

# **RDFa: Embedding RDF Knowledge in HTML**

Some content from a presentation by Ivan Herman of the W3c, [Introduction to RDFa](#), given at the 2011 Semantic Technologies Conference.

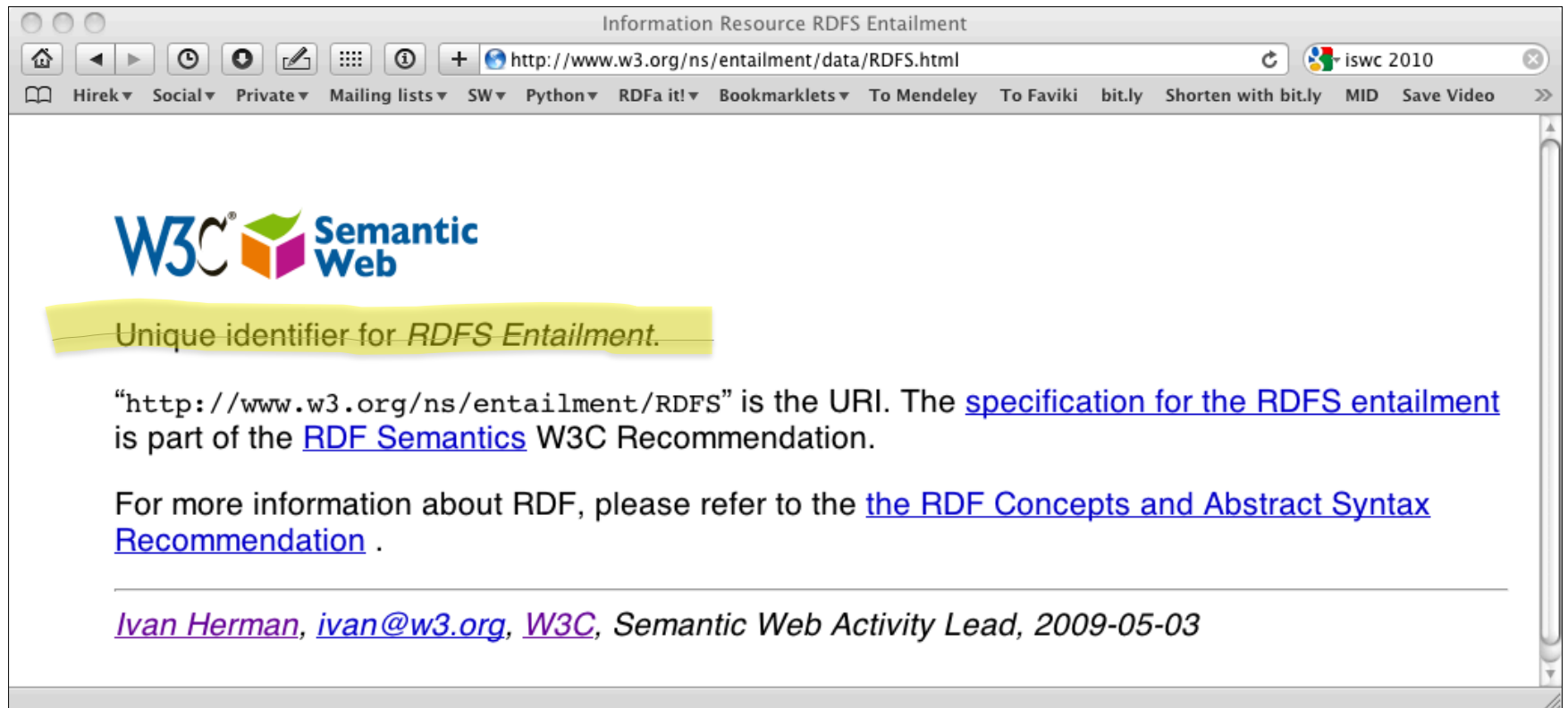
# What is RDFa?

- Simple idea: RDFa is a serialization of RDF embedded in XHTML, HTML or XML
  - Provides a set of attributes (the **a** in RDFa) to use with existing tags to carry the RDF metadata
- 2004: work on developing standards began
- 2008: RDFa 1.0 a recommendation
  - Worked only in XHTML, which did not catch on
- 2012: RDFa 1.1 a recommendation
  - Works in HTML4, HTML5 and XHTML
- See <http://rdfa.info/>

# Principles of RDFa

- RDF content specified in XML *attributes* rather than *elements*
  - The XML/HTML *tree structure* is used as context, when appropriate
  - Some new attributes are *introduced* and some existing ones (@href, @rel) *reused*
  - When possible, HTML text content is used for *literal values*
- ➔ Same file used by browser & RDF extractor

# A Web page viewed by a person



<http://www.w3.org/ns/entailment/data/RDFS.html>

# The source

```
<p about="http://www.w3.org/ns/entailment/RDFS"  
  property="http://purl.org/dc/terms/description">  
  Unique identifier for RDFS Entailment.</p>
```

# Source and generated RDF...

```
<p about="http://www.w3.org/ns/entailment/RDFS"  
  property="http://purl.org/dc/terms/description">  
  Unique identifier for <em>RDFS Entailment</em>.</p>
```

```
<http://www.w3.org/ns/entailment/RDFS>
```

```
... .
```

# Source and generated RDF...

```
<p about="http://www.w3.org/ns/entailment/RDFS"  
  property="http://purl.org/dc/terms/description">  
  Unique identifier for <em>RDFS Entailment</em>.</p>
```

```
<http://www.w3.org/ns/entailment/RDFS>  
  <http://purl.org/dc/terms/description>  
  ... .
```

