SMWCon Fall 2017

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Introduction and tutorial to Semantic MediaWiki

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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.

→ Basically information is given an explicit meaning.

What is Semantic MediaWiki?

What is Semantic MediaWiki?

- First proposed in August 2005 at Wikimania in Frankurt am Main, Germany
  - Paper by Markus Krötzsch, Denny Vrandečić and Max Völkel
    - "Wikipedia and the Semantic Web – The MissingLinks"

What is Semantic MediaWiki?

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

- First stable release in December 2007 (v1.0)

- Upcoming stable release in Q4.2017 or Q1. 2018 (v3.0)
  - Now a full-fledged framework extending MediaWiki with many spin-off extensions

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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

What is Semantic MediaWiki?

- Can be used to transform a wiki into a powerful information and/or data mangement system

    – Best used if out ot the box software does not provide the required functionality

    – Best used if creating a software with the required funtionality is to expensive

How does it work?

How does it work?

Fact:

➤ Berlin has a population of 3,520,031 people.

A fact consists of three parts:

- Wikipage (subject), e.g. "Berlin"
- Property (predicate), e.g. "Has population"
- Value (object), e.g. "3,520,031"

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"

value

Berlin

Population   3 500 000

property
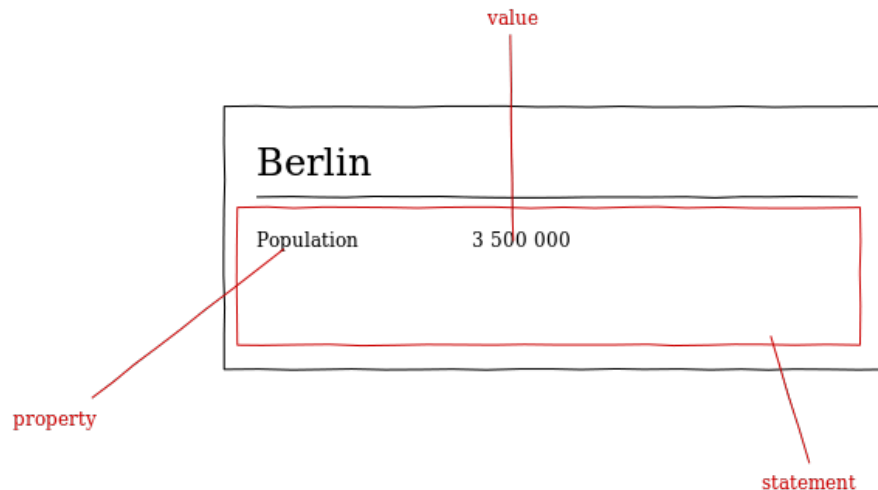
statement

➤ Adding a statement to a page (subject) is called annotation.

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How does it work?

- ## A property must have a datatype:

  – ## Needed to give the property a certain meaning

    e.g. a property of datatype "Telephone number" can only validely hold telephone numbers

    – Page namespace: "Property"
    – Page name: "Has telephone number"
    – Page content: `[[Has type::Telephone number]]`
      ↳ This is the datatype assignment.

    Default is datatype "Page" if nothing was explicitely added.

How does it work?

- ## A property must have a datatype:

  - Needed to be able to also do a formal check of the assigned value

    e.g. a property value of "abc" annotated to a property of datatype "Telephone number"

    ➤ An error message will be issued.

How does it work?

- A property must have a datatype:

  – Needed to allow a certain behaviour, i.e. add links, add formatting, etc.

    e.g. a property value of "+49-30-45-08-49-40" added to a property of datatype "Telephone number" will auto-matically be linked and additionally preceeded with URI prefix "tel:"

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.

    ➤ See "Special:Types" on your wiki

  - A property can only use one datataype.

How does it work?

- A property can be a "special property":

  – It has a predefined meaning and purpose

    e.g. "Has type" to hold the datatype information

  – It cannot be created manually since it is already provided by Semantic MediaWiki

How does it work?

