

Open Archives Initiative Object Reuse & Exchange

Abstract Data Model and Serialization

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Simeon Warner

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Cornell University

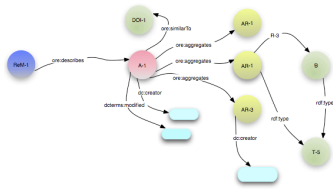
lagoze@cs.cornell.edu

<http://www.cs.cornell.edu/lagoze>



OAI Object Reuse & Exchange: Basics
ORE Open Meeting, OR'08, Southampton, UK
April 4, 2008





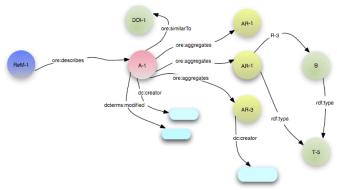
This Presentation

- OAI-ORE for the most of us
 - Abstract Data Model Basics
 - Aggregations
 - Resource Maps
 - Metadata
 - Aggregated Resource
 - Associating with similar resources
 - Relationships to other Resources
 - Using Atom to describe Aggregations



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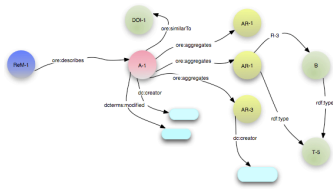
Abstract Data Model Why and What?

- Separation of concerns
 - Design
 - Implementation
- Provide basis for future implementations
 - Technology of the web (e.g. HTTP) will change over time
 - Other implementations are possible



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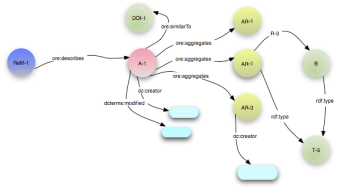




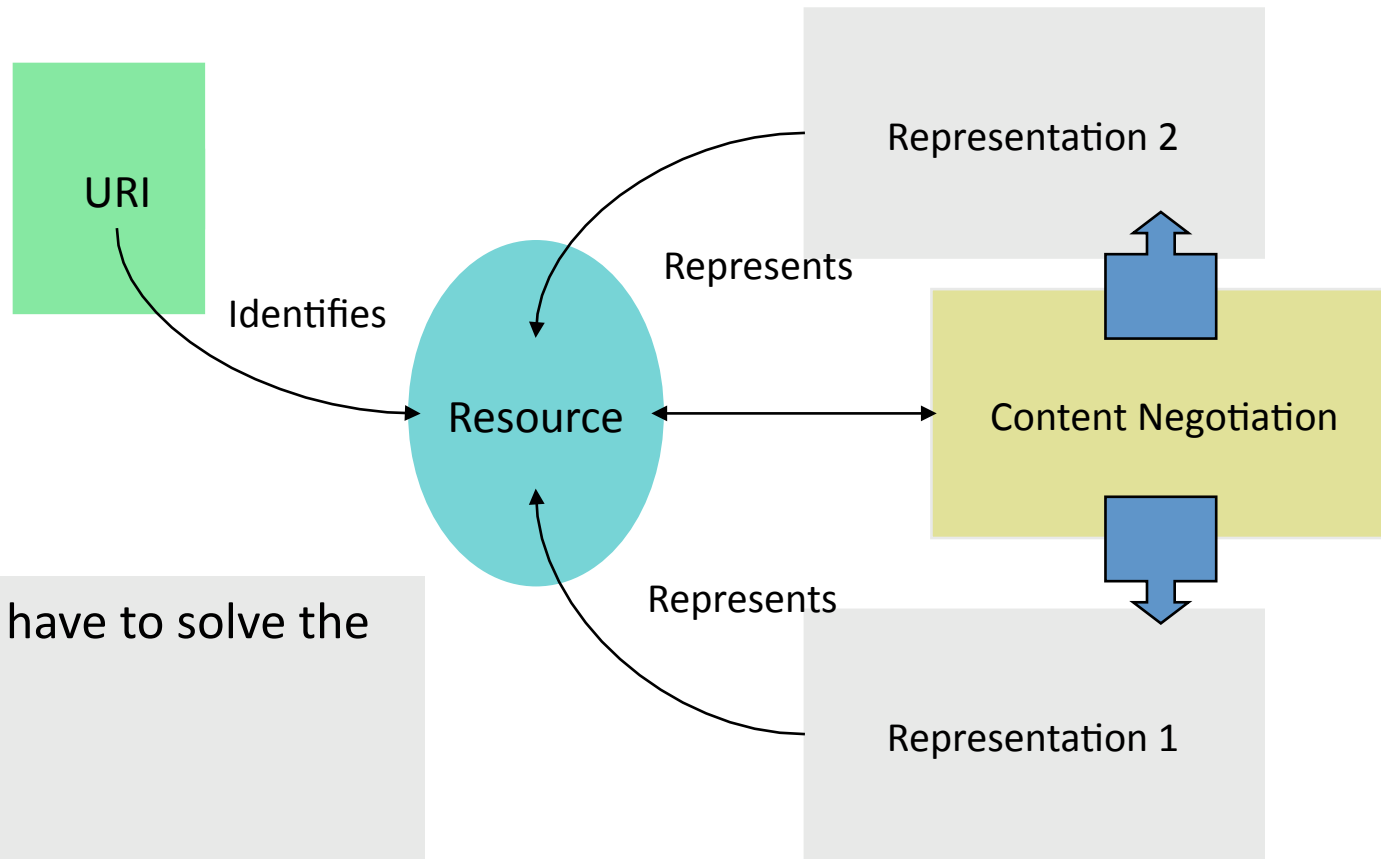
Requirements of the Model

- Aggregations
 - Both simple hierarchical and inter/intra related
 - Identification via URI
 - Metadata
- Resource Maps
 - Description of aggregations via a set of assertions
 - Identification via URI – independent of aggregation
 - Metadata
- Conformance to web architecture and RDF Semantics





W3C Web Architecture



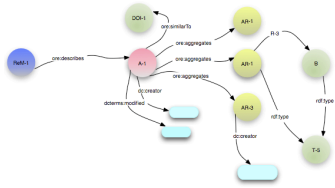
So, the tools we have to solve the problem are:

- Resource
- URI
- Representation

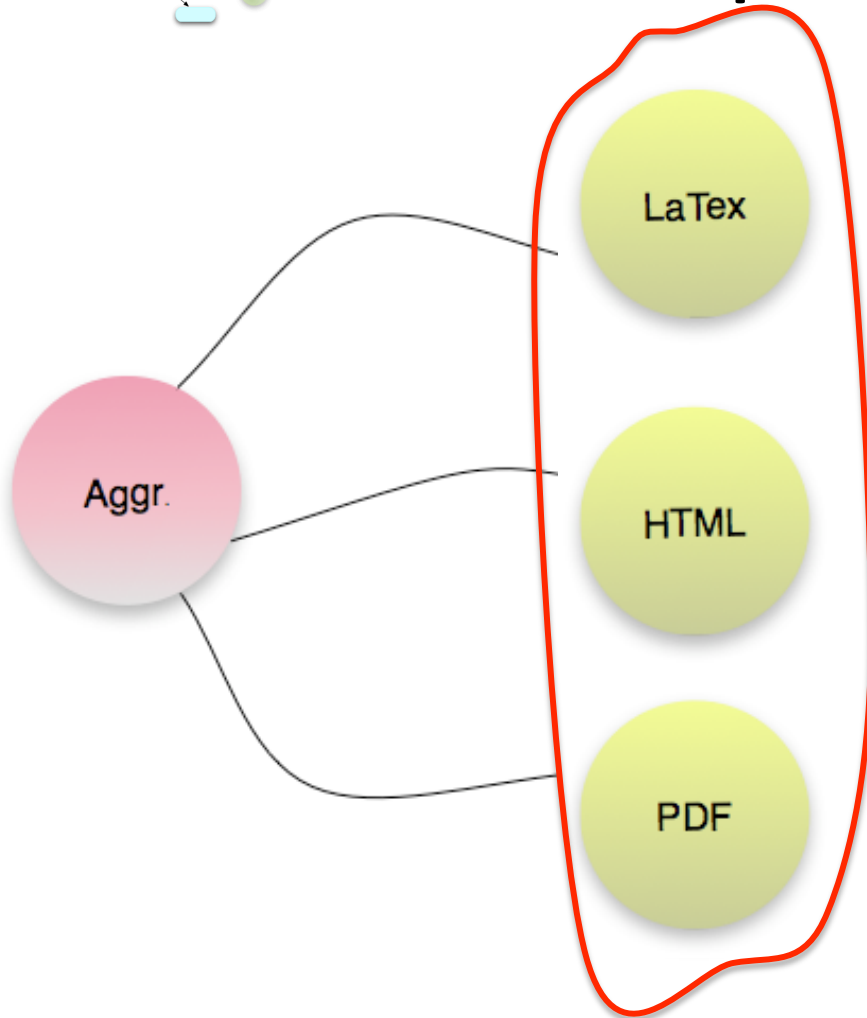


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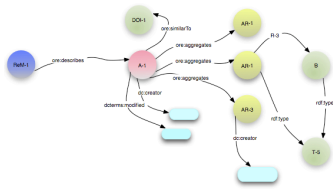
Simple Aggregation



