Advanced Design of Semantic Web Portal: ODESeW2

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Abstract

This poster presents a rapid web application development framework to build semantic portals. This framework is composed of reusable views of semantic information, ontology views and an intelligent controller, as elements of the Model-View-Controller design paradigm.

1 Introduction

Content presentation in a portal is always a hard task, especially in knowledge-intensive web sites where content is continuously updated and, in the case of semantic portals, an expert in knowledge representation to build the ontology is needed. To reduce the effort of knowledge portal management we need applications that help manage the knowledge workflow processes (content provision and integration, content presentation and access) and a set of tools to reduce the cost of training a web developer in charge of managing the semantic information.

In this paper we propose a framework to build semantic portals. This framework is supported by a design paradigm currently used for building portals and Web applications: the Model-View-Controller (MVC) [1] design paradigm.

We are going to describe first the MVC design paradigm, and finally how we include the MVC inside the ODESeW2.

The **Model-View-Controller** is a design paradigm used nowadays to build Web. It proposes three types of objects: The **model** is a representation of the domain information; the **controller** receives and interprets the user's actions and responds to them; the **controller** manages the user's navigation by means of a navigation model; and the **view** is in charge of presenting and visualizing the model.

ODESeW2 is the second version of ODESeW [2]. ODESeW (Semantic Web Portal based on WebODE platform[1]) is an ontology-based application that automatically generates and manages a knowledge portal for Intranets and Extranets. ODESeW is designed on top of WebODE ontology engineering platform.

ODESeW2 includes the MVC paradigm for developing semantic web portals, and this is its main enhancement and the main contribution of this paper.

2 MVC in ODESeW2

ODESeW2 provides a MVC-based kit of tools to the semantic web portal designers for producing views in short time; these views can then be reused by an intelligent controller. The intelligent controller modifies dynamically the user's navigation by means of inferred information based on the user profile.

The following section presents the way in which the three MVC elements (model, view, and controller) are used in ODESeW2.

In a semantic portal, each object of the MVC design paradigm has different types of resources: the model will be compose of different domain ontologies; the view has a library of visual components and a library of functions to apply in views; and the controller has a ontology based navigation model.

The **model** inside a portal is the domain information to be visualized on the portal. In the case of semantic portals, the model is the set of ontologies that models the web portal domain. ODESeW2 includes two types of ontologies: domain and cross-domain ontologies. The domain ontology [3] serves as the basis for the content presented on the instance Web sites to be created. So, if the semantic web portal is used for managing R&D projects[2], the domain ontologies would include terms such as researchers, deliverables, milestones, etc. Cross-domain ontologies are domain-independent ontologies and can be used by semantic portals in different domains. Examples are the time ontology, the unit of measurement ontology, the event ontology, etc.

The **controller** uses a navigation model for controlling the user's navigation. It also manages all the user's actions, responding to the user with a specific view. ODESeW2 provides an ontology-based navigation model and an ontology-based permission model. We call them portal ontologies. The semantic portal de-

[1] http://webode.dia.fi.upm.es/webode

[2] KnowledgeWeb Portal. http://knowledgeweb.semanticweb.org

signer uses the portal ontologies for specifying declaratively the navigation throughout the views.

The *portal ontologies* are the ontologies used by the controller to build and maintain portals and these ontologies are built-in with the portal. Examples of portal ontologies are: semantic Web service descriptor ontologies, navigation ontologies, user ontologies, portal log ontologies, etc.

The most important ontology in the set of portal ontologies is the navigation ontology, which determines the navigation of a user through the portal. ODESeW2 includes a navigation ontology. This ontology is composed of concepts that represent a view. Each view might have one or more relations with other views. The controller uses these relations to control the navigation of a user through different views.

All concepts in the navigation ontology have two mandatory attributes: the attribute "*precondition*", which specifies the conditions to be satisfied when requesting a view; the attribute "*view URL*", which specifies the URL of the view implementation. Thus, the relations between concepts in the navigation ontology represent alternative navigation paths, and also alternative actions of a user in a view.

When the controller receives a user action from a view, it knows in which concept it is. By means of the users' actions, the controller determines the destination-concept candidates; then the controller selects a concept that satisfies the preconditions of the views. If more than one concept satisfies these preconditions, the controller selects the first concept and redirects to the user the view located in the URL; this URL is specified by the value of the attribute "*view URL*" in the selected concept.

Two types of **views** can be generate by ODESeW2: *generics view* for visualizing ontology components independently of the domain of the portal (such as generics views of concepts, attribute types, attributes, relations, instances); *and specific views* of an ontology components tied to how to visualize in a specific portal (the view of any instance of concept *Person*, the view of *Photo* attribute values, view of list of *Persons* group by their *Organizations*). The generics views have a low maintenance, are highly reusable but reduce the usability of the views. The specific views fit the representation of the piece of information from the model but it is not reusable and could be totally or partially useless when a change in the ontology is carried out.

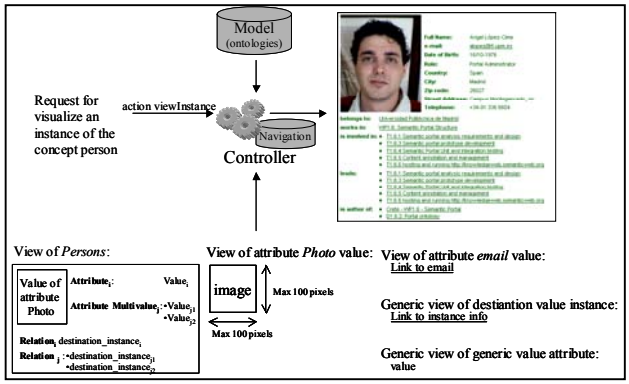
In ODESeW2, a mechanism to compose a view with other views has been implemented; this mechanism increases the reusability of views and reduces the effort to design new views.

When the user request a composed view, the controller receives from the composed view an action to include others views, then the controller acts as it has acted with the navigation ontology, but, instead of sending the view to the user, it sends it to the composed view.

ODESeW2 can also offer the users advanced functionalities based on semantic web services.

A semantic web service (SWS) is a function based on ontologies and is located in a URL. The software agents can locate and execute them. This artifact can be displayed by taking the SWS definition as an instantiation of the SWS definition ontology that uses as input and output concepts of a domain ontology. Thus, ODESeW2 can display the input form for the execution and the output of the SWS execution.

In the following figures shows how the intelligent controller compose a view of an instance of the concept *person* and instantiates that view with a requested instance from the model:



3 Conclusions

ODESeW2 maintains the same functionalities for the portal users, but it includes a technology very well known by the web designer. This technology is highly used for developing web portals, but we have adapted this technology to retrieve and modify semantic information stored in an ontology server. The results of applying this technology are: the reduction of the learning curve for a web designer for non-experts in the semantic web; the decrease of the effort and time spent in generating views; the freedom to generate generic or specific views of information so that the web designer can select between reusability or maintenance of views.

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References

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[3] http://www.esperonto.net

[4] http://knowledgeweb.semanticweb.org