Semantic Univer

RDF NUTS & BOLTS (HTTPS://WWW.CAMBRIDGESEMANTICS.COM/BLOG/SEMANTIC-UNIVERSITY/LEARN-RDF/RDF-NUTS-BOLTS/)

XSD DATATYPE CHEAT SHEET (HTTPS://WWW.CAMBRIDGESEMANTICS.COM/BLOG/SEMANTIC-UNIVERSITY/LEARN-RDF/XSD-DATATYPE-CHEAT-SHEET/)

RDF VS. XML (HTTPS://WWW.CAMBRIDGESEMANTICS.COM/BLOG/SEMANTIC-UNIVERSITY/LEARN-RDF/RDF-VS-XML/)

WHAT IS JSON-LD? (HTTPS://WWW.CAMBRIDGESEMANTICS.COM/BLOG/SEMANTIC-UNIVERSITY/LEARN-RDF/RDF-NUTS-BOLTS-2/)

Introduction

This set of lessons is an introduction to RDF, the core data
Semantic Web technologies. The lessons introduce RDF, p
technologies such as XML and JSON. Coverage is meant fo
help you follow the material.

If you haven't already completed the lessons in Semantic T
context for this set of lessons.

RDF 101

RDF (Resource Description Framework) is one of the thre
SPARQL and OWL.

In particular, RDF is the data model of the Semantic Web.
represented as RDF. If you store Semantic Web data, it's ir
RDF data. If you send Semantic Web data to your friend, it

In this lesson we will introduce RDF.

Objectives

In this lesson you will learn:

- What RDF is and how it fundamentally differs from XML a
- What is meant by a "graph data model"
- How RDF is typically represented visually
- The importance of the URI, and the significance (or lack th

Today's Lesson

RDF is the foundation of the Semantic Web and what prov
represented in RDF, including schema describing RDF data

RDF is not like the tabular data model of relational databas

RDF Graphs

In particular, it's a labeled, directed graph. I don't mean "gra

Therefore you can think of RDF as a bunch of nodes (the d
nodes and edges have labels.

The term labeled, directed graph will mean a lot to the mat
simple example here.

This is a complete, valid, visual representation of a small RI
immediately obvious to her what it represents.

The nodes of the graph are the ovals and rectangles (ovals
are labeled arrows that connect nodes to each other. The l
detail in a bit).

Note: the graph nature of RDF is why the logos of Semanti
graph. See if you can spot the graph in the logos of Revelyt
not to mention the RDF logo, pictured at the top if this less

There are three kinds of nodes in an RDF directed graph:

- Resource nodes. A resource is anything that can have thing
  visual representation, resources are represented by ovals.
- Literal nodes. The term literal is a fancy word for value. In t
  is http://www.cambridgesemantics.com/people/about/rob
  "Rob Gonzalez". In a visual representation, literals are repr
- Blank nodes. A blank node is a resource without a URI. Bla
  usually recommend avoiding them in general, especially if

Edges can go from any resource to any other resource, or t
a literal to anything at all.

Think about this for a second.

This means that anything in RDF can be connected to anyt

This idea is key. When we talk about Semantic Web technc (XML, relational databases, BI cubes, etc.), this is the reaso Moreover, creating a new thing is as easy as drawing an ov

If you compare this mentally to the model you might know for basic relationships, such as many-to-many relationship end up adding extra tables and columns (think foreign keys system.

The ability to connect anything together, any time you war you have! The following video was in Introduction to the Se point.

This linking between things is the fundamental capability c

The Central Importance of the URI

If you want to connect two things in a relational database y many relationship, create join tables), etc. If you want to lir like Informatica. It's just not easily done.

If you consider the XML world, the same thing is true. Con Connecting things between XML documents requires real not doing that very often.

The fundamental value and differentiating capability of the

The URI is what makes this possible.

