Decoupling Content Management

Szabolcs Grünwald
Knowledge and Media Technologies
Salzburg Research
Salzburg, Austria
+43 662 2288 301
sgruenwald@salzburgresearch.at

Henri Bergius
Nemein
Helsinki, Finland
+358201986032
henri.bergius@nemein.com

ABSTRACT

Traditional content management systems (CMS) are following a monolithic architecture. If they wouldn't, one could exchange UI components much easier and CMS developers could share many of the front-end components, also divide the effort and multiply quality. Our approach to decouple content management is to use RDFa enhanced templating and Backbone.js as a mid-layer to instantiate a rich editor and other interactive widgets when the user would like to edit the content. We show components and prototypes in development.

Keywords

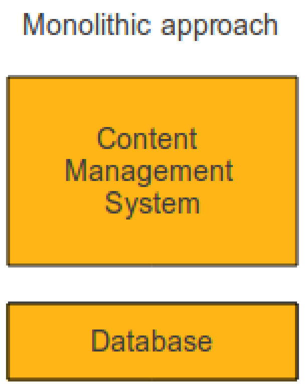
Content Management Systems, JavaScript, Semantic Technologies

1. INTRODUCTION: Decoupling content management

Traditional content management systems are following a monolithic architecture. Just to make a website editable one has to accept the web framework imposed by the system, the templating engine used by the CMS, and the editing tools used by the system. Requirements for changes in the user interface often result in rewriting the whole website and sometimes also in migrating the content between different storage systems.

Here is how a traditional CMS looks like:

Fig. 1: Monolithic approach

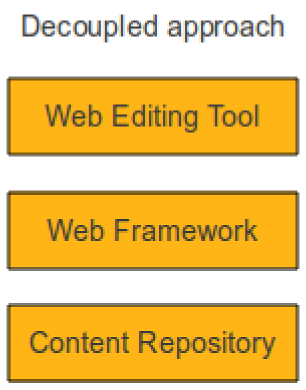


Being a monolithic block the CMS provides content storage, routing, templating, editing tools, and other content management functionality. The CMS is probably also tied to a particular relational database for content storage. Users wanting to utilize a more attractive HTML5 rich text editor like Aloha[1], or a different templating engine, or maybe a NoSQL storage back-end one would have to convince the whole CMS project or vendor to switch over.

[1] Aloha editor - http://aloha-editor.org/

A much better approach would be something like the following:

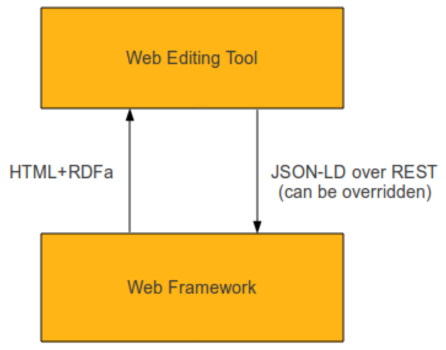
Fig. 2: Decoupled approach



In this scenario, the concept of content management is decoupled. There is a content repository that manages content models and how to store them. This could be something like JCR[2], PHPCR[3], CouchDB[4] or Midgard2[5]. The web framework is responsible for handling business logic and matching URL requests to particular content to generate corresponding web pages. And finally, the web editing tool provides an interface for managing contents of the web pages. This includes functionalities like rich text editing, work flows and image handling.

The web editing tools have traditionally been part of the web framework. The framework serving forms and tool bars to the user as part of the generated web pages. But with HTML5 it is possible to avoid forms and just make pages editable as they are.

Fig. 3: Decoupled information flow



[2] Jackrabbit - http://jackrabbit.apache.org/

[3] PHPCR - http://phpcr.github.com/

[4] CouchDB - http://couchdb.apache.org/

[5] Midgard2 - http://www.midgard-project.org/midgard2/

In the next sections we introduce our approach to solve the highlighted problem above. All the introduced components are published under a permissive open source license[6].

2. VIE – RDFa Backbone bridge

As part of the EU-funded IKS project[7] we developed VIE[8] as a JavaScript utility library building the bridge between any semantically annotated content and the user interaction layer. In this chapter we explain three aspects of the VIE library that are relevant to understand the applications introduced in the rest of this paper.

2.1 Common representation of content on HTML level

First of all, the web editing tool has to understand the content structure of the page, what parts of the page should be editable, and what the relations between the editable parts are. If there is a list of news items for instance, the tool needs to understand that it is a list so users can add new news items. The easy way of accomplishing this is to add some semantic RDFa[9] annotations to the HTML pages.

