SemPuSH: Privacy-Aware and Scalable Broadcasting for Semantic Microblogging*

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Abstract. Users of traditional microblogging platforms such as Twitter face drawbacks in terms of (1) Privacy of status updates as a followee – reaching undesired people (2) Information overload as a follower – receiving uninteresting microposts from followees. In this paper we demonstrate distributed and user-controlled dissemination of microposts using SMOB (semantic microblogging framework) and Semantic Hub (privacy-aware implementation of PuSH[3] protocol) . The approach leverages users' Social Graph to dynamically create group of followers who are eligible to receive micropost. The restrictions to create the groups are provided by the followee based on the hastags in the micropost. Both SMOB and Semantic Hub are available as open source.

Keywords: Semantic Web, Distributed Social Network, Social Web, Privacy, FOAF, PubSubHubbub

1 Introduction

The growing use of social networks has increased concerns over user generated content being received by undesired people[4] which is inturn a privacy challenge yet to be tackled. Twitter provides minimal privacy setting to the user, who can make his account either (1) Private: microposts is distributed to only the people who are permitted by the user to follow him/her or (2) Public: anyone on Twitter can view the generated microposts. Therefore, the user does not have enough settings to control the delivery of microposts to only those followers who he/she intends to send. The user who generates the microposts is called a followee and the users who follow other users are called followers.

In this paper we demonstrate an approach to solve the above mentioned issues by the use of SMOB [1] and Semantic Hub [3]. SMOB is a open and

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[3] http://code.google.com/p/pubsubhubbub/

[4] http://www.msnbc.msn.com/id/29796962/ns/technology_and_science-tech_and_gadgets/t/twitter-gets-you-fired-characters-or-less/

distributed semantic microblogging application. Semantic Hub (SemHub) is an extension of Google's PubSubHubbub using Semantic Web technologies to provide publisher-controlled real time notifications. PubSubHubbub is a protocol for scalable distribution of content on the Web (through Hubs that can broadcast updates to thousands of subscribers in almost reatime). More about the extension is described in [3], as this demo paper is a companion to the full-paper from the in-use track. Although the SemHub can be used for any domain, we focus on leveraging it to distribute microposts from SMOB users. Our contributions include (1) Dynamic grouping of the followers based on followee's FOAF[5] (Semantic) Social Graph (2) Mapping of groups to topic of the micropost (3) Real time notifications of micropost updates to the intended followers.

2 System

An overview of our system basically comprises of (1) SMOB[6] (2) Semantic Hub[7] as shown in Figure 1. In our system, the publisher and subscribers to SemHub are SMOB followee and followers.

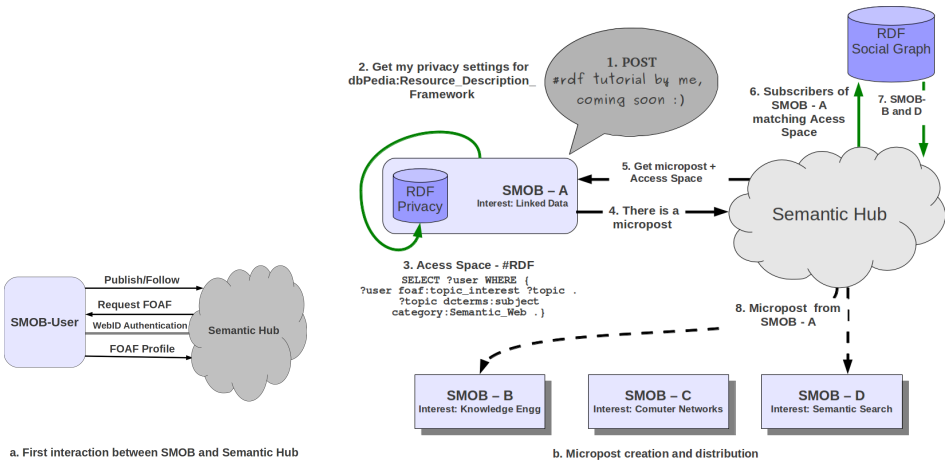

Fig. 1. SMOB and Semantic Hub Interactions

Figure 1a illustrates the first interaction between a SMOB User (publisher/subscriber) and the SemHub where the FOAF profiles of the SMOB Users is requested to build the Social Semantic Graph. Figure 1b presents the user-controlled micropost dissemination, where every micropost from a SMOB user is dynamically associated with a subset of his/her FOAF Social Graph (SG). Over all, the approach can be explained in two phases as (1) Dynamic grouping of followers (2) Distribution of microposts

[5] http://www.foaf-project.org/
[6] http://smob.me
[7] http://semantichub.appspot.com

Dynamic grouping of followers: The first task for the followee to post an update (micropost) is to decide on the group of followers who will receive it. The followee can create such groups using SPARQL queries that represent a subset of his/her FOAF SG stored in the SemHub. These queries are also known as privacy preference for the micropost and are represented in RDF using PPO [2]. Since it is impractical to create privacy preference for each micropost, we associate the privacy preferences to the hashtags mentioned in the microposts for the whole user account.

