

Semantic Web Concepts and Buzzwords

Bob DuCharme

TopQuadrant

Charlottesville Semantic Web

and Linked Data Meetup

August 25, 2011





Introductions

- Presentation and all its URLs:
<http://www.snee.com/semwebmeetup/2011-08-25>
- Me: SGML and XML at Moody's, LexisNexis, Innodata Isogen, TopQuadrant
- Weblog: <http://www.snee.com/bobdc.blog>
- Twitter: @bobdc



Learning SPARQL: The Book

learningsparql.com
@learningsparql





What is the Semantic Web?

A set of standards and best practices for sharing data and the semantics of that data over the web for use by applications.



What is the Semantic Web?

A set of standards and best practices for sharing data and the semantics of that data over the web for use by applications.



- Resource Description Framework
- Store data about anything, but especially metadata about resources
- Stored where?
- Very easily aggregated



An RDF “statement”: the triple

- (Subject, predicate, object)
- “index.html has the title ‘My Home Page’.”
- Easily stores (resource ID, propertyName, propertyValue) assertions

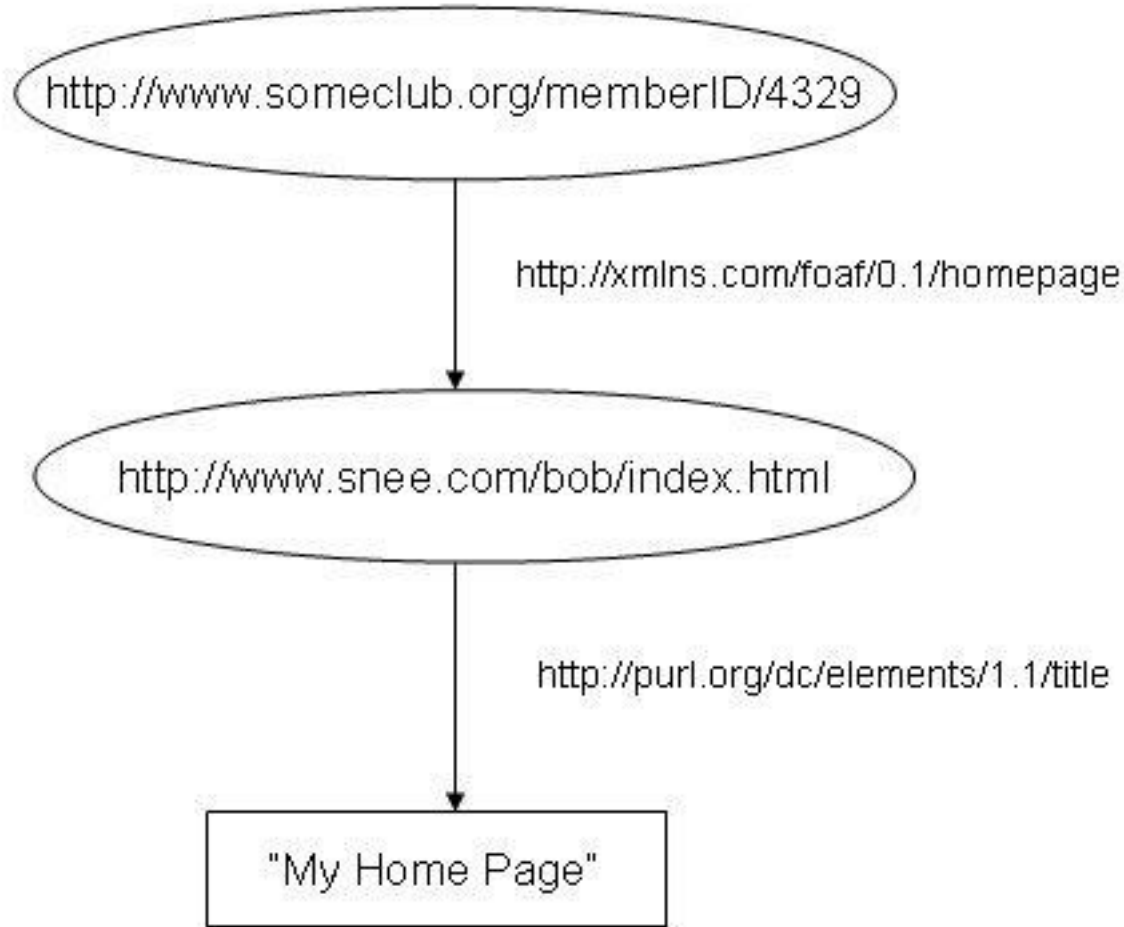
Triples

```
# rdf1.nt: sample RDF file in n-triples  
format.
```

```
<http://www.snee.com/bob/index.html>  
<http://purl.org/dc/elements/1.1/title>  
"My Home Page".
```

```
<http://www.someclub.org/memberID/4329>  
<http://xmlns.com/foaf/0.1/homepage>  
<http://www.snee.com/bob/index.html>.
```

Linking triples into a “graph”





Flexibility: freeform database

```
<rdf:Description rdf:about="http://www.snee.com/ns/id/i17">
  <business>CBGB</business>
  <workPhone>212-391-0429</workPhone>
  <street>315 Bowery</street>
  <soundGuy>Robin</soundGuy>
</rdf:Description>
```

```
<rdf:Description rdf:about="http://www.snee.com/ns/id/i8">
  <first>Don</first>
  <last>Brand</last>
  <workPhone>267-7792 x5058</workPhone>
  <workMobile>718-974-8094</workMobile>
  <email>dbrand@acm.org</email>
  <dogname>Spike</dogname>
  <dogname>Rex</dogname>
</rdf:Description>
```



Flexibility: storage and exchange

- Metadata inside or outside of described resources
- XML, RDBMS, N-triples, turtle...
- DMOZ open directory project, MusicBrainz

Aggregation and distributed data

- Merging two data sets? N-triples or turtle notation, just append files to each other.
- Great for distributed data
- W3C Technical Reports:
 - Over 400 created by over 500 editors
 - Metadata such as: title, date of publication, editors' names and e-mail addresses
 - Metadata file accompanies each report
 - Aggregate with simple HTTP requests

"In managing W3C technical reports, the data flows through all sorts of different peers, from the editors of the specs to the W3C webmaster to membership databases and online forms. RDF allows us to integrate the data with minimal impact on the way people work; we don't have to constrain everybody to one central database store or even one central database schema."