Describe an HTML page, PDF, and Latex as an aggregation

Hierarchical or *Tree* Structure





Hierarchical Models and XML

```

1  <?xml version="1.0" encoding="UTF-8"?>
2  <Memo xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3  xsi:schemaLocation="http://mynames.com/mine memo.xsd"
4  xmlns="http://mynames.com/mine"
5  language="en">
6  <to>George Bush</to>
7  <from>Carl Lagoze</from>
8  <date>2005-02-21</date>
9  <keywords>Greetings</keywords>
10 <body length="8">Hi There</body>
11 </Memo>
12

```

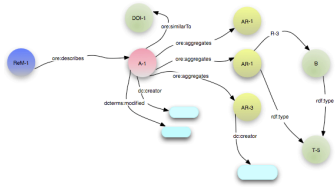
Document - memo.xml

- ▼ Memo
 - language en
 - xmlns http://mynames.com/mine
 - xmlns:xsi http://www.w3.org/2001/XMLSchema-instance
 - xsi:schemaLocation http://mynames.com/mine memo.xsd
 - ▼ to
 - T George Bush
 - ▼ from
 - T Carl Lagoze
 - ▼ date
 - T 2005-02-21
 - ▼ keywords
 - T Greetings
 - ▼ body
 - length 8
 - T Hi There

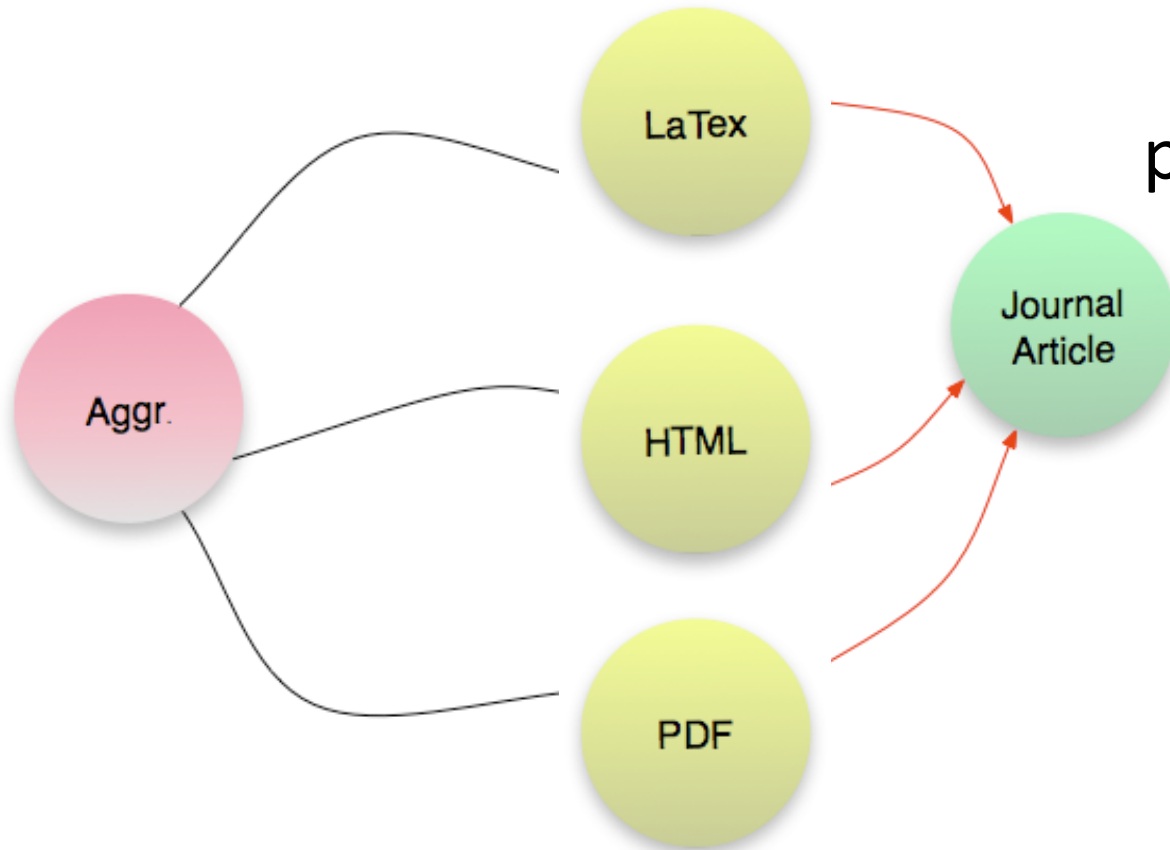


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More Complexity



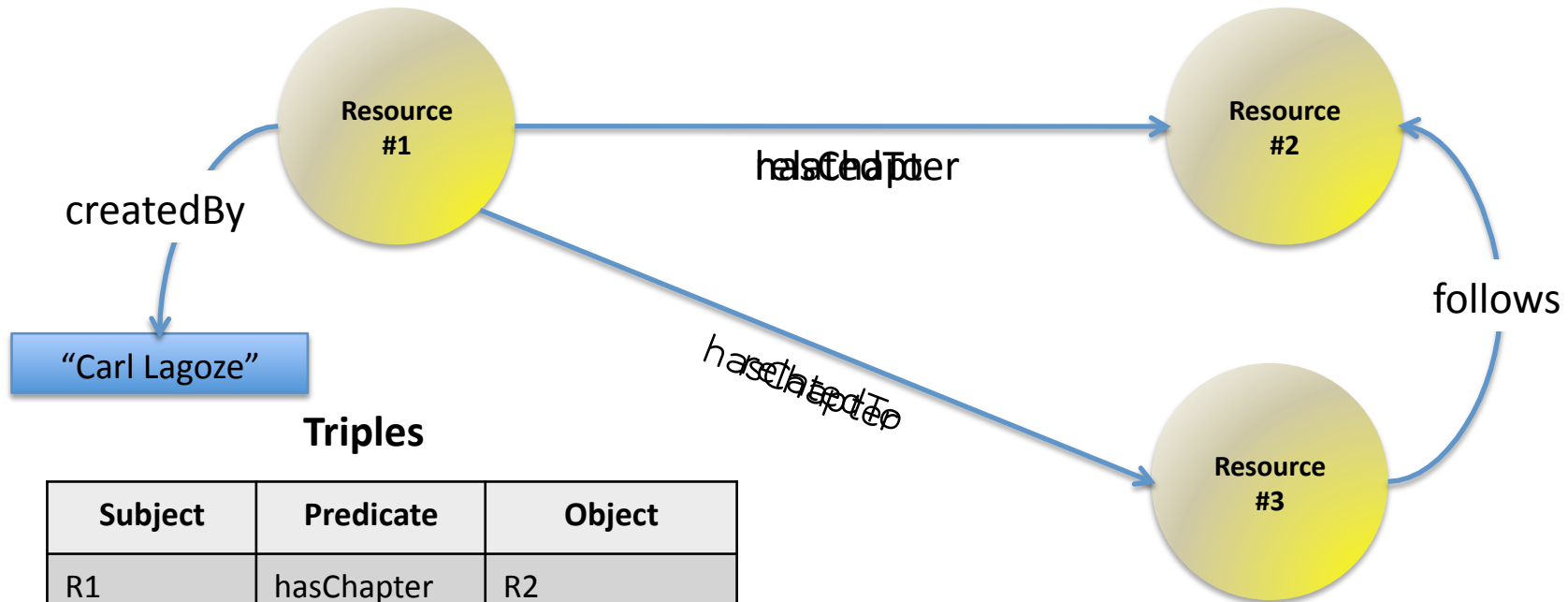
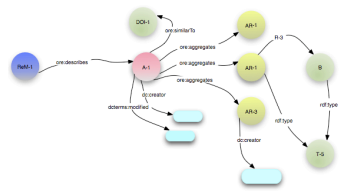
Describe an HTML page, PDF, and Latex as an aggregation.

