

Sven Groppe

# Data Management and Query Processing in Semantic Web Databases

# Data Management And Query Processing In Semantic Web Databases

**Bhavani Thuraisingham, Tyrone  
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Kantarcioglu, Vaibhav Khadilkar**

## **Data Management And Query Processing In Semantic Web Databases:**

**Data Management and Query Processing in Semantic Web Databases** Sven Groppe, 2011-04-29 The Semantic Web which is intended to establish a machine understandable Web is currently changing from being an emerging trend to a technology used in complex real world applications A number of standards and techniques have been developed by the World Wide Web Consortium W3C e g the Resource Description Framework RDF which provides a general method for conceptual descriptions for Web resources and SPARQL an RDF querying language Recent examples of large RDF data with billions of facts include the UniProt comprehensive catalog of protein sequence function and annotation data the RDF data extracted from Wikipedia and Princeton University s WordNet Clearly querying performance has become a key issue for Semantic Web applications In his book Groppe details various aspects of high performance Semantic Web data management and query processing His presentation fills the gap between Semantic Web and database books which either fail to take into account the performance issues of large scale data management or fail to exploit the special properties of Semantic Web data models and queries After a general introduction to the relevant Semantic Web standards he presents specialized indexing and sorting algorithms adapted approaches for logical and physical query optimization optimization possibilities when using the parallel database technologies of today s multicore processors and visual and embedded query languages Groppe primarily targets researchers students and developers of large scale Semantic Web applications On the complementary book webpage readers will find additional material such as an online demonstration of a query engine and exercises and their solutions that challenge their comprehension of the topics presented

**RDF Database Systems** Olivier Curé, Guillaume Blin, 2014-11-24 RDF Database Systems is a cutting edge guide that distills everything you need to know to effectively use or design an RDF database This book starts with the basics of linked open data and covers the most recent research practice and technologies to help you leverage semantic technology With an approach that combines technical detail with theoretical background this book shows how to design and develop semantic web applications data models indexing and query processing solutions Understand the Semantic Web RDF RDFS SPARQL and OWL within the context of relational database management and NoSQL systems Learn about the prevailing RDF triples solutions for both relational and non relational databases including column family document graph and NoSQL Implement systems using RDF data with helpful guidelines and various storage solutions for RDF Process SPARQL queries with detailed explanations of query optimization query plans caching and more Evaluate which approaches and systems to use when developing Semantic Web applications with a helpful description of commercial and open source systems

**Semantic Web Information Management** Roberto de Virgilio, Fausto Giunchiglia, Letizia Tanca, 2010-01-08 Databases have been designed to store large volumes of data and to provide efficient query interfaces Semantic Web formats are geared towards capturing domain knowledge interlinking annotations and offering a high level machine processable view of information However the gigantic amount of such useful information makes

efficient management of it increasingly difficult undermining the possibility of transforming it into useful knowledge The research presented by De Virgilio Giunchiglia and Tanca tries to bridge the two worlds in order to leverage the efficiency and scalability of database oriented technologies to support an ontological high level view of data and metadata The contributions present and analyze techniques for semantic information management by taking advantage of the synergies between the logical basis of the Semantic Web and the logical foundations of data management The book s leitmotif is to propose models and methods especially tailored to represent and manage data that is appropriately structured for easier machine processing on the Web After two introductory chapters on data management and the Semantic Web in general the remaining contributions are grouped into five parts on Semantic Web Data Storage Reasoning in the Semantic Web Semantic Web Data Querying Semantic Web Applications and Engineering Semantic Web Systems The handbook like presentation makes this volume an important reference on current work and a source of inspiration for future development targeting academic and industrial researchers as well as graduate students in Semantic Web technologies or database design

**Linked Data Management** Andreas Harth,Katja Hose,Ralf Schenkel,2016-04-19 Linked Data Management presents techniques for querying and managing Linked Data that is available on today s Web The book shows how the abundance of Linked Data can serve as fertile ground for research and commercial applications The text focuses on aspects of managing large scale collections of Linked Data It offers a detailed introduction to L

