SMWCon Fall 2016
September 28 to 30, Frankfurt am Main

Introduction and tutorial to Semantic MediaWiki

Karsten Hoffmeyer, WikiHoster.net
September 28, 2016
Overview

• What does semantic mean?

• What is Semantic MediaWiki?

• How does it work?

• How-tos and examples galore!
  – Setting values
  – Querying pages
What does semantic mean?
What does semantic mean?

sem•an•tic (sĭ-măn'tĭk)
adj. Of or relating to meaning, especially meaning in language.

→ Data is given an explicit meaning.
What is Semantic MediaWiki?
SMWCon Fall 2016 - Introduction and tutorial

What is Semantic MediaWiki?

• First proposed in August 2005 at Wikimania in Frankfurt am Main
  – Paper by Markus Krötzsch, Denny Vrandečić and Max Völkel

• First released in September 2005 (v0.1)
  – Extension to the MediaWiki software

• First stable release in December 2012 (v1.0)
  – Full-fledged framework with many spin-off extensions since then
SMWCon Fall 2016 - Introduction and tutorial

What is Semantic MediaWiki?

- Aims at making data more readable for humans and machines
  - Lets you store and query data within the wiki's pages
  - Lets you publish data via the Semantic Web

- Can be used to transform a wiki into a powerful information or data management system
  - Best used if out of the box software does not provide all the required functionality
  - Best used if creating a software with the required functionality is too expensive
How does it work?
SMWCon Fall 2016 - Introduction and tutorial

How does it work?

• A fact consists of three parts:
  – Wikipage (subject), e.g. “Berlin”
  – Property (predicate), e.g. “Has population”
  – Value (object), e.g. “3,520,031”

Fact:

→ Berlin has a population of 3,520,031 people.
SMWCon Fall 2016 - Introduction and tutorial

How does it work?

• These three parts can be split into a relation and a statement:
  - Relation: Berlin has a population.
  - Statement: The population is “3,520,031”.
How does it work?

- A statement consists of a property and its value:
  - Property (predicate), e.g. “Has population”
  - Value (object), e.g. “3,520,031”

→ Adding a statement to a page (subject) is called annotation.
A property must have a datatype:

- Needed to give the property a certain meaning.
- Needed to be able to also do a formal check of the assigned value.
- Needed to allow a certain behaviour, i.e. add links, add formatting, etc.
How does it work?

• A property must have a datatype:
  
  – There are a lot of datatypes, e.g. “Page”, “Text”, “Number”, “Email”, “URL”, “Telephone Number”, “Temperature”, “Boolean”, etc.
  
  – A property can only have one datatype.
A property must have a datatype (example):

- “Has population” is of datatype “Number”.

  If you add the value “abc” to the property “Has population” it knows that this is not a number. Thus the value does not have a meaning and must be incorrect.
A property must have a datatype (example):

- Created in the “Property” namespace.

- Page: “Property:Has population”

- Content: `[[Has type::Number]]`
How does it work?

- A property can be a “special property”:
  - It has a predefined meaning and purpose.
  - It cannot be created manually.
  - It cannot be changed and used otherwise, i.e. must be unique.
  - There are a lot of special properties, e.g. “Has type”, “Allows value”, “Modification date”, “Has improper value for”, “Has subobject”, “Has query”, etc.
A property can be a “special property” (examples):

- Special property “Has type” assigns the datatype to a user defined property (manual assignment)

- Special property “Has improper value for” stores incorrect values assigned to a property (automatic assignment)
How-tos and examples galore!
Setting values
• Setting values (syntax):
  - In-text annotation (single values for one property)
    
    ```
    [[Property name::Property value]]
    ```
    The property value is directly shown on the page.

  - `#set` annotation (single values for one property)

    ```
    {{#set:Property name=Property value}}
    ```
    The property value is not directly shown on the page.
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Setting values.

- Setting values (syntax):
  - In-text annotation (multiple values for one property)

        [[[Property name::Property value 1]]]
        [[[Property name::Property value 2]]]

    The property values are directly shown on the page.

  - \#set annotation (multiple values for one property)

        {{\#set:
            Property name=Property value 1; Property value 2|+sep=;
        }}

    The property values are not directly shown on the page.
Let's work with a real life use case:
Organizing information about books.

- Information to be stored:
  - Title of the book
  - Author of the book
  - Publisher of the book
  - Publishing year of the book
  - Publishing country of the book
  - ISBN of the book
  - Rating for the book
Let's work with a real life use case:

Organizing information about books.

- Needed properties and their datatypes:
  - “Has book title” → datatype “Text”
  - “Has book author” → datatype “Page”
  - “Has book publisher” → datatype “Page”
  - “Has book publishing year” → datatype “Date”
  - “Has book publishing country” → datatype “Page”
  - “Has book rating” → datatype “Number”
Let's work with a real life use case:
Organizing information about books.

