

# Canadian Semantic Web



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Editors

# Canadian Semantic Web

Technologies and Applications

 Springer

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# Preface

The emergence of Web technologies for the distribution of an immense amount of data and knowledge has given rise to the need for supportive frameworks for knowledge management. Semantic Web technologies aim at providing shared semantic spaces for Web contents, such that people, applications and communities can use a common platform to share information.

Canadian Semantic Web: Technologies and Applications aims at contributing to the advancement of the Semantic Web by providing the most recent significant research on Semantic Web theory, techniques and applications in academia, industry and government in Canada and all over the world. It also enlightens possible Semantic Web research directions in future by reporting some works in-progress that present on-going research on principles and applications of the Semantic Web, while their implementation or deployment may have not been completed.

This book consists of ten chapters. The chapters are extended versions of a selected set of papers from the second Canadian Semantic Web Working Symposium (CSWWS 2009) and the twenty-first international Conference on Software Engineering and Knowledge Engineering (SEKE 2009). CSWWS 2009 was held in Kelowna, British Columbia in May 2009. Since many of the challenging aspects of the research problems tackled in the Semantic Web area fall in the realm of Artificial Intelligence or employ of AI techniques, CSWWS 2009 was organized in association with the 22<sup>nd</sup> Canadian Conference on Artificial Intelligence. SEKE 2009 was held in Boston, July 2009, aiming at bridging the two domains of Software Engineering and Knowledge Engineering together. Hence, the content of this book covers the theory and applications of Semantic Web techniques from both important perspectives of Artificial Intelligence and Software Engineering.

Canadian Semantic Web: Technologies and Applications covers a combination of theory-based and application-based topics. Three chapters: ‘Incremental Query Rewriting with Resolution’ by Alexandre Riazanov and Marcelo A. T. Aragão (Chapter 1), ‘Knowledge Representation and Reasoning in Norm-Parameterized Fuzzy Description Logics’ by Jidi Zhao and Harold Boley (Chapter 2) , and ‘A Generic Evaluation Model for Semantic Web Services’ by Omair Shafiq (Chapter 3) focus on theoretical aspects of the Semantic Web. Chapter 1 provides meth-

ods for computing *schematic* answers to deductive queries and transforming these schematic answers into standard SQL queries. Further, this chapter discusses the completeness and soundness of the presented techniques. Chapter 2 provides an extension to standard Description Logics in order to enrich them with capability of representing imprecise, uncertain and fuzzy knowledge. It also provides a procedure for reasoning over these extended Description Logics and proves its soundness, completeness, and termination. Chapter 3 discusses the requirement for evaluating Semantic Web Services and provides a generic evaluation model for this purpose.

The remaining seven chapters present implementation support for existing Semantic Web techniques or investigate applications of the Semantic Web in different domains. ‘A Modular Approach to Scalable Ontology Development’ by Faezeh Ensan and Weichang Du (Chapter 4) provides an extension to the OWL ontology language and also introduces an ontology editor and browser for creating modular ontologies. It also proposes a set of metrics for evaluating modular ontologies and investigates four developed modular ontologies with regards to these metrics. ‘Corporate Semantic Web: Towards the Deployment of Semantic Technologies in Enterprises’ by Adrian Paschke, et al. (Chapter 5) investigates the Corporate Semantic Web idea for applying semantic technologies in enterprises. It also discusses the main challenges and research areas with regards to this idea. ‘Semantic Service Matchmaking in the ATM Domain Considering Infrastructure Capability Constraints’ by Thomas Moser et al. (Chapter 6) analyzes the application of Semantic Web techniques in the Air Traffic Management (ATM) domain. It introduces a framework for semi-automatic semantic matchmaking for software services in this domain. These chapters (Chapters 1 to 6) present accomplished research in the area of the Semantic Web, while the following four chapters (Chapter 7 to 10) are the shorter ones, presenting on-going research.

