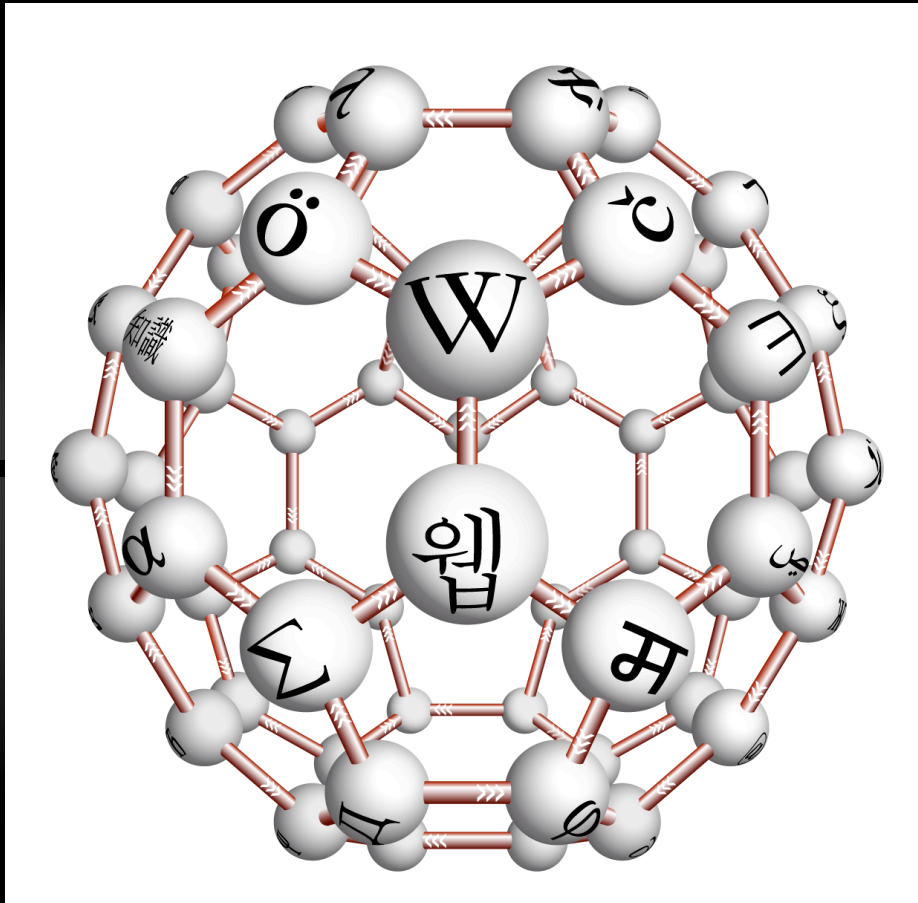




# Semantic mediawiki



*Some slide taken  
from Danny Drandevic*

# Semantic MediaWiki

- ✓ Extension of **MediaWiki**

- ✓ Popular Wiki engine
- ✓ Powers Wikipedia

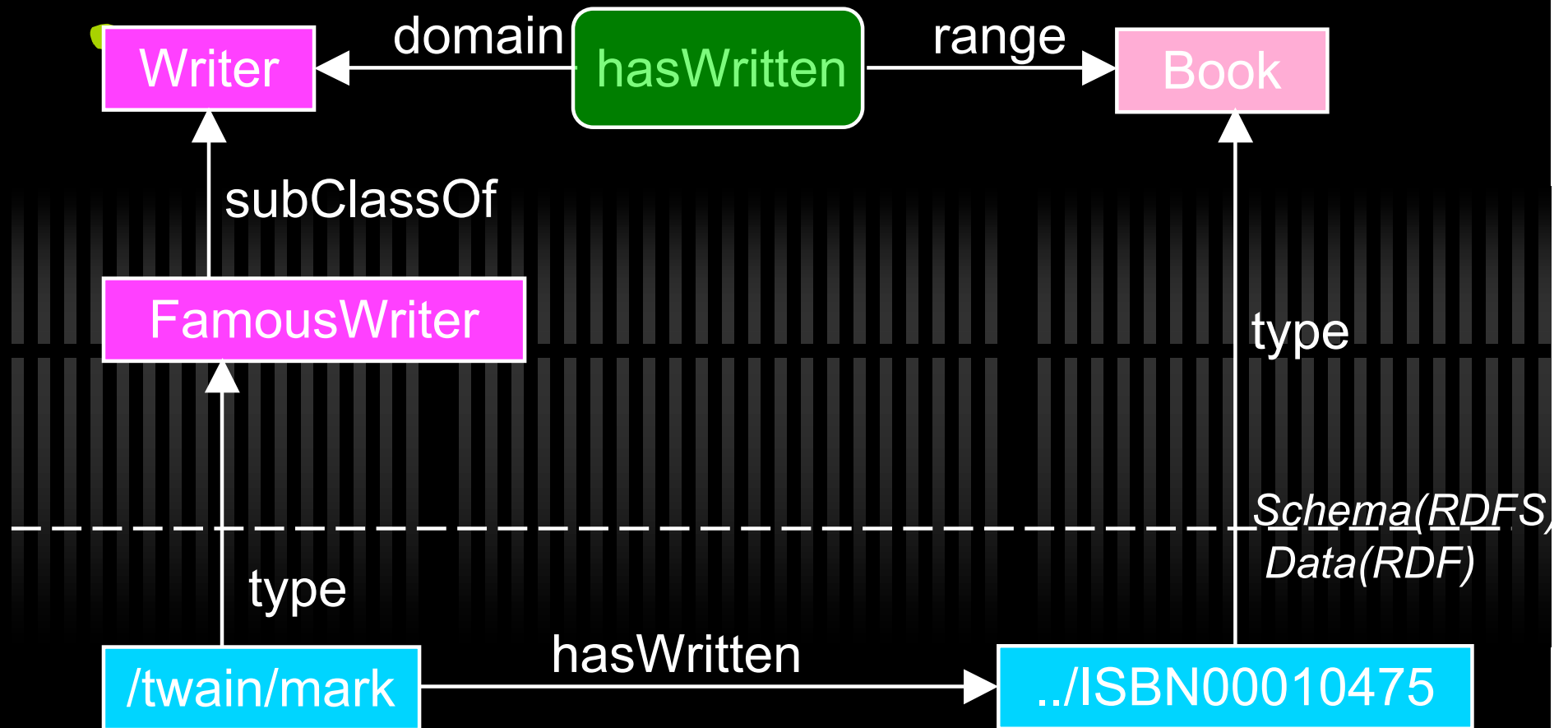
- ✓ Extends MediaWiki by enabling...

