

Proceedings

**Seventh International Conference on  
Quality Software  
(QSIC 2007)**

**October 11–12, 2007  
Portland, Oregon, USA**

**Sponsored by**

The University of Hong Kong, Hong Kong



Los Alamitos, California  
Washington • Tokyo



# Contents

## Proceedings of the Seventh International Conference on Quality Software

---

**QSIC 2007**

<b>Welcome Message from the General Chair</b> .....	x
<b>Message from the Program Co-Chairs</b> .....	xiv
<b>QSIC 2007 Conference Committees</b> .....	xv
<b>Additional Reviewers</b> .....	xviii
<b>Keynote Speeches</b> .....	xix
<b>Distinguished Plenary Panel</b> .....	xxi
<b>First International Workshop on Software Test Evaluation (STEV 2007) Committees</b> .....	xxii

---

### Position Papers by Distinguished Plenary Panel

Software Quality: Past, Present, and Future.....	1
<i>Suraj C. Kothari</i>	
Proposition for E-DoD: An Overall Plan for Network-Centric Operation.....	2
<i>Raymond A. Paul</i>	
Semantic Computing and Quality Software.....	3
<i>Phillip C.-Y. Sheu</i>	
Developing Adaptive Software with Multiple QoS Requirements .....	4
<i>Stephen S. Yau</i>	

### Regular Papers

#### Session 1A: Software Testing 1

Testing Non-Functional Requirements with Aspects: An Industrial Case Study .....	5
<i>Jani Metsä, Mika Katara, and Tommi Mikkonen</i>	
Test Case Prioritization Based on Varying Testing Requirement Priorities and Test Case Costs .....	15
<i>Xiaofang Zhang, Changhai Nie, Baowen Xu, and Bo Qu</i>	
Improving Model-Checkers for Software Testing .....	25
<i>Gordon Fraser and Franz Wotawa</i>	
Test-Driven Component Integration with UML 2.0 Testing and Monitoring Profile.....	32
<i>Donglin Liang and Kai Xu</i>	

## Session 1B: Distributed Systems

A QoS-Enabled WorkManager Model for Web Application Servers.....	40
<i>Wei Wang, Wenbo Zhang, Jun Wei, and Tao Huang</i>	
Towards Automatic Measurement of Probabilistic Processes .....	50
<i>Lin Song, Yuxin Deng, and Xiaojuan Cai</i>	
A Pattern-Based Constraint Description Approach for Web Services.....	60
<i>Qianxiang Wang, Min Li, Na Meng, Yonggang Liu, and Hong Mei</i>	

## Session 2A: Software Security and Model Checking

Security Requirements Elicitation via Weaving Scenarios Based on Security Evaluation Criteria.....	70
<i>Hiroya Itoga and Atsushi Ohnishi</i>	
Model Checking Security Pattern Compositions .....	80
<i>Jing Dong, Tu Peng, and Yajing Zhao</i>	
Real-Time Component Composition Using Hierarchical Timed Automata .....	90
<i>Xianli Jin, Huadong Ma, and Zonghua Gu</i>	
A Model-Driven Approach for Dependable Software Systems .....	100
<i>Michael Jiang and Zhihui Yang</i>	

## Session 3A: Software Testing 3

Nondeterministic Testing with Linear Model-Checker Counterexamples.....	107
<i>Gordon Fraser and Franz Wotawa</i>	
Detecting Double Faults on Term and Literal in Boolean Expressions .....	117
<i>M. F. Lau, Y. Liu, and Y. T. Yu</i>	
Alternative $\beta$ -Sequences .....	127
<i>Lihua Duan and Jessica Chen</i>	

## Session 3B: Embedded Systems

A Resource Scheduling Design Method with Model Checking for Distributed Embedded Software.....	137
<i>Masahiko Watanabe, Akira Fukuda, Michihiro Matsumoto, Hirokazu Yatsu, Ichiro Hosotani, and Shigeyuki Kido</i>	
OPTIMA: An Ontology-Based Platform-specific software Migration Approach.....	143
<i>Hong Zhou, Jian Kang, Feng Chen, and Hongji Yang</i>	
A Certified Infinite Norm for the Implementation of Elementary Functions.....	153
<i>Sylvain Chevillard and Christoph Lauter</i>	

## Session 4A: Component-Based Systems

A Reinforcement-Learning Approach to Failure-Detection Scheduling.....	161
<i>Fancong Zeng</i>	
Coping with API Evolution for Running, Mission-Critical Applications Using Virtual Execution Environment .....	171
<i>Bashar Gharaibeh, Tien N. Nguyen, and J. Morris Chang</i>	

Synthesizing Component-Based WSN Applications via Automatic Combination of Code Optimization Techniques .....	181
<i>Zhenyu Zhang, W. K. Chan, and T. H. Tse</i>	

## Session 4B: Software Quality

Metrics and Evolution in Open Source Software.....	191
<i>Young Lee, Jeong Yang, and Kai H. Chang</i>	
Failure Analysis of Open Source J2EE Application Servers .....	198
<i>Junguo Li, Gang Huang, Jian Zou, and Hong Mei</i>	
Automatic Quality Assessment of SRS Text by Means of a Decision-Tree-Based Text Classifier .....	209
<i>Ishrar Hussain, Olga Ormandjieva, and Leila Kosseim</i>	

