Review of a PhD Thesis

Jaroslav Gergič: Addressing On-Demand Assembly and Adaptation Using a Runtime Intentional Versioning Engine

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Overview

The presented PhD thesis of Jaroslav Gergič is concerned with the issues of run-time configuration of (modular, component-based) applications. The key specific area of interest is multi-modal applications which need to adapt to changing user-interface properties both for different users and possibly also within a user's session.

The author's approach is a pragmatic one – the main thesis proposal is a library API (the Versatile framework) which should be practically usable by regular developers, and which provides a consolidating layer over various standards and data sources describing device properties and variation points.

The research results related to this work were published in 4 international conference papers, and resulted in one Internet standard and several US patent applications. While this is unusual with a PhD candidate and highly commendable, most of these publications have multiple authors and candidate's contribution is therefore hard to judge. It can only be stated that the ideas contained in the papers are consistent with the thesis presented.

Key results and issues

The thesis starts with an introductory chapter, which briefly introduces the context of the work, i.e. the role of versioning, multi-modal applications and need for single authoring approach in their development. While the latter two areas are iterated over throughout the thesis, the interesting aspect of run-time versioning is mentioned only here and neglected in the rest of the work.

Second chapter mixes several motivation case studies and a survey of related work. The problem here is that the evaluation of the related work with respect to the thesis is placed rather out of order in the Conclusion, because the goals of the thesis are defined only in the subsequent chapter. Also, the areas of intentional versioning and feature logic, closely related to the thesis' subject of variant selection, were completely omitted from the research.

Chapter 3 briefly defines the goals of the thesis, based on the analysis provided in the previous chapter. In my opinion, the content of Section 2.4 should belong here as in its present place it partially distracts the reader.

Chapter 4 states the design constraints and implementation approaches for the framework proposed in the next chapter to achieve the goals. Its reasoning about the design options is sound and the resulting choice of implementing a new framework – rather than extending an existing approach – is well argumented.

The fifth chapter presents the core contribution of the author – the Versatile framework for representing and working with device or component properties in the context of adaptable multi-modal applications. Its design is based on author's experiences in the area, as well as some knowledge gained by the related work analysis, and provides I believe a sufficient – indeed versatile – tool for the goals it aims to address.

My primary concern is thus not with the framework itself but with the lack of fundamental concepts and models it is based on; or perhaps, with a lack of their presentation. The description organized around concepts represented by programming language interfaces emphasizes the engineering aspect of the framework, suppressing somehow the essential ideas and properties. I believe it should be easy to create a strong algebraical model of the framework (or at least an MOF-based model), which would serve better in discussing the otherwise well thought-out aspects like properties (p.67) and the scoring function (p.73+).

As a second issue, the design of the framework has not been validated by any means – analytical, case study examination, or working implementation. Such an effort would certainly uncover other uses of the idea neglected by the thesis, e.g. for runtime resource or performance adaptation in server-side applications or in product line settings.

The Conclusion summarizes and briefly evaluates the key achievements of the thesis. As mentioned above, section 6.3 should have been placed in the related work chapter.

Presentation and writing

Some structural issues of the text have been mentioned above. Apart from them, the text is readable and author's English is very good (except for occasional typos and unfinished sentences). At times, fewer words would suffice to convey the idea.

The biggest formal problem of the thesis is the bibliography. The entries do not follow standard format, and their ordering by occurrence in the text rather than an alphabetical one makes it extremely hard to find any reference in the bibliography list.

Conclusion

The presented thesis of Jaroslav Gergič is clearly a result of a substantial work and its key idea presents a good contribution to the field. Though it is not backed by as strong results as could have been achieved (scope of related work, published papers), I recommend that the author defend the thesis and, if successful, that he be awarded the degree of Ph.D.

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Ph.D.

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