Assert that the PDF and Latex are journal articles

Graph Structure, Typed Relationships



Resource Description Framework (RDF)



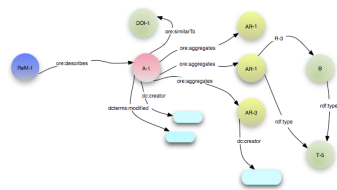
Triples

Subject	Predicate	Object
R1	hasChapter	R2
R1	hasChapter	R3
R3	follows	R2
R1	createdBy	"Carl Lagoze"

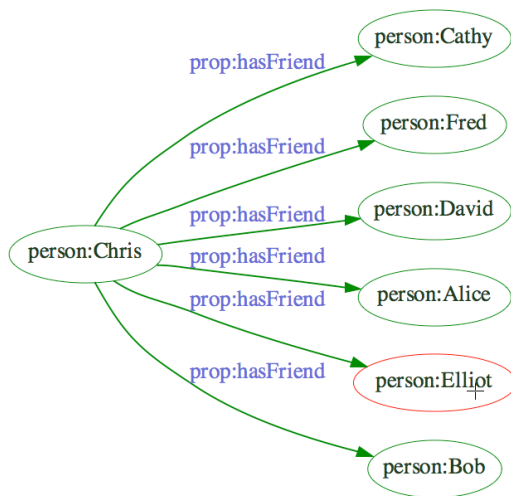


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Multiple serializations



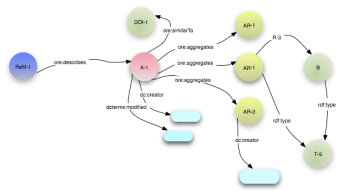
```
<rdf:RDF
  xmlns:j.0="prop:h"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" >
  <rdf:Description rdf:about="person:Chris">
    <j.0:asFriend rdf:resource="person:Cathy" />
    <j.0:asFriend rdf:resource="person:Fred" />
    <j.0:asFriend rdf:resource="person:David" />
    <j.0:asFriend rdf:resource="person:Alice" />
    <j.0:asFriend rdf:resource="person:Elliot" />
    <j.0:asFriend rdf:resource="person:Bob" />
  </rdf:Description>
</rdf:RDF>
```

```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix : <#> .

<person:Chris>
  <prop:hasFriend> <person:David> , <person:Elliot> , <person:Bob> , <
```

```
<person:Chris> <prop:hasFriend> <person:Cathy> .
<person:Chris> <prop:hasFriend> <person:Fred> .
<person:Chris> <prop:hasFriend> <person:David> .
<person:Chris> <prop:hasFriend> <person:Alice> .
<person:Chris> <prop:hasFriend> <person:Elliot> .
<person:Chris> <prop:hasFriend> <person:Bob> .
```





Open Archives Initiative Object Reuse and Exchange



ORE Specification - Abstract Data Model

28 March 2008

Note: This document is alpha and subject to change at any time. It is being made available to the public for review and comment. Any implementation of the specifications or recommendations within should be undertaken with recognition of this alpha status. Please comment via the [OAI-ORE Google Group](#).

This version:

<http://www.openarchives.org/ore/0.3/datamodel>

Latest version:

<http://www.openarchives.org/ore/datamodel>

Previous version:

<http://www.openarchives.org/ore/0.2/datamodel>

Editors (OAI Executive)

Carl Lagoze, Cornell University Information Science
Herbert Van de Sompel, Los Alamos National Laboratory

Editors (ORE Technical Committee)

Pete Johnston, Eduserv Foundation
Michael Nelson, Old Dominion University
Robert Sanderson, University of Liverpool
Simeon Warner, Cornell University Information Science

Abstract

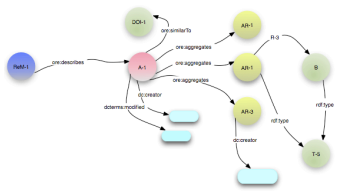
Open Archives Initiative Object Reuse and Exchange (OAI-ORE) defines standards for the description and exchange of aggregations of Web resources. This document describes the abstract data model that is the foundation for these standards. This model is conformant with the Architecture of the World Wide Web [[Web Architecture](#)] and leverages [Named Graphs](#).



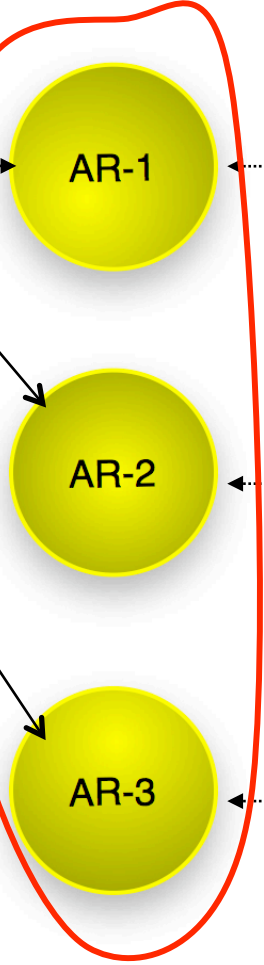
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The starting point: bringing some resources together



These resources have URIs

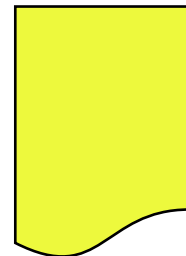
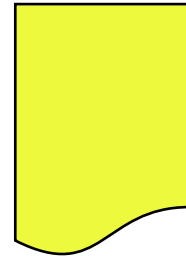
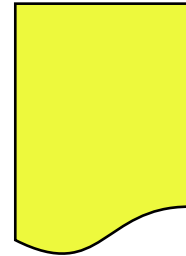


This has no URI

HTTP GET

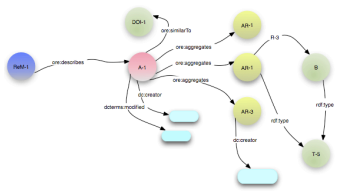
HTTP GET

HTTP GET



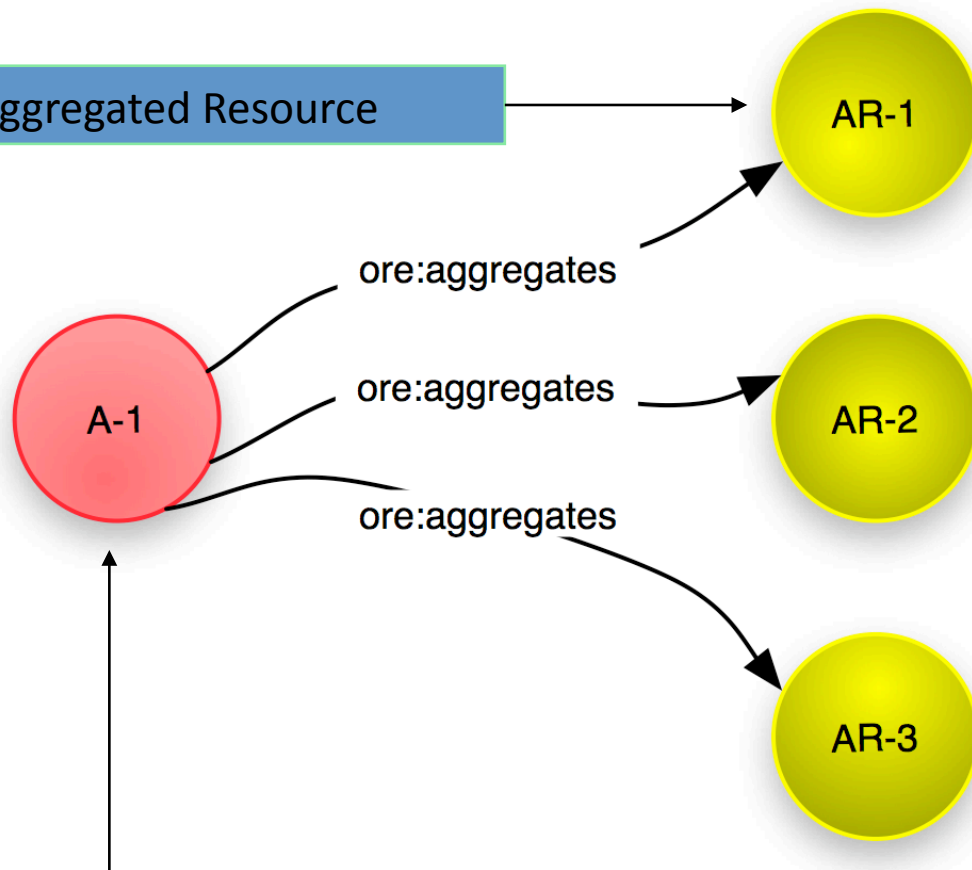
The resource have representations





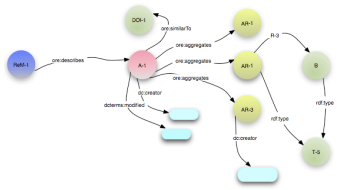
Aggregation: Resource that is a set of resources

