

INFO/CS 4302

Web Information Systems

FT 2012

Week 10 / Lecture 18:

Publishing Structured Data on the Web

- Bernhard Haslhofer -

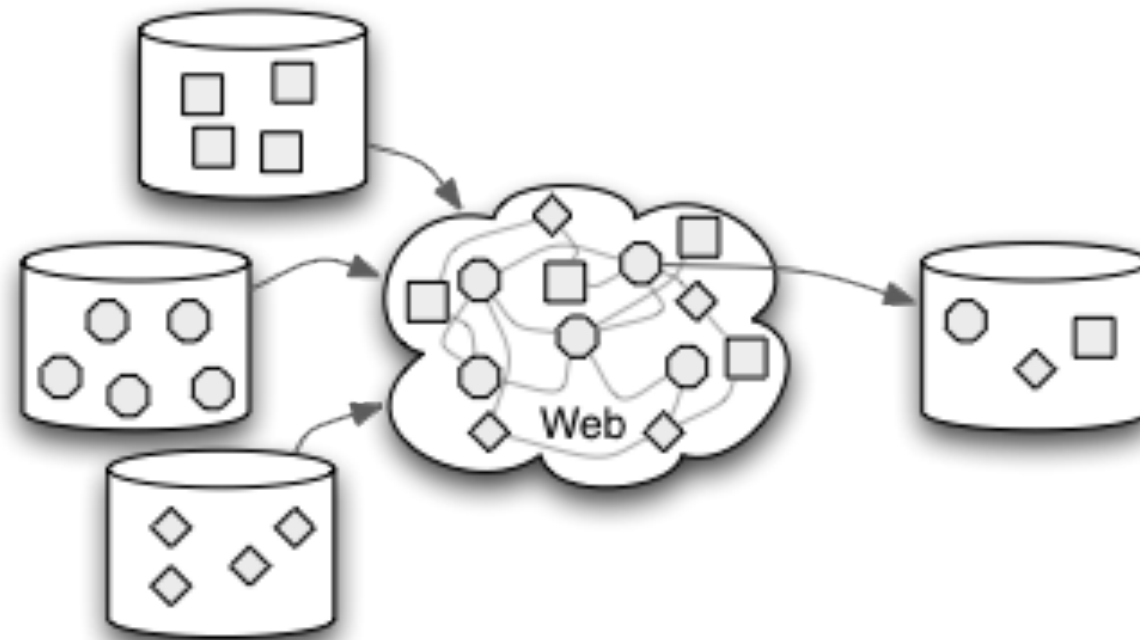
Plan for today...

- Recap
- Publishing Data – The Linked Data Way
- Embedding Structured Data into HTML
- Homework 8

PUBLISHING DATA – THE LINKED DATA WAY

What is Linked Data?

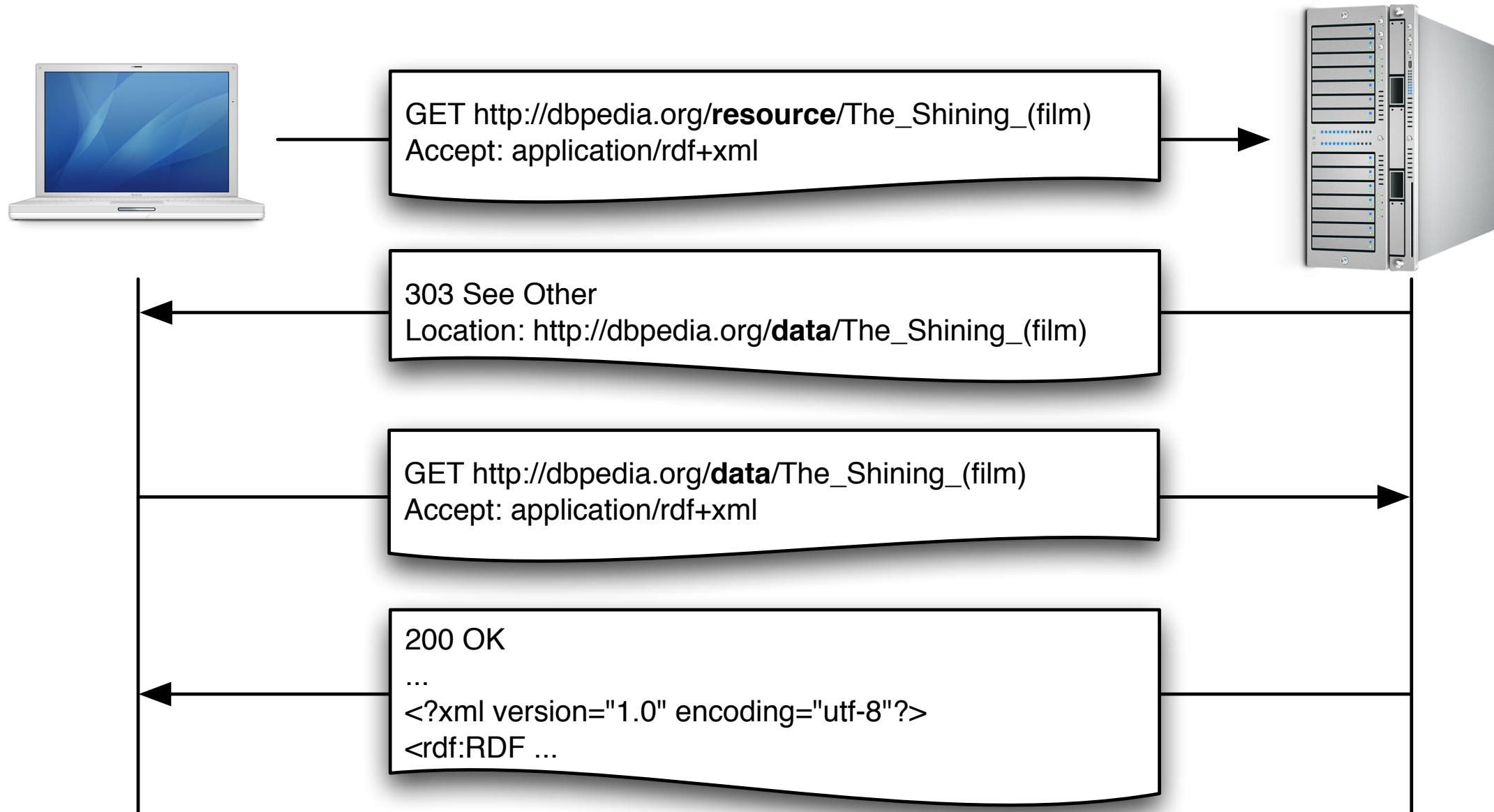
- A method to build a **Web of Data**
- Architectural style, set of standards