‘Developing Knowledge Representation in Emergency Medical Assistance by Using Semantic Web Techniques’ by Heloise Manica, et al. (Chapter 7) introduces an architecture for utilizing ontologies in mobile emergency medical assistance systems. The authors discuss that the proposed architecture can improve query processing and reduce network traffic in mobile environments. ‘Semantically Enriching the Search System of a Music Digital Library’ by Paloma de Juan and Carlos Iglesias (Chapter 8) describes two search systems over digital music libraries: a traditional key-word search and a semantic-based search system, evaluates and compares them and concludes how a semantic-based representation of information can lead to more flexibility in search systems. Chapter 9, ‘Application of an Intelligent System Framework and the Semantic Web for the CO<sub>2</sub> Capture Process’ by Chuansan Luo, Qing Zhou, and Christine W. Chan, describes the application of Semantic Web techniques in the domain of carbon dioxide capture process. Finally, Chapter 10, ‘Information Pre-Processing using Domain Meta-Ontology and Rule Learning System’ by Girish R Ranganathan and Yevgen Biletskiy, provides a solution for semi-automatic population of meta-ontologies, when a meta-ontology conceptualizes a domain of interest from huge amounts of source documents.

Semantic Web is an emerging research topic in the Canadian research community. Several important universities have started large projects and have dedicated

specific laboratories to the Semantic Web. Reasoning engines for different Description Logics and ontologies, application of Semantic Web in healthcare and bioinformatics, applying Semantic Web techniques in business domain and business document management and semantic interoperability are among current research directions on Semantic technologies in the Canadian community. Based on the current status, we would expect to see more comprehensive Semantic Web research in Canadian organizations and also in collaboration with the international research community.

June 2010

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# Contents

<b>1</b>	<b>Incremental Query Rewriting with Resolution</b> . . . . .	1
	Alexandre Riazanov and Marcelo A. T. Aragão	
1.1	Introduction. . . . .	1
1.1.1	Settings and motivation. . . . .	1
1.1.2	Outline of the proposed method. . . . .	4
1.2	Informal method description. . . . .	5
1.3	Soundness and completeness of schematic answer computation. . . . .	10
1.4	Recording literals as search space pruning constraints. . . . .	14
1.5	SQL generation. . . . .	16
1.6	Implementation and experiments. . . . .	17
1.7	A note on indexing Semantic Web documents with data abstractions. . . . .	20
1.8	Related work. . . . .	21
1.9	Summary and future work. . . . .	23
	References . . . . .	25
<b>2</b>	<b>Knowledge Representation and Reasoning in Norm-Parameterized Fuzzy Description Logics</b> . . . . .	27
	Jidi Zhao, Harold Boley	
2.1	Introduction . . . . .	27
2.2	Preliminaries . . . . .	31
2.3	Fuzzy Set Theory and Fuzzy Logic . . . . .	32
2.4	Fuzzy Description Logic . . . . .	34
2.4.1	Syntax of $fALCN$ . . . . .	35
2.4.2	Semantics of $fALCN$ . . . . .	35
2.4.3	Knowledge Bases in $fALCN$ . . . . .	38
2.5	Reasoning Tasks . . . . .	39
2.6	GCI, NNF, and ABox Augmentation . . . . .	41
2.7	Reasoning Procedure . . . . .	43
2.8	Soundness, Completeness, and Termination of the Reasoning Procedure for $fALCN$ . . . . .	45

