

Review of the Doctoral Thesis

Author of the thesis: **RNDr. Michal Malohlava**, *Department of Distributed and Dependable Systems, Faculty of Mathematics and Physics, Charles University in Prague*

Name of the thesis: ***Variability of Execution Environments for Component-based Systems***

Doctoral thesis of RNDr. Michal Malohlava introduces the meta-component software system – a SW product line which allows producing a specific component system based on a set of precisely defined requirements. The thesis has analyzed existing component systems and performed three case studies resulting into a definition of the meta-component system, its structure and the corresponding process of the preparation of a new component system.

In the first chapter (Introduction) the solved problem is described and thesis goals are stated. Chapter 2 contains a qualified overview of the state of the art.

The core of the thesis (Chapter 3 – 7) can be divided into two parts – the commented overview of selected published work of the author and a supplement of new (i.e. unpublished) work of the author.

The first part of the core (Chapter 3, Chapter 4 and Chapter 6) contains selected parts from four reviewed publications, the most important one was published in the scientific magazine *Software Practice and Experience*, April 2012. The two others were published in the proceedings of recognized international scientific conferences (37th Euromicro 2011, SAC09 - ACM Symposium of Applied Computing 2009). The fourth publication is from Junior Researcher Workshop on Real-time Computing 2008. It is necessary to say that author has published (as a member of team) 10 more contributions concerning the theme of SW components, mostly in the proceedings of significant international conferences. In all from the four listed cases the work was performed within a scientific collective and M. Malohlava is coauthor of the publication. From this fact follows the question which should be discussed during the defense:

- Is it possible to specify a relative part of research performed by M. Malohlava within the researchers collective in relation to single publications?

The second part of the thesis core (Chapter 5, Chapter 7) contains an original method of the author (i.e. the work was not done within the frame of a collective). The method is called μ SOFA and deals with model-driven development of an execution environment as the most important part of the meta-component system. In the Chapter 5 the μ SOFA method was described using UML-like notation common in SW engineering processes and/or procedures. In the Chapter 7 the utilization and usefulness of the developed method is demonstrated using three case studies of

execution environments formerly specified in the mentioned article for the SAC09 symposium. Here I have the following questions to be discussed during the defense:

- What is the reason for the μ SOFA name of the developed method? The connection with the former SOFA projects is not quite apparent and it could be explained during the defense.
- Which kind of publication has the author planned in order to spread his idea within the SW components researchers' community?
- A matter of development of specialized component-based execution framework is important especially for embedded computer systems, where some fail-safe or fault-tolerant properties can be required. Is it possible to cope with these properties (or a subset of them) as with NFRs (Non Functional Requirements) used in the μ SOFA method?
- The previous question could be taken as an instance of the more general one: Is it always possible to clearly separate NFRs from the components assembly at the input of the developed μ SOFA method? (Or some of NFRs needs to be incorporated a way into the assembly in advance?)

The last chapter (Chap. 8 Conclusion) contains author's evaluation of the thesis goals achieving and summarizes key benefits of the developed method based on the concept of meta-component system.

From the formal point of view the thesis is well written and well structured. The language is well readable and without mistakes. I have to appreciate the overall concept of the thesis, i.e. to use directly substantial parts of the text from key publications of the author and to join these parts together by means of explaining comments. The published parts of the text are clearly marked, so it is possible to distinguish these parts from the author's comments. New (i.e. up to now unpublished) parts of the thesis are separated in another chapters (Chap. 5 and Chap. 7) and the connection with published parts is clearly explained.

Conclusion

The doctoral thesis of M. Malohlava is in tight connection with long time research activity of the scientific team at the Department of Distributed and Dependable Systems. It brings new scientific knowledge in the area of component based software systems. The stated goals of the thesis have been fulfilled. It is necessary positively appreciate author's publication activity.

The author of the thesis proved to have an ability to perform research and to achieve scientific results. I do recommend the thesis for defense with the aim of receiving the Degree of Ph.D.

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Doc. Ing. Stanislav Racek, CSc.
Department of Computer Science Engineering
Faculty of Applied Sciences
Univerzitní 22, 30614 Plzeň