Dereferencing LD Resources

- Distinguish between non-information and information resource
- Sample non-information resource
 - [http://dbpedia.org/resource/The_Shining_\(film\)](http://dbpedia.org/resource/The_Shining_(film))
- Sample information resource
 - [http://dbpedia.org/page/The_Shining_\(film\)](http://dbpedia.org/page/The_Shining_(film)) - HTML
 - [http://dbpedia.org/data/The_Shining_\(film\)](http://dbpedia.org/data/The_Shining_(film)) - RDF

Dereferencing LD Resources



Publishing Large RDF Datasets

- Run a servlet that implements the 303 publishing approach
 - for non information resources
 - parse Accept Header field
 - Redirect (303 See Also) to corresponding information resource
- Generate RDF Serialization dynamically from underlying data storage

Publishing Vocabularies

- Hash-based URIs
 - e.g., <http://example.com/vocab.rdf#ClassA>
 - Suited to group the description of a moderate number of related terms into one RDF document
 - Agent can retrieve terms with a single request
- Slash-based URIs
 - e.g., <http://example.com/vocab/ClassB>
 - Suited to split terms in large vocabularies into one document per term
 - No need to download a massive document

Property: foaf:name

name - A name for some thing.

Status: testing

Domain: having this property implies being a [Thing](#)

The [name](#) of something is a simple textual string.

XML language tagging may be used to indicate the language of the name. For example:

```
<foaf:name xml:lang="en">Dan Brickley</foaf:name>
```

FOAF provides some other naming constructs. While foaf:name does not explicitly represent name substructure (family vs given etc.) it does provide a basic level of interoperability. See the [issue tracker](#) for status of work on this issue.

The [name](#) property, like all RDF properties with a range of `rdfs:Literal`, may be used with `XMLLiteral` datatyped values (multiple [names](#) are acceptable whether they are in the same language or not). `XMLLiteral` usage is not yet widely adopted. Feedback on this aspect of the FOAF design is particularly welcomed.

[\[#\]](#) [\[wiki\]](#) [\[back to top\]](#)

Property: foaf:nick

nickname - A short informal nickname characterising an agent (includes login identifiers, IRC and other chat nicknames).

Status: testing

```
haslhofer@CALIXTO~$ rapper http://xmlns.com/foaf/spec/#term_name
rapper: Parsing URI http://xmlns.com/foaf/spec/#term_name with parser rdfxml
rapper: Serializing with serializer ntriples
<http://xmlns.com/foaf/0.1/> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Ontology> .
<http://xmlns.com/foaf/0.1/> <http://purl.org/dc/elements/1.1/title> "Friend of a Friend (FOAF) vocabulary" .
<http://xmlns.com/foaf/0.1/> <http://purl.org/dc/elements/1.1/description> "The Friend of a Friend (FOAF) RDF vocabulary, described using W3C RDF
Schema and the Web Ontology Language." .
<http://xmlns.com/wot/0.1/assurance> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#AnnotationProperty> .
<http://xmlns.com/wot/0.1/src_assurance> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#AnnotationProperty> .
<http://www.w3.org/2003/06/sw-vocab-status/ns#term_status> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#AnnotationProperty> .
<http://purl.org/dc/elements/1.1/description> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#AnnotationProperty> .
<http://purl.org/dc/elements/1.1/title> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#AnnotationProperty> .
<http://purl.org/dc/elements/1.1/date> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#AnnotationProperty> .
<http://www.w3.org/2000/01/rdf-schema#Class> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Class> .
<http://xmlns.com/foaf/0.1/LabelProperty> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2000/01/rdf-schema#Class> .
<http://xmlns.com/foaf/0.1/LabelProperty> <http://www.w3.org/2003/06/sw-vocab-status/ns#term_status> "unstable" .
<http://xmlns.com/foaf/0.1/LabelProperty> <http://www.w3.org/2000/01/rdf-schema#label> "Label Property" .
<http://xmlns.com/foaf/0.1/LabelProperty> <http://www.w3.org/2000/01/rdf-schema#comment> "A foaf:LabelProperty is any RDF property with textual values that serve as labels." .
<http://xmlns.com/foaf/0.1/LabelProperty> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Class> .
<http://xmlns.com/foaf/0.1/LabelProperty> <http://www.w3.org/2000/01/rdf-schema#isDefinedBy> <http://xmlns.com/foaf/0.1/> .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2000/01/rdf-schema#Class> .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2000/01/rdf-schema#label> "Person" .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2000/01/rdf-schema#comment> "A person." .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2003/06/sw-vocab-status/ns#term_status> "stable" .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Class> .
<http://xmlns.com/foaf/0.1/Agent> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Class> .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2000/01/rdf-schema#subClassOf> <http://xmlns.com/foaf/0.1/Agent> .
<http://www.w3.org/2000/10/swap/pim/contact#Person> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Class> .
<http://www.w3.org/2000/10/swap/pim/contact#Person> <http://www.w3.org/2000/01/rdf-schema#label> "Person" .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2000/01/rdf-schema#subClassOf> <http://www.w3.org/2000/10/swap/pim/contact#Person> .
<http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Class> .
<http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing> <http://www.w3.org/2000/01/rdf-schema#label> "Spatial Thing" .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2000/01/rdf-schema#subClassOf> <http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing> .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2000/01/rdf-schema#isDefinedBy> <http://xmlns.com/foaf/0.1/> .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2002/07/owl#disjointWith> <http://xmlns.com/foaf/0.1/Organization> .
<http://xmlns.com/foaf/0.1/Person> <http://www.w3.org/2002/07/owl#disjointWith> <http://xmlns.com/foaf/0.1/Project> .
<http://xmlns.com/foaf/0.1/Document> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2000/01/rdf-schema#Class> .
<http://xmlns.com/foaf/0.1/Document> <http://www.w3.org/2000/01/rdf-schema#label> "Document" .
<http://xmlns.com/foaf/0.1/Document> <http://www.w3.org/2000/01/rdf-schema#comment> "A document." .
<http://xmlns.com/foaf/0.1/Document> <http://www.w3.org/2003/06/sw-vocab-status/ns#term_status> "testing" .
<http://xmlns.com/foaf/0.1/Document> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://www.w3.org/2002/07/owl#Class> .
```

