Total Business Integration
“Rethinking the Structure of Business Automation”

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1980 년대

- IS Dept: write new applications
- Point 2 Point Interface: quadratic (N*(N-1))/2
- Too much Spaghetti Code
1990년대

- Packaged Solution

- IS Dept: Selecting Packaged Solution
- Bulldoze the slums (replace multiple old systems)
- One Systems does not provide all of solution (ERP covers 30% of an enterprise’s business functions)
2000년

◆ e-Business

- **SAP**
  - Initiatives Addressed: Financials, Order Management, Inventory Management, etc.

- **Siebel eBusiness**
  - Initiatives Addressed: Sales Force Automation, Field Serve, Call Center Support, etc.

- **i2**
  - Initiatives Addressed: Demand Planning and Fulfillment, Strategic Sourcing, Delivery Logistics, etc.

- **Customer Relationship Management (CRM)**
- **Enterprise Resource Planning (ERP)**
- **Supply Chain Management (SCM)**

- **IS Dept**: Integrating new, purchased and legacy apps with each other
- **Need Integrated Information for numerous solutions**
E-Business Integration Styles

- **A2A Integration** involve integrating applications running in the same enterprise.
- **B2B Integration** involve integrating application systems running in different enterprises (a form of A2A integration except the different owners).

\[
eAI = A2Ai(EAI) + B2Bi
\]

\[
TBI = A2Ai + B2Bi + B2Ci
\]
TIBCO’s world: the “white space” of neutral technologies

- Search
- Knowledge Management
- Data-marts

Total Business Integration
- EAI & B2Bi
- BPM & Work flow
- Portals

Emerging infrastructure
- Wireless
- Internet protocols & “transports”
- Web services

App Servers & development tools
(e.g. BEA, Rational, Borland)

Operating Systems and related “platform” technologies
TIBCO Products

- From EAI to Portal, B2B
Most enterprise integration has no central planning (city plan).

More than 80% of integration today is done using batch file transfer rather than real-time mechanism.

There is not even an automated batch file transfer (the data is re-keyed, no application integration).

Many enterprises pin their hopes on a never-completed transition to a new, common, permanent information architecture.
Standards: Segmenting Information Assets

Yesterday Today Tomorrow

Legacy

J2EE

Web Services/XML

.Net
The Enterprise Platform Architectures

New Enterprise Projects

100%

Precomponent Architectures
(CICS, Tuxedo, PL/SQL, AS/400, CGI, Scripts and 4GL)

50%

CORBA

COM/MTS/COM+

.JET

J2EE


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Integration was seen as the responsibility of individual applications development team.

Integration is a common problem that spans applications in multiple departments, data centers, remote offices and even trading partners.

Organized Application provides a shared infrastructure (intelligent network, city plan).

Source: Gartner Research
- Basic communication facilities (MOM)
- Integration Broker
  - Data Transformation
  - Intelligent Routing (Content-Based Routing)
- Business Process Managers (Workflow)
- Business Activity Monitor
Middleware

◆ 서로 다른 통신 프로토콜, 시스템 아키텍처, 운영체제, 데이터베이스 등을 이용하는 다양한 애플리케이션을 네트워크를 통해 하드웨어에 독립적으로 연결해주는 소프트웨어

◆ MOM (Message Oriented Middleware)
  - TIBCO Rendezvous, IBM MQ
  - 메시지 전달 보증

◆ Transaction Middleware
  - Tuxedo, Tmax
  - 트랜잭션 처리 보증 (2 phase commit)
TIBCO MOM

- 어플리케이션간 데이터 전달을 위한 통신 인프라

**Diagram:**
- Metadata Repository
- Data Transformation
- Process Automation and Workflow
- Monitoring and Management
- Adapter
- Application
- RV
- RV
- JMS
- SMTP
- FTP
- HTTP
- SmartSocket
All messages are sent unicast or multicast.
Rendezvous (TIB, The Information Bus)

- Publish/Subscribe
  - Event Driven
  - Subject Based Addressing

Publisher

Subscribers

Subject Based Addressing

The Information Bus (TIB)
SmartSockets

Publisher

RTserver
TCP

RTserver

TCP or SSL

Subscriber

Subscriber

Subscriber

SSL

TCP

Subscriber

Subscriber

Subscriber

PGM

TIBCO
The Power of Now
Problem: Information is copied and sent to ‘each and every’ party on a peer-to-peer basis…

Problem: High CPU load required for multiple streams
‘Multicast’
The TIBCO ‘Reliable Multicast’ Solution

**Benefit:** Low CPU load required for single stream

**Benefit:** Information is delivered to multiple parties – ‘without crossing a network link more than once!’… saves costly network infrastructure resources.
Variation of Integration Topology according to MOM

- **Message Bus**
  - Messaging Bus
  - Adapters
  - Data Transformation
  - Publisher
  - Subscriber

