



Semantic MediaWiki Applications

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Seminar: SMW-on-a-stick

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1. Introduction

Semantic MediaWiki (SMW) is a free, open-source extension to MediaWiki – the wiki software that powers Wikipedia – that lets you store and query data within the wiki's pages and turns a wiki into a powerful and flexible knowledge management system (SMW, 2014). The Transregional Collaborative Research Centre (TCRC) has the aim to create a technical, cognitive system to support the surgeon using SMW in its “Cognition-Guided Surgery” (CGS) project. While the virtue of Cognition-Guided Surgery is that it is similar to human assistance, it is better in the sense that it retains knowledge permanently, e.g. without forgetting, and reducing knowledge transmission problems due to workers fluctuation. Further, it is capable of accumulating information in large databases, which can be reused for future operations by any user (CGS, 2014). CGS is supposed to promote following functions:

1. To accumulate pre-, peri- and postoperative information.
2. To interpret information through the knowledge base.
3. To follow the operational procedure continuously.
4. To gather (only) relevant information.
5. To incorporate both factual and practical knowledge.
6. To estimate the current situation using available information.
7. To recommend the appropriate (reasonable) course of action.
8. To feedback results for the learning process.
9. To make empirical knowledge available for future use.

One of the fourteen projects of CGS is the “Knowledge-based Navigated Liver Surgery”, which is the focus of this seminar paper. It is well known that physicians not always have got a (sufficient) internet connection, to access the database. In many use-cases, physicians might have the need to annotate the database while working offline. To solve this problem we approach the “Semantic MediaWiki on-a-stick”, e.g. “Surgipedia on-a-stick”, where physicians could annotate patient information offline and then export it to the server via RDF (Resource Description Framework). Therefore, the aim of this seminar paper is

1. To test if Semantic MediaWiki works flawless on a Server based on a USB 2.0 memory stick.
2. To test if the Surgipedia is easily imported to the “virgin” SMW-on-a-stick.
3. To test if it is possible to annotate Patient data on a Stick, and then export it via RDF.
4. To test the performance of the SMW-on-a-stick in different Computers.

2. Method

To install Surgipedia on a memory flash drive, follow this steps:

1. Enter the Apachefriends website ¹ and download the latest stable XAMPP portable version. In this case I'm downloading XAMPP Portable Lite 1.8.3 PHP 5.5.
2. If you didn't download the .exe file, you can use 7-zip² to extract XAMPP to your usb stick. It takes around 24 minutes. Now you can enter the xampp file in your stick and double click xampp-control.exe to open the control panel and start both Apache and MySQL. Hint: Be sure that Skype is turned off! If Skype is running, Apache will eventually stop working.
3. Enter the download area of MediaWiki website³ and download the latest stable MediaWiki version, unpack it (if compressed) to `E:\xampp\htdocs\` and rename it to "surgipedia". In this case I'm downloading MediaWiki 1.22.1.
4. Download the surgipedia files from MediaWiki Exports of Surgipedia (e.g., for installing your own surgipedia locally)⁴ and copy that folder to `E:\xampp\htdocs\` and rename it to "surgipedia".
5. Install MediaWiki on XAMPP following the instructions of this Manual⁵. By now, Wikimedia should be successfully installed on your stick. Be sure of writing down the name of your database, user and password; you may need them in the future. My database is named "smw_onastick", the (localhost) user is named "user_smw" and my password is "wiwi2010"
6. Access the `E:\xampp\php\php.ini` file (again) and replace every "`\xampp`" for "`E:\xampp`". Save and restart Apache and MySQL from the XAMPP control panel. Although "renaming" the path might be dangerous, because other computers will name the USB-drive differently, this change is necessary because there has to be a defined path to the `php.exe` file in order to run the composer installer. Make sure that your drive is assigned with the letter "E:", since the Apache path installed in the drive has been changed and is dependent on the drive letter. Please follow the steps attached in A1 if your drive has been automatically assigned with another letter.
7. Make sure that the command "`extension=php_openssl.dll`" is included in the `php.ini` file. Replace "`;extension=php_openssl.dll`" for "`extension=php_openssl.dll`" to uncomment. Save and restart Apache and MySQL. This allows you to download files via https.
8. Enter the official composer website⁶ and download the `Composer-Setup.exe` installer. While running the installer, type (or browse) the path to your `php.exe` file e.g.: "`E:\xampp\php\php.exe`". By now, Composer should be successfully installed on your computer.