## Short Papers

### Session 1C: Short Papers—Software Quality and Reliability

Quality Assurance in Web Information Systems Development.....	219
<i>Klaus-Dieter Schewe, Jane Zhao, and Bernhard Thalheim</i>	
AOP Based Trustable SLA Compliance Monitoring for Web Services .....	225
<i>Congwu Chen, Lei Li, and Jun Wei</i>	
A Multivariate Analysis of Static Code Attributes for Defect Prediction.....	231
<i>Burak Turhan and Ayşe Bener</i>	
Refinement of a Tool to Assess the Data Quality in Web Portals .....	238
<i>Angélica Caro, Coral Calero, Juan Enriquez de Salamanca, and Mario Piattini</i>	
Formal Embedded Operating System Model Based on Resource-Based Design Framework.....	244
<i>Jin-Hyun Kim, Jae-Hwan Sim, Chang-Jin Kim, and Jin-Young Choi</i>	
Systematic Development of Quality Aware Decentralised Service-Oriented Systems.....	250
<i>Lipo Chan and Shanika Karunasekera</i>	

### Session 2B: Short Papers—Software Testing 2

An Automated Approach to System Testing Based on Scenarios and Operations Contracts .....	256
<i>Najla Raza, Aamer Nadeem, and Muhammad Zohaib Z. Iqbal</i>	
Architectural Test Coverage for Component-Based Integration Testing.....	262
<i>Nor Laily Hashim, Sita Ramakrishnan, and Heinz W. Schmidt</i>	
An Approach to Integration Testing of Object-Oriented Programs .....	268
<i>Zhe (Jessie) Li and Tom Maibaum</i>	
Distribution Metric Driven Adaptive Random Testing.....	274
<i>Tsong Yueh Chen, Fei-Ching Kuo, and Huai Liu</i>	
Uniform Selection of Feasible Paths as a Stochastic Constraint Problem .....	280
<i>Matthieu Petit and Arnaud Gottlieb</i>	
White Box Pairwise Test Case Generation .....	286
<i>Jangbok Kim, Kyunghye Choi, Daniel M. Hoffman, and Gihyun Jung</i>	
An Effective Iterative Metamorphic Testing Algorithm Based on Program Path Analysis.....	292
<i>Guowei Dong, Changhai Nie, Baowen Xu, and Lulu Wang</i>	

## Session 2C: Short Papers— Software Architecture and Components

Towards a Software Component Certification Framework .....	298
<i>Alexandre Alvaro, Eduardo Santana de Almeida, and Silvio Lemos Meira</i>	
Reduction of Complexity and Automation of Parallel Execution through Loop Level Parallelism .....	304
<i>Robert A. Tefft and Roger Y. Lee</i>	
An Incremental and FCA-Based Ontology Construction Method for Semantics-Based Component Retrieval.....	309
<i>Xin Peng and Wenyun Zhao</i>	
Trustworthiness Evaluation and Testing of Open Source Components .....	316
<i>Anne Immonen and Marko Palviainen</i>	
Testability and Test Framework for Collaborative Real-Time Editing Tools .....	322
<i>Lian Yu, Lifeng Xu, Guanzhu Wang, Changyan Chi, Wenping Xiao, and Hui Su</i>	
Cohesion Metrics for Predicting Maintainability of Service-Oriented Software .....	328
<i>Mikhail Perepletchikov, Caspar Ryan, and Keith Frampton</i>	

## Session 5: Short Papers— Systems Modeling, Model Construction and Checking

On the Collaborative Development of Para-Consistent Conceptual Models .....	336
<i>Ebrahim Bagheri and Ali A. Ghorbani</i>	
Increasing Software Effort Estimation Accuracy—Using Experience Data, Estimation Models and Checklists.....	342
<i>Kristian Marius Furulund and Kjetil Moløkken-Østvold</i>	
A Denotational Semantic Model for Validating JVM/CLDC Optimizations under Isabelle/HOL .....	348
<i>Hamdi Yahyaoui, Mourad Debbabi, and Nadia Tawbi</i>	
Verifying UML Diagrams with Model Checking: A Rewriting Logic Based Approach.....	356
<i>Farid Mokhati, Patrice Gagnon, and Mourad Badri</i>	
Verifying Noninterference in a Cyber-Physical System—The Advanced Electric Power Grid .....	363
<i>Yan Sun, Bruce McMillin, Xiaoqing (Frank) Liu, and David Cape</i>	

## First International Workshop on Software Test Evaluation (STEV 2007)

Message of the Program Chairs of STEV'07 .....	370
<i>Johannes Mayer and Sami Beydeda</i>	

### Workshop Papers

Learning Effective Oracle Comparator Combinations for Web Applications .....	372
<i>Sara Sprenkle, Emily Hill, and Lori Pollock</i>	
Testing against Natural Language Requirements .....	380
<i>Harry M. Sneed</i>	

Test-Based Specifications of Components and Systems.....	388
<i>Dick Hamlet</i>	
A Scriptable, Statistical Oracle for a Metadata Extraction System.....	396
<i>Kurt J. Maly, Steven J. Zeil, Mohammad Zubair, Ashraf Amrou, Ali Aazhar, and Naveen Ratkal</i>	
Statistical Metamorphic Testing—Testing Programs with Random Output by Means of Statistical Hypothesis Tests and Metamorphic Testing .....	404
<i>Ralph Guderlei and Johannes Mayer</i>	
Abstraction in Assertion-Based Test Oracles .....	410
<i>Yoonsik Cheon</i>	
<b>Workshop Position Paper</b>	
The Oracle Problem for Testing against Quantified Properties .....	415
<i>Patricia D. L. Machado and Wilkerson L. Andrade</i>	
<b>Author Index</b> .....	419