Xodx

A node for the Distributed Semantic Social Network

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1 Introduction

The world wide web (WWW) is not anymore just an information retrieval system [1] but rather an interactive communication medium. Within the last decade online social networks have evolved and constantly increased in popularity. The currently most used online social network services, according to their estimated monthly active users[1], are Facebook (1.27 billion, `facebook.com`), Google Plus (541 million, `plus.google.com`) and Twitter (283 million, `twitter.com`). Compared to the estimated total users of the WWW of 2.93 billion, over 40 % of the users of the WWW are actively using Facebook. This concentration on some single services contradicts the actual organisation of the WWW and the whole Internet as a network of decentrally organised and interconnected computer nodes. This situation bears risks regarding the privacy, data security, data ownership, reliability of the services and freedom of communication. By building up a distributed online social network with multiple interconnected services this risks can be minimised and a much more flexibly expendable network is created.

We present *Xodx* (`http://aksw.org/Projects/Xodx`, includes a live demo) an implementation of a node for the *Distributed Semantic Social Network* (DSSN). The DSSN is a general architecture for building an online social network using Semantic Web standards and additional protocols for real-time communication. Xodx provides functionality for publishing and editing personal profiles, adding friends to the friend list, sending and receiving friendship requests, publishing posts and following other users activities across distributed nodes.
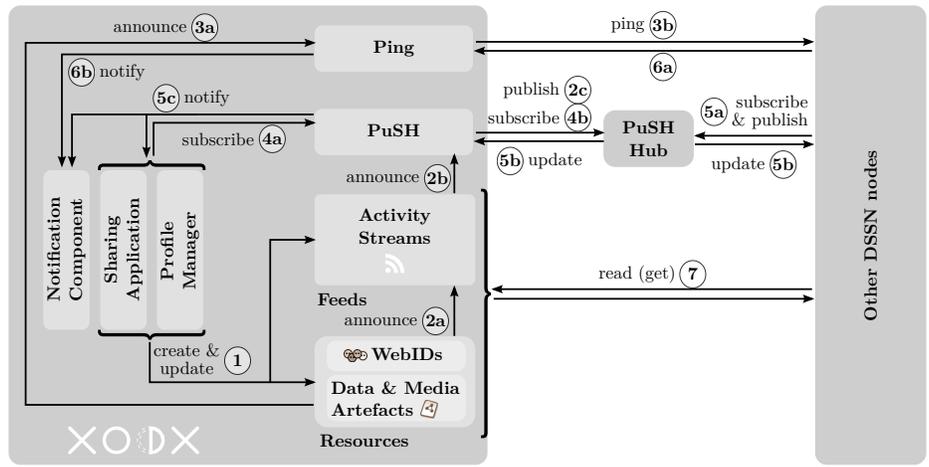
2 Node Intercommunication and Integration in the Web

The complete architecture for the DSSN is proposed in „An Architecture of a Distributed Semantic Social Network" [2]. It combines established Web 2.0 technologies i.e. (Semantic) Pingback [3] (Ping) and Activity-Streams published through PubSubHubbub (PuSH)[2] with an RDF data model and the Linked Data protocol [4]. The consequent use of RDF facilitates the integration of heterogeneous data in the data model. By using the Linked Data protocol the DSSN is

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[1] as estimated on Internet Live Stats: `internetlivestats.com`, July 13th 2014

[2] PubSubHubbub: `https://code.google.com/p/pubsubhubbub/`

easily integrated with any other Semantic Web application and thus facilitates an extendable infrastructure. This enables us to build up a completely distributed network of data and services, which is highly integrated and embedded in the Web of Data and WWW.

Figure 1. Architecture of an Xodx node and intercommunication between nodes on the DSSN. [5]

The architecture of the Xodx implementation and the intercommunication with other nodes is depicted in fig. 1. The profile manager is used for editing the WebID and adding new friendship relations, it creates and updates the according resources and activity streams (1). Similarly, the sharing application can be used for sharing media artefacts and web resource. Updates of the WebID or any other data or media artefact are announced (2a) by updating the activity stream, which is then announced to the PuSH service (2b), which in turn publishes the updates to the PuSH hub (2c). In parallel this change is announced to the Ping component (3a), which sends a ping to each resource which is mentioned in the update (3b). With the PuSH service a user can be subscribed to any activity stream on the DSSN (4a, 4b), which implements a follow functionality. If the PuSH hub receives a new update announcement from any DSSN node (publish, 5a) it will update all nodes, which are subscribed to the according resource stream (5b). The PuSH service of the Xodx node will then notify the according components (5c). When the ping service receives a new ping (6a) it will call the notification component to generate a new user notification (6b). If other nodes (or any Linked Data application) browses the DSSN the activity streams, data & media artefacts and any RDF resource can be retrieved via standard HTTP-GET-requests (7) according to the Linked Data principle.
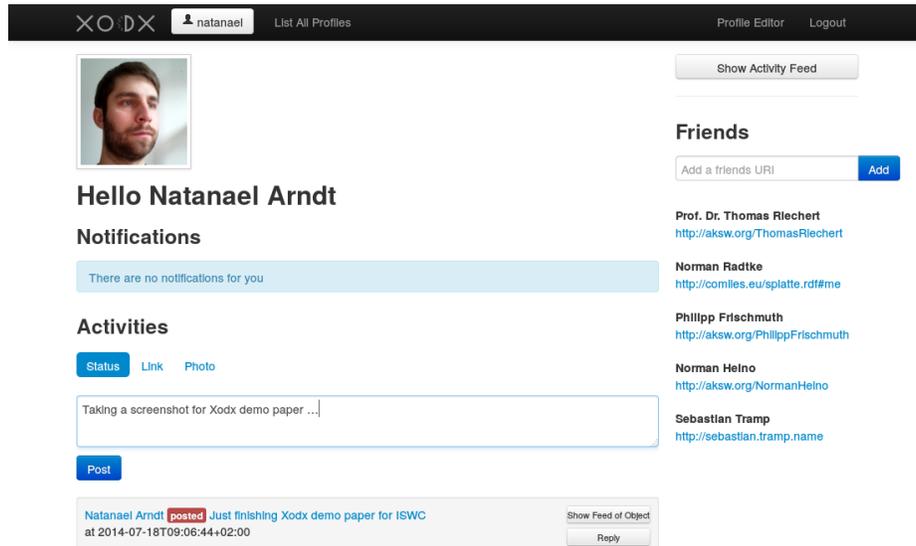
Figure 2. Screenshot and feature demonstration of Xodx

