Research on Utilization of Library Website Digital Resources based on Web

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Abstract - With the rapid development and widespread use of Internet, readers, especially scientific researchers, depend more on Internet than on traditional library services for necessary information. The Web access of libraries has begun to lay more emphasis on digital reference and consultation services. More importantly, this new type of service is becoming the focus of many scholars' research at home and abroad. In this paper, we design a library digital resources management system based on the semantic Web technology, and analyze the access control model in our system by the semantic Web.

Index Terms -Website, library, digital resources, Semantic Web

I. Introduction

In the era of information, traditional library is no longer the heart of information in modern educational institutions. With the adoption of digital library portal, students are now being able to access a wide variety of resources in a center. However, it is not easy to absorb the acceptability of this new-born technology among students because of lack of awareness and knowledge about the portal. When the library develops new services for their users, very little attention is given to whether or not the initiatives taken are useful, successful or whether targeted users are even aware of their availability [1]. Somehow, although users knew the existence of the portal, only few of them know exactly how to run the portal without the intervention of other people.

Nowadays, we are seeing the emergence of Web-based services that pull data from a wide range of back-end systems to deliver value to users, when, where and in the form that they require it. We are seeing ad hoc relationships being formed by and for these services at the point of need, rather than the costly and time-consuming human creation of contracts or service level agreements. We are seeing disaggregation of content and services into components that are far more meaningful to the user (and potentially far more valuable to the provider), alongside disintermediation of the Gate Keepers in favor of direct access to Web-visible resources. We are seeing previously passive recipients of content beginning to engage, and to combine and recombine that which they are given in new and interesting ways. We are seeing the realization of much of the Interoperability promise [2], with expensive monolithic systems increasingly likely to be replaced by a platform supporting purpose-specific components.

With the rapid development of Internet, digital libraries have also had a rapid development in recent years. At present, computer technology has widely penetrated into every aspect of people's life. A lot of portable devices, such as smart phones, digital cameras and personal digital assistants (PDAs), are widely used [3]. With the development of wireless network and mobile computing, portable reading devices have been integrated with wireless network and become increasingly common. Ubiquitous computing data service access has become a reality. Computer technology increasingly presents an apparent trend of ubiquitous computing which is a new computing model beyond the desktop computing first proposed by Mark Weiser in the American Xerox PAPC Laboratory in 1991 [4].

As the digitalization of library resources, the conveniences of website access, and the diversity of access console, the digital resources of a library can be accessed on website by many consoles. In this paper, we design a web based library digital resources management system, and by several use cases, we introduce the application of this system.

The rest of the paper is organized as follows. Related work is given in section 2. In section 3, we review some related work on library management system. The web based library digital resources management system is given in section 4. In section 5, we present several use cases. Conclusion is given in section 6.

II. Background of Semantic Web

In this section, we introduce some background of the Semantic Web. The Semantic Web is a web of data, in some ways like a global database. The rationale for creating such an infrastructure is given elsewhere here I only outline the architecture as I see it.

A. The basic assertion model

When looking at a possible formulation of a universal Web of semantic assertions, the principle of minimalist design requires that it be based on a common model of great generality. Only when the common model is general can any prospective application be mapped onto the model. The general model is the Resource Description Framework.

Being general, this is very simple. Being simple there is nothing much you can do with the model itself without layering many things on top. The basic model contains just the concept of an assertion, and the concept of quotation - making assertions about assertions. This is introduced because (a) it will be needed later anyway and (b) most of the initial RDF applications are for data about data ("metadata") in which assertions about assertions are basic, even before logic. (Because for the target applications of RDF, assertions are part of a description of some resource, that resource is often an implicit parameter and the assertion is known as a property of a resource).

As far as mathematics goes, the language at this point has no negation or implication, and is therefore very limited. Given a set of facts, it is easy to say whether a proof exists or not for any given question, because neither the facts nor the questions can have enough power to make the problem intractable.

Applications at this level are very numerous. Most of the applications for the representation of metadata can be handled by RDF at this level. Examples include card index information (the Dubblin Core), Privacy information (P3P), associations of style sheets with documents, intellectual property rights labeling and PICS labels. We are talking about the representation of data here, which is typically simple: not languages for expressing queries or inference rules.

RDF documents at this level do not have great power, and sometimes it is less than evident why one should bother to map an application in RDF. The answer is that we expect this data, while limited and simple within an application, to be combined, later, with data from other applications into a Web. Applications which run over the whole web must be able to use a common framework for combining information from all these applications. For example, access control logic may use a combination of privacy and group membership and data type information to actually allow or deny access. Queries may later allow powerful logical expressions referring to data from domains in which, individually, the data representation language is not very expressive. The purpose of this document is partly to show the plan by which this might happen.

