

Checking interface interaction protocols using aspect-oriented programming

Truong A.-H., Trinh T.-B., Van Hung D., Nguyen V.-H., Trang N.T.T., Pham D.H.
College of Technology, Vietnam National University, 144 Xuan Thuy, Hanoi; Hanoi University of
Technology, 1 Dai Co Viet, Hanoi

Abstract: We propose an approach based on aspect-oriented programming to specify and to verify interaction protocols in the component interfaces of Java programs. First, based on method patterns of AspectJ we introduce a simple protocol specification language that specifies temporal orders of operations of an interface. We then develop an algorithm that takes a protocol specification and produces aspect code that will check for protocol conformance of programs that use the interface at runtime. Finally, we propose several extensions that enable the integration of our approach with static techniques and allow checking protocols over multiple components. © 2008 IEEE.

Index Keywords: Aspect-oriented programmings; AspectJ; Component interfaces; Interaction protocols; Interface interactions; Multiple components; Protocol specifications; SIMPLE protocols; Static techniques; Temporal orders; Computer software; Flow interactions; Java programming language; Software engineering; Specifications; Formal methods

Year: 2008

Source title: Proceedings - 6th IEEE International Conference on Software Engineering and Formal Methods, SEFM 2008

Art. No.: 4685826

Page : 382-386

Cited by: 1

Link: [Scopus Link](#)

Correspondence Address: Truong, A.-H.; College of Technology, Vietnam National University, 144 Xuan Thuy, Hanoi

Sponsors: IEEE Computer Society;Int. Inst. Software Technology of the United Nations Univ.;Formal Methods Europe;University of Cape Town

Conference name: 6th IEEE International Conference on Software Engineering and Formal Methods, SEFM 2008

Conference date: 10 November 2008 through 14 November 2008

Conference location: Cape Town

Conference code: 74875

ISBN: 9.78E+12

DOI: 10.1109/SEFM.2008.32

Language of Original Document: English

Abbreviated Source Title: Proceedings - 6th IEEE International Conference on Software Engineering and Formal Methods, SEFM 2008

Document Type: Conference Paper

Source: Scopus

Authors with affiliations:

- Truong, A.-H., College of Technology, Vietnam National University, 144 Xuan Thuy, Hanoi
- Trinh, T.-B., College of Technology, Vietnam National University, 144 Xuan Thuy, Hanoi
- Van Hung, D., College of Technology, Vietnam National University, 144 Xuan Thuy, Hanoi
- Nguyen, V.-H., College of Technology, Vietnam National University, 144 Xuan Thuy, Hanoi
- Trang, N.T.T., Hanoi University of Technology, 1 Dai Co Viet, Hanoi
- Pham, D.H., Hanoi University of Technology, 1 Dai Co Viet, Hanoi

References:

- Allan, C., Avgustinov, P., Christensen, A.S., Hendren, L., Kuzins, S., Lhoták, O., de Moor, O., Tibble, J., Adding trace matching with free variables to AspectJ (2005) OOPSLA '05: Proc. of the 20th annual ACM SIGPLAN conference on Object oriented programming, systems, languages, and applications, pp. 345-364. , New York, NY, USA, ACM
- Chen, F., Roşu, G., Towards monitoring-oriented programming: A paradigm combining specification and implementation (2003) Workshop on Runtime Verification (RV'03), volume 89(2) of ENTCS, pp. 108-127
- Chen, F., Roşu, G., MOP: An Efficient and Generic Runtime Verification Framework (2007) Object-Oriented Programming, Systems, Languages and Applications(OOPSLA'07), pp. 569-588. , ACM press
- Cheon, Y., Perumandla, A., Specifying and checking method call sequences in JML (2005) Software Engineering Research and Practice, pp. 511-516. , H. R. Arabnia and H. Reza, editors, CSREA Press
- Cheon, Y., Perumandla, A., Specifying and checking method call sequences of Java programs (2007) Software Quality Control, 15 (1), pp. 7-25
- Clark, T., Evans, A., Foundations of the unified modeling language (1997) Proc. of the 2nd Northern Formal Methods Workshop, pp. 23-24. , Springer-Verlag
- DeLine, R., Fahndrich, M., (2004) The fugue protocol checker: Is your software baroque
- Y. Jin. Formal verification of protocol properties of sequential Java programs. In Proc. of the 31st Annual International Computer Software and Applications Conference, 1, pages 475-482, Washington, DC, USA, 2007. IEEE Computer Society
- Kiczales, G., Aspect-oriented programming (1996) ACM Comput. Surv, p. 154
- Kiczales, G., Hilsdale, E., Hugunin, J., Kersten, M., Palm, J., Griswold, W.G., An overview of AspectJ (2001) ECOOP '01: Proc. of the 15th European Conference on Object-Oriented Programming, pp. 327-353. , London, UK, Springer-Verlag
- Leavens, G., Poll, E., Clifton, C., Cheon, Y., Ruby, C., (2002) JML reference manual