WAVV 2008

SOA Concepts and z/VSE: Implementing SOA using Web Services and Tools

Wilhelm Mild
z/VSE Solution Architect
zvse@de.ibm.com

© 2008 IBM Corporation

Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and / or other counties.

AIX*
CICS*
CICS/VSE*
C/370
DB2*
DB2 Connect
DB2 Universal Database
DFSORT
e-business logo*
eServer
Enterprise Storage Server*
HiperSockets
IBM*
IBM logo*
IMS
Intelligent
Language Environment*
Miner
MQSeries*
Multiprise*
MVS
OS/2*
OS/390*
OS/400*
Rational*
S/390*
SNAP/SHOT*
SQL/DS
Virtual Image Facility
VisualAge*
VisualGen*
VM/ESA*
VSE/ESA
VTAM*
WebSphere*
xSeries*
z/Architecture
z/OS*
z/VM
z/VSE
zSeries*
System z

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

LINUX is a registered trademark of Linus Torvalds in the United States, other countries, or both.
Tivoli is a trademark of Tivoli Systems Inc.
Java and all Java-related trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries
UNIX is a registered trademark of The Open Group in the United States and other countries.
Microsoft, Windows the Windows 95 logo, and Windows NT, are registered trademarks of Microsoft Corporation.
SET and Secure Electronic Transaction are trademarks owned by SET Secure Electronic Transaction LLC.
Intel is a registered trademark of Intel Corporation.
Other company, product, and service names, may be trademarks or service marks of others.

© 2008 IBM Corporation

Customers & Analysts Agree:

SOA Enables Rapid & Incremental Change Leading to Innovation

Innovation That Matters *

*"The IBM and GenXus SOA-based solution has made our product **more innovative, expanded our market** and made us **more competitive** It will let us grow our business significantly in the years to come."*

MADDENCO INC.

*"SOA is the **heart of the next wave of innovation**. The leaders that do this well are able to **rapidly change** …"*

AMR

*"SOA is critical for … executing the on-demand vision and in preparing … for the **incremental changes** … over time. Companies … make better decisions."*

IDC

© 2008 IBM Corporation

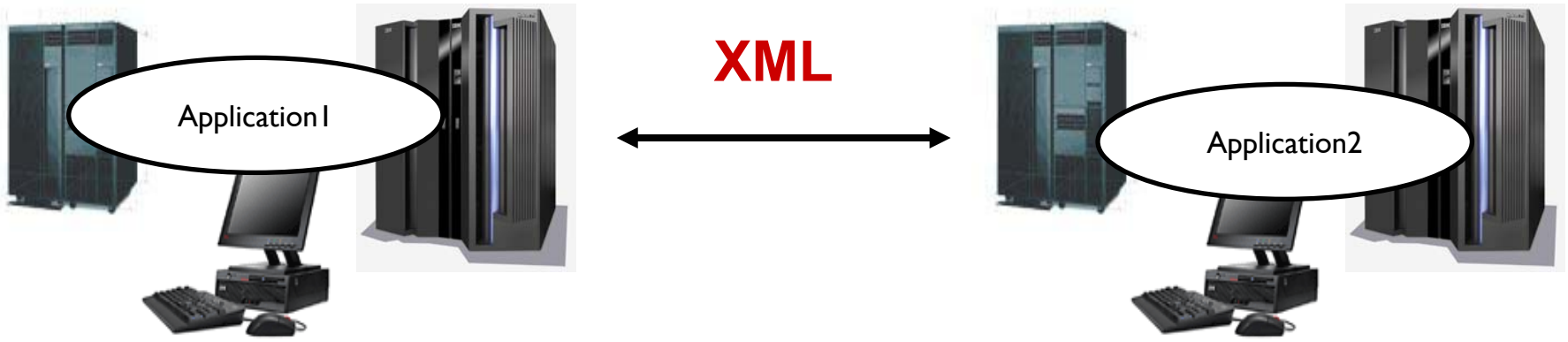
HTML - Traditional Internet Technology

What is HTML ?

- the most successfull markup language ever
- with the used tags, an HTML document can be seen on all platforms from Palmtops to mainframe
- extension interfaces like CGI (Common Gateway Interface) and Java (applets, servlets, EJB) allow access to backend systems
- **HTML was designed with humans in mind**

© 2008 IBM Corporation

XML - was designed for program communication



Today's Requirements for flexible solutions:

- Enterprise wide integration of:
  - information
  - processes
- Reduction of Data Redundancy and complexity
- Standard Internet protocols,
- Application integration
  - Programming Language independent,
  - Platform independent,
  - Architecture independent,

© 2008 IBM Corporation

XML - eXtendet Markup Language
the plattform independent data representations

- HTML - contains tags to tell a browser how to display information
  - but not WHAT that information is
- **XML was designed with applications in mind** (distributed application)
- XML has information about structure and content of information
- XML supports attributes that hold additional information about a tag
- HTML can be written within XML

An address in HTML

```
<p>
<b>Mrs. Mary Brown</b>
<br>
1401 MainStreet
<br>
Winston Salem, WN 34123
</p>
```

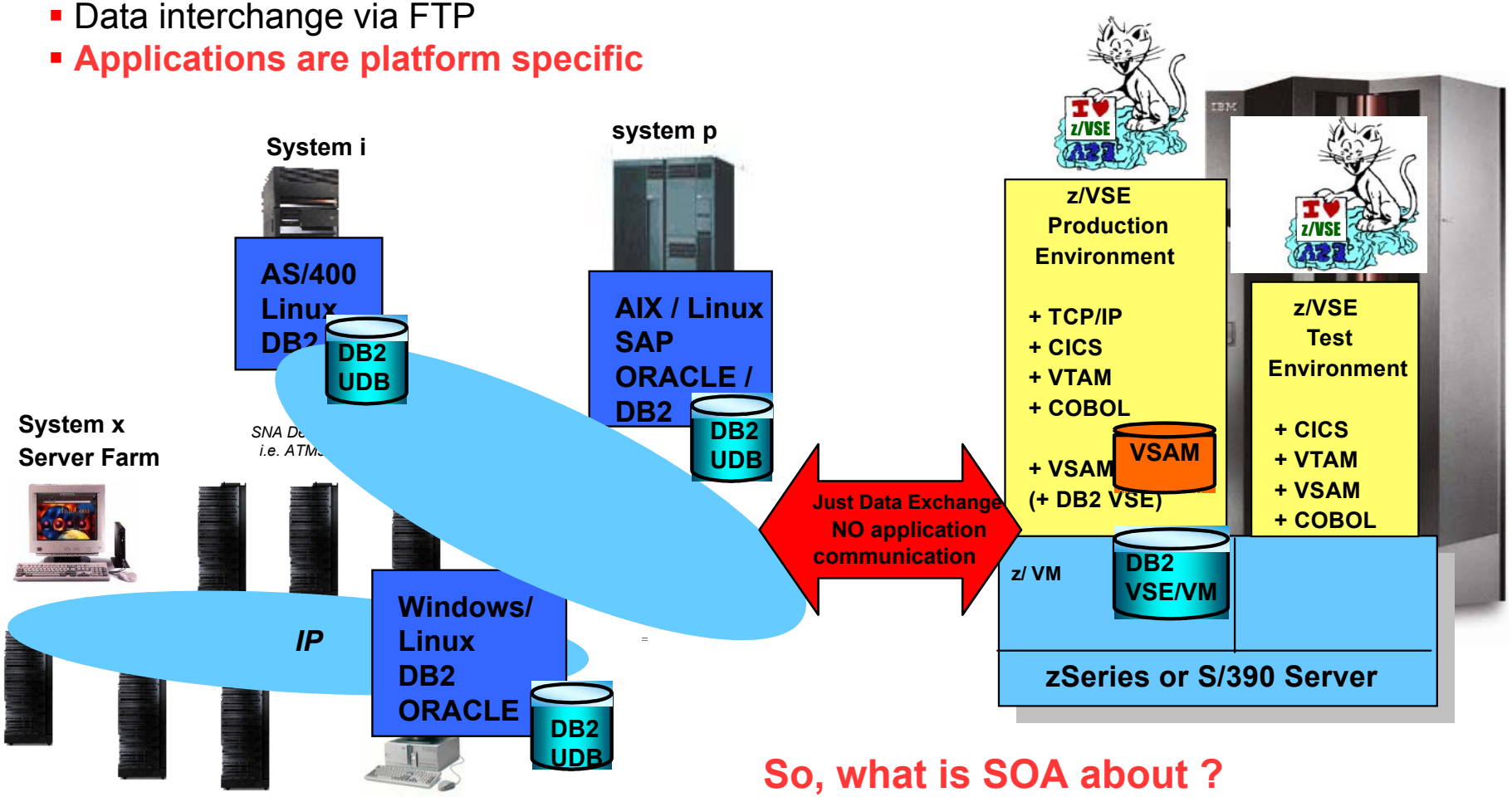
An address in XML

```
<address>
   <title>Mrs.</title>
   <firstname>Mary</firstname>
   <lastname>Brown</lastname>
   <street>1401 MainStreet</street>
   <city state="WN">Winston Salem</city>
   <postalcode type="int">34123</postalcode>
</address>
```


© 2008 IBM Corporation

Typical VSE Customer Environment Data interchange

- VSAM data on VSE (some DB2 environments)
- Relational databases on distributed platforms (DB2, Oracle)
- Data interchange via FTP
- **Applications are platform specific**



So, what is SOA about ?

