Modeling Online Presence

Milan Stankovic
Université Paris-Sud XI
91405 Orsay cedex, France
milan.stankovic@gmail.com

Abstract. In this paper, we introduce the notion of Online Presence, a concept related to user's presence on online services. We identify interoperability issues in the field of exchange of the online presence data and propose a solution in building a common model for semantic representation of online presence data. We present the Online Presence Ontology (OPO) together with benefits such an ontology could bring. Finally we outline some directions for future work on this matter of emerging importance.

Keywords: Online Presence, Ontology, Social Web

1 Introduction

With the appearance of instant messaging (IM) tools and Social Web sites, most notably Social Networks, Internet faced a proliferation of social activities among users. On a typical service that offers some form of social interactions, users present themselves to their contacts by maintaining user profiles. Services that favor direct and frequent communication tend to include descriptions of user's temporary state in the profile. By the elements of temporary state, we mean primarily custom messages on IM platforms and social networks, as well as description of availability/willingness to chat. Often, visual representations known as avatars are used to depict user's online persona. In fact, the activity of maintaining this kind of user profiles is no more than creating an image of one self's presence in the online world, a representation how one wishes to be seen by his/her contacts. The use of custom messages, IM statuses and avatars became a common way for users to make known the character of their presence on some online service and in the online world in general.

The variety of different purpose social applications and the fact that one's friends can be spread over various services for the same purpose, motivate users to maintain their profiles on many services, often just copying custom messages and other data related to their presence online. Different formats used by those services to represent semantically identical data, stands in the way of a user's ability to seamlessly transfer the data among services.

In this paper we propose an ontology-based approach for modeling the semantics of the aforementioned aspects of a user's appearance in the online world, with the final aim of enabling interoperability among services that collect and use online presence data. This is especially significant in the domain of exchanging IM statuses from different IM status scales – a use of emerging importance by the recent proliferation of inter-platform IM.

In Section 2 we give an insight into the problem's nature, and illustrate it with scenarios of use where difficulties for users, influenced by this problem, can be easily spotted. In Section 3 we explain our ontology-based approach for facing the outlined interoperability

problem, and go into details of the Ontology design. In Section 4 we take a look at related work while Section 5 is reserved for conclusions and plans for future work.

2   Problem Specification

Let us first consider some sources of online presence data to assure better understanding of later discussions. First of all, those are IM platforms that publish information like custom messages, avatars and statuses of availability for chat. We will call this kind of information Online Status. Then, there are Online Social Networks with custom messages and profile pictures, as well as services that publish short Online Statuses (like Twitter). There is also a large number of Social Web sites (e.g., Digg, Technorati, Flickr, etc.) and online communities (e.g., Web Forums) publishing similar data.

The following two scenarios demonstrate the essence of the interoperability problem. Let us first consider an example user, Harry, who uses an IM platform and a variety of different purpose social networks in order to keep up with his friends who are spread over several social networks. Besides that, he likes all those networks for different functionalities they offer. When Harry wants to define a custom message to share an insight about his current state (e.g., "going to New York") he has to do it on every particular service i.e., on the IM platform and every social network used. It would be a lot easier for Harry to define his custom message only once, and rely on some kind of exchange mechanism between services. A part from the lack of actual collaboration between the services in question, the lack of unified data exchange format that would define the shared semantics of the domain also presents a significant obstacle for solving the user's problem.

In the second scenario we consider the problem of another example user, Sally, who uses two different IM platforms (e.g., Skype and GoogleTalk) for the same reason of keeping in touch with friends using different platforms. When Sally is doing something important and does not want to be disturbed she has to choose either 'Busy' or 'Do Not Disturb' status on each IM platform. Sally's difficulty is even a greater challenge than the one faced by Harry, because in the case of exchanging IM statuses between different IM platforms the problem of mappings between different IM status scales appears as an additional obstacle.