Using RDFa is relatively complex for everyday development tasks, but VIE hides complexity from the Javascript developer. The following example shows the use of RDFa annotations to provide the necessary information to make a blog entry editable.

```
<article id="myarticle"
   typeof="http://rdfs.org/sioc/ns#Post"
   about="http://example.net/blog/news_item">
   <h1 property="dcterms:title">
      News item title
   </h1>
   <div property="sioc:content">
      News item contents
   </div>
</article>
```

Here we get all the necessary information for making a blog entry editable:

- *typeof* tells us the type of the editable object. On typical CMSs this would map to a content model or a database table
- *about* gives us the identifier of a particular object. On typical CMSs this would be the object identifier or database row primary key
- *property* ties a particular HTML element to a property of the content object. On a CMS this could be a database column

VIE finds and interprets embedded meta-data and makes it available to the JavaScript level. As a side effect, RDFa also makes pages more understandable to search engines and other semantic tools. So the annotations are not just needed for UI, but also for search engine optimization.[10]

2.2 Common representation of content on JavaScript level

Having contents of a page described via RDFa makes it possible to extract the content model of the CMS into a JavaScript model. Backbone.js[11] provides a convenient library for managing the RDF entities and their RDFa views:

> Backbone supplies structure to JavaScript-heavy applications by providing models with key-value binding and custom events, collections with a rich API of enumerable functions, views with declarative event handling, and connects it all to your existing application over a RESTful JSON interface.

With Backbone, the content extracted from the RDFa-annotated HTML page is accessible via JavaScript. Consider for example:

```
v = new VIE();
v.use(new v.RdfaService());
v.load({
   element: jQuery('#myarticle')})
     .from('rdfa').execute()
     .success(function(entities) {
       _.forEach(entities, function(entity) {
         entity.set({
            'dcterms:title': 'Hello, world'
         });
         entity.save(null, {
            success: function(savedModel, response) {
         alert("Your article '" +
         savedModel.get('dcterms:title') +
         "' was saved to server");
       }
     });
   })
   console.log("We got " + entities.length +
   " editable objects from the page");
});
```

In this example we use VIE to read RDFa from the article. As is apparent, interaction with an entity and an editable field doesn't require to know anything about the HTML structure.

Another thing we can see in the example above is the usage of VIE's RdfaService to read RDF triples[12] from the HTML. This leads us to the third important aspect of our VIE design.

[6] MIT license - http://www.opensource.org/licenses/mit-license.php

[7] IKS Project - http://www.iks-project.eu

[8] VIE – Vienna IKS Editables – http://viejs.org/

[9] Resource Description Framework – in – attributes – http://en.wikipedia.org/wiki/RDFa

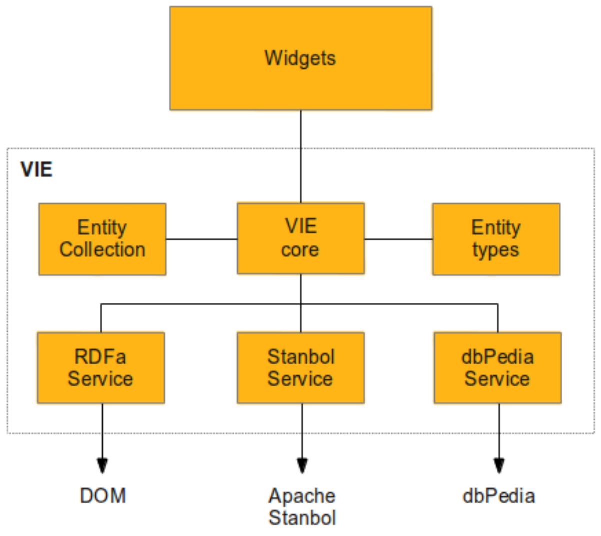
[10] http://www.seomoz.org/blog/schema-examples

[11] http://documentcloud.github.com/backbone/

[12] RDF – Resource Description Framework – http://en.wikipedia.org/wiki/Resource_Description_Framework

