Entity-centric Social Profile Integration

Paolo Bouquet and Stefano Bortoli

Department of Information Engineering and Computer Science
University of Trento
Via Sommarive, 14 38123 Povo di Trento, Italy
{bouquet,bortoli}@disi.unitn.it

Abstract. Web-based social networking applications gained considerable popularity in the recent years. However, most social networking platforms suffer from the limits of the centralized paradigm they adopted, limiting the mobility of their users, and their chances to benefit from diverse services. In this paper we want to illustrate how these limitations can be overcome by enabling a global naming service for the 'social semantic web'. To do so, we will describe a web tool, called foaf-O-matic, for creating FOAF profiles which is enabled to interact with a global naming system called Entity Name System (ENS). Through a well-known mashup system called Sigma, we will show how the use of globally shared IDs in the definition of user profiles enables frictionless integrations mechanism supporting web-based application interoperability in dealing with users information.

Key words: FOAF, Social Network, OKKAM, Entity Naming System, Sigma Entity-centric Data Integration

1 Introduction

A social network is a structure composed by individuals or organizations, that are connected by one or more relationships, such as interests, professional community, values, ideas, friendship and so on [10]. Recently, the offer of web-based social network services aiming at building online communities of people willing to share their interests or activities increased impressively. The fast growth in the number of social network services users created a brand new business market that led social network service providers to the definition policies aiming at reducing the "mobility" of users through the several social network service applications. In [4] we argued against this portability limitations, and we presented a decentralized social network management paradigm.

In this paper, we focus on the benefits which may derive from the adoption of a uniform naming system and shared ontologies to create a fertile ground for the definition of frictionless, entity-centric, generic integration mechanism. We use social network profiles as a typical example of user information that can be defined across different applications and according to different standard, causing well known portability issues.

In section 2 we introduce Friend-Of-A-Friend (FOAF) as shared vocabulary, and the Entity Name System (ENS) as a service which allows uniform identification of entities across social profiles. In section 3 we describe the entity-centric integration of social network profiles described according to the FOAF ontology and we briefly present a web-based tool, called **foaf-O-matic**[1], for the editing these profiles; we also show how these benefits may be directly tested through a general purpose mashup system for the Web of Data like Sigma[2]. In section 4 some related works are presented. Finally, in section 5 we present some conclusion.

2   Preliminaries

Friend-Of-A-Friend FOAF is a machine-readable ontology describing persons, their activities and their relations to other people and objects. The FOAF project, which defined and maintains the FOAF ontology [6], can be considered the first open standard for Social Semantic Web application, in that it combines RDF (i.e. Resource Description Framework) technology [9] with Social Web concerns [7]. One of the first tools supporting the creation of FOAF profiles was *foaf-a-matic* [3]. This web application consists of three parts: first a simple form presenting input fields corresponding to FOAF properties, then a part that allows to list known people, and finally a part supporting the generation of RDF FOAF profiles.

Entity Name System The ENS [5] is publicly available service aiming at handling the process of creation, management and look-up of globally shared identifiers for entities in the WWW. These identifiers are global, with the purpose of consistently identifying a specific entity across system boundaries. The ENS has a distributed repository for storing entity profiles and their identifiers. An entity profile is essentially a relatively small amount of openly available descriptive information used for discriminating among entities, not exhaustively describing them. It is important to notice that the identifiers and related descriptions managed by the ENS are not meant to be authoritative as they don't necessarily represent the view of any specific user. The main goal of the ENS is to provide an effective platform for sharing, and thus reusing, identifiers for existing entities. For this reason, the creation and maintenance of entities' profile follows a process similar to the one adopted by Wikipedia managing articles. This approach in handling identifiers differs from other authoritative approaches where ids are issued by some authority, e.g. OpenId, or by the same owner of the identifier, e.g. LinkedData URIs.