3   Modeling Online Presence

In order to meet the interoperability challenges introduced in the previous section, we created a model that enables semantic representation of all the data that are the subject of exchange. Using OWL-DL we formalized the model into the Online Presence Ontology (OPO). In further sections we consider the specifics of the solution and their practical implications.

3.1   The General Idea

Having observed that the creation of custom messages, IM statuses, avatars, etc. represents a part of users effort to publish their presence online, we decided to gather all that data under a common roof of the notion of Online Presence. This notion congregates all the data representing temporary aspects of a user's online presence, thus complementing his/her more stable online profile data defined, for example, by the FOAF vocabulary [1].

In order to develop a comprehensive model, we have analyzed the major sources of online presence data i.e., IM platforms, social networks and other social applications. As a result of that analysis we created a list of aspects that determine online presence in the sense of today's applications. The list contains avatars, custom messages, IM statuses, but also some complex aspects like the possibility for other users to find the user's contact details in public listings as well as the willingness of a user to receive notifications by applications.

While designing the model, we had in mind the dynamic nature of social applications, and their ever increasing functionalities. Thus we favored the flexibility and extensibility in our design in order for it to be able to support further changes in the way people present themselves online.

3.2 Ontology Design

OnlinePresence, the core class in OPO, represents a placeholder for all the aspects of a user's presence in the online world. Having in mind possible development of new, currently unpredictable, aspects of presence in the online world, we defined a class, OnlinePresenceComponent, to represent an abstract component of the OnlinePresence. This design decision introduces flexibility in modeling the building blocks of OnlinePresence.

Relying on the current state of practice in the area of online social interactions we have defined three components of Online Presence: Online Status, Notifiability and Findability (Figure 1). These are modeled as subclasses of the OnlinePresenceComponent class.

First we perceived the need to distinguish the attitude towards the possibility of interaction with humans (represented with Online Status) from the attitude towards the possibility of being contacted/interrupted by a machine. By a contact from a machine we mean the practice of IM programs to pop-up notifications. Many IM programs allow users to specify whether to allow this type of disturbance or not. This particularity is modeled with the Notifiability component, by assigning one of the different Notifiability instances (e.g., AllNotificationsPass, NotificationsProhibited) to the Online Presence.

Findability is a component meant to describe the possibility of other users to access a person's contact details and online presence data. In most systems this property is defined by users in some form of settings. The approach for defining Findability is the same as with Notifiability. Different predefined instances are used to denote various states of Findability (e.g., PubliclyFindable and ConstrainedFindability).

Finally, Online Status represents what one may call availability for chat – the status used by IM platforms. While analyzing different status scales used by different IM platforms we concluded that the complexity created by all the differences between them could be best resolved by introducing different Online Status Components whose combination would permit all existing IM scales to be mapped into one single model – the one used in OPO. We have defined the following components of the Online Status:

