Information Systems Development

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Editors

Information Systems Development

Asian Experiences

Foreword by William Wei Song and Shenghua Xu

Springer

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Foreword

(Messages from Program Co-Chairs)

The 18th International Conference on Information Systems Development (ISD2009) is held in Nanchang, China, from September 16 to 19, 2009.

In keeping with the traditions of the conference, ISD2009, which is organized by Jiangxi University of Finance and Economics, aims to provide an international platform for the discussion and exchange of new research ideas on information system development and related among researchers, developers, and users from around the world. The theme of the conference is "Asian Experience".

This year, we received 89 papers from more than 20 counties and regions. These papers have been rigorously reviewed by the Program Committee members, each paper being reviewed by least three reviewers. Finally, 54 papers have been accepted for presentation at the conference, setting an acceptance rate of 61%. The accepted papers are organized for presentation in 14 sessions spanning 9 tracks: "Enterprise Systems – A Challenge for Future Research and Improved Practice", "Business Systems Analysis", "IS/IT Project Management", "Data and Information Systems Model", "Human–Computer Interaction in ISD", "Information Systems for Service Marketing", "Development of Information Systems for Creativity and Innovation", "Model-Driven Engineering in ISD", "Legal and Administrative Aspects of Information Systems Development", "Information Systems Engineering and Management", and "Agile and High-Speed Systems Development".

The conference is privileged to host five keynote speeches delivered by Guoqing Chen (Tsinghua University, China), Jian Ma (City University of Hong Kong, China), Zhi Jin (Peking University, China), Chengqi Zhang (University of Technology, Australia), and Deli Yang (Dalian University of Technology, China). The speeches provide an insight into a variety of research topics including e-Business, Internet-based software development, data mining, and electronic commerce and present challenges on related research issues.

The conference would not have been a success without the hard work of many individuals, including the general co-chairs Guoqin Chen and Qiao Wang, the organizing co-chairs Changxuan Wan, Guoqiong Liao, Bo Shen, Shumei Liao, and Yuansheng Zhong, and others in the organizing committees, thanks for putting

an exceptional programme. We are also grateful for all the PC members and the external reviewers for setting up a high standard for our conference. We would also like to thank the keynote speakers, the track chairs, the authors in particular who have contributed to the success of our conference. We would like to thank our sponsor NSFC. Last but not least, a big "thank you" to Jiangxi University of Finance and Economics for their great effort in organizing the event.

Durham, UK — William Wei Song
Nanchang, China — Shenghua Xu
Program Co-chairs

Preface

(*Messages from the General Co-Chairs*)

On behalf of the organizing committee, we would like to welcome you to the 18th International Conference on Information Systems Development (ISD2009). The purpose of this conference is to provide an international forum for technical discussion and exchange of ideas in information systems area among the researchers, developers, and users from academia, business, and industry.

This is the first time that this conference is held in China. We are most privileged to be hosting this conference. Nanchang is an ancient city full of historical and cultural heritages dating back more than 2,200 years. As the capital city of Jiangxi Province, it is an excellent location for a forum of academic and professional communications and exchange of research ideas, with a side helping of meaningful entertainment and cultural immersion.

In spite of the negative impact of the financial recession starting from 2008 and the prevalence of A/H1N1 Flu, the conference still received many papers from more than 20 counties and regions this year.

This year's conference continues the ISD conferences tradition with an excellent program, consisting of 5 keynote speeches and 54 research paper presentations. The accepted papers have been peer reviewed strictly by three or more experts and selected carefully from 89 submissions across Australia, China (including Hong Kong), Croatia, Czech Republic, Denmark, Finland, Germany, Greece, Hong Kong, India, Ireland, Latvia, Lithuania, the Netherlands, Poland, Spain, Sweden, the UK, and the USA.

We wish to express our gratitude to the programme committee members, external reviewers, track chairs, and all the authors in particular for their excellent contributions of their work.

We would like to thank the International Advisory Committee, Gregory Wojtkowski, Wita Wojtkowski, and Henry Linger for their guidance. We also appreciate the work by the programme co-chairs, William Wei Song and Shenghua Xu; the organizing co-chairs, Changxuan Wan and Guoqiong Liao; the organizing vice-chairs, Bo Shen, Shumei Liao, and Yuansheng Zhong; the finance and registration chair, Jucheng Yang; the local arrangements chair, Shihua Luo; the publication chair, Xiaofeng Du; and the publicity co-chairs, Joe Geldart and Juling Ding, who have done a great job putting together an excellent technical program.

Finally, but none the less, thanks to NSF China, Jiangxi Computer Society, and Jiangxi University of Finance and Economics for their sponsorship and support.

We hope that all of you will find the technical programme of ISD2009 to be interesting and beneficial to your research. We also hope that you enjoy your stay in Nanchang, with time to visit the plethora of historic and scenic locations, such as Tengwang Pavilion, Lushan Mountain, Shanqing Mountain, and leave with a memorable experience of China.

Beijing, China	Guoqing Chen
Nanchang, China	Qiao Wang

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September 16–19, 2009

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Part I
Enterprise Systems – A Challenge for Future Research and Improved Practice

CbSSDF and OWL-S: A Scenario-Based Solution Analysis and Comparison

Xiaofeng Du, William Wei Song, and Malcom Munro

Abstract To tackle the semantic issues of web services, we proposed a comprehensive semantic service description framework – CbSSDF – and a two-step service discovery mechanism based on CbSSDF to help service users to easily locate their required services. In this chapter, we evaluate the framework by comparing it with OWL-S to examine how the proposed framework can improve the efficiency and effectiveness of service discovery and composition. The evaluation is done through analysing the different solutions proposed based on these two frameworks for achieving a series of tasks in a scenario.