2.3 Service architecture

Fig. 4: VIE architecture

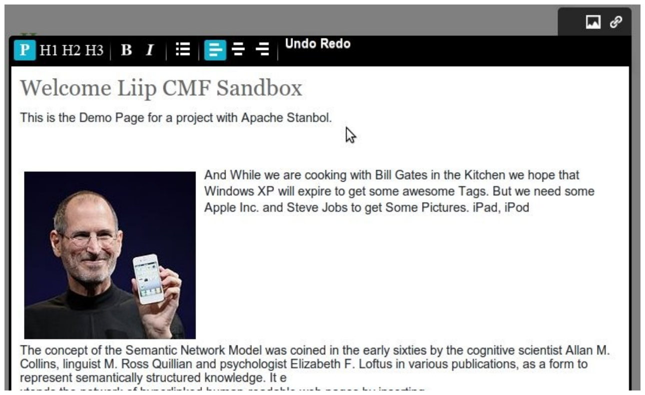


VIE has a plug-in architecture to make it modular and easy to extend. This gives us an elegant way to communicate with RDFa -annotated HTML, but also with any RESTful back-end, and RDF-based back-end components like Apache Stanbol[13] or dbPedia[14].

3. Hallo Editor

To show the flexibility of the concept we created a simple HTML5 editor. The following screen-shot shows it as part of the Symfony2 CMS Sandbox.

Fig. 5: Hallo editor screen shot



Welcome Liip CMF Sandbox

This is the Demo Page for a project with Apache Stanbol.

And While we are cooking with Bill Gates in the Kitchen we hope that Windows XP will expire to get some awesome Tags. But we need some Apple Inc. and Steve Jobs to get Some Pictures. iPad, iPod

The concept of the Semantic Network Model was coined in the early sixties by the cognitive scientist Allan M. Collins, linguist M. Ross Quillian and psychologist Elizabeth F. Loftus in various publications, as a form to represent semantically structured knowledge. It e

As part of the editing experience, tags and images are recommended based on the edited text. The recommendations are provided by Stanbol Enhancer endpoint which can find keywords and entities mentioned in the text being analyzed. In 4.2 Annotate.js will make use of the same feature but for highlighting the mentioned entities directly in the text.

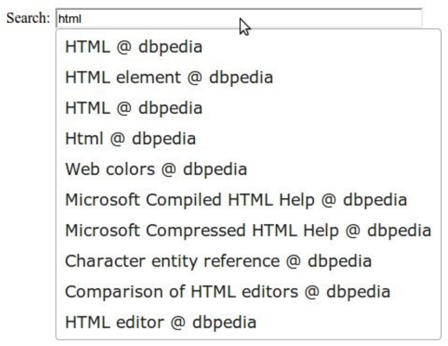
4. VIE Widgets

To support the web developers with a tool set allowing an enriched user experience for future web applications, we developed a set of generic widgets, just like jQuery UI[15] widgets make it fairly easy to instantiate an accordion widget in a few lines of code.[16]

4.1 VIE.autocomplete

VIE auto-complete[17] uses the `VIE.find` service method to make auto-complete suggestions. The `VIE.find` method can query different back-end or front-end data sources. Our implementation uses for example the Apache Stanbol Entityhub, querying a local dbPedia index.

Fig. 6: VIE autocomplete screen shot



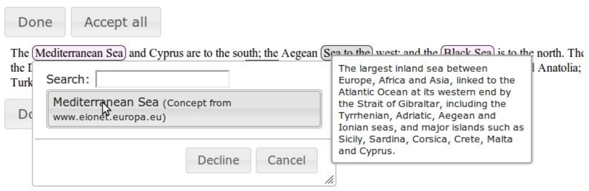
Search: html

HTML @ dbpedia
HTML element @ dbpedia
HTML @ dbpedia
Html @ dbpedia
Web colors @ dbpedia
Microsoft Compiled HTML Help @ dbpedia
Microsoft Compressed HTML Help @ dbpedia
Character entity reference @ dbpedia
Comparison of HTML editors @ dbpedia
HTML editor @ dbpedia

4.2 Annotate.js

The annotate.js[18] widget uses the Apache Stanbol Enhancer endpoint to suggest RDFa enhancements of the edited content, just like a spell checker would suggest corrections. When the user accepts a recommendation, new RDFa meta-data is written in the HTML.

Fig. 7: autocomplete.js widget screen shot



The Mediterranean Sea and Cyprus are to the south; the Aegean Sea to the west; and the Black Sea is to the north. The

Search:

Mediterranean Sea (Concept from www.eionet.europa.eu)

The largest inland sea between Europe, Africa and Asia, linked to the Atlantic Ocean at its western end by the Strait of Gibraltar, including the Tyrrhenian, Adriatic, Aegean and Ionian seas, and major islands such as Sicily, Sardina, Corsica, Crete, Malta and Cyprus.