III. Related work

As the prosperity of digital content in the Internet and the development of mobile computing, portable devices have become increasingly powerful and widely used in daily life. Online digital library service allows people to freely enjoy information services anytime and anywhere, which arise the revolutionary change of daily life. However, there are still a lot of piracy and infringement issues of online dissemination of digital content. Zhang et al. [5] introduced a digital library system and its online sales model based on TD-SCDMA communication. They also proposed a novel and practical digital rights management (DRM) scheme. The data interface between client and server in typical scenarios are presented too. Their scheme can provide a technical basis of digital right protection for other mobile business applications.

Sandra et al. [6] probed the motivation of librarians to develop public library Websites for young adults. What young adult information needs did they target? Were teenagers involved in creating and updating the site? How was the site promoted to teenagers? What barriers had to be overcome in the creation and maintenance of the site? Connections are drawn between the findings of this study and research about teens and their Internet use. Related implications for Web site development are discussed, with an emphasis on the need for librarians to not only acknowledge teens ' developmental needs but to take into consideration their expectations of Web technologies.

Cloud computing has been applied in many fields at home and abroad as a rapidly developing new information technology. Chen et al. [7] applied cloud computing in digital libraries, analyzed current situation and existing problems of the cloud computing in digital library. Based on this, on the combination of cloud computing, SaaS, web2.0, SOA and other technologies, they proposed a CALIS-based cloud service strategy and the corresponding cloud library services platform (i.e. Nebula platform) model. Their model is suitable for constructing large-scale distributed network of public digital library services. All library resources and service distributed on the Internet can be integrated as a whole, which forms a new type of adaptive control service system supporting interlibrary collaboration and service access, as well sharing resources from different libraries.

With the advent of what has been referred to as 'Web 2.0' in 2004, libraries have been anxious to use interactive, social networking tools to create something many have called 'Library 2.0'. Web 2.0 and Library 2.0 are not radical departures from the past and that social networking tools have little relevancy or user take-up in the context of academic libraries [8].

There was a revolutionary shift for libraries in the late 1960s when libraries pioneered enhanced services using computer technology. This shift the author s call 'Library II' to distinguish this new age of libraries from the old and in contradistinction to 'Library 2.0' [9]. Gavrilis et al. [10] presented a prototype of an Online Public Access Catalog (OPAC). This new OPAC features new functionalities and utilizes web 2.0 technologies in order to deliver improved search and retrieval services. Some of these new services include social tag annotations, user opinions and ranks and tag-based similarity searches. Foo et al. [11] explored these challenges from the point of libraries and library schools, and examines whether these entities, locally in Singapore and overseas, have been able to meet the needs of its users and its clientele, as well as employers of LIS graduates.

The Internet and libraries are now at a stage where the development of what Sir Tim Berners-Lee calls the Semantic Web, could lead to what could be 'Library III', where library leadership and resources can again be a key in developing and exploiting the resources of libraries and the digital world. Li [12] introduced digital library information retrieval and semantic web related concepts and technologies, and analyzed the digital library information retrieval problems faced. Digital libraries have been an important source of information throughout the history of mankind. It has been present in our societies in different forms. They have taken the shape of semantic digital libraries, which are accessible at any time, and accordingly provide a more meaningful search. Alotaibi [13] further discussed social semantic digital libraries that also incorporate the social and collaborative aspect. Tempich and Volz [14] provided a systematic approach for the creation of benchmarks for knowledge representation systems and presented the results of the first step in benchmark creation - the analysis of available data. The semantic Web is an exciting prospect, but not yet a reality, for

researchers who are faced with an ever-increasing range of material – some freely available and some accessible to them only by virtue of their affiliation. Sadeh and Walker [15] introduced the concept of the semantic Web and indicated how, if realized, the semantic Web could be of great benefit to researchers.

IV. Web based library digital resources management system

In this section, we design a library digital resources management system based on the web, and presents some main function of our system.

A. System overall design

The overall design of the library digital resource management system is in figure 1. The presentation of the client side is a website. Users can access the system on both personal computer and mobile devices using browser. Different from personal computer, the mobile devices access the system through the mobile operators by wireless access. The server side of the system is composed of mobile web server, web server, database and other digital resources.