- ✓ Typed links
- ✓ Property – Value
- ✓ Inline queries
- ✓ New ways to explore the content

- ✓ Open source and well documented

# An example RDF Schema

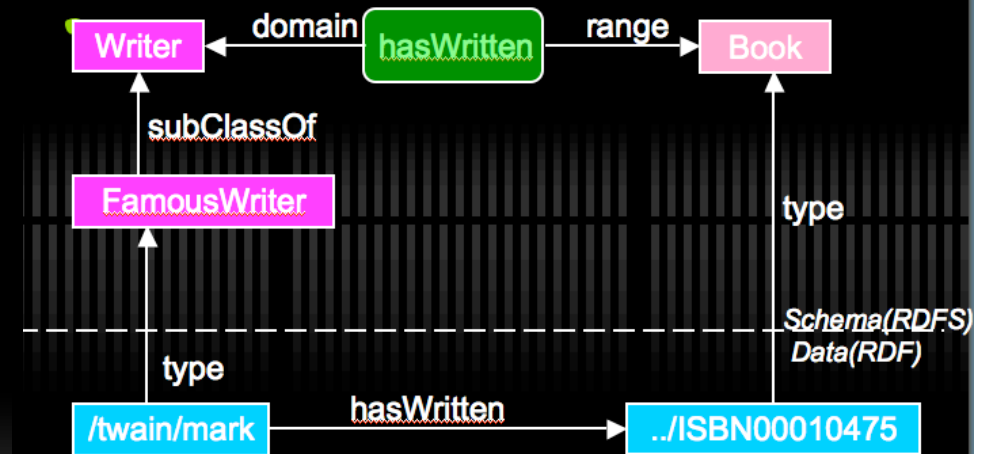
Annotation of WWW resources and *semantic links*



# Concepts

## An example RDF Schema

Annotation of WWW resources and *semantic links*



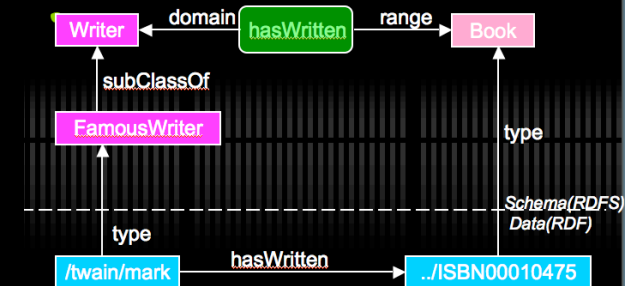
- ✓ INSTANCE  $\Leftrightarrow$  PAGE
- ✓ CLASS  $\Leftrightarrow$  CATEGORY
- ✓ RELATION  $\Leftrightarrow$  PROPERTY

# Instance <-> Page



## An example RDF Schema

Annotation of WWW resources and *semantic links*



## Editing Marco Ronchetti



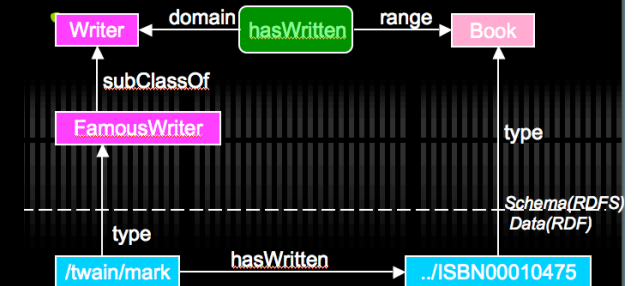
Hi guys,  
My nationality is [[Has nationality::Italy|italian]].  
My nickname in this wiki is [[User:Ronchet|Ronchet]].  
Here is my [http://latemar.science.unitn.it home] where you can find info about me.  
You can reach me at the e-mail address [[Has e-mail::marco.ronchetti@unitn.it]].  
[[Category:Man]]  
[[Category:Speaker]]

