

# Checking the consistency between ucm and psm using a graph-based method

Truong N.T., Tran T.M.T., To V.K., Nguyen V.H.

College of Technology, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Viet Nam

**Abstract:** Checking the consistency in component models at design phase is essential in component-based software engineering (CBSE). In our previous work, we proposed an approach for verifying automatically the matching between protocol state machines (PSMs) and the Use Case Map (UCM), using the B method. Due to the expressive power of B notations, however, we cannot describe the parallel processing in the implementation machine, particularly we are not able to express all features (such as AND-forks/joins, OR-forks/joins) of UCMs in a B implementation machine. In this work, we propose an approach to solve the expression problem of UCM features using a graph-based algorithm. The UCM path which describes the interaction between components is extracted and then decomposed into sequential events paths if it has AND-forks/joins and/or OR-forks/joins. Each of sequential events paths will be checked with the order of events of PSMs by the proposed algorithm. © 2009 IEEE.

**Index Keywords:** B method; Component model; Component-based software engineering; Design phase; Expression problem; Expressive power; Graph-based; Graph-based methods; Parallel processing; State machine; Use case maps; Algorithms; Model checking; Models; Object oriented programming; Semiconductor quantum dots; Sequential switching; Software engineering; Database systems

Year: 2009

Source title: Proceedings - 2009 1st Asian Conference on Intelligent Information and Database Systems, ACIIDS 2009

Art. No.: 5175991

Page : 190-195

Link: [Scopus Link](#)

Correspondence Address: Truong, N. T.; College of Technology, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Viet Nam; email: [thuantn@vnu.edu.vn](mailto:thuantn@vnu.edu.vn)

Conference name: 2009 1st Asian Conference on Intelligent Information and Database Systems, ACIIDS 2009

Conference date: 1 April 2009 through 3 April 2009

Conference location: Dong Hoi

Conference code: 78395

ISBN: 9.78E+12

DOI: 10.1109/ACIIDS.2009.66

Language of Original Document: English

Abbreviated Source Title: Proceedings - 2009 1st Asian Conference on Intelligent Information and Database Systems, ACIIDS 2009

Document Type: Conference Paper

Source: Scopus

Authors with affiliations:

- Truong, N.T., College of Technology, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Viet Nam
- Tran, T.M.T., College of Technology, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Viet Nam
- To, V.K., College of Technology, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Viet Nam
- Nguyen, V.H., College of Technology, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Viet Nam

References:

- JavaBeans 1.01 Specification, , <http://java.sun.com/beans>, Sun Microsystems
- <http://www.omg.org><http://www.usecasesmaps.org>/<http://www.w3c.org/XML/>, World Wide Web Consortium XMLAlfaro, L., Henzinger, T.A., Interface automata (2001) 9th Annual Symposium on Foundations of Software Engineering, , pages 109-120. ACM press
- Amyot, D., He, X., He, Y., Cho, D.Y., Generating scenarios from use case map specifications (2003) Third International Conference on Quality Software, p. 108
- Booch, G., Rumbaugh, J., Jacopson, I., (1998) The Unified Modeling Language User Guide, , Addison-Wesley
- Eddon, G., Eddon, H., (2000) Inside COM+ Base Services, , Microsoft Press
- Han, J., A comprehensive interface definition framework for software components (1998) Asia Pacific Software Engineering Conference, , pages 110-117. IEEE Computer Society
- Han, J., Temporal logic based specification of component interaction protocols (2000) Proceedings of the Second Workshop on Object Interoperability ECOOP'2000, , pages 12-16. Springer-Verlag
- Hatcliff, J., Cadena: An integrated development, analysis, and verification environment for component-based systems (2003) Proceedings of 25th International Conference on Software Engineering, , pages 160-172
- Mencl, V., Specifying component behavior with port state machines (2004) Electronic Notes in Theoretical Computer Science, 101C, pp. 129-153. , Special issue: Proceedings of the Workshop on the Compositional Verification of UML Models
- Migliore, M., Martorana, V., Sciortino, F., An algorithm to find all paths between two nodes in a graph (1990) J. Comput. Phys., 87 (1), pp. 231-236
- Truong, N., Tran, V., Nguyen, V., Consistency between UCM and PSMs in component models (2008) International Conference on Research, Innovation and Vision for the Future in Computing and Communication Technologies (RIVF), , pages 184-189