Report of Fifth International Workshop on Principles of Software Evolution (IWPSE2002)

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Abstract

The IWPSE2002 is the fifth workshop in the series that started with IWPSE'98, held in conjunction with 20th International Conference on Software Engineering (ICSE98) in Kyoto, Japan. Since then, the workshops have been held annually. IWPSE'99 was held in Fukuoka, ISPSE2000 (the International Symposium on Principles of Software Evolution) in Kanazawa, Japan, and IWPSE 2001 in Vienna, Austria in conjunction with ESEC/FSE2001.

The workshops focus on various topics of software evolution, such as the theory of software evolution, architecture for evolution, evolution of software process, metrics and evaluation of evolution, configuration and change management for evolution, experience and lessons learned from evolutional software systems, and so on.

This year's workshop, IWPSE2002 was held in conjunction with the International Conference on Software Engineering 2002 (ICSE2002) in Orlando, Florida, from May 19th to 20th, 2002.

By drawing 51 attendees from 10 countries, the IWPSE 2002 is considered the biggest workshop collocated with ICSE2002

The program of the two-day workshop is found in the Appendix.

We had eight technical sessions, including one keynote session, two full-paper sessions, four short-paper sessions, and one closing session. Out of 12 submissions, six full papers were accepted. Each paper was reviewed by at least three reviewers.

The proceedings of the IWPSE was published by the ACM Press at the time of workshop [1]. Presentations at the workshop are available on the IWPSE2002 website [2].

Keynote

In his keynote, Professor Tetsuo Tamai proposed a new model for collaboration and interaction called Epsilon. In the model, objects evolve by participating in collaboration fields. Each collaboration field represents a concern so that separation of concerns is explicitly supported. The collaboration fields include roles, and can act as reusable units.

A programming language, also called Epsilon, was designed to support this model. The collaboration fields are named contexts, and are declared with attributes and methods. Instances of contexts and roles are created dynamically.

A preliminary version of Epsilon compiler has been implemented in ABCL, a reflective concurrent OO language. In addition, EpsilonJ, an Epsilon-like language with Java-like syntax, is being designed.

Many issues were discussed in response to the audience questions, such as scalability issues, perturbation, role restrictions, and execution in Java.

Full Papers

The first presentation of the first full paper session presented refactoring C programs with preprocessor directives. The preprocessor directives complicate refactoring since they are not part of C code and may violate an otherwise correct refactoring. This presentation proposed a new refactoring method for macro definitions and conditionals.

The second paper discussed implicit coding rules. Implicit coding rules are a major cause for faults in legacy software. This paper proposed a method for detecting code fragments that violate implicit coding rules.

The bug code patterns are described in a pattern description language, and potential faulty code fragments are extracted.

The third presentation discussed dependency between classes. The designer of software extensions may be unaware of the dependencies among class features, which should be taken into account when a class is evolved. Such dependencies are documented using C# attributes.

In the second full-paper session, various evolution patterns and models were presented. The first paper investigated open source software development models. The authors found three different collaborative development models, namely Exploration-Oriented, Utility-Oriented, and Service-Oriented. Such classification provides guidance on the creation and maintenance of sustainable open-source software development and communities.

The second presentation presented a tool called SA3 that helps develop semi-automatically adaptable architectures. The current version of the tool is used in developing architectures for embedded systems.

The third paper evaluated the applicability of prediction models using two software systems in two experiments. The results show that effective models can be constructed by focusing on common predictors.

Short Papers

Twenty short papers were presented in four sessions. The sessions were named System and Practical Issues, Middleware Issues, Analysis Issues, and Conceptual Issues. The papers deal with various topics of software evolution, such as adaptive hypermedia system, program transformation, evolution model, mobile code, component-based system evolution, library evolution, change impact, origin analysis, evolution process, separation of concerns, and computational scrapbook. The details can be found in the proceedings.

Discussions and Future Research Topics

Throughout the presentations and discussions, the following issues were of greatest interest to the attendees:

- What is the impact of separation of concerns, including aspect oriented, subject oriented, and similar approaches.
- Concerns over scalability of various evolution techniques.
- As software evolves, the software development community will evolve too.
- The intriguing similarity and difference between two key terms, adaptation and evolution
- The distinction between continuous and discontinuous evolution.
- Measures to quantify evolution are essential.

Conclusion

The IWPSE 2002 was considered very successful. Many attendees indicated that they enjoyed the presentations and discussions until the final session, and they found inspiration on the future software engineering research and practice.

The next IWPSE, IWPSE2003, is planned to be held in Helsinki, Finland, in conjunction with ESEC/FSE 2003, in September 2003.

References

[1] Mikio Aoyama, Katsuro Inoue, and Vaclav Rajlich, Proceedings of the Fifth International Workshop on Principles of Software Evolution (IWPSE2002), ACM Press, ISBN 1-58113-545-9, Orlando, Florida. USA, May 2002.

[2] IWPSE 2002, http://iwpse2002.ics.es.osaka-u.ac.jp/.