# Class <-> Category



## An example RDF Schema

Annotation of WWW resources and *semantic links*



## Editing Marco Ronchetti



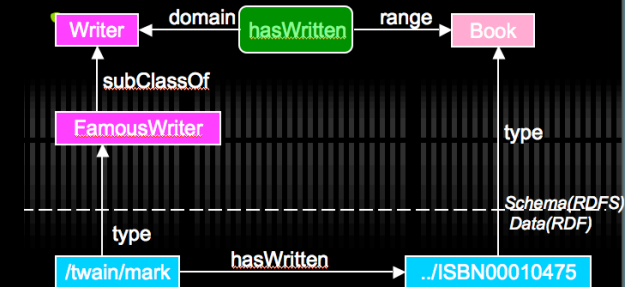
Hi guys,  
My nationality is [[Has nationality::Italy|italian]].  
My nickname in this wiki is [[User:Ronchet|Ronchet]].  
Here is my [http://latemar.science.unitn.it home] where you can find info about me.  
You can reach me at the e-mail address [[Has e-mail::marco.ronchetti@unitn.it]].

[[Category:Man]]  
[[Category:Speaker]]

# Relation $\leftrightarrow$ Property

## An example RDF Schema

Annotation of WWW resources and *semantic links*



## Editing Marco Ronchetti



Hi guys,

My nationality is `[[Has nationality::Italy|italian]]`.

My nickname in this wiki is `[[User:Ronchet|Ronchet]]`.

Here is my `[http://latemar.science.unitn.it home]` where you can find info about me.

You can reach me at the e-mail address `[[Has e-mail::marco.ronchetti@unitn.it]]`.

`[[Category:Man]]`

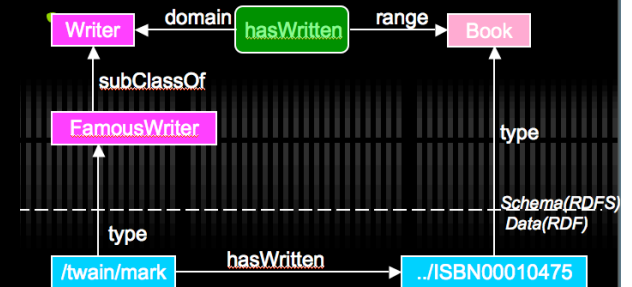
`[[Category:Speaker]]`

# Instance <-> Page



## An example RDF Schema

Annotation of WWW resources and *semantic links*



[article](#) [discussion](#) [edit](#) [history](#) [move](#) [watch](#)

## Marco Ronchetti

Hi guys, My nationality is [italian](#).

My nickname in this wiki is [Ronchet](#).

Here is my [home](#) where you can find info about me. You can reach me at the e-mail address [marco.ronchetti@unitn.it](mailto:marco.ronchetti@unitn.it) .

**Facts about Marco Ronchetti**

Has e-mail

[marco.ronchetti@unitn.it](mailto:marco.ronchetti@unitn.it)

Has nationality

[Italy](#)

**Categories:** [Man](#) [I Speaker](#)



# Instance



- ✓ Blue links mean there is a page about it
- ✓ Red link means there is no page about it

[article](#) [discussion](#) [edit](#) [history](#) [protect](#) [delete](#) [more](#)

## Denny Vrandecic

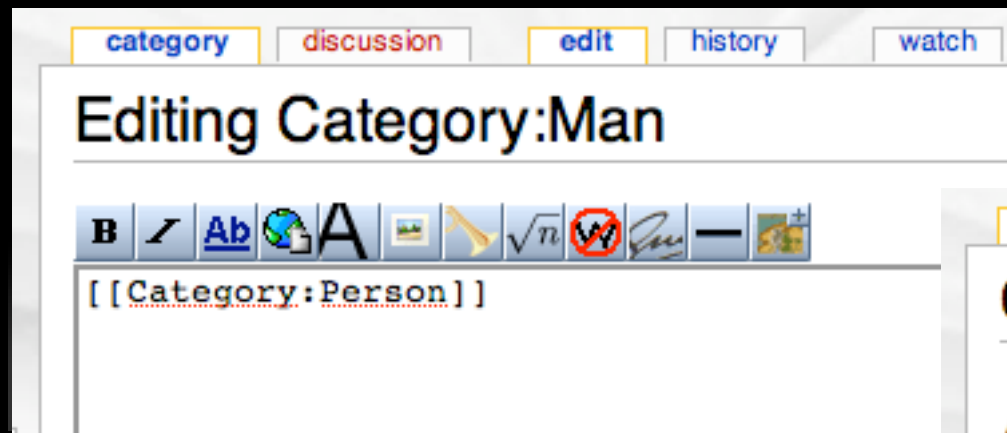
Denny is working at the [AIFB](#). He is from [Croatia](#), but lives in [Germany](#) for quite a while now.

