

Introduction to the Proceedings of the EDOC 2007 Workshop Middleware for Web Services (MWS) 2007

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Welcome to the Proceedings of the EDOC 2007 workshop Middleware for Web Services (MWS) 2007! This workshop is a follow-up to the MWS 2005 workshop held at EDOC 2005, the subsequent special issue of the International Journal of Business Process Integration and Management (IJBPI), and the MWS 2006 workshop held at EDOC 2006. Similarly to these past venues, the MWS 2007 workshop is sponsored by NICTA (previously known as National ICT Australia).

Middleware plays an important role for XML (Extensible Markup Language) Web services technologies, including SOAP, WSDL (Web Services Description Language), UDDI (Universal Description, Discovery, and Integration), and the numerous WS-* technologies. Reusable Web services technologies are implemented in middleware, so appropriate middleware is a prerequisite for the growing acceptance of these technologies. For example, implementation independence of Web services is achieved using middleware, such as application servers and/or SOAP engines (software that analyzes, processes, and generates SOAP messages). In addition, middleware solutions have been proposed to provide, monitor, and control quality of service (QoS) aspects, such as response time, throughput, availability, reliability, security, and privacy. One of the major challenges that Web services middleware faces is to provide appropriate reusable software building blocks for QoS management. Consequently, middleware for Web services is a very important research and development topic for advanced enterprise distributed computing and e-business process integration and management. This importance is also illustrated in the fact that in addition to the MWS 2005, MWS 2006, and MWS

2007 workshops at IEEE (The Institute of Electrical and Electronics Engineers) EDOC conferences, related Middleware for Service Oriented Computing (MW4SOC) workshops have been organized at the ACM (Association for Computing Machinery) Middleware conferences in 2006 and 2007.

The previous two versions of this workshop, MWS 2005 and MWS 2006, were successful as they contributed to the field through useful exchange of knowledge and ideas, dissemination of results about completed and on-going research projects, improvement of understanding of wider research issues, as well as clearer identification and analysis of remaining important open research issues and possible approaches towards their solution. They gathered industrial, academic, and government researchers and developers interested in Web services and/or middleware technologies, many of whom have not attended previous EDOC conferences. The workshop proceedings were published by the IEEE Computer Society.

The programs of both MWS 2005 and MWS 2006 were interesting and diverse. In addition to presentations of selected peer-reviewed papers describing both mature results and work in progress, the workshops contained keynote speeches and panel discussion sessions. The keynote speakers were Dr. Heiko Ludwig from IBM Research, USA at MWS 2005 and Professor Lionel M. Ni from Hong Kong University of Science and Technology, China at MWS 2006. Both MWS 2005 and MWS 2006 discussion sessions were related to QoS issues in middleware for Web services. The topic at MWS 2005 was "Quality of Service (QoS) Middleware for Web Services: Achieved Results and

Challenges for the Future”, while the topic at MWS 2006 was “Requirements and Challenges for Middleware Supporting Reliability of Web Service Composition”. The keynote speakers and the panelists were praised for the insights they passed to the audience.

MWS 2005 was followed by a special IJBPM journal issue (currently in press) on middleware for Web services, for which papers were invited both from MWS 2005 authors and through an open call for papers. After an additional rigorous double-blind review process, four best submissions were selected. Two of them were papers from the open call for papers, while two were significantly improved versions of MWS 2005 papers.

The goal of this year’s workshop, MWS 2007, is to further contribute to the research and development in this exciting area, using the workshop models of MWS 2005 and MWS 2006. We have again composed an interesting and diverse program, containing presentations of selected long (mature work) and short (work-in-progress) peer-reviewed papers, a keynote speech, and a discussion session. Research papers were selected after a thorough and competitive peer-review by workshop Program Committee members. Every paper was reviewed by 3 or 4 international experts from the Program Committee, whose identity was not revealed to the authors. The best 5 long papers and 3 short papers were selected for publication in these workshop proceedings and presentation at the MWS 2007 workshop.

The MWS 2007 keynote is “Privacy Issues in Middleware for Service-oriented Applications” by Patrick C.K. Hung from the University of Ontario Institute of Technology, Canada. Prof. Hung is one of the leading international experts in service-oriented computing, as well as the EDOC community. His keynote overviews open research issues and future research directions related to privacy issues in the context of complex interactions between heterogeneous, cross-organizational entities and middleware in Web service systems. The keynote abstract is a part of these proceedings.

The first long paper is “BFT-WS: A Byzantine Fault Tolerance Framework for Web Services” by Wenbing Zhao from Cleveland State University, USA. It discusses the important area of Web service reliability/dependability, particularly to Byzantine faults (arbitrary faults during algorithm execution by distributed systems). The author proposes and discusses the BFT-WS framework designed to provide tolerance to Byzantine faults (including crash faults as a special case), on top of the standard SOAP messaging framework. Its prototype is implemented as a pluggable module within the popular Axis2 SOAP engine, requiring minimal

changes of existing applications and incurring only moderate run-time overhead.