- 2.9 Conclusion and Future Work ..... 51
- References ..... 52
- 3 A Generic Evaluation Model for Semantic Web Services ..... 55**
- Omar Shafiq
- 3.1 Introduction ..... 55
- 3.2 Performance Engineering for Component- and Service-oriented  
Systems ..... 57
- 3.3 Requirements for a Generic Evaluation Model ..... 58
  - 3.3.1 Openness ..... 58
  - 3.3.2 Tool Independent ..... 59
  - 3.3.3 Conciseness ..... 59
  - 3.3.4 Preciseness ..... 59
  - 3.3.5 Completeness ..... 59
  - 3.3.6 Based on Classical Problems ..... 60
  - 3.3.7 Different Complexity Levels ..... 60
  - 3.3.8 Common Benchmarking ..... 60
  - 3.3.9 Flexibility to Perform Remote Evaluation ..... 61
- 3.4 A Generic Evaluation Model for Semantic Web Services ..... 61
  - 3.4.1 Semantic Web Services Execution Lifecycle ..... 62
  - 3.4.2 Critical Evaluation Factors ..... 64
- 3.5 Using the Evaluation Model for Semantic Web Services based  
on TSC ..... 69
  - 3.5.1 Comparing Resource Availability ..... 69
  - 3.5.2 Analyzing Performance on Concurrent Execution of  
Goals ..... 70
  - 3.5.3 Comparing Communication Overhead ..... 70
  - 3.5.4 Communication Overhead vs. Time Saved in Multiple  
Goal Execution ..... 70
  - 3.5.5 Comparing Time Taken in Distributed Service Execution ..... 71
  - 3.5.6 Comparing Time Saved by Applications while  
Executing a Goal ..... 71
  - 3.5.7 Comparing Time Saved in Resource Retrieval by WSMX ..... 72
- 3.6 Related Work ..... 72
  - 3.6.1 Semantic Web Challenge ..... 72
  - 3.6.2 Semantic Web Services Challenge ..... 73
  - 3.6.3 Semantic Service Selection (S3) ..... 73
  - 3.6.4 IEEE Web Services Challenge ..... 73
  - 3.6.5 SEALS Evaluation Campaigns ..... 74
  - 3.6.6 STI International Test Beds and Challenges Service ..... 74
  - 3.6.7 International Rules Challenge at RuleML ..... 75
- 3.7 Conclusions and Future Work ..... 75
- References ..... 76

- 4 A Modular Approach to Scalable Ontology Development . . . . . 79**  
 Faezeh Ensan and Weichang Du
  - 4.1 Introduction . . . . . 79
  - 4.2 Interface-Based Modular Ontologies . . . . . 82
    - 4.2.1 The Formalism . . . . . 82
    - 4.2.2 IBF: Scalability and Reasoning Performance . . . . . 83
  - 4.3 OWL Extension and Tool Support for the Interface-Based  
 Modular Ontology Formalism . . . . . 83
  - 4.4 Evaluating IBF Modular Ontologies . . . . . 89
    - 4.4.1 cohesion . . . . . 89
    - 4.4.2 coupling . . . . . 91
    - 4.4.3 Knowledge Encapsulation . . . . . 94
  - 4.5 Case Studies . . . . . 94
    - 4.5.1 IBF Modular Ontologies . . . . . 95
    - 4.5.2 IBF Ontologies Analysis . . . . . 97
  - 4.6 Related Work . . . . . 99
  - 4.7 Conclusion . . . . . 100
  - References . . . . . 101
  - 4.8 Appendix . . . . . 103
  
- 5 Corporate Semantic Web: Towards the Deployment of Semantic  
 Technologies in Enterprises . . . . . 105**  
 Adrian Paschke, Gökhan Coskun, Ralf Heese, Markus Luczak-Rösch,  
 Radoslaw Oldakowski, Ralph Schäfermeier, and Olga Streibel
  - 5.1 Introduction . . . . . 105
  - 5.2 Application Domains for a Corporate Semantic Web . . . . . 106
  - 5.3 Gaps . . . . . 108
  - 5.4 Corporate Semantic Web . . . . . 109
  - 5.5 Corporate Ontology Engineering . . . . . 111
    - 5.5.1 Modularization and Integration Dimensions of COLM . . 112
    - 5.5.2 Versioning Dimensions of COLM . . . . . 114
  - 5.6 Corporate Semantic Collaboration . . . . . 116
    - 5.6.1 Editor Functionalities . . . . . 117
    - 5.6.2 User Groups . . . . . 118
    - 5.6.3 Design of the Light-weight Ontology Editor . . . . . 119
  - 5.7 Corporate Semantic Search . . . . . 121
    - 5.7.1 Search in Non-Semantic Data . . . . . 122
    - 5.7.2 Semantic Search Personalization . . . . . 125
  - 5.8 Conclusion and Outlook . . . . . 130
  - References . . . . . 130
  
- 6 Semantic Service Matchmaking in the ATM Domain Considering  
 Infrastructure Capability Constraints . . . . . 133**  
 Thomas Moser, Richard Mordinyi, Wikan Danar Sunindyo, and Stefan  
 Biffl
  - 6.1 Introduction . . . . . 133