EMBEDDING STRUCTURED DATA INTO HTML

Embedding Data in HTML

- The **Linked Data publishing recipes** separates
 - raw-data representations (RDF/XML, Turtle, N3)
 - human-readable representations (HTML)
- We can also embed structured data directly into HTML
 - **RDFa**
 - **Microformats**
 - **Microdata**

RDFa / Microformats / Microdata

- Mechanisms for embedding structured data in Web documents
- Define or use a set of attributes to **augment** presentation-oriented (**HTML**) documents **with structured data**
- User agents can **extract triples** from Web pages

RDFa Example

XHTML

```
<div>  
  <h2>The trouble with Bob</h2>  
  <h3>Alice</h3>  
</div>
```

XHTML + RDFa

```
<div xmlns:dc=http://purl.org/dc/elements/1.1/>  
  <h2 property="dc:title">The trouble with Bob</h2>  
  <h3 property="dc:creator">Alice</h3>  
</div>
```

RDFa Example

XHTML + RDFa

```
<div xmlns:dc="http://purl.org/dc/elements/1.1/">
  <div about="/alice/posts/trouble_with_bob">
    <h2 property="dc:title">The trouble with Bob</h2>
    <h3 property="dc:creator">Alice</h3>
  </div>
  <div about="/alice/posts/jos_barbecue">
    <h2 property="dc:title">Jo's Barbecue</h2>
    <h3 property="dc:creator">Eve</h3>
  </div>
</div>
```

RDFa Example

XHTML + RDFa

```
<div typeof="foaf:Person" xmlns:foaf="http://xmlns.com/foaf/0.1/">
  <p property="foaf:name">Alice Birpemswick</p>
  <p>Email: <a rel="foaf:mbox"
href="mailto:alice@example.com">alice@example.com</a></p>
  <p>Phone: <a rel="foaf:phone" href="tel:+1-617-555-7332">+1
617.555.7332</a>
  </p>
</div>
```


RDFa Attributes

- **about** and **src**: the resource the metadata is about
- **rel** and **rev**: (reverse) relationship between resources
- **href** and **resource**: the partner resource
- **property**: a property for the content of an element
- **content**: override content of an element
- **datatype**: specify the datatype of text
- **typeof**: specifies the RDF type(s) or a subject

Real-world RDFa Examples

- OReilly.com:

<http://oreilly.com/catalog/9780596520694/>

- NY Times:

<http://thecaucus.blogs.nytimes.com/>

[2012/10/21/mondays-debate-puts-focus-on-foreign-policy-clashes/](http://thecaucus.blogs.nytimes.com/2012/10/21/mondays-debate-puts-focus-on-foreign-policy-clashes/)



RDFa 1.1 Distiller and Parser

Warning: This version implements [RDFa 1.1 Core](#), including the handling of the [Role Attribute](#). The distiller can also run in XHTML+RDFa 1.0 mode (if the incoming XHTML content uses the RDFa 1.0 DTD and/or sets the `version` attribute). The [package available for download](#), although it may be slightly out of sync with the code running this service.

Distill by **URI**

Distill by **File Upload**

Distill by **Direct Text Input**

URI:

**Output
Format:**



**Returned
content:**



**Expand
vocabularies:**



**Generate
warnings for
non RDFa 1.1
Lite usage:**



▶ [More \(non-standard\) options](#)

RDFa illustrated

[http://www.minddevelopmentanddesign.com/
blog/the-importance-of-rdfa-infographic/](http://www.minddevelopmentanddesign.com/blog/the-importance-of-rdfa-infographic/)

Microformats

- A Microformat extends conventional HTML tags with semantic information
- Started by Technorati, Inc.; now community-driven (IRC, mailing list, blogs)
- Make use of the following (X)HTML attributes
 - class
 - rel

Microformats Example

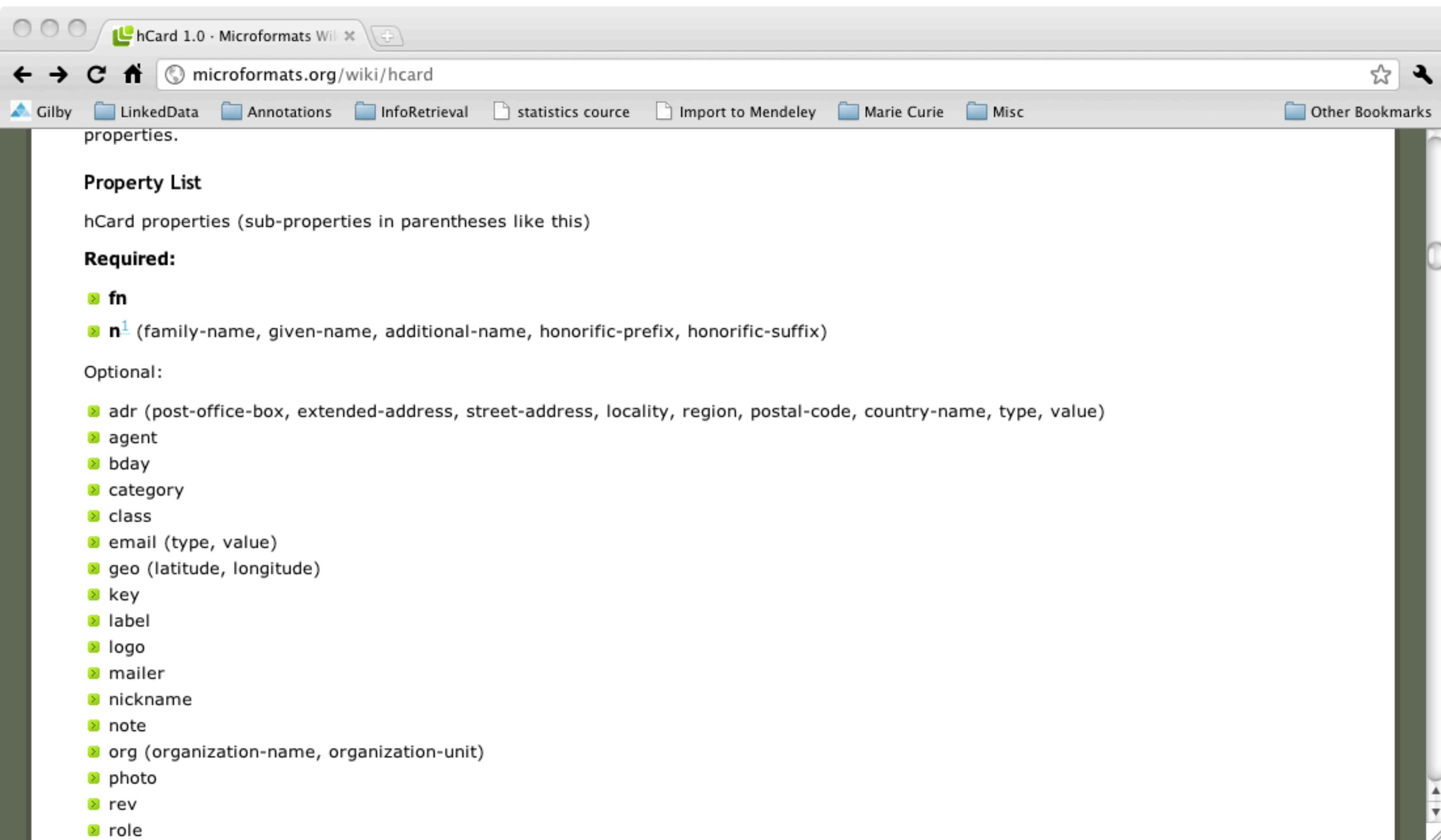
HTML

```
<div>
  <div>Joe Doe</div>
  <div>Jo</div>
  <div>The Example Company</div>
  <div>604-555-1234</div>
  <a href="http://example.com/">http://example.com/</a>
</div>
```