**Facts about Denny Vrandecic** [RDF feed](#)

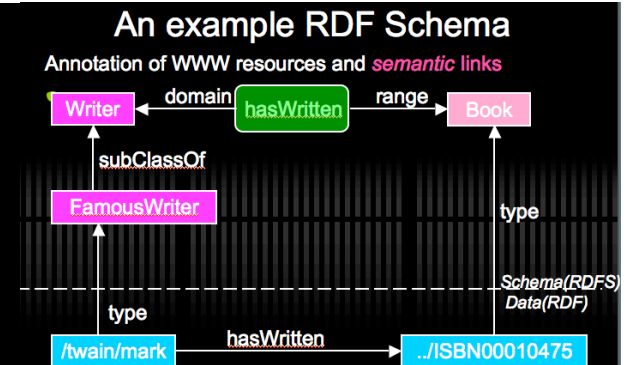
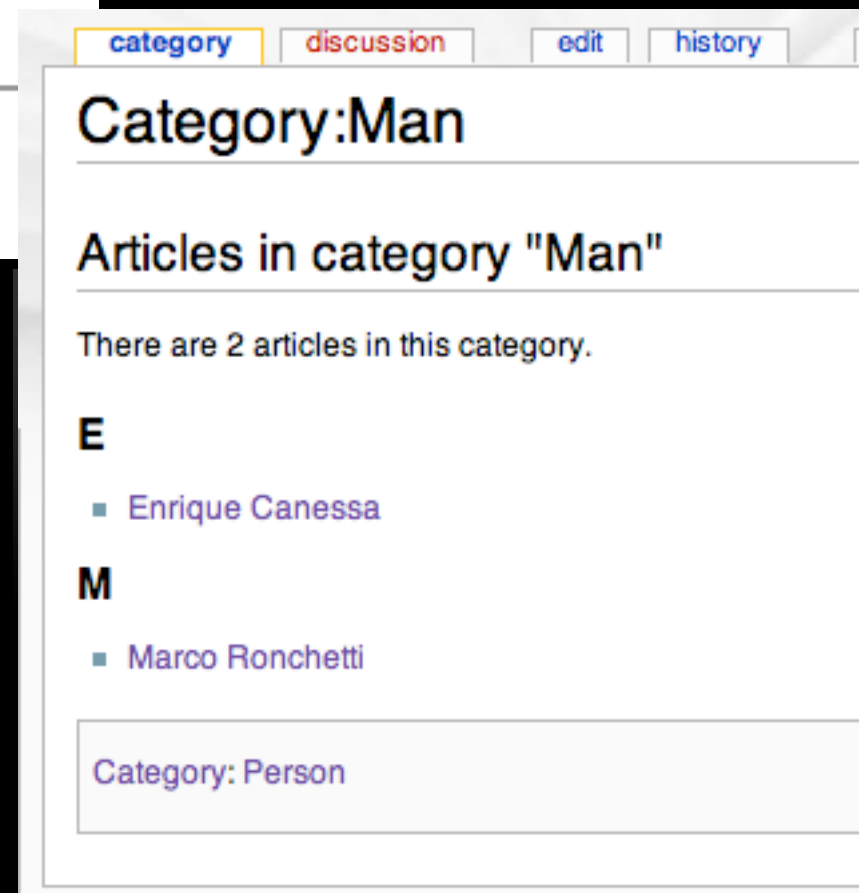
|                            |  |
|----------------------------|--|
| Affiliation                | <a href="#">AIFB</a> <a href="#">+q</a>    |
| <a href="#">Located in</a> | <a href="#">Germany</a> <a href="#">+q</a> |
| Nationality                | <a href="#">Croatia</a> <a href="#">+q</a> |

Categories: [Tutor](#) | [Man](#)