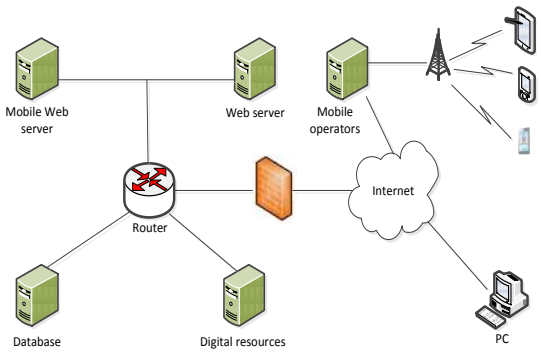

Figure 1. System overall design

B. System architecture

Different from the overall system design, the system architecture contains all functions. Based on the semantic web, the digital library system is composed of five parts users, grid framework, and the framework of the semantic Web, SMDL framework of digital libraries and five frameworks. The system architecture of our system is in figure 2.

The traditional information retrieval is that the users directly enter the keywords to search, but its result is not very well. Up to expectations, the main reason is that the professional knowledge of the field of cognitive is not comprehensive, and not easy to understand the demand of information distortion, and thus users can't change flexible information needed, so similar results cannot be search out. At the same time, the user real retrieval is difficult to use a few key words intentions clear expressions, and users to areas of knowledge of professional degree have differences between cognitive, these have influenced the retrieval efficiency. Therefore, human-computer interaction began to attention and concern, become information retrieval efficiency improving study. And the user interface of human-computer interaction is based on the semantic, and on the basis of in the field of computer, semantic is the user for those who used to describe the real world of computer said explanation, that is used to connect users expressed and real world way. In the user interface of the model and query information processing modules, when the user in the user interface using natural language input inquires the request, general is key words or statements, and reasoning machine for inquires preprocessing first request, be responsible for the user to natural language inquires into appropriate conversion words or sentences of words or sentences ontology inquires. Reasoning machine is to point to realize the system. In the knowledge of the reasoning of the components, is based on knowledge reasoning in the realization of computer, including the reasoning and control two aspects, knowledge system is the indispensable important component.

This module's main function is the treatment of key phrases or sentences group, use the domain ontology construction, in the knowledge base in the search users really need the information retrieval. When the user input inquires the request, reasoning machine for the entry of keywords or statements, and in the domain ontology are conducted, based on the semantic reasoning, extract the semantic phrases or sentences key group, form logical expression, submitted to the retrieval system. In the retrieval, the system of knowledge base to using RDF, RDFS described such as the example of effective reasoning, reasoning process according to specific reasoning rules, and the system programmer can be according to the specific circumstances create a correct reasoning rules. Then, the system from the digital library information resources in the search for the word or sentence the semantic of all of the relevant literature resources, namely the result set. At this time, to get the result set for integration, according to the request processing module son query, analyzes the meaning of the phrase or get key statement group, or combined with the return key phrases or a sentence semantic of choice, with the user's original queries to contrast, and according to the key phrases and semantic inquires or statements and semantic analysis of related degree.

Get user retrieval intention, according to the information in the domain ontology, according to a certain semantic similarity algorithm, comprehensive information and related numerical form, and concludes that the specific semantic similarity value. And so to sort and the similarity is high, the more near the front of the rankings.

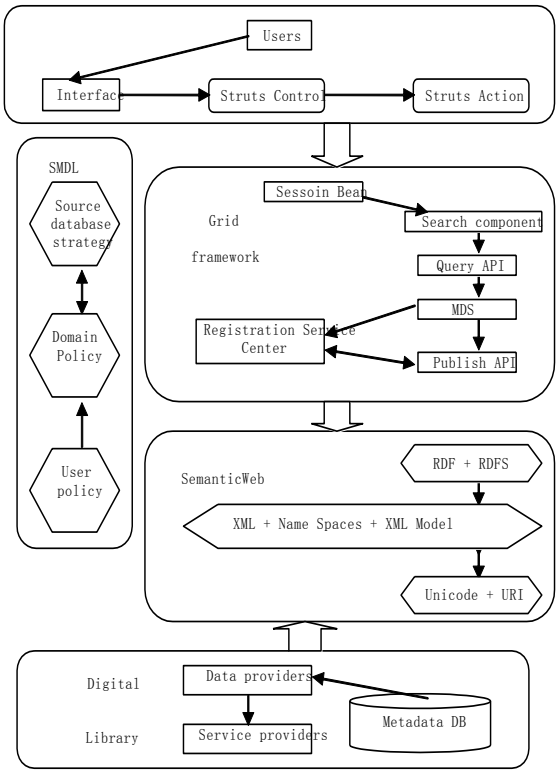

Figure 2. System architecture

V. Access Control Model

The system mentioned above involves additional effort from the host organizations in deciding which roles or users from remote organizations should have access to which object. While some organizations seek this amount of control, there are organizations which seek to enable share with those organizations that they can trust to a certain level. These organizations want sharing to be enabled with minimum changes to their access control model and their information systems.

