QRA: A Quality Requirements Analysis Approach for Service Systems

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Abstract—Although quality requirements (QRs) are considered as being of crucial importance in today’s service-oriented systems, existing approaches almost exclusively deal with QRs from the service providers’ perspective (namely late QRs). The motivation for this paper is to address the analysis of QRs from the service customers’ perspective (namely early QRs). The work presented in this paper focuses on the way that early QRs may be modeled and evaluated and demonstrates this approach on a stock trading service system – a real-world practice taken from an international firm in the financial sector. We focus on three QRs that are critical to service systems and especially that of stock trading, namely performance, availability and security. We introduce a modeling paradigm that extends the well-known UML Activity Diagram by explicitly representing these three QRs as an integral part of business process modeling and augments this modeling with quantitative and qualitative reasoning that together provide the means for enhanced decision making by service customers.

Keywords-service-oriented systems; quality requirements; quality of service; quantitative reasoning; qualitative reasoning

Introduction

Quality of service requirements [1], henceforth referred to as Quality Requirements (QRs) in this paper, define how well a service system should perform, how reliable it should be and how easy it is to be used. The fulfillment of these requirements in a service system is crucial to the successful operation of the system.

Yet, most of today’s service systems development approaches [2-9] focus mainly on the system facing QRs (the late QRs), rather than the customer facing QRs (the early QRs). In these approaches, the specification of the early QRs is rather informal, often as simple textual description attached to functional requirements (FRs) specification models, such as business process models.

Such informal treatment of QRs makes it difficult for a business analyst to determine or reason about the degree to which a certain service will satisfy the stated QRs [10, 11].

In this paper, we argue that the lack of support for the early QRs means that QRs have become an afterthought addition, rather than a central part of service systems. We propose an approach that allows a business analyst to specify QRs alongside FRs. Specifically, the proposed approach, called QRA (Quality Requirements Analysis), aims to (a) augment functional modeling of business processes with QRs and (b) provide reasoning facilities to enable a business analyst to quantitatively and qualitatively evaluate how well business processes satisfy the required QRs. The goal of QRA is to drive the development of service systems from a business perspective, rather than from the system perspective.

The paper is structured as follows: Section II introduces the main business process of a real world stock trading service system (STSS). Section III then describes and demonstrates the QRA approach in detail by using the STSS. Section IV discusses related approaches in relation to QRA and finally Section V concludes the paper with a reflection on the contribution of QRA and of its possible future enhancements and extensions.

1 Presented at the 10th International Conference on Services Computing, June 27-July 2, 2013, Santa Clara Marriott, CA, USA.
REFERENCES


