

Toward Evaluation of Self-Adaptive Systems

Eslam Nazemi¹ Hossein Sadr² Mozhdeh Nazari Soleimandarabi³

¹Computer Engineering and Science, Shahid Beheshti University, Tehran, Iran

²Electrical, Computer and IT Engineering, Qazvin Islamic Azad University, Qazvin, Iran

³Department of Computer Engineering, Rasht Islamic Azad University, Rasht, Iran

ABSTRACT

In the last decades, employing self-adaptive systems in the field of software engineering has been considerably increased. In this regard, with the aim of improving self-adaptive systems and using all their benefits and features, we require tools and methods that can effectively evaluate self-adaptive systems not only at design time but also at run-time. Notably, evaluation is considered as one of the most important factors for understanding the success of any software. On the other hand, despite the growing use of self-adaptive systems their evaluation has been rarely taken into account and most of the studies do not consider variability characteristics of these systems at run-time. Moreover, quality attributes and their corresponding metric presented for evaluating these systems are limited and do not deliberate all adaptive features of these systems. To fill these lacuna, a framework for evaluating a self-adaptive system is presented in this paper which is achieved based on a detailed analysis of the range of studies carried in this field. Therefore, in the beginning adaptive characteristics which are the main reason of creating a self-adaptive systems are identified and mapped into their corresponding quality attributes which are known as the best measures for evaluating a software system. In the following, quality metrics of these quality attributes are presented. It must be noted that presented quality attributes and their corresponding metrics are specific for self-adaptive systems and presented framework can be considered as a comprehensive foundation for evaluating self-adaptive systems.

Keywords: Self-Adaptive Systems, Evaluation, Verification and Validation, Efficiency, Reliability, Security.