Proceedings

Seventh Asia–Pacific Software Engineering Conference

APSEC 2000

5–8 December 2000
Singapore

Sponsored by
National University of Singapore
Knowledge Engineering Pte Ltd
Rational Software Inc.
Fujitsu Singapore Pte. Ltd.
Taknet Systems Pte Ltd
Lee Foundation

In cooperation with
IEEE Technical Council on Software Engineering
IEEE Computer Society

IEEE COMPUTER SOCIETY

Los Alamitos, California
Washington • Brussels • Tokyo
# Table of Contents

Seventh Asia-Pacific Software Engineering Conference  
APSEC 2000

Message from the Conference Chair ................................................................. x
Message from the Program Chairs ..................................................................... xi
Conference Committee ........................................................................................ xii
Program Committee ................................................................................................ xiii
Steering Committee ............................................................................................ xiv
Additional Reviewers ........................................................................................... xiv

## Tutorials

- Advanced OO Modeling: Metamodels and Notations ........................................ 2
  *Brian Henderson-Sellers*
- Beyond RUP ...................................................................................................... 3
  *Brian Henderson-Sellers*

## Workshops

- Two-Stage Derivation of System Architectures  
  *Fergus O'Brien (chair)*
- The Future of Software Engineering  
  *Paul Layzell (chair)*

## Keynote I

- Survivability Analysis of Networked Systems .................................................. 6  
  *Jeannette M. Wing*

## Session 1A: Real-Time

- Co-development of Real-Time Systems and Their Environments .................. 8  
  *K. Kang, J. Lee, and H. Kim*
- Reasoning about Real-Time Programs Using Idle-Invariant Assertions .......... 16  
  *I. Hayes*
- Pareto-Based Soft Real-Time Task Scheduling in Multiprocessor Systems ....... 24  
  *J. Oh, H. Bahn, C. Wu, and K. Koh*

## Session 1B: Software Engineering: Education & Practice I

- Transatlantic Project Courses in a University Environment ......................... 30  
  *B. Bruegge, A. Dutto, R. Kobylinski, and G. Teubner*
- Supporting Collaboration in Distributed Software Engineering Teams .......... 38  
  *P. Layzell, O. Brereton, and A. French*
- Bloodshot Eyes: Workload Issues in Computer Science Project Courses ......... 46  
  *J. Brown*
Session 2A: Formal Methods I

The LAST Project: Development of a Formal Method for IS-Specification and of a CASE-Tool for IS-Design

J. Jiménez and L. Jiménez

A Process Logic for Distributed System Synthesis

Y. Isobe and K. Ohmaki

Unifying Theories of Healthiness Condition

H. Jifeng and C. Hoare

Session 2B: Software Reliability

Verification of a Wireless ATM Medium-Access Protocol

N. Sidorova and M. Steffen

Monitoring Facilities in Languages Supporting Development of Concurrent Self-Measurement Programs

Y. Nonaka, K. Ushijima, and J. Cheng

Evaluation of Inspectors' Defect Estimation Accuracy for a Requirements Document after Individual Inspection

S. Biffl, T. Grechenig, and M. Köhle

Session 3A: Analysis/Design I

The Concept of Path-Closed Subsets and Its Use in Software Functional Design

S. Kundu

Pragmatic Data Modeling and Design for End Users

C. Churcher, T. McLennan, and A. McKinnon

Requirements Engineering and Strategic Decision Exploration: An Area for Interdisciplinary Research

N. Mehandjiev and C. Gaskell

Keynote II

Building Formal Models for Software Requirements

A. van Lamsweerde

Session 4A: Testing/Verification

Analysis of the Impact of Reading Technique and Inspector Capability on Individual Inspection Performance

S. Biffl

Deriving Test Cases Using Class Vectors

K. Leung and W. Wong

Checking Compositions of UML Sequence Diagrams for Timing Inconsistency

X. Li and J. Lilius

Consistency Checks for UML

P. Krishnan

Session 4B: Component Based Development

The Support Tool for Highly Reliable Component-Based Software Development

M. Matsumoto and K. Futatsugi
Formal Specification of Catalysis Frameworks ................................................................. 180
   J. Filipe, K.-K. Lau, M. Ornaghi, K. Taguchi, H. Yatsu, and A. Wills
A Distributed Component Architecture for a Large Telecommunication Application .......... 188
   H. Hermansson, M. Johansson, and L. Lundberg
Accessing Software Component Documentation during Design:
   An Observational Study ................................................................................................. 196
   A. Pohthong and D. Budgen

Session 4C: Requirements Engineering
A Framework of Requirements Tracing Using UML ........................................................... 206
   T. Tsumaki and Y. Morisawa
Service-Based Software: The Future for Flexible Software .................................................. 214
   K. Bennett, P. Layzell, D. Budgen, P. Brereton, L. Macaulay, and M. Munro
Translating Descriptions of a Viewpoint among Different Representations ...................... 222
   N. Stanger
Fuzzy Concepts and Formal Methods: Some Illustrative Examples .................................. 230
   C. Matthews and P. Swatman