# Class <-> Category



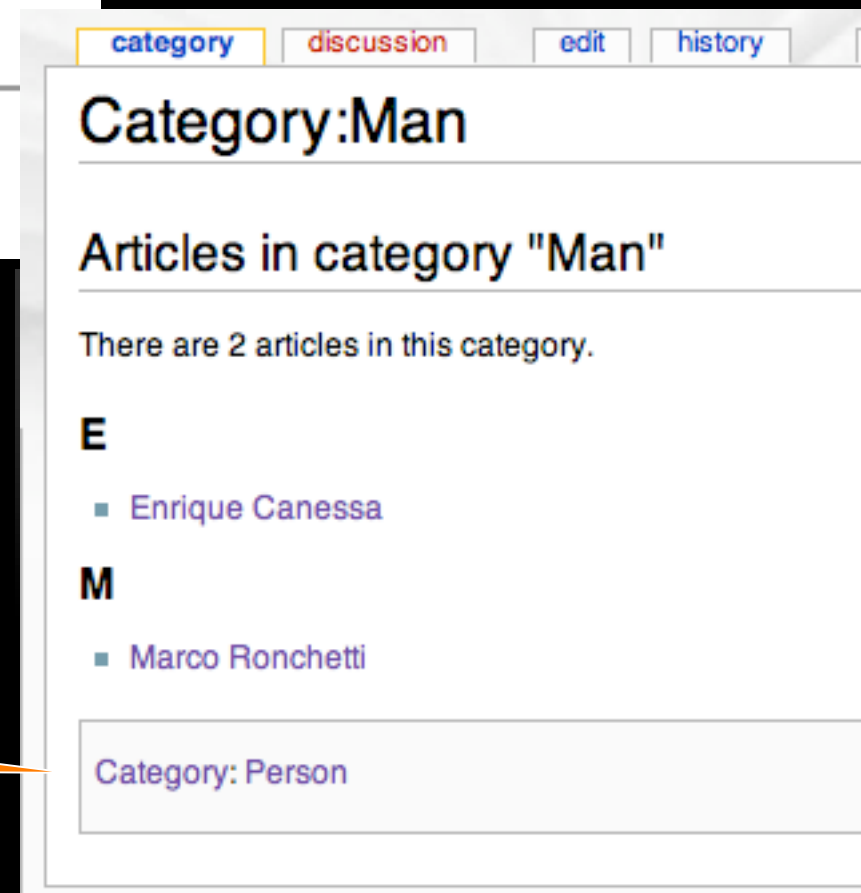
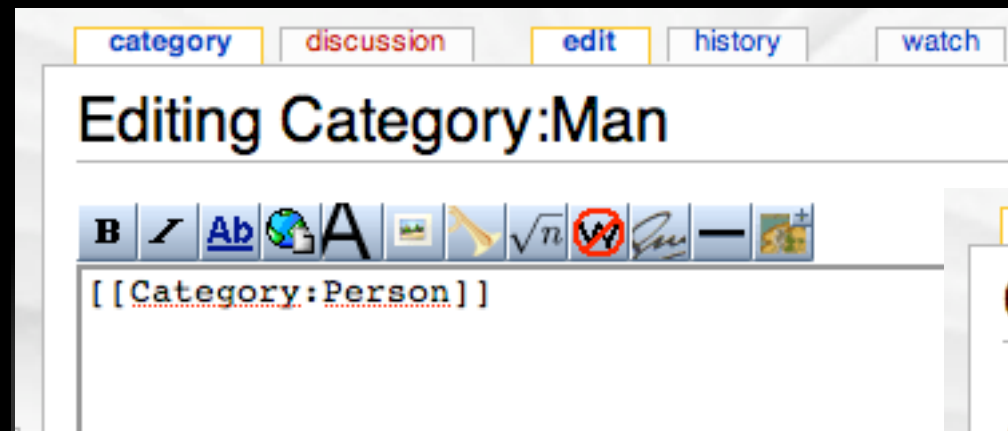
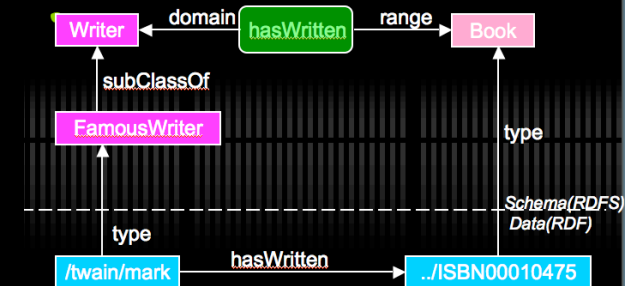
*There are pages  
describing  
categories*