- ## A property can be a "special property":

  - It cannot be changed and used otherwise, i.e. must be unique in naming and usage.

  - There are a lot of special properties, e.g. "Has type", "Allows value", "Modification date", "Has improper value for", "Has subobject", "Has query", etc.

    ➜ See "Special:Properties" on your wiki (marked in italics)

How does it work?

- ## A property can be a "special property"

  – Some special properties are assigned manually

    e.g. special property "Has type" which assigns the datatype to a user defined property

  – Some special properties are assigned automatically

    e.g. "Has improper value for" stores incorrect values assigned to a property

How-tos and examples galore!

Annotate information/data

How-tos and examples galore! Annotate information/data.

- ## Setting values (syntax):

    - ### In-text annotation (single value for one property)

        ```
        [[Property name::Property value]]
        ```

        The property value is directly shown on the page. Note that this is not working with restricted characters as part of the data value, e.g. "::" as in IPv6 addresses: anntoation must use the #set parser function.

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How-tos and examples galore! Annotate information/data.

- ## 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.

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How-tos and examples galore! Annotate information/data.

- ## Setting values (syntax):

    - ### In-text annotation (single value for one property)

        `[[Property name::Property value| ]]`

        The property value is not directly shown on the page. Probably better here: annotation using the `#set` parser function.

How-tos and examples galore! Annotate information/data.

- ## Setting values (syntax):
  - – `#set` annotation (single value for one property)

    `{{#set:Property name=Property value}}`

    The property value is not directly shown on the page. Note that this must be used if there are restricted characters as part of the data value, e.g. ":" as in IPv6 addresses:

    `{{#set:Has IPv6 address=2001:db8::1428:57ab}}`

    Note that there is a way to directly show values added via `#set`.

How-tos and examples galore! Annotate information/data.

- ## Setting values (syntax):

  - – `#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. Uses the `+sep` parameter.

How-tos and examples galore! Annotate information/data.

- ## Setting values (syntax):

  - ### `#set` annotation (single value for one property)
    ```
    {{#set:
     Property name=Property value
     |template=Show property value
    }}
    ```

    The property value is directly shown on the page. Uses the `template` parameter.

    Template "Show property value":

    ```
    {{{value}}}
    ```

    The annotated data value is directly shown with `{{{value}}}`.

How-tos and examples galore! Annotate information/data.

- ## Setting values (syntax):
  - – `#set` annotation (multiple values for one property)

    ```
    {{#set:
     Property name=Property value 1; Property value 2
     |+sep=;
     |template=Show property values
    }}
    ```

    The property value is directly shown on the page. Uses the `template` parameter. Requires ParserFunctions extension (`#if`).

    Template "Show property values":

    ```
    {{{value}}}{{#if: {{{last-element}}} | |, }}
    ```

    The trailing separator is being avoided with `{{{last-element}}}`.

How-tos and examples galore! Annotate information/data.

- ## 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

How-tos and examples galore! Annotate information/data.

- ## 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 ISBN" ➤ datatype "Text"
    - "Has book publishing country" ➤ datatype "Page"
    - "Has book rating" ➤ datatype "Number"

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How-tos and examples galore! Annotate information/data.

- ## Let's work with a real life use case:

  Organizing information about books.