4.3 Create UI

Create UI is a "web editing interface for any CMS"[19]. It finds the parts of an HTML that can be interacted with and instantiates the appropriate editing widget for them, e.g. different editing widgets are used for the title and for the body of a blog post. Create UI supports the following functions:

- Managing collections of content (add, remove)
- Local, in-browser storage and retrieval of unsaved content
- Adaptable connector for communicating with the back-end system
- Running work flows (approval, etc.) for content items
- Browsing and reverting content history

[13] Apache Stanbol Incubator - http://incubator.apache.org/stanbol/

[14] DBPedia - http://dbpedia.org/About

[15] Jquery UI - http://jqueryui.com/

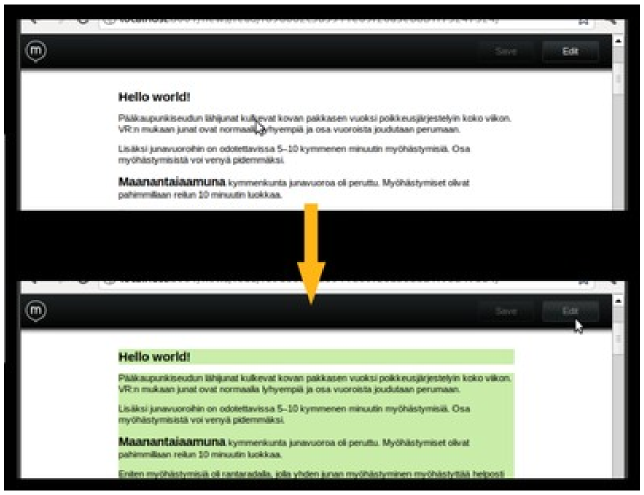
[16] Jquery UI Demos, Accordion - http://jqueryui.com/demos/accordion/

[17] VIE autocomplete - https://github.com/szabyg/VIE.autocomplete

[18] Annotate.js - https://github.com/szabyg/annotate.js

[19] Create UI - https://github.com/bergie/create

Fig. 8: Create UI, change to editable mode, screen shot



Hello world!

Pääkaupunkiseudun lähijunat kulkevat kovan pakkasen vuoksi poikkeusjärjestelyin koko viikon. VR:n mukaan junat ovat normaalia lyhyempiä ja osa vuoroista joudutaan perumaan.

Lisäksi junavuoroihin on odotettavissa 5–10 kymmenen minuutin myöhästymisiä. Osa myöhästymisistä voi venyä pidemmäksi.

Maanantaiaamuna kymmenkunta junavuoroa oli peruttu. Myöhästymiset olivat pahimmillaan reilun 10 minuutin luokkaa.

Hello world!

Pääkaupunkiseudun lähijunat kulkevat kovan pakkasen vuoksi poikkeusjärjestelyin koko viikon. VR:n mukaan junat ovat normaalia lyhyempiä ja osa vuoroista joudutaan perumaan.

Lisäksi junavuoroihin on odotettavissa 5–10 kymmenen minuutin myöhästymisiä. Osa myöhästymisistä voi venyä pidemmäksi.

Maanantaiaamuna kymmenkunta junavuoroa oli peruttu. Myöhästymiset olivat pahimmillaan reilun 10 minuutin luokkaa.

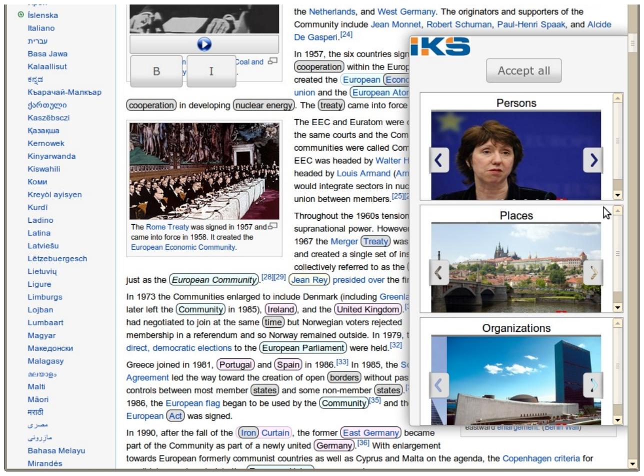
Eniten myöhästymisiä oli rantaradalla, jolla yhden junan myöhästyminen myöhästyttää helposti

The screen shot above (Fig. 8.) shows different parts of an HTML becoming editable on clicking the edit button of the Create tool bar.

