



## Sistemi ICT per il Business Networking

### B2B Integration

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## B2B Interactions

- Businesses are constantly searching for ways **to improve efficiency**
- The **global availability** provided by the Internet and the constant advances in technology offer more and more choices when deploying **business-critical systems**
- For years companies have desired **to share information between applications**
- The use of Internet-based **e-mail** has been, over the years, a common method of conducting **human interaction** and is now deeply engrained in our **business** culture
  - used to **exchange documents** and **collaborate with co-workers**, communicate personal messages with friends, and dialogue with people around the world

## e-mail

- Today, **email** is used between people much as the **non-guaranteed postal service** was used in the past
  - Undeliverable email, and illegible email attachments have become commonplace. People constantly ask, "Did you get my email?"
- The need for **"guaranteed" delivery** led to a new model of delivery service
- Alternative standards-based solutions for B2B communication have emerged
- **Doing business over the Internet** demands
  - **high performance**
  - **low latency**
  - **reliable data exchange** within the enterprise and across enterprises

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## What is B2B Integration?

- **B2B integration (B2Bi)** is about the secured **coordination of information among businesses** (and their information systems)
  - Promising to dramatically **transform** the way business is conducted between partners, suppliers, customers, buyers, etc.
  - Companies can benefit from **tightly (electronically) integrated partnership**
- **Enabling technology** for most current business strategies
  - Collaborative e-commerce
  - Supply Chain Management (SCM)
  - Customer Relationship Management (CRM)
  - ...

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## B2B Integration

- **Benefits:**

- Faster time-to-market
- Increased operational efficiency
- Increased customer services
- Real-time view of partners' information and services
- Reduced costs

- The **market** for B2Bi is **huge**

- **Easier said than done**

- A **big challenge**, especially for global corporation that have hundreds or even thousands of trading partners
- **Time-consuming, complex, and expensive task**

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## Key features for B2Bi solutions

- to enable **any transaction** and **any time**
- to **link** a company **automatically** to buyers, sellers, e-marketplaces, and collaborative networks
- to fully automate **real-time exchange** of data between disparate applications
- to conduct all transactions **securely**, maintain **audit logs**, etc.
- to be based on **open standards**
  - EDI standards: EDIFACT, ...
  - XML standards: RosettaNet, ebXML, Biztalk, ...
  - ...
- to **scale** horizontally and vertically

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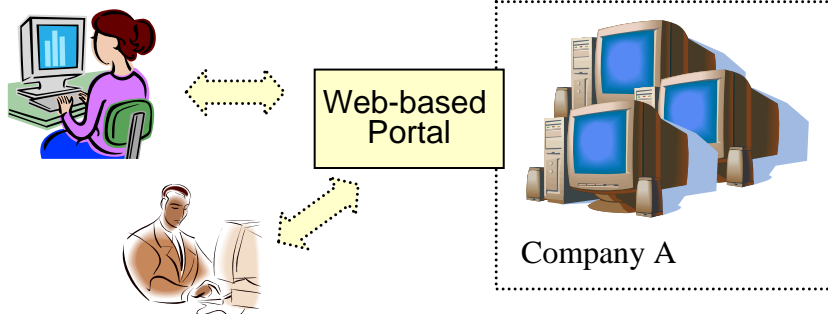
## Conventional B2Bi Patterns

- Portal-oriented Integration
- Data-Oriented Integration
- Application-Oriented Integration
- Process-oriented Integration

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## Portal-oriented integration

- Quick way for **small to medium sized companies** ...
- ... to provide **information access** to customers and trading partners ...
- ... through a **Web-based** user interface

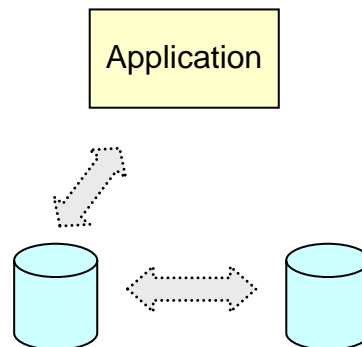


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## Data-oriented integration



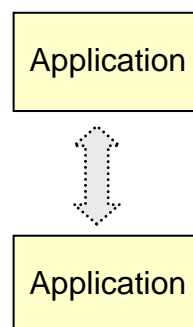
- **Data sharing**
- Communication **between**
  - an application and a data source
  - two data sources
- **Scheduled** or **event-driven**
- Data-oriented **solutions**:
  - Synchronous replication
  - Asynchronous replication
  - Virtual Datawarehouse
  - ...



