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PIK Special Edition on Service-Oriented Computing

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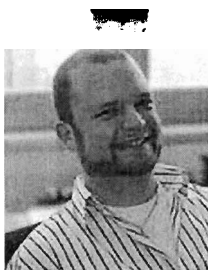
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INTRODUCTION

In recent years, the paradigm of Service-oriented Computing (SOC) emerged within the distributed systems, as well as the software and enterprise engineering disciplines. The core concept of SOC is a "service", a self-describing encapsulation of domain-specific functionalities. SOC promotes a vision of distributed business processes and composite applications based on arrangements of loosely coupled services.

SOC was enabled by the emergence of open internet standards and protocols like Web services based on HTTP and XML. Such standards promise the easy integration and cost-effective adoption of SOC using an existing IT infrastructure. Furthermore, it promises the development of flexible, scalable and manageable applications and compositions that can evolve if the enterprise's demands change. Furthermore, SOC promises business IT alignment as well as the reflection of the enterprises business goals in its IT architecture. Thus, it aims at adapting the IT infrastructure in respect to business demands without disturbing the enterprise's course of business.

The arrangement and management of composite services and applications is an open issue due to the distributed character of those compositions. The problem becomes even more apparent when considering inter-organizational enterprise relationships in form of business processes and their respective IT infrastructures.

Nevertheless, SOC offers a unique way for a cooperation of the computer science and business related disciplines. The cooperation of the business and technology areas leads to various different interesting fields of research to be addressed by enterprises during the development of new business models, in research and standardization as well as by the software industry. A steadily increasing number of research projects related to the emergence of SOC, funded by either private or public bodies, develop new technologies to augment the SOC paradigm. These extensions to the existing body of knowledge range from service management and service definition to the inclusions of semantic information. They represent new approaches for service security, service management and service level management for both single services and service compositions. All these projects show that SOC related technologies and approaches become more mature and widespread, both in research and in enterprise projects.

This special issue addresses some of the open issues in SOC research and presents current research directions in this area. We selected five articles for this special issue, which all discuss a different aspect of Service-oriented Computing and the engineering of services.

TOPICS OF THIS SPECIAL ISSUE

The articles in this special issue are structured according to a basic service lifecycle model illustrated in Fig. 1.

The first article by Stefan Kaetker and Susanne Patig discusses an approach to the model-driven development of service-based business applications as a foundation for service engineering. The authors offer a meta-model as well as modeling guidelines for model-driven development of service-based business appli-
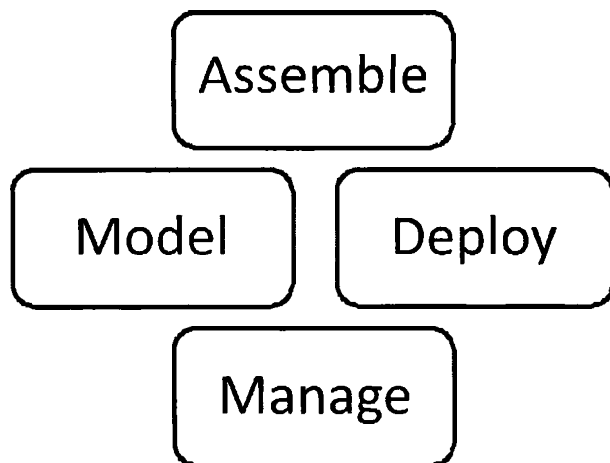
Fig. 1   Basic Service Lifecycle

cations. Furthermore, a governance process ensuring the compliance with the modeling guidelines as well as tool support are introduced and discussed in the context of an industry application.

Following the introduction of an overall model-driven development approach, Stephan Kluth, Tomasz Porzucek, Flavius Copaciu and Werner Zorn focus on aspects of quantitative modeling and analysis using FMC-QE (Fundamental Modeling Concepts for Quantitative Evaluation) in order to model quality aspects of complex systems, especially service-based ones. Moreover, the authors' approach can be used as a foundation for performance prediction of a system, e.g. its throughput or response time. In addition to the introduction of the concept, the FMC-QE modeling approach is furthermore evaluated based on case study research.

The work of Iris Braun, Sandro Reichert, Josef Spillner, Anja Strunk and Alexander Schill also addresses quality issues and challenges in service-oriented infrastructures and systems. Their article discusses the support of non-functional properties in the Internet of Services by the provision of an adequate infrastructure and service provisioning platform supporting the inte-

gration of non-functional requirements into business process descriptions and their execution platforms. Here, enhancements supporting the automatic negotiation of service level agreements are presented. The authors' research is embedded in the THESEUS TEXO project, which is working towards the Future Internet of Services.

Focusing on the monitoring of services at runtime, Markus Schmidt, Jan Schaefer and Reinhold Kroeger present a model-driven software development based approach to ensure service quality by integrating monitoring aspects seamlessly into the modeling phase. The authors' approach supports a late binding of an instrumentation method during deployment time, allowing a decoupling of the model and its implementation. Additionally, the use of standardized monitoring interfaces allows the integration of the monitoring approach in existing monitoring infrastructures.

This special issue closes with an article by Andreas Hinnerichs, Tibor Farkas and Carsten Neumann, in which the authors discuss the application of service-oriented computing technologies, especially Web services to the simulation of mechatronic systems, which can be found for example in the automotive industry. Here, the development of new and complex products depends on in-depth simulation of all involved components. Therefore, simulation engines of different domains need to be coupled in order to support integrated simulations. The authors' framework supports integrated simulations by coupling simulation systems using Web service technology.

SUMMARY

The application of the SOC paradigm to real world scenarios provides research and business challenges both in the present and the future of the distributed systems as well as the software and enterprise engineering disciplines. After reviewing the submitted papers, we are sure that the selected papers indicate a distinctive research focus on the development and provisioning of high-quality services and systems.

We hope that you like the selection of articles in this special issue. Enjoy reading!