- Activity – denotes whether a user is present or away from the service;
- Disturbability – denotes whether a user wants to be contacted or declares himself/herself as busy;
- Visibility – denotes the possibility of others to view a user's actual state of presence;
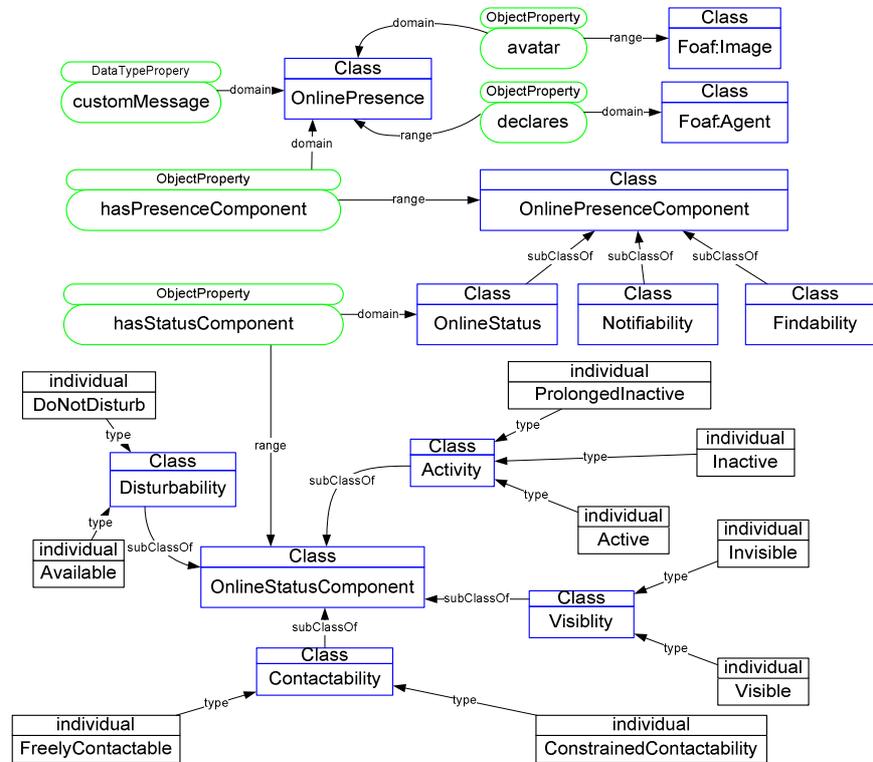- Contactability – denotes whether the possibility to contact a user is restricted.

Fig. 1. The partial view of concepts and properties of OPO

These are modeled as subclasses of the OnlineStatusComponent class. By combining different predefined instances of these OnlineStatusComponents, every IM status scale that we took into consideration can be unambiguously described (see Section 3.3).

As for the custom message, and avatar, we modeled them as properties of the OnlinePresence class since their lack of complexity does not demand the creation of new classes for them.

The concept of Online Presence itself is connected to the class Agent from the FOAF vocabulary [1] using the property *declares* (see Figure 1).

The OPO is available at http://ggg.milanstankovic.org/opo/ns/.

3.3 Mappings of Online Status scales to the OPO

Representing different Online Status scales in OPO is one of the most complex and most important issues in the OPO design. The complexity arises from differences in meaning and usage of particular Online Statuses on different platforms. OPO delivers a flexible model to represent the semantics of Online Statuses thus making their descriptions precise and understandable for the IM platform importing them.

In order to demonstrate the actual benefit of the OPO in this domain, we will take the example of SkypeMe status used on Skype IM platform and show its OPO representation. The description of this status provided by Skype is the following:

*"SkypeMe! mode allows everyone else on Skype know that you are available and interested in talking or chatting. This includes people who you do not know or you have not authorized but who can find you by searching the Skype directory. SkypeMe! mode **disables** your privacy settings and allows anyone to contact you, whether you've authorized them or not."*[2]

The corresponding representation in OPO (Turtle syntax [3]) would be the following:

```
@prefix dc: <http://purl.org/dc/elements/1.1/>.
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>.
@prefix opo: <http://ggg.milanstankovic.org/ontologies/
OnlinePresence.owl#>.
:SkypeMe rdf:type opo:OnlineStatus ;
       opo:onlineStatusName "SkypeMe";
       opo:hasStatusComponent opo:Active, opo:Available,
       opo:FreelyContactable, opo:Visible.
```

This representation in OPO describes the SkypeMe status trough several statements that define it in terms of Online Presence aspects. After defining SkypeMe to be of type OnlineStatus, we assign it the adequate onlineStatusName (a string used by IM platforms to identify different statuses). Then we describe this Online Status in terms of Online Status Components. The following components are assigned to SkypeMe: Active – the user is active on the service (not away); Available – the user is available for contact (as opposed to busy); FreelyContactable – everyone can contact the user; and Visible – the user's onlinePresence is visible. With all these characteristics declared in OPO, our description of SkypeMe status is fully compliant to the textual description provided by Skype.