A. The Semantic Access Control Model

In this case, the organizations have their role hierarchies and role-based access control models. Involving an expert or automated methods, who is cognizant of the security and access needs of the two organizations, the role lattices of two organizations are mapped to each other. An additional issue in interoperation systems is the differences in the semantics of the terms used to name objects across information sources. The expert or automated mapping tool also maps ontologies across information sources that establish the correspondence rules among concepts across the information sources. In our setting, a mediator mediates between different organizations by translating access requests from one organization to an access request that can be processed by another. This translation is done by replacing roles with matched roles and objects with matched objects. Details are in figure 3.

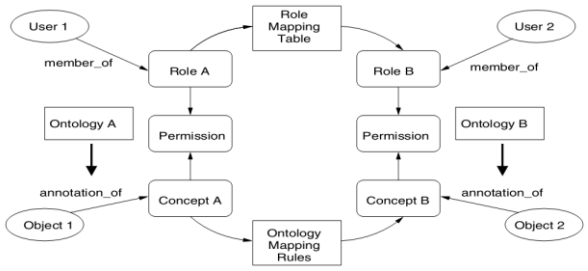

Figure 3. Semantic Access Control Model

B. The Semantic Interaction Model

In order for both system administrators and users to accept any steps taken by the security infrastructure, following reasoning, the infrastructure should be able provide some justifications on why an interaction was accepted or rejected.

In order to provide such capabilities relating to security policies, we propose that a service-oriented infrastructure is supported by semantic-level security services working alongside more conventional supporting infrastructure, such as firewalls, reasoning about the security requirements of both individual services as well as the wider security policy requirements of the domain. The required security capabilities require that we are able at run-time to take decisions about the types of services interacting, the current context and the security policies from a number of different domains. Semantic Web technologies are currently the only viable option for enabling us to perform such reasoning, since they allow for a more fine-grained description and reasoning over the relevant issues in a manner that could also address the challenges placed by the open and heterogeneous nature of the service-oriented environment envisioned. In order to provide a more concrete understanding of how such semantic-level security infrastructure could begin to develop, in the next section we investigate the requirements for a semantic firewall, which acts on behalf of the protected services to ensure the enforcement of security policies and also provide reasoning capabilities about security policies. We draw direct links between the abstract requirements described above and specific Semantic Web technologies to be used, as well as discuss how a Semantic Firewall could be employed in our motivating scenario.

The Semantic Firewall is envisioned as a service operating alongside a traditional firewall, which reasons about the acceptability of incoming and outgoing messages based on the context under which the messages are being sent or received and the security policies in place within the protected domain. This device is under the control of the system administrator, which is responsible for defining appropriate policies. Next, we discuss the features that should be built into a Semantic Firewall, based on the division into description, reasoning and infrastructure capabilities as discussed above. Throughout the discussion, we will refer to out motivating scenario and how Semantic Firewall devices could be used to resolve some of the problems raised. In Figure 4 we illustrate how the semantic firewalls would operate “behind” a

traditional firewall and the message exchange that would take place.

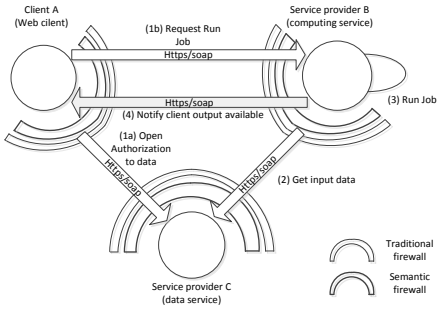

Figure 4. Basic interaction across the Semantic firewall

VI. Conclusion

Semantic Web is a convenient label upon which to hang a range of concepts. Our automatic reaction to hype such as that accruing to the Web 2.0 meme is often to dismiss the whole thing. Here, though, there is much of value with which libraries should be seeking to engage. In this paper, we design a library digital resources management system based on the semantic Web technology, and analyze the access control model in our system by the semantic Web. The system is easy to implement, and is convenient to access by all kinds of consoles through the Web browser.

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