Other Syntaxes: Turtle

```
@prefix a:    <http://learningsparql.com/abook/> .
```

```
@prefix i:    <http://www.snee.com/ns/id/> .
```

```
i:i17 a:business "CBGB" .
```

```
i:i17 a:soundGuy "Robin" .
```

```
i:i17 a:street "315 Bowery" .
```

```
i:i17 a:workPhone "212-391-0429" .
```

```
i:i8  a:email    "dbrand@acm.org" ;  
      a:first    "Don" ;  
      a:last     "Brand" ;  
      a:workMobile "718-974-8094" ;  
      a:workPhone "267-7792 x5058" ;  
      a:dogname  "Rex" , "Spike" .
```

- Embedding RDF in HTML
- Re-using existing markup:

```
<h1 property="dc:title">The trouble with Bob</h1>
```

```
<h2 property="dc:creator">Alice</h2>
```

- Embedding a complete triple:

```
<span about="http://example.com/yourDoc.html"  
      property="ex:goofinessFactor" content="3.5"/>
```




Web page with RDFa embedded

The
London
Gazette

Change edition: [Edinburgh](#) / [Belfast](#)

Home

Policy-Makers

Data Re-Use

Insolvency

Browse

Treasury

National Savings

Bank of England

Bank of Issue in
Scotland

Customs & Excise

Bankers (NI) Acts

Placing a Notice

My Account

Friday, August 28, 2009

Search archive

Search

Advanced Search

[Home](#) / [Browse](#) / [Public Finance](#)

Bank of England [Atom news feed](#)

Results 1-2 of 2 notices from the last 10 issues

Issue: Search:

Result Page: [First](#) [Previous](#) [1](#) [Next](#) [Last](#)

Date: 21 August 2009 Issue number: 59163 Page number: 14474

59163 Friday 21 August 2009 9780116691637 Bank of England Statement

Date: 14 August 2009 Issue number: 59157 Page number: 14076

59157 Friday 14 August 2009 9780116691576 Bank of England Statement

Result Page: [First](#) [Previous](#) [1](#) [Next](#) [Last](#)



Triples from preceding London Gazette page

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix g: <http://www.gazettes-online.co.uk/ontology#> .
@prefix xhv: <http://www.w3.org/1999/xhtml/vocab#> .

<http://www.belfast-gazette.co.uk/id> a g:Edition .
<http://www.edinburgh-gazette.co.uk/id> a g:Edition .
<http://www.london-gazette.co.uk/id> a g:Edition .

<http://www.london-gazette.co.uk/id/issues/59157> a g:Issue ;
  g:hasNotice <http://www.london-gazette.co.uk/id/issues/59157/notices/896735> ;
  g:hasPublicationDate "2009-08-14" .

<http://www.london-gazette.co.uk/id/issues/59163> a g:Issue ;
  g:hasNotice <http://www.london-gazette.co.uk/id/issues/59163/notices/901798> ;
  g:hasPublicationDate "2009-08-21" .

<http://www.london-gazette.co.uk/issues/recent/10/public-finance/bank-of-
  england/start=1/page.htm> xhv:alternate <http://www.london-
  gazette.co.uk/issues/recent/10/public-finance/bank-of-england/start=1/atom.xml> ;
  xhv:stylesheet <http://www.london-gazette.co.uk/Styles/gazettes.css> .

<http://www.london-gazette.co.uk/id/issues/59157/notices/896735> a g:Notice ;
  foaf:page <http://www.london-gazette.co.uk/issues/59157/pages/14076> .

<http://www.london-gazette.co.uk/id/issues/59163/notices/901798> a g:Notice ;
  foaf:page <http://www.london-gazette.co.uk/issues/59163/pages/14474> .

<http://www.london-gazette.co.uk/issues/59157/pages/14076> a foaf:Document .

<http://www.london-gazette.co.uk/issues/59163/pages/14474> a foaf:Document .
```



What is the Semantic Web?

A set of standards and best practices for sharing data and the semantics of that data over the web for use by applications.



RDF Schema (RDFS)

- Define vocabularies: properties and classes
- Not to constrain data, but to enhance it

```
@prefix ab: <http://learningsparql.com/ns/addressbook#>
```

```
ab:i0432 ab:firstName "Richard" ;  
         ab:lastName  "Mutt" ;  
         ab:plays     ab:spoons .
```

RDF Schema (RDFS)

```
@prefix ab:    <http://learningsparql.com/ns/addressbook#>
```

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
```

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

```
ab:Musician
```

```
  rdf:type rdfs:Class ;
```

```
  rdfs:comment "Someone who plays a musical instrument" .
```

```
ab:MusicalInstrument
```

```
  rdf:type rdfs:Class ;
```

```
  rdfs:label "musical instrument" .
```

```
ab:plays
```

```
  rdf:type rdf:Property ;
```

```
  rdfs:comment "Identifies the instrument that someone plays" ;
```

```
  rdfs:domain ab:Musician ;
```

```
  rdfs:range ab:MusicalInstrument .
```

RDF Schema (RDFS)

ab:plays

```
rdf:type rdf:Property ;  
rdfs:comment "Identifies the instrument that someone plays" ;  
rdfs:domain ab:Musician ;  
rdfs:range ab:MusicalInstrument .
```

```
ab:i0432 ab:firstName "Richard" ;  
ab:i0432 ab:lastName "Mutt" ;  
ab:i0432 ab:plays ab:spoons .
```



Using RDFS to publish vocabularies

- For a real application, I wouldn't use the `http://learningsparql.com/ns/addressbook` namespace for an address book
- RDFS file at `www.w3.org/2006/vcard/ns`
- Looking for an existing vocabulary to re-use **or extend?** Look for RDFS version of it.
- OWL builds on RDFS to let you publish ontologies



SPARQL

- SPARQL Protocol and RDF Query Language
- Became W3C standard January 2008
- SPARQL 1.1 now in Working Draft status

SPARQL query I

```
PREFIX a: <http://www.snee.com/ns/abook#>
SELECT ?s
WHERE { ?s a:firstName "Jim" }
```

Result:

s
<http://www.snee.com/ns/id/jimgartner>
<http://www.snee.com/ns/id/i129>



SPARQL query 2

```
PREFIX a: <http://www.snee.com/ns/abook#>
SELECT ?ln
WHERE { ?s a:firstName "Jim".
        ?s a:lastName ?ln.
}
```

Result:

ln
"Gartner"
"Gabriel"

SPARQL query 3

```
PREFIX a: <http://www.snee.com/ns/abook#>
SELECT ?fn ?ln
WHERE { ?s a:firstName ?fn;
          a:lastName ?ln;
          a:instrument "guitar".
}
```

Result:

fn	ln
"Jason"	"Lyman"
"Jaye"	"Urgo"



Creating triples with SPARQL (part I)

```
PREFIX m: <http://www.example.com/ns/mytestvocab#>

SELECT ?child ?dad
WHERE {
    ?child m:parent ?dad .
    ?dad   m:gender m:male .
}
```



Creating triples with SPARQL (part 2)

```
PREFIX m: <http://www.example.com/ns/mytestvocab#>

CONSTRUCT { ?child :father ?dad }
WHERE {
    ?child m:parent ?dad .
    ?dad   m:gender m:male .
}
```



What is the Semantic Web?