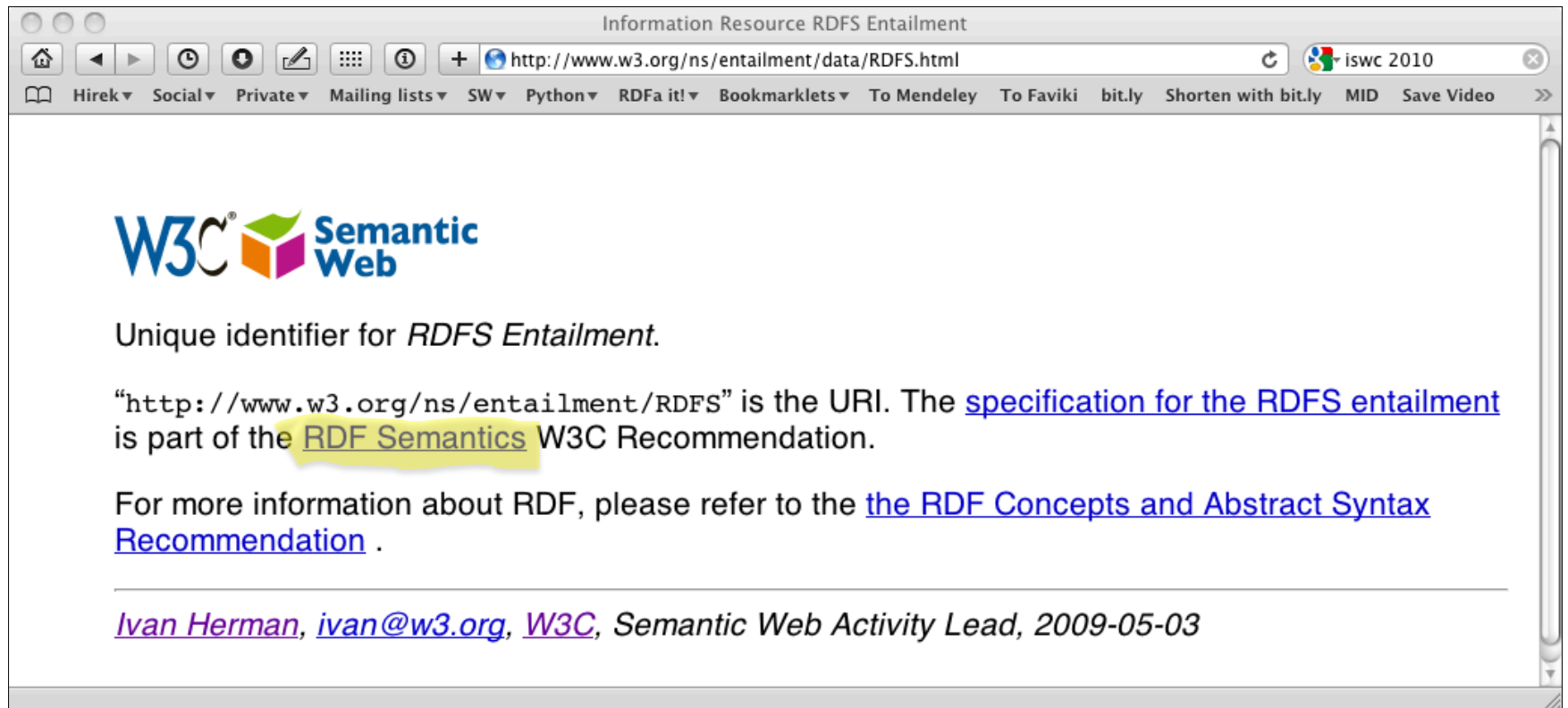
# Source and generated RDF...

```
<p about="http://www.w3.org/ns/entailment/RDFS"  
  property="http://purl.org/dc/terms/description">  
  Unique identifier for <em>RDFS Entailment</em>.</p>
```

```
<http://www.w3.org/ns/entailment/RDFS>  
  <http://purl.org/dc/terms/description>  
    "Unique identifier for RDFS Entailment." .
```



# The Web page viewed by a person



# The source

```
<a about="http://www.w3.org/ns/entailment/RDFS"  
  rel="http://www.w3.org/2000/01/rdf-schema#seeAlso"  
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210/">  
  RDF Semantics.  
</a>
```

# Source and generated RDF...

```
<a about="http://www.w3.org/ns/entailment/RDFS"  
  rel="http://www.w3.org/2000/01/rdf-schema#seeAlso"  
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210/">  
  RDF Semantics.  
</a>
```

```
<http://www.w3.org/ns/entailment/RDFS>
```

```
...
```

# Source and generated RDF...

```
<a about="http://www.w3.org/ns/entailment/RDFS"  
  rel="http://www.w3.org/2000/01/rdf-schema#seeAlso"  
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210/">  
  RDF Semantics.  
</a>
```

```
<http://www.w3.org/ns/entailment/RDFS>  
  <http://www.w3.org/2000/01/rdf-schema#seeAlso>  
  ... .
```

# Source and generated RDF...

```
<a about="http://www.w3.org/ns/entailment/RDFS"  
  rel="http://www.w3.org/2000/01/rdf-schema#seeAlso"  
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210/">  
  RDF Semantics.  
</a>
```

```
<http://www.w3.org/ns/entailment/RDFS>  
  <http://www.w3.org/2000/01/rdf-schema#seeAlso>  
    <http://www.w3.org/TR/2004/REC-rdf-mt-20040210/> .
```

# We have Ntriples in HTML

- Maybe we can do better, instead of this

```
<http://www.w3.org/ns/entailment/RDFS>  
  <http://purl.org/dc/terms/description>  
    "Unique identifier for RDFS Entailment." .  
<http://www.w3.org/ns/entailment/RDFS>  
  <http://www.w3.org/2000/01/rdf-schema#seeAlso>  
    <http://www.w3.org/TR/2004/REC-rdf-mt-20040210/> .
```

- Allow URI prefixes and shared subject, like

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .  
@prefix dcterms: <http://purl.org/dc/terms/> .  
  
<http://www.w3.org/ns/entailment/RDFS>  
  rdfs:seeAlso <http://www.w3.org/TR/2004/REC-rdf-mt-20040210/> ;  
  dcterms:description "Unique identifier for RDFS Entailment." .
```

# Turtlizing RDFa

- Turtle supports several simplifying ideas
- Use compact URIs when possible
  - A CURIE or compact URI, typically a URI with a prefix defined elsewhere, e.g., *foaf:mbox*
- Making use of the natural structure for
  - shared subjects
  - shared predicates
  - creating blank nodes
  - ...

# CURIE definition and usage

```
<html>
...
<p about="http://www.w3.org/ns/entailment/RDFS"
  property="http://purl.org/dc/terms/description">
  Unique identifier for <em>RDFS Entailment</em>.</p>
...
</html>
```

- can be replaced by:

```
<html prefix="dcterms: http://purl.org/dc/terms/">
...
<p about="http://www.w3.org/ns/entailment/RDFS"
  property="dcterms:description">
  Unique identifier for <em>RDFS Entailment</em>.</p>
...
</html>
```



# Details on @prefix in RDFa

- Can be anywhere in the tree and is valid for the whole sub-tree
  - i.e., the html element is not the only place to have it
- The same @prefix attribute can hold several definitions:
  - prefix="dcterm: http://purl.org... foaf: http://..."
- CURIEs and “real” URIs can usually be mixed
- CURIEs *cannot* be used on @href

# Sharing subjects

The basic principle: @about is inherited by children nodes, so there's no reason to repeat it

```
<html prefix="dcterms: http://purl.org/dc/terms/  
        rdfs: http://www.w3.org/2000/01/rdf-schema#">  
...  
<body about="http://www.w3.org/ns/entailment/RDFS">  
...  
<p property="dcterms:description">  
  Unique identifier for <em>RDFS Entailment</em>.</p>  
<p>...<a rel="rdfs:seeAlso"  
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210">  
  RDFS Semantics</a>...</p>
```

# ... yielding

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

```
@prefix dcterms: <http://purl.org/dc/terms/> .
```

```
<http://www.w3.org/ns/entailment/RDFS>
```

```
  rdfs:seeAlso <http://www.w3.org/TR/2004/REC-rdf-mt-20040210/> ;
```

```
  dcterms:description "Unique identifier for RDFS Entailment." .
```

# On reusing literals

- Reusing literals is a plus, but you don't always want to do it
- The basic rule says: the (RDF) Literal is the enclosed text from the HTML content
- This is fine in 80% of the cases, but...
- ...it may not be natural in many cases!

# Example: dates

```
<body about=".." prefix="dcterms: http://... xsd: http://..."  
  <address>  
    <p property="dcterms:date" datatype="xsd:date">2010-07-05</p>  
  </address>  
</body>
```

- This leads to:

