Scenario-driven Model Transformation in Reverse Engineering

Kamran Sartipi and Anis Yousefi

Department of Computing and Software
McMaster University
Hamilton, ON, L8S 4K1, Canada

Abstract

Most approaches to software reverse engineering focus on the empirical aspects of the recovery process. In these approaches, the proper level of abstraction for the software ingredients or architectural components are implicitly encoded within the analysis process. However, a rigorous reverse engineering approach should represent different software artifacts according to explicit domain models. Consequently, the reverse engineering process would be regarded as well-defined model transformations. Also, adding semantics to the reverse engineering process is crucial to produce meaningful components out of software system ingredients. In this paper, we first provide a model driven framework for reverse engineering process consisting of models for high-level and low-level processes, and describe the proper transformation techniques among them. The framework is driven by task scenarios that provide a common goal for the whole process. We present techniques and associated models for dynamic analysis of the software system as the means for providing semantics to both conceptual model of the software architecture and abstraction of its source code. We also present an approximate pattern matching process that acts as the main model transformation and gradually transforms the conceptual model to a concrete model. The proposed models and transformations are empirically presented using two case studies.