© 2008 IBM Corporation

What is Service Oriented Architecture (SOA) ?

(1) SOA is a Concept for IT Business Management

A Service-Oriented Architecture (SOA) is focused on developing technology to accomplish your business tasks.

- **eliminate technological constraints** that dictate the activities (i.e op. system and data organization constraints)
- it is **organized around actual activities, or business services**, rather than the different individual silos of information maintained by departments of the company to enable:
  - a greater alignment of business and IT
  - A network-based infrastructure, enabling geographically and technologically diverse resources to work together
  - On-demand, built-on-the-fly-applications
  - Greater code reuse
  - Better process standardization throughout the enterprise
  - Easier centralization of corporate control

"While deploying technology is certainly key to a successful SOA integration, it is the maximizing of the people, process and information elements that are truly core to the SOA process."

Judith Hurwitz
President, Hurwitz & Assoc.

SOA is more than just about technology, but technology's integration with business insight and thought leadership.

© 2008 IBM Corporation

What is Service Oriented Architecture (SOA) ?

(2) SOA is an new IT Architectural Concept

- SOA is represented in "loosely coupled" application components:
  - not tied to a particular database,
  - not tied to a particular infrastructure.
  - self-contained
  - with well-defined interfaces

- Services enable the combination of themselves:
  - to extend existing business logic
  - to create new applications.
- Services can be accessed over a network.
  - the network may exist within your corporate, or it may be geographically and technologically diverse
  - the access is as though they were all installed on your local desktop.
- It enables much greater code reuse,
- cutting your workload at the same time that it increases your capabilities.
- enables your business to adapt to changing conditions and requirements

SOA is more than just doing the same thing a different way.

© 2008 IBM Corporation

The SOA Architecture - Standards

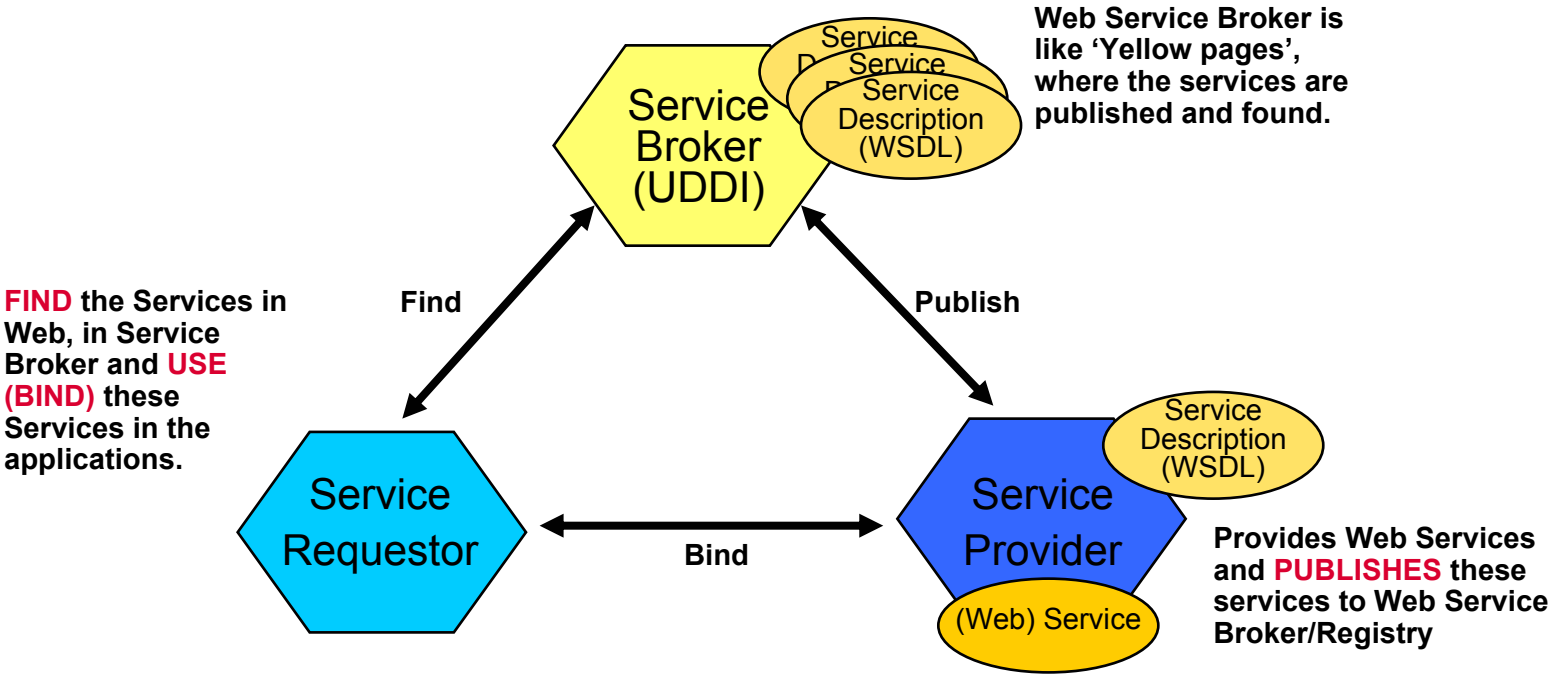
- **Web Services**
  - defined Services
- **XML** (eXtended Markup Language)
  - platform independent data representation
- **SOAP** (Simple Object Access Protokol)
  - protocol for Web Services
- **UDDI** (Universal Description Discovery Integration)
  - catalog to register and find Web Services
- **WSDL** (Web Services Description Language)
  - language in which the Web Services describes
- **Enterprise Service Bus**
  - The Plug for the Services

© 2008 IBM Corporation

What are Web Services ?

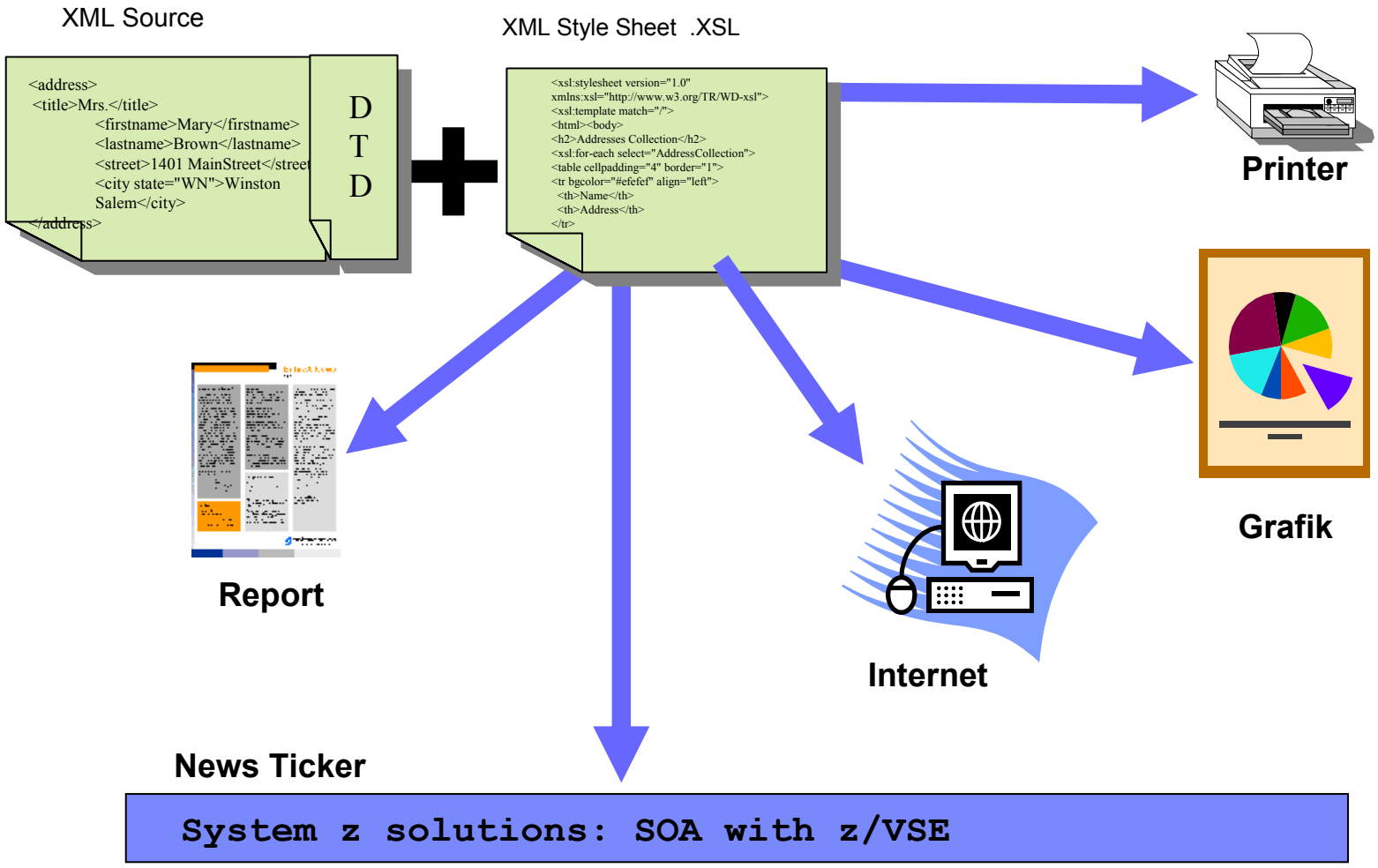
„WebServices are self-contained, modular applications that can be described, published, located, and invoked over a network, generally, the World Wide Web." **IBM**

