schema – RDF's Vocabulary Description Language

- RDF Schemas (RDFS) define:
  - classes – which appear as the subjects or objects of triples
  - properties – which appear as predicates in triples

- Classes and sub-classes:
  - rdfs:Resource – all *things* described by RDF are instances of the class rdfs:Resource; this class has sub-classes, e.g.:
    - rdfs:Literal is the class of literal values such as strings & integers
    - rdfs:Datatype – a typed literal is an instance of the datatype class
    - rdf:XMLLiteral is a sub-class of rdfs:Datatype
    - Sub-classes specific to your semantics

- A particular thing is an instance of its class
- The object of rdf:type is a class or sub-class
The Agent class from Dublin Core Terms RDFS

<rdf:Description rdf:about="http://purl.org/dc/terms/Agent">
  <rdfs:label xml:lang="en">Agent</rdfs:label>
  <rdfs:comment xml:lang="en">A resource that acts or has the power to act.</rdfs:comment>
  <dcterms:description xml:lang="en">Examples of Agent include person, organization, and software agent.</dcterms:description>
  <rdfs:isDefinedBy rdf:resource="http://purl.org/dc/terms/"
  <dcterms:issued rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2008-01-14</dcterms:issued>
  <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  <rdf:type rdf:resource="http://purl.org/dc/terms/AgentClass"/>
  <dcterms:hasVersion rdf:resource="http://dublincore.org/usage/terms/history/#Agent-001"/>
</rdf:Description>
RDF Schema
– RDF's Vocabulary Description Language

• Properties and sub-properties:
  • rdf:Property – the class of RDF properties;

• all other properties in RDF are instances of rdf:Property, e.g.:
  • rdfs:domain – is used to state that any resource that has a given property is an instance of one or more classes
  • rdfs:range – is used to state that the values of a property are instances of one or more classes
  • rdf:type – is used to state that a resource is an instance of a class
  • rdf:subClassOf – is used to state that all the instances of one class are instances of another
  • rdfs:subPropertyOf – is used to state that all resources related by one property are also related by another

• Also, rdfs:label, rdfs:comment, properties specific to your semantics
The creator property from Dublin Core Terms RDFS

<rdf:Description rdf:about="http://purl.org/dc/terms/creator">
  <rdfs:label xml:lang="en">Creator</rdfs:label>
  <rdfs:comment xml:lang="en">An entity primarily responsible for making the resource.</rdfs:comment>
  <dcterms:description xml:lang="en">Examples of a Creator include a person, an organization, or a service.</dcterms:description>
  <rdfs:isDefinedBy rdf:resource="http://purl.org/dc/terms/">
  <dcterms:issued rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2008-01-14</dcterms:issued>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  <dcterms:hasVersion rdf:resource="http://dublincore.org/usage/terms/history/#creatorT-002"/>
  <rdfs:range rdf:resource="http://purl.org/dc/terms/Agent"/>
  <rdfs:subPropertyOf rdf:resource="http://purl.org/dc/terms/contributor"/>
  <owl:equivalentProperty rdf:resource="http://xmlns.com/foaf/0.1/maker"/>
</rdf:Description>
General Resources for RDF

• W3C RDF Validation Service: http://www.w3.org/RDF/Validator/
• W3C RDFa 1.1 Distiller and Parser: http://www.w3.org/2012/pyRdfa/
• RDF: http://www.w3.org/RDF/
• RDF 1.1 Semantics: http://www.w3.org/TR/2013/WD-rdf11-mt-20130723/
• RDF/XML Syntax Specification: http://www.w3.org/TR/REC-rdf-syntax/
• RDFa Core 1.1 - Second Edition: http://www.w3.org/TR/rdfa-syntax/
• Turtle - Terse RDF Triple Language: http://www.w3.org/TeamSubmission/turtle/
• N3: http://www.w3.org/2000/10/swap/Primer.html
• JSON-LD 1.0: http://www.w3.org/TR/json-ld/
Schema.org - 
OCLC

2011: Started experimenting with schema.org semantics for exposing library metadata to Web search engines
2012: Published 300 million catalog records expressed in schema.org semantics
  • Extending library specific vocabularies, Bibliograph.net
Since 2013: Managed and published linked data models of FAST and VIAF authority files
2014: Created Work identifiers for more than 200 million works

2014: Schema Bib Extend Community Group was formed to recommend/establish additional semantics for Library data
### Linked Data