This resource is an Aggregated Resource

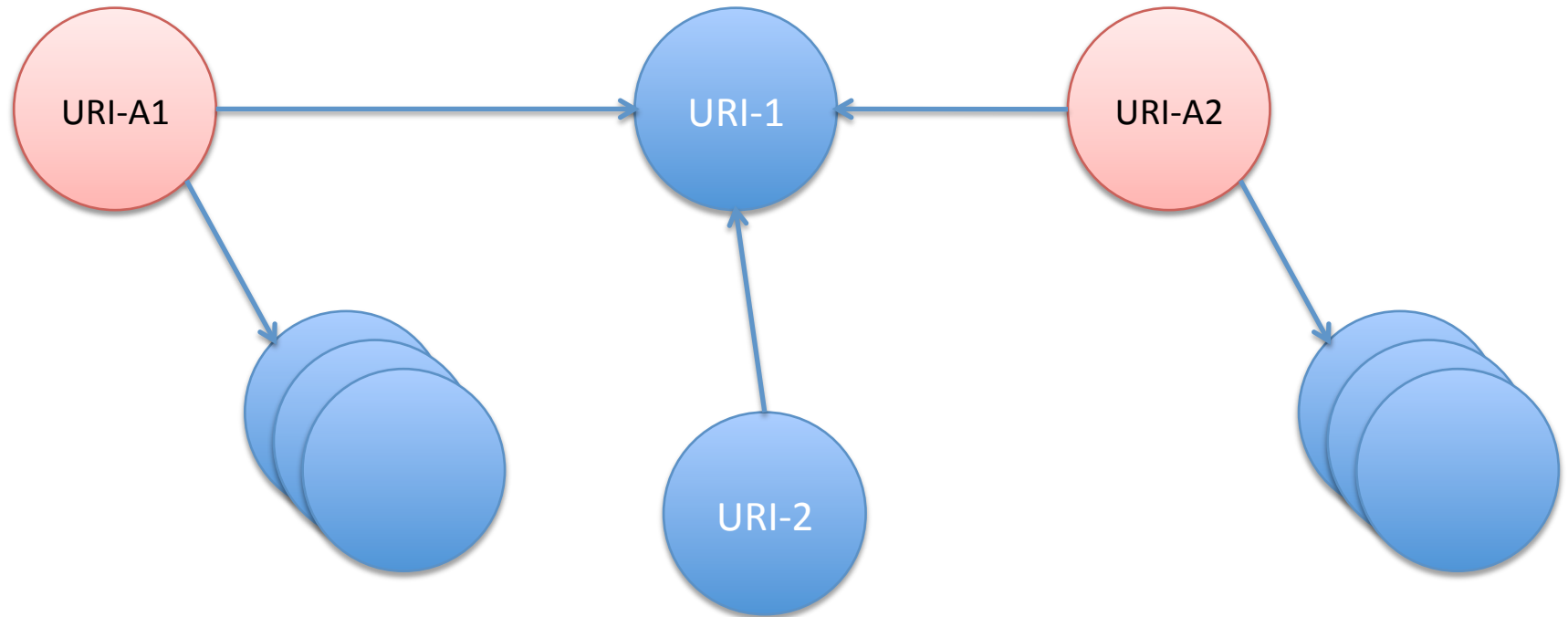


This resource is an Aggregation





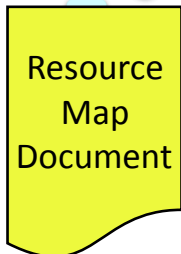
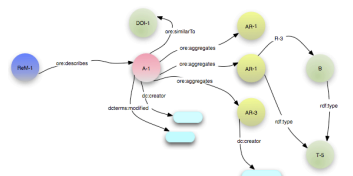
An Aggregated Resource is just a Resource



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Describe this Aggregation: Resource Map



The resource has a representation

HTTP GET



ore:describes



ore:aggregates



ore:aggregates



ore:aggregates

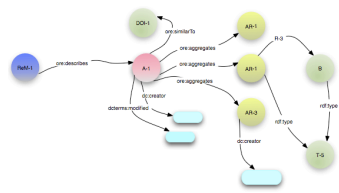


This resource is a Resource Map



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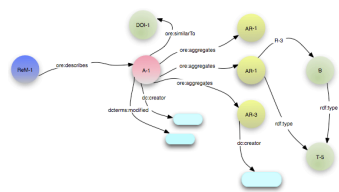




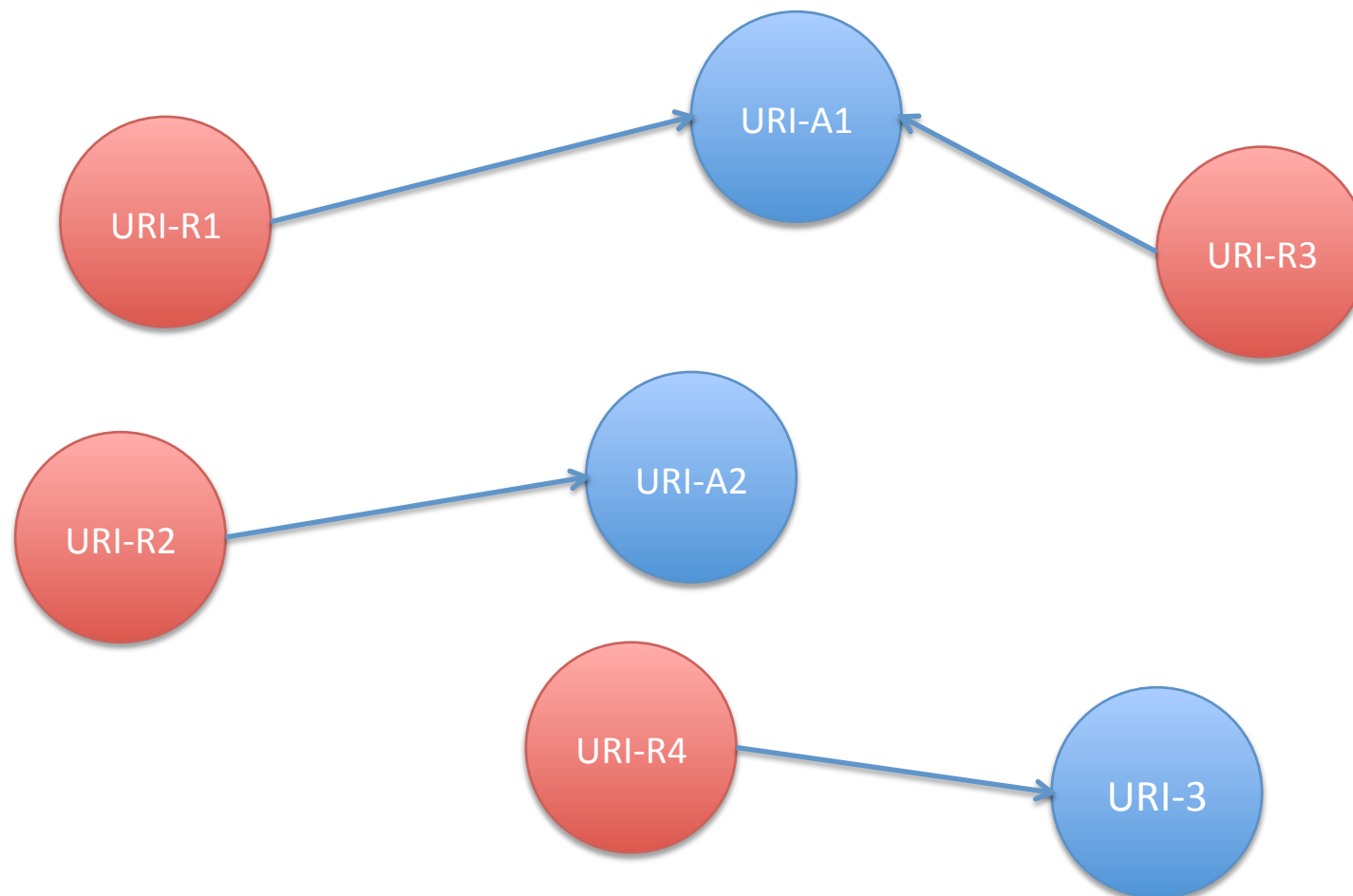
Relationship between Aggregation and Resource Map