"A WebService is programmable application logic, accessible using standard Internet protocols" **Microsoft**



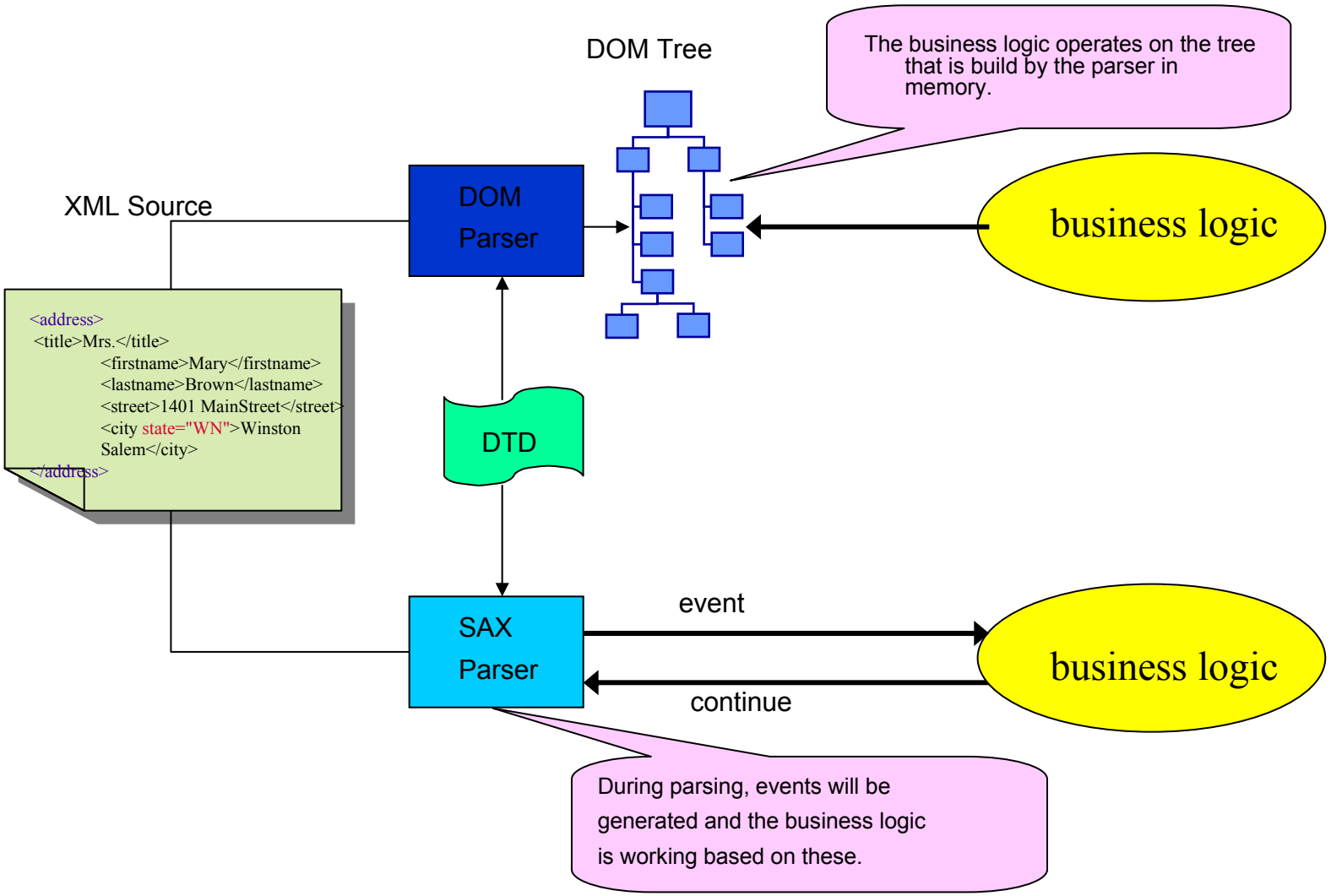
© 2008 IBM Corporation

What is XML ?



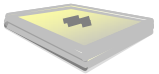
© 2008 IBM Corporation

XML parser Technology (DOM,SAX)



© 2008 IBM Corporation

What is SOAP?

- Simple Object Access Protocol
- SOAP is an XML based protocol for communication between two remote applications:
  - is based on RPC messaging
  - is language independent (de-couples interface from implementation)
  - represents remote procedure calls and responses
- A SOAP message consists of:
  - envelope
    - wraps the message itself
    - defines rules for decoding the message
  -  message
    - request
      - method to invoke on a remote object and parameters
    - response
      - result of running the method and exceptions

© 2008 IBM Corporation

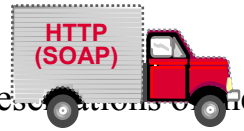
What is UDDI?

- Universal Description, Discovery and Integration
- UDDI is a specification for publishing and discovery of businesses and the services they provide
- UDDI specifications define how to construct UDDI Business Registries
- UDDI specifications are based on XML and SOAP:
  - API to communicate with a UDDI Registry are SOAP based
    - UDDI4J (UDDI for Java) - Open Source implementation in Java
    - JAXR (Java API for XML Registries) - Sun
  - data structures that define Web Service in UDDI Registry are XML based

© 2008 IBM Corporation

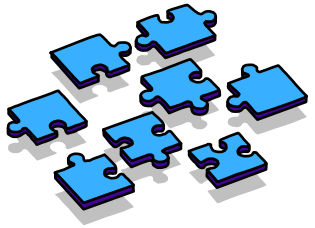
What is WSDL?

- **Web Services Description Language**
- **WSDL is an XML based vocabulary for defining a Web Service:**
  - **interfaces**
    - **operation types (i.e. one-way, request-response, notification)**
    - **messages defining a Web Service interface**
    - **definition of data types (XML Schema)**
  - **access protocol (i.e. SOAP over HTTP)**
  - **contact endpoints (i.e. Web Service URL and URNs[1])**



(1URNs are location independent pointers to a file, or to different representations of the same content. In most ways they can be used like URLs)

- **A Web Service URL returning WSDL makes Web Services self-describing**
- **Similar in purpose to IDL (Interface Definition Language)**
  - **From a WSDL file, wizards can generate:**
  - **proxy classes for calling Web Service**
    - **skeleton classes to implement a Web Service**



© 2008 IBM Corporation

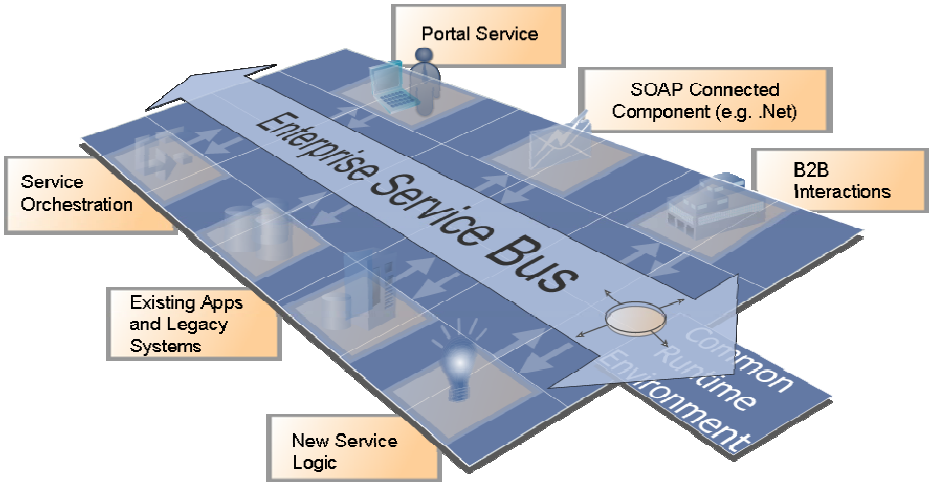
What is an Enterprise Service Bus?

An Enterprise Service Bus (ESB) is a flexible Infrastructure for services and application integration

An ESB reduces the number, size and complexity of your interfaces in a SOA solution.

