Studies on the Semantic Web

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A New Book Series:
Studies on the Semantic Web, ISSN 1868-1158
Aims and Scope

Semantic Web has grown into a mature field of research. Its methods find innovative applications on and off the World Wide Web. Its underlying technologies have significant impact on adjacent fields of research and on industrial applications.

This new book series reports on the state of the art in foundations, methods, and applications of Semantic Web and its underlying technologies. It is a central forum for the communication of recent developments and comprises research monographs, textbooks and edited volumes on all topics related to the Semantic Web.

Volumes in this series are co-published by IOS Press Amsterdam and AKA Verlag Heidelberg ensuring a short publication time and world-wide distribution. Proposals for publishing excellent PhD thesis in this series are welcome. Publications in German language are possible.

New SSW 011 Christoph Lange: **Enabling Collaboration on Semiformal Mathematical Knowledge by Semantic Web Integration**
2011. xviii, 592 pp., Softcover. 70,00 €. ISBN 978-3-89838-657-9 (Print).
ISBN 978-3-89838-662-3 (eBook / in preparation)

Mathematical research is becoming increasingly collaborative. Individual research tasks (authoring, publishing, peer-review, or verification) are supported by software, but complete workflows are not. This work enables semantic service integration by bridging different perspectives on knowledge (document- vs. network-oriented), and thus contributes the building blocks for effectively supporting collaboration in mathematics.

SSW 010 Tran Duc Thanh: **Process-oriented Semantic Web Search**
2011. xxii, 221 pp.,Hardcover. 64,00 €. ISBN 978-3-89838-648-7

Besides a principled study of the state-of-the-art, this book offers a novel process-oriented point of view. It combines work targeting different aspects to present the big picture of process-oriented Semantic Web search. For demonstrating this big picture, a particular compilation of work called SemSearchPro is presented. Unlike the Semantic Web Search approaches known so far, where Semantic Web resources are used only for processing the query, SemSearchPro exploits the semantics captured by the underlying resources throughout the process, i.e., from query construction, to query processing, to result presentation and to query refinement.

SSW 009 A. Passant: **Semantic Web Technologies for Enterprise 2.0**
2011. xx, 328 pp., Softcover. 50,00 €, ISBN 978-3-89838-646-3

This book is a translated (and updated) version of the Ph.D. thesis „Technologies du Web Sémantique pour l'Entreprise 2.0'', defended on the 9th of June 2009 at Université Paris-IV Sorbonne. It presents techniques for data integration and knowledge management using Social Software in enterprises. More that a theoretical framework, it provides practical examples and implementation details in an industrial context.

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SSW 008

M. Krötzsch: **Description Logic Rules.**
2010. xii, 263 pp. Softcover. 50,00 €, ISBN 978-3-89838-643-2

This book provides new perspectives on combining description logics and rules, the technologies on which today's most important Semantic Web knowledge representation standards – OWL and RIF – are based. Extensive introductory chapters explain the goals and challenges of this field, while advanced chapters focus on ways of extending description logics with rules without sacrificing good computational properties, including a detailed treatment of the light-weight rule language ELP.

SSW 007

J. M. Gómez-Pérez: **Acquisition and Understanding of Process Knowledge using Problem Solving Methods**. 2010, x, 144 pp., Softcover 50,00 €, ISBN 978-3-89838-639-5

This book deals with process knowledge and how it can be possible to enable users without any kind of IT skills to i) model and reason about processes and ii) analyze the provenance of process executions, without the intervention of software or knowledge engineers. We propose the utilization of Problem Solving Methods (PSMs) as key enablers for the accomplishment of such objectives and demonstrate the solutions developed, evaluated in the contexts of Project Halo and the Provenance Challenge, respectively. The book concludes with a process-centric overview on the challenges raised by the new web-driven computing paradigm, where large amounts of data are contributed and exploited by users on the web, requiring scalable, non-monotonic reasoning techniques as well as stimulating collaboration while preserving trust.

SSW 006

J. Lehmann: **Learning OWL Class Expressions**.
March 2010, xiv, 265 pp., Softcover 50,00 €, ISBN 978-3-89838-336-3

With the advent of the Semantic Web and Semantic Technologies, ontologies have become one of the most prominent paradigms for knowledge representa-tion and reasoning. However, recent progress in the field faces a lack of well-structured ontologies with large amounts of instance data due to the fact that engineering such ontologies requires a considerable investment of resources. Nowadays, knowledge bases often provide large volumes of data without so-phisticated schemata. Hence, methods for automated schema acquisition and maintenance are sought. Schema acquisition is closely related to solving typi-cal classification problems in machine learning, e.g. the detection of chemical compounds causing cancer. In this work, we investigate both, the underlying machine learning techniques and their application to knowledge acquisition in the Semantic Web.

