EIC Editorial: Application-Driven Management of Service Systems

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It is my great pleasure to welcome you to the first issue of the IEEE Transactions on Services Computing in 2011. In the services and software industry, Services Computing has become a foundational discipline for many emerging technologies such as cloud computing and social networking. Services Computing not only provides service-oriented frameworks for software and system architectures, but also provides new service delivery platforms as well as new patterns for service interactions among services providers and consumers in the value chain. In this issue, I am pleased to publish six research papers with a theme on Application-Driven Management of Service Systems, which deal with several aspects of management of services systems that include composition-based government applications, SLA monitoring, SLA negotiation, mobility-driven service composition in a mobile environment, service availability models, and universal identity management.

The first paper is entitled “Service-Centric Framework for a Digital Government Application” by Athman Bouguettaya, Qi Yu, Xumin Liu, and Zaki Malik. This paper gives a case study of a Websenior WSMS system on providing services to the senior citizens in a digital government web environment. The authors propose a composability model for web services, including composability rules as a model, binding, and message composability. The composition soundness concept and a matchmaking algorithm are proposed. The authors also propose to use the score function with exhaustive and greedy search methods to perform the service optimization.

The second paper, “Monitoring Service Systems from a Language-Action Perspective,” is contributed by William N. Robinson and Sandeep Purao. Monitoring is an important concern not only for business processes themselves, but also for the services that comprise these processes. The authors present a framework for multilevel monitoring of these service systems. This paper formalizes interaction protocols, policies, and commitments that account for standard and extended effects following the language-action perspective, and allows specification of goals and monitors at varied abstraction levels.

The third paper, “An Adaptive and Intelligent SLA Negotiation System for Web Services,” comes from Farhana H. Zulkernine and Patrick Martin. This paper proposes a Negotiation Broker (NB) framework which performs adaptive and intelligent bilateral bargaining of SLAs between a service provider a service consumer. The authors define mathematical models to map business level requirements to low level parameters of the decision function, which obscures the complexity of the system from the parties. They also introduce an algorithm for adapting the decision functions during an ongoing negotiation to comply with an opponent’s offers or with updated consumer preferences.

The fourth paper is entitled “Exploiting Mobility Prediction for Dependable Service Composition in Wireless Mobile Ad Hoc Networks” by Jianping Wang. This paper assumes that the service providers can predict their stay time and possible uncertainty in the current environment. This paper proposes two models to characterize the uncertainty, a probability-free model and a probabilistic model to design dependable service composition for these two models. Based on the formulation of the problems, this paper proves that the problems are NP-hard, then presents heuristic algorithms, derives the upper and lower bounds of the problems, and conducts computational experiments to study the effectiveness of the proposed heuristic algorithms.

The fifth paper, “Automatic Generation of Service Availability Models,” is contributed by Nikola Milanovic and Bratislav Milic. The authors present a systematic model-based methodology and a tool for service and business process availability assessment. The proposed method can automatically generate availability models based on the service/process description and technical infrastructure it is executing on. As a result, service level agreements can be tested/simulated or return on investment calculation can be performed, without the need for costly experiments and/or actual investments.

The last paper, “A Delegation Solution for Universal Identity Management in SOA,” is contributed by Yang Zhang and Jun-Liang Chen. The authors propose a practical delegation solution for universal identity management. Specifically, a pseudonym-based signature scheme is designed where pseudonyms are self-generated and unlinkable for realizing user’s privacy. Then, a proxy signature is presented with the pseudonyms as public keys where delegation can be achieved through certificate chains. The security of the proposed scheme is analyzed and proved in the random oracle model.
I hope you like this issue of TSC. I also want to encourage all of you to continuously contribute to TSC as authors, volunteers/reviewers, and promoters. Without the support from YOU, it is unlikely to run TSC in such a great success. I would like to send my special thanks to all the reviewers shown on the Reviewers List at the end of the current issue.

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