Open access • Book • DOI:10.1007/978-3-642-28038-2

Advances in Software Engineering Techniques — Source link

David Hutchison, Takeo Kanade, Josef Kittler, Jon Kleinberg ...+14 more authors

Institutions: Lancaster University, Carnegie Mellon University, University of Surrey, Cornell University ...+10 more institutions

Published on: 01 Jan 2012

Lecture Notes in Computer Science 7054

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Tomasz Szmuc Marcin Szpyrka
Jaroslav Zendulka (Eds.)

Advances in Software Engineering Techniques

4th IFIP TC 2 Central and East European Conference
on Software Engineering Techniques, CEE-SET 2009
Krakow, Poland, October 12-14, 2009
Revised Selected Papers

Springer

Volume Editors

Tomasz Szmuc
AGH University of Science and Technology
Department of Automatics
al. Mickiewicza 30
30-059 Krakow, Poland
E-mail: tsz@agh.edu.pl

Marcin Szpyrka
AGH University of Science and Technology
Department of Automatics
al. Mickiewicza 30
30-059 Krakow, Poland
E-mail: mszpyrka@agh.edu.pl

Jaroslav Zendulka
Brno University of Technology
Faculty of Information Technology
Božetěchova 2
612 66 Brno, Czech Republic
E-mail: zendulka@fit.vutbr.cz

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-28037-5 e-ISBN 978-3-642-28038-2
DOI 10.1007/978-3-642-28038-2
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2011945545

CR Subject Classification (1998): D.2, C.2, H.4, F.3, D.3, I.2

LNCS Sublibrary: SL 2 – Programming and Software Engineering

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

Software Engineering combines science and practice in the field of software system development. The 4th IFIP TC2 Central and East European Conference on Software Engineering Techniques, CEE-SET 2009, (Krakow, Poland, October 12–14, 2009) provided an opportunity for researchers and practitioners to exchange knowledge and ideas. The CEE-SET 2009 event was the fourth edition of this international conference.

The conference was a forum for presentation and evaluation of both currently used methods and techniques and of new approaches or directions in software engineering. Main topics of the conference covered all aspects of software development:

- Software architectures
- Software components and reuse
- Software development methodologies
- Software quality
- Software measurement and metrics
- Software testing, analysis, and verification
- Software products and process improvement
- Formal methods in software engineering
- Agile software development methodologies and practices
- Maintenance and reverse engineering
- Software projects management
- Documentation management in software project
- Human factors in software engineering
- Software engineering training and education

The book contains 19 papers carefully selected from 63 submissions on the basis of reviews of the international Program Committee (PC) members and external reviewers. The papers were grouped according to the corresponding sessions; however, this rule cannot be fully applied. The main reason was the selection of only 30% of the best conference papers, so a set of the selected papers covers partially areas of the conference sessions. Therefore, the chapters in this volume follow the order of presentation at the conference structure (if possible). Finally, the papers are grouped within the following three sections:

1. Software Architectures and Development
2. Modeling and Formal Methods in Software Development
3. Measurement, Testing, and Quality of Software

The first section contains seven papers dealing with important topics in the area of software architectures and development. The papers deal with several issues

related to architectural knowledge repository, design of different classes of systems (message-based, aspect-oriented, component-based), and selected problems of databases. A short overview of their contents is given below.

Design of software architecture is usually an iterative process, and thus knowledge repository supporting the process is proposed in the paper "Towards Decision Centric Repository of Architectural Knowledge" (by Bartosz Michalik and Jerzy Nawrocki). Integration of software modules to achieve the required functionality may be treated as a process of searching for a proper sequence of services. A method for generating such a sequence and a description of experiments testing the method using selected planners are presented in the paper "Construction of Messaging-Based Enterprise Integration Solutions Using AI Planning" (by Pavol Mederly, Marián Lekavý, Marek Závodský, and Pavol Návrat). Separation of business logic and business layers by introduction of an integration layer (and domain description language) is proposed in the paper "Integration of Application Business Logic and Business Rules with DSL and AOP" (by Bogumiła Hnatkowska, and Krzysztof Kasprzyk). The concept was checked using an aspect-oriented language (AspectJ). A proposal of direct change manipulation using multiparadigm design with feature modeling is presented in the next paper "Aspect-Oriented Change Realization Based on Multi-Paradigm Design with Feature Modeling" (by Radoslav Menkyna and Valentino Vranić). The solution is an extension of the two-level change realization framework and is illustrated with two examples of feature models. A method for the introduction of changes of evolving environment in component-based systems is proposed in the paper "On the Evolution of Component-Based Software" (by Isabelle Côté, Maritta Heisel, and Jeanine Souquières). The paper "Query Processing Using Negative and Temporal Tuples in Stream Query Engines" (by Marcin Gorawski, and Aleksander Chrószcz) deals with modification of time models for stream processing systems. The modification is based on the incorporation of positive and negative events allowing simplification (and optimization) of individual stream operators and query plans. The architecture of a scalable store for a huge number of objects is an important problem in distributed object-oriented database management systems. A new algorithm based on bucket partitioning is proposed in the paper "Scalable Store of Java Objects Using Range Partitioning" (by Mariusz Bedla and Krzysztof Sapiecha). The experiments performed confirm the promising features of the proposal.