**Semantic Web Information Management** Roberto de Virgilio,Fausto Giunchiglia,Letizia Tanca,2010-05-03 Databases have been designed to store large volumes of data and to provide efficient query interfaces Semantic Web formats are geared towards capturing domain knowledge interlinking annotations and offering a high level machine processable view of information However the gigantic amount of such useful information makes efficient management of it increasingly difficult undermining the possibility of transforming it into useful knowledge The research presented by De Virgilio Giunchiglia and Tanca tries to bridge the two worlds in order to leverage the efficiency and scalability of database oriented technologies to support an ontological high level view of data and metadata The contributions present and analyze techniques for semantic information management by taking advantage of the synergies between the logical basis of the Semantic Web and the logical foundations of data management The book s leitmotif is to propose models and methods especially tailored to represent and manage data that is appropriately structured for easier machine processing on the Web After two introductory chapters on data management and the Semantic Web in general the remaining contributions are grouped into five parts on Semantic Web Data Storage Reasoning in the Semantic Web Semantic Web Data Querying Semantic Web Applications and Engineering Semantic Web Systems The handbook like presentation makes this volume an important reference on current work and a source of inspiration for future development targeting academic and industrial researchers as well as graduate students in Semantic Web technologies or database design

RDF Database Systems Olivier Curé,Guillaume Blin,2014-11-26 If you have this book in your hands we guess you are

interested in database management systems in general and more precisely those handling Resource Description Framework RDF as a data representation model We believe it is the right time to study such systems because they are getting more and more attention in industry with communities of Web developers and information technology IT experts who are designing innovative applications in universities and engineering schools with introductory and advanced courses and in both academia and industry research to design and implement novel approaches to manage large RDF data sets We can identify several reasons that are motivating this enthusiasm

*Uncertain Spatiotemporal Data Management for the Semantic Web* Bai, Luyi,Zhu, Lin,2024-03-01 In the world of data management one of the most formidable challenges faced by academic scholars is the effective handling of spatiotemporal data within the semantic web As our world continues to change dynamically with time nearly every aspect of our lives from environmental monitoring to urban planning and beyond is intrinsically linked to time and space This synergy has given rise to an avalanche of spatiotemporal data and the pressing question is how to manage model and query this voluminous information effectively The existing approaches often fall short in addressing the intricacies and uncertainties that come with spatiotemporal data leaving scholars struggling to unlock its full potential

*Uncertain Spatiotemporal Data Management for the Semantic Web* is the definitive solution to the challenges faced by academic scholars in the realm of spatiotemporal data This book offers a visionary approach to an all encompassing guide in modeling and querying spatiotemporal data using innovative technologies like XML and RDF Through a meticulously crafted set of chapters this book sheds light on the nuances of spatiotemporal data and also provides practical solutions that empower scholars to navigate the complexities of this domain effectively

**XML Databases and the Semantic Web** Bhavani Thuraisingham,2002-03-27 Efficient access to data sharing data extracting information from data and making use of the information have become urgent needs for today s corporations With so much data on the Web managing it with conventional tools is becoming almost impossible New tools and techniques are necessary to provide interoperability as well as warehousing betw

*RDF Database Systems* Olivier Curé,Guillaume Blin,2014 *RDF Database Systems* is a cutting edge guide that distills everything you need to know to effectively use or design an RDF database This book starts with the basics of linked open data and covers the most recent research practice and technologies to help you leverage semantic technology With an approach that combines technical detail with theoretical background this book shows how to design and develop semantic web applications data models indexing and query processing solutions Understand the Semantic Web RDF RDFS SPARQL and OWL within the context of relational database management and NoSQL systems Learn about the prevailing RDF triples solutions for both relational and non relational databases including column family document graph and NoSQL Implement systems using RDF data with helpful guidelines and various storage solutions for RDF Process SPARQL queries with detailed explanations of query optimization query plans caching and more Evaluate which approaches and systems to use when developing Semantic Web applications with a helpful description of commercial and open source systems

**Handbook of Research on Innovative Database Query Processing Techniques** Yan, Li, 2015-09-25 Research and development surrounding the use of data queries is receiving increased attention from computer scientists and data specialists alike Through the use of query technology large volumes of data in databases can be retrieved and information systems built based on databases can support problem solving and decision making across industries The Handbook of Research on Innovative Database Query Processing Techniques focuses on the growing topic of database query processing methods technologies and applications Aimed at providing an all inclusive reference source of technologies and practices in advanced database query systems this book investigates various techniques including database and XML queries spatiotemporal data queries big data queries metadata queries and applications of database query systems This comprehensive handbook is a necessary resource for students IT professionals data analysts and academicians interested in uncovering the latest methods for using queries as a means to extract information from databases This all inclusive handbook includes the latest research on topics pertaining to information retrieval data extraction data management design and development of database queries and database and XM queries

**Semantic Web Services for Web Databases** Mourad Ouzzani, Athman Bouguettaya, 2011-10-23 Semantic Web Services for Web Databases introduces an end to end framework for querying Web databases using novel Web service querying techniques This includes a detailed framework for the query infrastructure for Web databases and services Case studies are covered in the last section of this book Semantic Web Services For Web Databases is designed for practitioners and researchers focused on service oriented computing and Web databases

