

## INFS 3204/7204 Service-Oriented Architecture



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**M2: EAI and B2B - A business case**

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## M2 Topics

- Business concepts
  - Supply chain, EAI, B2B, B2C, EDI, business logic, workflow management
- Integration
  - Middleware
  - Web service
- SOA
  - Benefits, challenges, criticism
  - Web 2.0, Mashup, SOA 2.0

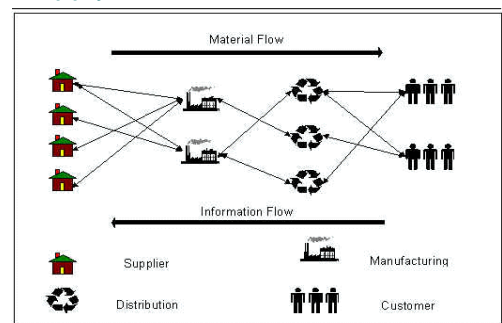
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## Supply Chain

- Comprised of the interaction between parties required to produce products or services and deliver them to customers

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## Supply Chain – an overview

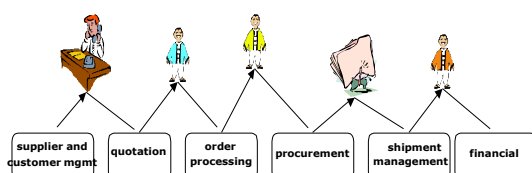


(from Wu and O'Grady, 2001)

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## Supply Chain - an example

- Traditionally, manual implementation of a supply chain where human users act as relays



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## E-business

- The marriage of traditional supply chain management with internet
  - E-commerce (B2C, C2C)
    - Direct transactions; Point-of-sale
  - E-procurement (B2B)
    - Processes by which a manufacturer obtains products from suppliers
    - For aggregations of buyers/sellers
    - Enormous in volume, quantity, and value
  - E-collaboration (B2B)
    - Information sharing among participants
    - Collaborative planning to decision-making

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## Business goals

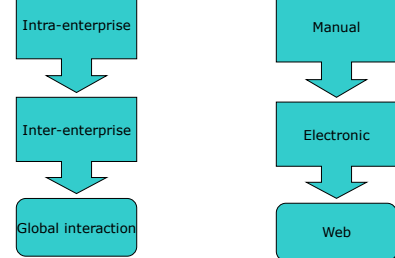
- Low cost
- Streamlined and efficient process
- Monitor and track process execution
- Detect and manage exception
- In-time response, etc

Solution: **IT**

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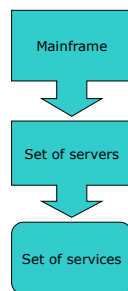
## Business trends

- Scale dimension
- Time dimension



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## IT trends



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## Problems

- Different parties may have different
  - Operating system, interface, data format, infrastructure, interaction protocols, language, etc
- Automating supply chain implies bringing all of them together

Solution: **Integration**

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## Integration types

- EAI
- B2B
- B2C
- EDI

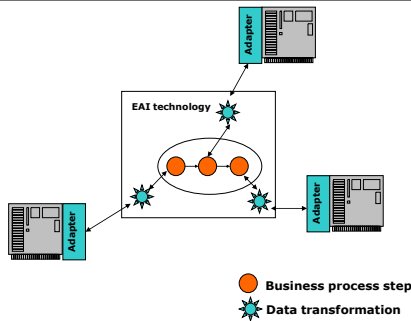
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## EAI

- Enterprise application integration (EAI) technology is the means of integrating existing software systems or applications **within enterprises** with each other in order to execute business processes involving many software systems
  - User Interface Integration
  - Data Integration
  - Method or Function Integration
  - Business Process Integration

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## EAI - an overview



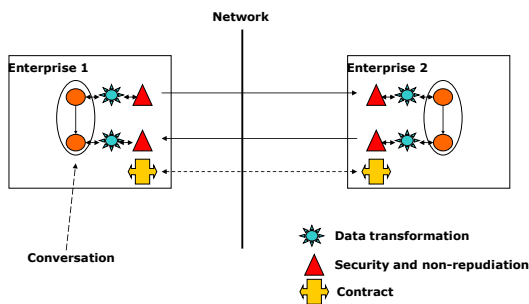
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## B2B integration