The second section ("Modeling and Formal Methods in Software Development") focuses on these two issues supporting the development of software. Applications of several formal tools, i.e., Petri nets, temporal logics, set/category theory for modeling and analysis of software artifacts are considered. A short overview of the content is given below.

The two first papers use the same formal language, i.e., high-level timed colored Petri net (HTCPN) to deal with different problems. This formal language is used in the proposed approach to build modules used for modeling and performance evaluation of Internet systems. An extended module is applied for

the analysis of the proposed cluster reconfiguration algorithm ("HTCPNs-Based Modeling and Evaluation of Dynamic Computer Cluster Reconfiguration"—by Sławomir Samolej and Tomasz Szmuc), while performance analysis (using this approach) of an exemplary on-line stock exchange system is presented in the second paper "Performance Analysis of Interactive Internet Systems for a Class of Systems with Dynamically Changing Offers" (by Tomasz Rak and Jan Werewka). A proposal of a new specification language merging subsets of state and activity diagrams as well as related methodology is presented in the paper "Information Systems Development Based on Visual Domain-Specific Language BiLingva" (by Jana Ceriņa-Bērziņa, Jānis Bičevskis, and Ģirts Karnīti). Transformation of business process workflow specifications (described by ontology and associated normative rules) into EventB formalism (successor of B-method) is presented in the paper "A Mapping from Normative Requirements to Event-B to Facilitate Verified Data-Centric Business Process Management" (by Iman Poernomo and Timur Umarov). The proposed methodology allows consistency checking of specification, and then preserving the consistency transformation into an operational model, which may be implemented relatively easily. Unified notation for both graph rewriting and attribute computations is proposed in the paper "Computations in Graph Rewriting. Inductive Types and Pullbacks in DPO Approach" (by Maxime Rebout, Louis Féraud, Lionel Marie-Magdeleine, and Sergei Soloviev). The defined formalism provides tools for easier building of robust software. A new SAT-based verification technique for multiagent real-time systems is proposed in the paper "Bounded Model Checking for the Existential Part of Real-Time CTL and Knowledge" (by Bożena Woźna-Szcześniak). The existential part of real-time CTL for specification and bounded model checking as a verification method constitute the foundations in the approach. A set-theoretic definition of semantics for a set of role-based trust management credentials (specified by RT languages) is proposed in the paper "The Semantics of Role-Based Trust Management Languages" (by Anna Felkner and Krzysztof Sacha). The definition covers a powerful set of RT languages, including the ones specifying manifold roles and expressing a threshold structure and separation of duty policies.

The last section ("Measurement, Testing, and Quality of Software") concentrates on the assessment of software products. The main topics considered in the papers are presented below.

The section starts with a paper on "Applying of Smart Technologies: Evaluation of Effectiveness" (by Zane Bičevska). Criteria for evaluation effectiveness (ability to deliver required effect) are discussed in the first part of the paper, while the effectiveness of introducing smart technologies in two real projects is analyzed in the second part. An approach toward the relocation of multiple related class members in order to improve the modularization of legacy software is proposed in the paper "Reducing the Class Coupling of Legacy Code by a Metrics-Based Relocation of Class Members" (by Marvin Ferber, Sascha Hunold, Björn Krellner, Thomas Rauber, Thomas Reichel, and Gudula Rünger). A relocation algorithm based on dependencies metrics and the proposed pattern-based

