



# Workflows und Web Services

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## Types of E-Business

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<b>Business To Consumer (B2C)</b>	<b>Business To Business (B2B)</b>	<b>Intra Business</b>
<ul style="list-style-type: none"><li>• Relation between enterprise and customers</li><li>• Sales-related aspects are predominant, like product presentation, advertising, service advisory, shopping</li></ul>	<ul style="list-style-type: none"><li>• Relation between processes of different enterprises</li><li>• Predominant are relation to suppliers, and customer relations to other enterprises like industrial consumers, retailers, banks</li></ul>	<ul style="list-style-type: none"><li>• Electronic organization of internal business processes, like realization within workflow systems</li></ul>

## B2B - Current Situation

- Traditional B2B has focused on well-defined, standard message formats and protocols (e.g., RosettaNet, cXML)
  - Ad hoc B2B occurs today via XML over HTTP
- How to publish business functions to customers, partners and suppliers?
  - E.g. access to reservation systems, quote systems
  - Programmatic access to a service, independent of underlying implementation and client software
- Technologies such as Corba, DCOM, EJBs, etc. barely present in this context

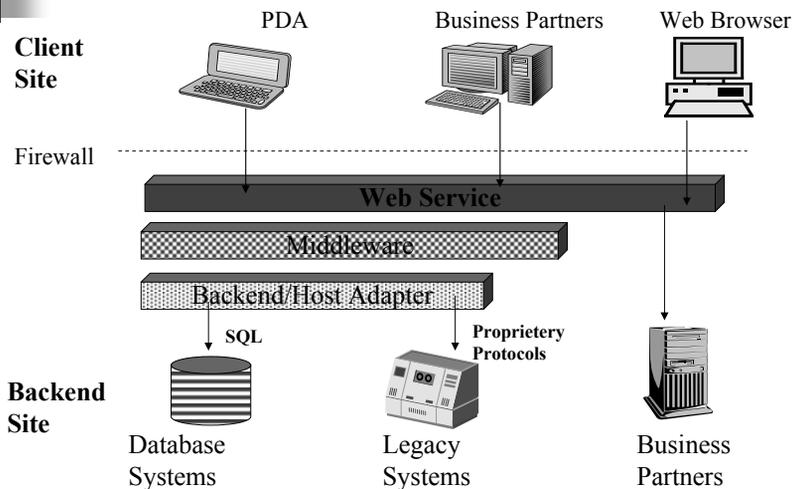
## Web Services

- New distributed computing platform built on existing infrastructure including XML & HTTP
  - Web services are for B2B what browsers are for B2C
- Self-contained, self describing, modular service that can be published, located and invoked across the web
  - Refer to open standards and specifications:
    - component model (WSDL)
    - inter-component model communication (SOAP)
    - discovery (UDDI)
  - Platform- and implementation-independent access
  - Described, searched, and executed based on XML
  - E.g. credit card validation, airline schedules, rental car.
- Enable component-oriented applications
  - Loose coupling from client to service
  - Enable to integrate legacy systems into the web
  - Useful for other distributed computing frameworks such as Corba, DCOM, EJBs

# Web Services: Examples

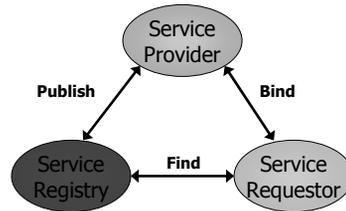
- Stock information
  - Current stock value of a particular stock within a portfolio application
- Proof reading
  - Proof reading for a certain document
- Order service
  - Automatic order for a given product ID and quantity
- Travel planning and organization
  - Services for car rental, flight reservation, and hotel booking