  - ## Syntax to store and annotate 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 last 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]]
    ```
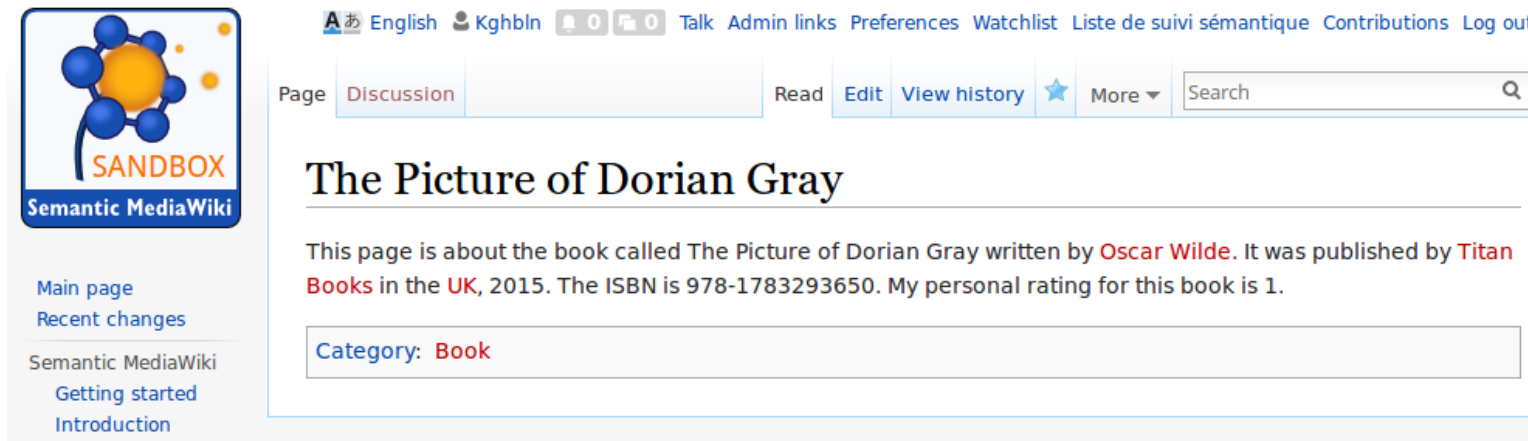
    Most probably one would prefer a tabular instead of a text presentation for this kind of subject but that's entirely up to you. Also you will most probably rather use a form (requires the Page Forms extension) and a template to edit and display the data.

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How-tos and examples galore! Annotate information/data.

- ## 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 annotations are stored. ➔

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How-tos and examples galore! Annotate information/data.

- ## Let's work with a real life use case:

  Organizing information about books.

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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

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 acually there for.

How-tos and examples galore! Querying pages.

- # Querying pages (syntax):

  - `#ask` or inline or embedded or semantic query

    - Consists of two parts

      - Query condition

        � Which pages containing information should be selected.

      - Printout statement with display format

        ➤ Which information found on the selected pages should be displayed and how should it be displayed.

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How-tos and examples galore! Querying pages.

- ## Querying pages (syntax):

  - ### `#ask` query

    - #### Query condition (selecting pages)

```
{{#ask:
 [[Category:Book]]
 [[Has book title::+]]
 printout statement
}}
```

How-tos and examples galore! Querying pages.

- ## Querying pages (syntax):

  - #ask query

    - Printout statement (displaying information) with default thus basic display formatting

      ```
      {{#ask:
       query condition
       |?Has book title
       |?Has book author
       |?Has book publishing year
       |?Has book ISBN
       |?Has book rating
      }}
      ```

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
}}
```

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How-tos and examples galore! Querying pages.

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

… but the first column is missing a label!

- ## 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
}}
```

How-tos and examples galore! Querying pages.

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

… but the book title is duplicated!

How-tos and examples galore! Querying pages.

- ## Querying pages (syntax):

  - `#ask` query

```
{{#ask:
 [[Category:Book]]
 [[Has book title::+]]
 |?Has book author
 |?Has book publishing year
 |?Has book ISBN
 |?Has book rating
 |mainlabel=title
}}
```

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

… but the column labels should be changed!

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 ISBN=ISBN
 |?Has book rating=rating
 |mainlabel=title
}}
```

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How-tos and examples galore! Querying pages.

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

… but the column labels should not be linking to the property page!

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 ISBN=ISBN
 |?Has book rating=rating
 |mainlabel=title
 |headers=plain
}}
```

How-tos and examples galore! Querying pages.

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

… but the tabel should be sorted by year!