*Advances in Database Technology - EDBT 2004* Elisa Bertino, Stavros Christodoulakis, Dimitris Plexousakis, Christophides Vassilis, Manolis Koubarakis, Klemens Böhm, Elena Ferrari, 2004-02-12 The 9th International Conference on Extending Database Technology EDBT 2004 was held in Heraklion Crete Greece during March 14 18 2004 The EDBT series of conferences is an established and prestigious forum for the exchange of the latest research results in data management Held every two years in an attractive European location the conference provides unique opp tunities for database researchers practitioners developers and users to explore new ideas techniques and tools and to exchange experiences The previous events were held in Venice Vienna Cambridge Avignon Valencia Konstanz and Prague EDBT 2004 had the theme new challenges for database technology with the goal of encouraging researchers to take a greater interest in the current exciting technological and application advancements and to devise and address new research and development directions for database technology From its early days database technology has been challenged and advanced by new uses and applications and it continues to evolve along with application requirements and hardware advances Today s DBMS technology faces yet several new challenges Technological trends and new computation paradigms and applications such as pervasive and ubiquitous computing grid computing bioinformatics trust management virtual communities and digital asset management to name just a few require database technology to be deployed in a variety of environments and for a number of

different purposes. Such an extensive deployment will also require trustworthy resilient database systems as well as easy to manage and exible ones to which we can entrust our data in whatever form they are

### **Linked Data Management**

Andreas Harth,2014-01-01 Linked Data Management presents techniques for querying and managing Linked Data that is available on today s Web. The book shows how the abundance of Linked Data can serve as fertile ground for research and commercial applications. The text focuses on aspects of managing large scale collections of Linked Data. It offers a detailed introduction to Linked Data and related standards including the main principles distinguishing Linked Data from standard database technology. Chapters also describe how to generate links between datasets and explain the overall architecture of data integration systems based on Linked Data. A large part of the text is devoted to query processing in different setups. After presenting methods to publish relational data as Linked Data and efficient centralized processing, the book explores lookup based distributed and parallel solutions. It then addresses advanced topics such as reasoning and discusses work related to read write Linked Data for system interoperation. Despite the publication of many papers since Tim Berners Lee developed the Linked Data principles in 2006, the field lacks a comprehensive unified overview of the state of the art. Suitable for both researchers and practitioners, this book provides a thorough consolidated account of the new data publishing and data integration paradigm. While the book covers query processing extensively, the Linked Data abstraction furnishes more than a mechanism for collecting, integrating and querying data from the open Web; the Linked Data technology stack also allows for controlled, sophisticated applications deployed in an enterprise environment.

*Relevant Query Answering over Streaming and Distributed Data* Shima Zahmatkesh, Emanuele Della Valle,2020-01-21 This book examines the problem of relevant query answering over the Web and provides a comprehensive overview of relevant query answering over streaming and distributed data. In recent years, Web applications that combine highly dynamic data streams with data distributed over the Web to provide relevant answers have attracted increasing attention. Answering in a timely fashion, i.e. reactively, is one of the most important performance indicators, especially when the distributed data is evolving. The book proposes a solution that retains a local replica of the distributed data and offers various maintenance policies to refresh the replica over time. A limited refresh budget guarantees the reactivity of the system. Focusing on stream processing and Semantic Web, it appeals to scientists and graduate students in the field.

### **Query Processing over Graph-structured Data on the Web**

M. Acosta Deibe,2018-10-12 In the last years, Linked Data initiatives have encouraged the publication of large graph structured datasets using the Resource Description Framework (RDF). Due to the constant growth of RDF data on the web, more flexible data management infrastructures must be able to efficiently and effectively exploit the vast amount of knowledge accessible on the web. This book presents flexible query processing strategies over RDF graphs on the web using the SPARQL query language. In this work, we show how query engines can change plans on the fly with adaptive techniques to cope with unpredictable conditions and to reduce execution time. Furthermore, this work investigates the application of

crowdsourcing in query processing where engines are able to contact humans to enhance the quality of query answers The theoretical and empirical results presented in this book indicate that flexible techniques allow for querying RDF data sources efficiently and effectively