```
@prefix dcterms: <http://...> .  
@prefix xsd: <http://...> .  
<..> dcterms:date "2010-07-05"^^xsd:date .
```

- 2010-07-05 is the official ISO format (for xsd:date)  
but “July 5, 2010” is preferred by people

# Usage of @content

```
<body about=".." prefix="dcterms: http://... xsd: http://..."  
  <address>  
    <p property="dcterms:date" datatype="xsd:date"  
      content="2010-07-05">July 5, 2010</p>  
  </address>  
</body>
```

- Also leads to:

```
@prefix dcterms: <http://...> .  
@prefix xsd: <http://...> .  
<...> dcterms:date "2010-07-05"^^xsd:date .
```

# On subjects and objects

- Here is our rule so far
  - @about sets the subject
  - @href sets the object
- But that is not always good enough
  - We may not want to introduce an active link (i.e., "a" element) on the web page
  - what about other links in HTML?

# We may not always want links...

- The RDFa `@resource` attribute is equivalent to `@href`
- Sets the object, just like `@href` but is ignored by browsers, e.g.,:

```
<span about="http://www.ivan-herman.net/foaf#me">  
  <span rel="rdfs:seeAlso"  
    resource="http://www.w3.org/People/Ivan/">Activity Lead</span>  
</span>
```



# More features

- RDFa1.1 has more features that make it easier to represent knowledge compactly in HTML
- These take advantage of the HTML tree context
- See the hidden slides if you are interested

# Chaining

- Here is what we would like to have in RDFa

```
<http://www.w3.org/ns/entailment/RDFS>  
  dct:creator <http://www.ivan-herman.net/foaf#me> .
```

```
<http://www.ivan-herman.net/foaf#me>  
  foaf:mailbox <mailto:ivan@w3.org> ;  
  foaf:workplaceHomepage <http://www.w3.org> .
```

# Chaining

- A straightforward way:

```
<body about="http://www.w3.org/ns/entailment/RDFS">
...
<address>
  <span rel="dcterms:creator"
    resource="http://www.ivan-herman.net/foaf#me"/>
  <span about="http://www.ivan-herman.net/foaf#me">
    <a rel="foaf:mailbox"
      href="mailto:ivan@w3.org">ivan@w3.org</a>,
    <a rel="foaf:workplaceHomepage"
      href="http://www.w3.org">W3C</a>
  </span>
</address>
```

# Chaining

- A straightforward way:

```
<body about="http://www.w3.org/ns/entailment/RDFS">
...
<address>
  <span rel="dcterms:creator"
    resource="http://www.ivan-herman.net/foaf#me"/>
  <span about="http://www.ivan-herman.net/foaf#me">
    <a rel="foaf:mailbox"
      href="mailto:ivan@w3.org">ivan@w3.org</a>,
    <a rel="foaf:workplaceHomepage"
      href="http://www.w3.org">W3C</a>
  </span>
</address>
```

# Chaining: when objects become subjects

- An alternative:

```
<body about="http://www.w3.org/ns/entailment/RDFS">
...
<address>
  <span rel="dcterms:creator"
    resource="http://www.ivan-herman.net/foaf#me">
    <a rel="foaf:mailbox"
      href="mailto:ivan@w3.org">ivan@w3.org</a>,
    <a rel="foaf:workplaceHomepage"
      href="http://www.w3.org">W3C</a>
  </span>
</address>
```

# Chaining means

- @resource (or @href) becomes a subject *for the sub-tree*
- This feature is a bit like in RDF/XML

# Some extra features

- Blank nodes can be created using “\_:XX”
- Shorthand for RDF types
- Helping single-vocabulary cases
- Profiles

# Typing

- Typing can of course be done using `@rel="rdf:type"`
- But that is a widely used combination, so there is a separate `@typeof` attribute for that



# Typing example

```
<span about="http://www.ivan-herman.net/foaf#me"  
  typeof="foaf:Person">  
  <span property="foaf:name">Ivan Herman</span>  
</span> ,
```

- yields

```
<http://www.ivan-herman.net/foaf#me> a foaf:Person ;  
  foaf:name "Ivan Herman" .
```

# Single-vocabulary case

- In many cases the content is dominated by one vocabulary, e.g., dcterms, foaf, etc.
- CURIEs and URIs use is intuitive for RDF people but *not* for average HTML authors!
- Solution:
  - define a vocabulary URI for a sub-tree
  - for that sub-tree, simple *terms* in @rel, @property, etc., are automatically expanded into a full URI using the vocabulary

# @vocab and terms: this...

```
<div prefix="foaf: http://xmlns.com/foaf/0.1/">
...
<address about="http://www.ivan-herman.net/foaf#me"
  typeof="foaf:Person">
  <span property="foaf:name">Ivan Herman</span>,
  <a rel="foaf:mailbox"
    href="mailto:ivan@w3.org">ivan@w3.org</a>,
  <a rel="foaf:workplaceHomepage"
    href="http://www.w3.org">W3C</a>
</address>
```

# ...becomes

```
<div vocab="http://xmlns.com/foaf/0.1/">
...
  <address about="http://www.ivan-herman.net/foaf#me"
    typeof="Person">
    <span property="name">Ivan Herman</span>,
    <a rel="mailbox"
      href="mailto:ivan@w3.org">ivan@w3.org</a>,
    <a rel="workplaceHomepage"
      href="http://www.w3.org">W3C</a>
  </address>
```

# ...becomes

```
<div vocab="http://xmlns.com/foaf/0.1/">
...
<address about="http://www.ivan-herman.net/foaf#me"
  typeof="Person">
  <span property="name">Ivan Herman</span>,
  <a rel="mailbox"
    href="mailto:ivan@w3.org">ivan@w3.org</a>,
  <a rel="workplaceHomepage"
    href="http://www.w3.org">W3C</a>
</address>
```

# ...becomes

```
<div vocab="http://xmlns.com/foaf/0.1/">
...
<address about="http://www.ivan-herman.net/foaf#me"
  typeof="Person">
  <span property="name">Ivan Herman</span>,
  <a rel="mailbox"
    href="mailto:ivan@w3.org">ivan@w3.org</a>,
  <a rel="workplaceHomepage"
    href="http://www.w3.org">W3C</a>
</address>
```

# Profile files

- Prefix and term declarations can be collected in a separate file and referred to via a `@profile` attribute pointing to the file
- Say, file “`http://ex.org/prof`” defines
  - prefix mappings:
    - “foaf” → “`http://xmlns.com/foaf/0.1/`”
    - “rdfs” → <http://www.w3.org/2000/01/rdf-schema#>
  - term mapping:
    - “desc” → <http://purl.org/dc/terms/description>

# Profile usage example: this...

