Web services have become more and more popular in the research community as well as industry. Web services have cost on one hand, and they also produce benefit on the other hand. Like any for-profit organizations, Web services providers use resources to provide services to requestors in return for benefits. On the other side, Web services requestors pay for services from providers in return for benefits as well. This special issue brings four distinguished papers from the 2003 International Conference on Web Services (ICWS 2003) held in Las Vegas, Nevada, on June 23-26, 2003 and the 2003 International Conference on Web Services – Europe (ICWS-Europe 2003) held in Erfurt, Germany, on September 23-24, 2003.

The first paper is “An Extensible Workflow Management Architecture with Web Services”. Jang et al. present an extensible workflow management architecture based on Web services and object-oriented techniques. The proposed architecture contains three components: the Open Kernel Framework, the Universal Resource Manager, and the Process Definition Publisher. The concepts developed in this paper are useful and practical in developing a workflow engine to support Web services.

The second paper is “Web Service Business Context - The Normative Perspective”. Marjanovic discusses the normative perspective of the Web services business context with the business entities and their relationships. The normative perspective deals with responsibilities, rights and obligations of both Web services providers and users. In particular, Marjanovic’s work brings out the importance of a Web services agreement model in the business context. One can imagine that an agreement is a binding contract between two or more parties, defining the set of responsibilities, rights and obligations in a business process. This reduces uncertainty associated with the interactions between the parties. In fact, the Web services agreement model has been discussed in the research community for a while.

The last two papers are related to two important research issues in Universal Description, Discovery and Integration (UDDI). Referring to the publish and find model in Web Services Architecture
(Mohen, 2002), one can imagine that Web services providers publish their service descriptions in UDDI registries. UDDI registries are used to support the description and discovery of: (1) businesses, organizations, and other Web services providers, (2) the Web services they make available, and (3) the technical interfaces to access those Web services (UDDI, 2002). In the current practices, a UDDI entry is optional to Web services. A service description can be published using a variety of mechanisms. These various mechanisms provide different capabilities depending on how dynamic the application using Web services is intended to be. The service description may be published to UDDI registries using different publication mechanisms.

Referring to the third paper, “Merkle Tree Authentication in UDDI Registries,” Betino et al. present a Merkle Hash Trees approach for tackling the trust issues between different parties in UDDI registries. The Merkle Hash Trees approach provides a new authentication mechanism for UDDI registries, which is different from the traditional techniques such as XML Signature. Next, in the last paper, “QoS-Aware and Federated Enhancement for UDDI,” Chen Zhou et al. present a framework of UX (UDDI eXtension) that facilitates Web services requestors to discover Web services with some Quality of Service (QoS) indicators. Specifically, this paper attempts to present two efforts in UDDI. One is QoS-aware UDDI registry by summarizing QoS reports received from service requestors. Another one is the federated discovery ability among the UDDI registries federation. One especially important research topic is briefly mentioned in this paper as follows:

“As more and more services appear on the web, service requesters are presented with a group of service offers providing similar services. Different service offers may have different qualities of service. This will require sophisticated patterns of negotiation. For example, the trade-offs between quality and cost, or invocation of another trade service determining the QoS of various service offers. Current UDDI registries are neither accountable nor responsible for the QOS descriptions in service offers.”

In the recent Web services research area, there are increasing demands and discussions about negotiation technologies for supporting different Web services applications. Negotiation is a decision process in which two or more parties make individual decisions and interact with each other for mutual gain (Thompson, 1998). Proposals are sent to other parties, and a new proposal may be generated after receiving a counter-offer. The process continues till an agreement or a deadlock is reached, or even one or more parties quit. In general, negotiation activities include the tasks of problem definition, generation of alternatives, evaluation of alternatives, preference modeling and consensus building (Meister, 1993). Thus, a more sophisticated business model with negotiation feature is required for this challenging Web services research area. In general, there are three important tasks to automate this negotiation process between Web services providers and requestors: (1) formalize the negotiation process, (2) develop an XML negotiation language for defining negotiation message, negotiation protocol and negotiation decision making, and
(3) incorporate negotiation support technologies into the Web services architecture (W3C, 2002). For introducing such a challenging research topic, this preface briefly overview the research issues of a Web services negotiation and agreement model.

AN EXPECTED TECHNOLOGY IN WEB SERVICES

This section shows a variety of evidence to support the idea that a Web services negotiation and agreement model is required in Web services. For example, WS-Policy (IBM, 2002) provides a grammar for expressing Web services policies. WS-Policy is used to specify policy information on a broad range of service requirements, preferences, and capabilities. The WS-Policy is represented by a policy expression that is an XML Infoset representation of one or more policy statements. The WS-Policy includes a set of general messaging-related assertions defined in WS-PolicyAssertions (IBM, 2002) and a set of security policy assertions related to supporting the WS-Security specification defined in WS-SecurityPolicy (IBM, 2002). But nevertheless the current WS-Policy specification also mentions that WS-Policy by itself does not provide a negotiation solution for Web services; negotiation supports between a Web services requestor and provider on an agreement about security requirements and services could be foreseen for WS-Policy in the future.