- Business-to-business (B2B) integration technology is the means to integrate the electronic data transmission **between enterprises** over:
  - public or private
  - secured or unsecured
  - transactional or unreliable networks

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## B2B – an overview



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## B2C integration

- Business-to-Consumer (B2C) integration is the means to have **human users connect to businesses** in order to purchase or to sell goods or services
- And example is Amazon.com where customers can buy from a variety of goods, including kitchenware, electronics, and, of course, books

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## EDI

- Electronic data interchange (EDI) is used for **inter-industry electronic interchange** of business transactions
- Accredited Standards Committee (ASC) develops, maintains, interprets, publishes and promotes the proper use of EDI Standards, chartered by American National Standards Institute in 1979
- It defines business document formats - transaction sets, does not define collaborations

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## Business logic

- Business logic (or business process) is the **sequence of business functions** that are necessary to achieve a value-added business goal
- Each of these functions can be business logic itself if it constitutes a complete set of business functionality

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## Business logic – an example

- Purchasing of goods
  - A good to be purchased is determined
  - A quotation request is conducted
  - The goods are purchased
  - Upon delivery, the goods are paid
- It can be subdivided into phases
  - Good selection
  - Request for quotation
  - Purchasing
  - Payment

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## Business logic composition

- Business logic composition is the integration of **smaller** business processes into more **complex** ones
- This involves
  - Definition of **control flow** between the parts
  - Definition of **data flow** between the parts
  - Definition of **compensation** to account for errors and cancellations

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## Workflow management

- Workflow management is a technology for the **organisation of composition**
  - Between human office workers
  - Between legacy application systems
- Typically, work is organized in steps whereby each step contributes toward the overall results
- An example – insurance agent
  - Check life insurance application form
  - Assess risk
  - Optionally demand health check
  - Issue insurance policy
  - Set up payment arrangement with customer

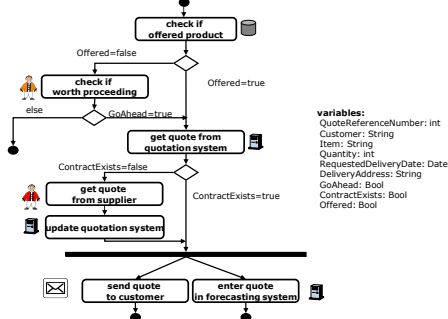
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## Centralized vs. P2P

- Workflow management system (WfMS) views itself as the work process organizer and views humans as well as legacy applications as helpers for the work process
- Workflow management is centralized
- However, conversations in e-Business between communication partners follow the model of peer-to-peer (P2P)

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## A workflow with work node, routing node, and start/completion node



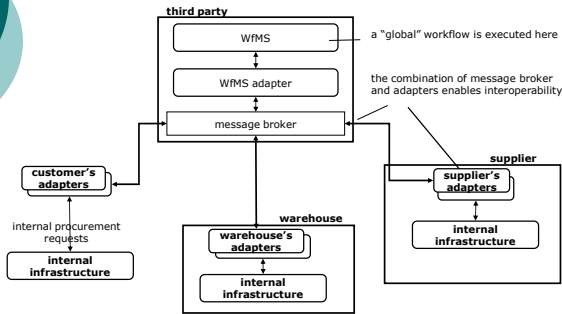
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## But how exactly to do integration? - Middleware

- Middleware is just a level of **indirection** between clients and other layers of the system
- It introduces an additional layer of business logic encompassing all underlying systems
- By doing this, a middleware system
  - simplifies the interface design
  - provides transparent access
  - acts as the platform for inter-system functionality
  - takes care of locating/accessing resources

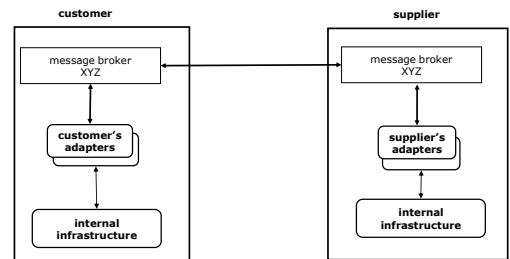
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## Centralized middleware



