Introduction to the Special Issue on middleware for Web services

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Abstract: Web services are distributed computing application components implementing the Service-Oriented Architecture (SOA). They are used for Business-to-Business (B2B) integration, Enterprise Application Integration (EAI), e-business process integration and management services. Reusable Web services technologies are implemented in middleware, so powerful middleware for web services is therefore a prerequisite for advanced e-business process integration and management. This special issue contains revised best papers from the 2005 Middleware for Web Services workshop (MWS 2005) held at the EDOC 2005 conference, as well as selected papers from the open call for papers. This issue also contains two regular papers, outside the special issue topic.

Keywords: web service; middleware; performance management; dynamic adaptation.

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1   Introduction

Welcome to the special issue of the *International Journal of Business Process Integration and Management (IJBPIM)* on Middleware for Web Services (MWS)! The majority of this *IJBPIM* issue is devoted to this special topic, although it also contains two papers from the regular *IJBPIM* call for papers.

In the last few years, web services have become a very prominent technology in both the research community and industry. Web services are distributed computing application components implementing the Service-Oriented Architecture (SOA). They rely on Extensible Markup Language (XML) interface description languages, such as the standardised Web Services Description Language (WSDL) and uniform communication protocols, such as the standardised SOAP protocol. Important application areas of web services are Business-to-Business (B2B) integration, Enterprise Application Integration (EAI), e-business process integration and management services. Implementation-independence of web services technologies allows different businesses to collaborate and achieve common business goals despite the fact that the collaborating web services can be distributed over the internet, run on different platforms and implemented in different programming languages. In particular, web services technologies are embedded in products and services of all major computing companies, including IBM, Microsoft, Sun, HP, Oracle and SAP.

Reusable web services technologies are implemented in middleware, so good middleware is therefore a prerequisite for the growing acceptance of the web services technologies. For example, implementation independence of web services is achieved using middleware, such as application servers and/or SOAP engines. In addition, middleware solutions have been proposed to provide, monitor, and manage Quality of Service (QoS) aspects, such as response time, throughput, availability, reliability, security and privacy. QoS is important for web services for several reasons. For example, run-time management (monitoring and control) of QoS for a web service helps to ensure correct operation, attain or surpass QoS levels expected by consumers, discover and fix (or, better, predict and prevent) problems, accommodate change, balance price/performance ratios and maximise profits. QoS negotiation between consumer and web services provider can help in providing QoS levels appropriate for particular consumers. Also, description and publication of QoS in addition to functionality can help in selection between web services providers with the same (or similar) functionality. One of the major challenges that web services middleware faces is to provide appropriate reusable software building blocks for QoS management. Consequently, MWS is a very important topic for advanced e-business process integration and management.

This Special Issue arises from the 2005 MWS workshop (MWS, 2005, http://www.greenpea.net/mws/mws2005/index.html) held at the EDOC 2005 conference in Enschede, The Netherlands. The workshop gathered industrial, academic and government researchers and developers interested in web services and/or middleware technologies. Through an interesting and diverse programme, containing a keynote speech, presentations of peer-reviewed papers and a panel discussion, the workshop contributed to the exchange of knowledge and ideas, dissemination of results about completed and on-going research projects, as well as identification and analysis of remaining open research issues and possible approaches towards their solution. The workshop proceedings were published by the IEEE Computer Society. The workshop and this special journal issue have been sponsored by NICTA (previously known as National ICT Australia). NICTA is funded through the Australian Government's *Backing Australia's Ability* initiative, in part through the Australian Research Council – ARC.

For the Special Issue of *IJBPIM*, papers were invited both from MWS 2005 authors and through an open call for papers. All papers were additionally peer-reviewed by three or four members of the special issue's programme committee, who are internationally recognised experts in this area. The rigorous review process was double-blind. Based on the reviewer comments, we have selected the four best submissions. Two of them came from the open call for papers, while two came from MWS 2005 authors. This issue of *IJBPIM* also contains two papers outside the Special Issue topic, received and independently reviewed through the regular *IJBPIM* call for papers.

The first paper is 'Improving the quality of business and quality of experience in web services through prioritising and scheduling' by Murali Muniyandi, Shonali Krishnaswamy, and Bala Srinivasan from Monash University (Australia). It presents a novel strategy for both satisfying service levels expected by users and improving revenue and throughput of service providers.

The second paper is 'An evaluation of the performance of web services using table driven XML' by Alex Ng from Macquarie University (Australia). This author suggests and evaluates Table Driven XML (TDXML) – a new messaging format that, compared to standard SOAP, provides more compact messages, simpler message structure, and easier access to individual elements. This paper won the best paper award sponsored by NICTA.

The third paper is 'Policy-driven middleware for adaptive web services composition' by Abdelkarim Erradi and Piyush Maheshwari from the University of New South Wales (UNSW) (Australia). The authors studied how to accommodate various changes in operating conditions.

Their solution is based on an extensible set of declarative policy-based adaptation constructs and on a corresponding service management middleware. The paper is a considerable update and extension of their MWS 2005 paper 'AdaptiveBPEL: a policy-driven middleware for flexible web services composition'.

The fourth paper is 'Rule-based business collaboration development and management' by Bart Orriens from Tilburg University (The Netherlands) and Jian Yang from Macquarie University (Australia). They also looked at the problem of how to address the need for agility and dynamics of business processes. Their approach is based on advanced modelling of context of business collaborations and appropriate management/adaptation rules. This is a considerable refinement of their MWS 2005 paper 'Modelling and managing service oriented business collaboration'.

The first of the two papers from the regular *IJBPIM* call for papers is 'An application of augmented MDA for the extended healthcare enterprise' by Val Jones, Aart van Halteren, Dimitri Konstantas, Ing Widya and Richard Bults. The authors are from the University of Twente (The Netherlands), except Dimitri Konstantas, who is from the University of Geneva (Switzerland). Their paper proposes a novel methodology for engineering of mobile healthcare information systems using Body Area Networks (BANs).

The second of the two papers from the regular *IJBPIM* call for papers is 'A secure service-based collaborative workflow system' by Duncan Russell, Peter Dew and Karim Djemame from the University of Leeds (UK). They examine collaborative access to shared grid services in workflows and propose a novel framework that includes collaborative access to service instances.

We are grateful to NICTA for their sponsorship. Further, we sincerely thank Patrick C.K. Hung from the University of Ontario Institute of Technology (Canada), who helped us organise both the MWS 2005 workshop and this Special Issue. Last, but not the least, we appreciate the considerable work done by the members of the special issue's programme committee who publicised the workshop and reviewed papers submitted to the special issue (excluding the two papers from the regular *IJBPIM* call for papers). The list of programme committee members is given at the end of this introduction.

We hope you will enjoy this *IJBPIM* issue and that it will inspire you and others to contribute further to the research and development in the exciting area of MWS and service-oriented computing in general.

2 Members of the programme commitee of this Special Issue

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