

Proceedings

14th IEEE International Conference on Program Comprehension (ICPC 2006)

14–16 June 2006
Athens, Greece

Sponsored by

The IEEE Computer Society

In Collaboration with

The Reengineering Forum

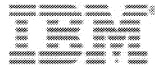


Supported by

IBM Corporation

The University of Waterloo

RCOST–University of Sannio



Los Alamitos, California

Washington • Tokyo

Copyright © 2006 by The Institute of Electrical and Electronics Engineers, Inc.
All rights reserved.

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries may photocopy beyond the limits of US copyright law, for private use of patrons, those articles in this volume that carry a code at the bottom of the first page, provided that the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

Other copying, reprint, or republication requests should be addressed to: IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, P.O. Box 133, Piscataway, NJ 08855-1331.

The papers in this book comprise the proceedings of the meeting mentioned on the cover and title page. They reflect the authors' opinions and, in the interests of timely dissemination, are published as presented and without change. Their inclusion in this publication does not necessarily constitute endorsement by the editors, the IEEE Computer Society, or the Institute of Electrical and Electronics Engineers, Inc.

IEEE Computer Society Order Number P2601
ISBN-13: 978-0-7695-2601-0
ISBN-10: 0-7695-2601-2
Library of Congress Control Number 2006924255

Additional copies may be ordered from:

IEEE Computer Society
Customer Service Center
10662 Los Vaqueros Circle
P.O. Box 3014
Los Alamitos, CA 90720-1314
Tel: + 1 800 272 6657
Fax: + 1 714 821 4641
<http://computer.org/cspress>
csbooks@computer.org

IEEE Service Center
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
Tel: + 1 732 981 0060
Fax: + 1 732 981 9667
[http://shop.ieee.org/store/
customer-service@ieee.org](http://shop.ieee.org/store/customer-service@ieee.org)

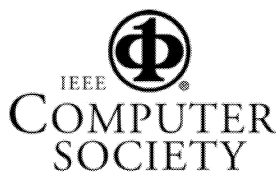
IEEE Computer Society
Asia/Pacific Office
Watanabe Bldg., 1-4-2
Minami-Aoyama
Minato-ku, Tokyo 107-0062
JAPAN
Tel: + 81 3 3408 3118
Fax: + 81 3 3408 3553
tokyo.ofc@computer.org

Individual paper REPRINTS may be ordered at: reprints@computer.org

Editorial production by Randall S. Bilof

Cover art production by Joe Daigle/Studio Productions

Printed in the United States of America by The Printing House



IEEE Computer Society
Conference Publishing Services
<http://www.computer.org/proceedings/>

Contents

Proceedings of 14th International Conference on Program Comprehension

ICPC 2006

Message from the General and Program Co-Chairs	viii–ix
Organizing Committee	x
Program Committee	xi
Steering Committee	xii
Keynote Address	
<i>Robert S. Autor</i>	xiii
<i>Scott Tilley</i>	xiv

Technical Session 1: Experimental Studies

What's in a Name? A Study of Identifiers	3
<i>Dawn Lawrie, Christopher Morrell, Henry Feild, and David Binkley</i>	
Building Usage Contexts during Program Comprehension	13
<i>Chris Parnin and Carsten Görg</i>	
Digging the Development Dust for Refactorings.....	23
<i>Curtis Schofield, Brendan Tansey, Zhenchang Xing, and Eleni Stroulia</i>	

Technical Session 2: Evolution

Classifying Change Types for Qualifying Change Couplings	35
<i>Beat Fluri and Harald C. Gall</i>	
Studying the Evolution of Software Systems Using Change Clusters.....	46
<i>Jay Kothari, Trip Denton, Ali Shokoufandeh, Spiros Mancoridis, and Ahmed E. Hassan</i>	
How Developers Copy	56
<i>Mihai Balint, Tudor Gîrba, and Radu Marinescu</i>	

Technical Session 3: Short Papers

A Synergistic Approach to Program Comprehension	69
<i>Bradley L. Vinz and Letha H. Etzkorn</i>	
How Webmining and Coupling Metrics Improve Early Program Comprehension	74
<i>Andy Zaidman, Bart Du Bois, and Serge Demeyer</i>	
Programs Are Knowledge Bases	79
<i>Daniel Ratiu and Florian Deissenboeck</i>	
Dynamic Analysis of Software Systems Using Execution Pattern Mining	84
<i>Hossein Safyallah and Kamran Sartipi</i>	

Layered Program Auralization: Using Music to Increase Runtime Program Comprehension and Debugging Effectiveness	89
<i>Andreas Stefik, Kelly Fitz, and Roger Alexander</i>	
Integrating Reverse Engineering Tools Using a Service-Sharing Methodology	94
<i>Dean Jin and James R. Cordy</i>	
An Architecture to Support Model Driven Software Visualization	100
<i>R. Ian Bull, Margaret-Anne Storey, Jean-Marie Favre, and Marin Litoiu</i>	