¹ <http://www.apachefriends.org/de/xampp-windows.html>

² <http://www.7-zip.de/download.html>

³ <http://www.mediawiki.org/wiki/Download>

⁴ <http://surgipedia.sfb125.de/wiki/Surgipedia>

⁵ http://www.mediawiki.org/wiki/Manual:Installing_MediaWiki_on_XAMPP

⁶ <http://getcomposer.org/download/>

9. Download the Extension Installer extension⁷, unpack it to `E:\xampp\htdocs\surgipedia\extensions\` and rename the folder (if necessary) to `\ExtensionInstaller\`.
10. Copy the `composer-example.json` file from `E:\xampp\htdocs\surgipedia\` to `E:\xampp\htdocs\surgipedia\extensions\ExtensionInstaller\` and rename it to `composer.json`. Then replace copy-pasting the source code from the installation Example for Semantic MediaWiki⁸.
11. Add the following code at the bottom of your `LocalSettings.php`: `require_once "$IP/extensions/ExtensionInstaller/ExtensionInstaller.php";`. Save and restart Apache and MySQL.
12. Download the latest stable Semantic Mediawiki version⁹ and unpack it to `E:\xampp\htdocs\surgipedia\extensions\`.
13. Enter the Semantic Mediawiki Extension installation page¹⁰ and follow the installation steps. For the first step, open the `cmd.exe` file and type: `E:\xampp\php\php.exe C:\ProgramData\ComposerSetup\bin\composer.phar install`. For the second step type in the command line: `E:\xampp\php\php.exe E:\xampp\htdocs\surgipedia\maintenance\update.php`. For the third step open the `E:\xampp\htdocs\surgipedia\LocalSettings.php` file and add `require_once "$IP/extensions/SemanticMediaWiki/SemanticMediaWiki.php"; enableSemantics('example.org');` at the end. Save and restart Apache and MySQL. You can check your installed extensions by accessing the `Special:Version` page.
14. The first thing to do after installing Semantic Mediawiki is to log in as an Admin (Sysop user), then access the `Special:SMWAdmin` page and run the "Initialise or upgrade tables" by clicking on the button. By now, SMW should be usable and successfully installed on your stick.
15. Because the maximum article size is by default set to 2048 Kb and some pages in Surgipedia (e.g.: Patient pages) may be larger than that, double the maximum size allowed in article pages writing `$wgMaxArticleSize = 4048;` at the bottom of the `LocalSettings.php` file. Save and restart Apache and MySQL.
16. Run the `rebuildall.php` from the Maintenance scripts¹¹ by typing `E:\xampp\php\php.exe E:\xampp\htdocs\surgipedia\maintenance\rebuildall.php` on the command line (in `cmd.exe`).
17. Download the latest Semantic Forms extension¹². If you choose to download the extension in .zip format, extract the file to a folder named "SemanticForms" and copy it to `E:\xampp\htdocs\surgipedia\extensions\`. If you downloaded the extension using Git no unpacking is needed.
18. Add `include_once("$IP/extensions/SemanticForms/SemanticForms.php");` at the bottom of the `LocalSettings.php` file. Save and restart Apache and MySQL.

⁷ https://www.mediawiki.org/wiki/Extension:Extension_Installer

⁸ http://semantic-mediawiki.org/wiki/Help:Installation/Example_%22composer.json%22_file#Semantic_MediaWiki

⁹ <http://semantic-mediawiki.org/wiki/Help:Download>

¹⁰ <http://semantic-mediawiki.org/wiki/Help:Installation#Installation>

¹¹ https://www.mediawiki.org/wiki/Manual:Maintenance_scripts#Running_the_scripts

¹² http://www.mediawiki.org/wiki/Extension:Semantic_Forms/Download_and_installation

19. Download the surgipedia XML dump from MediaWiki Exports of Surgipedia (e.g., for installing your own surgipedia locally)¹³ and unpack it. I saved it in a folder called `\surgipediadownloads\` on my Desktop.
20. Run the `importDump.php` command line script located in the maintenance folder¹⁴ by typing


```
E:\xampp\php\php.exe
E:\xampp\htdocs\surgipedia\maintenance\importDump.php --conf
E:\xampp\htdocs\surgipedia\LocalSettings.php
C:\Users\Mateo\Desktop\surgipediadownloads\surgipedia.xml\surgipedia.xml smw_onastick
```

 on the command line.
21. Change `max_allowed_packet = 16 M` in `xampp/mysql/bin/my.ini`.
22. Change `Max_execution time` in `xampp/php/php.ini` to 600

3. Performance tests

It has been test proven that Semantic MediaWiki works flawless on a Server based on a USB 2.0 memory stick, performing at least one action of every task in the user manual. Also, Surgipedia has been easily imported to the “virgin” SMW-on-a-stick. The export of any page via RDF has also been successfully performed. Although the first results might sound encouraging, Surgipedia-on-a-stick is performing very slow in the three tested computers, especially when annotating patient data, with averages that come close to two minutes of processing time in the worst cases. The reason of that has to be further studied. Find the used SMW and Extentions version attached in A2.

