Types of E-Business

<table>
<thead>
<tr>
<th>Business To Consumer (B2C)</th>
<th>Business To Business (B2B)</th>
<th>Intra Business</th>
</tr>
</thead>
</table>
| • 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 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

1. Publish/register
2. Find/localize
3. Bind/execute
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.)

1. **Publish/register**
2. **find/localize**
3. **Bind/execute**
**WS Tooling Principles**

- UDDI
  - publish
  - find

- WSDL
  - generate

- Proxy
  - Requestor

- Transport

- Stub
  - Service

**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
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
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

- 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

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- All W3C Recommendations/Specifications are available for download at http://www.w3c.org
- XML Basics for WS
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    - Extensible Markup Language (XML) 1.0 (Second Edition) 6 October 2000, Tim Bray, Jean Paoli, C. M. Sperberg-McQueen, Eve Maler.
    - Namespaces in XML 14 January 1999, Tim Bray, Dave Hollander, Andrew Layman
    - XML Schema Part 0: Primer,
    - XML Schema Part 1: Structures,
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    - XSL Transformations (XSLT) Version 1.0, 16 November 1999
    - Document Object Model Level 2 specifications: Core, Views, Events, Style, Traversal and Range, HTML, all 13 November 2000
    - XML Path Language (XPath) Version 1.0, 16 November 1999
    - XQuery 1.0: An XML Query Language, W3C Working Draft, see http://www.w3.org/TR/xquery/
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- **SOAP**
  - SOAP Version 1.2 Part 0: Primer, W3C Recommendation 24 June 2003

- **Web Services Addressing & Reliable Messaging**
  - WS-Addressing Specification, BEA, Microsoft, IBM, 13 March 2003
  - WS-Reliable Messaging Specification, BEA, Microsoft, IBM, TIBCO, 13 March 2003

- **Description (WSDL, …)**
  - Web Services Description Language (WSDL) 1.1, W3C Note 15 March 2001
  - Web Services Description Language (WSDL) 2.0 Part 1: Core Language, W3C Working Draft 10 November 2003
  - Web Services Description Language (WSDL) 2.0 Part 2: Message Patterns, W3C Working Draft 10 November 2003
  - Web Services Description Language (WSDL) 1.2 Part 3: Bindings, W3C Working Draft 11 June 2003

- **Discovery**
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- Web Services Support in Java, J2EE (see http://java.sun.com for documents)
  - SOAP with Attachments API for Java™ (SAAJ) 1.2
  - Java™ API for XML Registries (JAXR)
  - Java™ API for XML Processing, Version 1.2 Final Release

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  - Web Services Coordination Specification, Microsoft, BEA, IBM, September 2003
  - Web Services Atomic Transaction Specification, Microsoft, BEA, IBM, September 2003
  - Web Services Business Activity Framework (WS-BusinessActivity), Microsoft, BEA, IBM, January 2004
  - Business Process Execution Language for Web Services, Version 1.1, Microsoft, IBM, Siebel, BEA, SAP, 5 May 2003
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Security

- Web Services Security (WS-Security), Microsoft, IBM, VeriSign, April 2002
- Web Services Policy Framework (WSPolicy), Version 1.01, Microsoft, BEA, IBM, SAP, 2 June 2003
- Web Services Federation Language (WS-Federation), VeriSign, Microsoft, IBM, BEA, RSA Security, 8 July 2003
- Web Services Secure Conversation (WS-SecureConversation), Microsoft, IBM, VeriSign, RSA Security, Draft 18 December 2002
- Web Services Trust Language (WS-Trust), Microsoft, IBM, VeriSign, RSA Security, Draft 18 December 2002