An ESB realizes following tasks between requestor und service

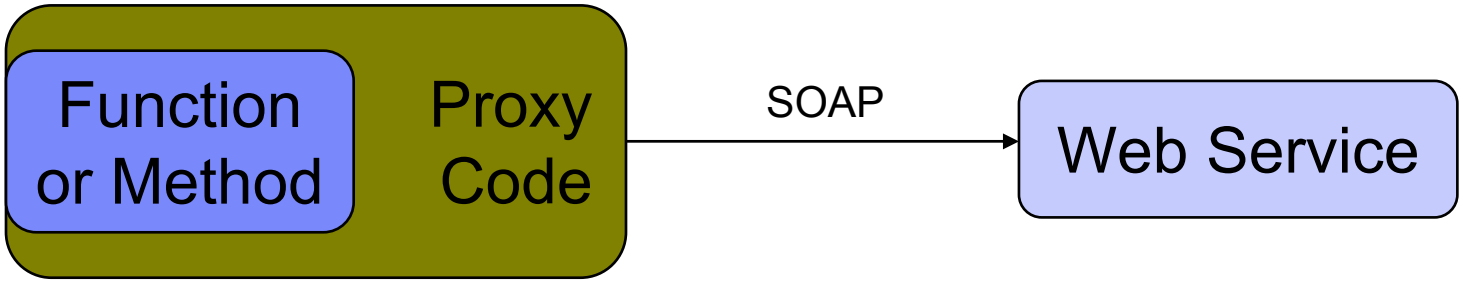
- **ROUTING of messages between Services**
- **CONVERTING the transport protocol between requestor and service**
- **TRANSFORMING message formats between requestor and service**
- **HANDLING of business events between different types of services**



© 2008 IBM Corporation

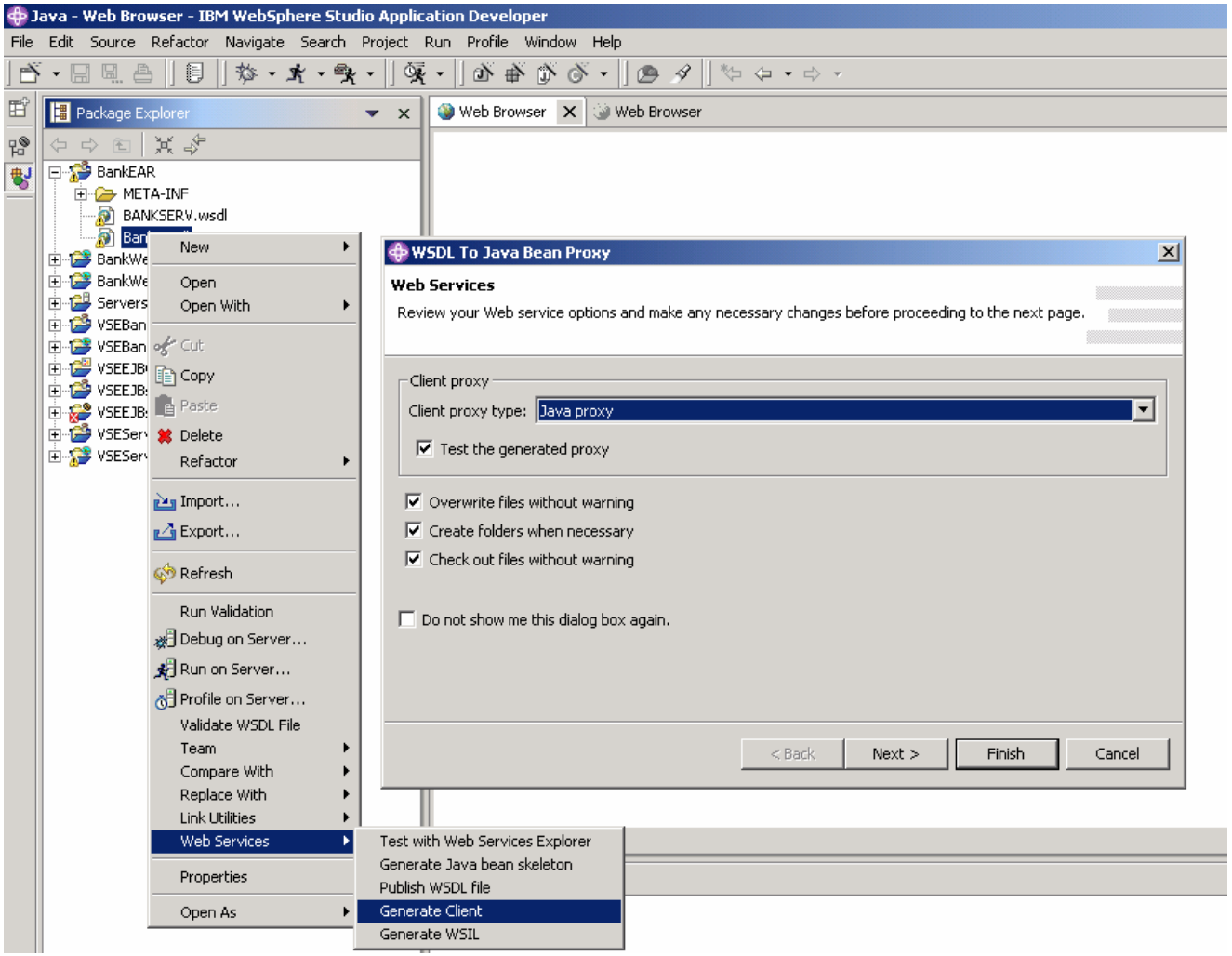
Call a Web Services with Java or MS .Net

- Call an existing Web Service
  - Locate the Web Service Description (WSDL) for the Web Service you want to access
  - Use a tool like Rational Application Developer (RAD) or Microsoft Visual Studio and import the WSDL
    - Generate “proxy code” that implements all things needed to invoke the Web Service
    - Applications call a function of the proxy code as it would implement the service by itself



