

## Capacity-Aware Middleware for Web Services

Middleware for Web Services (MWS) 2005 Keynote

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### Abstract

*As the Web services interoperability specification stack is maturing and implementations are available in open source and commercially, one of the next issues to be addressed is the one of service capacity, in particular in a cross-organizational environment. Only in centrally managed environment can we assume that there will always be enough Web service capacity to service all clients at a defined level of service because we can anticipate client demand and provision resources correspondingly.*

*However, this doesn't apply in a decentralized and cross-organizational setting. Web service providers cannot accommodate large changes in Web service consumption without sacrifices of performance. Likewise, a service consumer wants to make sure to actually receive a service at a specific performance and availability level. Both, the requirement of a service provider to anticipate demand and the need of a service consumer to ensure performance QoS levels require a change in binding paradigm. Rather than just discovering a service and binding to it, a customer organization will reserve service capacity from one or more service providers prior to using a service referring to the capacity reservation.*

*Managing capacity dynamically, particularly on the side of a service client, is a typical middleware issue. Managing capacity on a per-client basis presents too much overhead for the implementation of Web service client applications and too much protocol overhead for executing one or few Web services calls. Client implementers like the middleware to support the application to acquire service capacity at QoS levels required and manage how multiple clients use the capacity without being exposed to other clients' behavior.*

*This keynote address discusses novel requirements for Web services middleware related to service capacity acquisition, management and consumption. We categorize applications according to their resource*

*awareness and propose different system architecture alternatives assigning responsibilities for capacity-related decisions to client applications and middleware in different ways. Bringing capacity considerations from systems management to Web services middleware is a rather novel thought, triggered by the requirement of flexibility and dynamics in loosely coupled Web services. Rather than presenting ready made solutions, this keynote wants to raise awareness of the research issue, point to potential solution approaches, but mainly wants to encourage further work in this fruitful domain.*

### Biography

Dr. Heiko Ludwig is a Research Staff Member at IBM's T.J. Watson Research Center, where he was a visiting scientist since June 2001. As a member of the Internet Infrastructure and Computing Utilities department he works in the field of autonomic service-oriented computing, primarily addressing issues of dynamic resource acquisition and quality of service management in cross-domain service-oriented architectures, including the Grid. This includes contributions to policy representation and management, agreement representation and implementation, and the role of agreements in service binding and resource acquisition. He represents IBM in the GGF GRAAP working group, working on the WS-Agreement specification.

Prior to that he was a Research Staff Member at IBM's Zurich Research Laboratory where he was working on cross-organisational distributed systems, service outsourcing, electronic contracts, outsourcing-related security aspects, and service modelling. From 1992 to 1996 he was a research and teaching assistant at the department of Office Automation at the Otto-Friedrich University Bamberg, Germany. During that time he worked on the integration of workflow and collaborative applications. He holds a Master's (Diplom) degree (1992) and a PhD (1997) in computer science and

business administration from Otto-Friedrich University Bamberg, Germany.

He published a book and multiple book chapters, numerous journal articles and conference papers, acted in program committees, and organized workshops in

the area of CSCW, workflow management, e-business infrastructures, contracts and policies. Heiko guest edited multiple journal issues, serves on editorial boards, and gave numerous invited talks at conferences, workshops and universities.