```
<html prefix="dcterms: http://purl.org/dc/terms/  
        rdfs: http://www.w3.org/2000/01/rdf-schema#">  
...  
<body about="http://www.w3.org/ns/entailment/RDFS">  
...  
<p property="dcterms:description">  
  Unique identifier for <em>RDFS Entailment</em>.</p>  
<p>...<a rel="rdfs:seeAlso"  
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210">  
  RDFS Semantics</a>...</p>  
...  
<address about="http://www.ivan-herman.net/foaf#me">  
  <span property="foaf:name">Ivan Herman</span>,  
...
```



# ...becomes

```
<html profile="http://ex.org/prof">
...
<body about="http://www.w3.org/ns/entailment/RDFS">
...
<p property="desc">
  Unique identifier for <em>RDFS Entailment</em>.</p>
<p>...<a rel="rdfs:seeAlso"
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210">
  RDFS Semantics</a>...</p>
...
<address about="http://www.ivan-herman.net/foaf#me">
  <span property="foaf:name">Ivan Herman</span>,
  ...
```

# ...becomes

```
<html profile="http://ex.org/prof">
...
<body about="http://www.w3.org/ns/entailment/RDFS">
...
<p property="desc">
  Unique identifier for <em>RDFS Entailment</em>.</p>
<p>...<a rel="rdfs:seeAlso"
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210">
  RDFS Semantics</a>...</p>
...
<address about="http://www.ivan-herman.net/foaf#me">
  <span property="foaf:name">Ivan Herman</span>,
...
```

# Default profiles

- Even usage of profiles might be “too much” for many HTML authors 😞
  - authors will forget to add the @profile declaration
- RDFa defines *default profiles*:
  - RDFa clients include these profiles automatically

# Default profiles

- Default for RDFa in general
  - <http://www.w3.org/profile/rdfa-1.1>
  - includes some widely used prefixes (rdf, rdfs, vcard, og, foaf, dc, or dcterms are typical candidates)
  - the profile is to be updated regularly by *adding* new prefixes
- Default for (X)HTML
  - <http://www.w3.org/profile/html-rdfa-1.1>
  - includes the HTML4 @rel values (next, up, license, ...)
  - the profile is to be updated regularly by *adding* @rel values as they evolve in the HTML world

# So this...

```
<html profile="http://ex.org/prof">  
...  
<body about="http://www.w3.org/ns/entailment/RDFS">  
...  
<p property="dcterms:description">  
  Unique identifier for <em>RDFS Entailment</em>.</p>  
<p>...<a rel="rdfs:seeAlso"  
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210">  
  RDFS Semantics</a>...</p>
```


# ...becomes:

```
<html>
...
<body about="http://www.w3.org/ns/entailment/RDFS">
...
<p property="dcterms:description">
  Unique identifier for <em>RDFS Entailment</em>.</p>
<p>...<a rel="rdfs:seeAlso"
  href="http://www.w3.org/TR/2004/REC-rdf-mt-20040210">
  RDFS Semantics</a>...</p>
```

# Authoring RDFa

- Some authoring tools already have RDFa facilities:
  - e.g., it is possible to add the right DTD to Dreamweaver, Amaya has it at its core, etc.
- There are plugins to, e.g., WordPress, to generate RDFa markup
- CMS systems (like Drupal 7) may have RDFa built in their publication system
  - users generate RDFa whether they know about it or not...

# Consuming RDFa

- Various search engines are consuming RDFa
  - Google, Yahoo, ...
    - they may specify which vocabularies they “understand”
    - this is still an evolving area
- There are libraries, distillers, etc., to extract RDFa information
  - may be part of RDF development environments like Redland, RDFLib
  - see, for further references,  
<http://rdfa.info/wiki/Consume>
- Facebook’s “social graph” is based on RDFa 



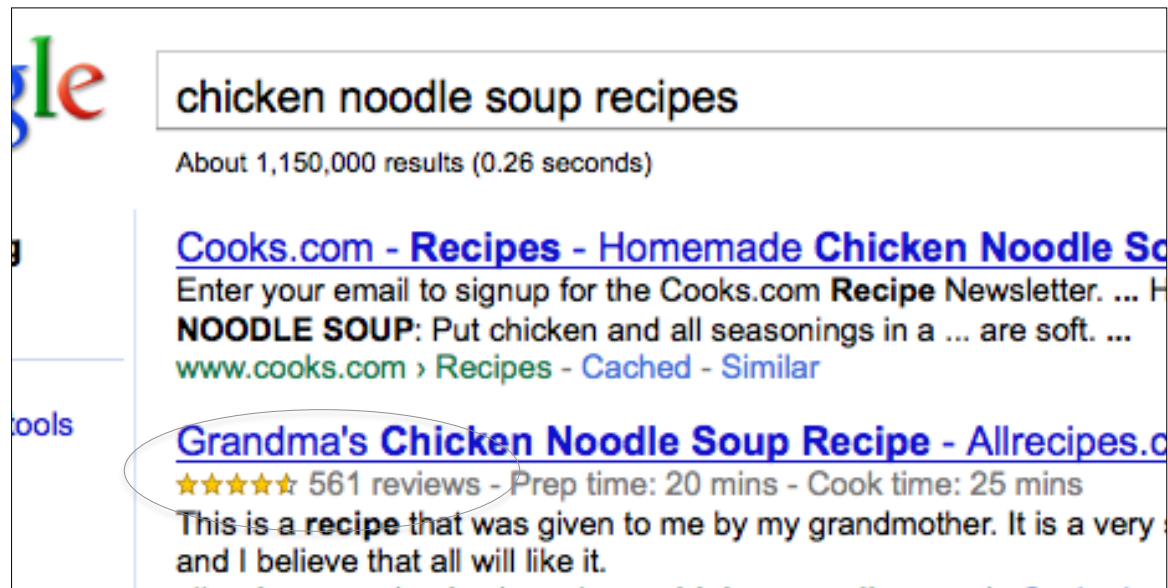
# Publishing RDFa

- RDFa+HTML file can just be on a server
  - the client extracts the RDF content
- Content negotiations can be set up on the server side
  - the client gets the format he/she asks for
  - the RDF content can either be generated on the fly or stored on the server statically

# Google's rich snippets

Embedded metadata (microdata or RDFa) is used to improve search result page

- at the moment only a few vocabularies are recognized, but that will evolve over the years



The image shows a screenshot of a Google search result for "chicken noodle soup recipes". The search bar contains the text "chicken noodle soup recipes" and shows "About 1,150,000 results (0.26 seconds)". Below the search bar, there are two search results. The first result is from "Cooks.com - Recipes - Homemade Chicken Noodle Soup" and includes a snippet: "Enter your email to signup for the Cooks.com Recipe Newsletter. ... H NOODLE SOUP: Put chicken and all seasonings in a ... are soft. ... www.cooks.com > Recipes - Cached - Similar". The second result is from "Grandma's Chicken Noodle Soup Recipe - Allrecipes.com" and includes a snippet: "★★★★★ 561 reviews - Prep time: 20 mins - Cook time: 25 mins This is a recipe that was given to me by my grandmother. It is a very and I believe that all will like it." The title of the second result is circled in red.

# Effects of, e.g., Google of Facebook

A number of popular sites publish RDFa as part of their normal pages:

- Tesco, BestBuy, Slideshare, The London Gazette, Newsweek, MSNBC, O'Reilly Catalog, the White House...
- Creative Commons snippets are in RDFa (e.g., on Flickr)

# BestBuy xxample of RDFa use

My Account | Order Status | Customer Service | Español


**BEST BUY** Weekly Ad Store Locator Outlet Center Services Gifts cart Items

TV & VIDEO AUDIO CAR & GPS CAMERAS & CAMCORDERS COMPUTERS MOBILE PHONES & OFFICE MUSIC, MOVIES & BOOKS VIDEO GAMES & GADGETS HOME & APPLIANCES

Search All Categories Keyword or Item # GO Credit Cards Reward Zone®

## Best Buy - Carbondale

Print



1270 E Main St  
Carbondale, IL 62901  
Phone: 618-351-1700  
GEO: 37.732719, -89.192314


Customer Reviews:  
☆☆☆☆☆  
Be the first to write a store review.

[Maps & Directions](#) | [Weekly Ad](#)

**Store Hours**  
Mon: 10-9; Tue: 10-9; Wed: 10-9; Thurs: 10-9; Fri: 10-9; Sat: 10-9; Sun: 11-7;  
4/4 - 4/10, 2010  
Mon: 10-9; Tues: 10-9; Wed: 10-9; Thurs: 10-9; Fri: 10-9; Sat: 10-9; Sun: Closed

### Events

**Avatar Midnight Release!**



The biggest movie of 2009 is coming to Best Buy on April 22nd! Carbondale Best Buy is hosting a special midnight release! We will open the doors at 12:00am on 4/22! We'll have door prizes including movie posters available only to those in attendance at the midnight release! Local band "Ravenhill" will be playing, as well! You don't want to miss this special event! Check back for more information as we get closer to the release date!

### Local Selections

Check out these special product selections at our store.

**Open Box Items (25)**

### At This Location

- Geek Squad**  
Computer setup & services, plus home theater, appliance and car installation.
- Best Buy Mobile**  
Get informed advice from noncommissioned mobile phone specialists.
- Small Business Solutions**  
Featuring Professional Series products and trained staff to help with small business needs.
- Apple Shop**  
Mac, iPod and more at this Apple store-within-a-store.
- Electronics Recycling**  
We offer electronics recycling at this and all other U.S. stores.

# BestBuy example of RDFa Use

My Account | Order Status | Customer Service | Español


**BEST BUY** Weekly Ad Store Locator Outlet Center Services Gifts cart Items

TV & VIDEO AUDIO CAR & GPS CAMERAS & CAMCORDERS COMPUTERS MOBILE PHONES & OFFICE MUSIC, MOVIES & BOOKS VIDEO GAMES & GADGETS HOME & APPLIANCES

Search [All Categories] < >