© 2008 IBM Corporation

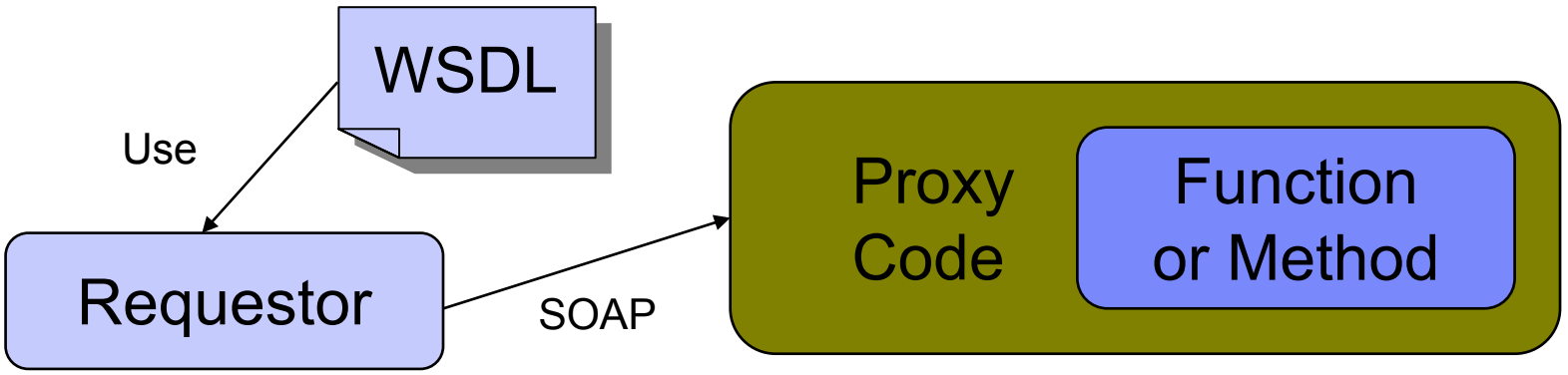
Using Web Services with Java or MS .Net



© 2008 IBM Corporation

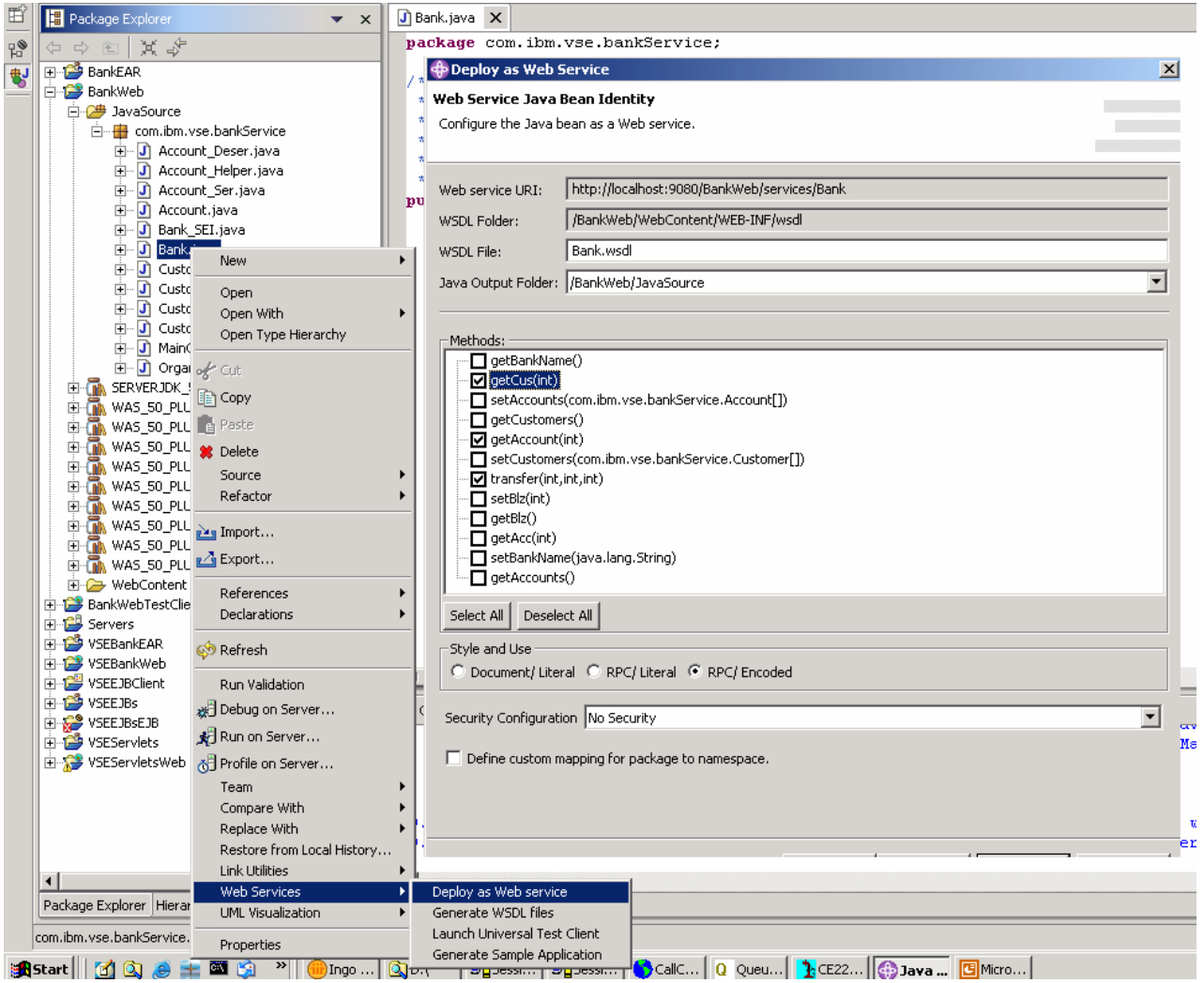
Create a Web Services in Java or MS .Net

- Create/provide a new Web Service
  - You have a callable business logic that you wan to transform into a Web Service
  - Use a tool like Rational Application Developer (RAD) or Microsoft Visual Studio to model a Web Service
    - Generate a Web Service Description (WSDL) and publish it
    - Generate “proxy code” that makes the function or method callable from outside as a Web Service via SOAP
    - Deploy it in an application server



© 2008 IBM Corporation

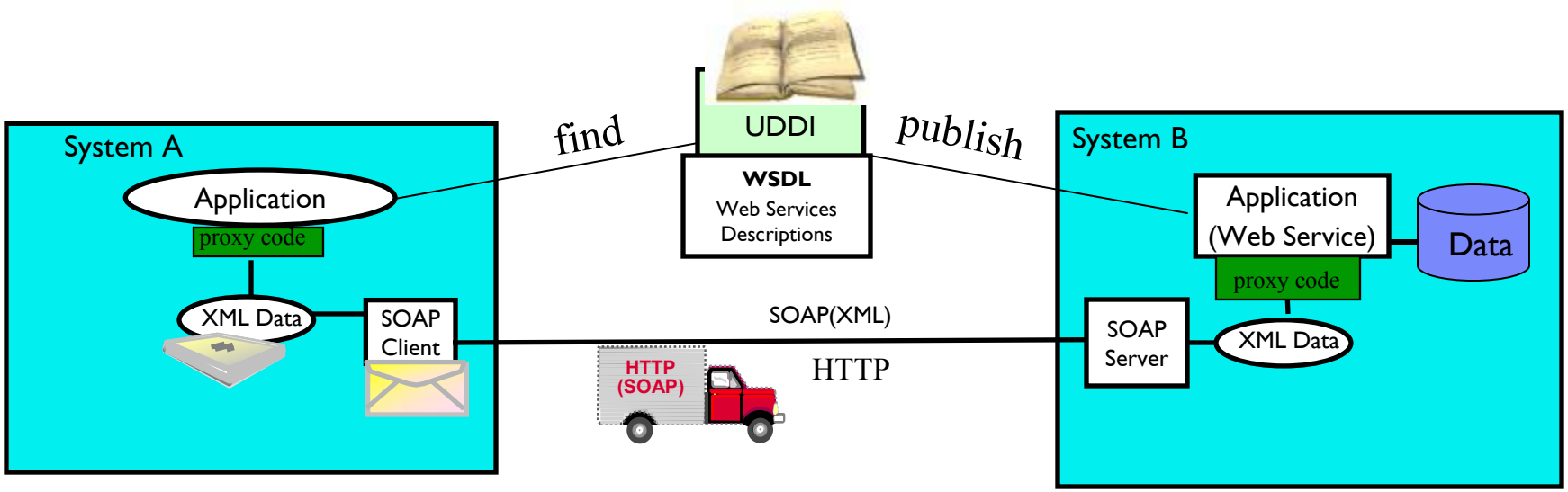
Create a Web Services in Java or MS .Net



© 2008 IBM Corporation

Web Services in action

XML Document + SOAP Protocol = Web Services



XML -

SOAP -

HTTP - **Carrier**

TCP/IP - **Street**

UDDI - **Yellow pages**

A ***web service***

- is intended for application communication
- implements a business logic, application or system functionality
- is useable in internet, intranet, extranet
- is useable for browser-based solutions up to the integration between companies
- uses only standard internet technologies

© 2008 IBM Corporation

Why should VSE customers consider SOA?

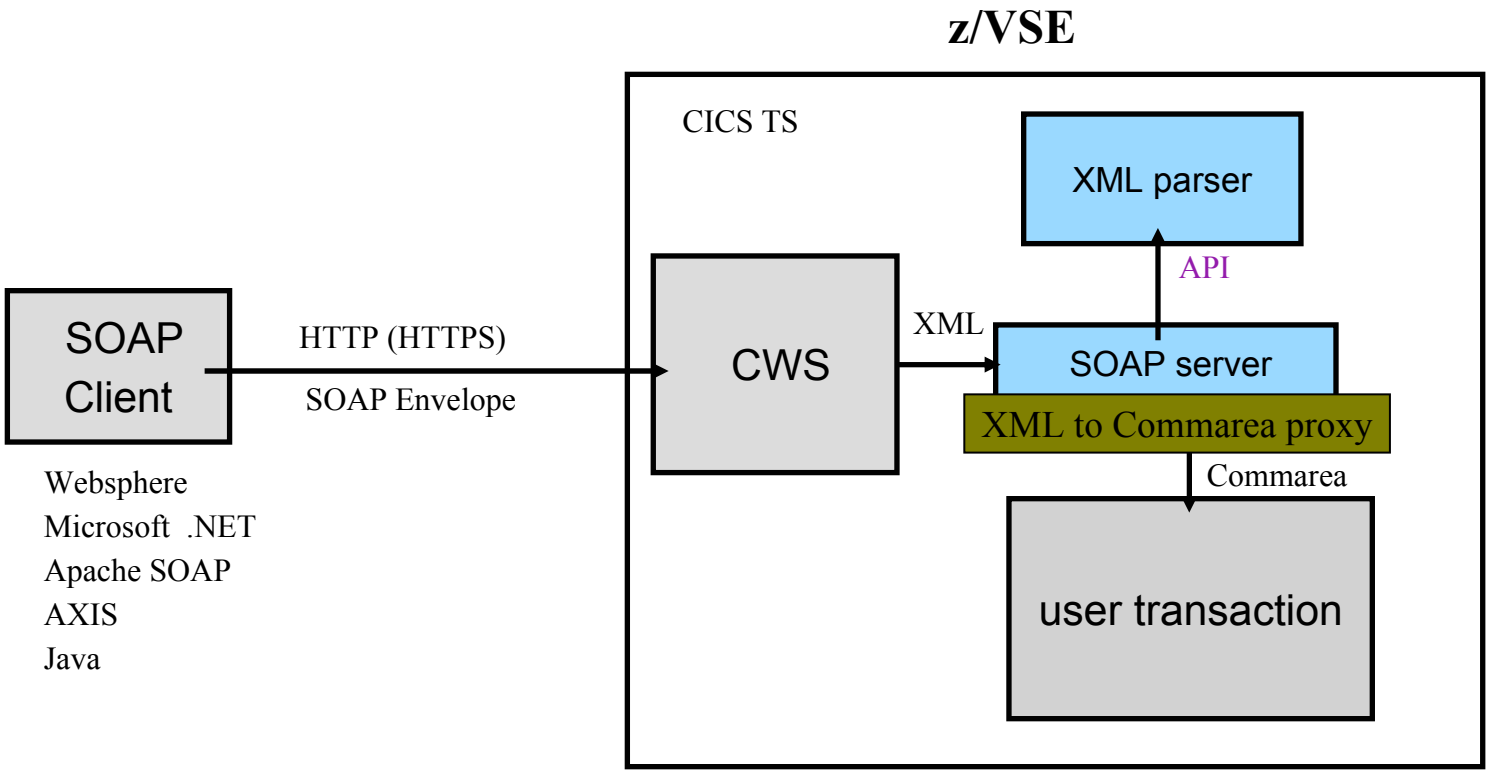
- **SOA is modern (hype) and strategic**
  - It is mentioned in all IT journals and newspapers
- **Easy integration of existing VSE programs and processes**
  - Reducing the interface complexity
  - Reuse of existing application logic as services
  - Use of standard protocols (XML, SOAP, HTTP)
- **integration is platform independent**
  - independent of application programming language
  - independent of the data involved
- **Integration of VSE logic with a Microsoft .Net environment**
  - without the use of Java
  - the most incompatible environments can be integrated
- **SOA enables the extension of VSE applications**
  - to other platforms and architectures
  - to partners and open world

