

Chapter 19

Negotiation of Service Level Agreements

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ABSTRACT

Non-functional properties are an essential constituent of service level agreements as they describe those quality-of-service parameters that are not related to the actual function of a service. Thus, non-functional properties let providers create distinguishing service offers and let consumers discriminate between various offers that provide the same function. The negotiation of non-functional properties is how service level agreements are commonly established. This chapter introduces various forms, models, specifications, and realizations of service level agreement negotiation to provide a broad background of the current state-of-the-art. Although different in various details, the described systems share a number of common features. Based on them, a holistic architecture is defined combining previous work into one coherent framework. The architecture is applicable to different negotiation models and protocols, and covers all functions of the negotiation phase. Based on this architecture, particular challenges and areas of future work are motivated. These mostly revolve around increasing the acceptance of service level agreement negotiation and enhancing interoperability.

INTRODUCTION

In a service-oriented IT landscape, where more and more essential business functions are outsourced to external parties, management and control of the IT services externally procured are of paramount

importance to ensure that the promised service quality is actually provided. Such control can only be exerted by having appropriate contracts in place that clearly state the agreed upon performance, legal, financial, and regulatory properties of the services provided and consumed. One method for expressing electronic contracts is through service level agreements (SLAs) (Marilly, Mar-

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tinot, Betge-Brezetz & Delege, 2002). Such SLAs typically contain functional descriptions of what the service is and how it is to be accessed. In addition, SLAs contain descriptions of non-functional properties (NFPs) in the performance, legal, financial, and regulatory categories (Lee & Ben-Natan, 2002).

Service level agreements are used throughout the lifecycle of service-oriented systems. They are an important tool for providing, procuring, and operating electronic services. For the different purposes in service-oriented systems, SLAs are expressed through different, often domain-specific formalisms and representations. To this end, a number of different frameworks for service-level management exist, which cover different management aspects of service-oriented system operation (Parkin, Badia & Martrat, 2008).

The establishment of electronic contracts and SLAs requires the reconciliation of the needs of the service customer and the constraints of the service provider. This reconciliation is achieved with some form of negotiation between providers and customers. Negotiation can be seen as part of the service selection process where the result is a binding agreement between the two parties that provides solid guarantees on non-functional properties to the customer to base their business on and information to the service provider to plan and optimize service provisioning and revenue.

At present, contracts between service providers and customers are established in a mainly manual fashion, making the negotiation process lengthy, resource-intensive, and difficult to manage. With the abundance of services expected for future service markets and the associated dynamism of service interrelations, such a manual process will need to be partly, if not fully, automated. SLA negotiation is a method to reach such automation and is therefore expected to be an essential tool for the future service market.

In this chapter, we focus on SLA negotiation as the means to establish a common understanding between service provider and service customer

regarding the non-functional properties of service delivery. We therefore first introduce in Section “Service Level Agreements” what definition of SLAs we adhere to and where in the lifecycle of an SLA negotiation actually takes place (as outlined in Section “The SLA Lifecycle”). Following this, in the “Background” Section we present a selection of SLA models, protocols, and frameworks to provide the necessary background for the reader to understand and be able to discuss our solution as described in Section “A Proposal for a Generic Negotiation Architecture”. We finally complete this chapter with a discussion of potential research directions in the area of SLA negotiation for the purpose of providing ideas for future work.

Service Level Agreements

A multitude of SLA application domains, specifications, and frameworks exist, just like definitions of what an SLA actually represents and contains. For our work and hence this chapter we follow the TeleManagement Forum, which defines an SLA as,

[a] formal negotiated agreement between two parties, sometimes called a service level guarantee [...], it is a contract (or part of one) that exists between the service provider and the customer; designed to create a common understanding about services, priorities, responsibilities, etc. (Lee & Ben-Natan, 2002, p. 3).

Part of this common understanding is formed by the functional and non-functional properties of a service, collectively referred to as the *terms* of the SLA. Functional properties specify what a service is doing, e.g. performing a finite-element analysis. Non-functional properties describe various quality aspects that the service fulfills, e.g. a minimum resolution of 0.1 mm in relation to the analysis mentioned before.

Negotiations are used to adjust the properties of an SLA to suit both parties. They generally only cover the non-functional properties of the

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