

W3C Provenance XG
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Overview of
Named Graphs

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Named Graphs

Named Graphs are a simple extension of the RDF data model for representing meta-information about RDF data.

2004: Invented by Jeremy Carroll, Christian Bizer, Pat Hayes, and Patrick Stickler

2005: First release of NG4J – Named Graphs for Jena toolkit

2008: Named Graphs part of W3C SPARQL specification

2008: Named Graphs implemented widely by SPARQL stores

2009: Named Graphs used by many Linked Data applications

2011: Named Graphs likely to be part of upcoming RDF 2.0

Basic idea

- A Named Graph is an entity which consists of
 - A name, which is an URIref
 - A graph, which is an RDF Graph
- Blank nodes not shared between different graphs
- A Named Graph is a resource, which can be described within the graph itself or in another graph.
- Pragmatic alternative to RDF reification, which avoids
 - triple bloat (3 times more triples)
 - problems with querying reified triples
 - problem of meta-data redundancy

Syntaxes for Named Graphs

■ TriX

- XML based syntax for exchanging a set of Named Graphs in a single document

■ TriG

- Plain text syntax for better readability

■ RDF/XML

- a set of RDF documents on the Web can be seen as a set of Named Graphs
- using the first `xml:base` or the URL of a RDF file as graph name
- This is the usual approach used by Linked Data applications for provenance tracking.

■ Straight forward XML serialization of the abstract syntax

```
<TriX xmlns="http://www.w3.org/2004/03/trix/trix-1/">
  <graph>
    <uri>http://www.bizer.de/InformationAboutRichard</uri>
    <triple>
      <uri>http://richard.cyganiak.de/foaf.rdf#RichardCyganiak</uri>
      <uri>http://xmlns.com/foaf/0.1/mbox</uri>
      <uri>mailto:richard@cyganiak.de</uri>
    </triple>
  </graph>
  <graph>
    <uri>http://www.bizer.de/ProvenanceInformation</uri>
    <triple>
      <uri>http://www.bizer.de/InformationAboutRichard</uri>
      <uri>http://purl.org/dc/elements/1.1/author</uri>
      <plainLiteral>Chris Bizer</plainLiteral>
    </triple>
  </graph></TriX>
```

■ allows the usage of generic XML tools like XSLT or XQuery

- based on the Turtle subset of N3, extended with graph naming

```
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix ex: <http://www.example.org/vocabulary/> .
@prefix : <http://www.example.org/exampleDocument/> .

:G1 { _:Monica ex:name "Monica Murphy" .
      _:Monica ex:email <mailto:monica@murphy.org>.
      :G1 ex:disallowedUsage ex:Marketing }

:G2 { :G1 dc:author :Chris .
      :G1 dc:date "2009-09-03"^^xsd:date }
```

The Semantic Web Publishing Vocabulary



```
@prefix swp: <http://www.w3.org/2004/03/trix/swp-1/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix : <http://www.example.org/exampleDocument/> .

:G1 { :Monica foaf:name "Monica Murphy" .
      :G1 swp:assertedBy :w1 .
      :w1 swp:authority :cb .
      :w1 dc:date "2009-11-19T08:33:19"^^xsd:dateTime .
      :cb foaf:mbox <mailto:chris@bizer.de> }

:G2 { :G1 swp:quotedBy :w2
      :w2 swp:authority :ps .
      :ps foaf:mbox <mailto:patrick.stickler@nokia.com> }
```

Named Graphs and SPARQL

- Expressing a trust policy within a SPARQL query.
- “Give me all information about Siemens. Use only information from data sources that I trust.”

```
SELECT ?company ?predicate ?object
WHERE {
  GRAPH ?graph {
    ?company ?predicate ?object
    ?company rdfs:label "Siemens AG" . }

  GRAPH db:ProvenanceGraph {
    ?graph swp:assertedBy ?warrant .
    ?warrant swp:authority ?dataSource }

  GRAPH db:userInformationChrisBizer {
    db:ChrisBizer iqv:trusts ?dataSource . } }
```


Named Graphs Tools

- **NG4J – Named Graphs API for Jena**
 - Extension to the Jena semantic web toolkit
 - API for manipulating sets of Named Graphs
 - Support for the TriX, TriG and RDF/XML syntax
 - Provenance-enabled Jena statements

- **All current SPARQL stores**
 - For instance Virtuoso, Sesame, Jena TDB, ...
 - Benchmark comparing the query performance
BSBM – Berlin SPARQL benchmark

Thanks :-)

■ Overview paper

- Jeremy Carroll, Christian Bizer, Patrick Hayes, Patrick Stickler: Named Graphs. Journal of Web Semantics, Vol. 3, Issue 4, p. 247-267, 2005.

■ SPARQL Specification

- <http://www.w3.org/TR/rdf-sparql-query/#rdfDataset>

■ NG4J - Named Graphs API for Jena (BSD License)

- <http://www4.wiwiss.fu-berlin.de/bizer/ng4j/>

■ Berlin SPARQL Benchmark

- <http://www4.wiwiss.fu-berlin.de/bizer/BerlinSPARQLBenchmark/>