Computer Specifications	
Operating System	64-Bit Windows 8.1 Pro
Processor	Intel Core i3 CPU 370 @ 2.40 GHz
Installed RAM	3 GB
Manufacturer	Packard Bell (TK85)

Task: Enter “Edit Identification Data” (Template instance of the example patient)	Time to accomplish task [s]
1	15
2	3
3	14
4	3
5	11
6	3
7	3
8	4
9	12
10	10
11	20
12	4

¹³ <http://surgipedia.sfb125.de/wiki/Surgipedia>

¹⁴

https://www.mediawiki.org/wiki/Manual:Importing_XML_dumps#Using_importDump.php.2C_if_you_have_shell_access

13	4
14	3
15	2
16	3
17	3
18	3
19	3
20	3
Average	6,3

Task: Save <i>one</i> change in "Edit Identification Data"	Time to accomplish task [s]
1	105
2	118
3	112
4	115
5	118
6	125
7	120
8	110
9	108
10	130
Average	116,1

Task: Save <i>five</i> changes in "Edit Identification Data"	Time to accomplish task [s]
1	108
2	125
3	120
4	120
5	105
6	115
7	123
8	116
9	103
10	120
Average	115,5

Task: Enter Random Page	Time to accomplish task [s]
1	18
2	5
3	7
4	5
5	5
6	6
7	5
8	6
9	4
10	3

11	6
12	7
13	5
14	15
15	5
16	5
17	6
18	5
19	4
20	4
Average	6,3

Computer Specifications	
Operating System	64-Bit Windows 7 Professional Service Pack 1
Processor	Intel® Core™ i5-2450M CPU @ 2.50 GHz
Installed RAM	4 GB
Manufacturer	Dell (Model 3550)

Task: Enter the Edit Form: Identification Data	Time to accomplish the task [s]
1	4
2	2
3	3
4	10
5	2
6	3
7	3
8	4
9	2
10	2
11	2
12	2
13	3
14	3
15	10
16	3
17	3
18	2
19	2
20	4
Average	3,45

Task: Save <i>one</i> change in Identification Data	Time to accomplish the task [s]
1	110
2	108
3	130
4	92
5	115
6	96
7	113
8	110
9	108
10	130
Average	111,2

Task: Save <i>five</i> changes in Identification Data	Time to accomplish the task [s]
1	97
2	98
3	70
4	94
5	96
6	92
7	97
8	95
9	92
10	94
Average	92,5

Computer Specifications	
Operating System	64-Bit Windows 8.1 Professional Service Pack 1
Processor	Intel® Core™ i5-3317U CPU @ 1.70 GHz
Installed RAM	6 GB
Manufacturer	Asus (X401)

Task: Enter the Edit Form: Identification Data	Time to accomplish the task [s]
1	10
2	7
3	3
4	1
5	2
6	4
7	2
8	3
9	3
10	2
11	2
12	2
13	3
14	3

15	3
16	4
17	4
18	3
19	2
20	2
Average	3,25

Task: Save <i>one</i> change in Identification Data	Time to accomplish the task [s]
1	84
2	92
3	87
4	118
5	115
6	103
7	118
8	100
9	90
10	83
Average	99

Task: Save <i>five</i> changes in Identification Data	Time to accomplish the task [s]
1	87
2	84
3	83
4	89
5	82
6	84
7	88
8	84
9	83
10	85
Average	84,9

4. Conclusion

Surgipedia-on-a-stick is not yet ready for its use because of its performance, although it has been shown that the approach of annotating patients offline, in a stick, is possible. The bottle neck of its performance has to be further identified, and a problem solution has to be implemented.

Attachments

A1. Assign a static drive letter to a USB drive in Windows

1. Open the "Control Panel".
2. Access "System and Security" from the Control Panel.
3. Click the "Administrative Tools" on the System and Security window.
4. Double-click the "Computer Management" shortcut in the Administrative tools window.
5. Select "Disk Management" under "Storage" in the tree on the left of the Computer Management dialog box.
6. Right-click on the drive in the list and select "Change Drive Letter and Paths" from the popup menu.
7. Change Drive Letter and Paths dialog box displays for the selected drive showing the current drive letter. To change the drive letter, click "Change".
8. On the "Change Drive Letter or Path" dialog box, select the "Assign the following drive letter" option and select "E:". (If "E:" is already taken, it will not show up in the drop-down list. Solve this changing the current "E:" drive letter path first, e.g. to "G:").
9. While changing the driver letter a following warning will appear: "Some programs that rely on drive letters might not run correctly. Do you want to continue?" Click yes.
10. Close all windows opened in the steps above.

