

SPECIAL COLLECTION: SOFTWARE SYSTEM MODELING FROM ARCHITECTURE TO DETAIL DESIGN

High-quality software is not an accident; it is constructed via a systematic plan that demands familiarity with analytical techniques, architectural and design methodologies, implementation polices, and testing techniques. Software architecture and design plays an important role in the development of today's complex software systems. Furthermore, our ability to model and reason about the architectural and design properties of a system, built from existing components, is of great concern to modern system developers.

Current research in the software engineering area has resulted in the definition of a number of methodologies and techniques for model development and code generation throughout the system development life cycle. Coupled with these many research approaches are techniques for transforming from one level of system abstraction to another vis-a-vis architectural and design models, and code. The motivation for this latter area of research is sparked by the successful applications of the many system architectural and design description languages and notations, and the need to integrate the best aspects of these methodologies and techniques.

In June 2005, the International Conference on Software Engineering Research and Practice (SERP05) was held in Las Vegas, Nevada. SERP05 was one of the many co-conferences of the World Congress in Computer Science, Computer Engineering, and Applied Computing. For year 2005, SERP received contributions from research institutes around the world.

The history of SERP goes back to the late 1990s. The main purpose of SERP, among other things, is to promote discussion and interaction between researchers and practitioners focused on discipline of software engineering. In particular, we sought to showcase the latest works with respect to the full spectrum of software development cycle.

Researchers were invited to submit a paper of approximately 6–8 pages. These papers were evaluated for originality, significance, clarity, and soundness. All accepted papers were published in the conference proceedings, and a selected number were invited to resubmit extended versions of their papers for possible journal publication. From the one hundred and sixteen papers accepted for SERP05 seven were invited to submit extended versions for possible journal publication. These seven were selected based on their relevance to the area of software model development and the comments of the initial conference reviewers. Of the seven invitations four were finally selected for journal publication.

The first paper, "Relationships for Domain Reuse and Composition", by Jacky Estublier, Anca Daniela Ionita, and German Vega, outlines a methodology for composing domain models at the metamodel and model level. This approach differs from previous techniques for composing domain-specific languages by preserving the composed languages and establishing relationships between the respective metamodel and model elements.

The second paper, "Eliciting CM³: Emergency Problem Management at Scandinavian Airline Systems", by Mira Kajko-Mattsson, Claus Nielsen, Per Winther, Brian Vang, and Anne Petersen, presents an emergency software problem management model that has been applied to SAS, followed by the benefits realized, lessons learnt, current limitations and future research directions. With further work, this research has the potential to make a valuable contribution to the field of software management and maintenance. The paper attempts to describe the Corrective Maintenance Maturity Model (CM³) as applied to the Scandinavian Airline Systems (SAS). It presents the CM³ emergency process and operational levels, and attempts to show its equivalent application to the operational levels at SAS.

The third paper, "Availability Modeling and Evaluation on High Performance Cluster Computing Systems", by Hertong Song, Chokchai Leangsuksun and Raja Nassar, presents a technique on availability modeling, model evaluation, and model monitoring for cluster computing. The

availability model is based on an object-oriented Markov model and some numerical solution methods are provided for model evaluation. In addition, a framework to monitor the availability model is also discussed. Availability as mentioned by the authors, is a key attribute of HPC cluster systems. The solutions provided in this paper can be thought of as a single framework for availability modeling, model evaluation and data analysis. Based on knowledge, the solutions provided are novel and quite helpful in investigating availability for cluster systems.

The final of the four papers, “Metamodel Search: Using XPath to Search Domain-Specific Models”, by Rajesh Sudarsan and Jeff Gray, is a unique scholarship of application of existing procedures (XPath and GME models) to proffer solutions that can be used in many software development tools for flexible and scalable search strategy in a domain-specific modeling environment. The paper advanced the XPath predicates to provide searching facilities for visual hierarchical models, a distinctive contribution to knowledge, that has so far eluded existing software modeling tools. The authors provided case studies with results on how their technique (XMOS) differs from current search utilities with similar objectives. Existing search tools focus on textual software artifacts while this research effort uniquely focuses on visual hierarchical models.

XMOS, an XPath plug-in search engine for domain-specific models, was developed and applied to models developed using the ESML language and the GME toolkit. The search engine extends the flexibility and scope of the built-in search capability of GME, returning model entities that match the XPath predicate search expression, and is capable of presenting the search result at the visual abstraction level provided by the modeling tool. The architecture of the XMOS and four samples of search predicate expressions and the results returned are presented. A summary of future work to be done is also given.

Organizing a successful conference and selecting high-quality research journal papers demand significant commitment and dedication of the referees who provide their knowledge, expertise, and time. Their service is a matter of success and failure for the conference, journal, and the research community. We would like to thank the many referees, without whom this would not have been possible. We would also like to thank Professor Sidney Morris, Editor-in-Chief, and Rosemary Hay for their support and help. It is our hope that this collection of papers will demonstrate the current trends in software model development and future directions that may be taken in this field.

*Hassan Reza, PhD
Assistant Professor
Department of Computer Science
University of North Dakota
Grand Forks, North Dakota, USA
<http://people.cs.und.edu/~reza/>
reza@cs.und.edu*



*Emanuel S. Grant, PhD
Assistant Professor
Department of Computer Science
University of North Dakota
Grand Forks, North Dakota, USA
<http://people.cs.und.edu/~grante/>
grante@cs.und.edu*

