

A Scalable Multiple Perspective Variability Management CASE Tool

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Abstract—One of the main challenges in variability management is the visualization and management of industry size variability models. In this work, we introduce our CASE tool MUSA that uses a multiple perspective approach to variability modeling and is implemented using state-of-the-art multi-touch interfaces. This gives it the power and flexibility to create and manage large-scale variability models.

Keywords- Feature Modelling, Variability Management;

I. INTRODUCTION

One of the main challenges within Variability management (VM) is the handling and visualizing “industry-size” models which usually comprise a large number of variability points and variants along with the dependency relationships that exist among them.

The MUSA CASE tool was designed to overcome these challenges. MUSA is based on our work on multiple-perspective based variability management which provides a rich modeling framework while using the concept of separation-of-concerns to alleviate the problem of information overloading. This is further highlighted in the next section. MUSA is implemented using state of the art concepts in UI designed which is discussed in section 3.

II. THEORETICAL BACKGROUND

The Four Views Model (4VM) forms the theoretical foundation upon which MUSA is designed as a Proof-of-Concept. The original version of the 4VM can be found in [1] and to appear in [2].

The 4VM proposes a four view presentation of the feature model. The views are:

- **Business View:** where the information related to the project management, cost/benefit analysis, closed/open sets of features, etc. is presented.
- **Hierarchical & Behavioral View:** where the way the different features are organized (usually presented in a tree structure) along with the behavior attached to each feature is presented.
- **Dependency & Interaction View:** where the dependency and interaction among features is presented.
- **Intermediate View:** where some design decisions are injected into the feature model to take it one step further towards the architecture domain in an

attempt to bridge the gap between the feature model and the system architecture.

III. TECHNICAL FOUNDATION

The implementation of MUSA was largely driven by three main technologies:

- **The *Microsoft Surface* platform:** which provides a large gesture based interface for managing the variability model.
- **360-D UI design:** These design principles allow for seamless multi-user simultaneous interaction and collaborative environment.
- **Hyperbolic trees:** The variability model itself is implemented using a mind-mapping approach based on hyperbolic trees providing an unprecedented potential for scalability

IV. CONCLUSION AND RELATED WORK

Over the past few years, a number of variability management approaches have been developed ranging from research techniques to commercial products.

The major challenge for most research techniques is scalability. The scalability issue arises from the graphical modeling techniques traditionally adopted (such as trees) and the I/O devices used (standard keyboards, mice and monitors). Commercial products on the other hand have managed scalability by largely moving away from graphical representation of models. File system tree like structures and even text listings (e.g. using MS Excel sheets) have been seen in use.

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REFERENCES

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- [2] US Patent Application No 12/349,797, Inventor: Rabih Bashroush, Title: "Multiple Perspective Feature-based Variability Management", (Patent Pending)