Figure 2 shows the home-screen of a logged-in user, it is organised in three main parts, the top navigation bar, the button and friend-list bar to the right and the main part with activity stream in the middle. All other resource-views are organised very similar to the user's home-screen. The top navigation bar from left to right has a home button for the user, which also indicates if new notifications are available. A button to navigate to the list of profiles, available at the current node. The profile editor enables the user to edit any triple of her WebID. The right most button is for log-out.

On the right hand side one can view the Activity Feed of the current displayed resource by clicking on "Show Activity Feed". If the profile of a person different from the current user is displayed, an additional button "Add {name} as Friend" is displayed, to add a friendship relation to the own profile, send a ping to the respective person for notification and subscribe to his activity stream for updates. Below the buttons one can find the friend list. It contains a field for adding a new friend using its WebID-URI and a list of existing friendship relations. By clicking on the individual entries the user can browse the profiles and further navigate to the friends of their friends. If the browser reaches a resource, which is not yet available in the local triple store, it is retrieved according to the Liked Data principles.

The central part shows the picture and the name of the current user, current notifications and the sharing application with activity stream. If a new friend request is send to the node or if the user was mentioned in a post, a new notification is generated and displayed in the notification section to inform the user. Using the sharing application a user can create and share new posts, web re-

sources or photos with his subscribers via PuSH. The activity stream displayed at the very bottom is a combined stream of the personal stream of the user and all activity streams she is subscribed to. With the two buttons to the right of the activity entry a user can generate a reply resource answering to this activity resource and view the activity feed of this resource, which includes all its replies.

3   Prospect and Future Work

The Xodx implementation demonstrates the feasibility of a semantic social network build by distributed nodes. It already supports the main features of building friendship relations and sharing resources across the network. Currently some further features for supporting the work in groups are planed. The practical tests with multiple nodes already pointed out the usage of the PubSubHubbub protocol as a limiting factor. Currently only a few hub implementations are available and effectively the google reference implementation and instance is the only usable hub. So we are trying to substitute the federation protocol with a Linked Data and Semantic Pingback protocol. But due to the Linked Data nature of the DSSN we have seen, that it is easy to integrate this social network architecture with any application or data-set on the Web of Data. Possible applications, which can benefit from the semantic integration with the social network are e.g. collaborative-wikis, web-logs or personal information management systems. This concept will give us new opportunities for integrating social functionality in any web application and thus extend the social web to the whole Internet rather than some big closed nodes.

References

1. Berners-Lee, T., Cailliau, R., Groff, J.F., Pollermann, B.: World-Wide Web: The Information Universe. Electronic Networking: Research, Applications and Policy **2**(1) (1992) 52–58
2. Tramp, S., Frischmuth, P., Ermilov, T., Shekarpour, S., Auer, S.: An Architecture of a Distributed Semantic Social Network. Semantic Web Journal **Special Issue on The Personal and Social Semantic Web** (2012)
3. Tramp, S., Frischmuth, P., Ermilov, T., Auer, S.: Weaving a Social Data Web with Semantic Pingback. In Cimiano, P., Pinto, H., eds.: Proceedings of the EKAW 2010 - Knowledge Engineering and Knowledge Management by the Masses; 11th October-15th October 2010 - Lisbon, Portugal. Volume 6317 of Lecture Notes in Artificial Intelligence (LNAI)., Berlin / Heidelberg, Springer (October 2010) 135–149
4. Berners-Lee, T.: Linked Data. Design issues, W3C (June 2009) `http://www.w3.org/DesignIssues/LinkedData.html`.
5. Arndt, N.: Xodx – Konzeption und Implementierung eines Distributed Semantic Social Network Knotens. Master's thesis, Universität Leipzig, Fakultät für Mathematik und Informatik, Institut für Informatik (June 2013)