A set of standards **and best practices** for sharing data and the semantics of that data over the web for use by applications.



Linked Data

- W3C wiki: “LinkedData is to spreadsheets and databases what the Web of hypertext documents is to word processor files.”
- Jim Hendler: “My document can point at your document on the Web, but my database can't point at something in your database without writing special purpose code. The Semantic Web aims at fixing that.”
- Kingsley Idehen: “It's a deliverable from the "Semantic Web Project". It adds reference & access granularity to existing #web.”
- Me: The semantic web without the semantics. An end to screen scraping!



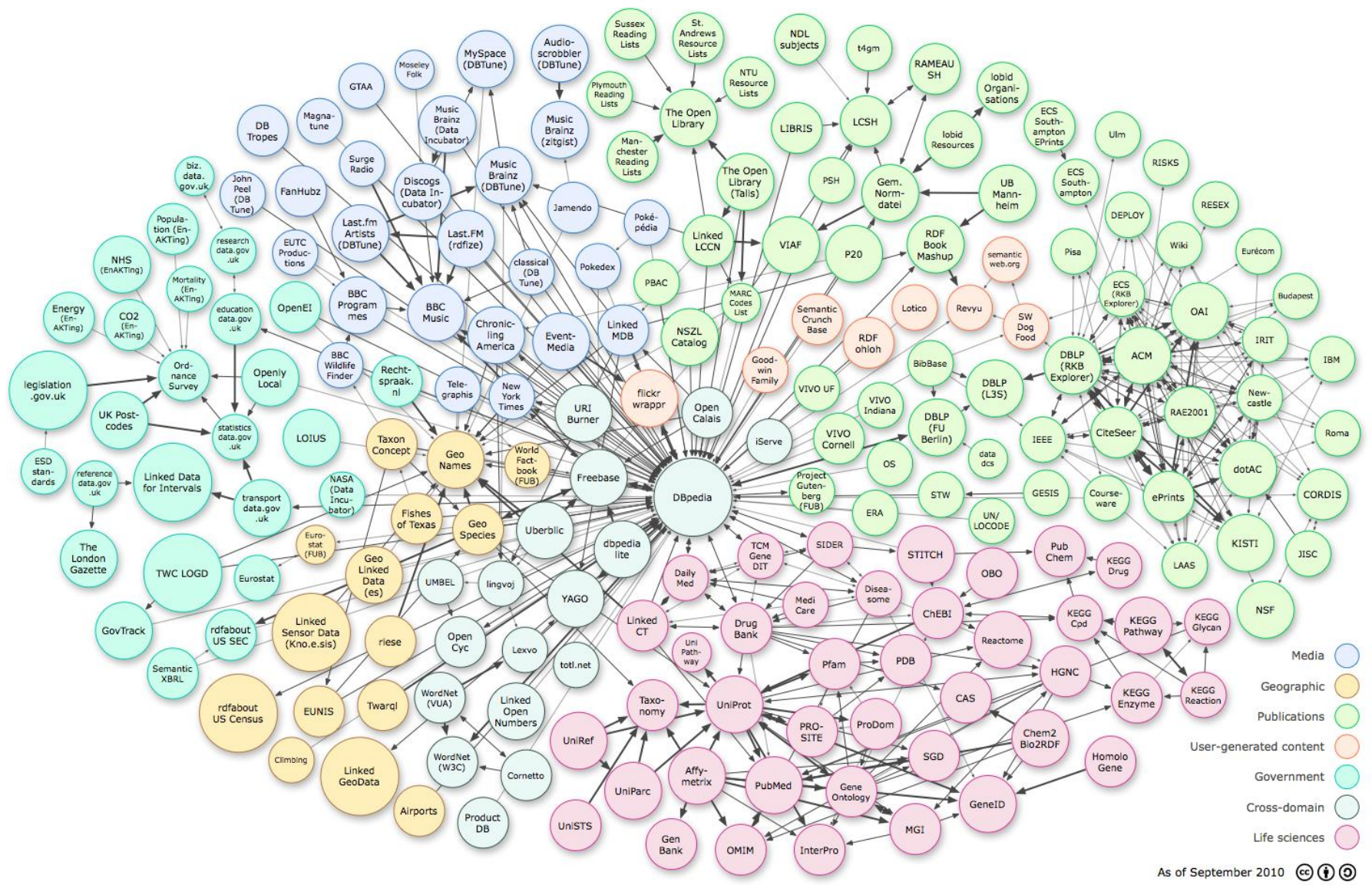
What is the Semantic Web?

A set of standards and best practices for sharing data and the semantics of that data **over the web for use by applications.**

Tim Berners-Lee's Four Linked Data Principles

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names.
3. When someone looks up a URI, provide useful information, using the standards (RDF, SPARQL)
4. Include links to other URIs, so that they can discover more things.

Linked data cloud, color-coded



As of September 2010

Wikipedia page for one Simpsons episode

You can support Wikipedia by making a tax-deductible donation.

Log in / create account

Interested in contributing to Wikipedia?

Tennis the Menace

From Wikipedia, the free encyclopedia

"Tennis the Menace" is the twelfth episode of the twelfth season of *The Simpsons* which originally aired February 11, 2001.