Session 5A: UML/Object-Z/ZZ
An Integrated Framework with UML and Object-Z for Developing a
   Precise Specification: The Light Control Case Study ...................................................... 240
   S.-K. Kim and D. Carrington
A Semantic Model of a Small Typed Functional Language Using Object-Z ...................... 249
   W. Tan
μ-charts and Z: Examples and Extensions ........................................................................ 258
   G. Reeve and S. Reeves

Session 5B: Software Maintenance
Fusing Ambiguous Domain Knowledge Slices in a Reverse Engineering Process ................ 266
   Y. Li, H. Yang, and W. Chu
A Formal Approach to Program Modification ..................................................................... 274
   L. Groves
A Comparative Evaluation of Techniques for Syntactic Level Source Code Analysis ........... 282
   A. Cox and C. Clarke

Session 5C: Architecture Framework I
A Case Study of Horizontal Reuse in a Project-Driven Organization ................................. 292
   H. Christensen and H. Ron
PMF/GRIP: A Framework for the Development and Implementation of Reuse Models ......... 299
   V. Schroeter
An Adaptive Distributed Workflow System Framework ...................................................... 311
   M. Purvis, M. Purvis, and S. Lemalu

Session 6A: Analysis/Design II
Goal Based Agent-Oriented Software Modeling .................................................................. 320
   K. Park, J. Kim, and S. Park
### Issues in Object Orienting the ST Microelectronics Manufacturing Model

V. Carchiolo, S. D'Ambr, A. Longheu, and M. Malgeri

---

### Extending Statecharts with \textit{ad lib} and Multi-Thread Features

K. Leung

---

## Session 6B: Architecture Framework II

### Enterprise Modeling Using Class and Instance Models

R. Agarwal, G. Bruno, and M. Torchiano

---

### CIMO — Component Integration Model

Y. Xia, A. Ho, and Y. Zhang

---

### Component-Based Application Development on Architecture of a Model, UI and Components

T. Chusho, H. Ishigure, N. Konda, and T. Iwata

---

## Session 6C: Component Based Development

### Tailoring Test Process by Using the Component-Based Development Paradigm and the XML Technology

J. Seo and B. Choi

### Reusable Integrated Components of Inter-related Patterns for Software Development

D. Ram and M. Sreekan

### Component-Based Software Engineering: Technologies, Development Frameworks, and Quality Assurance

X. Cai, M. Lyu, K.-F. Wong, and R. Ko

---

## Keynote III

### Experiences in Systems Evolution: Practical Aspects and Cautionary Tales

G. Hoffnagle

---

## Session 7A: Software Engineering: Education & Practice II

### Selecting an Object-Oriented Process for Student Analysts

G. Costain

### An Education Support System of Information System Design and Implementation and Lessons Learned from Its Application

A. Hazeyama, K. Osada, Y. Miyadera, and S. Yokoyama

### Implementation of a Software Engineering Course for Computer Science Students

I. Crnkovic, M. Larsson, and F. Luders

### A Preliminary Comparison of Computer Mediated Training Tools

J. Paynter, J. Ong, and L. Frazer

---

## Session 7B: Formal Methods II

### Behavioral Specification of GOF Design Patterns with LOTOS

M. Saeki

### Combining Case-Based and Model-Based Reasoning: A Formal Specification

L. Shuguang, J. Qing, and C. George

### A GUI and Testing Tool for SOFL

S. Liu, T. Fukuzaki, and K. Miyamoto
Session 8A: Software Process

Third Generation OO Processes: A Critique of RUP and OPEN from a Project Management Perspective ................................................................. 428
   B. Henderson-Sellers, R. Dué, I. Graham, and G. Collins
Creating a Process for Transitioning to Object Technology ................................................................. 436
   B. Henderson-Sellers and M. Serour
A Framework for Risk Analysis in Software Engineering ................................................................. 441
   G. Roy and T. Woodings

Session 8B: Software Metrics

Virtual Worlds for Web Site Visualization ......................................................................................... 448
   D. Hartley, N. Churcher, and G. Albertson
Predicting Class Libraries Interface Evolution: An Investigation into Machine Learning Approaches ................................................................. 456
   H. Sahraoui, A. Boukadoum, H. Lounis, and F. Etheve
Coherence Equals Cohesion — Or Does It? ......................................................................................... 465
   V. Mišić

Session 9A: Distributed Systems

Visualizing the Influence of Data Structure Choice on the Performance of a Distributed System ......................................................................................... 472
   C. Churcher, A. McKinnon, and R. Jarquin
Platforms for Agent-Oriented Software Engineering ......................................................................... 480
   M. Nowostawski, G. Bush, M. Purvis, and S. Cranefield
A Study on Static Analysis in Network of Synchronizing FSMs ................................................................. 489
   J. Chen

Author Index ........................................................................................................................................ 494