```
<div class="fn n" property="foaf:name rdfs:label vcard:fn gr:legalName"> Reward Zone*
<h1 class="org" property="geo:lat_long" content="37.732719,-89.192314">Best
Buy - Carbondale</h1>
</div>
```

Best Buy - Carbondale Print



1270 E Main St  
Carbondale, IL 62901  
Phone: 618-351-1700  
GEO: 37.732719, -89.192314

Customer Reviews:  
☆☆☆☆☆  
Be the first to write a store review.

```
<span rel="rdfs:seeAlso foaf:depiction"></span>
```

Store Hours  
Mon: 10-9; Tue: 10-9; Wed: 10-9; Thurs: 10-9; Fri: 10-9; Sat: 10-9; Sun: 11-7;

```
<div class="hours" rel="gr:hasOpeningHoursSpecification">
<div typeof="gr:OpeningHoursSpecification" about="#regularhours">
<span typeof="gr:OpeningHoursSpecification">
<span rel="gr:hasOpeningHoursDayOfWeek" resource="http://
purl.org/goodrelations/v1#Monday" class="dow">Mon:</
span>&nbsp;&nbsp;&nbsp;<span property="gr:opens" datatype="xsd:time">10</
span><span property="gr:closes" datatype="xsd:time">9</span>;
</span>
...
</span>
</div>
</div>
```

The biggest movie of 2009 is coming to Best Buy on April 22nd! Carbondale Best Buy is hosting a special midnight release! We will open the doors at 12:00am on 4/22! We'll have door prizes including movie posters available only to those in attendance at the midnight release! Local band "Ravenhill" will be playing, as well! You don't want to miss this special event! Check back for more information as we get closer to the release date!

```
<div class="adr" rel="vcard:adr">
<div typeof="vcard:Address">
<div class="street-address"
property="vcard:street-address">1270 E Main
St</div>
<span class="locality"
property="vcard:locality">Carbondale</span>,
<span class="region"
property="vcard:region">IL</span> <span
class="postal-code" property="vcard:postal-
code">62901</span> <span
class="tel"
property="vcard:tel">618-351-1700</span>
</div>
<div class="geo" rel="vcard:geo">GEO:
<span class="latitude"
property="vcard:latitude">37.732719</span>,
<span class="longitude"
property="vcard:longitude">89.192314</span>
</div>
```

**Apple Shop**  
Mac, iPod and more at this Apple store-within-a-store.

**Electronics Recycling**  
We offer electronics recycling at this and all other U.S. stores.

# Effects on BestBuy

- Reported in a BestBuy blog:
  - GoodRelations+RDFa improved Google rank tremendously
  - 30% increase in traffic on BestBuy store pages
  - Yahoo observers a 15% increase in click-through rate
- Today, BestBuy uses RDFa for much more than just snippets
  - E.g., to locate shops that have certain products on stock...

# Library of Congress RDFa use

## Semantic Web

### From Library of Congress Subject Headings

#### Details

Visualization

Suggest Terminology

#### Semantic Web

##### URI

<<http://id.loc.gov/authorities/sh2002000569#concept>>

##### Type

Topical Term

##### Broader Terms

- > [Semantic integration \(Computer systems\)](#)
- > [Semantic networks \(Information theory\)](#)
- > [World Wide Web](#)

##### Related Terms

- > [Microformats](#)

##### Sources

- > Engr. index online, May 6, 2002 (identifier: Semantic Web)
- > ASTI on FirstSearch, May 6, 2002: in titles (semantic Web)
- > Work cat.: 2002070545: The Semantic Web--ISWC 20002, 2002.

##### LC Classification

TK5105.88815

# Library of Congress RDFa use

```
Source of http://id.loc.gov/authorities/sh2002000569
<p rel="skos:inScheme" resource="http://id.loc.gov/authorities#topicalTerms">topical
Term</p>
  </li>
  <li>
    <h3>Broader Terms</h3>
    <ul class="std">
      <li>
        <a href="http://id.loc.gov/authorities/sh2004000479#concept" rel="skos:broader">
          <span property="skos:prefLabel" xml:lang="en">Semantic integration (Computer
systems)</span>
        </a>
      </li>
      <li>
        <a href="http://id.loc.gov/authorities/sh92004914#concept" rel="skos:broader">
          <span property="skos:prefLabel" xml:lang="en">Semantic networks (Information
theory)</span>
        </a>
      </li>
      <li>
        <a href="http://id.loc.gov/authorities/sh95000541#concept" rel="skos:broader">
          <span property="skos:prefLabel" xml:lang="en">World Wide Web</span>
        </a>
      </li>
    </ul>
  </li>
```



# Overstock.com example

Shopping Community Cars Real Estate Auctions We Recommend My Account


Welcome To **overstocktober™**  
11 Years

Free Shipping on yo

Shop All Departments

Online Shopping Electronics Cameras & Photo Camcorders Digital Camcorders

Photos



**Bell and Howell DV550UW 12MP Digital Video Camera with Underwater Housing**

Rating 3.8 ★★★★★ 10 reviews  
Read Reviews / Write a review

**Today: \$68.99**

Get 5% Back with Club O  
View Details

**Brief Description** Item#: 12403958

- Take great videos with the Bell + Howell digital video camera
- Digital video camera has ultra compact body and features a flip-up USB
- Camcorder includes waterproof underwater housing to take video underwater (up to 33 ft)


**Sold out!**  
This product is not in stock.  
We will notify you when this product is in stock.  
Please enter your email address below, then

Compare to these  
This?

ADORAMA  
The Photography People

TigerDirect

People Who Viewed



SVP Underwater 5MP Digital Video Camera  
**Today: \$75.99**  
Reviews

# Overstock.com example

Shopping Community Cars Real Estate Auctions We Recommend My Account



Free Shipping on yo

Shop All Departments

