WonderDesk – A Semantic Desktop for Resource Sharing and Management

Xiang Zhang, Wennan Shen, Yuzhong Qu

Department of Computer Science and Engineering, Southeast University,
Nanjing 210096, P. R. China
{xzhang,wnshen,yzqu}@seu.edu.cn

Abstract. We present our approach in building WonderDesk - a semantic desktop for resource sharing and management, which is a component of our WonderSpace application and designed to be an e-Science tool. We propose a desktop architecture for resource sharing and management using semantic-enriched RSS model and P2P technology. To enable fine-grained metadata for e-Science, an ontology about resource is presented as basic vocabulary to be used in constructing resource metadata along with RSS. Further, group-specific discipline ontology is proposed to enhance the semantic description of information resource within user group.

1 Introduction

Nowadays there are many ways for resource sharing. It will be beneficial to the resource consumers if resources are provided with richer metadata. Some efforts have been made on centralized resource sharing with rich metadata, such as Forum Nokia[1]. Other conspicuous efforts are made on desktop, such as Haystack [1, 2], Chandler [3] and Gnowsis [4].

In literature [5], Decker remarks on how to build a distributed desktop, and use it for online social networking. This paper presents our primary attempt – WonderDesk, as a vision that the Semantic Web and P2P technology can be used in building a semantic-enriched and distributed desktop for resource sharing and management.

WonderDesk is designed to be an e-Science tool and mostly concern about nontrivial resources that are important for research. Born as an e-Science tool, WonderDesk is strongly affected by the visionary prescribed by Vannevar Bush in his "As We May Think" [6]. Researchers often feel eager to record their fleeting inspiration for reviewing in aftertime, or exchange thoughts with neighbor researchers for a corporate brainstorm. Sometimes after reading a classical or state-of-the-art paper, the first thing a researcher want to do is to share it with colleagues immediately. The same thing happens when someone saw a presentation of a stunning technology. WonderDesk is focusing on making these activities of e-Science feasible and efficient. WonderDesk deems these objects of e-Science, e.g. paper and presentation, as resources. We design an ontology about resource as basic vocabulary

[1] http://www.forum.nokia.com/

to construct fine-grained resource metadata. We can also add metadata about topic information to an e-Science resource. Since topics of resource differ a lot, it is hard to design a comprehensive topics category. An ontology about group-specific discipline is proposed to enhance the semantic description of information resource within user group, and each topic of a resource can be point to a class in the ontology. Different groups may use different discipline ontologies, which entirely depend on their research areas.

2 WonderSpace

WonderDesk is a component of WonderSpace, which is a Semantic Web application developed in our Lab[2]. Its potential users are researcher groups.

WonderSpace is still under development, of which WonderDesk and WonderServer are two important components. WonderDesk is a desktop tool focusing on resource sharing and management, while WonderServer acts as an information integrator for all the WonderDesk peers in a group and undertake some computation extensive tasks. It affords some web services and P2P services like indexing service simultaneously. The reason we design in this way is that: when we are trying to obtain scalability, we still want to utilize some server technology to handle issues like concurrent requests and gain high performance.

The typical scenario of WonderDesk is a combined usage with a WonderServer within a research group. We named it a stand-alone WonderSpace application.

3 WonderDesk

In WonderDesk, RSS[3] model is used as the model of resource sharing, and we use RSS 1.0 specification as the syntax to describe resources metadata. This idea is from Blog (or Weblog) systems. In WonderDesk, we enrich RSS 1.0 Vocabulary to represent specific metadata of various kinds of resources.

WonderDesk is developed basing on an open source RSS Aggregator – RSSOwl[4] (The “Owl” here has no relation with the Web Ontology Language), We extended its RSS parser and equipped it with ontologies to make our vocabularies in RSS file comprehensible to the computer. More details about RSS and our ontologies will be discussed in following sections.

WonderDesk peer has the following functionalities:

- Presents an user interface to let desktop users annotate their resources;
- Shares the annotated resource with the members in a group;
- Present an enhanced query interface to help desktop user search for the shared annotated resources within a group;
- Requests and retrieves resources from other peers.