Web Information Systems Engineering Leong Hou U, Jian Yang, Yi Cai, Kamalakar Karlapalem, An Liu, Xin Huang, 2020-02-05 This book constitutes the refereed proceedings presented on the 20th International Conference on Web Information Systems Engineering WISE 2019 and on The International Workshop on Web Information Systems in the Era of AI held in Hong Kong and Macau China Due to the problems in Hong Kong WISE 2019 has been postponed until January 2020 The 7 workshop papers 5 demo papers and 3 tutorial papers presented were carefully reviewed and selected from numerous submissions The papers are organized in the following sections tutorials demos the International Workshop on Web Information Systems in the Era of AI

*Secure Data Provenance and Inference Control with Semantic Web* Bhavani Thuraisingham, Tyrone Cadenhead, Murat Kantarcioglu, Vaibhav Khadilkar, 2014-08-01 With an ever increasing amount of information on the web it is critical to understand the pedigree quality and accuracy of your data Using provenance you can ascertain the quality of data based on its ancestral data and derivations track back to sources of errors allow automatic re-enactment of derivations to update data and provide attribution of the data source Secure Data Provenance and Inference Control with Semantic Web supplies step by step instructions on how to secure the provenance of your data to make sure it is safe from inference attacks It details the design and implementation of a policy engine for provenance of data and presents case studies that illustrate solutions in a typical distributed health care system for hospitals Although the case studies describe solutions in the health care domain you can easily apply the methods presented in the book to a range of other domains The book describes the design and implementation of a policy engine for provenance and demonstrates the use of Semantic Web technologies and cloud computing technologies to enhance the scalability of solutions It covers Semantic Web technologies for the representation and reasoning of the provenance of the data and provides a unifying framework for securing provenance that can help to address the various criteria of your information systems Illustrating key concepts and practical techniques the book considers cloud computing technologies that can enhance the scalability of solutions After reading this book you will be better prepared to keep up with the on going development of the prototypes products tools and standards for secure data management secure Semantic Web secure web services and secure cloud computing

**Secure Data Science** Bhavani Thuraisingham, Murat Kantarcioglu, Latifur Khan, 2022-04-27 Secure data science which integrates cyber security and data science is becoming one of the critical areas in both cyber security and data science This is because the novel data science techniques being developed have applications in solving such cyber security problems as intrusion detection malware analysis and insider threat detection However the data science techniques being applied not only for cyber security but also for every application area including healthcare finance manufacturing and marketing could be attacked by malware Furthermore due to the power of data science it is now possible to infer highly private and sensitive

information from public data which could result in the violation of individual privacy This is the first such book that provides a comprehensive overview of integrating both cyber security and data science and discusses both theory and practice in secure data science After an overview of security and privacy for big data services as well as cloud computing this book describes applications of data science for cyber security applications It also discusses such applications of data science as malware analysis and insider threat detection Then this book addresses trends in adversarial machine learning and provides solutions to the attacks on the data science techniques In particular it discusses some emerging trends in carrying out trustworthy analytics so that the analytics techniques can be secured against malicious attacks Then it focuses on the privacy threats due to the collection of massive amounts of data and potential solutions Following a discussion on the integration of services computing including cloud based services for secure data science it looks at applications of secure data science to information sharing and social media This book is a useful resource for researchers software developers educators and managers who want to understand both the high level concepts and the technical details on the design and implementation of secure data science based systems It can also be used as a reference book for a graduate course in secure data science Furthermore this book provides numerous references that would be helpful for the reader to get more details about secure data science

**Advances in Database Technology** ,2002      **Querying the Semantic Web** Artem Chebotko,Shiyong Lu,2010 The explosive growth of RDF data on the Semantic Web drives the need for novel database techniques that can efficiently store and query large RDF datasets To provide good performance and scalability of query processing many existing RDF stores use an RDBMS as a backend to manage RDF data The main challenge of this approach is the translation of RDF queries formulated in the SPARQL query language into their equivalent relational algebra expressions and SQL queries In this book we formalize a relational algebra based semantics of SPARQL define the first provably semantics preserving SPARQL to SQL translation in the literature describe a novel relational join nested optional join to efficiently evaluate SPARQL queries and design the first relational RDF store RDFProv that is optimized for querying the Semantic Web of scientific workflow provenance The book features a number of performance studies and comparisons with existing systems and approaches The advanced query techniques in this book should be useful to students instructors computer scientists and IT professionals whose research interests are in the areas of semantic web databases and scientific workflows

Embark on a transformative journey with is captivating work, Discover the Magic in **Data Management And Query Processing In Semantic Web Databases** . This enlightening ebook, available for download in a convenient PDF format Download in PDF: , invites you to explore a world of boundless knowledge. Unleash your intellectual curiosity and discover the power of words as you dive into this riveting creation. Download now and elevate your reading experience to new heights

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