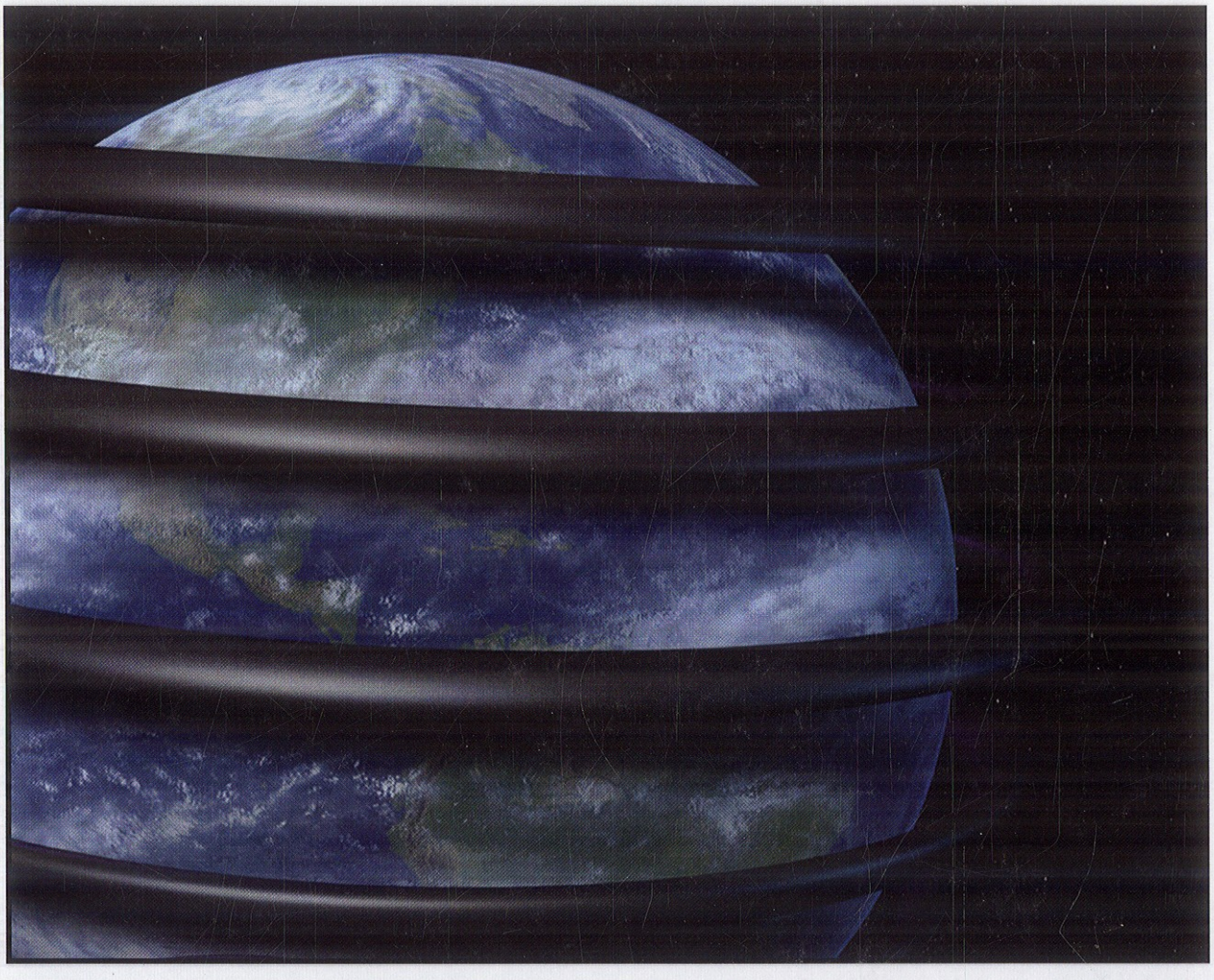
PREMIER REFERENCE SOURCE

PROGRESSIVE CONCEPTS FOR SEMANTIC WEB EVOLUTION

Applications and Developments



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requirement, this chapter proposes the integration of two modern service technologies: Web Services and mobile agents. This integration allows wireless users to access and invoke semantically enriched Web Services without the need for simultaneous, online presence of the service requestor. Moreover, in order to improve the capabilities of Service registries, the authors exploit the advantages offered by the Semantic Web framework. Specifically, they use enhanced registries enriched with semantic information that provide semantic matching to service queries and published service descriptions. Finally, they discuss the implementation of the proposed framework and present their performance assessment findings.

The number of mobile subscribers in the world will soon reach the three billion mark. Ontologies are an important ingredient towards more complicated mobile services and wider usage of mobile terminals. This chapter first discusses ontology and epistemology concepts in general. After that, the author reviews ontologies in the computer science field and introduces mobile ontologies as a special category. It seems reasonable to distinguish between two orthogonal categories, mobile domain ontologies and flowing ontologies. The domain of the former one is in some sense related with mobility, whereas the latter ones are able to flow from computer to computer in the network. This chapter then discusses the creation issues, business aspects, and intellectual property rights (IPR), including patentability of mobile ontologies. The chapter also discusses some basic requirements for computer systems architectures that would be needed to support the usage of mobile ontologies.

