

Seamless Variability Management With the Virtual Platform (Summary)

Wardah Mahmood,¹ Daniel Strüber,² Thorsten Berger,³ Ralf Lämmel,⁴ Mukelabai Mukelabai⁵

Abstract: This extended abstract summarizes our paper with the same title published at the main track of the International Conference of Software Engineering (ICSE) 2021 [Ma21].

Keywords: software product lines; variability management; clone management; re-engineering; framework

1 Introduction

Customization is a general trend in software engineering, demanding systems that support variable stakeholder requirements. Two opposing strategies are commonly used to create variants: software clone&own and software configuration with an integrated platform. Organizations often start with the former, which is cheap, agile, and supports quick innovation, but does not scale. The latter scales by establishing an integrated platform that shares software assets between variants, but requires high up-front investments or risky migration processes.

Researchers have contributed frameworks for migrating from clone&own to a fully integrated platform. The frameworks, however, rely on heuristics and significant developer intervention, rendering them error-prone and ineffective. Additionally, the frameworks assume a binary mode of working; once an organization has switched to an integrated platform, it ceases to use clone&own. In reality, developers still employ clone&own owing to its convenience and availability. So, could we have a method that allows an easy transition or even combine the benefits of both strategies?

We propose a method and tool that supports a truly incremental development of variant-rich systems, exploiting a spectrum between both opposing strategies. We design, formalize, and prototype the variability-management framework *virtual platform*. It bridges the gap between clone&own and platform-oriented development by introducing governance levels

¹ Chalmers | University of Gothenburg, Sweden wardah@chalmers.se

² Radboud University, Netherlands d.strueber@cs.ru.nl

³ Ruhr University Bochum, Germany and Chalmers | University of Gothenburg, Sweden thorsten.berger@rub.de

⁴ University of Koblenz-Landau, Germany laemmel@uni-koblenz.de

⁵ Chalmers | University of Gothenburg, Sweden muka@chalmers.se

between both; each adding a further level of detail and offering incremental benefits in return.

The virtual platform offers operators for engineering and evolving a system, relying on programming-language-independent conceptual structures representing software assets. The operators comprise traditional, asset-oriented operators and novel, feature-oriented operators for incrementally adopting concepts of an integrated platform. They record metadata that is exploited by other operators to support the transition. Specifically, we record metadata pertaining to clone traceability (where are the clones?) and feature-to-asset traceability (what is in the clones?). Among others, they eliminate expensive feature-location effort or the need to trace clones. The recorded metadata also enables two novel use-cases: feature cloning and feature change propagation.

Our evaluation simulates the evolution of a real-world, clone-based system, comprising four medium-sized variants. The results indicate that using virtual platform led to cost savings in terms of saved time spent on clone detection and feature location.

2 Data Availability

The source code of the Scala-based prototype of virtual platform is publicly available online [Vi21b]. Additionally, an online appendix with a technical report about our operators, additional examples, and evaluation data can be found online [Vi21a].

Literaturverzeichnis

- [Ma21] Mahmood, Wardah; Strueber, Daniel; Berger, Thorsten; Laemmel, Ralf; Mukelabai, Mukelabai: Seamless Variability Management With the Virtual Platform. In: 43rd International Conference on Software Engineering (ICSE). 2021.
- [Vi21a] Virtual Platform Online Appendix. <https://bitbucket.org/easelab/2021-icse-vponlineappendix>, 2021.
- [Vi21b] Virtual Platform prototype. <https://bitbucket.org/easelab/workspace/projects/VP>, 2021.