Workflows und Web Services

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Types of E-Business

Business To Consumer (B2C)	**Business To Business (B2B)**	**Intra Business**
• Relation between enterprise and customers • Sales-related aspects are predominant, like product presentation, advertising, service advisory, shopping	• Relation between processes of different enterprises • Predominant are relation to suppliers, and customer relations to other enterprises like industrial consumers, retailers, banks	• Electronic organization of internal business processes, like realization within workflow systems

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

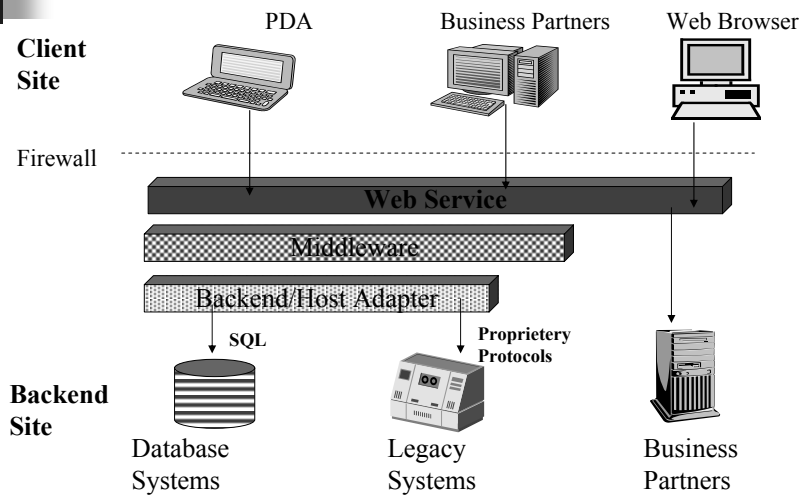
Web Services

- 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

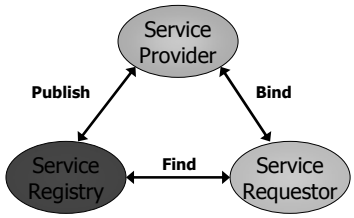
- Stock information
  - Current stock value of a particular stock within a protofolio application
- Proof reading
  - Proof reading for a certain document
- Order service
  - Automatic order for a given product ID and quantity
- Travel planning and organization
  - Services tor car rental, flight reservation,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

Web Service System Architecture

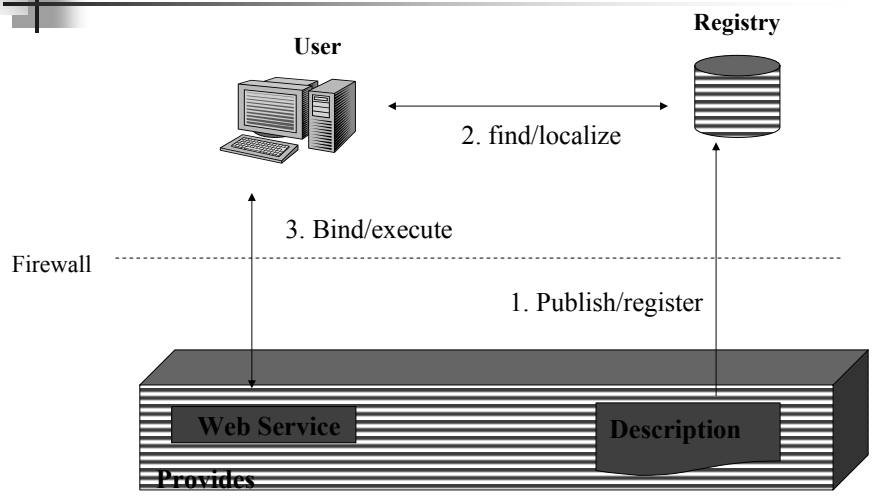


Service-Oriented Architecture (SOA)