XHTML + Microformats

```
<head profile=http://www.w3.org/2006/03/hcard>...</head>
...
<div class="vcard">
  <div class="fn">Joe Doe</div>
  <div class="nickname">Jo</div>
  <div class="org">The Example Company</div>
  <div class="tel">604-555-1234</div>
  <a class="url" href="http://example.com/">http://example.com/</a>
</div>
```

Microformats Example



The screenshot shows a web browser window with the address bar displaying `microformats.org/wiki/hcard`. The browser's bookmark bar contains several folders and files, including 'Gilby', 'LinkedData', 'Annotations', 'InfoRetrieval', 'statistics course', 'Import to Mendeley', 'Marie Curie', 'Misc', and 'Other Bookmarks'. The main content area of the page is titled 'hCard 1.0 - Microformats Wiki' and contains the following text:

properties.

Property List

hCard properties (sub-properties in parentheses like this)

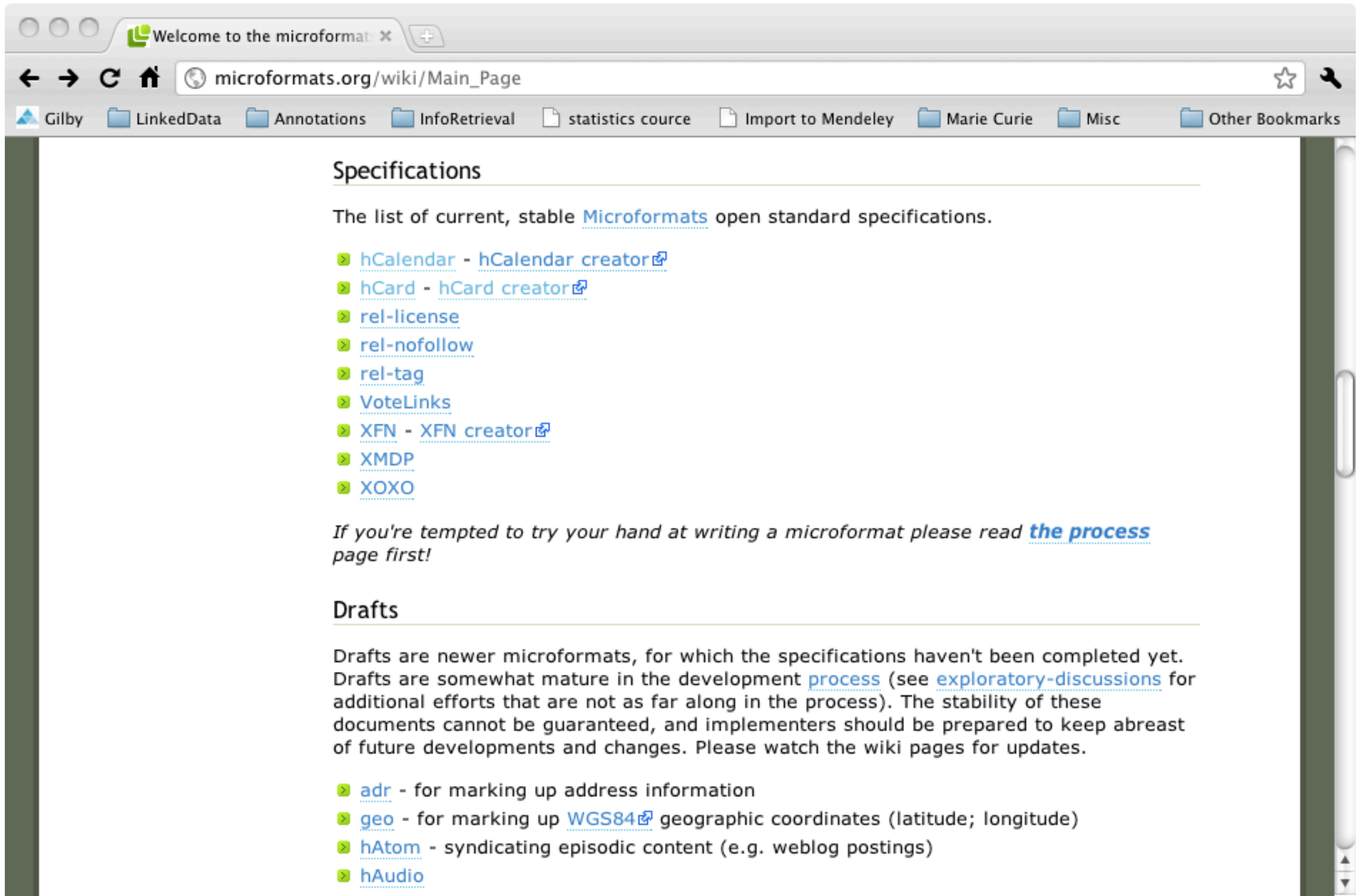
Required:

- fn
- n¹ (family-name, given-name, additional-name, honorific-prefix, honorific-suffix)

Optional:

- adr (post-office-box, extended-address, street-address, locality, region, postal-code, country-name, type, value)
- agent
- bday
- category
- class
- email (type, value)
- geo (latitude, longitude)
- key
- label
- logo
- mailer
- nickname
- note
- org (organization-name, organization-unit)
- photo
- rev
- role

Available Microformats



The image shows a browser window with the address bar displaying "microformats.org/wiki/Main_Page". The browser's bookmark bar contains several folders and files, including "Gilby", "LinkedData", "Annotations", "InfoRetrieval", "statistics course", "Import to Mendeley", "Marie Curie", "Misc", and "Other Bookmarks". The main content area of the page is titled "Specifications" and contains the following text and links:

Specifications

The list of current, stable [Microformats](#) open standard specifications.

- ▶ [hCalendar](#) - [hCalendar creator](#)
- ▶ [hCard](#) - [hCard creator](#)
- ▶ [rel-license](#)
- ▶ [rel-nofollow](#)
- ▶ [rel-tag](#)
- ▶ [VoteLinks](#)
- ▶ [XFN](#) - [XFN creator](#)
- ▶ [XMDP](#)
- ▶ [XOXO](#)

If you're tempted to try your hand at writing a microformat please read [the process](#) page first!

Drafts

Drafts are newer microformats, for which the specifications haven't been completed yet. Drafts are somewhat mature in the development [process](#) (see [exploratory-discussions](#) for additional efforts that are not as far along in the process). The stability of these documents cannot be guaranteed, and implementers should be prepared to keep abreast of future developments and changes. Please watch the wiki pages for updates.

- ▶ [adr](#) - for marking up address information
- ▶ [geo](#) - for marking up [WGS84](#) geographic coordinates (latitude; longitude)
- ▶ [hAtom](#) - syndicating episodic content (e.g. weblog postings)
- ▶ [hAudio](#)

Microformats vs. RDFa

```
<div xmlns=http://www.w3.org/1999/xhtml
      xmlns:rdf=http://www.w3.org/1999/02/22-rdf-syntax-ns#
      xmlns:rdfs=http://www.w3.org/2000/01/rdf-schema#
      xmlns:v=http://www.w3.org/2006/vcard/ns#>
<div about="http://example.com/me/behas" typeof="v:VCard">
  <span property="v:fn">Bernhard Haslhofer</span>
  <span property="v:nickname">behas</span>
  <div rel="v:adr">
    <div typeof="v:Address v:Work">
      <span property="v:street-address">301 College Avenue</span>
      <span property="v:locality">Ithaca</span>,
      <span property="v:postal-code">14850</span>,
      <span property="v:country-name">United States</span>.
    </div>
  </div>
  <a rel="v:email" ref="mailto:bernhard.haslhofer@cornell.edu">
    bernhard.haslhofer@cornell.edu</a>.
</div>
</div>
```

Sample vCard Object in RDFa (see <http://www.w3.org/Submission/vcard-rdf/>)

Microformats vs. RDFa

```
<div class="vcard">  
  
  <span class="fn">Bernhard Haslhofer</span>  
  
  <div class="adr">  
    <div class="street-address">301 College Avenue</div>  
    <span class="locality">Ithaca</span>  
    <span class="postal-code">14850</span>  
    <span class="country-name">United States</span>  
  </div>  
  
  <a class="email" href="mailto:bernhard.haslhofer@cornell.edu">  
    bernhard.haslhofer@cornell.edu  
  </a>  
  
</div>
```

Microformats	RDFa
flat namespace	XML namespaces
support HTML4, XHTML 1.1, and HTML 5	support for XHTML 1., HTML 5
use latent HTML attributes	introduces new metadata attributes
vocabulary defined by one organization/community	open to any RDF-based vocabulary

See: [http://evan.prodromou.name/RDFa vs microformats](http://evan.prodromou.name/RDFa_vs_microformats)

Microdata (HTML5)

- A very young HTML 5 proposition that extends Microformats and addresses its shortcomings
- Items are created within an **itemscope**
- Every item is assigned an arbitrary number of properties (**itemprop**) and relationships (**itemref**)
- Uses global identifiers for typing and naming items

Microdata Example

```
<div itemscope itemtype="http://schema.org/Person">  
  <span itemprop="name">Bernhard Haslhofer</span>,  
  <span itemprop="nickname">behas</span>.  
  <div itemprop="address"  
    itemscope itemtype="http://schema.org/PostalAddress">  
    <span itemprop="streetAddress">301 College Avenue</span>  
    <span itemprop="addressLocality">Ithaca</span>  
    <span itemprop="addressCountry">United States</span>  
  </div>  
</div>
```

What are the pros / cons of embedding structured data directly into HTML?

Web Data Publishing Approaches

	Pro	Con
Linked Data Conneg IR / NIR	Separates data / presentation markup Web Architecture	Technical complexity Communication overhead
RDFa / Microformats / Microdata	Easy to implement Search engine friendly	Mixes data / presentation markup Becomes messy

Schema.org and the FB Open Graph Protocol

Google



bing





Search Webmaster Tools help



Webmaster Tools

Help home About rich snippets

Rich snippets (microdata, microformats, and RDFa)

About rich snippets and structured data

About rich snippets

Rich snippets (microdata, microformats, and RDFa)

- About microdata
- About microformats
- About RDFa
- schema.org FAQ



Introduction to Rich Snippets
Watch a video overview

Snippets—the few lines of text that appear under every search result—are designed to give users a sense for what's on the page and why it's relevant to their query.

Little Water Cantina - Eastlake - Seattle, WA
www.yelp.com › Restaurants › Mexican
★★★★☆ 90 reviews - Price range: \$\$
90 Reviews of **Little Water Cantina** "Three things are on my list when I eat out: great food, atmosphere, and **Vegetarian Vegan Pizza No Cheese) Recipe - Food.com - 248865**

Vegetarian Vegan Pizza No Cheese) Recipe - Food.com - 248865
www.food.com/recipe/vegetarian-vegan-pizza-no-c...
★★★★★ 2 reviews - 1 hr 32 mins - 242.9 cal
Aug 26, 2007 – This is from my dad, who developed some **vegan recipes** doesn't have any cheese, and you

Leonard Cohen – Free listening, videos, concerts, stats, & pictures at...
www.last.fm/music/Leonard+Cohen
Watch videos & listen to **Leonard Cohen**: Suzanne, Hallelujah & more, plus 132 pictures. **Leonard Cohen**, (born September 21, 1934 in Montréal, Quebec, ...