- **Hub and Spoke**
  - Message Hub/Broker
  - Business Rules
  - Transformation
  - Intelligent Routing
  - Publisher
  - Subscriber
Integration Broker

- 데이터 변환 및 라우팅
- Content-Based 라우팅
- TIBCO IntegrationManager 4.0에 MessageBroker의 데이터 변환 및 라우팅 기능 수용
Design: Transformation Flow and Mapping
Runtime: Automated Message Transformation
Integration Broker

- 데이터 변환 및 라우팅
- Content-Based 라우팅
Integration Patterns

- **Data Integration**
  - Batch or “zero-latency” transfer
  - Multiple business process
  - Data level
  - Systems are logically independent

- **Process Integration**
  - “zero-latency” transfer
  - One business process
  - Process level
  - Systems are logically dependent
STP Strategy

- **STP (Straight-Through Processing)**
  - Focused on eliminating the manual hand-offs
  - Flow-through provisioning, hands-free processing
  - Workflow, Process Automation
ZLE(Zero Latency Enterprise)

- Latency is the time for a system to respond to an input
- Focused on real-time processes
워크 플로우는 업무 흐름에 대한 정의이며 이는 특정 업무를 수행하기 위한 일련의 tasks로 구성됨.

이러한 업무 프로세스는 hard-coded 프로그래밍 솔루션이 아니라 업무에 대한 model-based view를 이용하여 어플리케이션의 통합을 가능케 함.
Why BPM?

**Old World View**
A product-centric view of the world led to system silos, supported by fragmented infrastructure.

**New World View**
A customer-centric view of the world leads to integrated infrastructure driven by process enablement, shared functionality, and enterprise-wide data.

- **Product-Centric Business**
- **Fragmented Infrastructure**

**Example from Telecom Industry**
How BPM Works

Web Order Entry

Databases

Network Provisioning

Billing

Message Bus

Order Management

Workflow Server

Provisioning

Design
Assign
Install
Config
Activate
Test

Provisioning Pool

Customer Service Pool

Workforce Pool

Verify Service w/ Cust.

Order Mgmt.

Loop Test
Relationship between tasks, roles, pools, and users
A binder reserves a place for a document in a task.

Task 3 Sales

When a document is attached to a binder, it appears in every other assigned task.

Task 4 Sales

Task 5 Sales
**TIBCO BPM Solution**

**BPM (Business Process Management)**
- UML (IM Based) Design Tool
- IM/IC Bridge – Allows data across global space
- Intermix - Process flow / Workflow
- Process Debugging environment

**InConcert**
- Long running (Days, Months, Years)
- State Engine (All events stored in DB)
- OO – Dynamic, Customizable
- Reporting, Tracking, Alerts
- Front Office Automation

**Integration Manager**
- Short lived (Seconds, Minutes, Hours)
- No external State (memory)
- Access to external data sources (EAI)
- Powerful scripting capabilities (ECMA)
- Back Office Automation
Application integration will be the most important IS deliverable during the next five years.

The most common mistake in application integration is treating it as the responsibility of individual development teams, rather than as an enterprise-wide function.

The two keys to implement great e-business processes are:
- Zero-latency enterprise
- Straight-through processing

The most successful e-business will deploy a real-time, middleware-based “central nervous system” for integrating applications within the virtual enterprise.
Web Services provide a standardized way of connecting systems and people over the Web

The Good
- Web Services make it easier to connect your systems and people so you can focus on improving how they work together

The Bad
- Web Services will increase the number of systems and services that you need to incorporate into your business processes

And the Ugly
- Web Services is being defined by literally dozens of standards bodies and technologies – some competitive and some complementary
Business Benefits of Web Services

- Reduce operating costs by outsourcing non-core activities
- Increase customer satisfaction by providing more complete/timely information
- Improve visibility and decision making by making information more easily accessible
- Increase business agility by turning processes into sequences of plug-and-play “services”
- Lower supply chain costs by standardizing interactions with partners
Standards are Just the Foreword of a Very Interesting Book

XML for data, SOAP for transport, WSDL for service description – the list of technologies and standards bodies goes on

The rest of the story:

- Platform vendors will offer development tools so you can create Web Services on their platforms: J2EE, .NET, etc.