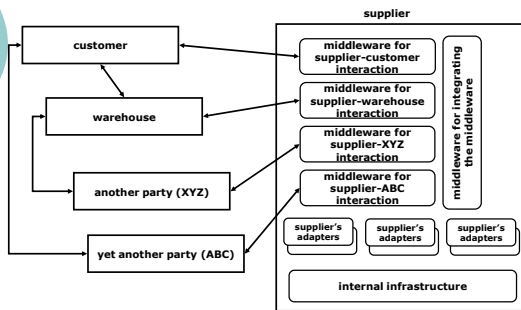
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## P2P middleware



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## P2P – multi-middleware



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## Limitations of conventional middleware

- In cross organizational interaction, there are no obvious places to put middleware
  - Centralized
    - need a central middleware and global workflow
    - Lack of trust, autonomy and security
  - P2P
    - Too many partners require too many middleware platforms
    - Lack of standardization across middleware platforms makes costly in practice

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## Web service

- The natural evolution of middleware and EAI platforms as they try to leverage:
  - the Web
  - the Internet
  - The globalization of society, particularly in its economic aspects
- No difference from middleware except:
  - being invoked via Internet
- A **standardized** means of dealing with integration, where traditional methods are vendors/application/language specific

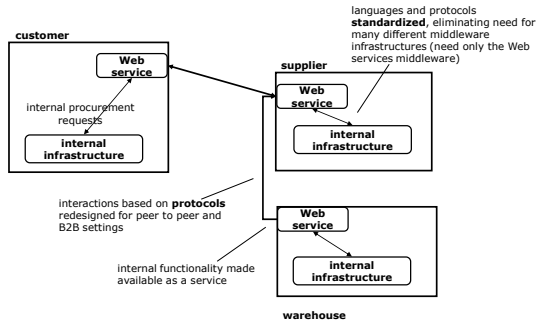
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## Web service blur

- New proposals appear every month, many of them never to be heard of again
- The nature of Web services and the motivation to use them are often blurred by hype as well as many contradictory and overlapping proposals and specifications
- The most popular version of Web services (SOAP, UDDI, and WSDL) is a very poor and limiting view on what true Web services should be
- After all, what can be done with web services today?

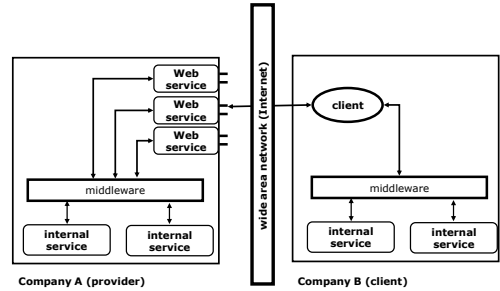
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## B2B with Web service



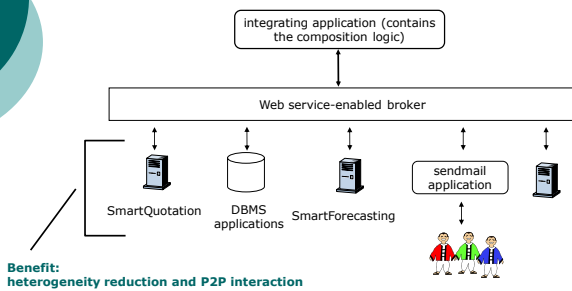
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## Web services also provide entry points for accessing local services



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## Web service – an enterprise example



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## Web service standards

- The notion of service in the conventional middleware is now translated into the notion of Web service
- Web service can be pre-existing service
  - e.g., stored procedures in databases made available as Web services
- The only thing that changes from the middleware is that **standards** need to be set so that they match the needs of exchanges through the Internet
  - **XML** as the data representation format
  - **SOAP** as the protocol to allow communication
  - **WSDL** as the Interface Description Language
  - **UDDI** as the Web repository