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 ISBN=ISBN
 |?Has book rating=rating
 |mainlabel=title
 |headers=plain
 |sort=Has book publishing year
}}
```

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

… but the year should be sorted in descending order!

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 ISBN=ISBN
 |?Has book rating=rating
 |mainlabel=title
 |headers=plain
 |sort=Has book publishing year
 |order=descending
}}
```

How-tos and examples galore! Querying pages.

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

… but the author should also be sorted but in ascending order!

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 ISBN=ISBN
 |?Has book rating=rating
 |mainlabel=title
 |headers=plain
 |sort=Has book publishing year,Has book author
 |order=descending,ascending
}}
```

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How-tos and examples galore! Querying pages.

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

… but the values for year and rating should be centered!

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 ISBN=ISBN
 |?Has book rating=rating|+align=center
 |mainlabel=title
 |headers=plain
 |sort=Has book publishing year,Has book author
 |order=descending,ascending
}}
```

How-tos and examples galore! Querying pages.

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

… but I would like to have a short introductory sentence!

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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 ISBN=ISBN
 |?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
}}
```

- Querying pages:
  - #ask query (result)

… but I would like show only the first three results!

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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 ISBN=ISBN
 |?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
}}
```

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How-tos and examples galore! Querying pages.

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

… in English and a bit more specific please!

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 ISBN=ISBN
 |?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
}}
```

How-tos and examples galore! Querying pages.

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

Shouldn't the colums "title" and "author" be wider and of the same width?

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How-tos and examples galore! Querying pages.

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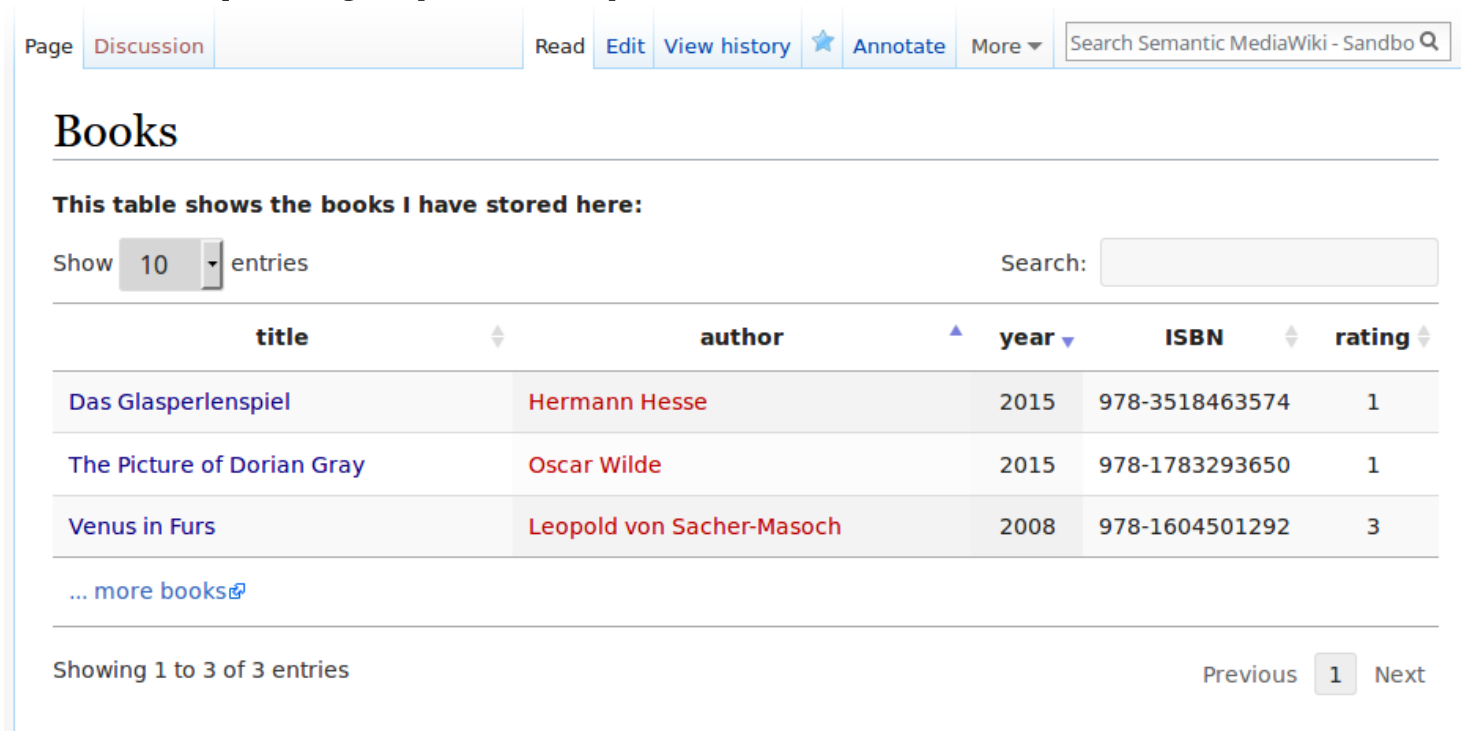 - `#ask` query