---

[1] See `http://www.foaf-o-matic.org`
[2] See `http://sig.ma`
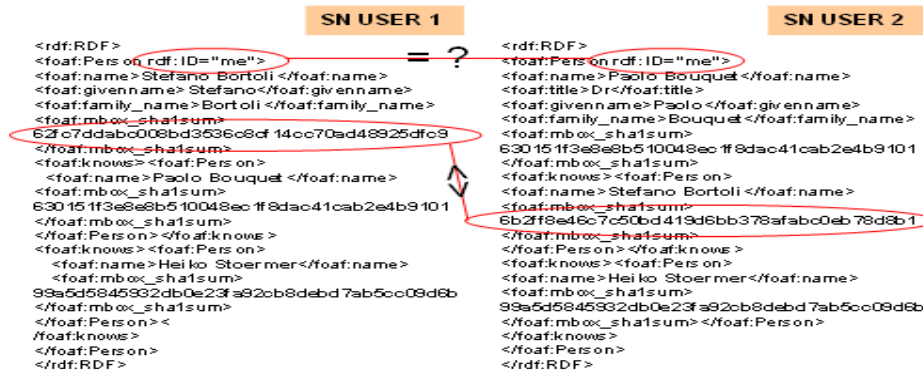[3] `http://www.ldodds.com/foaf/foaf-a-matic`

Fig. 1. Two social network created with foaf-o-matic

3 FOAF Social Network Profile Integration

The founding pillars of a frictionless social network profile integrations are: (1) *Use of shared ontology*: all the social network profiles must be structured according to formal ontologies; (2) *Uniform identification system*: people must be identified uniformly across different social network. profiles.

The combination of these two enables automated and smooth social networks integration. It is important to notice that ideally, social networking applications should endorse the same ontology, but when this is not feasible it possible to rely on techniques for automatic ontology alignment [8]. The main advantage of using shared ontologies to structure information is that different systems can share a common understanding of the types of information contained. Furthermore, if two social network profiles present a description of a person, and this is uniformly identified in both profiles, then it is easily possible to integrate the two social networks.

To prove that smooth social network user profile integration is feasible, we have implemented a tool enabling users to manage personal social network profiles defined using the well known FOAF ontology and integrating globally shared identifiers provided through interaction with the ENS. This tool, named foaf-O-matic, is briefly described in section 3.1. For the sake of clarity, we defined two simple couples of social network profiles. The first couple was defined using our tool foaf-O-matic, where users can search the ENS for the identifier of the people they want to talk about and integrate their identifier in the social network profile (see Figure 2). The second couple using foaf-a-matic, standard tool linked in the foaf project web site, where the integration process is managed by means of equivalence of values of specific properties (see Figure 1).

As you can see in the Figure 2, the two social network defined independently according to the FOAF ontology are integrable at zero cost. Indeed, it is possible to merge the two social network by simply putting together the description of the person involved.
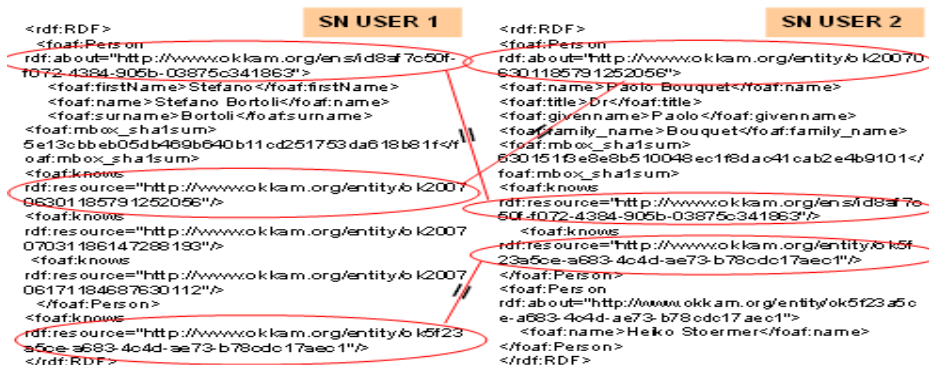
Fig. 2. Two social networks sharing the same identifiers for people

In order to evaluate the advantages of the adoption of FOAF and uniform identification system to define social networks, we rely on Sigma: a generic web based tool for (semantic) information mashup. The tool collects information from different sources available on the web, and produces an entity-centric mashup of the retrieved information. The fact that social network profiles were described according to the same ontology, and presented the same identifiers for people, allows the mashup tool to automatically integrate the retrieved information. A view of Sigma information mashup based on the entity identifier of one of the author of this article is presented in Figure 3.

3.1 An overview of Foaf-O-matic

Foaf-O-matic, available at `http://www.foaf-o-matic.org`, is a Rich Internet Application developed using the Faceltes and Icesoft Icefaces 1.8.2 J2EE AJAX framework, that supports users in managing their social network profiles. A user can create new, load and edit the personal social network profile, and integrate globally unique identifiers retrieved through guided interaction with an Entity Name System. Foaf-O-matic allows also to import of list of friends description contained in FOAF profiles and hCard ([4], and to save the RDF FOAF representation of the network on local or remote machine. It is important to notice that Foaf-O-matic does not force the usage of the identifier retrieved through the ENS, but also supports the integration of other identifiers by means of *OWL sameAs*[5] statements being compatible with LinkedData principles [1].