Keywords Semantic web services · Concept graph · Service description · OWL-S · Semantic match

1 Introduction

In the last decade, enormous research effort of web services has been spent on service description, discovery [10, 11], and composition [1, 4]. In order to effectively and efficiently perform web service discovery and composition, a comprehensive service description framework is essential. There are several semantic service description frameworks that have been proposed to provide richer service descriptions, such as OWL-S [8], WSDL-S [2], and WSMF [7], to address the semantic issue of web services. The main idea behind the existing work is to build a semantic layer either on the top of WSDL or to be integrated into WSDL to semantically describe the capabilities of web services. By having the semantics, a software agent or other services can reason about what a web service's capabilities are and how to interact with it. However, as we mentioned in [5], there are still some problems

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that remain in the current semantic service description and search, such as insufficient usage context information, precisely specified requirements needed to locate services, and insufficient information about inter-service relationships.

To tackle the problems, in our previous work [5], we proposed a context-based semantic service description framework (CbSSDF) and a two-step service discovery mechanism to improve the flexibility of service discovery and the correctness of generated composite services. In our recent work [6, 12], we improved the CbSSDF to address more sufficient context information in service descriptions. The context information addressed in the framework is the information that can help to understand the usage of a service and the relationship between the service and other services, so-called service usage context (SUC). By considering the SUC information of services, service discovery can be much more flexible and the service composition process can be simplified.

The main purpose of the chapter is to evaluate the framework by comparing it with OWL-S to examine how the proposed framework can improve the efficiency and effectiveness of service discovery and composition. The evaluation is done through analysing the different solutions proposed based on these two frameworks for achieving a series of tasks in a scenario. The reason we choose OWL-S is that it is the most well known and mature semantic web service description framework and also has been submitted to the World Wide Web Consortium (W3C) for assessment to be a standard.

2 Summary of the Context-Based Semantic Service Description Framework

As discussed previously in [5, 6, 12], to fully describe a service, we must address how the service is related to other services and entities in a business domain and under which context the service should be used. The potential relationship between a service and the other services and entities in a business domain is called service usage context (SUC), which we consider as an important aspect of service description. At a conceptual level, SUC is the conceptual relationships between a service concept and other concepts in a business domain, including other service concepts. At an instance level, SUC is the potential interactions between an instance service and other instance services at runtime. The concept of SUC forms the core of CbSSDF.

There are two layers of components in CbSSDF. The first layer is called service conceptual graphs (S-CGs) that represents the conceptual level SUC. The key point to have S-CGs in a service description is that they bridge the gap between the technical details of services and the conceptual explanations of service users' needs. Normally the users (except the domain experts) are much more familiar to conceptual descriptions than stipulated technical information, such as the information addressed in WSDL. Each S-CG in CbSSDF captures a scenario that the described service can participate in so that it can be matched with service users' usage scenarios to locate most suitable services. The conceptual graph formalism [13] is used to represent S-CG because (1) conceptual graph provides both flexible visual diagrams for service description and rigour logic expressions and (2) there are well-developed graph matching algorithms for deriving various relations between concepts and relations, such as conceptual graph projection.

The second layer is called semantic service description model (SSDM) that provides enriched semantic service description. SSDM addresses four types of semantics [3] associated with a service, which are data semantics, functional semantics, non-functional semantics, and execution semantics. The data semantics in SSDM is addressed through semantically annotated inputs and outputs. The functional semantics is captured by a service ontology and a set of pre-conditions and effects. The non-functional semantics is addressed through a set of service metadata. The execution semantics is addressed by a description of the internal structure of a service, which also indicates whether a service is a constituent of another service or a service contains a sequence of services.

Another important feature of SSDM is that it embeds the instance level SUC into service description, which can considerably improve the efficiency of service discovery and composition. The key component that addresses the instance level SUC is a set of common usage patterns (CUPs) [6]. Each CUP is a structure that describes how an instance service can be composed with other instance services in terms of semantic compatibility and data compatibility in achieving a task. The whole set of CUPs collectively represents how the instance service can interact/compose with other instance services in its business domain. Therefore, when an instance service is located, the service composition system can easily know which services are compatible with the located service rather than assuming that the services in the entire service repository are compatible and checking them one by one.

In CbSSDF, Defeasible Logic [9] is adopted as the rule language to describe pre-conditions and effect of services and other service composition rules [6]. Defeasible Logic is an implementation of non-monotonic logic, which provides the agile reasoning mechanism for highly dynamic environment and frequently changing conditions, such as the condition reasoning during service composition. The rules in the CbSSDF are divided into two categories: the general rules and the domain-specific rules. The general rules are used to govern and validate the service composition process. The domain-specific rules are used to describe the pre-conditions and effects of services and the business rules and policies in a specific business domain.

We also proposed an improved service discovery mechanism based on CbSSDF: a two-step service discovery mechanism [5]. The S-CGs in CbSSDF support the service search engine to locate services by concepts and conceptual relations, so in the first step what a service user needs to do is to describe his requirements or usage scenarios in natural language without worrying about any technical details. The search engine will first convert the natural language query into a CG and match with the S-CGs in the service repository to locate the query's relevant services. The located services may or may not be the exact required services. However, it guarantees that these services are relevant to the user's query. The second step is to refine