REST and linked data

A match made for domain driven development?

Kevin Page
Oxford e-Research Centre, University of Oxford, UK
Electronics & Computer Science, University of Southampton, UK

WS-REST 2011, Hyderabad, 28/03/2011

Context

- Building systems and tools for e-Science and e-Research in several domains
- All could be considered data-centric (though that's not to forget method)
  - Computational musicology, Music Information Retrieval
  - Geographers, oceanographers
  - Scientific workflow (bioinformaticians etc.)

Context (continued)

- Common requirements
  - Structure information for the domain
  - Expose data for use (and re-use)
- Have had some success with
  - RESTful APIs
  - Linked Data

Context (continued)

- Common requirements:
  - Structure information for the domain
  - Expose data for use (and re-use)
- Have had some success with
  - RESTful APIs
  - Linked Data
  - *But not necessarily at the same time (why?)*

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

Commonality

Commonalities

- The Primacy of Resources
  - *Identification of resources is the key abstraction in REST and RDF where it is also the means to express relationships*

Commonalities

- The Primacy of Resources
  - *Identification of resources is the key abstraction in REST and RDF where it is also the means to express relationships*
- Linking is not optional
  - *Links to other URIs to discover more things (Linked Data); and as the engine of application state (REST)*

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

Commonalities

- The Primacy of Resources
  - *Identification of resources is the key abstraction in REST and RDF where it is also the means to express relationships*
- Linking is not optional
  - *Links to other URIs to discover more things (Linked Data); and as the engine of application state (REST)*
- Segregation of Semantics
  - *Semantics have their place (and it's not in the resource addressing/URIs)*

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

Adaptability

- Both approaches can evolve over time
  - REST: state transitions can be changed by modifying the links returned by representations
  - Linked Data: assertions about the same resource can be made at different times, in different places, using different ontologies

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

Adaptability

- Both approaches can evolve over time
  - REST: state transitions can be changed by modifying the links returned by representations *(modifying the hyperstructure)*
  - Linked Data: assertions about the same resource can be made at different times, in different places, using different ontologies *(modifying the hyperstructure)*

Differences

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

Differences *or* *Complementarity?*

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

Model or API

- What purpose are the commonalities put to?
- Resources and their relationships are used to:
  - REST: identify data and transition to other resources; the means to develop an application; an API
  - Semantic Web: encapsulate the underlying data model; move to more data related using the model

Domain Driven Design

- Both the information model and API design are driven by the domain requirements
- This focusses differentiation and complexity where it *should* be: around those issues specific to the domain
  - A common model can be shared between the data and the API

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

So...

- Are all Linked Data applications today RESTful?
- Are there lots of RESTful systems using Linked Data?

Tensions

- *Are the remaining differences fundamental mismatches or artefacts of current use?*
- SPARQL
- Content negotiation
  - Information and non-information resources
  - 303 overhead

In Summary

- REST and Linked Data are complementary in the domain
- An opportunity to build powerful domain centric systems with a common API and data model
- *Questions?*

UNIVERSITY OF Southampton
School of Electronics and Computer Science
OXFORD e-Research CENTRE
UNIVERSITY OF OXFORD

