Guest Editorial: Special Section on Query Models and Efficient Selection of Web Services

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SERVICE-ORIENTED computing is gaining momentum as the next technological vehicle to leverage the huge investments in web application development. Web services are poised to take center stage as part of this adoption [4]. The ever-increasing number of web services will have the effect of transforming the web from a data-oriented repository to a service-oriented repository, also known as the Service Web [1]. In this new paradigm, existing business logic would be wrapped as web services to be accessible on the web via a web services middleware [2]. As the number of web services is expected to substantially increase, this would have the effect of introducing competition among web services that offer similar functionalities. Service users are enabled to select the "best" web services and/or their combinations with respect to their expected quality, such as price, response time, and reputation.

There is a need to provide a sound framework to organize web services. This would form as a platform to query web services. Building this framework is especially important due to the ever-increasing large and heterogeneous web service deployment. A key ingredient of such a service framework is a formal service query model that can capture the key features of services to filter interactions and accelerate service searches. The query models must be congruent with the dynamic, active, autonomous, and highly heterogeneous nature of web services and their environment. Query languages and efficient selection techniques can then be developed once such a service model is in place.

Existing service discovery technologies, such as service registries and service search engines, mainly support the simple keyword-based search on web services. However, keyword search cannot always precisely locate web services, partially because of the rich semantics embodied in these services. Due to the ambiguity of the keywords, which are typically described using natural language, either too many irrelevant services may be returned or some highly relevant services may be missed. As a key facilitator for application outsourcing, a common usage pattern of web services is to be programatically integrated into other applications (e.g., a travel package, navigation system, etc.). This further requires a service query mechanism that is more precise and reliable than keyword-based search. Query processing on web services is a novel concept that goes beyond the traditional data-centric view of query processing, which is mainly performance centered. It focuses on user quality parameters to select multiple services that are equivalent in functionality but exhibit a different quality of web service [3].

This special issue provides insights into the latest research on web service querying and efficient selection. Five articles were selected through a rigorous review process. They cover a set of key research topics including modeling techniques for web services, service query languages, algorithms for efficient service selection, as well as quality of web service modeling and quality-based service selection. The article by Skoutas et al., "Ranking and Clustering Web Services Using Multicriteria Dominance Relationships," proposes a service selection framework that integrates the similarity matching scores of multiple parameters obtained from various matchmaking algorithms. The framework relies on the service dominance relationships to determine the relevance between services and users' requests. Instead of using a weighting mechanism, the dominance relationship adopts a multi-objective strategy that simultaneously considers the matching scores of all the parameters for ranking the relevant services. A clustering algorithm is also proposed that captures the trade-offs among different parameters with respect to the considered matching criteria. The article by Grigori et al., "Ranking BPEL Processes for Service Discovery," proposes a service discovery approach based on behavioral descriptions expressed in BPEL. Behavioral matchmaking goes beyond interface matchmaking as it considers the constraints on the invocation order of operations in service interfaces. Graph matching algorithms are applied, which enable the delivery of approximate behavioral matches. The article by Michlmayr et al., "End-to-End Support for QoS-Aware Service Selection, Binding, and Mediation in VRESCo," describes a runtime environment for service-oriented computing, called VRESCo. The proposed VRESCo framework provides a service metadata model. Service discovery and selection approaches are developed using this model. In addition, other important issues, such as QoS monitoring, dynamic binding, and service mediation, are addressed. The article by Barhamgi et al., "A Query Rewriting Approach for Web Service Composition," proposes a service querying approach to compose data-providing services. The data-providing services are modeled as RDF views over a mediated ontology specified in RDF to capture the consensual and shared knowledge in a

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given domain. Query rewriting algorithms are proposed to automatically transform a user's query into a composition of data-providing services. The article by Guinard et al., "Interacting with the SOA-Based Internet of Things: Discovery, Query, Selection, and On-Demand Provisioning of Web Services," addresses the issue of service discovery and on-demand provisioning of missing functionalities in an environment that is composed of a large number of networked and resource-limited devices. It proposes a Real-World Service Discovery and Provisioning Process (RSDPP) to help developers discover real world services running on embedded devices, which are in turn included in composite applications.

We would like to thank all of the authors for submitting their latest research results to this special section. We are also grateful to the reviewers for their insightful and thoughtful reviews.

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Guest Editors

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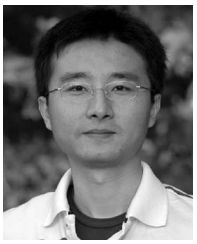

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