A2. Versions

Installed software

Product	Version
MediaWiki	1.22.1
PHP	5.5.6 (apache2handler)
MySQL	5.6.14

Installed extensions

		Semantic extensions	
<i>Semantic Forms (Version 2.6.2-alpha)</i>	(4c3c14e)	Forms for adding and editing semantic data	Yaron Koren, Stephan Gamble and others
<i>Semantic MediaWiki (Version 1.9.0.1)</i>		Making your wiki more accessible - for machines and humans (online documentation)	Markus Krötzsch, Jeroen De Dauw, James Hong Kong and others
<i>Semantic Web Browser (Version 0.4)</i>	(812d4cc)	Adds a special page Browse Wiki & Semantic Web	Benedikt Kämpgen, Anna Kantorovitch and Andreas Adler
DataValues			
<i>DataValues (Version 0.1.1)</i>		Collection of objects representing various kinds of values	Jeroen De Dauw
<i>DataValues Geo (Version 0.1.1)</i>		Geographical value objects, parsers and formatters	Jeroen De Dauw and The Wikidata team
<i>DataValues Time (Version 0.1)</i>		Time value objects, parsers and formatters	The Wikidata team
<i>DataValues Validators (Version 0.1)</i>		Contains common ValueValidator implementations	Jeroen De Dauw and The Wikidata team
<i>DataValuesCommon (Version 0.2)</i>		Contains common implementations of the interfaces defined by DataValuesInterfaces	Jeroen De Dauw
<i>DataValues/Interfaces (Version 0.1.2)</i>		Defines interfaces for ValueParsers, ValueFormatters and ValueValidators	Jeroen De Dauw
Other			
<i>Extension Installer (Version 0.2.2)</i>		Allows installing extensions and PHP libraries via Composer	Jeroen De Dauw
<i>Validator (Version 1.0.0.1)</i>		Declarative parameter processing library	Jeroen De Dauw
Parser extension tags			
<code><describe></code> , <code><gallery></code> , <code><info></code> , <code><listerrors></code> , <code><nowiki></code> , <code><pre></code> and <code><smwdoc></code>			
Parser function hooks			
<code>anchorencode</code> , <code>array/map</code> , <code>array/maptemplate</code> , <code>ask</code> , <code>autoedit</code> , <code>basepagename</code> , <code>basepagenamee</code> , <code>canonicalurl</code> , <code>canonicalurle</code> , <code>concept</code> , <code>declare</code> , <code>defaultsort</code> , <code>describe</code> , <code>displaytitle</code> , <code>filepath</code> , <code>formatdate</code> , <code>formatnum</code> , <code>forminput</code> , <code>formlink</code> , <code>fullpagename</code> , <code>fullpagenamee</code> , <code>fullurl</code> , <code>fullurle</code> , <code>gender</code> , <code>grammar</code> , <code>info</code> , <code>int</code> , <code>language</code> , <code>lc</code> , <code>lfirst</code> , <code>listerrors</code> , <code>localurl</code> , <code>localurle</code> , <code>namespace</code> , <code>namespacee</code> , <code>namespacenumber</code> , <code>ns</code> , <code>nse</code> , <code>numberingroup</code> , <code>numberofactiveusers</code> , <code>numberofadmins</code> , <code>numberofarticles</code> , <code>numberofedits</code> , <code>numberoffiles</code> , <code>numberofpages</code> , <code>numberofusers</code> , <code>numberofviews</code> , <code>padleft</code> , <code>padright</code> , <code>pagename</code> , <code>pagenamee</code> , <code>pagesincategory</code> , <code>pagesize</code> , <code>plural</code> , <code>protectionlevel</code> , <code>queryformlink</code> , <code>rootpagename</code> , <code>rootpagenamee</code> , <code>set</code> , <code>set_recurring_event</code> , <code>show</code> , <code>smwdoc</code> , <code>special</code> , <code>special</code> , <code>subjectpagename</code> , <code>subjectpagenamee</code> , <code>subjectspace</code> , <code>subjectspacee</code> , <code>subobject</code> , <code>subpagename</code> , <code>subpagenamee</code> , <code>tag</code> , <code>talkpagename</code> , <code>talkpagenamee</code> , <code>talkspace</code> , <code>talkspacee</code> , <code>uc</code> , <code>ucfirst</code> and <code>urlencode</code>			