

Guest Editorial

Special issue: Development of service-based and agent-based computing systems

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1. Overview of workshop themes

This special issue presents the best papers from the workshops on *Service-Oriented Computing: Agents, Semantics and Engineering (SOCASE 2010)* held in May 2010 in Toronto, Canada and the *IEEE 2010 First International Workshop on Service-Oriented Computing and Multi-Agent Systems (SOCMAS 2010)* held in July 2010 in Miami, Florida, USA.

The goal of the workshops was to present the recent significant developments at the intersections of multi-agent systems, semantic technology, and service-oriented computing, and to promote cross-fertilization of techniques. In particular, the workshops attempted to identify techniques from research on multi-agent systems and semantic technology that will have the greatest impact on automating service-oriented application construction and management, focusing on critical challenges such as service quality assurance, reliability, and adaptability.

The areas of service-oriented computing and Semantic Web services offer much of real interest to the multi-agent system community, including similarities in system architectures and provision processes, powerful tools, and the focus on many related issues including quality of service, security, and reliability. In addition, service-oriented computing and Semantic Web services offer various diverse application fields for both the concepts and methodologies of intelligent agent and multi-agent systems.

Similarly, techniques developed in the multi-agent systems research community promise to have a strong impact on this fast growing technology. In particular, they enable services to be discovered and enacted across enterprise boundaries. If an organisation bases its success on services provided by others, then it must be able to trust that the services will perform as promised, whenever needed. Researchers in multi-agent systems have investigated such trust mechanisms.

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2. Synopsis of selected papers in this special issue

Six papers, three from each workshop, have been selected for this special issue. The first paper, by Brazier et al., presents initial work towards a model for dynamic service-oriented architectures (SOA), using agent-based technology, that provides different levels of abstraction for the specification of governance, expectations, and behaviour. Its considerations of the behaviours of services – as opposed to just architectural considerations – are the major contributions of this work.

The paper by Liu et al. describes the experiences of using a service-oriented architecture (SOA) for implementing domain-specific languages. The advantages of SOA are improved modularization at the lexical, syntactic, and semantic levels and the delegation of tokenization and parsing to a lower level WS-BPEL engine.

Autonomic Web services are addressed in the paper by Chainbi et al. An agent-based framework that provides self-management for Web services is presented. This solves a major limitation of deployed Web services, in that it has been difficult to maintain large numbers of them. Clients must be able to trust that their systems relying on the services will continue to behave as desired, and agent-based autonomic systems can help to provide the requisite level of trust.

Klusch and Kapahnke investigate how services can be selected based on matching a semantic description of a service with a semantic description of a request for a service. Their semantic matchmaking innovation is a *hybrid, adaptive* matchmaker that learns how best to combine text similarity measures with ontological structures. A benefit of the adaptation is that the matchmaker can accommodate new services without manual intervention.

The paper by Fernández et al. also examines service matchmaking, but from the viewpoint of permitting flexibility in the semantics of the service and request descriptions. The flexibility is enabled by aligning the ontologies that are used as the basis for the different services and requests.

The paper by Küster et al. describes an approach for modeling the high-level behaviours, interactions, and communications among the agents in the development of an agent-based application. It uses the Business Process Modeling Notation to combine business models with multi-agent system models.