- 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



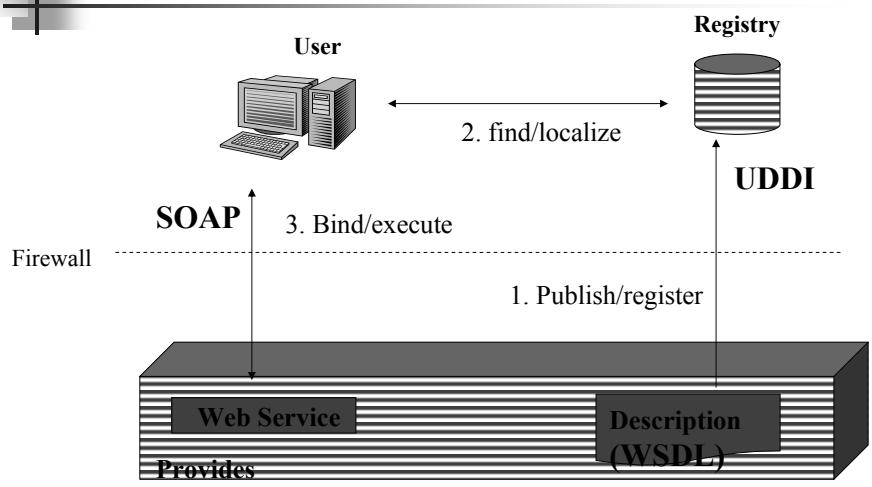
Web Service Model



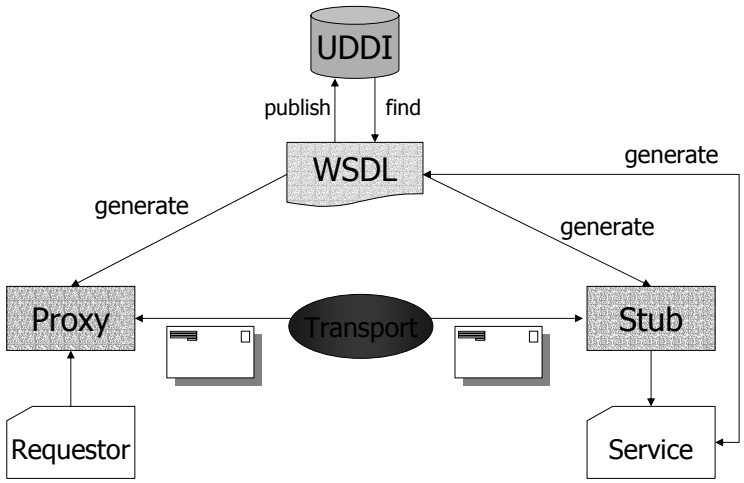
Standards

- 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.)

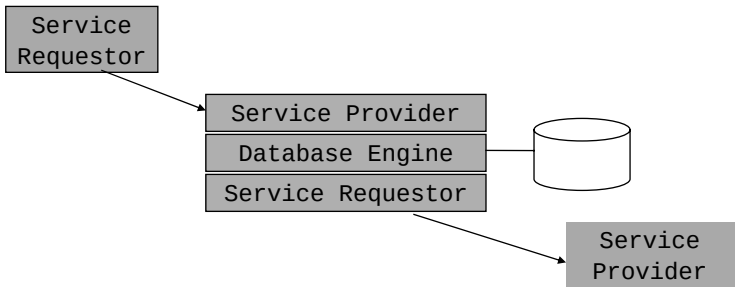


WS Tooling Principles



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)