The last few years have seen two parallel trends emerge. The first of such trends is set by technologies such as Near Field Communication, 2D Bar codes, RFID and others that support the association of digital information with virtually every object. Using these technologies ordinary objects such as coffee mugs or advertisement posters can provide information that is easily processed. The second trend is set by (semantic) Web services that provide a way to automatically invoke functionalities across the Internet lowering interoperability barriers. The PERCI system, discussed in the chapter, provides a way to bridge between these two technologies allowing the invocation of Web services using the information gathered from the tags effectively transforming every object in a service proxy.

of identification, the URI (uniform resource identifiers). Although URIs succeed when used for retrieving resources on the Web, their suitability for identifying any kind of thing, for example, resources that are not on the Web, is not guaranteed. This chapter investigates the meaning of the identity of a Web resource, and how the current situation, as well as existing and possible future improvements, can be modeled and implemented on the Web. In particular, the authors propose an ontology, IRE, that provides a formal way to model both the problem and the solution spaces. IRE describes the concept of resource from the viewpoint of the Web, by reusing an ontology of Information Objects, built on top of DOLCE+ and its extensions. In particular, the authors formalize the concept of Web resource, as distinguished from the concept of a generic entity, and how those and other concepts are related, for example, by different proxy for relations. Based on the analysis formalized in IRE, the authors propose a formal pattern for modeling and comparing different solutions to the problems of the identity of resources.

Chapter 8

The expected utility of the Semantic Web (SW) hinges upon the idea that machines, just like humans, can make and interpret statements about "real world" objects, properties, and relations. A cornerstone of this idea is the notion that Uniform Resource Identifiers (URIs) can be used to refer to entities existing independently of the Web and to convey meanings. In this chapter, when a URI is used in this manner we will say that it is used declaratively, or that it is an R-URI. The key question is this: when an R-URI is used declaratively on the SW how is an agent, especially a non-human one, supposed to "understand" or "know" what it is intended to refer to or mean?

Chapter 9

This chapter offers an approach that combines a hierarchy of concepts and ontology for the task of identifying Web documents in the environment of the Semantic Web. A user provides a simple query in the form a hierarchy that only partially "describes" documents (s)he wants to retrieve from the Web. The hierarchy is treated as a "seed" representing user's initial knowledge about concepts covered by required documents. Ontologies are treated as supplementary knowledge bases. They are used to instantiate the hierarchy with concrete information, as well as to enhance it with new concepts initially unknown to the user. The proposed approach is used to design a prototype system for document identification in the Web environment. The description of the system and the results of preliminary experiments are presented.

and language-independent semi-distance measure defined for the space of individuals, that is based on a finite number of dimensions corresponding to a committee of discriminating features (represented by concept descriptions). A maximally discriminating group of features can be obtained with the randomized optimization methods described in the chapter. In the algorithm, the possible clusterings are represented as strings of central elements (medoids, w.r.t. the given metric) of variable length. Hence, the number of clusters is not required as a parameter since the method is able to find an optimal choice by means of the evolutionary operators and of a proper fitness function. An experimentation with a number of ontologies proves the feasibility of this method and its effectiveness in terms of clustering validity indices. Then, with a supervised learning phase, each cluster can be assigned with a refined or newly constructed intensional definition expressed in the adopted language.

Chapter 13

Relational technology has shown to be very useful for scalable Semantic Web data management. Numerous researchers have proposed to use RDBMSs to store and query voluminous RDF data using SQL and RDF query languages. This chapter studies how RDF queries with the so called well-designed graph patterns and nested optional patterns can be efficiently evaluated in an RDBMS. The authors propose to extend relational algebra with a novel relational operator, nested optional join (NOJ), that is more efficient than left outer join in processing nested optional patterns of well-designed graph patterns. They design three efficient algorithms to implement the new operator in relational databases: (1) nested-loops NOJ algorithm, NL-NOJ, (2) sort-merge NOJ algorithm, SM-NOJ, and (3) simple hash NOJ algorithm, SH-NOJ. Using a real life RDF dataset, the authors demonstrate the efficiency of their algorithms by comparing them with the corresponding left outer join implementations and explore the effect of join selectivity on the performance of these algorithms.

Chapter 14

While it is agreed that semantic enrichment of resources would lead to better search results, at present the low coverage of resources on the Web with semantic information presents a major hurdle in realizing the vision of search on the Semantic Web. To address this problem, this chapter investigates how to improve retrieval performance in settings where resources are sparsely annotated with semantic information. Techniques from soft computing are employed to find relevant material that was not originally annotated with the concepts used in a query. The authors present an associative retrieval model for the Semantic Web and evaluate if and to which extent the use of associative retrieval techniques increases retrieval performance. In addition, the authors present recent work on adapting the network structure based on relevance feedback by the user to further improve retrieval effectiveness. The evaluation of new

retrieval paradigms - such as retrieval based on technology for the Semantic Web - presents an additional challenge since no off-the-shelf test corpora exist. Hence, this chapter gives a detailed description of the approach taken to evaluate the information retrieval service the authors have built.