# Web Service System Architecture

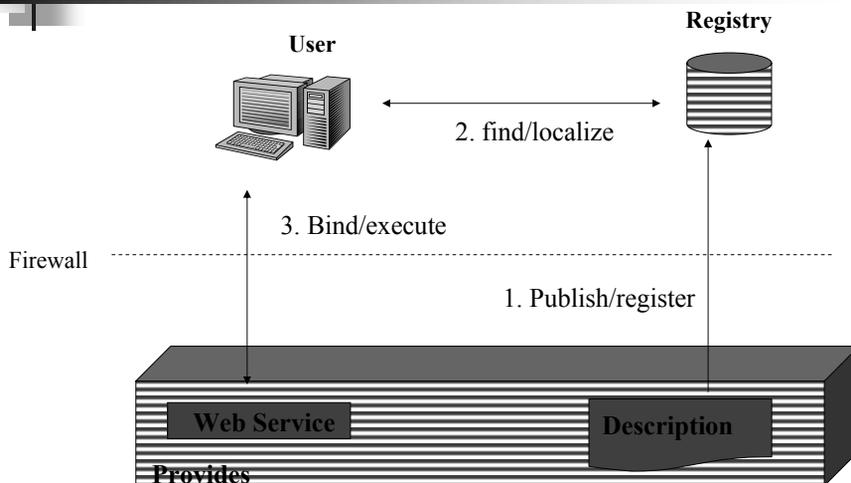


# Service-Oriented Architecture (SOA)

- Service Requestor
  - Finds required services via Service Broker
  - Binds to services via Service Provider
- Service Provider
  - Provides e-business services
  - Publishes availability of these services through a registry
- Service Registry
  - Provides support for publishing and locating services
  - Like telephone yellow pages



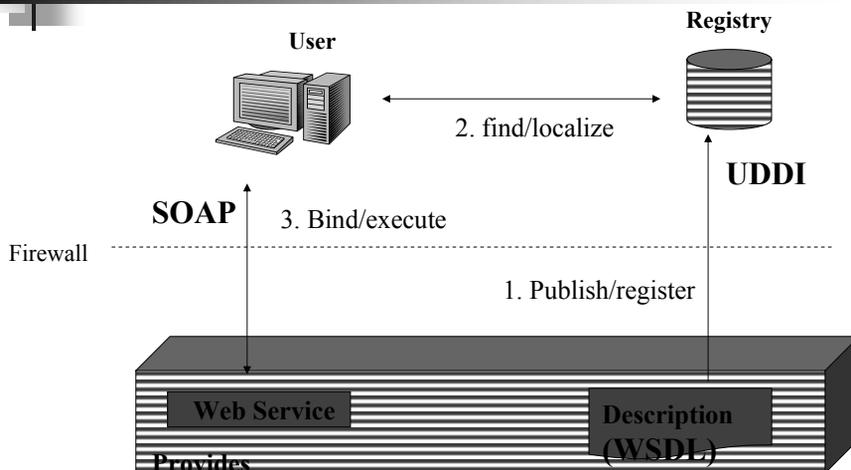
# Web Service Model



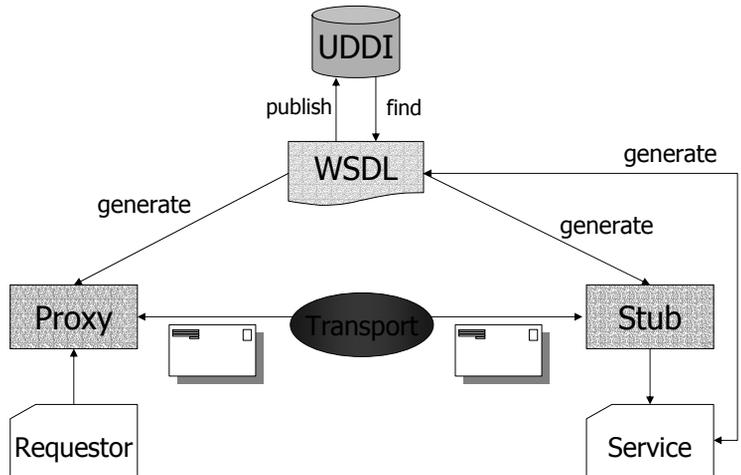
# Standards

- UDDI
  - Universal Description, Discovery and Integration
  - Registry of and search for web services
- SOAP
  - Simple Object Access Protocol
  - Communication protocol
- WSDL
  - Web Services Description Language
  - Description of a service's functionality
- XML
  - eXtensible Markup Language
  - Underlying basic representation approach

