

1 Introduction

The art of progress is to
preserve order amid change
and to preserve change amid
order.

(Alfred North Whitehead)

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1.1 Overview

Change is a process that is inevitable in all stages of a software project. From the original concept through phases of completion, a software product is constantly changing to meet the main goal of the project. Those changes have to be managed and predicted to maintain the project. On the management point of view, software change is considered as an input in the software development process to evolve the software itself. Furthermore, software change is considered as motivation for managing software variability.

"Software variability refers to the ability of a software system or artifact to be changed, customized or configured for use in a particular context", [JJ03].

Variability in this master thesis will be focused on metric entities variability. As a software product evolved from an abstract domain problem to a final software product, metric entities are defined from rough description to concrete model that can be implemented. In this entity specification progress, changes occur as a result of different inputs from different stage. Varying degree of metric entities specification is the variability that needs to be managed. Managing variability starts with understanding on how entities can be changed and predicts possibilities of entities changes as variants. These variants will be used as options to adjust the system in facing different input.

The goals of this master thesis are to enhance the MeDIC information systems, focusing on the entities variability issue. Although there are many researches related with software variability performed, variability in entity specifications has

not been discussed. Therefore, entity variability will be presented and applied in the MeDIC domain.

The MeDIC information system itself is a metrics management system developed by the Research Group Software Construction (SWC) of the RWTH Aachen. Metrics are used to quantify software process and projects as part of quality control activities. One key process area of CMMI maturity level 2, Measurement and Analysis, covers the use of metrics to perform measurements in software organizations [SEI10]. In the MeDIC system, metrics are managed to meet the project's objective.

1.2 Objectives

The aim of this master thesis will be described by the decomposition of several phrases from the title of this master thesis itself, which is "*Enhancing the MeDIC Meta-Models by EJB Conformant Variability Concepts*".

Enhancing the MeDIC Meta-Models

This master thesis will be focused on the MeDIC information system. The main part of the enhancement is the metadata model of the MeDIC system. The aim of the enhancement itself is to evaluate the current meta-model based on the changes of an entity and result the new meta-model that addresses this problem.

By Enterprise JavaBeans (EJB)

The implementation of the existing system uses Enterprise JavaBeans 3.0 as the base technology to develop a web-based software tool. The idea of the web-based implementation is to support the communication within the organization. Thus, the enhancement of the meta-model will be implemented with the same framework, which is EJB 3.0.

Conformant Variability Concepts

Variability concepts have been proved as an approach to manage the difference or variation in many topics, ranging from the development process itself to the various artifacts created. Although there are many sources of variability, current research is focusing on variability in Software Product Line (SPL) to define commonality on software products for reusability. The variability focus on this work is data and function variation of the entity specification, as the part of entities' abstraction from the real world and evolve based on different input. Therefore, the variability concepts will be applied and adjusted to specific variability point in the MeDIC meta-model.

1.3 Thesis structure

The outline of this master thesis is divided into seven chapters. The content of remaining chapter is explained briefly below.

Chapter 2: Foundation

This chapter covers the theoretical and practical information as the foundation that is needed and related it to the master thesis. The first part is a general overview of metrics. The second part is the theoretical foundation about meta-modeling. The third part covers general understanding about variability concepts, and provides details about the type of variability and the mechanism. The fourth part is technical information about the implementation in the current system with EJB 3.0 technology. The chapter ends with an introduction about the MeDIC information system itself, the motivation behind this project and the current progress.

Chapter 3: Modeling Variability

This chapter presents the analysis of the variability in the MeDIC information system. After the variation points are determined, the variability concept is applied and adjusted to find the general concept of variability that can reflect the problem in the current system. Finally, solution pattern for each variation point is applied to result in the new meta-model.

Chapter 4: Prototyping

The prototyping part describes the implementation plan of the new meta-model in the specific variation point of the MeDIC information system. Some sketches of the system interface are provided to give a first look at the actual implementation.

Chapter 5: Evaluation

This chapter briefly sums up the main points in this master thesis with a discussion to evaluate the evaluation.

Chapter 6: Summary and Future Work

Future work plan and improvements are proposed in this chapter.