- An Aggregation is a Resource with a URI
- A Resource Map is a Resource with a URI
- Each Resource Map asserts (identifies) and describes one Aggregation
- Each Aggregation MAY be asserted and described by multiple Resource Maps
- Each Resource MUST have one serialization (representation)



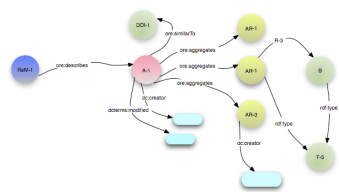


Relationship between Aggregation and Resource Map

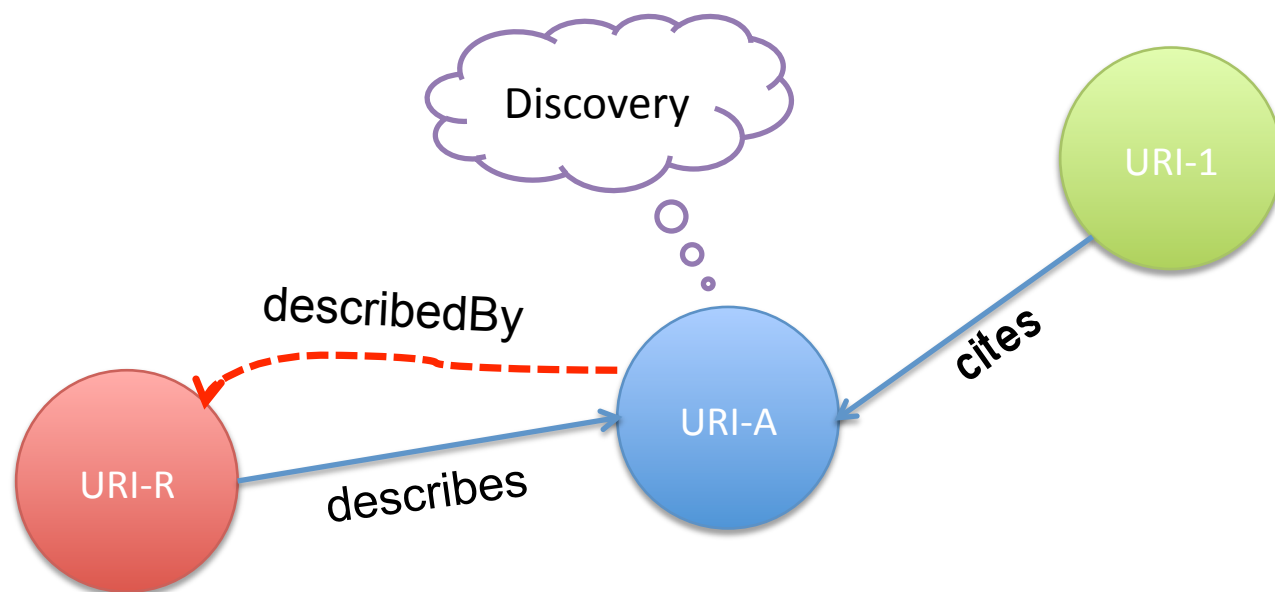


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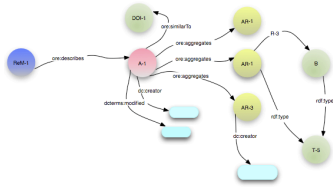


Relationship between Aggregation and Resource Map

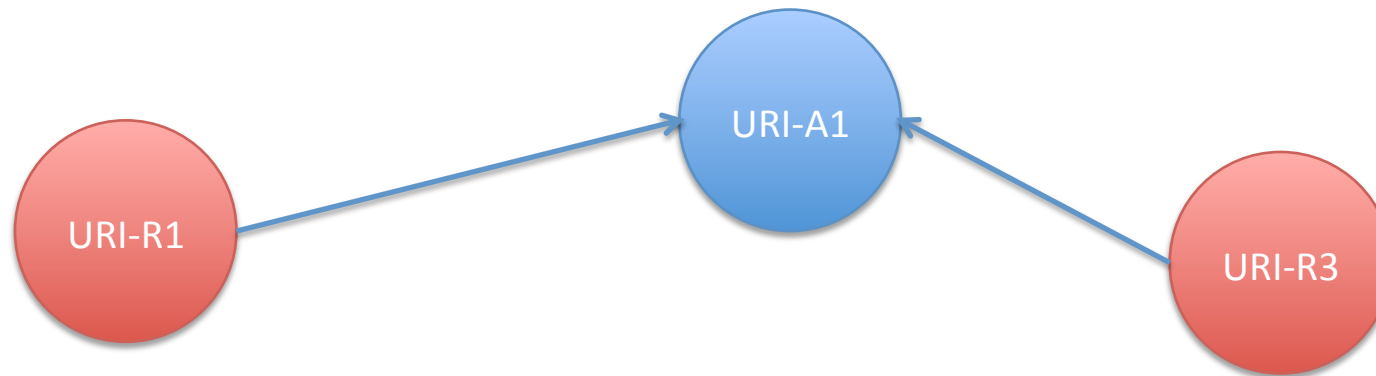


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Trust and Authority



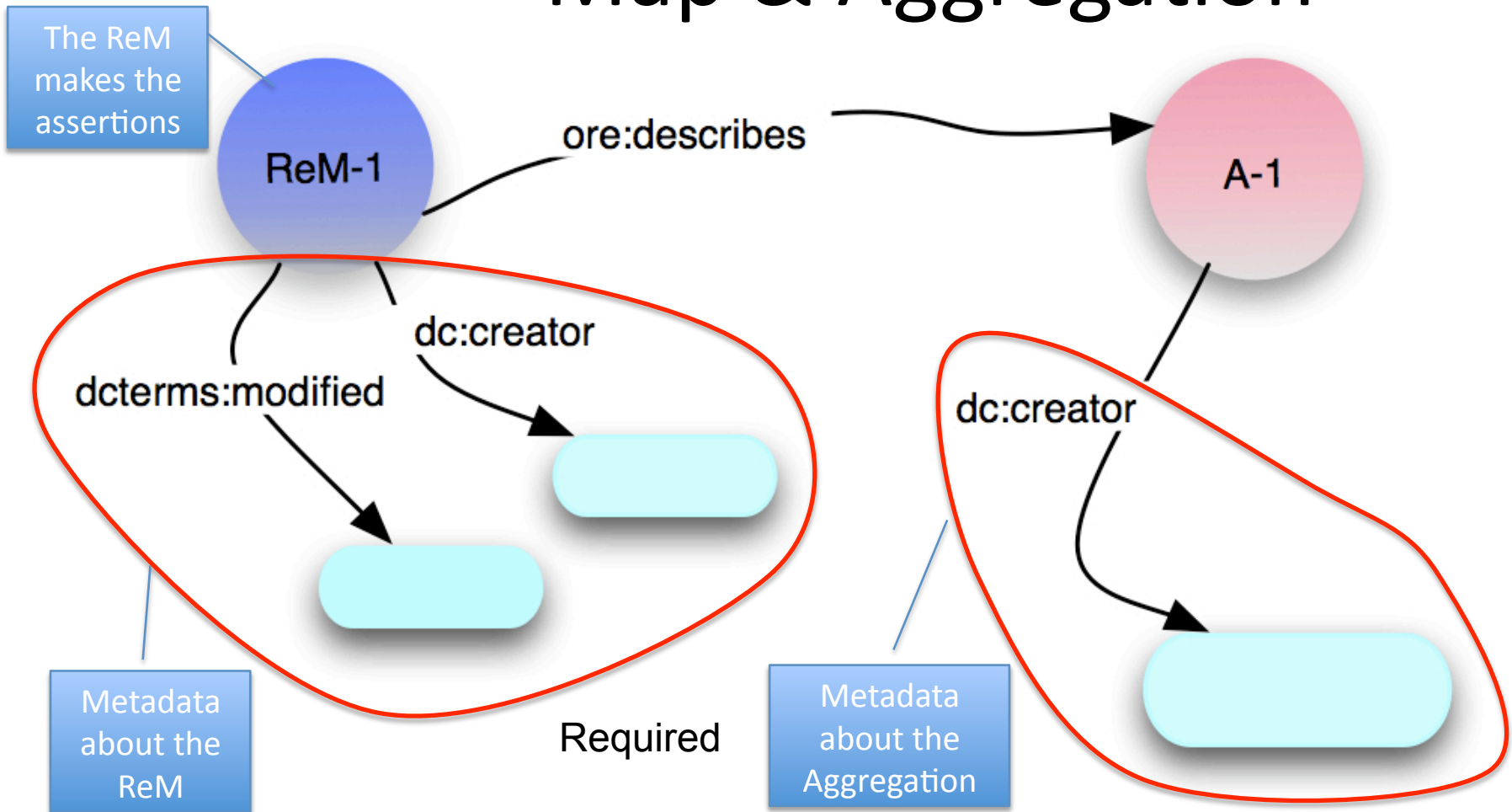
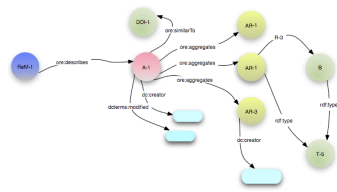
- Same as any metadata on the Web
- Addressed somewhat by discovery mechanisms (Aggregation can lead client to “authoritative” Resource Map)