```
http://www.w3.org/2007/08/pyRdfa/extract?format=turtle&uri=http%3A//www.overstock.co...d-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#myoffer> .
```

```
<http://www.overstock.com/Electronics/Bell-and-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#myoffer> v:count "10" .
```

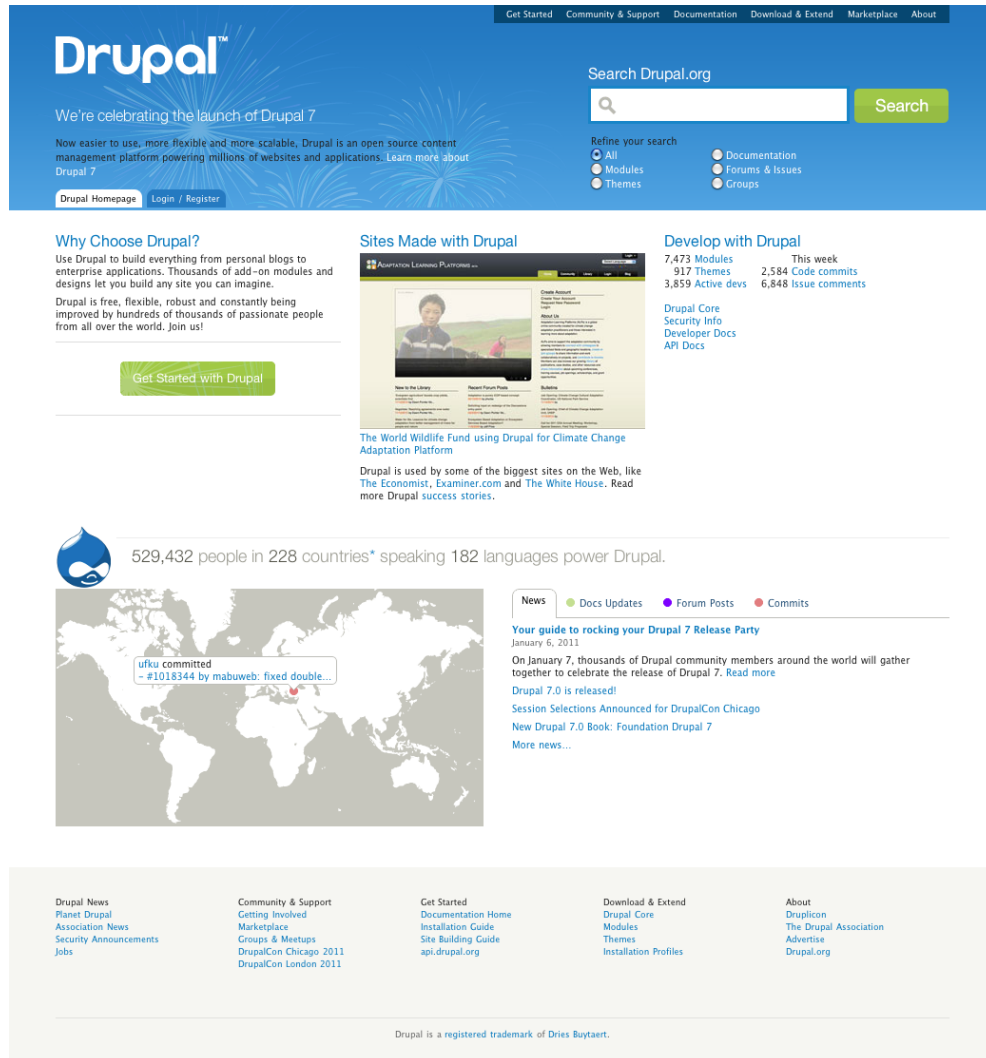
```
<http://www.overstock.com/Electronics/Bell-and-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#myoffer> xhv:icon <http://ak1.ostkcdn.com/favicon.ico> ;  
xhv:stylesheet <http://ak1.ostkcdn.com/css/ProductPageC.css>, <http://ak1.ostkcdn.com/css/os_master.less>, <http://ak1.ostkcdn.com/css/productPageImgGallery.css> .
```

```
<http://www.overstock.com/Electronics/Bell-and-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#TypeAndQuantityNode> a gr:TypeAndQuantityNode ;  
gr:hasUnitOfMeasurement "C62"^^xsd:string ;  
gr:typeOfGood <http://www.overstock.com/Electronics/Bell-and-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#product> .
```

```
<http://www.overstock.com/Electronics/Bell-and-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#UnitPriceSpecification> a gr:UnitPriceSpecification .
```