SMOB provides a user friendly interface to create the privacy preferences associated to hashtags. Therefore, knowledge of semantic web technologies is not a compulsion for the user. Once the preferences are created, they are automatically stored in SMOB's RDF store and accessed when the mapped hashtags occur in the microposts of the user. The micropost with its privacy preferences is updated as an RSS feed and notified to the SemHub when posted by the followee.

Distribution of microposts: The distribution of the SMOB user's (followee) microposts requires the SemHub to build the user's FOAF SG. The FOAF SG of a SMOB User is centered around the user's FOAF profile connected to his/her followers' FOAF profiles using PuSH vocabulary[8]. The FOAF profile of the users is requested by the SemHub during the initial interaction of the user with the SemHub as shown in Figure 1a.

The SemHub receives notification as and when there is an update by the followee. The SemHub then extracts the privacy preferences for each updated feed/microposts. The micropost is delivered to the set of followers obtained by executing the privacy preferences on the followee's FOAF SG. The subset is updated dynamically as and when SG of the SMOB User is updated (addition or deletion of followers), therefore the grouping is dynamic.

3 Demonstration

In this section we demonstrate an Use-Case for user-controlled dissemination of microposts in SMOB as illustrated in Figure 1b. To distribute the microposts to specific set of followers, SMOB-A generates the privacy preferences using SMOB's User Interface, see Figure 2. The privacy preferences in SMOB are associated to the hashtags in the micropost, the hashtags are inturn associated to a concept on Linked Open Data cloud[9] (DBpedia[10]). The privacy preference generated by SMOB-A in Figure 2 states that, all the microposts tagged with `#rdf` has to be distributed to followers who have interests that fall under the DBpedia category:Semantic_Web.

Once the preferences are generated, the distribution of microposts containing `#rdf` from the followee follows the same sequence as in Figure 1b. The privacy preference is fetched and is included in the updated feed in RSS and a notification of the update is sent to the SemHub. After the updates are fetched, the SemHub

[8] http://vocab.deri.ie/push
[9] http://linkeddata.org/
[10] http://dbpedia.org

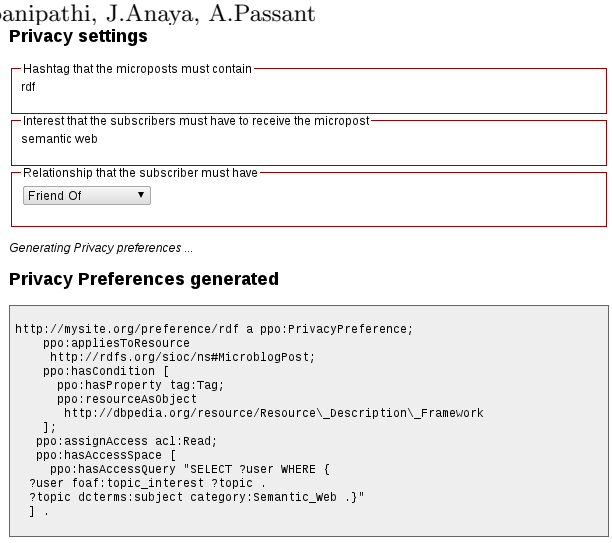

Fig. 2. Privacy Preference Generator

executes the privacy preference on SMOB-A's SG and restricts the micropost's distribution only to SMOB-B and SMOB-D because both the users have interests that fall under the category of Semantic Web. The video for this demo is available at `http://smob.me/video` and we expect to demo this live at the conference demo session.

4 Conclusion

The interaction between SMOB and Semantic Hub has been leveraged by the user to control the dissemination of microposts to other SMOB users. In this paper we have described a novel approach to provide better privacy settings for the users of social networks in a distributed environment. Our approach also shows the advantages of combining semantic web technologies with social web protocols. Transformation to a distributed environment using Google's scalable PuSH protocol has provided the scalability compared to centralized approaches. Also, we have demonstrated our complete approach using the SemHub and multiple SMOB instances in the video.

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