Contents [hide]

- 1 Plot
- 2 Production
- 3 Continuity
- 4 Cultural references
- 5 External links

Plot

The Springfield Retirement Castle holds a talent show, which the Simpsons attend. Grampa wins the show after doing a bad version of "What's New, Pussycat?" His prize is a free autopsy, so the Simpsons go to a funeral salesman. Instead, Homer realizes that a certain kind of cemetery monument uses the same amount of cement as a tennis court, and so Homer decides to get the house a tennis court, even though they can hardly afford their own house. The court is very popular with Springfield's residents, and yet, these residents mock Homer and Marge for losing all the time due to Homer's absent-mindedness. (Lou calls them the "L.A. Clippers of backyard tennis"). Homer tries to please Marge by entering Krusty's celebrity tournament, the "Krusty Kharity Klassic". However Homer is a hopeless tennis player and so Marge "dumps" him and enters with Bart as her new partner. Homer is outraged that he was abandoned for a ten year old. He receives a nightmare where Bart and Marge are married and he is a wall trophy, after being shot at a guillotine factory. He gets even by entering the tournament with Lisa as his partner. Marge and Bart antagonise Homer and Lisa, who play it cool (well, Homer panics at the thought of losing).

The tournament takes place and in the stands are leading tennis pros Andre Agassi, Pete Sampras, Venus Williams and Serena Williams. At the tournament, Homer dumps Lisa for Venus Williams. In response, Marge replaces Bart with Serena Williams as her partner. Ultimately, Serena and Venus replace Marge and Homer with Pete Sampras and Andre Agassi, respectively. This forces the family to go back to the bench and resume their normal places in the family; as they enjoy the exhibition of top-class tennis, they agree that it is better to watch things than to do things.

Production

It was the second episode of *The Simpsons* to be made with digital coloring, with a complete transition to digital animation made in Season 14.

Continuity

- In this episode, Homer thinks tennis is similar to *foxy boxing* (or as Homer calls it, "the sport where the chicks wall on each other"). Homer mentioned foxy boxing before (although he knows the name, it is clear he does not necessarily know what it is) in the season six episode *Lisa on Ice*, when he tells Lisa that "...if the Bible has taught us anything -- and it hasn't -- is that girls should stick to girl sports, such as hot oil wrestling, foxy boxing, and such and such..."
- In this episode, it's revealed that Bart has a fear of getting locked inside caskets. This would come back in the season 19 episode *Funeral for a Fiend* when Sideshow Bob locks Bart in a casket on a conveyor belt that's headed for a cremation oven.

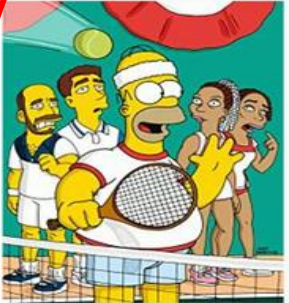
Cultural references

- The title is a play on the comic strip and movie *Dennis the Menace*.
- The episode is notable partly for the competition that emerges between Homer and Bart over Marge, and Lisa indeed makes a reference to Oedipus.
- When Andre Agassi introduces himself at the tennis match, Homer comments "The wrestler?," confusing him for professional wrestler André the Giant.
- Grampa sings the "What's New Pussycat?" theme by Tom Jones at the talent show, replacing "whoa whoa whoa" with "ow ow ow," having injured himself attempting to dance.
- When Homer is in the shower, Bart makes him scream in the style of Mary Had A Little Lamb.

External links

- "Tennis the Menace" episode capsule at The Simpsons Archive
- "Tennis the Menace" at the Internet Movie Database

The Simpsons episode
"Tennis the Menace"



Episode no. 260
 Prod. code CABP07
 Orig. airdate February 11, 2001
 Show runner(s) Mike Scully
 Written by Ian Maxtone-Graham
 Directed by Jen Kamenman
 Chalkboard "I will not publish the principal's credit report"
 Couch gag The living room floor is frozen over. The Simpsons ice skate to the couch. When Homer sits down, his slice falls right through.
 Guest star(s) Andre Agassi as himself
 Pete Sampras as himself
 Venus and Serena Williams as themselves

Season 12
 November 1, 2000 – May 20, 2001

- "Treehouse of Horror XI"
- "A Tale of Two Springfields"
- "Insane Clown Poppy"
- "Lisa the Tree Hugger"
- "Homer vs. Dignity"
- "The Computer Wore Menace Shoes"
- "The Great Money Caper"
- "Skinner's Sense of Snow"
- "SOLAR"



DBpedia page for same episode

Tennis the Menace at DBpedia.org

http://dbpedia.org/resource/Tennis_the_Menace



"Tennis the Menace" is the twelfth episode of the twelfth season of The Simpsons which originally aired February 11, 2001. It was the second episode of The Simpsons to be made with digital coloring, with a complete transition to digital animation made in Season 14."

Property	Value
p:abstract	<ul style="list-style-type: none"> "Tennis the Menace" is the twelfth episode of the twelfth season of The Simpsons which originally aired February 11, 2001. It was the second episode of The Simpsons to be made with digital coloring, with a complete transition to digital animation made in Season 14." ^(en) Tennis the Menace, llamado "La amenaza del tenis" en España y "Juego limpio" en Latinoamérica, es un capítulo perteneciente a la Duodécima Temporada." ^(es)
p:airdate	<ul style="list-style-type: none"> 2001-02-11 ^(xsd:date)
p:blackboard	<ul style="list-style-type: none"> "I will not publish the principal's credit report"" ^(en)
rdfs:comment	<ul style="list-style-type: none"> "Tennis the Menace" is the twelfth episode of the twelfth season of The Simpsons which originally aired February 11, 2001. It was the second episode of The Simpsons to be made with digital coloring, with a complete transition to digital animation made in Season 14." ^(en) Tennis the Menace, llamado "La amenaza del tenis" en España y "Juego limpio" en Latinoamérica, es un capítulo perteneciente a la Duodécima Temporada." ^(es)
p:couchGag	<ul style="list-style-type: none"> The living room floor is frozen over. The Simpsons ice skate to the couch. When Homer sits down, his side falls right through. ^(en)
p:director	<ul style="list-style-type: none"> dbpedia:Jen_Kamerman
p:episode	<ul style="list-style-type: none"> Tennis the Menace ^(en)
p:episodeName	<ul style="list-style-type: none"> Tennis the Menace ^(en)
p:episodeNo	<ul style="list-style-type: none"> 260 ^(xsd:integer)
p:guestStar	<ul style="list-style-type: none"> dbpedia:Andre_Agassi dbpedia:Pete_Sampras dbpedia:Serena_Williams



Everything Bart wrote on blackboard in season 12

```
SELECT ?episode ?chalkboard_gag
WHERE { ?episode skos:subject
<http://dbpedia.org/resource/Category:The Simpsons episodes%2C\_season\_12> .
?episode dbpedia2:blackboard ?chalkboard_gag .}
```