© 2008 IBM Corporation

VSE as SOAP server

Web Services (SOAP)

SOAP - Simple Object Access Protocol
(platform independent remote procedure call)

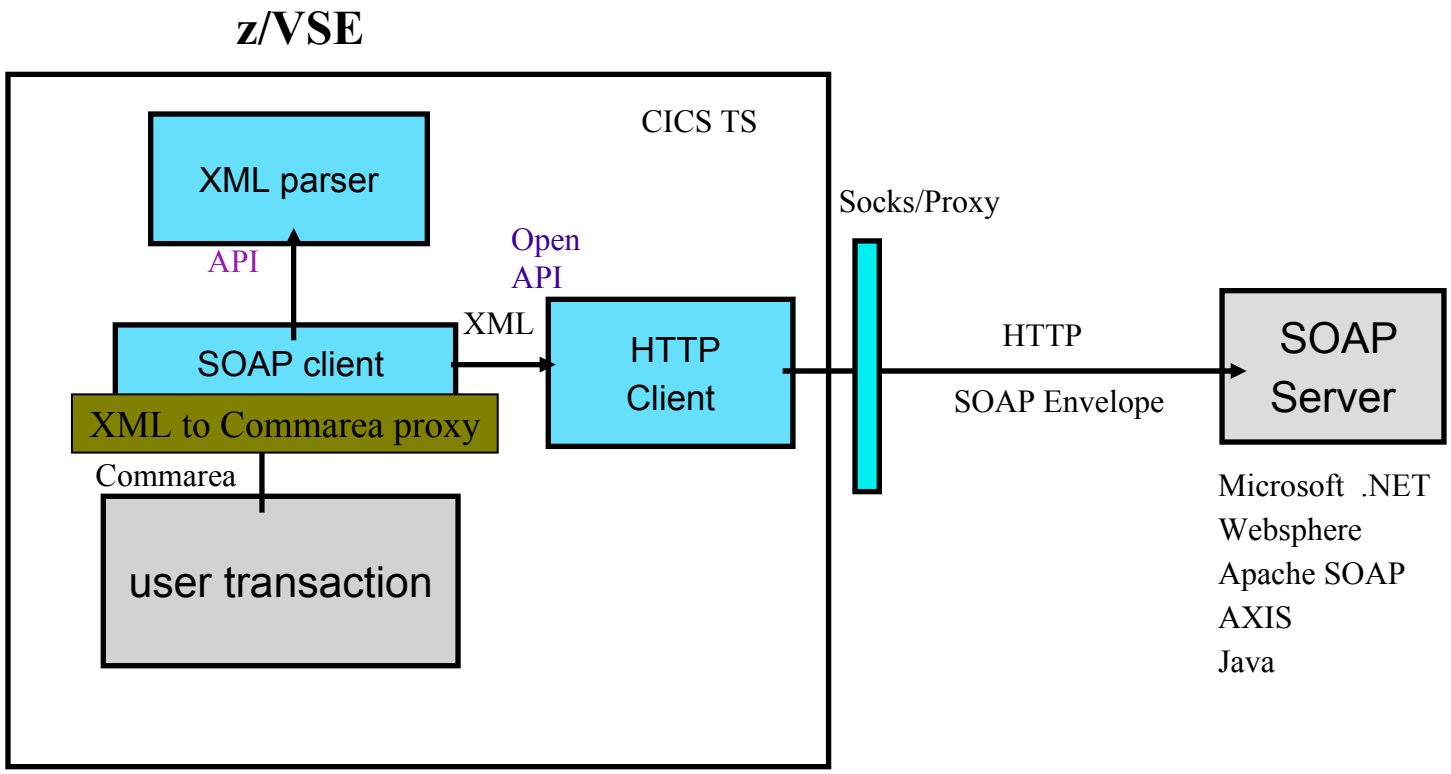


© 2008 IBM Corporation

VSE as SOAP client

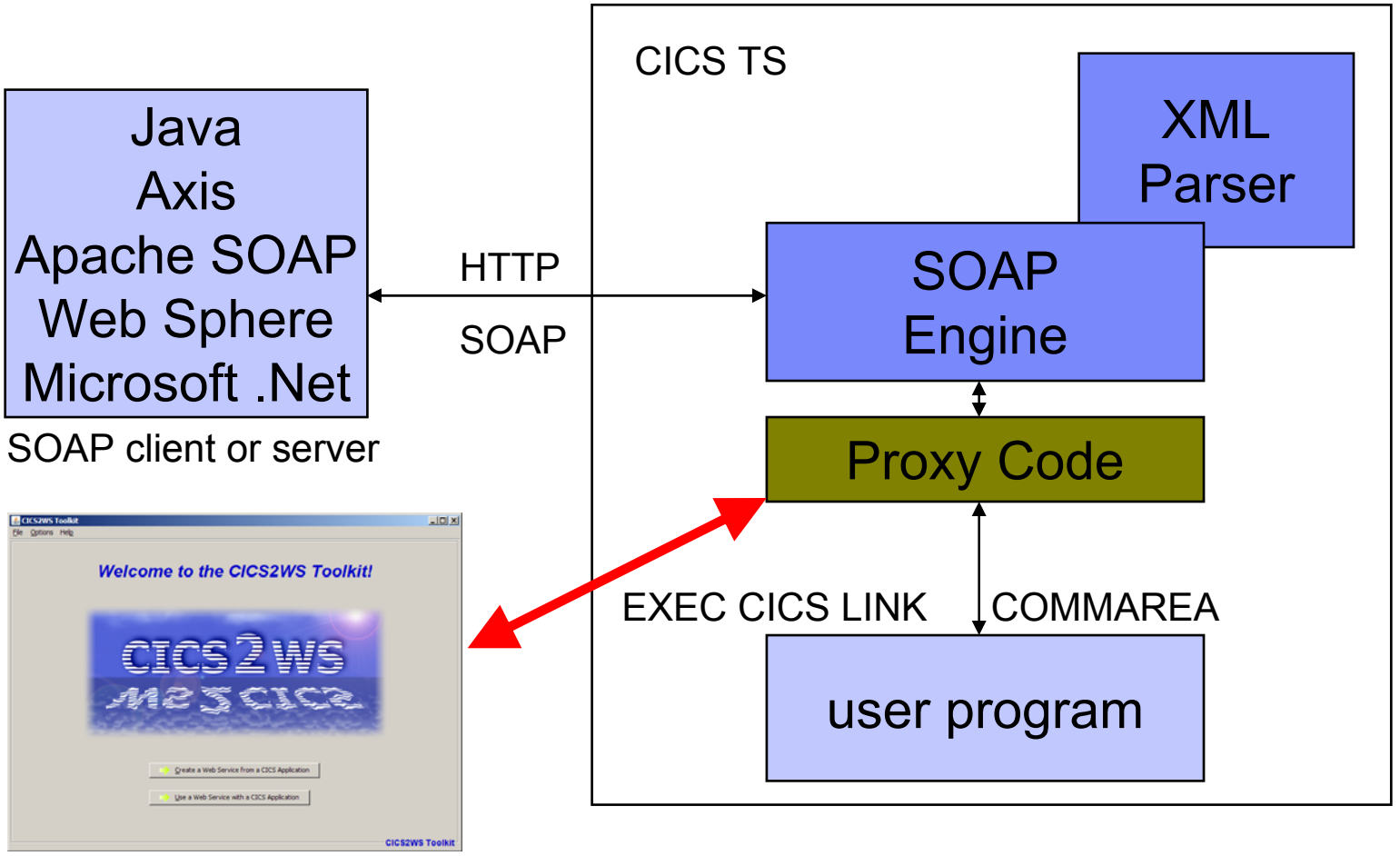
Web Services (SOAP)

SOAP - Simple Object Access Protocol
(platform independent remote procedure call)