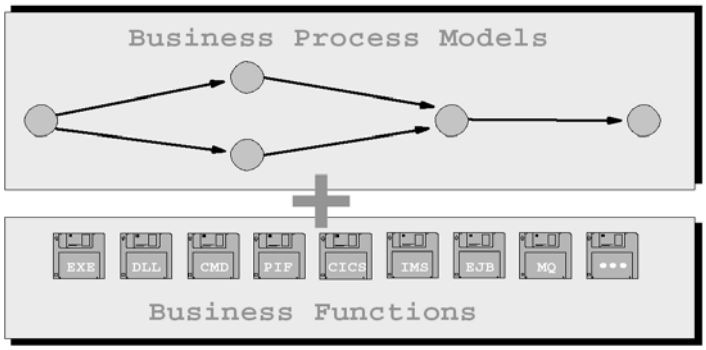
Web Services Today

- 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

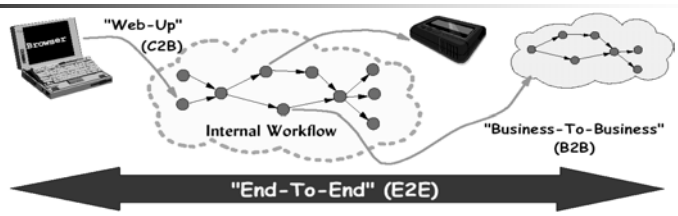
Workflow Technology

- 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

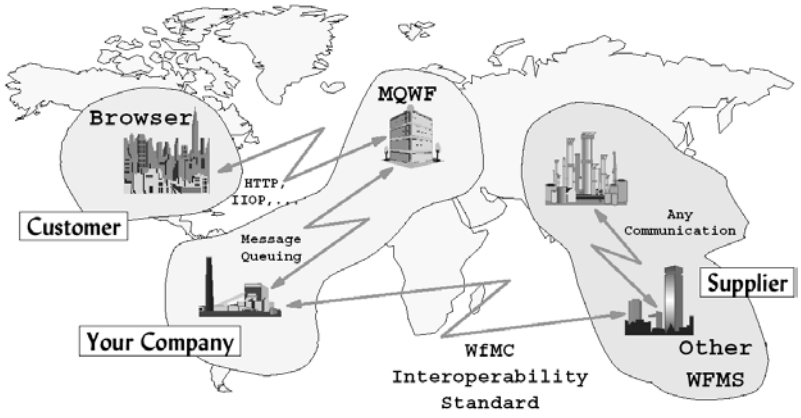


Workflows And External Communications



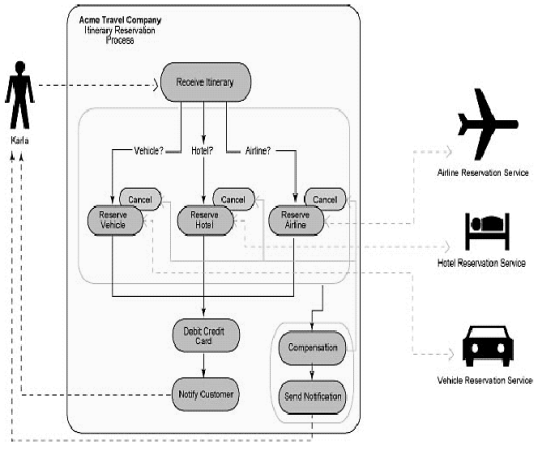
- Customers invoke company's applications to perform certain steps of the busines process
  - E.g. place on order, inquire status,...
  - Company's applications must get a browser-based front-end for that purpose ("web-up")
- Workflow activities may directly communicate with the outside
  - Send e-mail, faxes, messages,...
- Workflow activities may trigger actions in another company
  - Simple invokation 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



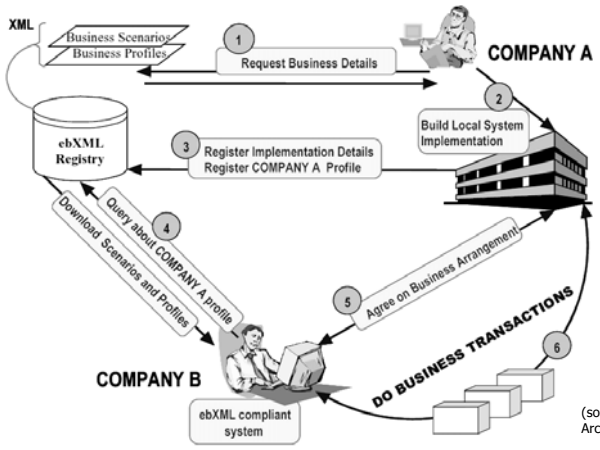
Web Services & Business Processes

- 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



(source: ebXML Technical Architecture Specification)

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
   - Transactions and Coordination
     - Activation, Registration and Coordination
     - Coordination Protocols and Coordination Context
     - Atomic Transactions
   - 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

Course Outline (3)

8. Workflow Management Systems
   - Basic Components (buildtime, runtime)
   - Support for Workflow Dimensions
   - Activities and (Sub-)Processes
   - Work Item Lists
9. Workflows and Transactions
   - Advanced Transaction Concepts
   - Atomic Spheres and Compensation Spheres
   - Recoverable Messaging and Stratified Transactions
10. Business Processes & Web Services
    - Web Services Composition
    - Stateful Web Services
    - Business Activities and Transactions
11. e-Business Coordination, Collaboration and Integration
    - RosettaNet
    - ebXML
    - Relationship to WS standards

Books

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    - XSL Transformations (XSLT) Version 1.0, 16 November 1999
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  - SOAP Version 1.2 Part 2: Adjuncts, W3C Recommendation 24 June 2003
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  - SOAP with Attachments API for Java™ (SAAJ) 1.2
  - Java™ Web Services for J2EE Specification ("Specification"), Version 1.0, JSR 109, Final Release, September 21, 2002, IBM Corporation
  - Java™ API for XML-based RPC JAX-RPC 1.0, JSR-101 Expert Group, Final Release, June 2002, Sun Microsystems Inc.
  - Java™ API for XML Registries (JAXR)
  - Java™ API for XML Processing, Version 1.2 Final Release

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