Development of an Automated Service Level Agreement Negotiation Framework for SaaS Cloud E-Marketplace

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Abstract:

With the increasing number of Software-as-a-Service (SaaS) users, catering to their diverse needs while ensuring Quality of Service (QoS) has become imperative. Although SaaS providers regularly introduce new applications with varying offerings and QoS parameters, the current Cloud e-marketplace may overlook the individual QoS requirements of each user. To tackle this challenge, a Service Level Agreement (SLA) negotiation framework is employed for cloud service selection, ensuring SaaS user satisfaction, often facilitated by brokers. These brokers secure optimal offers from providers, taking into account the user's preferences. To initiate an agreement, brokers rank cloud providers, proceeding to negotiations only if the user rejects the top-rated provider's offer. Given the multitude of users and providers in today's cloud e-marketplace, selecting the most suitable provider and negotiating QoS parameters can be a complex task for brokers. This paper introduces a negotiation framework designed to enhance the customer satisfaction value for SaaS users through a service broker. Our proposed framework employs multi-agent systems (MAS) as the methodology, incorporating the level of competition, current negotiation time, and opportunities to formulate an improved negotiation model for SaaS users in the cloud marketplace. By adopting this proposed negotiation framework, SaaS users can acquire services from providers that precisely meet their requirements. Experimental results from simulations demonstrate that the proposed framework outperforms previous studies in terms of satisfaction level, response time, and negotiation success rate.

I. Introduction

Cloud computing, an exceedingly popular computing paradigm, has significantly transformed the way technology resources are delivered and accessed. This innovative approach facilitates the provisioning of a wide array of scalable resources through a pay-per-use model over the Internet [1]. Among these resources are virtual servers, storage capacities, and a diverse range of applications, collectively empowering businesses and individuals with unprecedented flexibility and efficiency. Cloud computing embraces several service models, including software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS).

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