Appendix: IWPSE2002 Final Program

Sunday, May 19, 2002

09:00 - 09:15 Opening

09:15 - 10:30 Keynote

(Chair: Katsuro Inoue, Osaka University, Japan)

- Evolvable Programming Based on Collaboration-Field and Role Model
  Tetsuo Tamai (University of Tokyo, Japan)

10:30 - 11:00 Break

11:00 - 12:30 Session 1 (Full Technical Papers): Evolution in Source Code

- Challenges of Refactoring C Programs (Chair: Takako Nakatani, SLagoon, Japan)
  Alejandra Garrido and Ralph Johnson (University of Illinois at Urbana-Champaign, USA)
- A Method for Detecting Faulty Code Violating Implicit Coding Rules
  Tomoko Matsumura, Akito Monden and Ken-ichi Matsumoto (NAIST, Japan)
- Fostering Component Evolution with C# Attributes
  Carlo Ghezzi and Mattia Monga (Politecnico di Milano, Itary)

12:30 - 14:00 Lunch

14:00 - 15:30 Session 2 (Short Papers): System and Practical Issues

(Chair: Hausi Muller, University of Waterloo, Canada)

- Collaboration-Based Evolvable Software Implementations: Java and Hyper/J vs. CTemplates Composition
  Nguyen Truong Thang and Takuya Katayama (JAIST, Japan)
- Evolution in Adaptive Hypermedia Systems
  Nuria Medina-Medina (Granada University, Spain), Lina Garcia-Cabrera (Jaen University, Spain), J. Jesus Torres-Carbonell (Ministerio de Ciencia y Tecnologia., Spain) and Jose Parets-Llorca (Granada University, Spain)
- A Framework for Flexible Evolution in Distributed Heterogeneous Systems
  Eric Wohlstadter, Brian Toone and Prem Devanbu (University of California at Davis, USA)
- Evolving and Using Coordinated Systems
  M.Wermelinger (New University of Lisbon, Portugal), G.Koutsoukos (Oblog Software, Portugal), J.L.Fiadeiro (University of Lisbon, Portugal), L.Andrade (ATX Software, Portugal) and J.Gouveia (Oblog Software, Portugal)
- DMS: Program Transformations for Practical Scalable Software Evolution
  Ira D. Baxter (Semantic Designs, USA)

15:30 - 16:00 Break

16:00 - 17:30 Session 3 (Short Papers): Middleware Issues

(Chair: Kumiyo Nakakoji, University of Tokyo, Japan)

- A Verification of Class Structure Evolution Model and Its Parameters
  Mikio Ohki (Nippon Institute of Technology, Japan), Shinjiro Akiyama (JIP Engineering Service, Japan) and Yasushi Kambayashi (Nippon Institute of Technology, Japan)
- A Software Model for Flexible and Safe Adaptation of Mobile Code Programs
  Noriki Amano (JAIST, Japan) and Takuo Watanabe (Tokyo Institute of Technology, Japan)
- The Role of Dependencies in Component-Based Systems Evolution
  Marlon Vieira and Debra Richardson (University of California, Irvine, USA)
- Library Evolution for Reliable Software
  Noritoshi Atsumi, Shoji Yuen, Kiyoshi Agusa (Nagoya University, Japan) and Shinichirou Yamamoto (Aichi Prefectural University, Japan)
- Dynamic Component and Code Co-Evolution
  Markus Pizka (Technische Universitat Munchen, Germany)

Monday, May 20, 2002

09:00 - 10:30 Session 4 (Full Technical Papers): Evolution Patterns and Models

(Chair: Michael Godfrey, University of Waterloo, Canada)

- Evolution Patterns of Open-Source Software Systems and Communities
  Kumiyo Nakakoji, Yasuhiro Yamamoto (NAIST, Japan), Yoshiyuki Nishinaka, Kouichi Kishida (SRA Key Technology Laboratory, Japan) and Yunwen Ye (University of Colorado at Boulder, USA)

- Tool Support for Engineering Adaptability into Software Architecture
  Nary Subramanian (Anritsu, USA) and Lawrence Chung (University of Texas at Dallas, USA)
- Evaluating the Applicability of Reliability Prediction Models between Different Software
  Shin-ichi Sato (NTT DATA, Japan), Akito Monden and Kenichi Matsumoto (NAIST, Japan)

10:30 - 11:00 Break

11:00 - 12:30 Session 5 (Short Papers): Analysis Issues
(Chair: Carlo Ghezzi, Politecnico di Milano, Itary)

- Metrics and Analysis of Software Architecture Evolution with Discontinuity
  Mikio Aoyama (Nanzan University, Japan)
- Change Impact Analysis for Aspect-Oriented Software Evolution
  Jianjun Zhao (Fukuoka Institute of Technology, Japan)
- An Approach to Evolving Database Dependent Systems
  Mark Grechanik, Dewayne Perry and Don Batory (University of Texas at Austin, USA)
- Tracking Structural Evolution Using Origin Analysis
  Michael Godfrey and Qiang Tu (University of Waterloo, Canada)
- Analysis of Software Evolution Processes Using Statistical Distribution Models
  Tetsuo Tamai (University of Tokyo, Japan) and Takako Nakatani (SLagoon, Japan)

12:30 - 14:00 Lunch

14:00 - 15:30 Session 6 (Short Papers): Conceptual Issues
(Chair: Manny Lehman, Imperial College, UK)

- SOMA: A Paradigm to Evolve Software Based on Separation of Concerns
  Toshihiro Kamiya (Japan Science and Technology, Japan)
- Towards Consistency-Preserving Model Evolution
  Gregor Engels, Jochen M. Kuster, Reiko Heckel (University of Paderborn, Germany) and Luuk Groenewegen (Leiden University, Netherlands)
- Environmental Scenarios and Requirements Stability
  David Bush (UK National Air Traffic Services, UK) and Anthony Finkelstein (University College London, UK)
- Supporting Software Evolution with Intentional Software Views
  Kim Mens (Universite catholique de Louvain, Belgium), Tom Mens (Vrije Universiteit Brussel, Belgium) and Michel Wermelinger (Universidade Nova de Lisboa, Portugal)
- Computation Scrapbooks for Software Evolution
  Richard Potter (Japan Science and Technology, Japan) and Masami Hagiya (University of Tokyo, Japan)

15:30 - 16:00 Break

16:00 - 17:30 Closing Session
(Chair: Katsuro Inoue, Osaka University, Japan, David Notkin, University of Washington, USA)