

A METHOD PROPOSAL FOR ARCHITECTURAL RELIABILITY EVALUATION

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Keywords: Evaluation method, Software reliability, Software architecture, Scenarios, Software quality.

Abstract: Software quality characteristics, such as reliability, maintainability, usability, portability, among others, are directly determined by software architecture and, in consequence, it constitutes a very important artifact to be evaluated as soon as a general design is obtained. This article proposes a method to estimate software reliability by evaluating software architecture. Our method combines the strengths of three evaluation methods: ATAM (Kazman et al, 2000), DUSA (Bosch, 2000) and AEM (Losavio et al., 2004) obtained by identifying the main features needed in reliability architectural evaluation and studying several architectural mechanisms which promote this quality characteristic. Based on these features and the advantages of the studied methods and mechanism, we established phases, activities, roles, inputs/outputs, and artifacts; and we constructed a feasible method which can be applied in any organization interested in improving its software construction process and product.

1 INTRODUCTION

According to (ISO 9126, 2000), Reliability is defined as *the system's capability to perform its functions within certain operative conditions within a specific time period*. The sub-characteristics of Reliability (maturity, fault tolerance, and recoverability) are globally associated to the software's architecture or to each component in particular. In addition there are certain metrics that help us quantify those sub-characteristics.

Currently, the demands of the critical and Real-Time systems are growing (Laprie, 1995). These systems in particular are used in ever more complex tasks, wherein errors can lead to catastrophic consequences. As a result, these systems must be more reliable, since they must be able to perform despite those errors. An interruption in the system's service may lead to critical and dire situations. On the other hand, many organizations which render less critical services also require systems with high capabilities to satisfy their clients (e.g. online banking). Consequently, Reliability becomes a key characteristic for different organizations (Laprie, 1995).

Additionally Reliability (as well as other quality characteristics), is directly promoted by the software's architecture. In this sense, there are different architectural quality evaluation methods. However, none of these methods addresses Reliability in depth. The purpose of this article is to propose an Architectural Reliability Evaluation Method (AREM). To that end we have studied in detail several existing evaluation methods: Architecture Trade-off Analysis Method -ATAM, (Kazman et al, 2000), Software Architecture Analysis Method -SAAM (Kazman et al., 1994), Cost Benefit Analysis Method - CBAM (Nord et al., 2004), Architecture Level Modifiability Analysis - ALMA (Bengtsson et al., 2004), Architectural Evaluation Method - AEM (Losavio et al., 2004), Software Architecture Comparison Method - SACAM (Stoermer et al., 2004), and Design and use of Software Architecture - DUSA (Bosch, 2000) as well as architectural mechanisms. After an in-depth feature analysis, we have used as basis ATAM (Kazman et al., 2000), DUSA (Bosch, 2000) and AEM (Losavio, 2004).

This way our proposal is grounded in a rigorous revision of the concepts related to software reliability evaluation, which allowed us to establish a set of phases, activities, roles, inputs/outputs, and