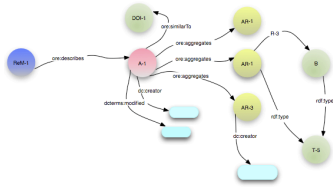


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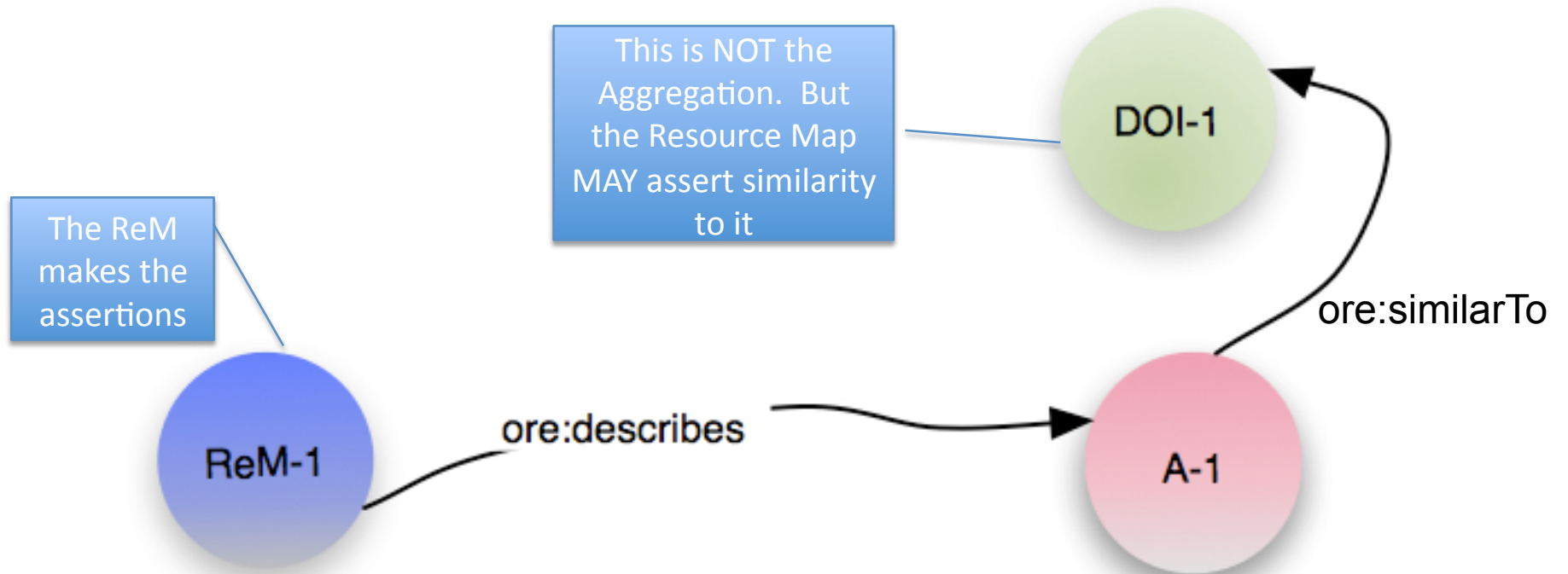


Metadata about the Resource Map & Aggregation



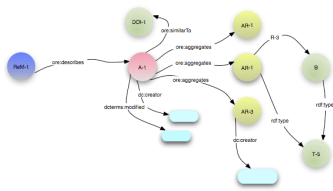


Asserting Similarity to other Resources



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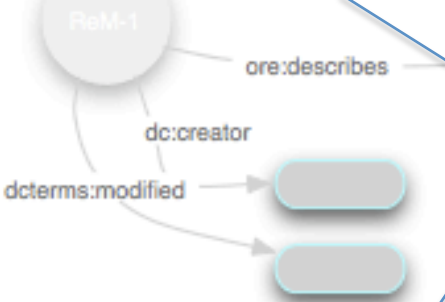


Asserting other Relationships

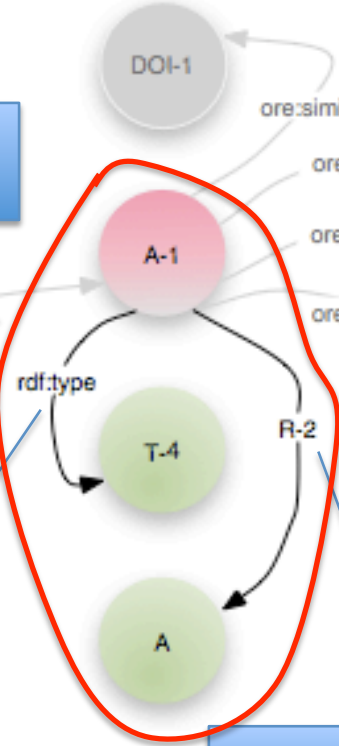
Assertions about Aggregated Resources.

The ReM makes the assertions

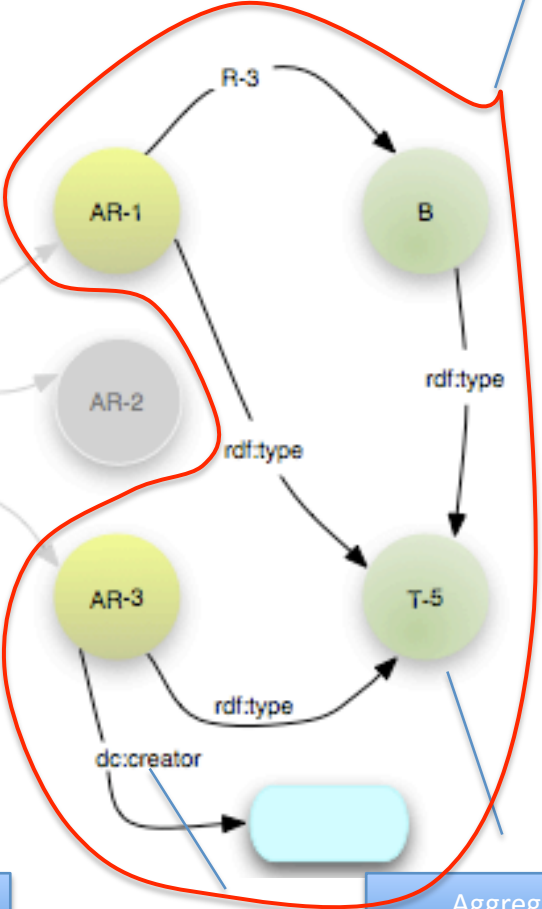
Assertions about the Aggregation.



