Editorial Preface

Metadata for Web Services

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It has been widely realized that semantic meta information is important for effective Web services discovery, dynamic Web services composition, as well as business collaboration at run-time. This issue of the International Journal of Web Services research (JWSR) highlights the theme of a special issue: “Bridging Communities: Semantically Augmented Metadata for Services, Grids, and Software Engineering.” The four articles in this special issue focus primarily on how to organize, analyze, and manage semantic metadata in the context of service-oriented architecture.

The fifth paper is recommended from the previous JWSR special issue Guest Editors Dr. Savas Parastatidis and Dr. Jim Webber. Online text documents like scientific articles are valuable information sources. However, common plain text may not be interpreted by programs thus becomes useless. Text mining methods embed annotations into text documents to facilitate machine processing. In “Web Service Architectures for Text Mining: An Exploration of Issues via an E-Science Demonstrator,” Neil Davis and his colleagues discuss various architectural alternatives to embed text-mining facilities into a Web services-based distributed landscape.

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Guest Editorial Preface

Bridging Communities: Semantically Augmented Metadata for Services, Grids, and Software Engineering

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In large-scale distributed systems, semantically rich metadata that describe entities in a machine-processable way are of key importance. Examples of such metadata are the behavioral description of interfaces in service-oriented architectures and the description of resources in Grid environments. Semantics-rich descriptions are necessary prerequisites for automatic management, automatic configuration, and user-friendly discovery of entities. They are crucial to resolve interoperability problems in large heterogeneous environments. Researchers from different fields have been working on this topic. The Semantic Web community outcomes various ontologies for service description. The Grid community has started the Semantic Grid initiative, which exploits technologies from the Semantic Web community such as ontologies and Description Logics. The Software Engineering community has contributed a variety of graph-based approaches to describe the behavior of services to support the software engineering process and for dynamic composition of modules and services.

This JWSR special issue aims to highlight current trends and research topics in the fields of semantic metadata. Although various rather different communities use these technologies, the basic problems and approaches are similar. With this special issue we hope to bridge these communities and to show up synergies in their research. We received 15 papers from all over the world, representing a broad range of communities and topics. The special issue contains four accepted papers that cover various aspects throughout the life-cycle of metadata.

Ontologies represent a shared and formal description of some domain of knowledge. As this definition implies, some formalism is needed to define the concepts and relationships that shall be encoded in the ontology. Within the scope of the Semantic Web, some levels of ontological languages have been designed with different degrees of expressive power. However, the underlying semantics of these languages are not always appropriate. In “Organizing Thematic, Geographic and Temporal Knowledge in a Well-founded Navigation Space: Logical and Algorithmic Foundations for EFGT Nets,” Levin Brunner and his colleagues introduce a new family of logical formalisms for ontology descriptions. Their main idea is to describe entities (“E”; e.g., services) using the dimensions thematic field
'F’), geographic areas (“G”), and temporal areas (“T”). The presented logics support reasoning on this kind of metadata and are thus called “EFGT” nets. The EFGT formalism allows to precisely encode various dimensions of relationships. The proposed formalisms can be used in Semantic Web contexts or to classify services in a yellow page directory.

How to identify and create ontologies remains challenging. Hand craft each ontology may be time-consuming and error-prone especially for large-scale domains. Thus, automated or semi-automated methods to create new ontologies or mappings between existing ontologies are necessary. In “Using Concept Lattices to Support Service Selection,” Lerina Aversano and his colleagues propose a novel technique based on Formal Concept Analysis to analyze service interfaces and documentation. They use existing WSDL descriptions, possibly annotated with natural language comments for service’s methods, as information source for such automated processes. Various relationships between services and between the operations of a complex service can be automatically detected.

On the application side, the main question is how to take advantage of semantic technologies to build new systems. This includes the developments of specific metadata models for different target environments, and the development of methodologies that guide engineers through the entire lifecycle of knowledge. This special issue contains two papers concerned with these topics. In “Metadata, Ontologies and Information Models for Grid PSE Toolkits based on Web Services,” Carmela Comito and colleagues introduce a metadata model for problem solving environments (PSEs) supported by an information system. They also develop a PSE toolkit, which is a meta-layer to help construct domain-specific PSEs from the toolkit.

In “Managing Semantic Metadata for Web/Grid Services,” Luke Chen and his colleagues present an approach to the engineering and management of semantic metadata in the context of service-oriented Grid systems. Their method is built upon the well-known CommonKADS knowledge management methodology and combines it with tools and techniques from the Semantic Web field.

To close this introduction, I would like to thank all authors who sent in their valuable work. I wish to thank Dr. Liang-Jie (LJ) Zhang, Editor-in-Chief of JWSR, and his Associate Editors. I would also like to express my special gratitude to the reviewers of this special issue:

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