HyperSD: a Semantic Desktop as a
Semantic Web Application

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Abstract. In this paper, we show how one can leverage a Semantic Web application development environment to define an application that is a Semantic Desktop browser called HyperSD. In addition, special wrappers have been defined to allow importing regular desktop objects, such as files, person records, calendar entries, etc… into the semantic desktop accessed through HyperSD.

Introduction

With the emergence of the Semantic Web, it has been quickly recognized the desirability of applying its technologies to enhance the everyday desktop on which users work everyday. By exploiting the semantically richer (meta)data available for relevant items, it should be possible to provide more useful ways to access and process information stored in desktop items, such as files containing data, music, video, images; information about persons; information about events; etc…There have been several proposals on how to achieve this, notably Gnowsis (http://www.gnowsis.org) and Haystack (http://haystack.lcs.mit.edu/), among others.

The availability of metadata describing desktop items, especially using Semantic Web technologies, immediately suggests that it should be possible to access it as a hypermedia application, allowing the user to navigate from one item to its semantically related items. This paper shows how we have taken a development environment for hypermedia applications in the Semantic Web, called HyperDE, and generated a Semantic Desktop browser called HyperSD, which allows accessing desktop information in hypermedia fashion.

A brief summary of SHDM and HyperDE

The HyperDE environment allows the implementation of web applications designed using the SHDM method [1,2]. SHDM is a model-driven approach to design web applications using five different steps: Requirements Gathering, Conceptual Design, Navigational Design, Abstract Interface Design and Implementation. Each phase

focuses on a particular aspect and produces artifacts detailing the application to be run on the web.

In SHDM we define a Semantic Web application as a navigational view over some ontology which describes the problem domain (see [4] for a more extensive discussion). We profit from being able to represent both data itself and its schema (metadata) using the same formalism, since the fact that the schema can be manipulated just like any other kind of data brings greater expressiveness and conciseness to the specifications.

The HyperDE (http://server2.tecweb.inf.puc-rio.br:8000/projects/hyperde/trac.cgi/) environment is based on the MVC framework, and allows the designer to input SHDM navigational models (the "model" in the MVC framework), and interface definitions (the "view" in the MCV framework), and generates complete applications adherent to the specification. It also provides an interface to create and edit instance data, although, strictly speaking, this should actually be part of the generated application. In HyperDE. SHDM meta-models, user defined navigation models, as well as the application instance data, are all stored as RDF data.

The Semantic Desktop as a Hypermedia application

A Semantic Desktop can be seen as a meta-data enriched set of information items accessible through the user's desktop. Typical item are of different types, such as various file contents, such as text, mp3s, videos, programs, etc….; information about persons; and information about events. Fig. 1 shows a simple schema for these information types. It should be noted that the properties and some relations in this schema are the same as in popular existing ontologies for existing ontologies for similar concepts, e.g., FOAF for describing persons and relations, RDFCal for events, etc…
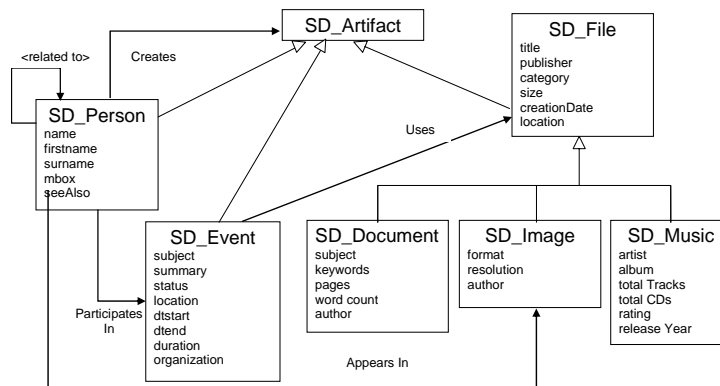

Fig. 1. A simple vocabulary for HyperSD.

Given the set of information items, a Semantic Desktop browser can be seen as an application that allows navigation among these items, as well as the ability to process them.