Technical Session 4: Static Analysis

Using Abstraction-Driven Slicing for Postmortem Analysis of Software	107
<i>Raoul Jetley, Yi Zhang, and S. Purushothaman Iyer</i>	
Automated Extraction of Database Interactions in Web Applications.....	117
<i>Minh Ngoc Ngo, Hee Beng Kuan Tan, and Doanh Trinh</i>	
An Approach for Extracting Workflows from E-Commerce Applications.....	127
<i>Ying Zou and Maokeng Hung</i>	
Combining Probabilistic Ranking and Latent Semantic Indexing for Feature Identification	137
<i>Denys Poshyvanyk, Yann-Gaël Guéhéneuc, Andrian Marcus, Giuliano Antoniol, and Václav Rajlich</i>	

Technical Session 5: Quality Assessment

Leveraged Quality Assessment Using Information Retrieval Techniques.....	149
<i>Dawn J. Lawrie, Henry Feild, and David Binkley</i>	
A Metric-Based Heuristic Framework to Detect Object-Oriented Design Flaws	159
<i>Mazeiar Salehie, Shimin Li, and Ladan Tahvildari</i>	
Identification of Design Roles for the Assessment of Design Quality in Enterprise Applications	169
<i>Cristina Marinescu</i>	

Technical Session 6: Dynamic Analysis

Summarizing the Content of Large Traces to Facilitate the Understanding of the Behaviour of a Software System	181
<i>Abdelwahab Hamou-Lhadj and Timothy Lethbridge</i>	
Dynamic Data Structure Analysis for Java Programs.....	191
<i>Sokhom Pheng and Clark Verbrugge</i>	
An Approach to High-Level Behavioral Program Documentation Allowing Lightweight Verification	202
<i>Coen De Roover, Isabel Michiels, Kim Gybels, Kris Gybels, and Theo D'Hondt</i>	
Profile-Based Approach to Support Comprehension of Software Behavior.....	212
<i>Johannes Koskinen, Markus Kettunen, and Tarja Systä</i>	

Working Session 1 (Parallel)

The Sound of Software: Using Sonification to Aid Comprehension	225
<i>Lewis Berman, Sebastian Danicic, Keith Gallagher, and Nicolas Gold</i>	

Working Session 2 (Parallel)

Experimental Settings in Program Comprehension: Challenges and Open Issues	229
<i>Giuseppe A. Di Lucca and Massimiliano Di Penta</i>	

Working Session 3 (Parallel)

Working Session: Program Comprehension and Migration Strategies for Web Service and Service-Oriented Architectures.....	235
<i>Dennis Smith, Liam O'Brien, and Kostas Kontogiannis</i>	

Tool Demonstrations

The Cognitive Assignment Eclipse Plug-In.....	241
<i>Brendan Cleary and Chris Exton</i>	
INFORM: A Framework for Performance Informed Software Development	245
<i>Aiden Grandfield and Chris Exton</i>	
Evolution Storyboards: Visualization of Software Structure Dynamics.....	248
<i>Dirk Beyer and Ahmed E. Hassan</i>	
JIRiSS—An Eclipse Plug-In for Source Code Exploration	252
<i>Denys Poshyvanyk, Andrian Marcus, and Yubo Dong</i>	
Alborz: An Interactive Toolkit to Extract Static and Dynamic Views of a Software System	256
<i>Kamran Sartipi, Lingdong Ye, and Hossein Safyallah</i>	
Fluid Source Code Views	260
<i>Michael Desmond, Margaret-Anne Storey, and Chris Exton</i>	
JComp: A Reuse-Driven Componentization Framework for Java Applications	264
<i>Shimin Li and Ladan Tahvildari</i>	
Understanding Obfuscated Code	268
<i>Matias Madou, Ludo Van Put, and Koen De Bosschere</i>	

Technical Session 7: Cognitive Approaches

A Context-Aware Analysis Schema for Bloom's Taxonomy	275
<i>Tara Kelly and Jim Buckley</i>	
Towards a Client Driven Characterization of Class Hierarchies	285
<i>Petru Florin Mihancea</i>	
Reverse Engineering Scripting Language Extensions	295
<i>Daniel L. Moise, Kenny Wong, H. James Hoover, and Daqing Hou</i>	

Technical Session 8: Traceability and Languages

Can Information Retrieval Techniques Effectively Support Traceability Link Recovery?	307
<i>Andrea De Lucia, Fausto Fasano, Rocco Oliveto, and Genoveffa Tortora</i>	
Improving Comprehensibility of Source Code via Traceability Information: A Controlled Experiment.....	317
<i>Andrea De Lucia, Massimiliano Di Penta, Rocco Oliveto, and Francesco Zurolo</i>	
Programmer-Friendly Decompiled Java	327
<i>Nomair A. Naeem and Laurie Hendren</i>	
Author Index	337