# Class <-> Category

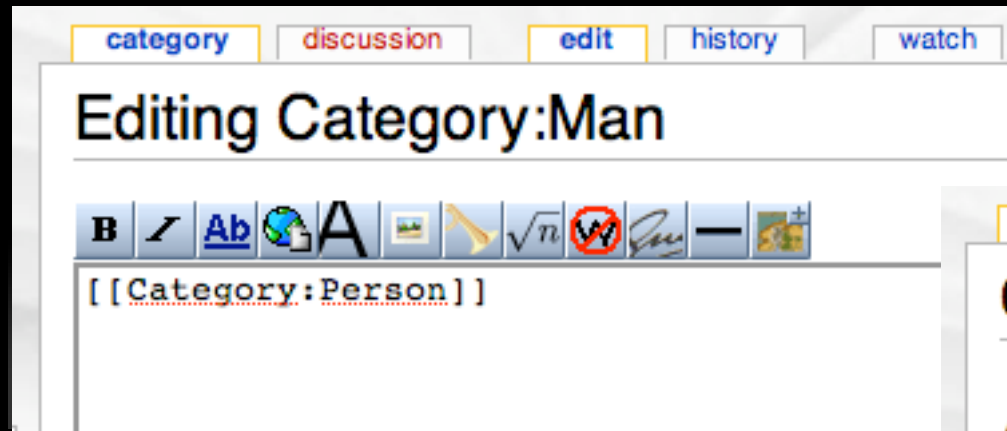
## An example RDF Schema

Annotation of WWW resources and *semantic links*

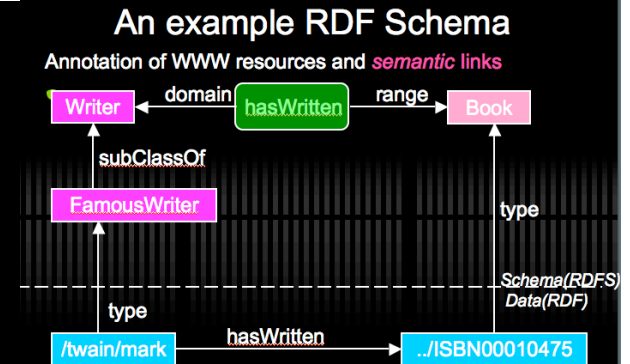
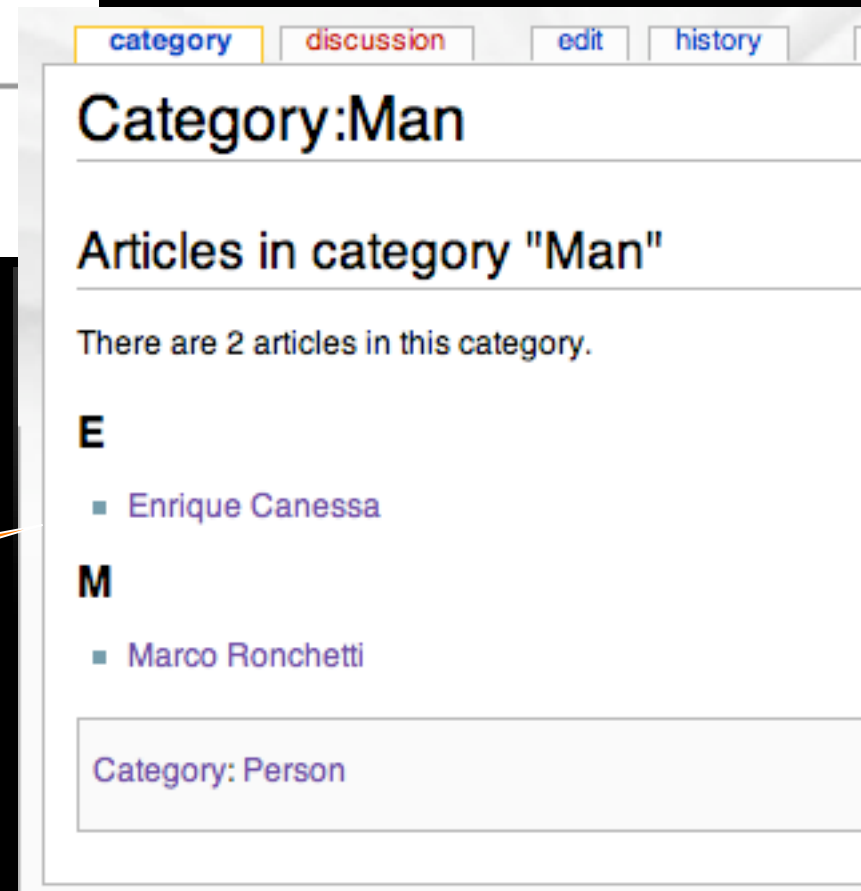


*Subclass  
(subcategory) of*

# Class <-> Category



- ✓ Extensional description
  - ✓ List of all instances
  - ✓ But: only direct ones



# Categories

- ✓ Informal description
  - ✓ Can be discussed
  - ✓ Can be edited

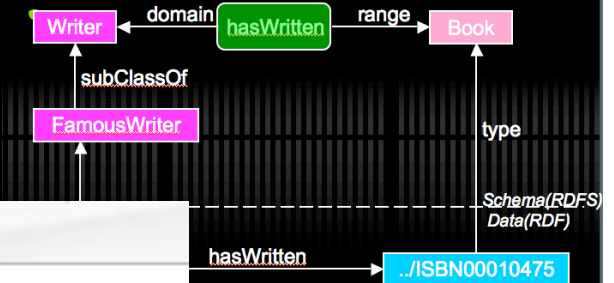


The screenshot shows a MediaWiki interface for a category page. At the top, there is a navigation bar with buttons: [category](#), [discussion](#), [edit](#), [history](#), [protect](#), and [delete](#). Below this is the title 'Category:Tutor'. A description follows: 'A tutor is a person that gives a course, talk, tutorial, or similar at the'. Below the description is the heading 'Articles in category "Tutor"'. A message states 'There are 2 articles in this category.' Below this, there are two sections: 'D' with a list item '▪ [Denny Vrandecic](#)' and 'P' with a list item '▪ [Peter Haase](#)'. At the bottom, there is a box containing the text 'Category: [Person](#)'.

# Relation $\leftrightarrow$ Property

## An example RDF Schema

Annotation of WWW resources and *semantic links*



property discussion edit history move watch

### Editing Property:Has nationality

**B** *I* **Ab** **A**  $\sqrt{n}$

Property that links a `[[person]]` to a `[[country]]`

*There are pages  
describing  
properties*

property discussion edit history move watch

### Property:Has nationality

Property that links a `person` to a `country`

#### Pages using the property "Has nationality"

Showing 2 pages using this property.