Following SHDM, we have defined a simple navigation schema for such an application, which was implemented in HyperDE; the resulting application is called HyperSD.
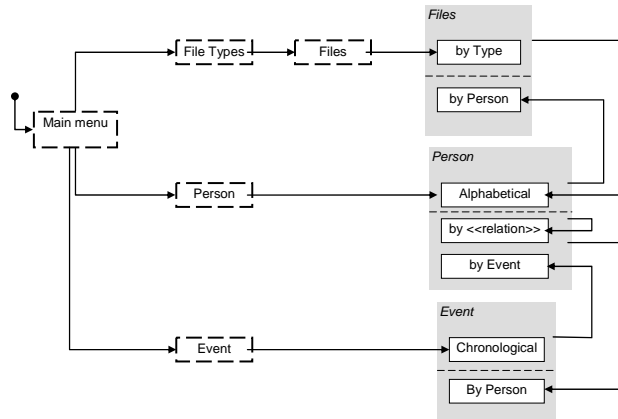

Fig. 2. Navigation Schema for HyperSD.

In Fig. 2, we show an initial navigation context diagram for HyperSD. In this diagram, dashed boxes are indices, and solid boxes are contexts (sets of items whose type is shown in the grey area). From the main menu, one can access a hierarchical index of files by file type, an alphabetical index of persons, and a chronological index of events. From a file, it is possible to navigate to the persons related to it. From a person, it is possible to navigate to the related persons according to each possible type of relation defined, to the files and to the events associated with that person. From an event, it is possible to navigate to the persons associated with this event.

It is important to stress that we do not claim that this is the only possible, relevant or meaningful way to navigate among items, but rather the fact that, having an environment such as HyperDE, it is very straightforward to implement whatever navigation topology is desired, and evolve it over time.

The Semantic Desktop implementation in HyperDE

Given the models described earlier, we implemented them in HyperDE, running as a web application local to the user machine. Fig. 3 shows the details of an Event in the context "Events in Chronological Order". Clicking on a attendee of the event, one navigates to the person's details, shown in Fig. 4.

Fig. 3. An event (in the context Events in Chronological Order), in HyperSD.

Fig. 4. Details of a Person in HyperSD.

The HyperDE environment provides contextual navigation automatically, according to the model specification. In this case, there is an index to all elements, shown in the left column of the screen, and sequential navigation in the Persons by Event, which generates ">>" anchor, next to the name of the next item in the context. Notice, in the example, that it is also possible to import a FOAF description to instantiate a new SD_Person. Notice also that there is an index of Relation Types (e.g., FriendOf, ApprenticeTo, etc…) associated with a person; this index is generated by a meta-query (i.e., a query to the model definition) extracting all defined relation types between SD_Person and itself.

HyperDE has a full fledged view definition mechanism allowing the customization of presentation templates, although it also possible to use a default presentation template that is built into the environment itself. In addition to defining views, the HyperDE enviroment also has facilities for the definition of all SHDM primitives (navigational classes, indexes, links, contexts). Fig. 5 shows an example of the interface for defining a navigation context, "Persons by Event", which retrieves all triples of type "SD_Person" that "Attends" an event which is passed as a parameter (the "?" in the query). Notice that we have extended RQL with an "Order by" clause.
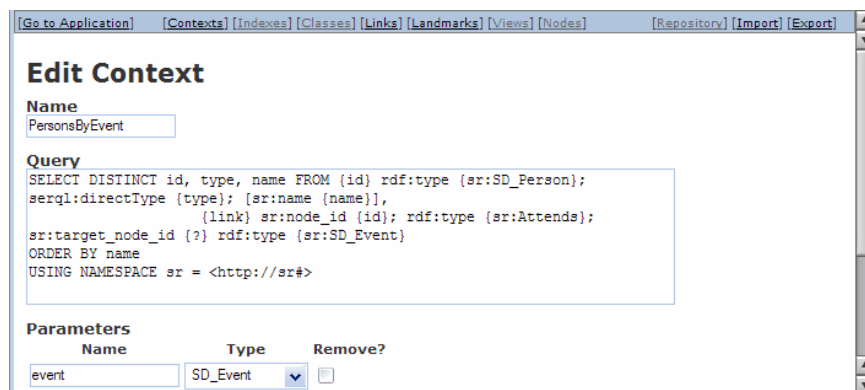
Fig. 5. The definition page in the model editor, for context Persons by Event.

Conclusions

We have defined and implemented HyperSD as a Semantic Web application that manipulates information items typical in a desktop, using the HyperDE environment. Current and future work being pursued includes

- Developing a richer set of wrappers;
- Providing a more sophisticated navigation structure, include also the possibility of allowing the user to customize it;
- Providing a more amicable interface look and feel;
- HyperSD currently runs as a local web application. We are investigating ways of integrating distributed HyperSD, running in individual machines

References

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