The second long paper is “Usage Tracking Components for Service-Oriented Middleware Systems” by Daniel Skrobo, Klemo Vladimir, and Sinisa Srblic from the University of Zagreb, Croatia. The authors present an architecture and performance evaluation of middleware components for monitoring of user activities in service-oriented environments. Their architecture contains two classes of loosely-coupled services: Local Usage Tracking (LUT) services that record service invocation events by means of SOAP message interception, and Global Usage Tracking (GUT) services that enable access to stored usage tracking records. For communication of usage records, custom-designed versions of push and pull protocols are used.

The third long paper is “An Economy Driven Resource Allocation Middleware for Grid Workflow” by Pengcheng Xiong and Yushun Fan from Tsinghua University, China. They study economy-driven resource allocation in Grid service environments and model the problem as the Multiple Choice Knapsack Problem (MCKP). Based on such market model of grid resource management architectures and Pisinger’s algorithm, they designed a resource allocation optimization algorithm that minimizes average turnaround time. The Grid workflow management system CIMFlow is extended with support for this algorithm.

The fourth long paper is “Alignment of Authentication Information for Trust Federation” by Zhengping Wu and Alfred C. Weaver from the University of Virginia, USA. They examine federation of authentication information across trust domains. Among other areas, this is an important issue in metadata exchange with security tokens for Web services. The authors’ solution is based on wavelet transformation to manipulate authentication information in the federation process.

The fifth long paper is “Towards a Privacy Policy Enforcement Middleware with Location Intelligence” by Yi Zheng from the University of Ontario Institute of Technology in Canada, Dickson K.W. Chiu from Dickson Computer Systems in Hong Kong, Hongbing Wang from Southeast University in China, and Patrick C.K. Hung from the University of Ontario Institute of Technology in Canada. Their paper presents a new privacy access control policy enforcement model for Web service systems, as well as how it can be realized with middleware. This solution extends role-based access control (RBAC) and provides location awareness. Extensions of the eXtensible Access Control Markup Language (XACML) and WS-PolicyConstraints are used to express such privacy policies.

The first short paper is “Metadata Support for Transactional Web Services” by Maciej P. Machulak, Jonathan J. Halliday, and Mark C. Little from JBoss division of Red Hat, USA. It describes an annotation-based framework for automated management of compensations extended transactions.

The second short paper is “Network-Centric Middleware for Service Oriented Architectures across Heterogeneous Embedded Systems” by Andreas Wolff, Stefan Michaelis, Jens Schmutzler, and Christian Wietfeld from the University of Dortmund, Germany. This paper reports the on-going work on the MORE middleware for integrating embedded systems into Web service systems. Some of the main innovations of MORE are a policy-based group management service, use of diverse new connectors for communication between Web services, and μ SOA messaging that is more lightweight than SOAP messaging.

The third (and final) short paper is “Web Services Interfaces and Open Standards Integration into the European UNICORE 6 Grid Middleware” by Morris Riedel et al. from John von Neumann Institute for Computing in Germany, Fujitsu Laboratories of Europe in the UK, T-Systems Corporation in Germany, CINECA in Italy, Torun Nicolaus Copernicus University in Poland, and Intel Corporation in Germany. They overview the new version 6 of the open-source UNICORE Grid middleware. One of the main characteristics of UNICORE 6 is that several proprietary solutions present in version 5 were replaced with solutions based on Web service technologies. This led to improvements in interoperability, usability, and compliance with industry standards.

The workshop will also contain the discussion session “Impact of Various Execution Environments on Middleware for Web Services”. The use of Web service requesters and providers executing in diverse executing environments is increasing rapidly. On one side of the spectrum are mobile and/or embedded environments, somewhere in the middle are the traditional business server environments, while on the other end of the spectrum are Grid computing systems. Embedded environments and many mobile environments are characterized with limited resources, such as processing power, memory, communication bandwidth, electrical energy. Mobility brings a number of issues and opportunities, such as location updates and context-awareness. Among the issues with increased importance for Web services in executing Grid systems are virtualization and instance lifecycle management. Due to these and other issues, middleware for Web services executing in one type of execution environment might require significant modifications to accommodate other

execution environments. While many MWS 2007 workshop participants already gained significant experience about these issues, their impact, and possible solutions (as well as non-solutions), there are still many unknowns. Thus, the goal of this discussion session is to facilitate exchange of knowledge, experiences, ideas, and opinions in this important area.

We sincerely thank NICTA for their sponsorship. Further, we are grateful to the members of the EDOC 2007 committees and, particularly, the workshop chairs Aniruddha Gokhale from Vanderbilt University, USA and Vijaykumar Rachamadugu from the MITRE Corporation, USA, as well as the general chair Dr. Donald W. Sparrow Jr. from the MITRE Corporation, USA, for their help in organizing the workshop. Last, but not the least, we acknowledge the members of the MWS 2007 workshop Program Committee for their help in publicizing the workshop and reviewing submitted papers. The list of Program Committee members is given at the end of this introduction.

We hope that the papers, presentations, and discussions at MWS 2007 will inspire you to contribute further to the research and development in the exciting area of middleware for Web services and service-oriented computing in general.

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