- 6.2 Related Work . . . . . 136
  - 6.2.1 Technical Integration . . . . . 136
  - 6.2.2 Semantic Integration with Semantic Web Services . . . . . 138
  - 6.2.3 Service Matchmaking Approaches . . . . . 142
- 6.3 Research Issues . . . . . 143
- 6.4 ATM Scenario Description . . . . . 144
- 6.5 Semantic Service Matchmaking Approach . . . . . 147
  - 6.5.1 Identification of Possible Collaboration Candidate Sets . . 147
  - 6.5.2 Validity-Check and Optimization of Collaborations . . . . . 149
- 6.6 Case Study . . . . . 150
  - 6.6.1 Discussion . . . . . 151
- 6.7 Conclusion . . . . . 153
- References . . . . . 155
  
- 7 Developing Knowledge Representation in Emergency Medical Assistance by Using Semantic Web Techniques . . . . . 159**  
 Heloise Manica, Cristiano C. Rocha, José Leomar Todesco, and M. A. R. Dantas
  - 7.1 Introduction . . . . . 159
  - 7.2 Ontology and Mobile Devices Background . . . . . 160
  - 7.3 Proposed Approach . . . . . 162
    - 7.3.1 Ontology Development . . . . . 163
    - 7.3.2 Determining the Ontology Domain . . . . . 164
    - 7.3.3 Enumerating Important Terms, Classes and the Class Hierarchy . . . . . 165
    - 7.3.4 Defining Properties and Restrictions of Classes . . . . . 166
    - 7.3.5 Creating Instances and New Terms Extraction . . . . . 166
    - 7.3.6 Semantic Cache . . . . . 170
  - 7.4 Experimental Environment and Results . . . . . 171
  - 7.5 Conclusions and Future Work . . . . . 171
  - References . . . . . 173
  
- 8 Semantically Enriching the Search System of a Music Digital Library . . . . . 175**  
 Paloma de Juan and Carlos . Iglesias
  - 8.1 Introduction . . . . . 175
  - 8.2 Research Context . . . . . 177
    - 8.2.1 Previous Work . . . . . 177
    - 8.2.2 Cantiga Project . . . . . 177
  - 8.3 MagisterMusicae Search System . . . . . 178
  - 8.4 Improving Searchability . . . . . 179
    - 8.4.1 Applying Semantic Web Technologies . . . . . 179
    - 8.4.2 Linking the Ontology with External Data Sources . . . . . 185
    - 8.4.3 Alternative Search Paradigms . . . . . 187
  - 8.5 Cantiga Semantic Search System . . . . . 188
    - 8.5.1 Details on the implementation . . . . . 189

- 8.6 Evaluation ..... 190
- 8.7 Related Work ..... 192
- 8.8 Conclusions and Future Work ..... 193
- References ..... 193
  
- 9 Application of an Intelligent System Framework and the Semantic Web for the CO<sub>2</sub> Capture Process ..... 195**  
 Chuansan Luo, Qing Zhou, and Christine W. Chan
  - 9.1 Introduction ..... 195
  - 9.2 Backgroundt ..... 196
    - 9.2.1 Application Problem Domain ..... 196
    - 9.2.2 Ontology and Semantic Web ..... 196
  - 9.3 Knowledge Modeling and Ontology Construction ..... 197
    - 9.3.1 Ontology Design ..... 197
    - 9.3.2 Ontology Management ..... 199
  - 9.4 Intelligent System Framework ..... 200
  - 9.5 Application of the Semantic Knowledge A Web-based Expert System ..... 202
  - 9.6 Conclusion and Future Work ..... 203
  - References ..... 205
  
- 10 Information Pre-Processing using Domain Meta-Ontology and Rule Learning System ..... 207**  
 Girish R Ranganathan and Yevgen Biletskiy
  - 10.1 Introduction ..... 208
  - 10.2 The domain meta-ontology ..... 210
  - 10.3 The system for semi-automatic population of domain meta-ontology ..... 213
  - 10.4 Details of the Rule Learning System flow ..... 214
  - References ..... 216