4.4 Annotation bookmarklet

The annotation bookmarklet[20] makes use of the annotate.js widget and finds images for the selected persons, places and organizations. The bookmarklet can be applied to any web page to analyze and extend user experience.

Fig. 9: Annotation bookmarklet screen shot



Íslenska
Italiano
עברית
Basa Jawa
Kalaallisut
ಕನ್ನಡ
Къарачай-Малкъар
ქართული
Kaszëbsczi
Қазақша
Kernowek
Kinyarwanda
Kiswahili
Коми
Kreyòl ayisyen
Kurdî
Ladino
Latina
Latviešu
Lëtzebuergesch
Lietuvių
Ligure
Limburgs
Lojban
Lumbaart
Magyar
Македонски
Malagasy
മലയാളം
Malti
Māori
मराठी
مصرى
مازِرونی
Bahasa Melayu
Mirandés

the Netherlands, and West Germany. The originators and supporters of the Community include Jean Monnet, Robert Schuman, Paul-Henri Spaak, and Alcide De Gasperi.[24]

In 1957, the six countries sign cooperation within the Europ created the European Econ union and the European Ator cooperation in developing nuclear energy. The treaty came into force

The EEC and Euratom were the same courts and the Com communities were called Com EEC was headed by Walter H headed by Louis Armand (Arn would integrate sectors in nuc union between members.[25][2

The Rome Treaty was signed in 1957 and came into force in 1958. It created the European Economic Community.

Throughout the 1960s tension supranational power. However 1967 the Merger Treaty was and created a single set of ins collectively referred to as the just as the *European Community*.[28][29] Jean Rey presided over the fi

In 1973 the Communities enlarged to include Denmark (including Greenla later left the Community in 1985), Ireland, and the United Kingdom. had negotiated to join at the same time but Norwegian voters rejected membership in a referendum and so Norway remained outside. In 1979, t direct, democratic elections to the European Parliament were held.[32]

Greece joined in 1981, Portugal and Spain in 1986.[33] In 1985, the S Agreement led the way toward the creation of open borders without pas controls between most member states and some non-member states. 1986, the European flag began to be used by the Community[35] and th European Act was signed.

In 1990, after the fall of the Iron Curtain, the former East Germany became part of the Community as part of a newly united Germany.[36] With enlargement towards European formerly communist countries as well as Cyprus and Malta on the agenda, the Copenhagen criteria for

eastward enlargement. (Berlin Wall)

5. Reference implementations

User interaction is only a half of what needs to be done for truly decoupled content management - you also need to decouple content storage from the delivery and business logic layer. The Java Content Repository specification (JCR) is achieves this, and is quite widely adopted in the Java-based CMS world. There is also an effort to bring similar functionality to the PHP space via PHPCR, a scripting implementation of JCR.

Some Content Management Systems have already embraced the decoupling approach explained in this paper. Some demonstrations of these include:

- Symfony CMF with Create [21]
- OpenCMS with VIE [22]
- Pisano Package manager with Annotate.js [23]

6. References

[1] Bergius, H.: Decoupling Content Management, 2011, http://bergie.iki.fi/blog/decoupling_content_management/

[2] Bergius, H.; Grünwald, S.; Germesin, S.: VIE documentation, 2011, https://github.com/bergie/VIE

[3] Sporny, M.: An Uber-comparison of RDFa, Microdata and Microformats, 2011, http://manu.sporny.org/2011/uber-comparison-rdfa-md-uf/

[4] Bergius, H. et al: Hallo Editor documentation, 2011, https://github.com/bergie/hallo

[5] Grünwald, S.: VIE autocomplete documentation, 2011, https://github.com/szabyg/VIE.autocomplete

[6] Buchmann, D.; Smith, L. et al: CMF sandbox IKS branch, 2011, https://github.com/liip/cmf-sandbox/tree/iks

[7] Germesin, S.: image search widget, 2011, https://github.com/IKS/VIEwidgets/tree/master/widgets/image_search

[20] Annotation bookmarklet - http://szabyg.github.com/vie-annotation-bookmarklet/

[21] Symfony 2 CMF - http://blog.iks-project.eu/semantic-enhanced-cmf-editor-now-available/

[22] OpenCMS demo - http://youtu.be/21QSPSKPs6I

[23] Pisano package manager screencast - http://youtu.be/GcH5OHsClRM