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## Application-oriented integration

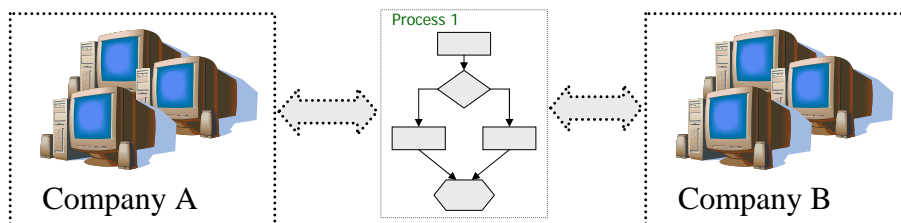
- **API** or **RPC** communication **between application** components
- May or may not involve **data** communication
- The participating companies have to work **very closely** to develop **applications jointly**
- Companies have **less autonomy**
  - The least suitable for most B2Bi implementations
- **Synchronous** in nature



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## Process-oriented integration

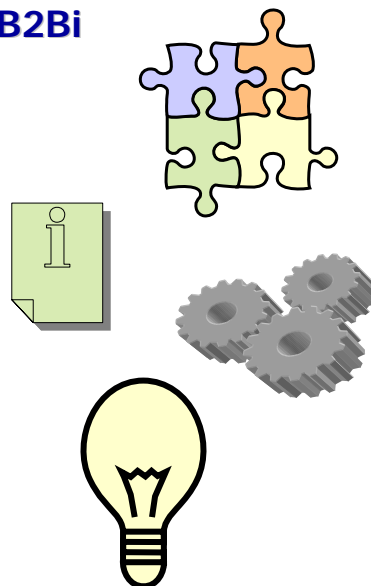
- **Purpose:** to maintain the **integrity of business rules**
- **Increasingly being used** as it aims at
  - integrating companies **on a business process basis**
  - making the business processes of a company **more efficient** by eliminating latency
- This integration type gives companies **complete autonomy** in terms of how (i.e. technical solutions) they want to conduct their business



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## Key factors in B2Bi

- Integration **needs**
- Will the integration be **real-time**?
- **Existing systems** to integrate
- **Complexity** of a give solution
- **Asynchronous vs. synchronous**
- Desired/possible level of **autonomy**
- **Business processes** to integrate
- **How much work** to do?



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## Some enabling technologies for B2Bi

- **Portal-oriented Integration**
  - Internet (i.e. protocols) and Web technologies (URI, HTML, DNS, ...)
  - Web application technologies (e.g. J2EE, .NET, PHP, ...)
- **Data-Oriented Integration**
  - DBMS, Ontologies, Data Integration, Synchronization, Semantic Web
- **Application-Oriented Integration**
  - Web Services technologies (e.g. WSDL, UDDI, SOAP, ...)
- **Process-oriented Integration**
  - B2B Messaging technologies (e.g. EDI, XML, RosettaNet, ...)
  - Business Process Description Languages (e.g. BPEL4WS, XLANG, XPDL, ...)
  - Distributed Process Management (e.g. ebXML)

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## What do we need to achieve B2Bi?

- Regardless the B2Bi pattern we adopt, there will be some **distributed information systems and software applications** that **interact** one another
- Apart from the Portal-oriented solution, other patterns relies on some kind of **B2B messaging** solution
- This implies to **the need of** a **business common language** that should be agreed among interacting parties

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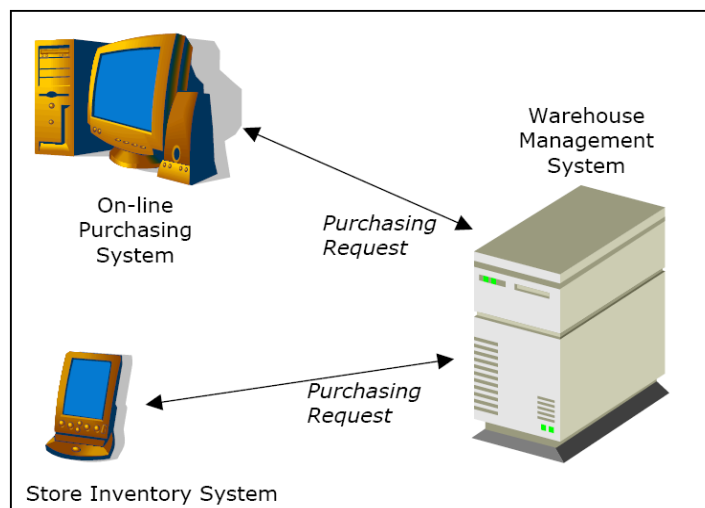
## What is messaging?