4 Related Work

Another description of a potential solution for social network portability based on FOAF is presented in [2]. In this paper the authors mainly formalize the idea

---

[4] `http://microformats.org/wiki/hcard`
[5] http://www.w3.org/TR/owl-ref/

Fig. 3. A view of Sigma mashing up entity-centric information

behind the FOAF project, providing a more detailed description about how a social network could be described using the FOAF and SIOC ontologies[6].

A decentralization of social network system based on FOAF is proposed by [11]. In this paper, the authors sketch a system where users manage all social network information on a trusted secure server allowing social network application to access and use the decentralized information for social network activity.

A FOAF based peer-to-peer social network system is proposed in [12]. The authors outline a peer-to-peer system where users can handle their social network in personal profiles described according to an extended FOAF ontology. The weak point, among others, of the aforementioned approaches is that social network integration relies on a weak identification system as URL pointing at other FOAF profiles, and inverse functional properties. The latter generally volatile as identifiers and thus they cannot do not guarantee smooth and complete social network integration [3].

5   Conclusion

In this paper we outlined the advantages given by the adoption of shared ontologies and uniform identification system when integrating social networks profile. We presented an example of zero-cost social network profile integration based on FOAF ontology and relying on the Entity Name System for the identification. While doing that, we also briefly presented an existing web application supporting users in creating automatically integrable social network profiles.

It is important to notice that in this context we used social network profile as known type of user profile to show the advantages of semantic web technologies combined with the adoption of a uniform identification system. Indeed, the

---

[6] `http://sioc-project.org/`

solution we applied to social networks can, in principle, be replicated in any other application environment, creating necessary condition for a frictionless entity-centric information integration, enabling de-facto web application inter-operability.

Acknowledgments

References

1. C. Bizer, R. Cyganiak, and T. Heath. How to publish linked data on the web. online tutorial, July 2007.
2. Uldis Bojars, Alexandre Passant, John G. Breslin, and Stefan Decker. Social network and data portability using semantic web technologies. pages 5–19, 2008.
3. S. Bortoli, P. Bouquet, H. Stoermer, and H. Wache. Foaf-o-matic - solving the identity problem in the foaf network. In *Proceeding of SWAP 2007 - Fourth Italian Semantic Web Workshop*, 2007.
4. Stefano Bortoli, Themis Palpanas, and Paolo Bouquet. Pulling down the walled garden : Towards a paradigm for decentralized social network management. In *Iadis Multi Conference On Computer Science And Information Systems. Web Based Communities 2009.*, Algarve, Portugal, 2009. Bradley, G. & Kommers, P. (Eds.).
5. Paolo Bouquet, Heiko Stoermer, Claudia Niederee, and Antonio Mana. Entity Name System: The Backbone of an Open and Scalable Web of Data. In *Proceedings of the IEEE International Conference on Semantic Computing, ICSC 2008*, number CSS-ICSC 2008-4-28-25, pages 554–561. IEEE Computer Society, August 2008.
6. D. Brickely and L. Miller. Foaf vocabulary specification. namespace document, September 2004.
7. Dan Brickely. About the foaf project. http://www.foaf-project.org/, 2000.
8. Jerome Euzenat and Pavel Shvaiko. *Ontology matching*. Springer-Verlag, Berlin Heidelberg, Germany, 2007.
9. Eric Miller Frank Manola. *RDF Primer*, February 2004. http://www.w3.org/TR/rdf-primer/.
10. Linton C. Freeman. *The Development of Social Network Analysis: A study in Sociology of Science*. Empirical Press, 2006.
11. Ching man Au Yeung, Ilaria Liccardi, Kanghao Lu, Oshani Seneviratne, and Tim Berners-Lee. Decentralization: The future of online social networking. Published online. W3C Workshop on the Future of Social Networking. 15-16 January 2009, Barcelona, 2008.
12. B. Sapkota, L. Ludwig, X. Zhou, and J.G. Breslin. Sifo-peers: A social foaf based peer-to-peer network. In *The 16th Annual International Information Management Association Conference (IIMA 2005), Dublin, Ireland*, 2005.