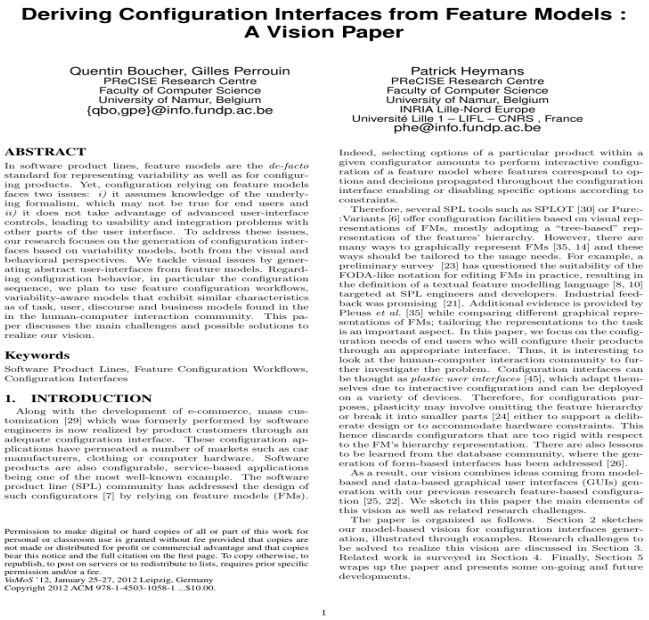
15th International Software Product Line Conference: Proceedings Munich, Germany, 21-26 August 2011



Deriving Configuration Interfaces from Feature Models : A Vision Paper

Quentin Boucher, Gilles Perrouin
PReCISE Research Centre
Faculty of Computer Science
University of Namur, Belgium
{qbo,gpe}@info.fundp.ac.be

Patrick Heymans
PReCISE Research Centre
Faculty of Computer Science
University of Namur, Belgium
INRIA Lille-Nord Europe
Université Lille 1 – LIFL – CNRS , France
phe@info.fundp.ac.be

ABSTRACT

In software product lines, feature models are the *de-facto* standard for representing variability as well as for configuring products. Yet, configuration relying on feature models faces two issues: *i)* it assumes knowledge of the underlying formalism, which may not be true for end users and *ii)* it does not take advantage of advanced user-interface controls, leading to usability and integration problems with other parts of the user interface. To address these issues, our research focuses on the generation of configuration interfaces based on variability models, both from the visual and behavioral perspectives. We tackle visual issues by generating abstract user-interfaces from feature models. Regarding configuration behavior, in particular the configuration sequence, we plan to use feature configuration workflows, variability-aware models that exhibit similar characteristics as of task, user, discourse and business models found in the in the human-computer interaction community. This paper discusses the main challenges and possible solutions to realize our vision.

Keywords

Software Product Lines, Feature Configuration Workflows, Configuration Interfaces

1. INTRODUCTION

Along with the development of e-commerce, mass customization [29] which was formerly performed by software engineers is now realized by product customers through an adequate configuration interface. These configuration applications have permeated a number of markets such as car manufacturers, clothing or computer hardware. Software products are also configurable, service-based applications being one of the most well-known example. The software product line (SPL) community has addressed the design of such configurators [7] by relying on feature models (FMs).

VaMoS '12, January 25-27, 2012 Leipzig, Germany

Indeed, selecting options of a particular product within a given configurator amounts to perform interactive configuration of a feature model where features correspond to options and decisions propagated throughout the configuration interface enabling or disabling specific options according to constraints.

Therefore, several SPL tools such as SPLOT [30] or Pure::Variants [6] offer configuration facilities based on visual representations of FMs, mostly adopting a "tree-based" representation of the features' hierarchy. However, there are many ways to graphically represent FMs [35, 14] and these ways should be tailored to the usage needs. For example, a preliminary survey [23] has questioned the suitability of the FODA-like notation for editing FMs in practice, resulting in the definition of a textual feature modelling language [8, 10] targeted at SPL engineers and developers. Industrial feedback was promising [21]. Additional evidence is provided by Pleuss *et al.* [35] while comparing different graphical representations of FMs; tailoring the representations to the task is an important aspect. In this paper, we focus on the configuration needs of end users who will configure their products through an appropriate interface. Thus, it is interesting to look at the human-computer interaction community to further investigate the problem. Configuration interfaces can be thought as *plastic user interfaces* [45], which adapt themselves due to interactive configuration and can be deployed on a variety of devices. Therefore, for configuration purposes, plasticity may involve omitting the feature hierarchy or break it into smaller parts [24] either to support a deliberate design or to accommodate hardware constraints. This hence discards configurators that are too rigid with respect to the FM's hierarchy representation. There are also lessons to be learned from the database community, where the generation of form-based interfaces has been addressed [26].

