Developing Rich Internet Applications as Social Sites on the Semantic Web: A Model-Driven Approach

Jesús M. Hermida, University of Alicante, Spain
Santiago Meliá, University of Alicante, Spain
Andrés Montoyo, University of Alicante, Spain
Jaime Gómez, University of Alicante, Spain

ABSTRACT

Current Web 2.0 applications, either social sites or Rich Internet Applications, share several problems of interoperability when interconnecting different systems. It is therefore complicated to reuse (or export) the information between sources. In this context, where the value belongs to the data, not the application, the use of Semantic Web technologies opens a way of resolution with mature and standard technologies, thus leading to the Web 3.0. This paper presents the application of Sm4RIA (Semantic Models for RIA), a model-driven design methodology that facilitates the development of semantic RIAs (SRIA), to the design of social network sites. The SRIA approach introduced herein combines the main advantages present in each of the current trends on the Web. In addition to these benefits, the application of a model-driven methodology can speed up the development process and simplify the reuse of external sources of knowledge.

Keywords: Model-Driven Engineering, Rich Internet Applications (RIA), Semantic RIA, Sm4RIA, Social Semantic Web, Web 3.0, Web Engineering

INTRODUCTION

A new wave of Web applications is currently under research. Web 2.0 applications (social sites and rich internet applications, RIA) are being enhanced with existing Semantic Web technologies, leading to the so-called Web 3.0, or Social Semantic Web (Mikroyannidis, 2007), combining technologies from the current Web trends (as stated by Murugesan, 2008). After years of development, all these technologies, techniques and applications are sufficiently mature to be tackled from an engineering viewpoint.

During the last decade, the Web 2.0 (O’Reilly, 2005) considerably extended the use of the Web among a large variety of users. Within this broad concept, at least two subtrends
can be identified, one associated to a change in users’ behaviour and another technological: the Social Web and the Rich Internet Applications (RIA). Among the most representative types of application within the Social Web environment, social network sites (SNS; Boyd & Ellison, 2008), such as Facebook (http://facebook.com), received the largest amount of attention because of the number of users of different ages, gender and nationalities gained worldwide. At the same time, the Web 2.0 brought a significant change in the manner of interaction and communication between users and applications, and among applications as well. RIAs offer user interfaces with a higher level of interactivity, similar to desktop interfaces, embed multimedia contents and minimise the communication between client and server components.

Nonetheless, both trends share some shortcomings that mainly limit the portability of data from their applications. On the one hand, social sites are normally born as proprietary sites where their API-based access methods do not share all their available information and the semantics of the data elements might vary between applications. Currently, it is usual that users have different profiles in several networks since they cannot reuse their own personal data (Breslin & Decker, 2007; Breslin, Passant, & Decker, 2009). On the other hand, RIAs show the information in a user-friendly manner but, due to their intrinsic structure and technological issues, they also suffer these types of limitations. Plugin-oriented RIAs (e.g., those implemented using Flex or Silverlight) are similar to black boxes since they are stored as binary objects constraining the access to data only to the human users in a visual manner. However, as RIAs are event-driven applications, even exploring the content of browser-oriented RIAs, i.e., those based on HTML and Javascript technologies (e.g., AJAX, Asynchronous JavaScript and XML), in an automatic manner is not a straightforward process. HTML5 is an ongoing effort from the World Wide Web Consortium (W3C) to provide a modern platform to build Web applications, including RIAs, which could solve the issues introduced by the RIA technologies. However, this standard has not yet reached the level of maturity required to be widely adopted by the community.

In the context of the present Internet, where the value has been moved from the Web applications to the data managed by them, the use of open technological solutions is a need. In this way, the Semantic Web (SW; Berners-Lee, Hendler, & Lassila, 2001) was aimed to resolve problems derived from the semantic incompatibility of systems by means of standard techniques and technologies (from knowledge representation and sharing to trust and security). These are the keys to solving the aforementioned issues and developing the Web to a further stage, i.e., systems containing our collective intelligence (Gruber, 2008).

The Social Semantic Web, as a combination of the Social and Semantic Web, is becoming a reality with new types of applications such as semantic blogs and wikis (described by Kinsella, Passant, Breslin, Decker, & Jaokar, 2009), and different approaches that facilitate the reuse of knowledge between social platforms, such as FOAF (Friend of a Friend, http://foaf-project.org) or SIOC (Semantically-Interlinked Online Communities, http://sioc-project.org/).

In this context, this paper presents the application of SM4RIA (Semantic Models for RIA, Hermida, Meliá, Montoyo, & Gómez, 2011), a model-driven design methodology that allows the creation of semantic RIAs, to the design of Web 3.0 RIA applications. In this case, the development of a social network site with a semantic RIA is employed as running example in order to explain the different stages of the methodology and the benefits of the use of SW technologies. This SNS will manage user profiles by means of FOAF and will integrate domain knowledge from the MusicBrainz knowledge base. The approach introduced herein will thus combine the main advantages present in each of the current trends on the Web. In addition to these benefits, the application of a model-driven methodology will speed up the development of these Web applications and simplify the reuse of external sources of knowledge. Developers will be able to specify the main features of their applications.
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