

Yves Demazeau et al. (Eds.)

Trends in Practical Applications of Agents and Multiagent Systems

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Trends in Practical Applications of Agents and Multiagent Systems

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Managing Real-Time Web Services through Agents

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Abstract. Time is an important Quality of Service (QoS) parameter in services. In many situations, the response provided by a service could be completely useless if it is not provided on time. In this paper the infrastructure to provide a real-time web service (RTWS) is described. These RTWS are provided by agents with the capability of negotiation and guaranteeing the service execution time. These kind of agents control the service execution time and allow a provider-client negotiation process in order to arrive at an agreement on when the service response is to be provided. If an agreement is reached, these agents also guarantee that the agreement is going to be fulfilled. Finally, tests to validate RTWSs and the behavior of provider agents are presented.

1 Introduction

Nowadays, service-oriented computing (SOC) brings additional considerations, such as the necessity of modelling autonomous and heterogeneous components in uncertain and dynamic environments. Such components must be autonomously reactive and proactive yet able to interact flexibly with other components and environments. As a result, they are best thought of as agents who collectively form Multi-Agent Systems. SOC represents an emerging class of approaches with Multi-Agent System-like characteristics for developing systems in large-scale open environments. For this reason agent orientation is considered an appropriate design paradigm to act as providers of services. Agents due to their characteristics can offer more flexibility in interactions between services and clients. Furthermore, agents through negotiation or agreement protocols can provide more suitable services attending to quality of service (QoS) client requirements.

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Table 1 Results with capacity of negotiation in the SPA

	With Negotiate	Without Negotiate	Gain (%)
\bar{x} no. of total requests	32	39,66	-19,31
Fulfilled requests	15,66	6,66	135,13
CPU utilization	0.94	0.85	11,90
QoS	0.336	0.188	78,72

4 Conclusions and Future Work

In this paper, an architecture which offers real-time web services through provider agents (SPA) that follow an agreement protocol is presented. The SPA controls the execution of the real-time web services, analyzes if a request can be provided by a service before a deadline and also schedules the service execution in order to guarantee the resources needed for the service. This architecture is executed over a real-time operating system which provides mechanisms that guarantee deadlines. In order to validate the behavior of the architecture, several tests have been done. The tests show that the use of a SPA improves the quality of the executed services through a negotiation process with the clients and increases CPU utilization.

An extension of this architecture is planned in order to offer a longer negotiation time for agreements and also to offer time-bounded service compositions. Furthermore, to avoid a bottleneck in the SPA, there is a proposal to replicate, if necessary, the SPA and distribute the workload.

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