- A mechanism that allows some **entities to communicate** by sending and receiving **messages**
  - communication among two or more **applications**, without requiring human intervention
  - these applications can reside independently on a **wide variety of hardware devices**

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## Messaging: example



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## Messaging

- **Asynchronous** nature: the sender of the message does not have to wait for the recipient to receive the information (like with emails)
  - Sending applications are free to generate messages at an appropriate **speed**, handling **peak periods** as they occur, without having to wait for recipients to deal with the requests
- However **sometimes synchronous** communication is required
  - e.g. waiting for the result of a complex mathematical calculation before making a decision
- Messaging is being **widely using today** in support of **business-to-business (B2B)** and **business-to-consumer (B2C)** transactions

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## What Problems Does Messaging Solve?

- Disparate system integration
- Exchanging information with business partners
- Automating common business functions
- Portals and e-Marketplaces
- Global business transactions

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## Disparate system integration

- In the business world, **mergers and acquisitions** take place every day
- A **low-cost**, **easy-to-implement**, and **flexible** solution is required
- **Messaging** technologies require little or no change to the underlying applications in order to guarantee communication among them
- **Messaging** lets applications coexist and communicate without disrupting everyday business processes
- This **decoupling** of applications allows the different business units to keep operating through the merger

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## Exchanging information with business partners

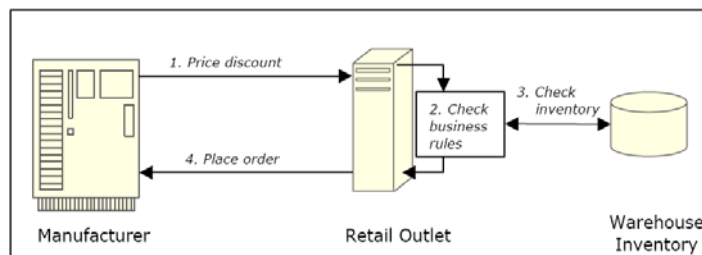
- Successfully conducting business requires **collaboration** with a variety of business partners, both on the supply side and on the distribution side
- All parties constantly exchange information, but not always reliably (faxes, phone calls, e-mails)
- You can use **messaging** technology to coordinate these communications and guarantee that the correct information is transmitted and received
- The **quality of service** levels available with today's messaging systems ensure that the right information is exchanged among the appropriate parties, and that the appropriate security measures are in place

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## Automating common business functions

- Where possible, companies are looking at technologies that **automate common business tasks or transactions** that traditionally have required costly and slow user interaction



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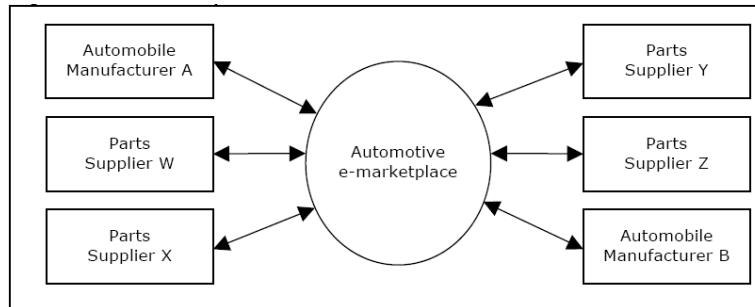
## Portals and e-Marketplaces

- The **Internet** has significantly changed the way organizations do business
  - By **removing geographic boundaries**, the Internet has allowed businesses to **exchange information** and **conduct transactions** without requiring face-to-face interaction
- Portals and e-marketplaces allow organizations to conduct business with each other
- Messaging systems are **fundamental** in e-marketplaces
  - They ensure that information in the form of messages are sent reliably to a potentially massive number of recipients

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## An example of e-marketplace

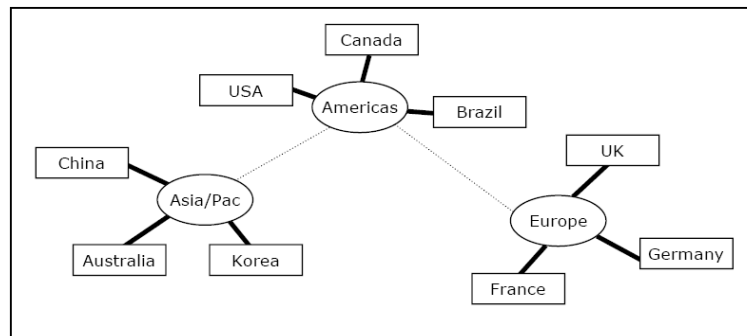


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## Global business transactions

- Doing business in a geographically **dispersed** fashion presents its own sets of **problems**
- The messaging model caters to **geographically** disperse locations



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## Types of Messaging

- Messaging products **vary** in their implementations
- The **two** most common implementations are
  - **Hub-and-spoke architectures**
  - **Message bus**
- Each has **benefits**, and it is up to the implementer to determine which best suits the **needs of the organization**