approach is applied to two open source projects. Data flow coverage (DFC)—a tool supporting data flow testing of Java programs—is briefly described in the paper "Dataflow Testing of Java Programs with DFC" (by Ilona Bluemke and Artur Rembiszewski). The idea is based on finding all definition-use pairs (building the corresponding graph) related to variables, and then testing the coverage of related graphs. The paper "Object-Oriented Testing Capabilities and Performance Evaluation of the C# Mutation System" (by Anna Derezińska and Anna Szustek) describes modifications of object-oriented mutation testing of C# programs, based on the definition of more advanced mutation operators. The related tool (with additional improvements) and experiments performed confirmed the advantages of the proposal. A new heuristic algorithm for reduction of regression tests suite (while preserving fault detection capability) is proposed in the paper "Bi-Criteria Test Suite Reduction by Cluster Analysis of Execution Profiles" (Saeed Parsa and Alireza Khalilian). The idea is based on the observation that clustering of the test case execution profiles implies partition of the test suite grouping similar (w.r.t. coverage criteria) test cases in the same subsets.

The editors express their cordial thanks to all authors for their significant contributions. We are very grateful to all reviewers (both external and PC members) for their excellent reviews and comments supporting the selection process and levering the quality of the papers. The CEE-SET 2009 Conference was organized under the auspices of the IFIP TC2 (TC2 Software: Theory and Practice) Committee with great support from Jerzy Nawrocki.

September 2011

Tomasz Szmuc
Marcin Szpyrka
Jaroslav Zendulka

Organization

CEE-SET 2009 was organized by the Department of Automatics, AGH University of Science and Technology, Krakow, Poland.

General Chairs

Tomasz Szmuc
Jaroslav Zendulka

Steering Committee

Maria Bielikova
Stefan Biffl
Miklos Biro
Albertas Caplinskas
Zbigniew Huzar
Bertrand Meyer
Jerzy Nawrocki
Barbara Paech
Jaroslav Zendulka

Program Committee Chairs

Zbigniew Huzar
Jerzy Nawrocki
Krzysztof Zieliński

Program Committee

Pekka Abrahamsson
Vincenzo Ambriola
Nathan Baddoo
Hubert Baumeister
Maria Bielikova
Miklos Biro
Pere Botella
Albertas Caplinskas
Jutta Eckstein
Gabor Fazekas
Kurt Geihs
Józef Goetz
Janusz Gorski
Bogumiła Hnatkowska
Petr Hnetynka
Tomas Hruska
Zbigniew Huzar
Paul Klint
Jan Kollar
Laszlo Kozma
Leszek Maciaszek
Jan Madey

Lech Madeyski
Zygmunt Mazur
Bertrand Meyer
Matthias Mueller
Juergen Muench
Jerzy Nawrocki
Janis Osis
Frantisek Plasil
Erhard Ploedereder
Saulius Ragaisis
Felix Redmill
Krzysztof Sacha
Wilhelm Schaefer
Tomasz Szmuc
Marcin Szpyrka
Giancarlo Succi
Andrey Terekhov
Richard Torkar
Corrado Aaron Visaggio
Tomas Vojnar
Bartosz Walter
Jaroslav Zendulka
Krzysztof Zielinski

Organizing Committee

Marcin Szpyrka
Krzysztof Kaczor
Rafał Mrówka
Grzegorz J. Nalepa
Paweł Skrzyński

External Reviewers

Diana Comes
Markus von Detten
Christoph Evers
Zsolt Hernáth
Pavel Jezek
Jan Kofron
Pavel Krcal
Bohuslav Krena
Zdenek Letko
Michal Malohlava
Bartosz Michalik
Ondrej Rysavy
Sławomir Samolej
Ondrej Sery
Hendrik Skubch
Toni Urpi

Scientific Sponsors

IFIP Technical Committee 2: "Software Theory and Practice"
Visegrad Fund
Czech Society for Cybernetics and Informatics
Gesellschaft für Informatik, Special Interest Group Software Engineering
John von Neumann Computer Society (NJSZT), Hungary
Lithuanian Computer Society
Polish Academy of Sciences, Committee for Informatics
Polish Information Processing Society
Slovak Society for Computer Science

Table of Contents

Part I: Software Architectures and Development

Part II: Modelling and Formal Methods in Software Development