```
{{#ask:
 [[Category:Book]]
 [[Has book title::+]]
 |?=title|+width=20em
 |?Has book author=author|+width=20em
 |?Has book publishing year=year|+align=center
 |?Has book ISBN=ISBN
 |?Has book rating=rating|+align=center
 |intro=<b>This table shows the books I have stored here:</b>
 |mainlabel=-
 |searchlabel=... more books
 |headers=plain
 |sort=Has book publishing year,Has book author
 |order=descending,ascending
 |limit=3
}}
```

Note: SMW 3.0.0 or later only!

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How-tos and examples galore! Querying pages.

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

Isn't there a cool new predefined class (view) around?

How-tos and examples galore! Querying pages.

- ## Querying pages (syntax):

  - `#ask` query

```
{{#ask:
 [[Category:Book]]
 [[Has book title::+]]
 |?=title|+width=40%
 |?Has book author=author|+width=40%
 |?Has book publishing year=year|+align=center|+width=5%
 |?Has book ISBN=ISBN|+align=center|+width=10%
 |?Has book rating=rating|+align=center|+width=5%
 |intro=<b>This table shows the books I have stored here:</b>
 |mainlabel=-
 |searchlabel=... more books
 |headers=plain
 |sort=Has book publishing year,Has book author
 |order=descending,ascending
 |limit=3
 |class=datatable <!-- comes with width=100% -->
}}
```

Note: SMW 3.0.0 or later only!

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How-tos and examples galore! Querying pages.

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

Can I also provide a link to download this information?

How-tos and examples galore! Querying pages.

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

