

Personalization Services for e-Learning in the Semantic Web

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Abstract. The Personal Reader framework implements a service-based architecture for developing and maintaining personalization functionalities on the Semantic Web, stemming from disciplines like e.g. adaptive hypermedia systems or collaborative filtering systems. A modular framework of components / services - for providing the user interface, for mediating between user requests and available personalization services, for user modeling, for providing personal recommendations and context information, et cetera, is the core of the Personal Reader framework. When a user is viewing some Web Content (the "Reader" part of the Personal Reader) s/he receives additional, personal information on the context of this particular Web content (the "Personal" part of the Personal Reader). Personal Readers have been developed for the area of e-Learning (Java, Semantic Web), and for browsing scientific publications.

Keywords. Personalization Services, Personalization Architectures, Semantic Web

1. Introduction

With the idea of a Semantic Web [2] in which machines can understand, process and reason about resources to provide better and more comfortable support for humans in interacting with the World Wide Web, the question of personalizing the interaction with web content is at hand. In the area of adaptive hypermedia, research has been carried out to understand how personalization and adaptation strategies can be successfully applied in hypertext systems and hypertext like environments. It has been stated that in the area of adaptive hypermedia and of adaptive web-based systems, the focus of developed systems has been so far on *closed world* settings. This means that these systems work on a fixed set of resources which are normally known to the system designers at design time (see the discussion on closed corpus adaptive hypermedia [4]). This observation also relates to the fact that the issue of authoring adaptive hypermedia systems is still one of the most important research questions in this area, see e. g. [3]. A generalization of adaptive hypermedia to an *Adaptive Web* depends therefore on a solution of the closed corpus problem in adaptive hypermedia. Within the Personal Reader project, we propose an architecture for applying *some* of the techniques developed in adaptive hypermedia to an open corpus. A modular framework of components / services - for providing the user

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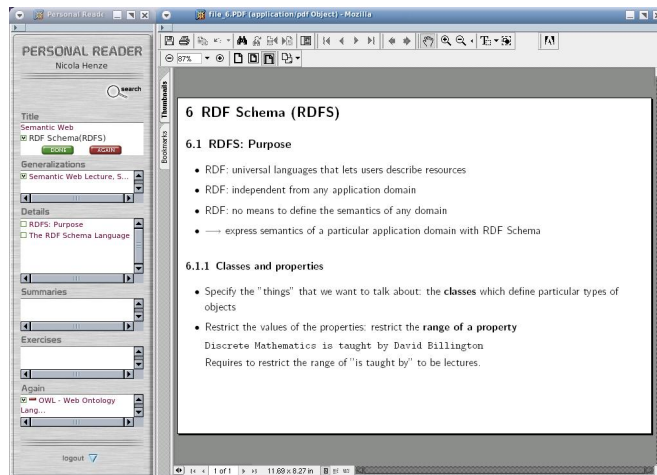


Figure 1. Screenshot of the Personal Reader for learning about the Semantic Web. The Personal Reader consists of a browser for learning resources *the reader part*, and a side-bar or remote, which displays the results of the personalization services, e.g. individual recommendations for learning resources, contextual information, pointers to further learning resources, quizzes, examples, etc. *the personal part*.

interface, for mediating between user requests and available personalization services, for user modeling, for providing personal recommendations and context information, et cetera, is the core of the Personal Reader framework [7]. The communications between all components / services is syntactically based on RDF descriptions. E.g. the request for getting personal recommendations for a learning resource for a certain user is provided by an RDF description which is exchanged between the components mediator and personal recommendations. Thus each component is a service, which is usually independent from the others and which can interact with them by "understanding" the RDF notifications they send. The common "understanding" is realized by referring to semantics in the ontologies used in the RDF descriptions which provide the valid vocabulary (see [6,7]). Prototypes of Personal Readers have been developed for the area of e-Learning (Java, Semantic Web), and for browsing scientific publications.

2. Proof-of-Concept: Personal Readers for e-Learning and for Browsing Scientific Publications

2.1. Personal Readers for e-Learning

The Personal Readers for e-Learning [5] (see Figure 1) provide a learner with a personal interface for regarding learning resources: the Personal Annotation Service recommends the learner next learning steps to take, points to examples, summary pages, more detailed information, etc., and always recommends the most appropriate of these information according to the learner's current knowledge, his/her learning style, learning goal, background, etc. The Personal search service extracts information from the actually regarded learning resource and checks for related information in other e-Learning corpora, and recommends retrieved results. If you want to set up your own Personal Reader instance

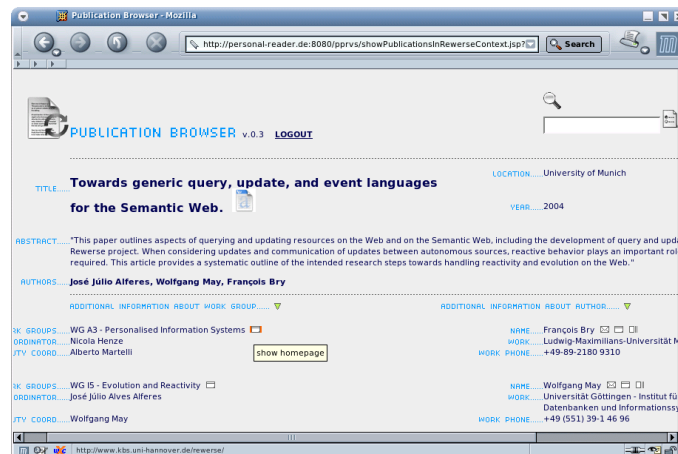


Figure 2. Screenshot of the Personal Publication Reader. When a user is viewing some publication, s/he receives additional, personal information on the context of this publication within the REWERSE project: background information about the persons and working groups carrying out this kind of or related research, additional information about the authors, etc.

for a course you are running, you need to provide RDF description on the learning resources of this course (examples of such RDF descriptions can be found following the link Resources on this project page, and a link to some domain ontology describing the application domain of your course, which you also use to annotate your resources.

Highlights:

- easy creation of personalized Readers for learning objects annotated according to LOM standard;
- demonstrates: re-usable personalization functionality for e-Learning courses;
- reasoning for the personalization services is realized using TRIPLE [9]

2.2. The Personal Publication Reader

The Personal Publication Reader [1] (see Figure 2) has been developed for the Network of Excellence REWERSE for providing a personal interface to the publications developed in the project: All web-pages containing information about publications of the REWERSE network are periodically crawled and new information is automatically detected, extracted and indexed in the repository of semantic descriptions of the REWERSE network. This information, with extracted information on the project REWERSE, on people involved in the project, their research interests, etc., is used to provide more information on each publication: who has authored it, which research groups are related to this kind of research, which other publications are published by the research group or by this author, which other publications are on the similar research, etc.

Highlights:

- automatized annotation of Web data: automatic extraction of Web data, and automatized annotation of extracted data with meaningful semantic information (powered by the Lixto Suite, www.lixto.com) ;

- demonstrates: personalized content syndication;
- reasoning for the personalization service is realized Jena's RDQL language [8].

3. Conclusion

We have presented a framework for designing, implementing and maintaining adaptive *Reader* applications for the Semantic Web. The Personal Reader framework is based on the idea of establishing personalization functionality as services on the Semantic Web. The realization of personalization functionality is done on the logic layer of the Semantic Web tower, making use of description and rule language recently developed in the context of the Semantic Web. We have tested the framework with example readers in the area of e-Learning (Java programming, Semantic Web), and for browsing scientific publications of the REWERSE project. The current state of the project can be followed at www.personal-reader.de, where all the realized prototypes are available, too.

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