© 2008 IBM Corporation

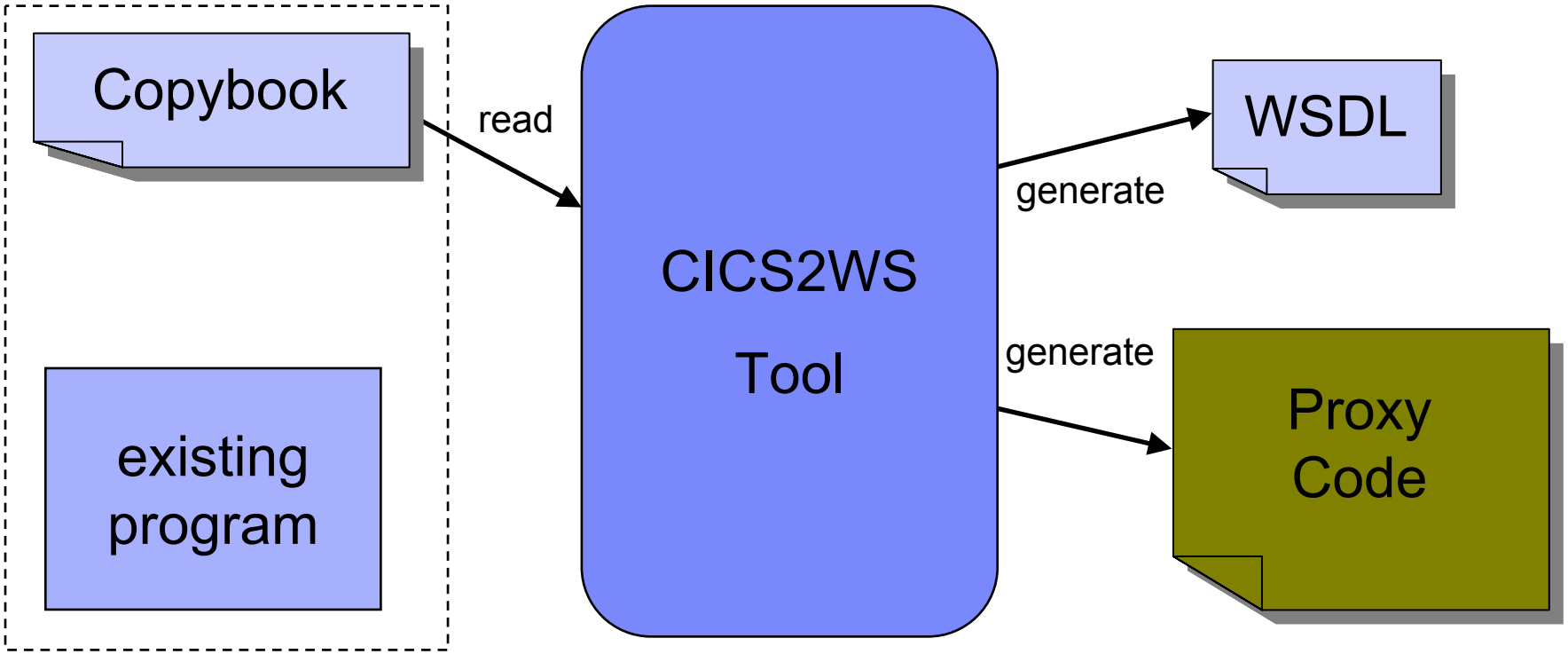
Web Services in and with VSE



Tool to generate the Proxy code

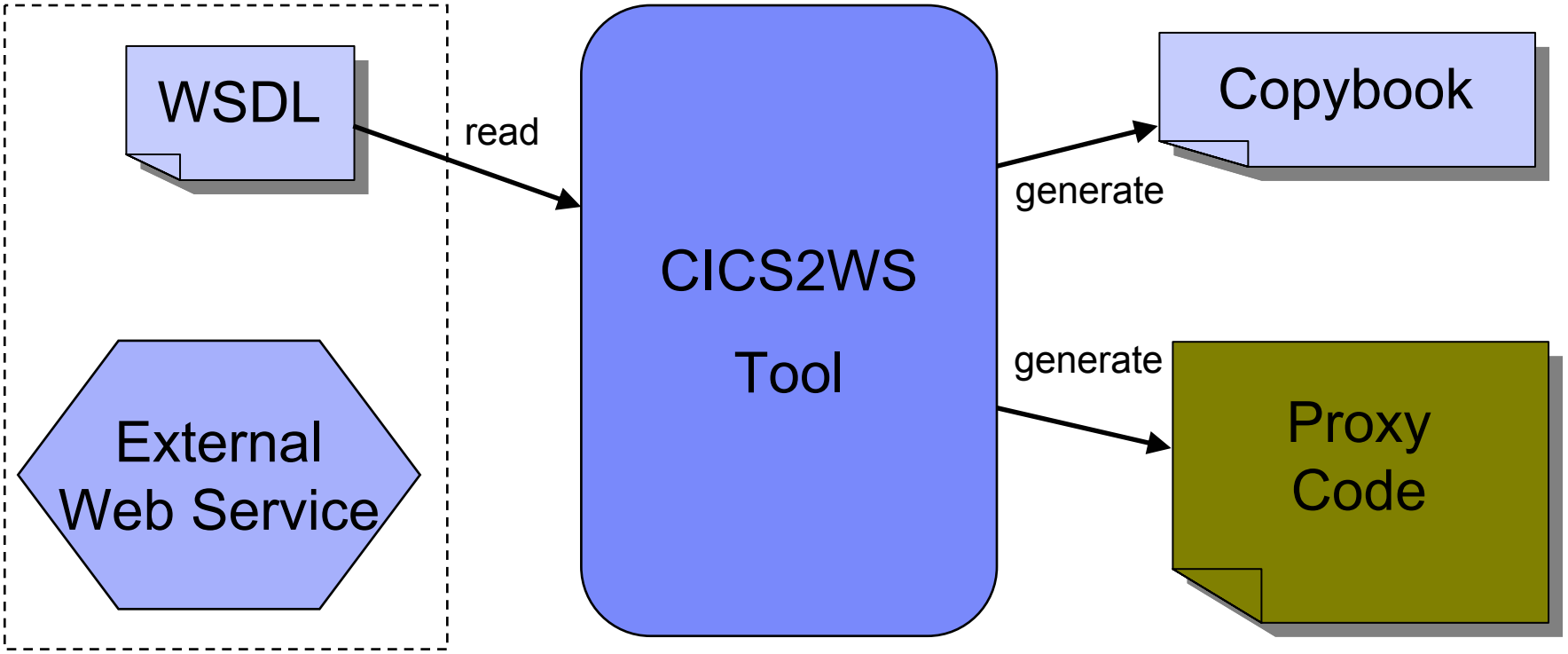
© 2008 IBM Corporation

VSE as a SOAP server (service provider)



© 2008 IBM Corporation

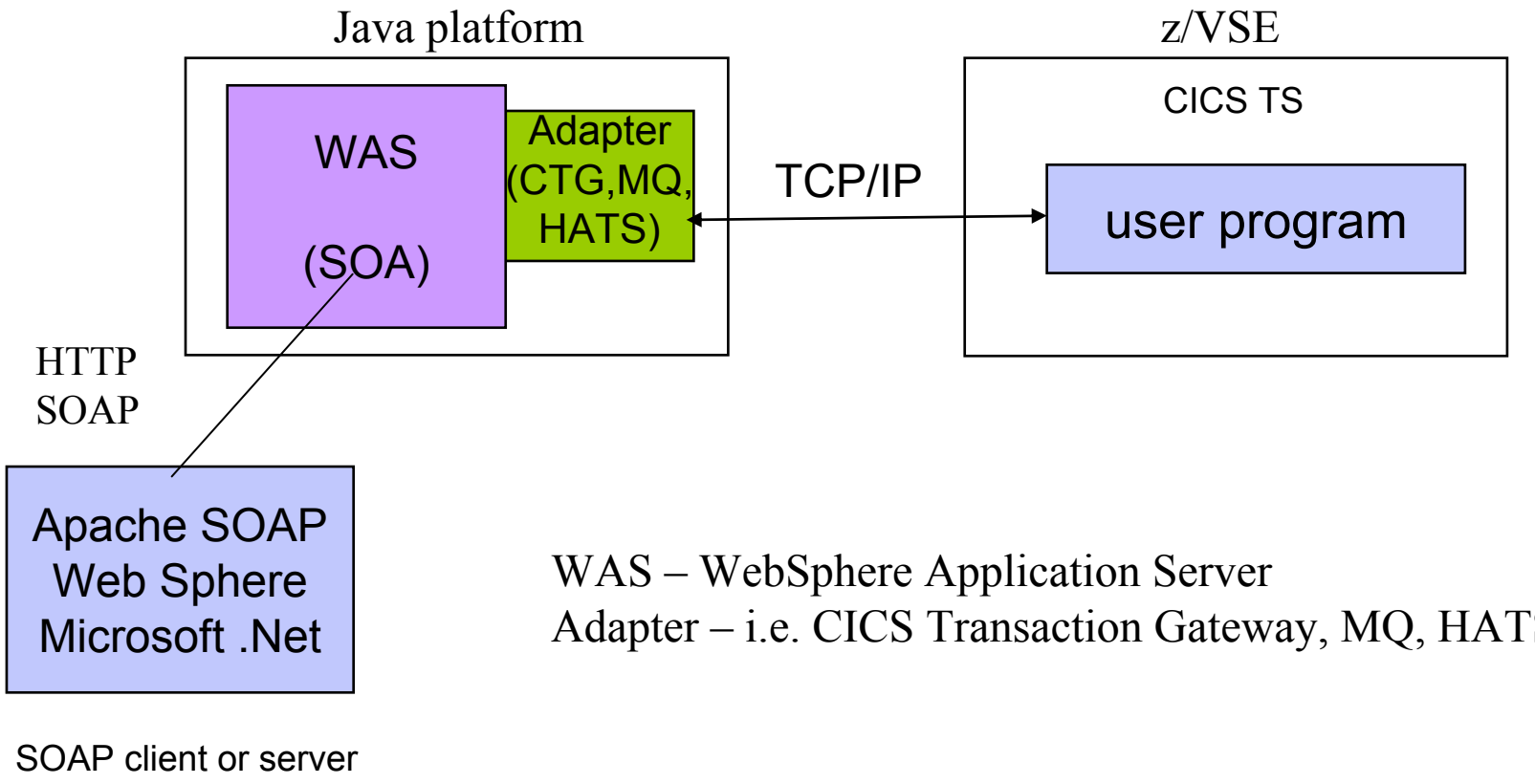
VSE as a SOAP client (service requestor)