- Application vendors are going to break their monolithic applications into lots of Web Services

- ASPs are going to rent you Web Services over the Internet

- You’re soon going to need to integrate and manage all those Web Services – and only integration vendors like TIBCO can do that
Microsoft and .NET

- Microsoft’s .NET initiative was a key initiator of what we now call Web Services

- .Net consists of three broad initiatives:
  - A vision of Microsoft’s future as a key player on The Internet
  - A development platform for Web Services (among other things)
    - BizTalk, .NET Server, Visual Studio .NET, etc.
    - Common Language Runtime (CLR) provides major new interoperability, stability, security benefits to what will be the .NET Framework
  - Services which run on that platform, such as .NET My Services
    - Passport, MSN Messenger running today, other services, such as calendering and personal information to come
    - These services are hosted by MSFT, available over The Internet
    - The user has fine-grained control over access to the services
JAVA, CORBA, COM 등의 주요 컴포넌트 기술은 독자적인 인프라와 기술을 사용하므로 상호 운용성이 크게 떨어짐

- Java(Interface,RMI)
- CORBAIDL,IIOP
- COMIDL, DEC RPC

SOAP은 웹상의 객체들을 액세스하기 위한 마이크로소프트의 프로토콜

- SOAP(WSDLXML,HTTP)
XML allows the separation of data content from display. XML is about what the data means, not how it looks. Its power lies in structuring data once and utilizing that data in many ways.

The XML Document

- A well-formed XML document
  - Follows the XML element naming conventions

- Valid XML
  - DTD나 XML Schema를 이용하여 validation
<doctype page system "page.dtd"
<page type="extract">
  <tab>
    <sect>Introduction</sect>
    <sno>1</sno>
  </tab>
  <content>
    <theme>In our diversity we find ... the IBM workplace.</theme>
    <para>To know our markets and serve them well ... is key to our continuing success.</para>
    <para>The purpose of this brochure is ... the issue of diversity.</para>
  </content>
</page>
Based on XSD

```xml
<element name="AccountId" type="string"/>
<element name="PIN" type="string"/>
<element name="BalanceRequest">
  <complexType>
    <sequence>
      <element ref="atm:AccountId"/>
      <element ref="atm:PIN"/>
    </sequence>
  </complexType>
</element>
```
Microsoft and others fostered the development of community-based standards to support the notion of Web Services:

- **WSDL** – Web Services Description Language (Interface/service description)
- **SOAP** – (Simple Object Access Protocol) - a combination of HTTP (and theoretically other) transports, with a means for Remote Method Invocation
- **UDDI** – Universal Description, Discovery and Integration – A directory service specification that lets you understand available Web Services, find them and use them

These standards constitute the basic notion of Web Services Standards

Though UDDI is always mentioned, it has not been widely deployed. It is unlikely to be the directory of choice in early implementations. First use will be by individual corporations behind the firewall rather than a DNS-like public utility.
There are two key standards bodies in the XML/WS world:

- W3C – US-oriented. Is driving many of the practical standards used today
- ebXML – Backed by UN, bigger vision. More traction in Europe than W3C

...and there are numerous other standards, including

- XSLT – Extensible Stylesheet Language Transformations
  - Object mapping, rendering
- XSD – XML Schema Definition
  - Metadata standard
- WSFL – Web Services Flow Language
  - Process Description

This only scratches the surface. Take a look at their web pages to see the complexity and breadth of this space.
Web Services do for modern information-driven enterprises what standardized nuts and bolts did for manufacturers in the late 1800s.

The standardization of these things eliminated the hassles of working with custom and incompatible bits and pieces so manufacturers could focus on improving the way they designed, built and sold the products they made out of those bits and pieces. This made them more efficient and enabled them to produce a larger volume of higher quality and more consistent products.

Information and services are the “bits and pieces” of modern enterprises, and Web Services standardizes them so companies can focus on improving the way those services come together as businesses processes that define how they design, build, sell and support products and services.

This ability depends on the ability to effectively manage and coordinate these services – which is what TIBCO’s Web Services integration and management platform provide.
Web Service standards are one of the interface technologies in a total business integration solution.

Even in a scenario where all components have Web Service interfaces, infrastructure is needed to:

- Mediate the data semantic mismatches among services
- Mediate the protocol mismatches among the services
- Define, deploy and manage the interactions among them (often across organizational boundaries)
- Integrate them into end-to-end business processes that also include people and other organizations

TIBCO’s infrastructure addresses all these and can be used as a pure Web Services integration platform:

- Plus the necessary capability of integrating other services
TIBCO’s Web Services Solution

Web Services Interfaces to Legacy Systems
(SAP, Siebel, Oracle, etc.)

Other Interfaces to Legacy Systems
(HTTP, JMS, MQSeries, TIBCO Rendezvous, etc.)

Newly Created Web Services
(Development platforms like .NET, ONE, WebSphere, etc.)

People
(Employee, Customers, Partners, etc.)

Third-party Web Services
(Application Service Providers)
TIBCO’s Web Services Solution

- TIBCO Has A Complete Web Service Infrastructure

- TIBCO is driving Key Web Service Standards across platforms and technologies

- You can do it in 2 processes, BW + SS
3 things enable businesses to increase revenues and profits:

Integrating them in real-time lets them:

- **Increase revenues** by selling to new markets and launching new products/services
- **Decrease costs** by improving efficiency/productivity and getting more out of existing assets
- **Provide superior service** to rise above commoditization and increase customer satisfaction