More info about Linked Data

<table>
<thead>
<tr>
<th>library:oclcnum</th>
<th>&quot;11069126&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>library:placeOfPublication</td>
<td>[<a href="http://id.loc.gov/vocabulary/countries/lu">http://id.loc.gov/vocabulary/countries/lu</a>]</td>
</tr>
<tr>
<td>rdf:type</td>
<td>schema:Country</td>
</tr>
<tr>
<td>library:placeOfPublication</td>
<td>rdf:type</td>
</tr>
<tr>
<td>schema:name</td>
<td>&quot;Urbana&quot;</td>
</tr>
<tr>
<td>owl:sameAs</td>
<td>[info:oclcnum/11069126]</td>
</tr>
<tr>
<td>rdf:type</td>
<td>library:Periodical</td>
</tr>
<tr>
<td>rdf:type</td>
<td>schema:CreativeWork/Periodical</td>
</tr>
<tr>
<td>library:serial</td>
<td>rdf:type</td>
</tr>
<tr>
<td>schema:about</td>
<td>[<a href="http://dewey.info/class/081/a11/">http://dewey.info/class/081/a11/</a>]</td>
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<tr>
<td>rdf:type</td>
<td>schema:Intangible</td>
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<tr>
<td>schema:about</td>
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</tr>
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<td>schema:Organization</td>
</tr>
<tr>
<td>schema:name</td>
<td>&quot;University of Illinois (Urbana-Champaign campus)&quot;</td>
</tr>
<tr>
<td>schema:about</td>
<td>[<a href="http://viaf.org/viaf/158181260">http://viaf.org/viaf/158181260</a>]</td>
</tr>
<tr>
<td>madsrdf:isIdentifiedByAuthority</td>
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<tr>
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</tr>
<tr>
<td>schema:genre</td>
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</tr>
<tr>
<td>schema:inLanguage</td>
<td>&quot;en&quot;</td>
</tr>
<tr>
<td>schema:name</td>
<td>&quot;University of Illinois bulletin.&quot;</td>
</tr>
<tr>
<td>schema:publisher</td>
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</tr>
<tr>
<td>umbel:isLike</td>
<td>[<a href="http://www.worldcat.org/issn/1048-9991">http://www.worldcat.org/issn/1048-9991</a>]</td>
</tr>
<tr>
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<td>&quot;1048-9991&quot;</td>
</tr>
<tr>
<td>owl:sameAs</td>
<td>[urn:ISSN:1048-9991]</td>
</tr>
<tr>
<td>rdf:type</td>
<td>library:Serial</td>
</tr>
</tbody>
</table>
2009: Started an experience providing linked data access to authority files
2011: BIBFRAME was launched as an initiative to develop a linked data alternative to MARC
- To supply search engines to its description of library resources in a form they could use
- To promote the application of concepts defined in the FRBR and RDA models
- To offer an extensible solution for the description of resources in the broader cultural heritage community
Late 2013: Early Experimenters Group concluded its work  
Early 2014: BIBFRAME Implementation Testbed was formally established (17 organizations have participated)  
  • Provide transformation tools and an editor  
  • Vocabularies are also available that need improvement  
Later 2015: Will publish a revised vocabulary & launch a pilot project to test  
  • Whether the BIBFRAME vocabulary supports the capability for catalogers to do original cataloging including authority work  
  • Will create BIBFRAME descriptions for variety of materials  
  • LC Name/Title and Title MARC records will be converted into BIBFRAME Works
Compare and contrast

• MARC: 3628815MARC.xml
• MODS: 3628815MODS.xml
• Dublin Core: 3628815DC.xml
• BIBFRAME: 3628815BF.xml
• Schema.org: 3628815-schema.xml
Illustration of BIBFRAME and schema.org semantics

Compare MARC, MODS, DC, BIBFRAME (RDF) and schema.org (RDF)

http://quest.library.illinois.edu/ALA2015/ALCTS-XML/Exercises/Exercise2/XML-MARC-MODS-DC/3628815MARC.xml
http://quest.library.illinois.edu/ALA2015/ALCTS-XML/Exercises/Exercise2/XML-MARC-MODS-DC/3628815MODS.xml
http://quest.library.illinois.edu/ala2015/alcts-xml/Exercises/Exercise2/XML-MARC-MODS-DC/3628815BF.xml
http://quest.library.illinois.edu/ala2015/alcts-xml/Exercises/Exercise2/XML-MARC-MODS-DC/3628815-schema.xml

MARC:

<?xml version="1.0" encoding="utf-8"?>
<leader>01124cam a2200289 a 4500</leader>
<controlfield tag="001">3628815</controlfield>
<controlfield tag="005">20020415165153.0</controlfield>
<controlfield tag="008">920219s1993    caua   j      000 0 eng </controlfield>
<datafield tag="020" ind1=" " ind2=" ">
<subfield code="a">0152038655 :</subfield>
<subfield code="c">$15.95</subfield>
</datafield>
<datafield tag="035" ind1=" " ind2=" ">
<subfield code="a">(OCoLC)ocm25508902</subfield>
</datafield>
<datafield tag="035" ind1=" " ind2=" ">
<subfield code="9">AXY-0864</subfield>
</datafield>
<datafield tag="040" ind1=" " ind2=" ">
<subfield code="a">DLC</subfield>
<subfield code="c">DLC</subfield>
<subfield code="d">UIU</subfield>
</datafield>
<datafield tag="050" ind1="0" ind2="0">
<subfield code="a">PS3537.A618</subfield>
<subfield code="b">A88 1993</subfield>
</datafield>
<datafield tag="082" ind1="0" ind2="0">
<subfield code="a">811/.52</subfield>
<subfield code="2">20</subfield>
</datafield>
<datafield tag="100" ind1="1" ind2="2">
<subfield code="a">Sandburg, Carl</subfield>
<subfield code="d">1878-1967.</subfield>
</datafield>
<datafield tag="245" ind1="1" ind2="0">
<subfield code="a">Arithmetic</subfield>
<subfield code="c">Carl Sandburg ; illustrated as an anamorphic adventure by Ted Rand.</subfield>
</datafield>
<datafield tag="250" ind1=" " ind2=" ">
<subfield code="a">1st ed.</subfield>
</datafield>
<datafield tag="260" ind1=" " ind2=" ">
<subfield code="a">San Diego</subfield>
<subfield code="b">Harcourt Brace Jovanovich</subfield>
<subfield code="c">c1993.</subfield>
</datafield>
</record>
One Mylar sheet included in pocket.

A poem about numbers and their characteristics. Features anamorphic, or distorted, drawings which can be restored to normal by viewing from a particular angle or by viewing the image's reflection in the provided Mylar cone.

Children's poetry, American.

American poetry.

Visual perception.

Juvenile poetry.

Rand, Ted
A poem about numbers and their characteristics. Features anamorphic, or distorted, drawings which can be restored to normal by viewing from a particular angle or by viewing the image's reflection in the provided Mylar cone.
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Arithmetic

Children's poetry, American.

Arithmetic
A poem about numbers and their characteristics. Features anamorphic, or distorted, drawings which can be restored to normal by viewing from a particular angle or by viewing the image's reflection in the provided Mylar cone.
Arithmetic / Carl Sandburg ; illustrated as an anamorphic adventure by Ted Rand.

Sandburg, Carl, 1878-1967.

Rand, Ted

Children's poetry, American

Arithmetic--Poetry

American poetry

Visual perception
<bf:authorizedAccessPoint>Arithmetic--Juvenile poetry</bf:authorizedAccessPoint>
<bf:label>Arithmetic--Juvenile poetry</bf:label>
<bf:hasAuthority>
<madsrdf:Authority>
<rdf:type rdf:resource="http://www.loc.gov/mads/rdf/v1#ComplexSubject"/>
<madsrdf:authoritativeLabel>Arithmetic--Juvenile poetry</madsrdf:authoritativeLabel>
<madsrdf:isMemberOfMADSScheme rdf:resource="http://id.loc.gov/authorities/subjects"/>
</madsrdf:Authority>
</bf:hasAuthority>
</bf:Topic>

<bf:classificationScheme rdf:resource="http://id.loc.gov/authorities/classSchemes/ddc"/>
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<bf:label>811/.52</bf:label>
</bf:Classification>

<bf:titleValue>Arithmetic / Carl Sandburg ; illustrated as an anamorphic adventure by Ted Rand.</bf:titleValue>
</bf:Title>
</bf:Topic>

SCHEMA.ORG (RDF):

<?xml version="1.0" encoding="utf-8"?>
<?xml-model href="http://www.w3.org/TR/REC-rdf-syntax/rdfxml.rng"
type="application/xml"
schematypens="http://relaxng.org/ns/structure/1.0" ?>

<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:mods="http://www.loc.gov/mods/v3"
xmlns:sc="http://schema.org/"
xmlns:owl="http://www.w3.org/2002/07/owl#"
xmlns:lib="http://purl.org/library/"
xmlns:madsrdf="http://www.loc.gov/mads/rdf/v1#">
<sc:CreativeWork>
<owl:sameAs rdf:resource="http://www.worldcat.org/oclc/3628815"/>
<sc:sameAs rdf:resource="http://catalogdata.library.illinois.edu/bi/6887644"/>
<sc:name>Arithmetic / Carl Sandburg ; illustrated as an anamorphic adventure by Ted Rand.</sc:name>
<rdf:type rdf:resource="http://schema.org/Book"/>
<sc:creator>
<sc:Person>
<sc:name>Sandburg, Carl, 1878-1967.</sc:name>
</sc:Person>
</sc:creator>
<sc:illustrator>
<sc:Person>
</sc:Person>
</rdf:RDF>
Thank You!

Questions to:
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MJ Han (mhan3@Illinois.edu)