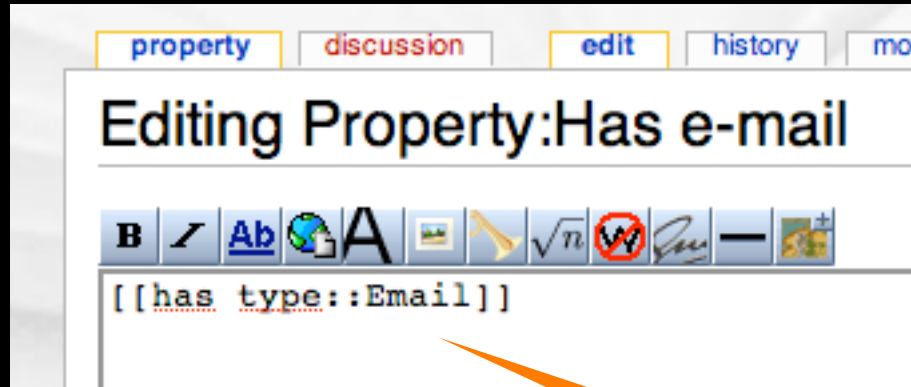
**E**

Enrique Canessa + Chile +

**M**

Marco Ronchetti + Italy +

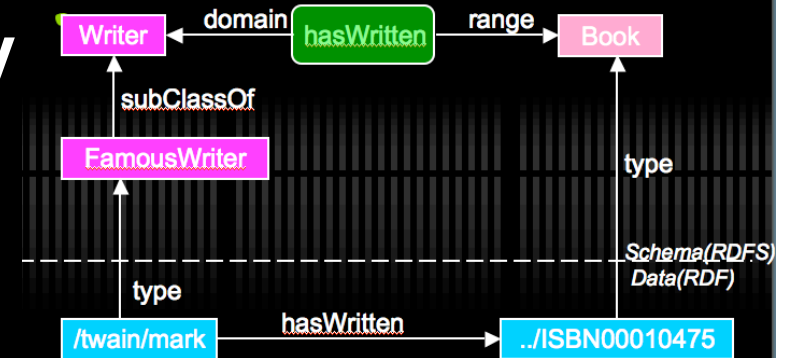
# Relation $\leftrightarrow$ Property



*Datatype definition*

## An example RDF Schema

Annotation of WWW resources and *semantic links*



# Data values and types

- ✓ Attributes like [[birthdate::February 27 1978]] or [[population::3,635,389]] must know the **type** of the value
- ✓ This is done by adding [[has type::T]] on the page of the attribute
- ✓ Available, predefined types:

- Annotation URI

- Date

- Email

- Enumeration

- Float

- Geographic coordinate

Integer

Page

String

Temperature

Text

URL



# Special:Categories



The screenshot shows the 'special' tab selected in a blue box. Below it, the title 'Categories' is displayed in a large, bold font. A horizontal line separates the title from the content. The text 'The following categories exist in the wiki.' is followed by a list of categories, each preceded by a blue square icon. The categories are: City (3 members), Country (1 member), Man (2 members), Organizer (1 member), Person (2 members), Querypage (2 members), and Speaker (1 member). Navigation links are provided at the top and bottom of the list: '(first | last) View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500)'.

special

## Categories


The following categories exist in the wiki.

(first | last) View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500)

- City (3 members)
- Country (1 member)
- Man (2 members)
- Organizer (1 member)
- Person (2 members)
- Querypage (2 members)
- Speaker (1 member)

(first | last) View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500)

# Special:Properties



[special](#)

## Properties

The following properties are defined for this page:

Showing below up to 50 items (previous 50) (next 50) (20 | 50 | 100 | 250 | 500)

This type is among the standard datatypes of this wiki.

1. [Belongs to country](#) of type [Page](#) (3) ⚠
2. [Has capital](#) of type [Page](#) (1) ⚠
3. [Has e-mail](#) of type [Email](#) (2) ⚠
4. [Has nationality](#) of type [Page](#) (2) ⚠
5. [Has population](#) of type [Number](#) (4) ⚠
6. [Located in](#) of type [Page](#) (1) ⚠
7. [Testproperty](#) of type [Page](#) (1) ⚠

View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500)

# Special:Ask



special

Search by entering a query into the search field below. Further information is given on the [help page for semantic search](#).

Sort by column  Ascending ▼

Find results

# Query examples - Category

For example, the query:

`[[Category:Teacher]]`

is a query for all pages within the category **Teacher**, i.e. for all teachers. If you enter this in Special:Ask and click "Find results", SMW executes the query and displays results as a simple list of all requested pages. If there are many results, they can be browsed via the navigations links at the top and bottom of the query results

# Query examples - Subcategories

 For example, the query:

`[[Category:Person]]`

Will find all pages in the categories **Teachers**, **Students** and **Organizer** if these categories are subcategories of **Person**

## Query examples - combining queries (AND)

For example, the query:

```
[[Category:Person]] [[has nationality::Italy]]
```

Will find all items in category Person that have the property of being italian. (AND)

## Query examples - combining queries (OR)

For example, the query:

`[[Category:Organizer II Teacher]]`

Will find all items that are category Organizer OR in category Teacher (Set Union).

`[[Category:Organizer]] II [[has nationality::Italy]]`

Will find all items that are category Person PLUS (Union) all those that have the property of being italian. (OR)

# Query examples - Properties

For example, the query:

```
[[has nationality::Italy]]
```

Will find all occurrences that have the specified property.

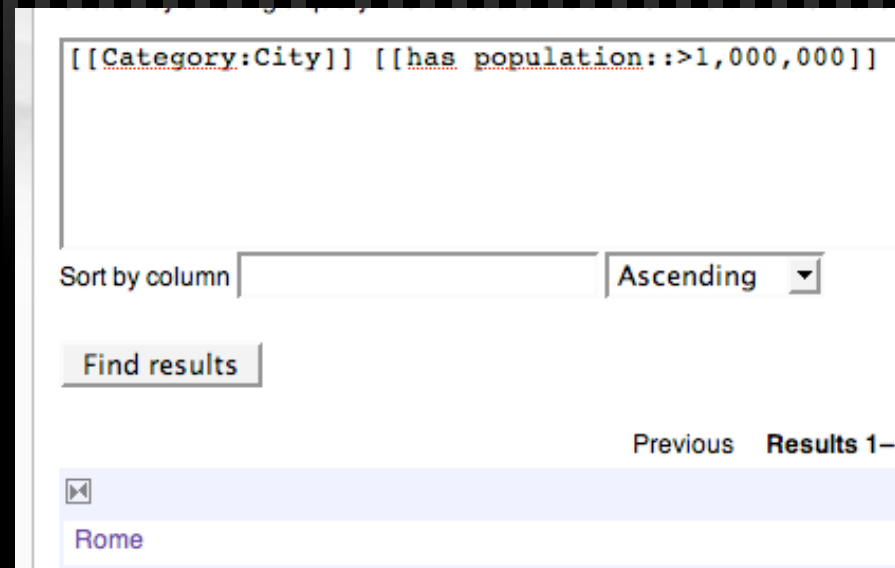


# Query examples - conditions on attributes

For example, the query:

`[[Category:City]] [[Has population>1,000,000]]`

Will find all pages in the category **City**, having more than one million inhabitants.