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## Web service vs. OO

- Are they similar?
  - Modularization ?
  - Reusability?
  - Encapsulation?
- What are the differences?
  - Web Service – Separate data and process (1 CD for different players)
  - OO- Bind data and process (1 CD for its own player)

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## SOA

- An **architectural style** whose goal is to achieve "loose coupling" among interacting and contracted services via communication protocol
- Often seen as built upon, and evolving from older concepts of **distributed computing** and **modular programming**

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## More on SOA

- Architecture is not tied to a specific technology
- SOA is commonly built using Web services standards
- It can also be implemented using any service-based technology at a higher cost
- The model and the notation in this architecture mimics what has been done in traditional RPC technologies
- First implementations are just extensions of existing platforms to accept **invocations through web service interfaces**

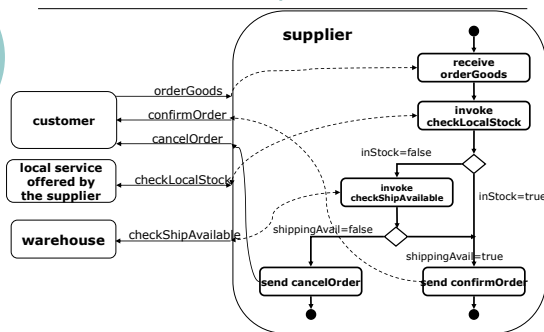
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## SOA goal

- Just-in-time integration of applications by discovering and orchestrating network-available services

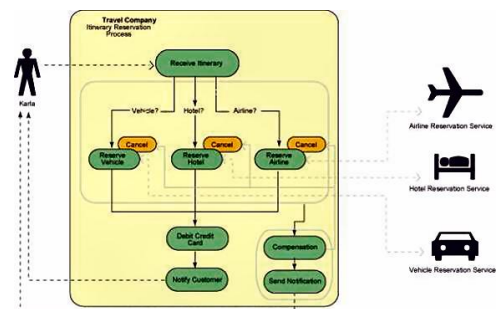
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## Web service composition



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## A real example



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## SOA challenges

- Trust
  - Data from a large number of services from different partners
- Test
  - All services work as designed?
- Security
  - Is the level of security is adequate?
- Continuous updating, refinement and expansion

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## SOA criticisms

- Just another term for Web service?
- Merely an obvious evolution of well-deployed architectures?
- WS-\* standards and products are still evolving (e.g., transaction, security)
  - SOA can thus introduce new risks

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## Web 2.0

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- Web 2.0 refers to a "second generation" of web sites, primarily distinguished by the ability for visitors to contribute information for collaboration and sharing
- Web 2.0 applications use Web services and may include Ajax, Flash, JavaFX user interfaces, Web syndication, blogs, etc
- It is characterised by building on the existing **web server architecture and using services**

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## Mashups

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- A Mashup is a web application that combines data from more than one source into a single integrated tool
  - An example is the use of cartographic data from Google Maps to add location information to real-estate data, thereby creating a new and distinct web service
- There is ongoing debate about "the collision of Web 2.0, mashups, and SOA", with some stating that Web 2.0 applications are a realization of SOA applications

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## SOA 2.0

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- Oracle is taking up SOA 2.0 as "the next-generation version of SOA" combining Service-Oriented Architecture and **Event Driven Architecture**, and categorizing the first generation as **Client-Server Driven**
- However, some people have criticized attaching a version number ("2.0") to an application architecture design approach, while others have stated that the "next generation" should apply to the evolution of SOA techniques from IT optimization to business development

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## Summary

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- This week:
  - Business concepts
    - Supply chain, EAI, B2B, B2C, EDI, business logic, workflow management
  - Integration
    - Middleware
    - Web service
  - SOA
- Next week:
  - **.Net Basics and C#**

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## References

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- **Text book 1:**
  - Chapter 1-5
- **IBM Web service architecture**
  - <http://www-106.ibm.com/developerworks/webservices/library/w-ovr>
- **Web service vs EAI**
  - [http://www.webservicesarchitect.com/content/articles/sa\\_mtani01.asp](http://www.webservicesarchitect.com/content/articles/sa_mtani01.asp)

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