Track	Duration
Suzanne	♫ 3:48
The Darkness	♫ 4:29
Going Home	♫ 3:51
Hallelujah	♫ 6:12

Related

- [Creating Sitemaps](#)
Sitemaps
- [Rich snippets - Events](#)
Rich snippets (microdata, microformats, RDFa) › Rich snippets types
- [Rich snippets - Organizations](#)
Rich snippets (microdata, microformats, RDFa) › Rich snippets types
- [Webmaster Guidelines](#)
Get Started
- [About Sitemaps](#)
Sitemaps

What is Schema.org?

This site provides a collection of schemas, i.e., html tags, that webmasters can use to markup their pages in ways recognized by major search providers. Search engines including Bing, Google and Yahoo! rely on this markup to improve the display of search results, making it easier for people to find the right web pages.

Many sites are generated from structured data, which is often stored in databases. When this data is formatted into HTML, it becomes very difficult to recover the original structured data. Many applications, especially search engines, can benefit greatly from direct access to this structured data. On-page markup enables search engines to understand the information on web pages and provide richer search results in order to make it easier for users to find relevant information on the web. Markup can also enable new tools and applications that make use of the structure.

A shared markup vocabulary makes easier for webmasters to decide on a markup schema and get the maximum benefit for their efforts. So, in the spirit of sitemaps.org, Bing, Google and Yahoo! have come together to provide a shared collection of schemas that webmasters can use.

We invite you to [get started!](#)

Last Updated: 27 May 2011

[Terms and conditions](#)

schema.org / Microdata example

<h1>Pirates of the Carribean: On Stranger Tides (2011)</h1>

Jack Sparrow and Barbossa embark on a quest to find the elusive fountain

of youth, only to discover that Blackbeard and his daughter are after it too.

Director: Rob Marshall

Writers: Ted Elliott, Terry Rossio, and 7 more credits

Stars: Johnny Depp, Penelope Cruz, Ian McShane

8/10 stars from 200 users. Reviews: 50.

schema.org / Microdata example

```
<div itemscope itemtype="http://schema.org/Movie">

<h1 itemprop="name">Pirates of the Carribean: On Stranger Tides (2011)</h1>
<span itemprop="description">Jack Sparrow and Barbossa embark on a quest to
  find the elusive fountain of youth, only to discover that Blackbeard and
  his daughter are after it too.</span>
Director:
  <div itemprop="director" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Rob Marshall</span>
</div>
Writers:
  <div itemprop="author" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Ted Elliott</span>
</div>
<div itemprop="author" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Terry Rossio</span>
</div>
, and 7 more credits
Stars:
  <div itemprop="actor" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Johnny Depp</span>,
  </div>
<div itemprop="actor" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Penelope Cruz</span>,
</div>
<div itemprop="actor" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Ian McShane</span>
</div>
<div itemprop="aggregateRating" itemscope itemtype="http://schema.org/AggregateRating">
  <span itemprop="ratingValue">8</span>/<span itemprop="bestRating">10</span> stars from
  <span itemprop="ratingCount">200</span> users.
  Reviews: <span itemprop="reviewCount">50</span>.
</div>
</div>
```

schema.org

- Defines
 - a number of **types** (e.g, person), organized in an inheritance hierarchy
 - a number of **properties** (e.g., name)
- Extension mechanisms to extend the schemas
- OWL representation:
<http://schema.org/docs/schemaorg.owl>
- <http://schema.rdfs.org/index.html>

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Achievement(Instance)

Album

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Graph API

API Reference > Graph API

At Facebook's core is the social graph; people and the connections they have to everything they care about. The Graph API presents a simple, consistent view of the Facebook social graph, uniformly representing objects in the graph (e.g., [people](#), [photos](#), [events](#), and [pages](#)) and the connections between them (e.g., friend relationships, shared content, and photo tags).

Every object in the social graph has a unique ID. You can access the properties of an object by requesting <https://graph.facebook.com/ID>. For example, the official page for the [Facebook Platform](#) has id 19292868552, so you can fetch the object at <https://graph.facebook.com/19292868552>:

```
{  
  "name": "Facebook Platform",  
  "website": "http://developers.facebook.com",  
  "username": "platform",  
  "founded": "May 2007",  
  "company_overview": "Facebook Platform enables anyone to build...",  
  "mission": "To make the web more open and social.",  
  "products": "Facebook Application Programming Interface (API)...",  
  "likes": 449921,  
  "id": 19292868552,  
  "category": "Technology"  
}
```

Alternatively, people and pages with usernames can be accessed using their username as an ID. Since "platform" is the username for the page above, <https://graph.facebook.com/platform> will return what you expect. All responses are JSON objects.

All objects in Facebook can be accessed in the same way:

- Users: <https://graph.facebook.com/btaylor> (Bret Taylor)

```

{
  name: "Coca-Cola",
  is_published: true,
  website: "http://www.coca-cola.com",
  username: "coca-cola",
  founded: "1886",
  description: "Created in 1886 in Atlanta, Georgia, by Dr. John S. Pemberton, Coca-Cola was first offered as a fountain beverage at Jac
  Coca-Cola was patented in 1887, registered as a trademark in 1893 and by 1895 it was being sold in every state and territory in the Un
  Coca-Cola might owe its origins to the United States, but its popularity has made it truly universal. Today, you can find Coca-Cola in
  Coca-Cola Page House Rules: http://CokeURL.com/q28a",
  about: "The Coca-Cola Facebook Page is a collection of your stories showing how people from around the world have helped make Coke into
- location: {
  latitude: 19.2,
  longitude: -96.1333
},
checkins: 127,
talking_about_count: 1687218,
category: "Food/beverages",
id: "40796308305",
link: "http://www.facebook.com/coca-cola",
likes: 53165520,
- cover: {
  cover_id: "10151948639733306",
  source: "http://sphotos-a.xx.fbcdn.net/hphotos-ash3/s720x720/557402_10151948639733306_1048781480_n.png",
  offset_y: 0
}
}