Let us recall our example user Sally, who wanted to propagate the Online Status from one IM platform to another, and suppose that she wanted to transfer her SkypeMe status to GoogleTalk. Without using OPO, relying on individual interpretations by IM platforms, GoogleTalk would just recognize her SkypeMe status as equivalent to Available on the GoogleTalk scale. In such an exchange there would be a significant loss of semantics, since the two statuses are not actually equal. Representing the status being exchanged in OPO preserves its semantics, allowing it to be correctly transferred. This way, GoogleTalk could import SkypeMe status and comprehend it as its Available status, since it does not support the variations of the Contactability dimension. However, in further transfers to other IM platforms, GoogleTalk could export the original OPO description allowing the application of all OnlineStatus dimensions on some other platform that may support them.

Thus the OPO serves, in this domain, as a mediator preserving the semantics of online status scales in their exchanges, enabling more precise transfers of data between heterogeneous services.

4 Related Work

One of the rare examples of related work in the field is the XMPP protocol [5]. However its main aim is to enable inter-platform IM, while in the field of interoperability of various IM status scales it does not provide much functionality. A large number of inter-platform IM tools built on top of XMPP have to conform to a very poor XMPP IM status scale. Creating mappings from that scale to others is left to individual implementations. In this area OPO can be of essential value for achieving a richer exchange of disparate online status scales by enabling an unambiguous description and understanding of semantic categories that determine them.

Another interesting example of related work is the MeNow Schema[1], aimed at enabling representations of various statuses that a user can assume online. The Schema's exceptional value is in the possibility to represent many different aspects of the context of user's presence online (e.g., current book, current music, company of others, etc.). On the other hand we find that the Schema underestimates the importance of the possibility to semantically represent different qualitative aspects of online status, a feature strongly supported by OPO.

4 Conclusions and Future Work

Building of the OPO represents, at its core, a task of bringing the Social and the Semantic Web closer together. It is inspired by the idea that the future of the Web lies in the merging of those two approaches [4].

The benefits of OPO and its flexible and extensible design are numerous. First of all, it enables interoperability between applications that collect online presence data. This interoperability could result in users being able to correctly transfer their online presence data from one service to another regardless of the type of the service, and possibly unify their appearance online over multiple services. The ontology itself is just a prerequisite for this goal, and applications would have to adopt the practice of exchange in accordance with the Data Portability[2] initiative in order for the goal to be achieved.

The favorable properties of Semantic Web technologies, allow for assembling partial semantic descriptions of Online Presence, published by various services, into one coherent description.

The future work will primarily focus on building plug-ins enabling applications and social websites to publish Online Presence metadata. Scenarios of metadata exchange will also be developed, resulting possibly in building a centralized server for resolving privacy issues concerning the exchange. We will also consider the possibilities to use semantic rules and policies to allow for defining restrictions of some aspects of Online Presence to some categories of users and other more sophisticated statements. Last, but not the least, we will consider the possibilities to integrate with the XMPP protocol, widely used in cross-platform chat, in order to enrich the OnlineStatus data being exchanged and build a ground for more meaningful mappings.

References

1. Brickley, D., Miller, L., 2006. Foaf vocabulary specification. Available at http://xmlns.com/foaf/spec/
2. Skype help record. Available at http://support.skype.com/index.php?_a=knowledgebase&_j=questiondetails&_i=442
3. Becket, D., 2007. Turtle - Terse RDF Triple Language. Available at http://www.dajobe.org/2004/01/turtle/
4. Bojars, U., Breslin, J., Peristeras, V., Tummarello, G., and Decker, S., Interlinking the Social Web with Semantics, IEEE Intelligent Systems, 23(3): 29-40, 2008
5. Extensible Messaging and Presence Protocol (XMPP): Core – RFC Document, 2004. available at http://www.xmpp.org/rfcs/rfc3920.html

---

[1] MeNow Schema specification can be found at http://crschmidt.net/foaf/menow/menow.rdf

[2] For details about the Data Portability initiative please see http://www.dataportability.org/