SPARQL results:

episode	chalkboard_gag
:A_Tale_of_Two_Springfields	""I will not plant sublimin""al"" messa"" gore""s""@en
:Bye_Bye_Nerdie	""I will not scare the vice president""@en
:Children_of_a_Lesser_Clod	""Today is not Mothra's Day""@en
:Day_of_the_Jackanapes	""The hamster did not have a 'full life""@en
:HOMR	:Network_television
:Homer_vs._Dignity	""I will not surprise the incontinent""@en
:Hungry%2CHungry_Homer	""Temptation Island was not a sleazy piece of crap""@en
:I%27m_Goin%27_to_Praiseland	""Genetics is not an excuse""@en
:Insane_Clown_Poppy	""I will not surprise the incontenent.""@en
:Lisa_the_Tree_Hugger	""I am not the acting President.""@en
:New_Kids_on_the_Blecch	""I will not buy a presidential pardon""@en
:Pokey_Mom	:Who_Let_the_Dogs_Out%3F
:Simpson_Safari	""I will not flush evidence""@en
:Simpsons_Tall_Tales	""I should not be twenty-one by now""@en
:Skinner%27s_Sense_of_Snow	""Science class should not end in tragedy""@en
:Tennis_the_Menace	""I will not publish the principal's credit report""@en
:The_Computer_Wore_Menace_Shoes	""I will only provide a urine sample when asked""@en
:The_Great_Money_Caper	""The nurse is not dealing""@en
:Trilogy_of_Error	""Fire is not the cleanser""@en

Linked Data at the EPA



- Three relational databases:
 - Substance Registry System (SRS)
 - Facilities Registry System (FRS)
 - Toxic Release Inventory (TRI)

- Freon C 51-12:

<http://us-epa.3roundstones.net/id/us/fed/agency/epa/data/97008>

- Relational databases provide metadata about their subjects; use of URIs lets you query across databases



What is the Semantic Web?

A set of standards and best practices for sharing data **and the semantics of that data** over the web for use by applications.

Semantics?



"LEROY CONSIDERS OUR MARRIAGE VOWS AS SEMANTICS."



Five facts from my address book

- Leroy has a work phone number of 212-334-4323.
- Leroy has an email address of leroy@ngcorp.com.
- Loretta has an email address of loretta031@yahoo.com.
- Loretta has a home phone number of 718-928-6621.
- Loretta's spouse is Leroy.

What is an ontology?

- controlled vocabulary
- taxonomy
- thesaurus
- ontology



RDF data and some OWL metadata

```
@prefix :      <http://learningsparql.com/ns/addressbook#> .  
@prefix lh:    <http://www.snee.com/ns/lockhorns#> .  
@prefix owl: <http://www.w3.org/2002/07/owl#> .
```

```
lh:Leroy
```

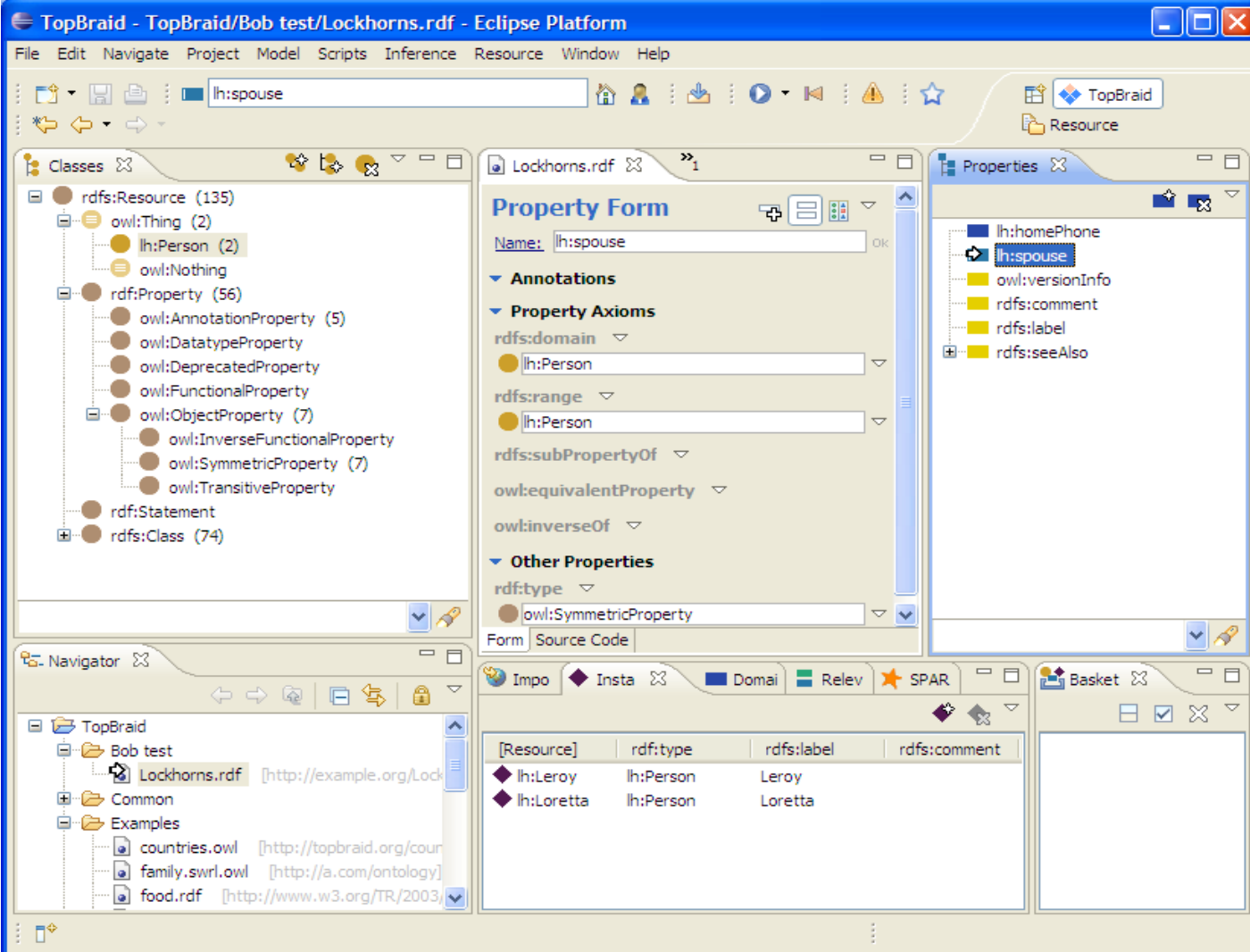
```
  :first  "Leroy" ;  
  :last   "Lockhorn" .
```

```
lh:Loretta
```

```
  :first  "Loretta" ;  
  :last   "Lockhorn" ;  
  :homePhone "523-998-18542" ;  
  :spouse <lh:Leroy> .
```

```
lh:spouse a owl:SymmetricProperty .
```