Aggregation is a journal



Aggregation has another version "A"



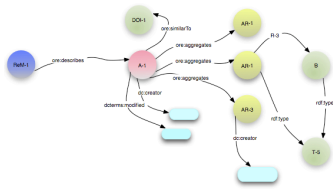
"AR-3" is by Stephen Hawking

Aggregated Resources are articles



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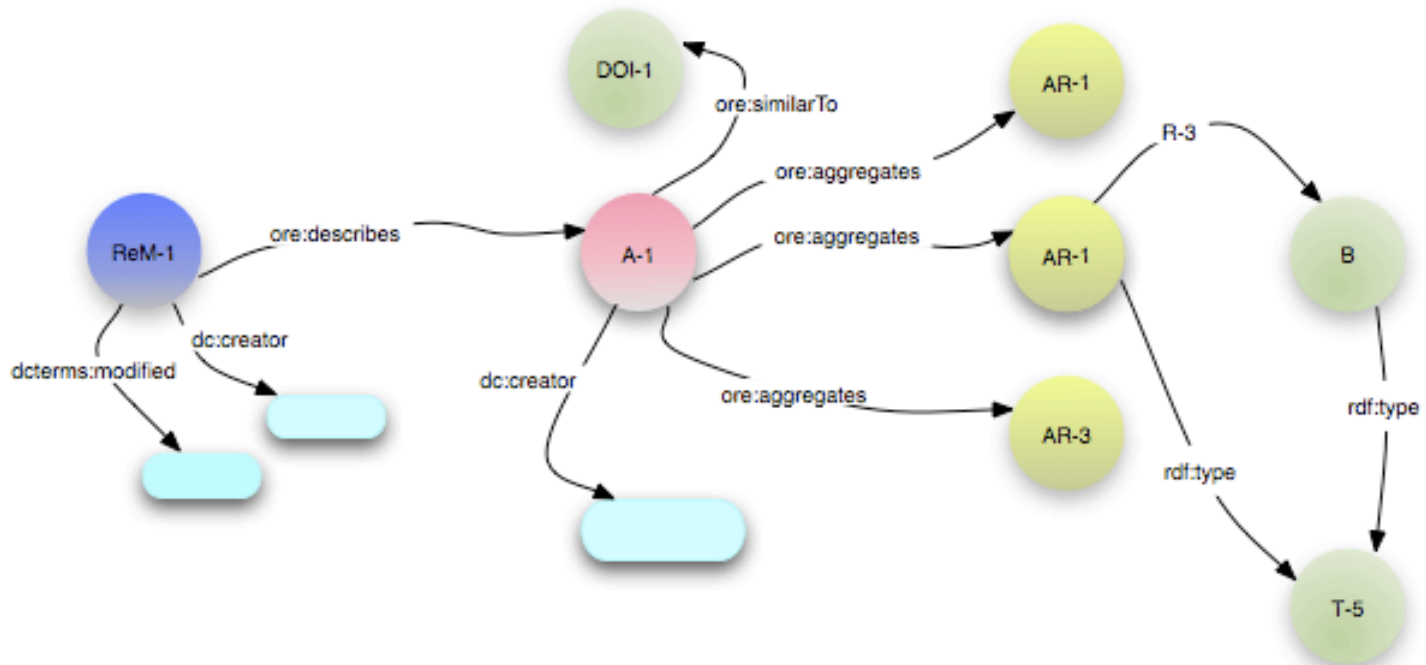
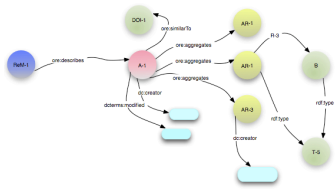


Limits of Assertions thus Far

- The meaning of an RDF triple is independent of the context in which it is stated
- Think of the difference:
 - Carl is a man
 - Carl is staying at Jury's
- All the triples described thus far are context independent
 - Therefore they can have the URI of an aggregated resource as subject or object
 - But remember that is just the URI of the Resource and is not exclusive of it being an Aggregated Resource
- Stay tuned for more



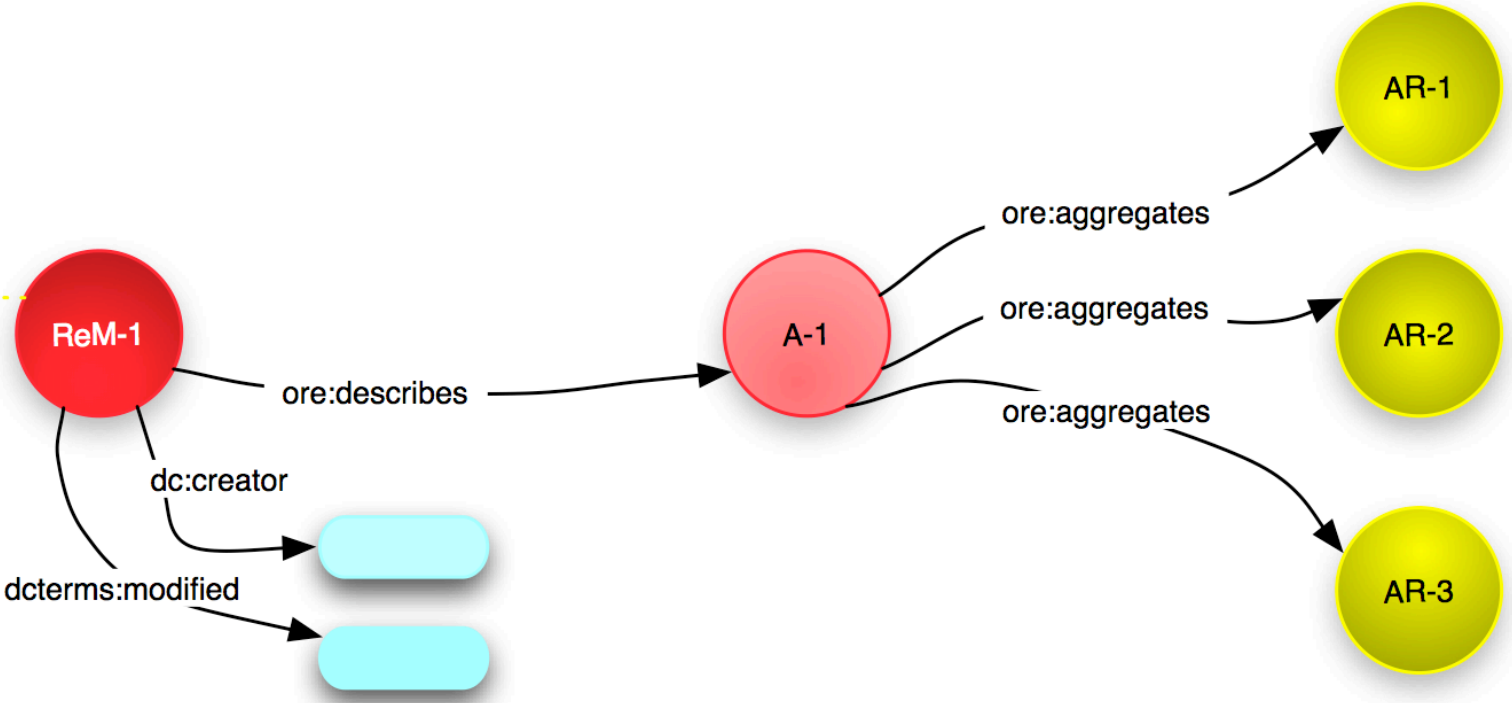
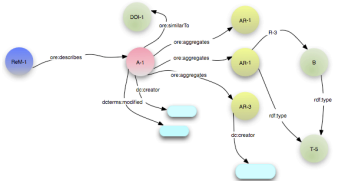
Aggregations can be Complex



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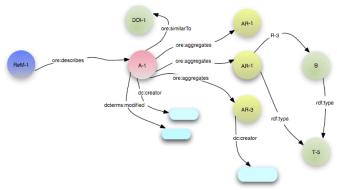


But most of the time they look like this....



