Chapter 14

Addressing Non-Functional Properties of Services in IT Service Management

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ABSTRACT

The assurance of availability and dependability for distributed applications is a challenging and non-trivial task. Massively distributed architectures are becoming more prevalent with the convergence of the Internet of Services and the Internet of Devices. Flexible provider models like Cloud Computing allow for nearly limitless scalability of applications, together with an attractive pay-as-you-go investment model.

A key point that remains to be addressed is the assurance of service levels for end-user applications that rely on these provider models. This chapter describes an approach for addressing non-functional properties (NFPs) of services in service-oriented architectures (SOA). The approach is based on reference models such as the IT Infrastructure Library (ITIL) and the SOA life cycle model. It has been applied in several industrial settings in the telecommunications sector.

INTRODUCTION

The Internet of Services is emerging as a platform for the provision of software functionality. The web is becoming more and more a space where users interactively call services, instead of simply consuming existing information. Cloud Computing (Armbrust et al., 2010) amplifies this trend by allowing software as a service (SaaS) provision in a more granular way than traditional application service providing (ASP). The granularity of software offerings is now at the level of single
application functions, respectively component operations. Web Services are the dominating technology for providing and combining such functionality in mobile (Wang et al., 2008) and distributed systems (Kumar, 2008).

Service-oriented architecture (SOA) is an architecture that combines elements of software architecture and enterprise architecture. It is based on the interaction with autonomous and interoperable services that offer reusable business functionality via standardized interfaces. Services can exist on all layers of an application system (business process, presentation, business logic, data management). They may be composed of services from lower layers, wrap parts of legacy application systems or be implemented from scratch. Typically, services at the business process layer are described as business services, while services at the lower implementation level are described as technical services (Stantchev & Schröpfer, 2009).

Two main aspects denote the successful provision of a service: it should provide the needed functionality, as well as the needed Quality of Service (QoS). QoS parameters are part of the non-functional properties (NFPs) of a service. The NFPs of a software system are those properties that do not describe or influence the principal task / functionality of the software, but are expected and can be observed by end users in its runtime behavior (Lohmann et al., 2005). Such properties can be design-time related or run-time related. Design-time related NFPs such as language of service and compliance are typically set during design time and do not change during runtime. Run-time related NFPs are typically performance oriented (e.g. response time, throughput, availability). They can change during runtime – when times of extensive usage by a big number of users are followed by times of unfrequent usage, or when failures occur.

In order to be successful in competitive and volatile settings, organizations require optimally designed business processes: Here, not one-time optimized business processes play the essential role, but rather the ability to quickly react to new developments and to flexibly adapt respective business processes are decisive (Borzo, 2005).

It is typical that these processes are supported through information technologies (IT) which consequently have been catalyzing increased interest in reference modeling for IT process management. Reference models such as ITIL and COBIT (Control Objectives for Information and related Technology) represent proven best practices and provide key frameworks for the design and control of IT services (Van Bon, 2008). On the one hand, utilization of reference models promises to enhance quality and facilitates better compliance according to statutes and contractual agreements. On the other hand, IT processes have to correspond to corporate strategy and its respective goals. Therefore, the question arises how best practices can be implemented in a particular corporate environment. Another challenge lurks in the checking of reference process execution as well as in assuring compliance to IT procedure in respect to new or altered business processes.

The application and the benefits of approaches such as COBIT and ITIL for the optimization of IT organizations are widely known. We recently introduced an approach for the continuous quality improvement of IT processes based on such models (Gerke & Tamm, 2009). Nevertheless, this approach is not directly applicable to NFPs in an intra-organizational SOA.

In this chapter we describe an approach that assures the continuous provision of service levels in such settings. It is based on our previous work with such reference models and our work in the area of service level assurance in SOA (Stantchev & Schröpfer, 2009; Stantchev & Malek, 2009; Stantchev & Malek, 2010). The approach has been implemented in several industrial settings.

The rest of this chapter is structured as follows: Section 2 presents the current developments in the area of Internet of Services and Internet of Devices. In Section 3 we describe governance
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