Next, World Wide Web Consortium (W3C) mentions in the Web Services Architecture Usage Scenarios (W3C, 2002a) document that the current SOAP 1.2 specification does not provide any assertion to specify appropriate QoS mechanisms. And W3C also requires that the specification of the QoS extension has to include negotiations in the future. Further, the W3C Platform for Privacy Preferences Project (P3P) provides a language called P3P Preference Exchange Language 1.0 (APPEL1.0) that is used to express the user’s preferences for making automated or semi-automated decisions regarding the acceptability of machine-readable privacy policies from P3P enabled Web-sites (W3C 2002b). Though the APPEL 1.0 specification mentions that the current APPEL needs not be capable of expressing negotiation strategies, it is believable that negotiation technologies will be helpful to enhance privacy practices for P3P (W3C, 2002c).

Furthermore, the OASIS ebXML Collaboration Protocol Profile and Agreement Technical Committee (OASIS, 2002) has formed an auto-negotiation sub-team since August 2001. Their primitive goal is to automate the negotiation process between two negotiation parties for bargaining on different technical issues in the context of Collaboration-Protocol Profile (CPP). As a result, an agreement between two negotiation parties is expressed in the format of Collaboration-Protocol Agreement (CPA). In addition, they are also planning to migrate their work to include negotiation of higher-level issues such as business parameters and legal matters. Their work mainly focuses on the CPP and CPA templates. Similarity, the Global Grid Forum (GGF) has recently been developing an agreement based Grid Service Management (OGSI-Agreement) model for managing negotiation of Grid services and other applications or resources (GGF, 2003). The OGSI-Agreement model
defines optional negotiation terms suitable for use as metadata in domain-specific term languages, and optional usage terms using the WS-Policy for adding meta-data to agreement terms expressed as policy assertions. OGSI-Agreement is an ongoing research activity and it is worth keeping an eye on.

Although the negotiation issues vary from one business domain to another, one can imagine that the number and nature of the issues are alike or fixed in a specific negotiation domain. Thus, the negotiation messages exchanged between two negotiation parties include a set of predetermined issues, and a negotiation template is composed of those issues. As a result, the negotiation template is the initial layout of an agreement between two negotiation parties that contains a set of service level indicators such as response time and availability with a target level to achieve. A service-level agreement (SLA) is a formal contract between a Web services requestor and provider guaranteeing quantifiable issues at defined levels only through mutual concessions (Sahai et al., 2002). The negotiation issues are described as SLA parameters, and the SLA parameters are based on the domain specific vocabularies. W3C also emphasizes the important role of SLA in the selection of QoS (W3C, 2002a). Up to this moment, W3C does not have any working group for modeling Web services negotiation and agreement. According to some existing SLA specifications, one potential solution that can be applied in this model is Web Service Level Agreement (WSLA). In addition, WSLA even provides an extensible mechanism to include domain specific vocabularies (Ludwig et al., 2003).

All this evidence creates a new challenge to create a Web services negotiation and agreement model in the research community. As a result, the quality of all four papers demonstrates the ability of the Web services research community to take up any research challenges in the future.

REFERENCES


ABOUT THE AUTHORS:

Patrick C.K. Hung is currently working as a Visiting Assistant Professor at the Department of Computer Science in the Hong Kong University of Science and Technology, and Patrick will be joining the Business School as an Assistant Professor at a new university in Canada called the University of Ontario Institute of Technology in July 2004. Before that, he was working as a Research Scientist with Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia. He has prior industrial experience in e-business projects in North America and Hong Kong. From 2000 to present, Patrick has been serving as a panellist of the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs of the National Science Foundation (NSF) in the USA. He is an executive committee member of the newly formed IEEE Technical Community of Services Computing (TCSC) and the Publicity Co-chair of the IEEE International Conference on Web Services (ICWS), a W3C member at the P3P Working Group, and also an Associate Editor and editorial board member in several international journals. Patrick has a Ph.D. and Master of Philosophy Science, both in Computer Science, from the Hong Kong University of Science and Technology, Hong Kong. Further, he has a Master of Applied Science in Management Sciences from the University of Waterloo, Ontario, Canada. He did his Bachelor of Science in Computer Science at the University of New South Wales, Sydney, Australia.

Liang-Jie Zhang is a Research Staff Member at IBM T.J. Watson Research Center. Currently he is part of the e-business solutions research team with a focus on collaborative business process integration and management innovations. He is actively creating novel technologies in the field of services computing (i.e., Web services, grid/utility computing, business process integration and management) for e-business On Demand. Dr. Zhang has numerous patents and about 70 published papers. He is an IEEE Senior Member and the Founding Chair of the IEEE Computer Society Technical Community for Services Computing (TCSC). He is the General Chair of the 2004 IEEE International Conference on Web Services (ICWS 2004) and the General Co-chair of the 2004 IEEE International Conference on Services Computing (SCC 2004) and the 2004 IEEE Conference on E-Commerce Technology (CEC 2004). Currently, he is the Editor-in-Chief of the International Journal of Web Services Research (JWSR), the first academic journal focusing on Web services. Liang-Jie received a B.S. in EE at Xidian University in 1990, and then at Xi’an Jiaotong University, an M.S. in EE in 1992, and a Ph.D. in Pattern Recognition and Intelligent Control in 1996 at Tsinghua University.