[2] http://xobjects.seu.edu.cn
[3] http://rss.userland.com
[4] http://www.rssowl.org

It is typical but not required to use WonderDesk peers combined with WonderServer. We can behold the typical scenario as an implementation of hybrid P2P architecture [7], in which WonderServer acts as a super node. Comparing to a pure P2P architecture, we think the hybrid one offers more manageability and facilities for resource query.

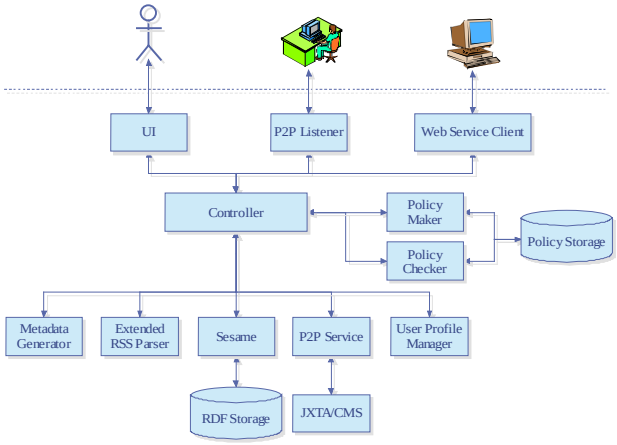

Fig. 1. WonderDesk Architecture

As presented in Fig. 1, we use Sesame[5] as the RDF framework, which has been proved to be efficient in large OWL application [8]. SeRQL[6] is a powerful RDF query language implemented in Sesame.

Some modules in the architecture are based on a java reference implementation provided by JXTA, which is a set of open protocols that allows any connected device on the network communicates and collaborates in a P2P manner [9].

4 Ontology

We have built ontology of resource, which defines terms to be used in constructing resource metadata along with other modules in RSS 1.0 specification. The other is group-specific discipline ontology describing the topic of resources.

4.1 Resource Ontology

Fig. 2 depicts part of the resource ontology model we designed. A hierarchy of "Resource" class defines different kinds of resources and their diverse properties. Although only "Information Resource " is most concerned sharable e-Science

[5] http://openrdf.org
[6] http://openrdf.org/doc/sesame/users/ch06.html

resources with WonderDesk at present, this kind of hierarchy concerning more general resources provides scalability for potential extension by any third-party.

Fig. 2. Resource Model

4.2 Group-specific Discipline Ontology

As mentioned before, topics of shared resources vary within different research groups. And in most cases, a certain group concerns about limited number of research area.

We build an ontology presenting a simple and incomprehensive classification of Computer Science research areas, where each area corresponds to a node in ACM CCS[7]. Each topic of a certain resource shared within our group can be linked to an area in this ontology.

It is nature that each stand-alone WonderSpace application will share a unified group-specific discipline ontology. We prefer the ontology to be small and specialized than huge and general for the sake of efficiency.

5 Conclusions and Future Work

We have demonstrated our approach in build WonderDesk - a semantic desktop for resource sharing and management, which is a component of our WonderSpace application. We design it to be an e-Science tool and benefit a lot from the experiences of previous research, including Haystack, Chandler and Gnowsis.

Among other semantic desktops, WonderDesk mainly contributes to the following aspects: first, we originally propose a desktop architecture for resource sharing and

[7] http://www.acm.org/class/1998

managing using RSS model and P2P technology; second, to enable fine-grained metadata for e-Science, a resource ontology is presented as basic vocabulary to be used in constructing resource metadata along with RSS. Further, group-specific discipline ontology is proposed to enhance the semantic description of information resource within user group. These ideas have been illustrated to be feasible in our primary implementation.

Our research is just an initial attempt in building Semantic Desktop. A lot of issues are still under consideration. In the future work, we will focus on the semi-automatic or automatic annotation for resources, which will bring great facility to WonderDesk users as discussed in foregoing sections. We will also focus on the connection and collaboration of different stand-alone WonderSpace applications, and model a social researcher network. Trust and reputation issues will be addressed to help users making decision in their researching collaborations.

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