```
<http://www.overstock.com/Electronics/Bell-and-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#myoffer> a gr:Offering ;  
gr:hasBusinessFunction gr:Sell ;  
gr:hasPriceSpecification  
[ gr:hasCurrency "USD"^^xsd:string ;  
gr:hasCurrencyValue "68.99"^^xsd:float  
] <http://www.overstock.com/Electronics/Bell-and-Howell-DV550UW-12MP-Digital-Video-Camera-with-Underwater-Housing/4450313/product.html#UnitPriceSpecification> .
```

# Drupal content management system



The screenshot shows the Drupal 7 homepage with a blue header. The main content area is divided into several sections: 'Why Choose Drupal?' with a 'Get Started with Drupal' button, 'Sites Made with Drupal' featuring a screenshot of a website and a link to 'The World Wildlife Fund using Drupal for Climate Change Adaptation Platform', and 'Develop with Drupal' with statistics on modules, themes, and active developers. A 'News' section highlights the 'Drupal 7.0 Release Party' on January 6, 2011. The footer contains navigation links for 'Drupal News', 'Community & Support', 'Get Started', 'Download & Extend', and 'About'.

**Drupal™**

We're celebrating the launch of Drupal 7

Now easier to use, more flexible and more scalable, Drupal is an open source content management platform powering millions of websites and applications. [Learn more about Drupal 7](#)

[Drupal Homepage](#) [Login](#) / [Register](#)

Search Drupal.org

Refine your search

- All
- Modules
- Themes
- Documentation
- Forums & Issues
- Groups

**Why Choose Drupal?**

Use Drupal to build everything from personal blogs to enterprise applications. Thousands of add-on modules and designs let you build any site you can imagine.

Drupal is free, flexible, robust and constantly being improved by hundreds of thousands of passionate people from all over the world. [Join us!](#)

[Get Started with Drupal](#)

**Sites Made with Drupal**

[The World Wildlife Fund using Drupal for Climate Change Adaptation Platform](#)

Drupal is used by some of the biggest sites on the Web, like [The Economist](#), [Examiner.com](#) and [The White House](#). [Read more Drupal success stories.](#)

**Develop with Drupal**

7,473 Modules	This week
917 Themes	2,584 Code commits
3,859 Active devs	6,848 Issue comments

[Drupal Core](#)  
[Security Info](#)  
[Developer Docs](#)  
[API Docs](#)

529,432 people in 228 countries\* speaking 182 languages power Drupal.

**News** Docs Updates Forum Posts Commits

**Your guide to rocking your Drupal 7 Release Party**  
January 6, 2011

On January 7, thousands of Drupal community members around the world will gather together to celebrate the release of Drupal 7. [Read more](#)

**Drupal 7.0 is released!**  
[Session Selections Announced for DrupalCon Chicago](#)  
[New Drupal 7.0 Book: Foundation Drupal 7](#)  
[More news...](#)

**Drupal News**  
[Planet Drupal](#)  
[Association News](#)  
[Security Announcements](#)  
[Jobs](#)

**Community & Support**  
[Getting Involved](#)  
[Marketplace](#)  
[Groups & Meetups](#)  
[DrupalCon Chicago 2011](#)  
[DrupalCon London 2011](#)

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[Installation Guide](#)  
[Site Building Guide](#)  
[api.drupal.org](#)

**Download & Extend**  
[Drupal Core](#)  
[Modules](#)  
[Themes](#)  
[Installation Profiles](#)

**About**  
[Drupalcon](#)  
[The Drupal Association](#)  
[Advertise](#)  
[Drupal.org](#)

Drupal is a registered trademark of Dries Buytaert.

- RDF support in Drupal v. 7
- Major CMS system
- Has RDF at his core, pages contain RDFa
- In one step millions of pages of additional RDF data!

# The Examiner.com



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## Sheriff Dupnik names Angle and Palin as two responsible for 'vitriol' (Video)



Yesterday Pima County Sheriff Charles Dupnik took the bold step of naming Sharon Angle and Sarah Palin as two individuals responsible for the kind of toxic 'political vitriol' which he believes must end in light of the recent shooting in Tucson, Arizona. Dupnik's comments came in an interview with Geraldo Rivera of Fox News. Earlier in the day Dupnik had been interview by Megyn Kelly of Fox News, who accused the Sheriff of inserting politics where it did not belong. In the Rivera interview, Dupnik stands by his earlier comments, and goes further in identifying two Republicans as the source...

**Ryan Witt**  
Political Buzz Examiner  
[Browse more Politics articles](#)

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SLIDESHOW

SLIDESHOW

Sheriff Dupnik names Angle and Palin as two responsible...

Missed field goals by Eagles kicker David Akers makes him...

FDA outlawing natural cancer cure to further destroy...

Eco-Travel Tip: Use an e-book reader to lighten your...

Lyndon Johnson and the Great Society...

# The Examiner.com

## Sheriff Dupnik for 'vitriol' (Video)



Sheriff Dupnik names  
Angle and Palin as two  
responsible...

Missed  
Eagles  
Akers

```
http://www.w3.org/2007/08/pyRdfa/extract?format=turtle&uri=http%3A//www.examiner.com/national
http://www.w3.org/2007/08/pyRdfa/extract?format=tl
the examiner
Feeds Reader Social Private Mailing lists SW Python RDFa it! Bookmarklets bit.ly To Faviki Add Zemanta tags To Mendeley
Log In
<http://www.examiner.com/sports-twitter-in-national/missed-field-goals-by-eagles-kicker-david-akers-makes-him-popular-
twitter-trend>;
xhv:icon <http://cdn2-b.examiner.com/sites/all/themes/base/favicon.ico>;
xhv:stylesheet
<http://cdn2-b.examiner.com/sites/default/files/css/css_0j_8rZyYEn4LW_6vfrH9Lk3SF1pAp1tBETwGkdYgucs_18.css>;
<http://cdn2-b.examiner.com/sites/default/files/css/css_2xhXDFX6AKESGrCwSeGy_SwFPESHaCkyJn35Kk9ecM_18.css>;
<http://cdn2-b.examiner.com/sites/default/files/css/css_L1V30UAWV2kWDs1F7U18UMZxdAvyTakCHPN2gR11JEM_18.css>;
<http://cdn2-b.examiner.com/sites/default/files/css/css_T617aJmFY3qgtxCh-hLpMKK1g9aLzWqMh5eXPR06t8_18.css>;
<http://cdn2-b.examiner.com/sites/default/files/css/css_28NQukDms5n0K5_mf-MYwExoy4rLZ16V28ovQwx340o_18.css>.
<http://www.examiner.com/national/discuss/an-offer-to-the-republican-party> a sioc:Item, foaf:Document ;
dc:title "An Offer to the Republican Party"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/an-offer-to-the-republican-party> .
<http://www.examiner.com/national/discuss/chicago-s-bill-daley-becomes-obama-s-newest-chief-of-staff> a sioc:Item, foaf:Document ;
dc:title "Chicago's Bill Daley becomes Obama's newest Chief of Staff"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/chicago-s-bill-daley-becomes-obama-s-newest-chief-of-staff> .
<http://www.examiner.com/national/discuss/could-the-mass-dead-fish-dead-bird-cases-be-a-case-of-over-reporting> a sioc:Item,
foaf:Document ;
dc:title "Could the mass dead fish, dead bird cases be a case of over-reporting?"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/could-the-mass-dead-fish-dead-bird-cases-be-a-case-of-over-reporting> .
<http://www.examiner.com/national/discuss/death-and-dignity-hospice-caregiver-advice-for-end-of-life-process> a sioc:Item,
foaf:Document ;
dc:title "Death and dignity: Hospice caregiver advice for end of life process"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/death-and-dignity-hospice-caregiver-advice-for-end-of-life-process> .
<http://www.examiner.com/national/discuss/exclusive-interview-with-naomi-judd-on-alternative-pain-management> a sioc:Item,
foaf:Document ;
dc:title "Exclusive interview with Naomi Judd on Alternative Pain Management"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/exclusive-interview-with-naomi-judd-on-alternative-pain-management> .
<http://www.examiner.com/national/discuss/if-given-a-choice-at-the-rental-counter-would-you-rent-the-chevy-volt> a sioc:Item,
foaf:Document ;
dc:title "If given a choice at the rental counter, would you rent the Chevy Volt?"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/if-given-a-choice-at-the-rental-counter-would-you-rent-the-chevy-volt> .
<http://www.examiner.com/national/discuss/introducing-the-next-tim-mcveigh> a sioc:Item, foaf:Document ;
dc:title "Introducing - the Next Tim McVeigh"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/introducing-the-next-tim-mcveigh> .
<http://www.examiner.com/national/discuss/is-the-reality-of-climate-change-still-question> a sioc:Item, foaf:Document ;
dc:title "Is the reality of climate change still in question?"@en ;
xhv:bookmark <http://www.examiner.com/national/discuss/is-the-reality-of-climate-change-still-question> .
<http://www.examiner.com/national/discuss/was-the-reading-of-the-u-s-constitution-congress-beneficial> a sioc:Item, foaf:Document ;
```

# Extracting the data

