CHARLES UNIVERSITY PRAGUE

faculty of mathematics and physics

The Board of Doctoral Study
Faculty of Mathematics and Physics
Charles University Prague
Ke Karlovu 3
12116 Prague 2

Prague, August 20, 2012

Re: Michal Malohlava, Doctoral Thesis – Advisor‘s Reference

The submitted PhD thesis concentrates on addressing variability of component frameworks, in particular on addressing the variability of component execution environments. The thesis proposes the concept of a meta-component system, which is a product-line for creating new component frameworks (i.e. component model, tools and execution environment). Further, the thesis elaborates on the runtime environment part of the meta-component system. It proposes a dedicated model-driven method for creating configurable execution environments (called uSOFA). The method features a dedicated uSOFA component model, which allows for aspect-based extensions; thus facilitating addressing of non-functional features. The method separates platform independent architectural design from platform-dependent realization, thus it allows for greater flexibility and reusability in configuring a particular component execution environment.
Apart from the uSOFA method itself, the thesis focuses on model-driven generation of executable artifacts for use in the uSOFA method and on model interoperability. This part of the thesis is based on an article published in an international journal with IF. The whole solution presented in the thesis is based on thorough analysis, which comes from three non-trivial case studies (each published in a peer-reviewed paper on an international conference).

Going in detail, the thesis starts with an overview (in Chapter 2) of existing approaches to addressing variability (in particular in execution environments). This is followed by Chapter 3, which presents in detail three real-life case studies and uses them to demonstrate three major kinds of execution environments (i.e. ad-hoc, library, container). The general solution for addressing the variability (at all stages of the development lifecycle) is presented in Chapter 4, which introduces and explains the concept of a meta-component system. The part of the meta-component system that relates to execution environment is elaborated in the next chapter (Chapter 5), which proposes the uSOFA method along with defining meta-models for it. Chapter 6 deals with generation of code for uSOFA execution artifacts and with model interoperability, which is an inherent issue in model-driven code generation. In particular the code generation elaborated in Chapter 6 relies on three types of input models (each coming from a different stage of the development lifecycle). The results of the thesis are evaluated in Chapter 7 and concluded in Chapter 8.

The thesis is based on a number of peer-reviewed papers published at international conferences and in a journal with impact factor. In particular these include journal of Software: Practice and Experience (IF: 0.519), EUROMICRO SEAA 2011 (proceedings by IEEE CS), SAC 2009 (proceedings by ACM), and JTRES'10 (proceedings by ACM). The intermediate results of the thesis were applied in a number of projects, most importantly SOFA 2, jPapaBench, and Soleil (done during internship at INRIA, France).

In my view, Michal Malohlava proved the ability of performing high-quality research with internationally relevant results. This thesis only confirms this fact. Thus, I strongly recommend the thesis for defense and to grant the Doctor degree to Michal Malohlava.

RNDr. Tomáš Bureš, Ph.D.
Advisor