SSW 005

R. Zhang: **Relation Based Access Control.**
2010, viii,114 pp., Softcover 50,00 €, ISBN 978-3-89838-626-5

The book addresses the problem of access control of Web 2.0. It provides a novel access control model called RelBAC and a domain specific Description Logic which allows to represent and reason about the model. The formal representation of the model brings unambiguous semantics for the access control and reasoning. Description Logic provers are used to provide efficient reasoning ability for the access control problems. RelBAC provides a novel approach to acess control which exploits state oft he art semantic web technology. Furthermore RelBAC is designed for and suited for semantic Web and web 2.0 applications

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SSW 004

D. Sonntag: **Ontologies and Adaptivity in Dialogue for Question Answering**.
2010, xii, 410 pp., Hardcover, 69,00 €, ISBN 978-3-89838-623-4

The appeal of being able to ask a question to a mobile internet terminal and receive an answer immediately has been renewed by the broad availability of information on the Web. Ideally, a spoken dialogue system that uses the Web as its knowledge base would be able to answer a broad range of questions. A new generation of natural language dialogue systems is emerging that transforms traditional keyword search engines into semantic answering machines by providing exact and concise answers formulated in natural language instead of today's long lists of document references, which the user has to check by himself for relevant answers.
This book presents the anatomy of the fully operational SmartWeb system (funded by the German Federal Ministry of Education and Research with grants totaling 14 million euros) that provides not only an open-domain question answering machine but a multimodal web service interface for coherent dialogue, where questions and commands are interpreted according to the context of the previous conversation. One of the key innovations described in this book is the ability of the system to learn how to predict the probability that it can answer a complex user query in a given time interval.
Daniel Sonntag's work within the SmartWeb project has laid important foundations for Theseus's efforts towards semantic web technologies for the Web 3.0. Theseus is the German flagship project on the Internet of Services, where the user can delegate complex tasks to dynamically composed semantic web services by utilizing multimodal interaction combining speech and multi-touch input on advanced smartphones.

Wolfgang Wahlster and Randy Goebel

SSW 003

R. García Castro: **Benchmarking Semantic Web Technology.**
2010. x, 338 pp., Softcover, 50,00 €, ISBN 978-3-89838-622-7

This thesis addresses the problem of benchmarking Semantic Web technologies, providing methodological and practical guidelines that cover the whole life cycle of Semantic Web technology benchmarking. The book also presents two practical examples with the organization and definition of two international benchmarking activities that involved benchmarking the interoperability of Semantic Web technologies using RDF(S) and OWL as interchange languages.

SSW 002

J. Völker: **Learning Expressive Ontologies.**
2009, 274 pp., Softcover, 50,00 €, ISBN 978-3-89838-621-0

This thesis advances the state-of-the-art in ontology learning by presenting a set of novel approaches to the semi-automatic acquisition, refinement and evaluation of logically complex axiomatizations. It has been motivated by the fact that the realization of the semantic web as envisioned by Tim Berners-Lee is still hampered by the lack of ontological resources, while at the same time more and more applications of semantic technologies emerge from fast-growing areas such as e-business or life sciences. Such knowledge-intensive applications, requiring large scale reasoning over complex domains of interest, even more than the semantic web depend on the availability of expressive, high-quality axiomatizations. This knowledge acquisition bottleneck could be overcome by approaches to the automatic or semi-automatic construction of ontologies. Hence a huge number of ontology learning tools and frameworks have been developed in recent years, all of them aiming for the automatic or semi-automatic generation of ontologies from various kinds of data. However, both the quality and the expressivity of ontologies that can be acquired by the current state-of-the-art in ontology learning so far have failed to meet the expectations of people who argue in favor of powerful, knowledge-intensive applications based on logical inference. This thesis therefore takes a first, yet important, step towards the semi-automatic generation and maintenance of expressive ontologies.

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SSW 001

S. Grimm: **Semantic Matchmaking with Nonmonotonic Description Logics.**
2009. 278 pp., Softcover, 50,00 €, ISBN 978-3-89838-620-3

In this thesis, we establish an ontology-based matchmaking framework for semantic resource descriptions formulated in OWL and description logics (DLs) that uses various DL inferences to judge about resource compatibility. We incorporate several nonmonotonic extensions to DLs into this matchmaking framework that extend standard DL inference mechanisms by forms of closed-world and default reasoning associated to common-sense features, thus improving the matchmaking behaviour. Moreover, we apply the technique of matchmaking to the problem of service discovery in the Semantic Web with services annotated by OWL descriptions formulated in terms of domain ontologies.

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