```
rdfa> python getdata.py "http://www.w3.org/ns/entailment/data/RDFS.html"
@prefix dc: <http://purl.org/dc/terms/> .
@prefix ent: <http://www.w3.org/ns/entailment/> .
...
ent:RDFS a ent:Entailment ;
  dc:creator <http://www.ivan-herman.net/foaf#me> ;
  dc:date "2010-05-03"^^xsd:date ;
  dc:description "Unique identifier for RDFS Entailment" ;
  rdfs:comment "The specification for the RDFS entailment is ... Semantics W3C Recommendation." ;
  rdfs:isDefinedBy <http://www.w3.org/TR/2004/REC-rdf-mt-20040210/#rdfs_entailment> ;
  rdfs:seeAlso <http://www.w3.org/TR/2004/REC-rdf-mt-20040210/> .
<http://www.w3.org/ns/entailment/data/RDFS.html> dc:title "Information Resource RDFS Entailment" ;
  xhv:stylesheet <http://www.w3.org/StyleSheets/TR/base> .
<http://www.ivan-herman.net/foaf#me> a foaf:Person ;
  rdfs:seeAlso <http://www.ivan-herman.net/foaf> ;
  foaf:mbox <mailto:ivan@w3.org> ;
  foaf:name "Ivan Herman" ;
  foaf:title "Semantic Web Activity Lead" ;
  foaf:workplaceHomepage <http://www.w3.org> .
```

# getdata.py is very simple

```
import rdflib, sys
```

```
nargs = len(sys.argv)
```

```
if not (1 < nargs < 4):
```

```
    print 'usage: python getdata.py url [ rdfa | rdfa1.1 | microdata | html ]'
```

```
    print ' eg: python getdata.py "http://www.w3.org/ns/entailment/data/RDFS.html"'
```

```
    sys.exit(0)
```

```
url = sys.argv[1]
```


```
format = sys.argv[2] if nargs == 3 else 'rdfa1.1'
```

```
g = rdflib.Graph()
```

```
g.parse(url, format=format)
```

```
print g.serialize(format='n3')
```

# Greenturtle Chrome plugin



W3 Information Resource RDFS x

www.w3.org/ns/entailm...

W3C Semantic Web

Unique identifier for *RDFS Entailment*.

"<http://www.w3.org/ns/entailment/RDFS>" is the URI. The [specification for the RDFS entailment](#) is part of the [RDF Semantics](#) W3C Recommendation.

For more information about RDF, please refer to the [the RDF Concepts and Abstract Syntax Recommendation](#) .

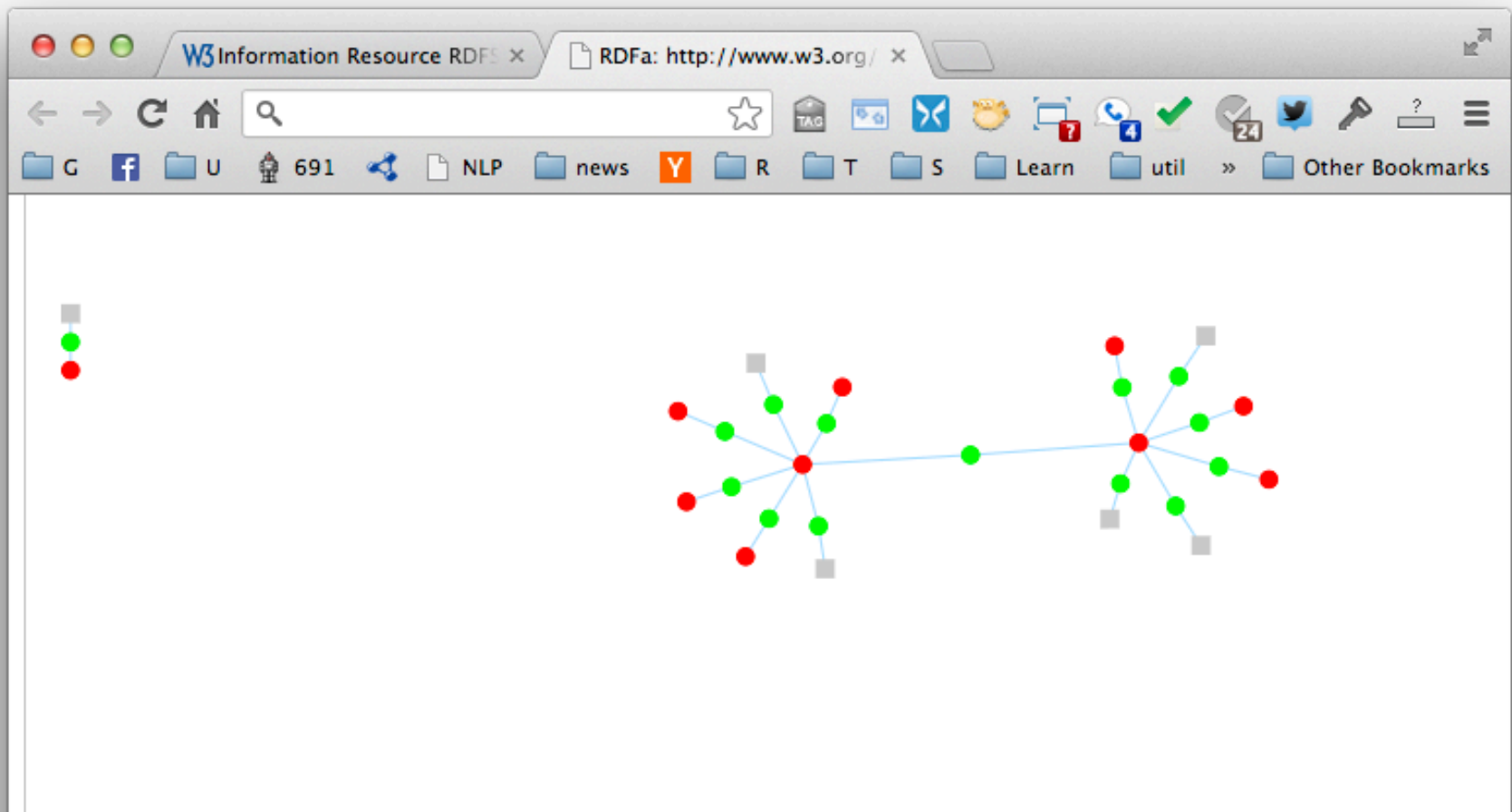
---

*Ivan Herman, [ivan@w3.org](mailto:ivan@w3.org), [W3C](#), Semantic Web Activity Lead, May 3rd, 2010*

<https://code.google.com/p/green-turtle/>



# Greenturtle Chrome plugin



Subject	Predicate
<code>&lt;http://www.w3.org/ns/entailment/data/RDFS.html&gt;</code>	<code>&lt;http://purl.org/dc/terms/title&gt;</code>
<code>&lt;http://www.w3.org/ns/entailment/RDFS&gt;</code>	<code>&lt;http://www.w3.org/1999/02/22-rdf-syntax-ns#type&gt;</code>
<code>&lt;http://www.w3.org/ns/entailment/RDFS&gt;</code>	<code>&lt;http://purl.org/dc/terms/description&gt;</code>
<code>&lt;http://www.w3.org/ns/entailment/RDFS&gt;</code>	<code>&lt;http://www.w3.org/2000/01/rdf-schema#comment&gt;</code>

# Conclusions

- Web developers want content providers to add structured data to HTML pages
- Content providers are incentivised to do so because their content will be better understood, ranked higher, more useful, etc.
- RDFa is the most powerful and flexible of the knowledge mark up standards understood by search engines
- RDFa is also an alternative serialization of full RDF