Verification and Validation of Nonfunctional Aspects in Enterprise Modeling

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ABSTRACT
Dependability consolidation is a novel solution for complex problems. It includes in-depth analysis of business systems and their technology infrastructure for identification of risk areas. Results include the generation of precise metrics to quantify the risk. Once areas of low dependability have been identified solutions that minimize risk are defined. With Dependability consolidation techniques it is possible to make precise value assessments of entities like outsourced business operations or complex IT systems. In the case of IT systems, the use of dependability consolidation techniques enables the smooth integration of existing and new applications. Through the use of dependability consolidation techniques it is possible to seamlessly integrate modern systems design approaches like model driven architecture (MDA), system integration principles like service oriented architecture (SOA) and operating environments that contain supervised dependability.

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INTRODUCTION

This chapter intends to provide a sound technical basis for the analysis and solution of issues of high interest in the e-business world. For example existing software applications represent a huge asset for industry but in most cases their design has addressed only the functional requirements with little or no attention given to dependability. Using dependability consolidation techniques such existing software can now be upgraded to create dependability assuring environments. Dependability consolidation makes use of formal analysis, proof of correctness and optimization methods to guarantee a proper quality of service.

The main notions related to the dependability of applications are presented in a self-contained way to make them accessible to non-experts. Topics include the formulation of modeling requirements in UML, the evolving UML profiles, the use of design patterns for best practices and basic means for testing. Validation based on formal methods and verification of designs are also covered. Another topic addressed is the use of model transformation techniques that allow Quality of Service driven optimization of enterprise systems architectures. The methods and techniques are illustrated with practical models and problems.

PROBLEM FOUNDATION

Impact of MDA

Recently, e-business came to be one of the main drivers in the development of economy. In the broadest sense, e-business is a standardized way for different service providers to share information and to cooperate.

The widespread use of computer-based business solutions has led to new challenges in the field of information technologies. The steady evolution of business and technology necessitates a high degree of flexibility and adaptability on the information technology side. Simultaneously, the reuse of existing intellectual property in the form of business logic designs has become a crucial factor in keeping the costs related to the development of e-business applications at a reasonable level.

The most promising answer is the model driven architecture (MDA) initiative by the Object Management Group. The basic idea in MDA is that the intended functionality of the target system under development will be described by means of a platform independent model (PIM). Automated transformations perform the resource allocation to these functions, map the PIM onto a platform specific model (PSM), and perform the generation of the runtime code (Figure 1).

Figure 1. Model driven architecture
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