URI stands for Universal Resource Identifier. The universa single database (think primary keys), in the Semantic Web databases. This enables us to create linkages between all t

In RDF, resources and edges are URIs. Literals are not; the means in the name). Everything else is, including the edges

If you look at our example above, there are several example

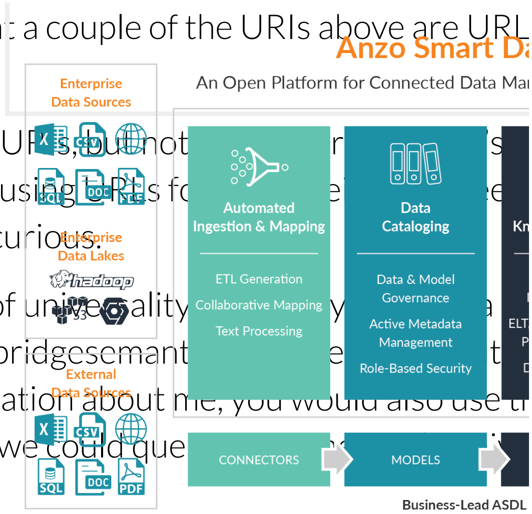
- http://www.cambridgesemantics.com/
- http://www.cambridgesemantics.com/people/about/rob
- foaf:member (this is shorthand for http://xmlns.com/foaf/(
- foaf:name (again, shorthand for http://xmlns.com/foaf/0.1

The first one is the URI for the company Cambridge Semar other two are URIs for the edges that connect the resourc

You should notice that a couple of the URIs above are URL
makes them a URI?

In short, all URLs are URIs, but not
practitioners stick to using URIs fo
differences if you're curious.

Back to the concept of universality
URI http://www.cambridgesemant
that has other information about me, you would also use th
databases about me, we could que



Easy, right?

Like all theoretically simple models, things are different in

On the Limits of Universality and RDF Schema Des

There is a major problem with the concept of universality p

It's impossible to get everyone everywhere to agree on a s

If you read the introductions to Semantic Web technologie
of the URI. After all, how can you connect things if you don
for those creating RDF vocabularies.

What we mean by an RDF Vocabulary is essentially the set
what relates the things in graph, and are what give it mean
the term vocabulary. For example, in order for two Semant
vocabulary. (Note: we're going to be covering RDF vocabul

So if two applications have to agree on vocabulary for all c
ahead of time, right? Fortunately, the a priori existence of s
our example, foaf:name is not the first URI ever created th
the name concept wasn't reused.

Fortunately, as you'll see in the SPARQL tutorials, it is very
vocabulary. The Semantic Web technologies were built un
written for different purposes at different times would cre
therefore there are provisions and methods to make it all v
XML or relational database worlds.

Said another way, you do not have to agree on all URIs for
vocabulary when possible and convenient, and don't worry

This same universal identity conundrum also happens for r
to be a URI representing me. This is clearly distinct from th
Web offers very simple ways to merge identical concepts s

We'll cover the details of how this works in future lessons,

Statements and Triples

Now that you get the basics, I have to introduce some com
the Web about Semantic Web technologies.

Rather than talk in the language of nodes and edges, Sema
representations of graph edges.

A statement or triple (they are synonymous) refers to a 3-t
linguistic, sentential form is why RDF schemas are often ca

As mentioned, the subject is a URI, the predicate is a URI, a

If we represent our graph example as a set of triples, they v

- (csipeople:rob, foaf:name, "Rob Gonzalez")
- (csipeople:rob, foaf:member,http://www.cambridgeseman

(Note that for brevity I'm using the namespace alias csipec
namespace http://www.cambridgesemantics.com/people/a

RDF graphs therefore are simply collections of triples. An I

However, Semantic Web practitioners found it very difficu
There are lots of reasons that you would want to segment
control, simplified updating, trust, etc.), and vanilla RDF ma

At first the community tried using reification to solve this c
but the concept is essentially triples about triples), but tod

Named Graphs and Quads

A named graph is simply a collection of RDF statements th

Modern triple stores all support named graphs, and they a
specification.

When referring to a triple in a named graph, you would oft
the form:

(named graph, subject, predicate, object)

For this reason, a triple store that supports named graphs
stores themselves are often quad stores anyway. That is, if
named graphs. The term quad store isn't that important.

Looking at the 4-tuples, it's pretty obvious that the same st
a very important feature. By organizing the statement into
control, trust, data lineage, and other functionality very cle

Exactly the best ways to segment triples in your applicatio
large part of the value brought by Semantic Web platforms
and segmentation to simplify application development. For
segmentation and organizational mechanism of the Seman

Conclusion

This is a lot of information to cover in a single lesson, espec
summary that will become second nature to you if you spe

- RDF is a graph data model.
- RDF data are directed, labeled graphs.
- A single edge in an RDF graph is a 3-tuple that is called eith
- Triples are organized into named graphs, forming 4-tuples
- RDF resources (nodes), predicates (edges), and named gra
- Although preferable to reuse URIs when possible, Semanti URI conflicts, as we'll see in future lessons.

‹ PREVIOUS LESSON
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