As a result, our vision combines ideas coming from model-based and data-based graphical user interfaces (GUIs) generation with our previous research feature-based configuration [25, 22]. We sketch in this paper the main elements of this vision as well as related research challenges.

The paper is organized as follows. Section 2 sketches our model-based vision for configuration interfaces generation, illustrated through examples. Research challenges to be solved to realize this vision are discussed in Section 3. Related work is surveyed in Section 4. Finally, Section 5 wraps up the paper and presents some on-going and future developments.

BMS Part Number CFPA-PRT. SPLC. 15th International. Software Product Line. Conference. August Munich, Germany lubasal.comSoftware product lines: practices and patterns . a communication system firmware product line, Proceedings of the 15th International Software Product Line Conference, Volume 2, August , , Munich, Germany.Software Product Lines in Action: The Best Industrial Practice in Product .. product line engineering, Proceedings of the 15th International Software Product Line Conference, Volume 2, August , , Munich, Germany.SPLC '11 Proceedings of the 15th International Software Product Line Conference, Volume 2 Munich, Germany August 21 - 26, Proceedings available online since March 29, In Software Product Line Engineering (SPLE), a portfolio of similar systems is developed from a shared set of software assets. Claimed . Co-located with the 15th International Software Product Line Conference (SPLC'11), Munich, Germany, August , Ltd., Proceedings of the 13th International Software Product Line Conference, . Product Line Conference, Volume 2, August , , Munich, Germany of product line artifacts, Proceedings of the 15th International Software Product.Proceedings - IEEE International Conference on Software Architecture, ICSA , p. The Evolution of Continuous Experimentation in Software Product Proceedings - 15th International Software Product Line Conference, SPLC Munich, August , p. Paper in proceedings. Jeroen Boydens, Test-driven development strategies for embedded software, and Sensor Systems (MASS), IEEE 8th International Conference on, .. Product Lines, Proceedings of the 15th International Software Product Line Conference, Volume 2, pages , Munich, Germany, August , bibtex.In: Proceedings of the Joint Workshop of the 3rd International Work- shop on Scalable Modeling Techniques for Software Product Lines (MAPLE/SCALE) at the 15th Inter- national at the 15th. International Software Product Line Conference (SPLC '11)}, . SPLC'11, August 2126, , Munich, Bavaria, Germany.20th International Conference on Testing Software and Systems. Paris 15th International Conference on Software Engineering and Formal Methods . Third Workshop on Formal Methods and Analysis in Software Product Line Engineering. Munich, Germany, August 26, K 2nd International K Workshop.Case study with NTU Nadine robot, The International Conference on with Nadine humanoid robot Abstract, 15th ACM SIGGRAPH International Conference on on Virtual Reality Software and Technology (VRST), Munich, Germany , Conference (ISSC), Kuala Lumpur, Malaysia, August , 13th International Conference on Software Reuse (ICSR), Pisa, Italy, Jun. The 15th International Software Product Line Conference (SPLC), Munich, Germany, Aug , . G. Chastek, editor, Software Product Lines: Proceedings of the Second Software.Variability in the software product line life cycle. Chapter 8 in: Systems and Software Variability in software product line engineering. In Proceedings of the 15th International Product Line Conference (Munich, Germany, August ,).Co-located with 4th ACM/SPEC International Conference on Performance Software Product Line Conference, Munich, Germany, August , , IEEE R.; (Eds.): Proceedings of the 15th

European Conference on Information Systems.Software Product Lines (SPL) based on reuse, claim to improve evolution, time to RA and PLA: a subtle but critical difference, ECSA , LNCS , pp. for Dynamic Reconfiguring Software Product Line Products, Conference Paper an Ontology-Based Approach for Deriving Product Architectures, 15th Intern.4th International Conference on Civil Engineering Education - EUCEET September , Munich, Germany Second International Workshop on Software Solutions for Integrated Computational . 29 August - 2 September , Barcelona, Spain 15th International Workshop on Dynamics and Control.