



# Middleware for Heterogeneous and Distributed Information Systems

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## Course Outline (1)

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- Chapter 1: Motivation
  - Developing distributed information systems
  - Enterprise Application Integration
  - B2B-Integration
- Chapter 2: Distributed Information Systems
  - Layers, architecture, interaction types
- Chapter 3: DB-Gateways
  - ODBC, JDBC, SQLJ
- Chapter 4: Remote Procedure Calls and Distributed Transactions
  - RPC concepts
  - Remote Method Invocation
  - Distributed Transactions
  - Transactional RPCs
  - X/Open DTP

## Course Outline (2)

- Chapter 5: Application Server Middleware
  - RPC middleware infrastructure
  - TP Monitors
  - Object Brokers and Object/Component Transaction Monitors
- Chapter 6: Object Persistence, Relationships and Queries
  - Concepts and approaches (explicit, implicit, orthogonal persistence)
  - Support in application server middleware (CORBA persistence, EJB CMP, Java Data Objects)
- Chapter 7: Security and Connectors
  - Security features and basic concepts
  - Security support in application server middleware
  - Connectors: Accessing Enterprise IS from application servers
- Chapter 8: Web-based Information Systems
  - Web-based DB access architecture
  - Client-side vs. server-side access
  - Session state management
  - SQL/HTML integration

## Course Outline (3)

- Chapter 9: Message-Oriented Middleware
  - Asynchronous transaction processing
  - Message Queuing
  - Message Brokering
  - Databases and Message Queuing Systems
- Chapter 10: Wrappers and External Data
  - Wrapper-based data federation (Garlic, SQL/MED)
  - Data-links for managing external data
- Chapter 11: Data Replication Middleware
  - Replication middleware uses and architecture
  - Change propagation and ownership strategies
- Chapter 12: Business Process Modeling and Workflow Management
  - Business Engineering
  - Workflow Management Systems
  - WF and Transactions
- Chapter 13: XML
  - Fundamentals
  - XML data processing (XPath, XQuery, SQL/XML)

## Course Outline (4)

- Chapter 14: Web Services
  - Service Oriented Architecture
  - Invocation (SOAP), Description (WSDL), Discovery (UDDI)
  - Web Services Support in Middleware Platforms
  - Transactions and Coordination
- Chapter 15: Web Service Composition
  - Web Services Composition and Choreography
  - BPEL4WS
- Chapter 16: e-Business Coordination, Collaboration and Integration
  - RosettaNet
  - Relationship to WS standards
- Chapter 17: Web Services – Additional Topics
  - Security
  - DBMS and Web Services
  - Grid Computing

## Books (1)

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- Melton, J., Eisenberg, A.: Understanding SQL and Java Together - A Guide to SQLJ, JDBC, and Related Technologies, Morgan Kaufmann, San Francisco, 2000
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- CORBA
  - CORBA services specifications at [http://www.omg.org/technology/documents/corbaservices\\_spec\\_catalog.htm](http://www.omg.org/technology/documents/corbaservices_spec_catalog.htm)
- Java Data Objects (JDO)
  - <http://java.sun.com/products/jdo/>
  - <http://jcp.org/aboutJava/communityprocess/maintenance/jsr012/index2.html>
- Web-based Information Systems
  - Loeser, H.: Techniken für Web-basierte Datenbankanwendungen - Anforderungen, Ansätze, Architekturen, in: Informatik - Forschung und Entwicklung 13(4), Springer, 1998, pp. 196-216. at <http://www.dvs.informatik.uni-kl.de/pubs/papers/Loe98.IFE.html>
- Databases and Message Queuing Systems
  - S. Doraiswamy, M. Altinel, L. Shrinivas, S.L. Palmer, F.N. Parr, B. Reinwald, C. Mohan: Reweaving the Tapestry: Integrating Database and Messaging Systems in the Wake of New Middleware Technologies, in T. Härder, W. Lehner (Eds.): Data Management in a Connected World, LNCS 3551, Springer 2005: 91-110
- Garlic
  - M. T. Roth, P. Schwarz: Don't Scrap It, Wrap It! A Wrapper Architecture for Legacy Data Sources", VLDB'97

## Additional References (2)

- SQL/MED
  - Jim Melton, Jan-Eike Michels, Vanja Josifovski, Krishna G. Kulkarni, Peter M. Schwarz: SQL/MED - A Status Report. SIGMOD Record 31(3): 81-89 (2002) at <http://www.sigmod.org/sigmod/record/issues/0209/jimmelton.pdf>
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