```
{{#ask:
 [[Category:Book]]
 [[Has book title::+]]
 |?=title|+width=20em
 ...
 |intro=<b>This table shows the books I have stored here:</b>
 |mainlabel=-
 |searchlabel=... more books
 |headers=plain
 |sort=Has book publishing year,Has book author
 |order=descending,ascending
 |limit=3
 |class=datatable
 |outro=→ {{#ask: ... }} <!-- Add #ask query no. 2 here -->
}}
```

How-tos and examples galore! Querying pages.
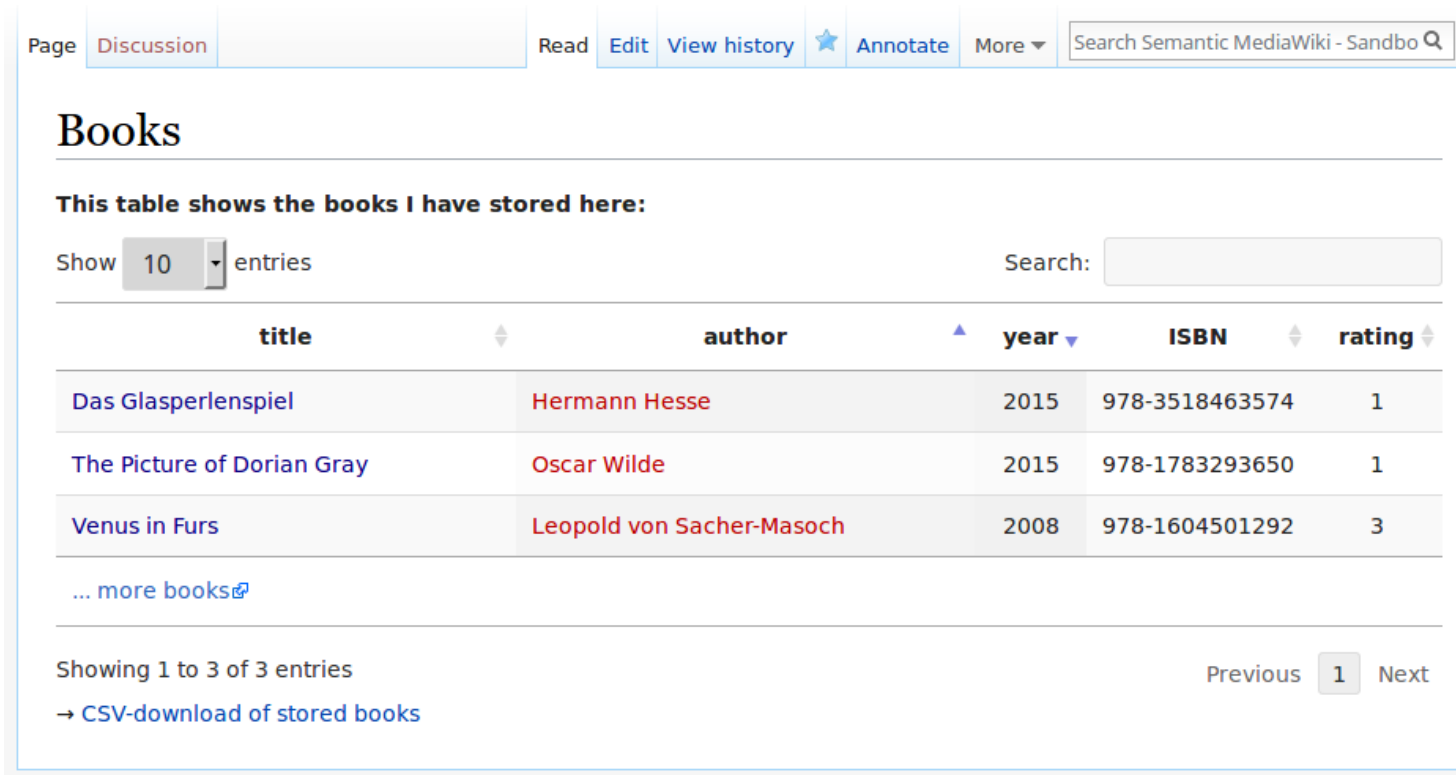
- ## Querying pages (syntax):
  - – `#ask` query no. 2

```
{{#ask:
 [[Category:Book]]
 [[Has book title::+]]
 |?Has book author=author
 |?Has book publishing year=year
 |?Has book ISBN=ISBN
 |?Has book rating=rating
 |mainlabel=title
 |searchlabel=CSV-download of stored books
 |sort=Has book publishing year,Has book author
 |order=descending,ascending
 |format=csv
}}
```

How-tos and examples galore! Querying pages.

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

Theoretically: What happens if there are no results?

How-tos and examples galore! Querying pages.

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

```
{{#ask:
 [[Category:Book]]
 [[Has book title::+]]
 |?=title|+width=20em
 ...
 |intro=<b>This table shows the books I have stored here:</b>
 |mainlabel=-
 |searchlabel=... more books
 |default=<b>No books have been stored yet.</b>
 |headers=plain
 |sort=Has book publishing year,Has book author
 |order=descending,ascending
 |limit=3
 |class=datatable
 |outro=→ {{#ask: ... }}
}}
```

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How-tos and examples galore! Querying pages.

- Relevant documentation:
  - Selecting pages
  - Displaying information
  - Inline queries

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Thank you!