

# ICWE Tutorial

## Title

Web services, their composition,  
and their impact on application structures

## Schedule

Monday July 16th, 9:00 to 12:30

## Presenter

Prof. Dr. Frank Leymann  
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Frank Leymann is a full professor of computer science and director of the Institute of Architecture of Application Systems at the University of Stuttgart, Germany. He was appointed IBM Distinguished Engineer in 2000 and elected member of the IBM Academy of Technology in 1994. Before accepting his professor position he worked for two decades for IBM Software Group building database and middleware products: Especially, he is the father of IBM's workflow product set. He was a co-architect of IBM's entire middleware stack as well as head Architect of IBM's On Demand software strategy. From the very beginning, Frank was one of 4 IBM Architects in charge of IBM's Web Service technology. He is co-author of many Web Service specifications. Two of his research projects funded by the European Union deal with Semantic Web Services.

## Topic

The origin of Web service technology (making Enterprise Application Integration EAI much easier) is discussed, such that the problems to be solved by Web services are understood. The key standards for Web services are presented: SOAP, WSDL, WSPolicy, BPEL, and WS-Coordination. SOAP is the messaging container for exchanging application payload and metadata between a requestor and a Webservice. WSDL allows to describe the functional capabilities of a Web service. WS-Policy provides a grammar and container for specifying non-functional properties of Web services. In order to compose more complex Web services from already existing services, BPEL is used. WS-Coordination is needed for agreement between ad hoc collections of Web services.

The relation between these standards is described and how they are reflected in corresponding middleware ("service bus"). The role service discovery is worked out and how this results in virtualization of functionality. The upcoming importance of semantic Web technology (RDF, OWL, &hellip;) for discovery is explained. A quick review on the goals of Grid computing (i.e. virtualization of compute resources) will make clear why Grid infrastructure and service bus currently converge, and what the key ingredients of this convergence are. The role of business processes (BPEL) in composing applications is described. Two-level-programming, as paradigm for such compositions, is explained.

The impact of the resulting application structure for outsourcing (parts of) applications will become clear. Required technology for supporting outsourcing in a dynamic fashion will be sketched (provisioning, utility computing). Actual trends in extending BPEL to broaden its applicability are sketched at the end of the tutorial: supporting human interactions (BPEL4People), supporting subprocesses (BPEL-SPE), and combining semantic Web services with BPEL-BPEL4SWS).