The screenshot shows a web-based query interface. At the top, a text box contains the query `[[Category:City]] [[has population:>1,000,000]]`. Below the text box, there is a "Sort by column" input field and a dropdown menu set to "Ascending". A "Find results" button is located below the sorting options. At the bottom right, there are links for "Previous" and "Results 1-". The results section shows a single entry, "Rome", with a small icon to its left.

# All cities having a has population property

`[[Category:City]] [[has population::+]]`

special

Search by entering a query into the search field below. Further information

`[[Category:City]] [[has population::+]]`

Sort by column  Ascending ▾

Find results

Previous Results 1–

|         |
|---------|
| ☒       |
| Rome    |
| Trento  |
| Trieste |

# All cities having and their population

`[[Category:City]] [[has population::*]]`

special



Search by entering a query into the search field below. Further information i

`[[Category:City]] [[has population::*]]`

Sort by column  Ascending ▾

Find results

Previous Results 1–3

|  |  Has population |
|---|--|
| Rome  | 2,706,428  |
| Trento  | 112,142  |
| Trieste   | 208,621  |

Previous Results 1–3

cancel







Special

# Embedding queries into pages

<ask>...</ask>

article discussion edit history move watch

Editing Person







B ↗ Ab A    $\sqrt{n}$     

List of people in the Category Person:  
<ask link="all">[[Category:Person]] [[Category:\*]] [[Has e-mail::\*]] [[Has nationality::\*]]</ask>  
[[Category:Querypage]]

article discussion edit history move watch

Person

List of people in the Category Person:

|  |  Category |  Has e-mail               |  Has nationality |
|---|--|--|---|
| Enrique Canessa   | Man<br>Organizer<br>Person   | canessae@ictp.it          | Chile   |
| Marco Ronchetti   | Man<br>Person<br>Speaker   | marco.ronchetti@unitn.it  | Italy   |

Category: Querypage

# Formatting and sorting



See

[http://ontoworld.org/wiki/Help:Inline\\_queries](http://ontoworld.org/wiki/Help:Inline_queries)

# Social aspects



- ✓ You are free to define categories and properties, but...
  - ✓ How to decide which properties and categories are important?
  - ✓ How to define the properties or categories?
  - ✓ How to ensure high quality data? What does it mean?
  - ✓ How to control the wiki knowledge base and its growth?

# Querying and social aspects



- ✓ Querying can only be done on aligned vocabularies
  - ✓ If half of the people use “affiliation” and the other half “works for” you cannot query the knowledge easily
- ✓ Inside SMW, information integration usually happens with social tools, not with technology
- ✓ Gardening tools can help with aligning vocabularies, but not replace them
  - ✓ Tools that allow you to rename a property throughout the wiki
  - ✓ Or to join two different names



# Exporting the data

✓ Every page can export its knowledge as RDF

edit history protect delete mo

C

He is from Croatia, but lives in Germany

ic ⓘ RDF feed

```
xmlns:wiki="&wiki;"
xmlns:property="&property;"
<!-- Ontology header -->
<owl:Ontology rdf:about="">
  <smw:exportDate rdf:datatype="http://www.
</owl:Ontology>
<!-- exported page data -->
<smw:Thing rdf:about="&wiki;Denny_Vrandecic">
  <rdfs:label>Denny Vrandecic</rdfs:label>
  <smw:hasArticle rdf:resource="&wikiurl;De
  <rdfs:isDefinedBy rdf:resource="&wikiurl;
  <rdf:type rdf:resource="&wiki;Category-37
  <rdf:type rdf:resource="&wiki;Category-37
  <property:Affiliation rdf:resource="&wiki
  <property:Located_in rdf:resource="&wiki;
  <property:Nationality rdf:resource="&wiki
</smw:Thing>
<!-- auxilliary definitions -->
<smw:Thing rdf:about="&wiki;Croatia">
  <rdfs:label>Croatia</rdfs:label>
  <smw:hasArticle rdf:resource="&wikiurl;C1
  <rdfs:isDefinedBy rdf:resource="&wikiurl;
</smw:Thing>
<owl:ObjectProperty rdf:about="&property;Nationality">
```

# Go to the wiki!

- ✓ If you are e.g. Bjorn Hassler, and your user page is Bjorn:
  - ✓ Copy the content of your **User:Bjorn** page into a new page called **Bjorn Hassler**
  - ✓ Add to it the right categories (e.g. Man, Teacher)
  - ✓ Add to it the right properties and values (e.g. **Has nationality**, **Has e-mail**)
  - ✓ Replace the content of your old User: page **User:Bjorn** with a link to your new page **[[Bjorn Hassler]]**
  - ✓ Go to the Special:Ask page and play with queries
- ✓ Discuss in group and propose new Categories and Properties