```



```
→ ~ rapper -i turtle -o turtle https://graph.facebook.com/cocacola
rapper: Parsing URI https://graph.facebook.com/cocacola with parser turtle
rapper: Serializing with serializer turtle
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix api: <tag:graph.facebook.com,2011://> .
@prefix og: <http://ogp.me/ns#> .
@prefix fb: <http://ogp.me/ns/fb#> .
@prefix : <http://graph.facebook.com/schema/~/> .
@prefix page: <http://graph.facebook.com/schema/page#> .

<https://graph.facebook.com/40796308305#>
  page:about "The Coca-Cola Facebook Page is a collection of your stories showing how people from around the world have helped make Coke into what it is today." ;
  page:category "Food/beverages" ;
  page:checkins 127 ;
  page:cover [
    :cover_id 10151948639733306 ;
    :offset_y 0 ;
    :source <http://sphotos-a.xx.fbcdn.net/hphotos-ash3/s720x720/557402_10151948639733306_1048781480_n.png>
  ] ;
  page:description ""Created in 1886 in Atlanta, Georgia, by Dr. John S. Pemberton, Coca-Cola was first offered as a fountain beverage at Jacob's Pharmacy by mixing Coca-Cola syrup with carbonated water.

Coca-Cola was patented in 1887, registered as a trademark in 1893 and by 1895 it was being sold in every state and territory in the United States. In 1899, The Coca-Cola Company began franchised bottling operations in the United States.

Coca-Cola might owe its origins to the United States, but its popularity has made it truly universal. Today, you can find Coca-Cola in virtually every part of the world.

Coca-Cola Page House Rules: http://CokeURL.com/q28a"" ;
  page:founded 1886 ;
  page:id "40796308305" ;
  page:is_published true ;
  page:likes 53165803 ;
  page:link <http://www.facebook.com/coca-cola> ;
  page:location [
    :latitude 19.2 ;
    :longitude -96.1333
  ] ;
  page:name "Coca-Cola" ;
  page:talking_about_count 1687218 ;
  page:username "coca-cola" ;
  page:website <http://www.coca-cola.com/> .

rapper: Parsing returned 20 triples
→ ~
```


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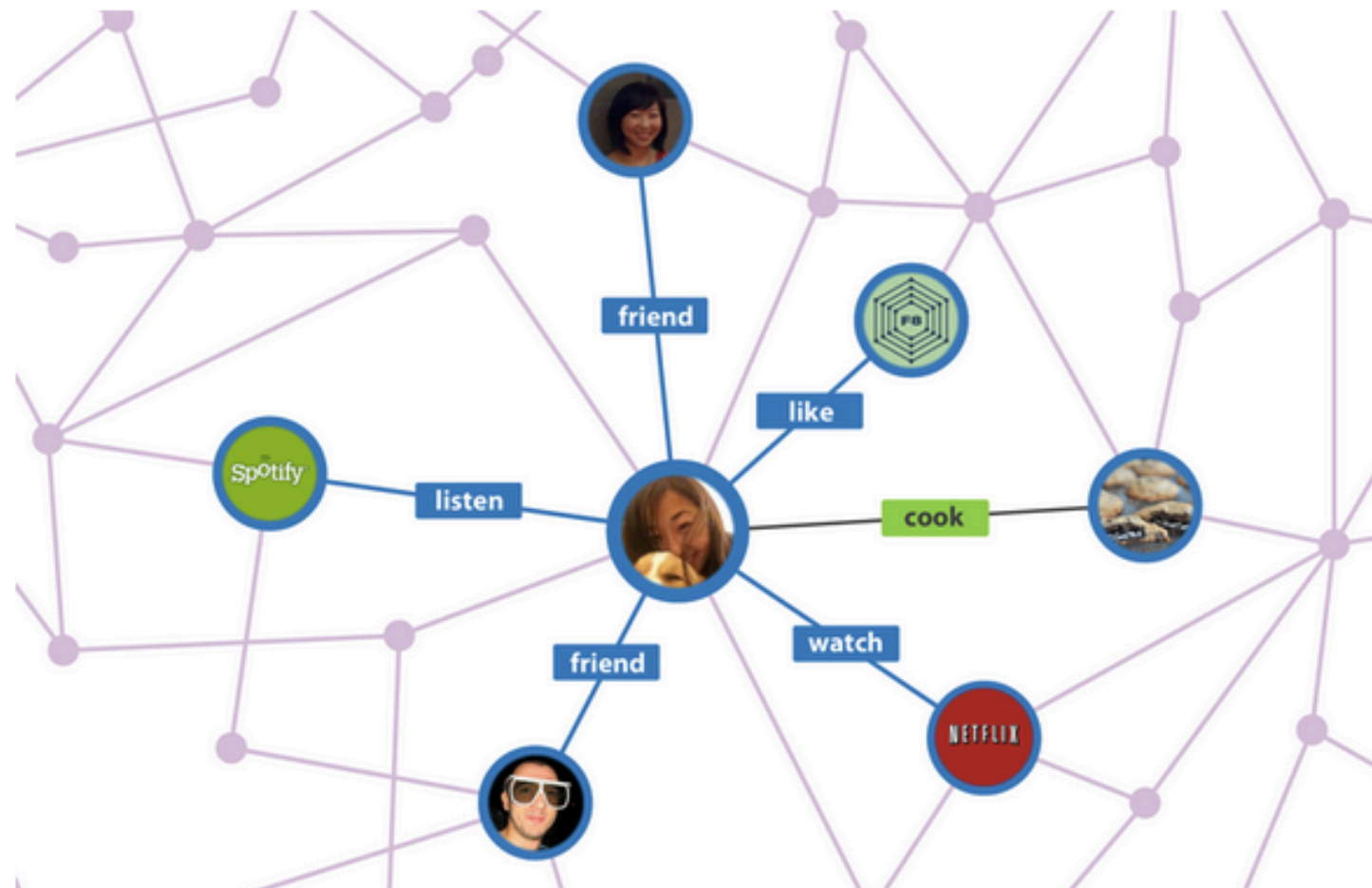
Getting Started

