Title of Project: Architecture Oriented Formal Approaches to High Quality Software Development

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Research Area: Informatics - Software
Keyword: Specification/Verification of specification, Software engineering, Software lifecycle

Purpose and Background of the Research
System faults of IT systems often cause serious problems in this modern society. The everyday life of the people is deeply dependent on a variety of IT systems widely connected through the Internet. The effects and damages by such faults sometimes propagate much more widely and rapidly than human understanding. Some of those faults arise from system errors while some are caused by human errors of the operators. Therefore, it has been highly and strongly required to realize reliable and dependable IT systems.

Formal methods for software and system development are regarded as promising approaches to realize reliable and dependable IT systems. However, at the actual development sites at IT companies (especially in Japan), formal methods are introduced in very limited cases even though company engineers and managers are interested in formal methods. We aim to propose effective and usable formal methods to cover the whole software lifecycle including operation and maintenance phases.

Research Methods
Under the collaboration between industry and academia, we propose practically effective formal approaches to model, analyze, verify, operate, and maintain complicated IT systems. We accumulate case studies of applying formal methods into conventional software development processes, and present as process models effective to real development projects. We also develop tools which embody our approaches and support system developers and users to realize high quality and dependable IT systems.

Our research topics include the following: (1) Proposal of effective formal techniques applicable to model and analyze complicated IT systems and case studies of their applications, (2) Reference models of software development processes based on formal methods, (3) Architecture oriented formal approaches to treat complicated systems of systems including environment and operation phases, and (4) Development of support tools.

Expected Research Achievements and Scientific Significance
We show practice and experience of architecture oriented formal methods applicable through the whole software lifecycle. E.g., (1) Engineering cases of software development projects to share and reuse, (2) Education and training materials and courses for high-quality and dependable IT systems, (3) Systematic software lifecycle model based on architecture orientation to realize high quality and dependable IT systems, and (4) Software process improvement through support tools which embody our research results.

Publications Relevant to the Project

Term of Project: FY2012-2016
Budget Allocation: 122,200 Thousand Yen
Homepage Address and Other Contact Information:
http://hyoka.ofc.kyushu-u.ac.jp/search/details/K000218/english.html