Making spouse property symmetric with TopBraid Composer (Free Edition)



The screenshot shows the TopBraid Composer interface with the following components:

- Classes:** A tree view showing the ontology structure, including `owl:Thing` (2) and `lh:Person` (2).
- Property Form:** The central configuration window for the `lh:spouse` property. It shows:
 - Name:** `lh:spouse`
 - Annotations:** `owl:SymmetricProperty` is selected under "Other Properties".
 - Property Axioms:** `lh:Person` is set for both `rdfs:domain` and `rdfs:range`.
- Properties:** A list of properties including `lh:homePhone`, `lh:spouse`, `owl:versionInfo`, `rdfs:comment`, `rdfs:label`, and `rdfs:seeAlso`.
- Navigator:** Shows the project structure with `Lockhorns.rdf` selected.
- Table:** A table displaying instances of the `lh:Person` class:

[Resource]	rdfs:type	rdfs:label	rdfs:comment
lh:Leroy	lh:Person	Leroy	
lh:Loretta	lh:Person	Loretta	

Classes and properties: OO vs. OWL

- Object-oriented development: if an instance is a member of a class, then it has the properties assigned to that class.
- OWL: if an instance has the properties of a class, then it's a member of that class.
 - Adding or removing properties can change class membership
 - Instance can be a member of multiple classes



“Semantic” search?

- “Semantic web startup” news items
- Semantics without the linked data?
- Or standards?

Software Landscape

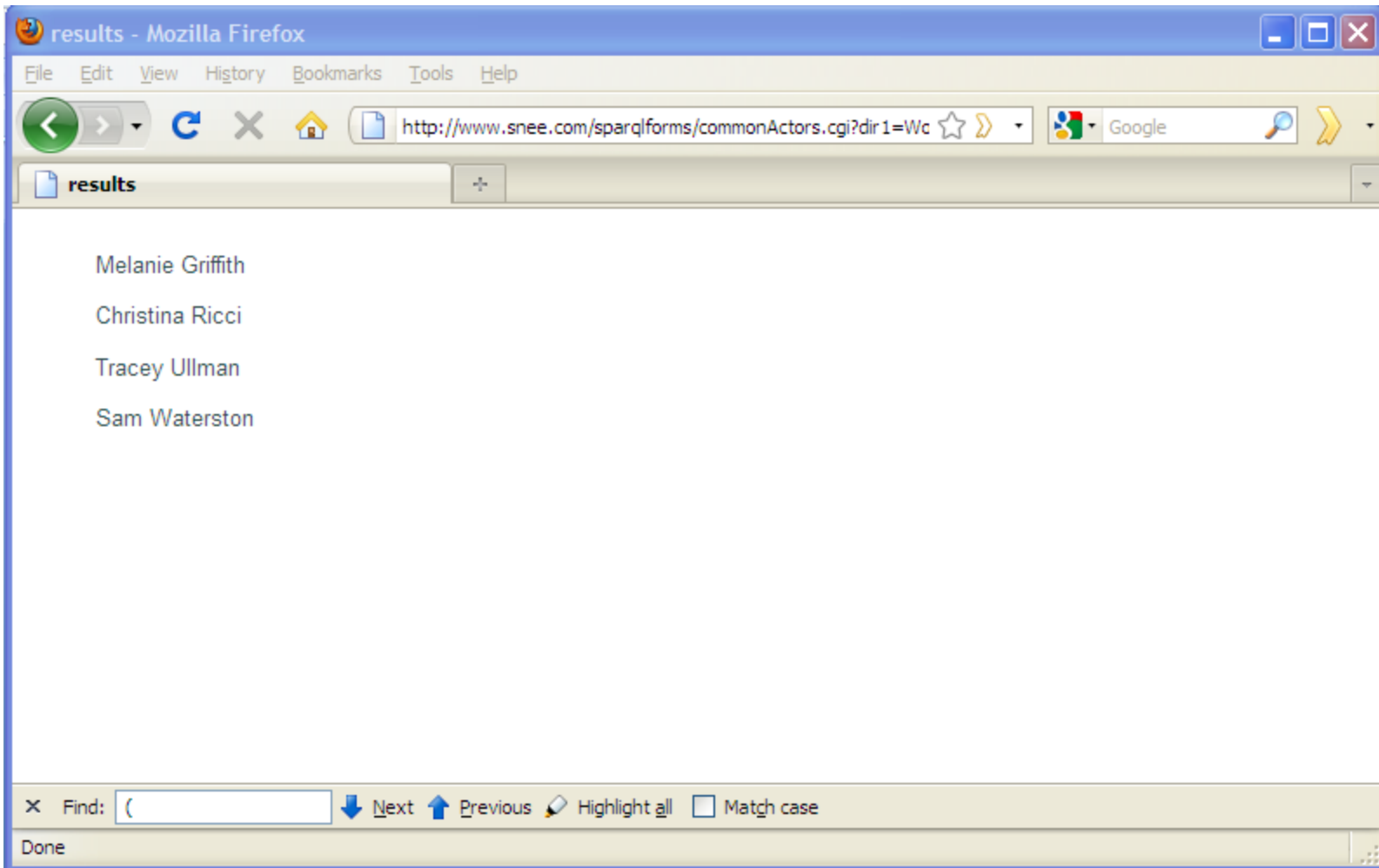
- Triple stores (Sesame, Talis, Oracle, Allegrograph, OpenLink Virtuoso, Jena's SDB and TDB)
- Reasoners (Racer, Pellet)
- Modelling tools (TopBraid Composer, Protégé, Swoop)
- Application development libraries and tools (Jena, RDFLib, Redland, TopBraid Live)



Form-based SPARQL app

The screenshot shows a Mozilla Firefox browser window with the title "Find common actors between two directors - Mozilla Firefox". The address bar displays the URL "http://www.snee.com/sparqlforms/commonActors.html". The page content includes the heading "Find common actors between two directors" and a paragraph: "Enter the 'official' name of each director (check [IMDB](#) if you're not sure) and click 'Search' to list actors who have appeared in movies by both directors." Below this text are two text input fields containing "Woody Allen" and "John Waters", and a "search" button. The browser's status bar at the bottom shows "Done" and search options like "Find: (", "Next", "Previous", "Highlight all", and "Match case".