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- Open Graph Distribution

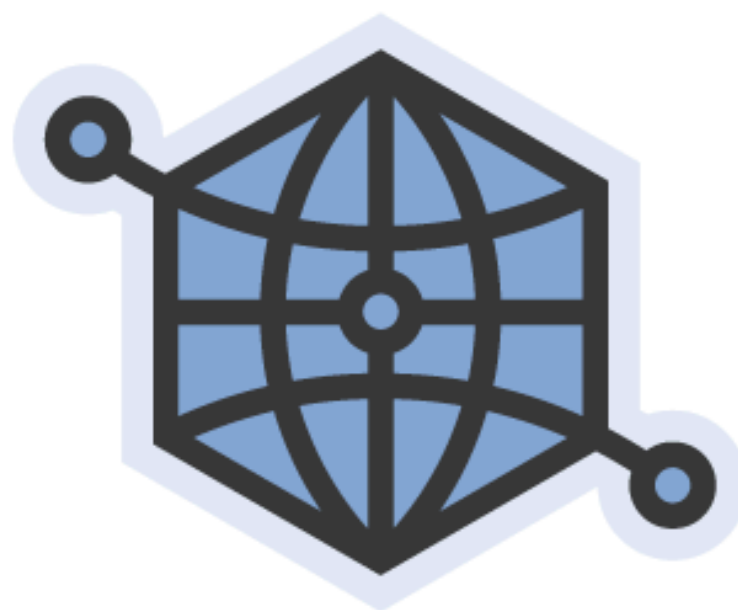
Open Graph

Core Concepts > Open Graph

At Facebook's core is the social graph: people and the connections they have to everything they care about. Historically, Facebook has managed this graph and has expanded it over time as we launch new products (ex: photos, places). In 2010, we introduced an **early version** of Open Graph, an extension of the social graph, via the **Open Graph protocol**, to include third-party websites and pages that people liked throughout the web. We are now extending the Open Graph to include arbitrary actions and objects created by third-party apps and enabling these apps to integrate deeply into the Facebook experience.



The Open Graph protocol



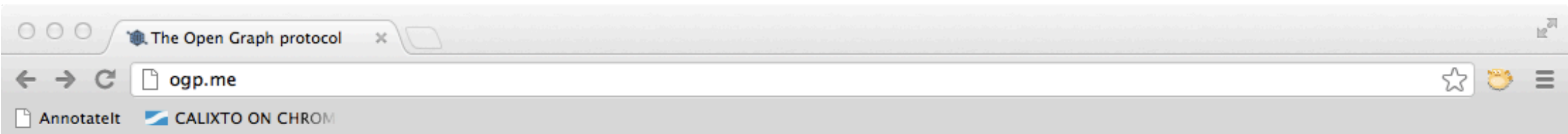
Introduction

The [Open Graph protocol](#) enables any web page to become a rich object in a social graph. For instance, this is used on Facebook to allow any web page to have the same functionality as any other object on Facebook.

While many different technologies and schemas exist and could be combined together, there isn't a single technology which provides enough information to richly represent any web page within the social graph. The Open Graph protocol builds on these existing technologies and gives developers one thing to implement. Developer simplicity is a key goal of the Open Graph protocol which has informed many of [the technical design decisions](#).

Basic Metadata

To turn your web pages into graph objects, you need to add basic metadata to your page. We've based the initial version of the protocol on [RDFa](#) which means that you'll place additional `<meta>` tags in the `<head>` of your web



protocol builds on these existing technologies and gives developers one thing to implement. Developer simplicity is a key goal of the Open Graph protocol which has informed many of [the technical design decisions](#).

Basic Metadata

To turn your web pages into graph objects, you need to add basic metadata to your page. We've based the initial version of the protocol on [RDFa](#) which means that you'll place additional `<meta>` tags in the `<head>` of your web page. The four required properties for every page are:

- `og:title` - The title of your object as it should appear within the graph, e.g., "The Rock".
- `og:type` - The [type](#) of your object, e.g., "video.movie". Depending on the type you specify, other properties may also be required.
- `og:image` - An image URL which should represent your object within the graph.
- `og:url` - The canonical URL of your object that will be used as its permanent ID in the graph, e.g., "http://www.imdb.com/title/tt0117500/".

As an example, the following is the Open Graph protocol markup for [The Rock on IMDB](#):

```
<html prefix="og: http://ogp.me/ns#">
<head>
<title>The Rock (1996)</title>
<meta property="og:title" content="The Rock" />
<meta property="og:type" content="video.movie" />
<meta property="og:url" content="http://www.imdb.com/title/tt0117500/" />
<meta property="og:image" content="http://ia.media-imdb.com/images/rock.jpg" />
...
</head>
...
</html>
```

Optional Metadata

The following properties are optional for any object and are generally recommended:

Object Types

In order for your object to be represented within the graph, you need to specify its type. This is done using the `og:type` property:

```
<meta property="og:type" content="website" />
```

When the community agrees on the schema for a type, it is added to the list of global types. All other objects in the type system are [CURIes](#) of the form

```
<head prefix="my_namespace: http://example.com/ns#">  
<meta property="og:type" content="my_namespace:my_type" />
```

The global types are grouped into verticals. Each vertical has its own namespace. The `og:type` values for a namespace are always prefixed with the namespace and then a period. This is to reduce confusion with user-defined namespaced types which always have colons in them.

Music

- Namespace URI: `http://ogp.me/ns/music#`

`og:type` values:

`music.song`

- `music:duration` - `integer` ≥ 1 - The song's length in seconds.
- `music:album` - `music.album` array - The album this song is from.
- `music:album:disc` - `integer` ≥ 1 - Which disc of the album this song is on.
- `music:album:track` - `integer` ≥ 1 - Which track this song is.
- `music:musician` - `profile` array - The musician that made this song.

`music.album`

Readings

- Heath, Bizer: Linked Data: Evolving the Web into a Global Data Space (Chapter 5)
<http://linkeddatabook.com/editions/1.0/>
- Web Data Commons.
<http://webdatacommons.org/>
- Mika, Potter: Metadata Statistics for a Large Web Corpus
<http://events.linkeddata.org/ldow2012/papers/ldow2012-inv-paper-1.pdf>
- Schema.org Tutorial: <http://schema.org/docs/gs.html>
- Open Graph Protocol:
<http://ogp.me/>

HOMEWORK 8

[http://www.infosci.cornell.edu/Courses/
info4302/2012fa/homeworks.php#hw8](http://www.infosci.cornell.edu/Courses/info4302/2012fa/homeworks.php#hw8)