- Syntax to store the information:

  This page is about the book called [[Has book title::The Picture of Dorian Gray]] written by [[Has book author::Oscar Wilde]]. It was published by [[Has book publisher::Titan Books]] in the [[Has book publishing country::UK]], [[Has book publishing year::2015]]. The ISBN is [[Has book ISBN::978-1783293650]]. My personal rating for this book is [[Has book rating::1]].

[[Category:Book]]

Probably one would prefer a tabular instead of a text presentation for this kind of subject but that's entirely up to you.
Let's work with a real life use case: Organizing information about books.

Here you cannot see if the information is stored semantically. Therefore use special page “Browse” via the sidebar to have a look and see what is stored.
Let's work with a real life use case:
Organizing information about books.
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Relevant documentation:
  – Property naming
  – Datatypes
  – In-text annotation
  – #set-annotation
  – Special properties
  – Special page "Browse"
How-tos and examples galore!
Querying pages
• Querying pages (syntax):

  - `#show query`

  `{{#show: Page name | ?Property name }}`

  * Display only a single property value for a single page.
  
  * This is not about selecting pages which is what Semantic MediaWiki is actually there for.
• Querying pages (syntax):
  
  - `#ask` query or inline query or semantic query

• Consists of two parts
  
  - Query condition
    
    This is about selecting the pages containing information.
  
  - Printout statement
    
    This is about displaying the information found on the queried pages.
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages (syntax):
  - `#ask query`

• Query condition (selecting pages)

```mediawiki
{{#ask:
  [[Category:Book]]
  [[Has book title::+]]
  printout statement
}}
```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages (syntax):

  - `#ask query`

- Printout statement (displaying information)

```{#ask:
  query condition
  | ?Has book title
  | ?Has book author
  | ?Has book publishing year
  | ?Has book ISBN
  | ?Has book rating
}
```
SMWCon Fall 2016 - Introduction and tutorial
How-tos and examples galore! Querying pages.

• Querying pages (syntax):
  - `#ask query`

• Query condition + printout statement

```{#ask:
[[Category:Book]]
[[Has book title::+]]
|?Has book title
|?Has book author
|?Has book publishing year
|?Has book ISBN
|?Has book rating
}
```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages:
  - `#ask query (result)`

... but the first column is missing a label!
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages (syntax):

  - \#ask query

```{{#ask:
  [[Category:Book]]
  [[Has book title::+]]
  |?Has book title
  |?Has book author
  |?Has book publishing year
  |?Has book ISBN
  |?Has book rating
  |mainlabel=title
}}```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages:
  - `#ask query (result)`

... but the book title is duplicated!
SMWCon Fall 2016 - Introduction and tutorial
How-tos and examples galore! Querying pages.

• Querying pages (syntax):

  - `#ask query`

```markdown
{{#ask:
[[Category:Book]]
[[Has book title::+]]
|?Has book author
|?Has book publishing year
|?Has book ISBN
|?Has book rating
|mainlabel=title
}}
```
SMWCon Fall 2016 - Introduction and tutorial
How-tos and examples galore! Querying pages.

- **Querying pages:**
  - `#ask query (result)`

... but the column labels should be changed!
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages (syntax):
  
  - `#ask query`

  ```
  {{#ask:
    [[Category:Book]]
    [[Has book title::+]]
    | ?Has book author=author
    | ?Has book publishing year=year
    | ?Has book rating=rating
    | mainlabel=title
  }}
  ```
SMWCon Fall 2016 - Introduction and tutorial
How-tos and examples galore! Querying pages.

• Querying pages:
  - `#ask query (result)`

... but the column labels should not be linking to the property page!
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages (syntax):

  - `#ask query

    {{#ask:
      [[Category:Book]]
      [[Has book title::+]]
      | ?Has book author=author
      | ?Has book publishing year=year
      | ?Has book rating=rating
      | mainlabel=title
      | headers=plain
    }}
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages:
  – `#ask query (result)`

... but the table should be sorted by year!
• Querying pages (syntax):
  
  - `#ask query`

```{#ask:
  [[Category:Book]]
  [[Has book title::+]]
  | ?Has book author=author
  | ?Has book publishing year=year
  | ?Has book rating=rating
  | mainlabel=title
  | headers=plain
  | sort=Has book publishing year
}
```
SMWCon Fall 2016 - Introduction and tutorial
How-tos and examples galore! Querying pages.

• Querying pages:
  – `#ask` query (result)

... but the year should be sorted in descending order!
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages (syntax):
  
  - `#ask query`

