Preface

The field of information systems development is constantly evolving. New techniques and tools are continuously being introduced. In this volume “Theoretical and Practical Advances in Information Systems Development: Emerging Trends and Approaches”, we are proud to present a compilation of excellent cutting-edge research from world-class researchers around the world. The volume is targeted at researchers in the areas as well as professionals in the industry.

The following are the short descriptions of each chapter:

Chapter 1, “Visual Support for Use Case Modeling: An Experiment to Determine the Effectiveness of Use Case Diagrams” discusses the advancement of Unified Modeling Language, UML as a customary approach to Systems Analysis and Design. It explores the Cognitive Theory of Multimedia Learning, and describes an experiment conducted in order to analyze this theory. The results provide considerable support that cases and use case diagrams may be significant boundary objects in systems analysis.

Chapter 2, “Applying Learner-Centered Design Principles to UML Sequence Diagrams” explores the sophistication and difficulty of learning to shape individual diagrams in the Unified Modeling Language. This chapter also analyzes the procedure of learning to build sequence diagrams and provides suggestions for presenting the sequence diagram construction with the purpose of condensing the difficulty of the learning process.

Chapter 3, “Ontology Based Object-Oriented Domain Modeling: Representing Behavior” presents issues regarding analyzing the application domain, and conceptual models involved. This chapter further discusses the use of object-oriented software modeling languages to support a more precise conversion from domain models to software models. It addresses behavioral matters relating to change and interaction, based upon mappings between ontological concepts. Modeling rules formed are used in creating ontologically well-formed models.

Chapter 4, “General Strategy for Querying Web Sources in a Data Federation Environment” focuses the support for inclusion and querying of non-relational sources within a data federation setting using wrappers. IBM DB2 federation engine is used to reveal the challenges of integrating Web sources into a data federation. A strategy is presented which detaches the code and knowledge in wrapper development, causing Web sources to be included promptly in a data federation system.

Chapter 5, “Information Privacy: Understanding How Firms Behave Online” proposes the idea concerning the acquisition and use of personal information by large corporations. The privacy policies of large US firms are analyzed in order to assess the content and value of their stated information practices. The study provides findings regarding factors that influence a firm’s independence upon consumer personal information, and implications for information privacy issues. The complication and disputes of managing personal private information are also adequately addressed.
Chapter 6, “Reverse Engineering from an XML Document into an Extended DTD Graph” relates to Extensible Markup Language (XML) which has become a benchmark for consistent storage and data exchange through the Internet. A systematic solution to reverse engineer arbitrary XML documents to their conceptual schema—extended DTD graphs is proposed, which determines the organization of the XML document, and derives candidate data semantics from the XML element instances to validate the linkages among elements. Because implicit and explicit referential linkages are among XML elements, an arbitrary XML document can be reverse engineered into its theoretical schema.

Chapter 7, “Scalable XML Filtering for Content Subscriptions” presents ideas relating to a technique for building efficient and scalable XML publish/subscribe applications. This chapter looks at the trouble of processing streaming XML data efficiently against a large number of branch XPath queries, and ways to improve the performance of XML data processing. This section also introduces ways to organize queries and execute join operations in a pipeline fashion. As a result, the number of join operations is reduced and all matching elements are efficiently returned.

Chapter 8, “Towards Autonomic Workload Management in DBMSs” provides insight into workload management as a requirement of database management systems, which is necessary for DBMS to be business-objective oriented, providing efficient differentiated service at fine granularity and maintaining high utilization of resources with low management costs. This chapter suggests that there is a shift in workload management from offline planning to online adaptation, where the objectives of workload management in autonomic DBMSs are discussed. A framework for examining current workload management mechanisms is used to study several mechanisms from both DBMS products and research efforts.

Chapter 9, “XTEngine: A Twin Search Engine for XML” proposes that the reason some frameworks work well for certain types of XML data models while fail in others is that the proposed techniques overlook the context of elements when building relationships between the elements. This division suggests that context of a data element is determined by its parent because a data element is generally a characteristic of its parent. A context-driven search engine called XTEngine for answering XML Keyword-based and Loosely Structured queries, is introduced in this chapter. It treats each set of elements consisting of a parent and its children data elements as one unified entity, and then uses context-driven exploration techniques for determining the relationships between the different unified entities.

Chapter 10, “Towards Structured Flexibility in Information Systems Development: Devising a Method for Method Configuration” introduces Method configuration as a specific type of Method Engineering. This chapter suggests that a metamethod approach (Method for Method Configuration, MMC) be used to cater towards organization-wide ISDMs. MMC considers the need to combine structure with flexibility, and is built with a three-layered reuse model. With these concepts united in an effective manner, a situational method is produced, facilitating the work of method engineers.

Chapter 11, “On Efficient Evaluation of XML Queries” discusses that W3C be used as the standard XML query language, as decided by the World Wide Web Consortium. This chapter explains the design and implementation of an efficient and scalable purely relational XQuery processor. The efficiency and scalability of our purely relational approach in comparison to the native XML/XQuery functionality is clearly exhibited, and results show that further research concerning purely relational approach for implementing XQuery processor is indeed necessary.

Chapter 12, “Cost Modeling and Range Estimation for Top-k Retrieval in Relational Databases” introduces Top-k retrieval which fulfills the need for efficient methods for exploratory search and retrieval. This chapter further describes the query-mapping approach that deals with converting top-k queries into equivalent range queries, combining the advantages of simplicity as well as practicality. It also reviews
current query-mapping techniques, and presents a range query estimation method based on cost modeling. Real-world experiments and synthetic data sets prove that the cost-based range evaluation means performs as well as prior methods and avoids the need to regulate workloads on specific database contents.

Chapter 13, “Document SQL, DSQL: A Conservative Extension to SQL as an Ad-hoc Querying Frontend for XQuery” presents DSQL, a conservative extension of SQL, as a query language for XML, and its development process. The chapter further discusses DSQL as a core subset of XQuery that lends well to query optimization techniques, allowing easy integration into current databases and applications that use SQL. Significant query language properties and an experimental study are also presented to display the influence of DSQL in terms of precision and effectiveness.

Chapter 14, “Range-Sum Queries over High Dimensional Data Cubes Using a Dynamic Grid File” proposes the use of grid file to store multi-dimensional data cubes and answer range-sum queries, with the grid file being enhanced with a dynamic splitting mechanism to accommodate insertions of data. This chapter debates about the drawbacks which are overcome by the use of grid file, and its various benefits of ease and competence. This part further introduces topics regarding the space requirement, update costs, and structure of grid files. Experimental outcome shows that the proposed method performs favorably in file size, update speed, construction time, and query response time for both evenly and unevenly distributed data.

Keng Siau  
University of Nebraska-Lincoln, USA  
Editor-in-Chief, Journal of Database Management