# Web Service Model (cont.)

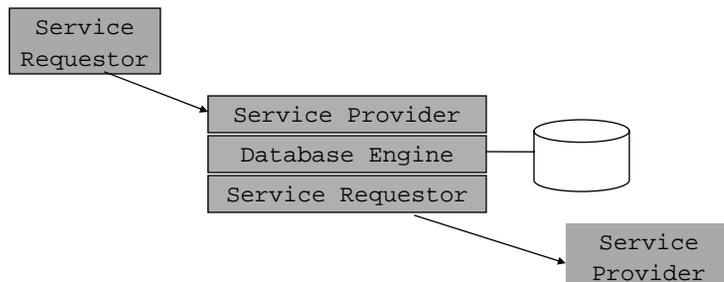


## WS Tooling Principles



## Databases and Web Services

- Information Integration and dissemination
- Database as web service requestor
  - Invoking web services to process my data or access other data sources
- Database as web service provider
  - Offering my data as service (making it easy)



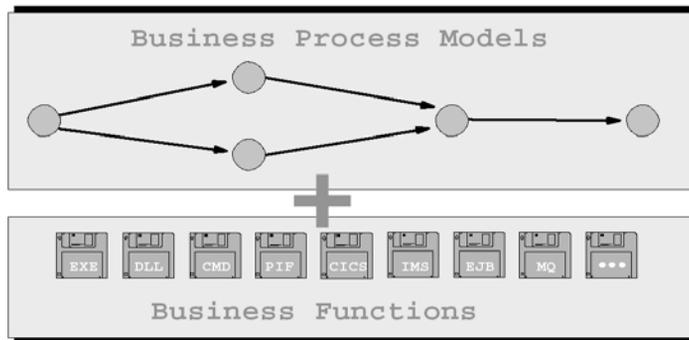
## Web Services Today

- Web services have matured
  - Intranet usage is much wider than Internet usage
  - See <http://www.xmethods.net> for sample Internet services
- Recent extensions or work in progress
  - Web Services Security
  - XML Digital Signature
  - XML Encryption
  - Authentication
  - Transaction management
  - ...
- Workflows/Business Process Modeling
  - Orchestration of web services
  - Vital for B2B integration
  - Recent specifications proposed by Microsoft, IBM, BEA

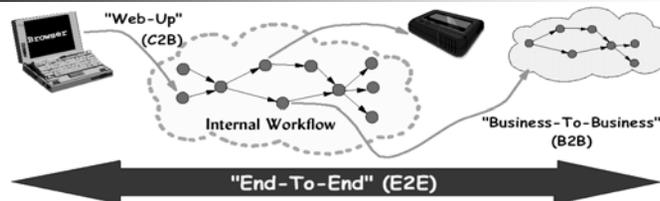
## Workflow Technology

- Companies use computers to support their business,
  - most frequently
- The way to do business is prescribed via a business process,
  - very often
- Applications support business processes and have to ensure compliance with business processes
  - => Application = Business Process + Business Functions
- Changes in how to perform business must be reflected as soon as possible in applications
- A workflow is a business process in execution (an instance of a process model) in a computing environment
  - Not all parts of a process are run in a computing environment - some processes are not run on a computer at all!
  - Often, "workflow" and "process" is identified