```{#ask:
  [[[Category:Book]]]
  [[[Has book title::+]]]
  | ?Has book author=author
  | ?Has book publishing year=year
  | ?Has book rating=rating
  | mainlabel=title
  | headers=plain
  | sort=Has book publishing year
  | order=descending
}
```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages:
  - \#ask query (result)

... but the author should also be sorted but in ascending order!
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages (syntax):

  - \#ask query

  {{\#ask:
  [[Category:Book]]
  [[Has book title::+]]
  |?Has book author=author
  |?Has book publishing year=year
  |?Has book rating=rating
  |mainlabel=title
  |headers=plain
  |sort=Has book publishing year,Has book author
  |order=descending,ascending
  }}
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages:
  – \#ask query (result)

<table>
<thead>
<tr>
<th>title</th>
<th>author</th>
<th>year</th>
<th>ISBN</th>
<th>rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Das Glasperlenspiel</td>
<td>Hermann Hesse</td>
<td>2015</td>
<td>978-3518463574</td>
<td>1</td>
</tr>
<tr>
<td>The Picture of Dorian Gray</td>
<td>Oscar Wilde</td>
<td>2015</td>
<td>978-1783293650</td>
<td>1</td>
</tr>
<tr>
<td>Venus in Furs</td>
<td>Leopold von Sacher-Masoch</td>
<td>2008</td>
<td>978-1604501292</td>
<td>3</td>
</tr>
<tr>
<td>The Turn of the Screw</td>
<td>Henry James</td>
<td>1991</td>
<td>978-0486266848</td>
<td>2</td>
</tr>
<tr>
<td>Il Gattopardo</td>
<td>Giuseppe Tomasi di Lampedusa</td>
<td>1990</td>
<td>978-8807810282</td>
<td>2</td>
</tr>
<tr>
<td>Johann Christof</td>
<td>Romain Rolland</td>
<td>1977</td>
<td>978-3423020329</td>
<td>1</td>
</tr>
<tr>
<td>Siddhartha</td>
<td>Hermann Hesse</td>
<td>1974</td>
<td>978-3518366820</td>
<td>1</td>
</tr>
</tbody>
</table>

... but the values for year and rating should be centered!
Querying pages (syntax):

- `#ask query`

```{}
{{#ask:
[[Category:Book]]
[[Has book title::+]]
| ?Has book author=author
| ?Has book publishing year=year|+align=center
| ?Has book rating=rating|+align=center
| mainlabel=title
| headers=plain
| sort=Has book publishing year,Has book author
| order=descending,ascending
}}
```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages:
  - `#ask query (result)`

... but I would like to have a short introductory sentence!
• Querying pages (syntax):

  - #ask query

```markdown
{{#ask:
  [[Category:Book]]
  [[Has book title::*+]]
  | ?Has book author=author
  | ?Has book publishing year=year | +align=center
  | ?Has book rating=rating | +align=center
  | intro=<b>This table shows the books I have stored here:</b>
  | mainlabel=title
  | headers=plain
  | sort=Has book publishing year,Has book author
  | order=descending,ascending
}}
```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages:
  – `#ask query (result)`

![Books table]

... but I would like show only the first three results!
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages (syntax):

  ```
  #ask query
  {{#ask:
    [[Category:Book]]
    [[Has book title::+]]
    |?Has book author=author
    |?Has book publishing year=year|+align=center
    |?Has book rating=rating|+align=center
    intro=<b>This table shows the books I have stored here:</b>
    mainlabel=title
    headers=plain
    sort=Has book publishing year,Has book author
    order=descending,ascending
    limit=3
  }}
  ```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages:
  – #ask query (result)

... in English and a bit more specific please!
Querying pages (syntax):

- `#ask query`
  
  ```
  {{#ask:
    [[Category:Book]]
    [[Has book title:::+]]
    | ?Has book author=author
    | ?Has book publishing year=year|+align=center
    | ?Has book rating=rating|+align=center
    | intro=<b>This table shows the books I have stored here:</b>
    | mainlabel=title
    | searchlabel=... more books
    | headers=plain
    | sort=Has book publishing year,Has book author
    | order=descending,ascending
    | limit=3
  }}
  ```
SMWCon Fall 2016 - Introduction and tutorial
How-tos and examples galore! Querying pages.

• Querying pages:
  – #ask query (result)

What happens if there are any results?
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

● Querying pages (syntax):

- `#ask query`

```{#ask:
[[Category:Book]]
[[Has book title::+]]
|?Has book author=author
|?Has book publishing year=year|+align=center
|?Has book rating=rating|+align=center
intro=<b>This table shows the books I have stored here:</b>
mainlabel=title
searchlabel=... more books
default=<b>Currently no bookes have been stored yet:</b>
headers=plain
sort=Has book publishing year,Has book author
order=descending,ascending
limit=3
}
```
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages:
  - `#ask query (result)`

Can I also download this information?
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Querying pages (syntax):
  - #ask query

{{#ask:
  [[Category:Book]]
  [[Has book title::+]]
  ?Has book author=author
  ?Has book publishing year=year
  ?Has book rating=rating
  mainlabel=title
  searchlabel=CSV download of stored books
  default=&lt;b&gt;Currently no bookes have been stored yet.&lt;/b&gt;
  sort=Has book publishing year,Has book author
  order=descending,ascending
  format=csv
}}
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

- Querying pages:
  - `#ask query (result)`

Now I am happy!
SMWCon Fall 2016 - Introduction and tutorial

How-tos and examples galore! Querying pages.

• Relevant documentation:
  - Selecting pages
  - Displaying information
  - Inline queries
Thank you!