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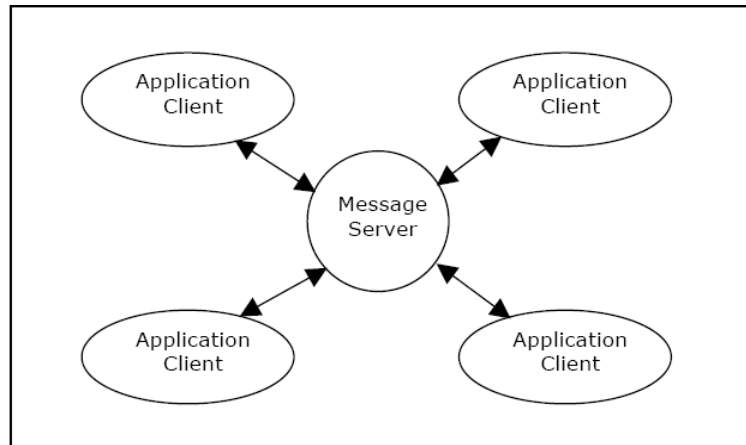
## Hub-and-spoke architectures

- All applications are connected to a central process, called a **message server**, which handles all communication among the connected applications, called the **application client**
- The message server is responsible for
  - **routing** messages correctly
  - **authenticating** and **authorizing** user access
  - **guaranteeing the delivery** of the message
- Each application client can **either** be a sender of messages, a recipient, or both

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## Hub-and-spoke architectures



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## Hub-and-spoke architectures

### ■ Benefits:

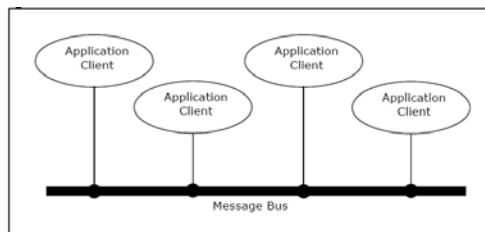
- **Reduced number of network connections:** each application client only needs to connect to a message server in order to send information to all other clients
- **Flexible client deployment:** as the message server handles all routing, senders and receivers are unaware of each other, so they can be moved around with minimal disruption to the system
- **Minimal software requirements on the application client:** because most of the messaging logic is contained within the message server, smaller software components (or even no components) may be required in the application clients in order to establish connections

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## Message bus

- **No centralized message server** to coordinate the distribution of messages
- Each application client contains the **functionality** typically found in a message server (message persistence, transaction support, security)
- All application clients are connected to a **message bus**, which routes messages among each of the application clients, but the clients must perform all checks and balances to ensure that the message is delivered securely and reliably



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## Messaging models

- **Publish-and-subscribe** model: a single sending application, or publisher, broadcasts a single message to several receiving applications, or subscribers
  - The publisher **sends a message to a topic**, which resides on a message server, which then distributes that message **to all subscribers** who have registered an interest in that topic
  - **Useful** when broadcasting the same information to a **wide audience**
- **Point-to-point** model: information is exchanged between a sending application, the sender, and one recipient, the receiver
  - a single sender places a message onto a **queue**, which resides on the messaging server
  - **the first application that queries the queue** receives the message. If the receiver accepts the message, it is **removed from the queue**, and no other receivers are sent that message

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## Messaging Implementation Features

- **Guaranteed reliability:**
  - Business-critical systems demand **reliable communication**, and the **Internet is far from a reliable communication channel**
  - A messaging product must offer different **levels** of service to guarantee **delivery of information**
- **Advanced security features**
  - The **Internet** is infamous for its ability to compromise system security
  - Participants must be assured that information will be passed on **only** to **those with the appropriate authority to receive the information**

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## Business Common Languages (BCL)

- The **lingua franca** to **publish, share, and exchange** data using some (e.g. open) standards over some networks (e.g. Internet)
- Most-commonly used languages:
  - EDI family
  - XML-based
- A BCL is **not an integration solution** in itself: it is just a **data definition language**
- But **without a global common language** there can be **no electronic business** among companies spread over the world

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## Business Common Languages (BCL)

- For **BCL-based messages to be interpreted** by all companies participating in B2Bi they need to **agree on a common standard**, which will define the document formats, allowable information, and process definitions
  - Like a common currency for conduct business
- The **need for industry-wide B2B e-commerce standards** in vertical industries is becoming critical and obvious
  - EDIFACT
  - Rosetta Net
  - ebXML
  - ...

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## eXtensible Markup Language (XML)

- XML is **rapidly becoming** the common language for doing business over the Internet
- **Standardized formatting** so that any application can understand information from other applications using XML
- **More and more application vendors** are **choosing** to support XML, so a messaging implementation should be able to handle the XML-formatted information without requiring translation to some other format

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## References

- **Business to Business Integration (B2Bi) and Web Services** (Chapter of the book “Web Services Business Strategies and Architectures”)
- **B2B Messaging** (provided by the teacher)