Acknowledgements

Authors

Kevin Page, David De Roure

Oxford e-Research Centre, University of Oxford, and

Electronics & Computer Science, University of Southampton

Kirk Martinez

Electronics & Computer Science, University of Southampton

Thanks

Colleagues from the SemsorGrid4Env, SALAMI, NEMA and myExperiment projects

Funding

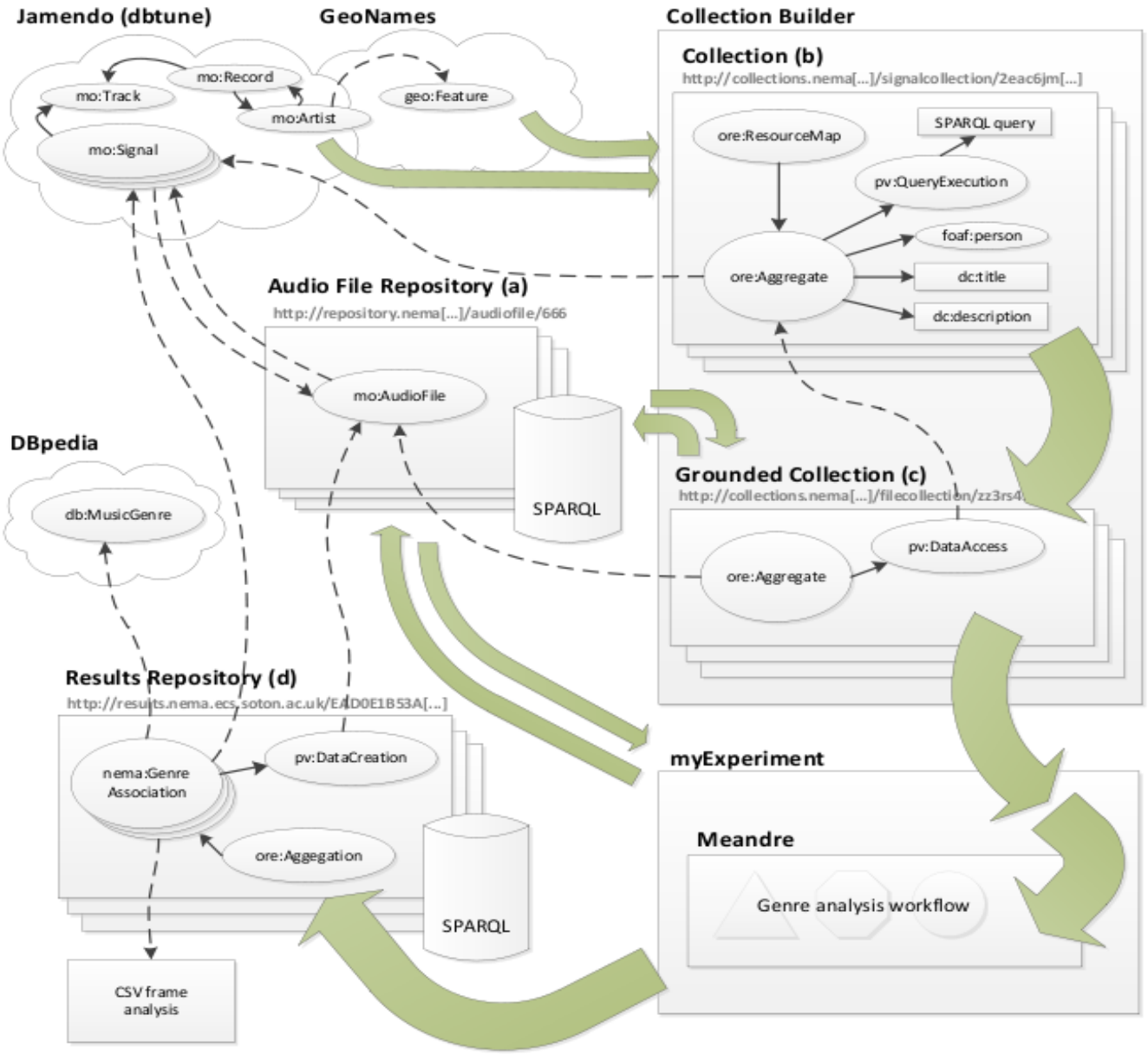
European Commission IST FP7-223913 (SemsorGrid4Env)

JISC Digitisation and e-Content, Digging into Data (SALAMI)

UNIVERSITY OF Southampton
School of Electronics and Computer Science

OXFORD e-Research CENTRE

UNIVERSITY OF OXFORD


Jamendo (dbtune)
GeoNames
Collection Builder
mo:Record
mo:Track
mo:Artist
geo:Feature
mo:Signal
Collection (b)
http://collections.nema[...]/signalcollection/2eac6jm[...]
ore:ResourceMap
SPARQL query
pv:QueryExecution
foaf:person
ore:Aggregate
dc:title
dc:description
Audio File Repository (a)
http://repository.nema[...]/audiofile/666
mo:AudioFile
SPARQL
DBpedia
db:MusicGenre
Grounded Collection (c)
pv:DataAccess
ore:Aggregate
Results Repository (d)
http://results.nema.ecs.soton.ac.uk/EAD0E1B53A[...]
nema:Genre Association
pv:DataCreation
ore:Aggegation
SPARQL
CSV frame analysis
myExperiment
Meandre
Genre analysis workflow