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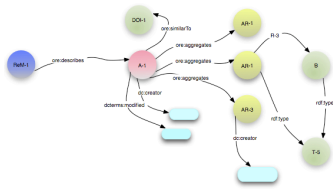
General Serialization Goals

- Express as much of the model as possible
- Ability to round-trip
 - serialization -> model triples -> serialization
- Use well-known standardized technologies
 - Leverage tools and knowledge



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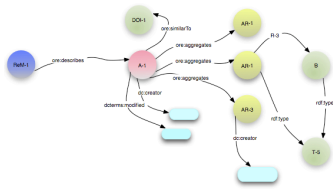




Atom

- Attempt to rationalize RSS 1.x, 2.x divergence
- Encoding is up-to-date with current XML standards
 - namespaces
 - Schema
- Robust content model
 - Distinguishes between metadata and content (plain text, HTML, base-64 binary)
- Well-defined extensibility model
- IETF FRC 4287
 - <http://www.ietf.org/rfc/rfc4287>





Simple Atom Feed

```

<?xml version="1.0" encoding="utf-8"?>
<feed xmlns="http://www.w3.org/2005/Atom">
  <title>Dan's Blog</title>
  <link href="http://netzoid.com/blog/" />
  <updated>2007-11-07T18:30:02Z</updated>
  <author>
    <name>Dan Diephouse</name>
  </author>
  <id>urn:uuid:60a76c80-d399-11d9-b91c-0003939e0af6</id>
  <entry>
    <title>Building services with AtomPub</title>
    <link href="http://netzoid.com/blog/atompub_services/" />
    <id>urn:uuid:1225c695-cfb8-4ebb-aaaa-80da344efa6a</id>
    <updated>2007-11-07T18:30:02Z</updated>
    <content type="text" (you must have content or a summary) />
  </entry>
</feed>

```

Feed

Feed Metadata

Feed id

Entry

Entry id

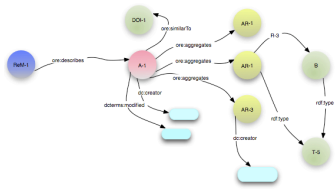
Entry Metadata

"alternate" (source) id



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Open Archives Initiative Object Reuse and Exchange



ORE Specification - Resource Map Profile of Atom 26 February 2008

Note: This document is alpha and subject to change at any time. It is being made available to the public for review and comment. Any implementation of the specifications or recommendations within should be undertaken with recognition of this alpha status. Please comment via the [OAI-ORE Google Group](#).

This version:

<http://www.openarchives.org/ore/0.3/atom>

Latest version:

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Previous version:

<http://www.openarchives.org/ore/0.2/atom>

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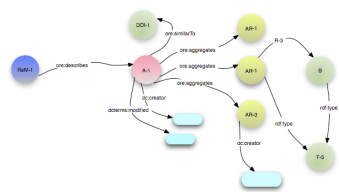
Abstract

Open Archives Initiative Object Reuse and Exchange (OAI-ORE) defines standards for the description and exchange of aggregations of Web resources, named Aggregations. OAI-ORE introduces the notion of Resource Maps that describe an Aggregation. A Resource Map is resource that is a specialization of a named graph. A Resource Map identifies an Aggregation, it asserts the finite set of constituent resources (the Aggregated Resources) of the Aggregation, and it can express types and relationships



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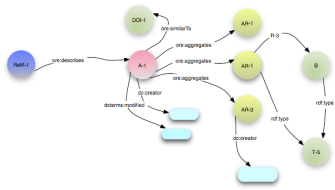
Mapping ORE Model to Atom

anoORE	Atom
<i>Aggregation</i>	<i>Feed</i>
URI-A	Feed <id>
URI-R	<link href="URI" rel="self"
ore:similarTo	<link href="URI" rel="related"
Aggregation Properties/Metadata	Feed metadata
<i>Aggregated Resource</i>	<i>Entry</i>
URI-AR	<link href="URI" rel="alternate"
Aggregated Resource Properties/Metadata	Entry metadata



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Atom/ORE Skeleton

URI-A

URI-R

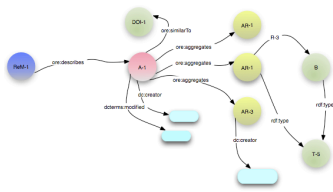
```
<?xml version="1.0" encoding="UTF-8"?>
<feed xmlns="http://www.w3.org/2005/Atom">
  <id>http://arxiv.org/rem/astro-ph/0601007/aggregation</id>
  <link href="http://arxiv.org/rem/astro-ph/0601007/rem.xml"
        rel="self" type="application/atom+xml"/>
  <generator uri="http://arXiv.org/">arXiv.org e-Print Repository</generator>
  <updated>2007-10-10T18:30:02Z</updated>
  <category scheme="http://www.openarchives.org/ore/terms/"
            term="http://www.openarchives.org/ore/terms/Aggregation" label="Aggregation" />
</feed>
```

This is an aggregation

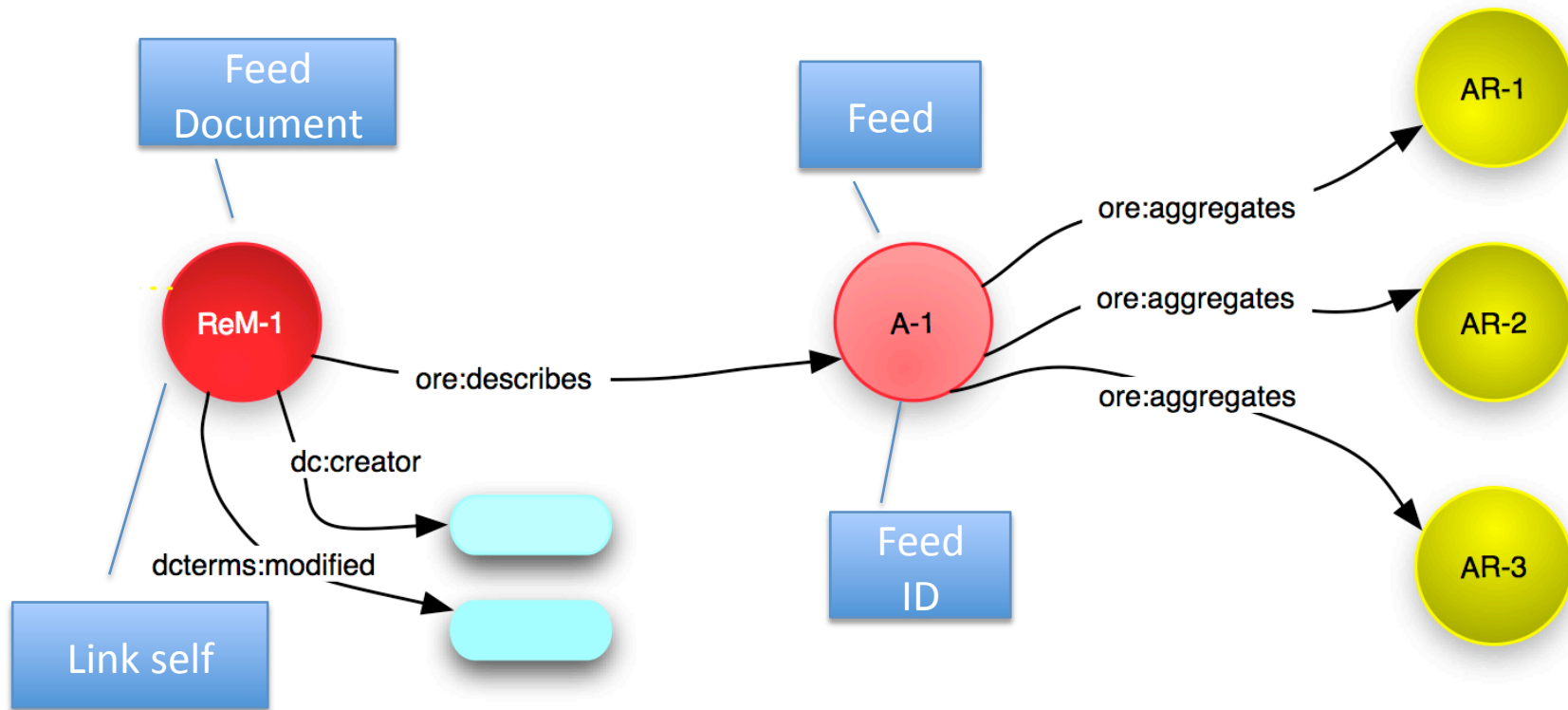


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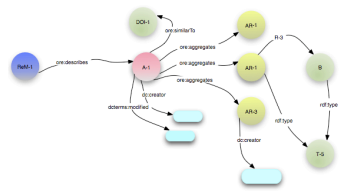


Data Model <-> Atom



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Looking to the future with Atom

- Atom Publishing Protocol
- SWORD
- Microsoft/Google APIs



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