Form-based SPARQL app: results



The screenshot shows a Mozilla Firefox browser window titled "results - Mozilla Firefox". The address bar contains the URL `http://www.snee.com/sparqlforms/commonActors.cgi?dir1=Wc`. The search results are displayed as a list of names:

- Melanie Griffith
- Christina Ricci
- Tracey Ullman
- Sam Waterston

The browser's search bar at the bottom shows the search term "(" and includes navigation buttons for "Next" and "Previous", along with "Highlight all" and "Match case" options. The status bar at the bottom left indicates "Done".



commonactors.cgi main() part I

```
def main():  
    form = cgi.FieldStorage()  
    dir1name = form.getvalue('dir1')  
    dir2name = form.getvalue('dir2')  
  
    sparql = SPARQLWrapper("http://data.linkedmdb.org/sparql")  
    queryString = ""
```

```
PREFIX m: <http://data.linkedmdb.org/resource/movie/>
```

```
SELECT DISTINCT ?actorName WHERE {
```

```
    ?dir1      m:director_name "DIR1-NAME".
```

```
    ?dir2      m:director_name "DIR2-NAME".
```

```
    ?dir1film m:director ?dir1;
```

```
                m:actor ?actor.
```

```
    ?dir2film m:director ?dir2;
```

```
                m:actor ?actor.
```

```
    ?actor     m:actor_name ?actorName.
```

```
}
```

```
"""
```



commonactors.cgi main() part 2

```
queryString = queryString.replace("DIR1-NAME",dir1name)  
queryString = queryString.replace("DIR2-NAME",dir2name)
```

```
sparql.setQuery(queryString)  
sparql.setReturnFormat(JSON)
```

```
try:  
    ret = sparql.query()  
    results = ret.convert()  
    requestGood = True  
except Exception, e:  
    results = str(e)  
    requestGood = False
```



commonactors.cgi main() part 3

```
print """Content-type: text/html

<html>
  <head>
    <title>results</title>
    <link href="simple.css" type="text/css" rel="stylesheet" />
  </head>
  <body>
"" "

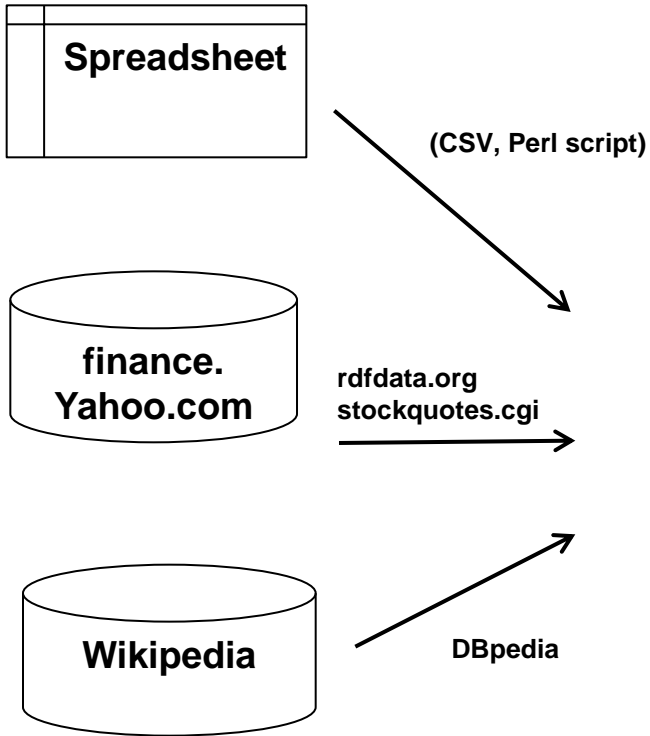
if requestGood == False:
    print "<h1>Problem communicating with the server</h1>"
    print "<p>" + results + "</p>"
elif (len(results["results"]["bindings"]) == 0):
    print "<p>No results found.</p>"

else:
    for result in results["results"]["bindings"]:
        print "<p>" + result["actorName"]["value"] + "</p>"

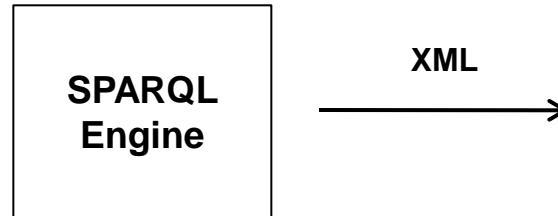
print "</body></html>"
```

Three basic steps

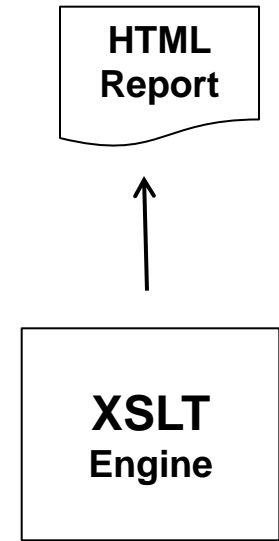
1.



2.



3.



Analyst recommendation spreadsheet

	A	B	C	D	E	F
1	analyst	Ticker Symbol	Wikipedia ID	recommendation	date-time	description
2	Nick Perkins	GOOG	Google	SELL	2009-12-14T13:36:00	Google has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisl nisl, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit amet ornare nunc. Duis fermentum, nibh quis fermentum sagittis, mi eros
3	Liz Ford	VOD	Vodafone	BUY	2009-12-15T18:24:00	Vodafone has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisl nisl, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit amet ornare nunc. Duis fermentum, nibh quis fermentum sagittis, mi eros
4	Betty Bailey	SNE	Sony	HOLD	2009-12-16T17:21:00	Sony has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisl nisl, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit amet ornare nunc. Duis fermentum, nibh quis fermentum sagittis, mi eros
5	Marilyn Walker	HMC	Honda	BUY	2009-12-16T10:13:00	Honda has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisl nisl, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit amet ornare nunc. Duis fermentum, nibh quis fermentum sagittis, mi eros
6	Linda Morales	IBM	IBM	SELL	2009-12-14T13:36:00	IBM has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisl nisl, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit amet ornare nunc. Duis fermentum, nibh quis fermentum sagittis, mi eros
	Matt Moore	TWX	Time_Warner	SELL	2009-12-16T14:24:00	Time Warner has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisl nisl, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit

Sheet1 Sheet2 Sheet3

Ready 100%

Analyst Recommendations: Report

Time Warner TWX \$28.16 at 2010-01-15T16:00:00

2008: Revenue 46980000000 Net Income -13400000000

Time Warner Inc. is the world's largest media and entertainment conglomerate, headquartered in the Time Warner Center in New York City. Formerly three separate companies (and owns the assets of a fourth, Turner Broadcasting System, Inc. , acquired by a pre-AOL merger TW in 1996): Warner Communications, Inc. and Time Inc. before the Time-Warner merger in 1990 and America Online, Inc. before its purchase of Time Warner in 2001 has created the current Time Warner, with major operations in film, television, publishing, Internet service and telecommunications. Among its subsidiaries are AOL, New Line Cinema, Time Inc. , HBO, Turner Broadcasting System, The CW Television Network, TheWB.com, Warner Bros. Entertainment, Kids' WB, The CW4Kids, Cartoon Network, Hanna-Barbera, Ruby-Spears Productions, Adult Swim, CNN, DC Comics, and Warner Bros. Games. Terra Firma Capital Partners is likely to buy a 10% Stake in TW, since it would buy all the remaining rights and stakes of Time Warner in Warner Music Group and merge it with EMI.

Analyst Matt Moore	Recommendation SELL	Date 2009-12-16T14:24:00
---------------------------	----------------------------	---------------------------------

Time Warner has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisi nisi, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit amet ornare nunc. Duis fermentum, nibh quis fermentum sagittis, mi eros porttitor magna, sed dictum tortor quam ut lectus. Praesent eu est augue.



IBM \$131.78 at 2010-01-15T16:00:00

2008: Revenue 103630000000 Net Income 12334000000

International Business Machines Corporation, abbreviated IBM, is a multinational computer technology and IT consulting corporation headquartered in Armonk, New York, United States. The company is one of the few information technology companies with a continuous history dating back to the 19th century. IBM manufactures and sells computer hardware and software (with a focus on the latter), and offers infrastructure services, hosting services, and consulting services in areas ranging from mainframe computers to nanotechnology. It has been nicknamed "Big Blue" for its official corporate color. IBM has been well known through most of its recent history as the world's largest computer company and systems integrator. With over 388,000 employees worldwide, IBM is the largest and most profitable information technology employer in the world. IBM holds more patents than any other U.S. based technology company and has eight research laboratories worldwide. The company has scientists, engineers, consultants, and sales professionals in over 170 countries. IBM employees have earned five Nobel Prizes, four Turing Awards, five National Medals of Technology, and five National Medals of Science. As a chip maker, IBM has been among the Worldwide Top 20 Semiconductor Sales Leaders in past years.

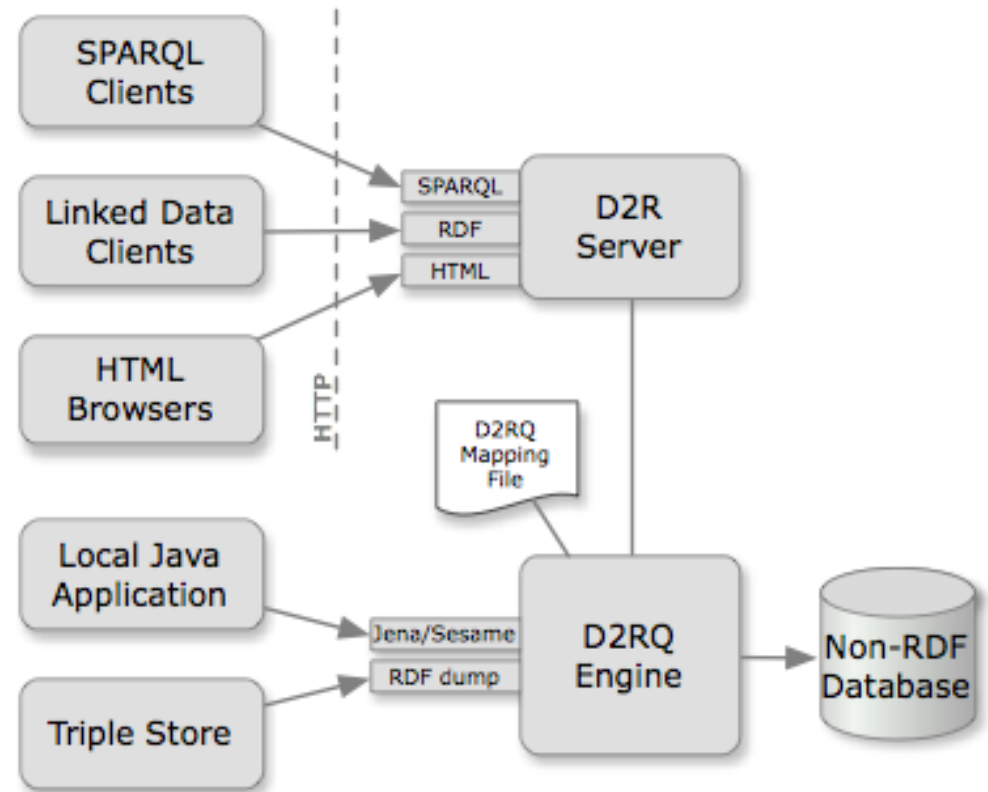
Analyst Linda Morales	Recommendation SELL	Date 2009-12-14T13:36:00
------------------------------	----------------------------	---------------------------------

IBM has had an interesting quarter. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent sed lectus augue. Suspendisse nisi nisi, pulvinar eu luctus non, sodales non magna. Sed in metus arcu, sit amet ornare nunc. Duis fermentum, nibh quis fermentum sagittis, mi eros porttitor magna, sed dictum tortor quam ut lectus. Praesent eu est augue.

HONDA HMC \$36.90 at 2010-01-15T16:03:00
The Power of Dreams

Querying relational data with SPARQL

- Open source
- Query multiple databases at once
- Used by Linked Movie Database
- Great for linked data behind the firewall



- W3C developing standardized version of D2RQ language

Summary, part I

- RDF standard
 - Data modelled as triples
 - Flexible and easily aggregated
 - Various syntaxes for saving it: RDF/XML, Ntriples, n3, Turtle
- SPARQL standard for querying RDF
 - Query local or remote triples
 - Construct new triples
 - 1.1 on the way



Summary, part 2

- Linked Data: best practices for sharing data on the web
 - Query it with SPARQL
 - Wikipedia fielded data in DBpedia, many other sources
- OWL standard: storing semantics of data as triples
- Tools available for modelling, storing, reasoning with, and building applications around triples