# Workflow-Based Applications: Structure

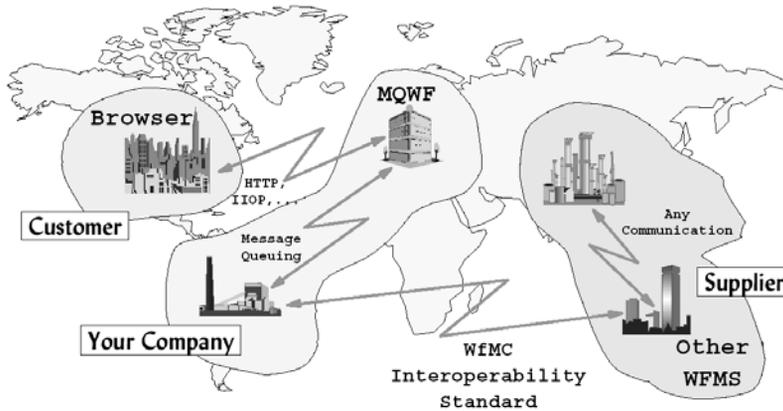


# Workflows And External Communications



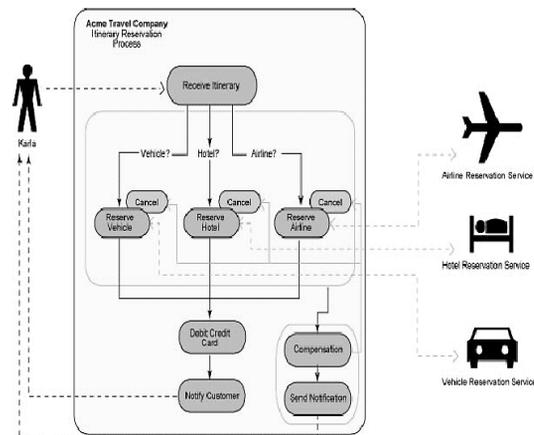
- Customers invoke company's applications to perform certain steps of the business process
  - E.g. place an order, inquire status,...
  - Company's applications must get a browser-based front-end for that purpose ("web-up")
- Workflow activities may directly communicate with the outside
  - Send e-mail, faxes, messages,...
- Workflow activities may trigger actions in another company
  - Simple invocation of program or start of another workflow ("subprocess" from invokers point-of-view)
  - Such "business-to-business" scenarios are the base for realizing sophisticated "supply chains"

# Virtual Enterprise: Scenario



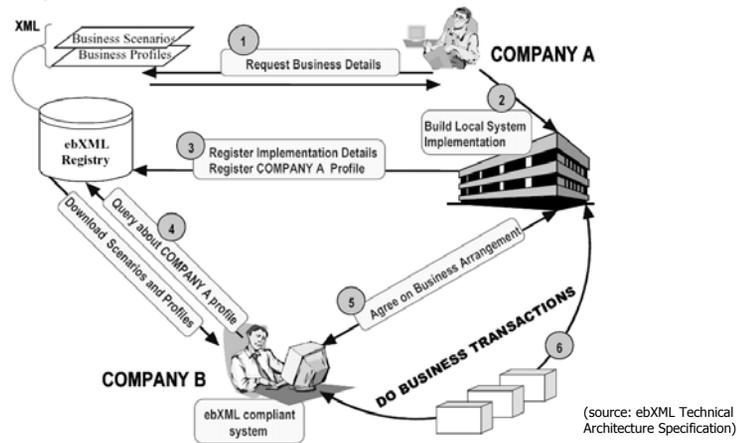
# Web Services & Business Processes

- Business process making use of web services
- Business process externalized as a web service
- Long-running transactions
- Compensation
- Correlation
- Dynamic Binding of business partners and web services



# e-Business Collaboration

- Example: ebXML



# Course Outline

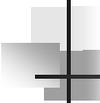
1. Motivation
2. XML Basics for Web Services
  - Core
  - Namespaces
  - DTD, XML Schema
  - DOM, XSLT
3. Web Services Foundations
  - Service Oriented Architecture
  - Invocation (SOAP, ...)
  - Description (WSDL, ...)
  - Discovery (UDDI, ...)
4. Web Services Support in Middleware Platforms
  - J2EE
  - .NET

## Course Outline (2)

5. Web Services Advanced Topics
  - Security
  - Data Access
  - Interoperability
  - Grid Computing
6. Workflow Management Introduction
  - Motivation, Evolution of WfM
  - Transactional Workflow
7. Business engineering
  - Business Process Modeling
  - Process Analysis and Simulation
8. Workflow Management Systems
  - Basic Components (buildtime, runtime)
  - Support for Workflow Dimensions
  - Activities and (Sub-)Processes
  - Work Item Lists

## Course Outline (3)

9. Workflows and Transactions
  - Advanced Transaction Concepts
  - Atomic Spheres and Compensation Spheres
  - Recoverable Messaging and Stratified Transactions
10. Web Services & Business Processes
  - Web Services Composition
  - Stateful Web Services
11. Web Services Transactions and Coordination
  - Activation, Registration and Coordination
  - Coordination Protocols and Coordination Context
  - Atomic Transactions
  - Business Transaction
12. e-Business Collaboration and Integration
  - RosettaNet, ebXML, ...



## Books

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- Alonso, Gustavo; Casati, Fabio; Kuno, Harumi; Machiraju, Vijay  
Web Services  
Springer Verlag, Heidelberg, 2003
- Cerami, Ethan  
Web Services Essentials  
O'Reilly, 2002
- Graham, Steve et.al  
Building Web Services with Java  
Sams Publishing, 2002
- Leymann, Frank; Roller, Dieter  
Production Workflow – Concepts and Techniques  
Prentice Hall, 2000
- Newcomer, Eric  
Understanding Web Services  
Addison Wesley Professional, 2002