© 2008 IBM Corporation

Web Services with Middle tier and z/VSE

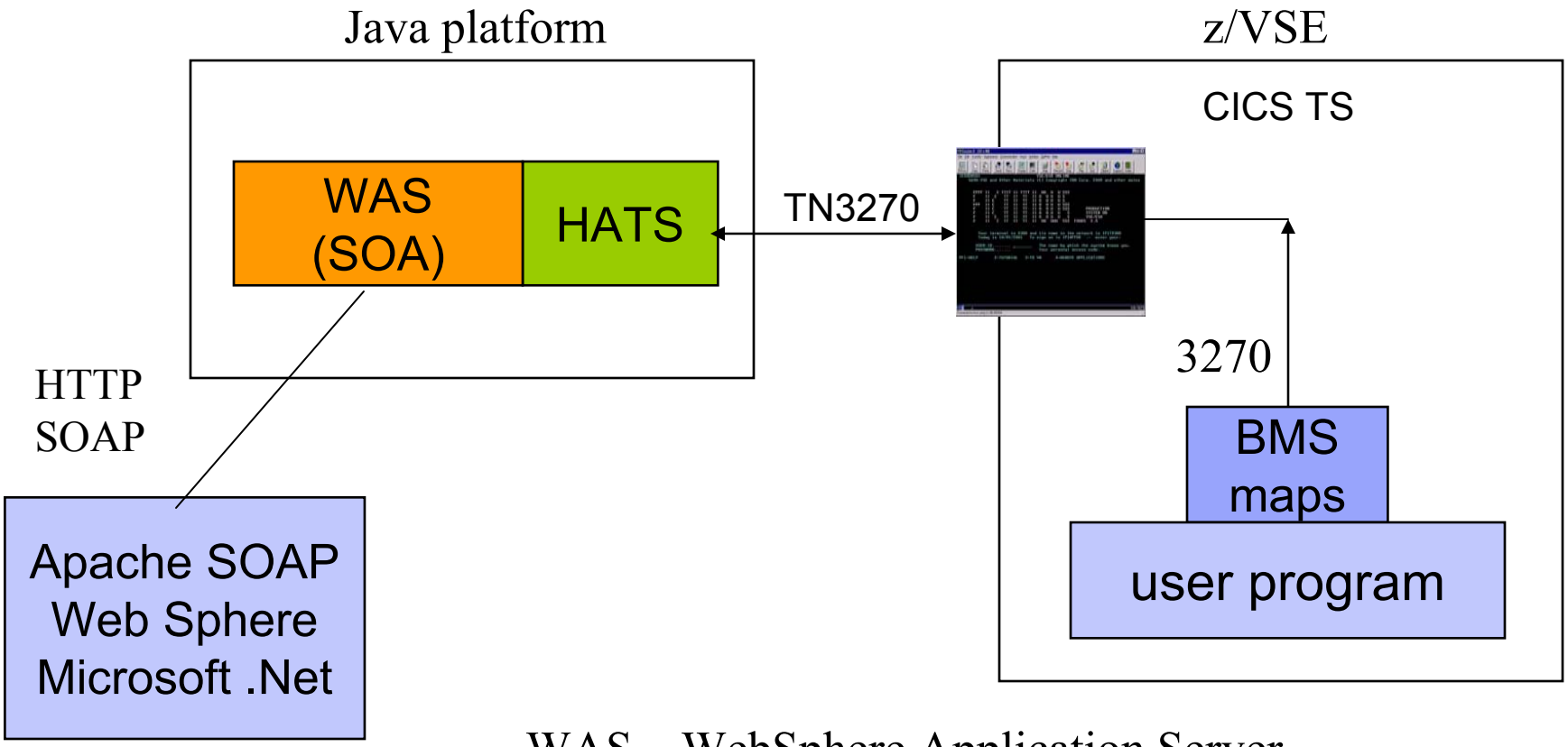
The Web Service is implemented on the middle tier – WebSphere Connector technology is used to access VSE logic



WAS – WebSphere Application Server
Adapter – i.e. CICS Transaction Gateway, MQ, HATS

© 2008 IBM Corporation

Web Services with 3270 applications

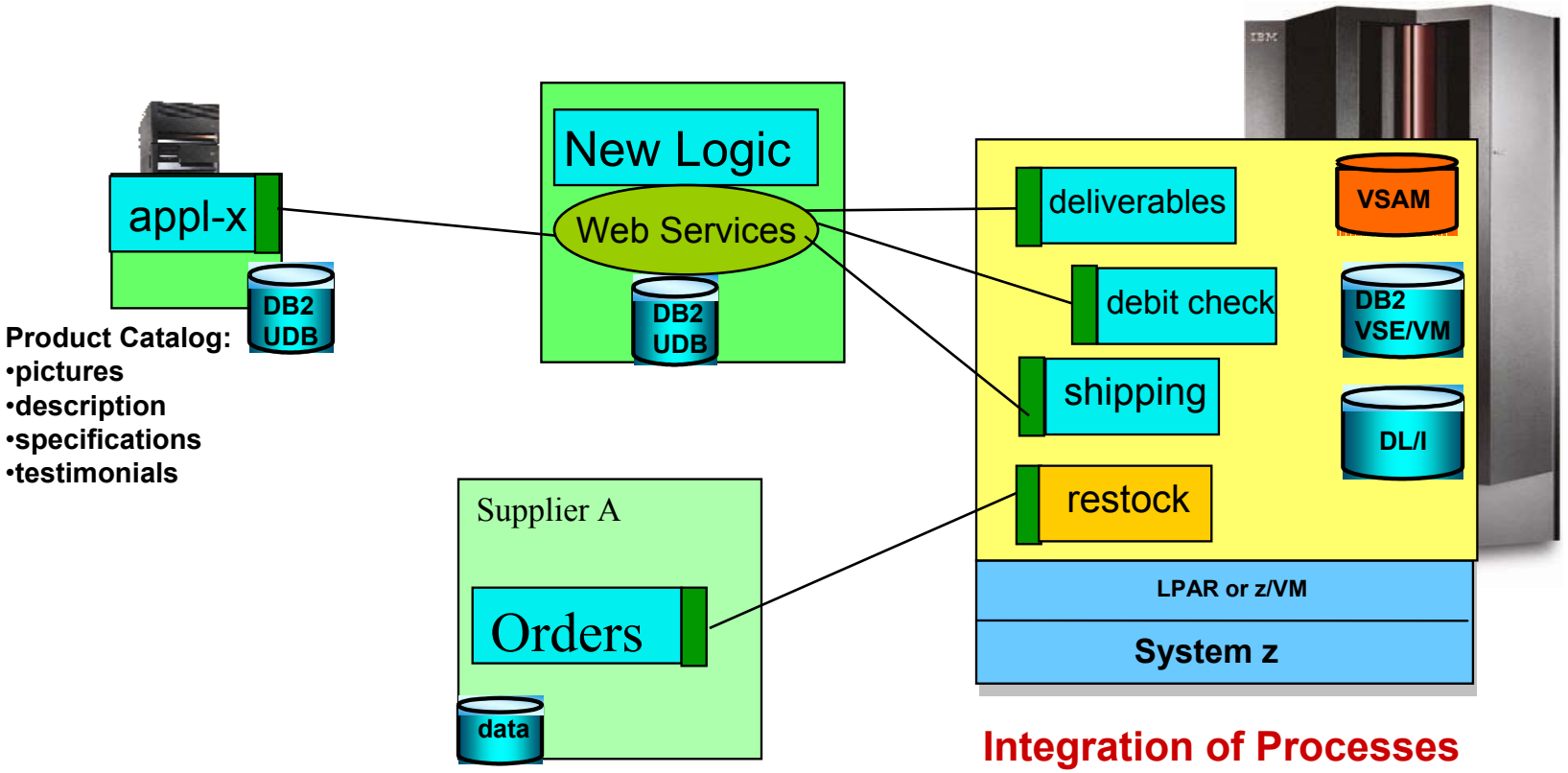


© 2008 IBM Corporation

SOA – the way to New applications and processes

- Applications look the same for all users
- Core applications can be enhanced (independent of their language, COBOL, ASM, PL/I)
- New business logic can be built

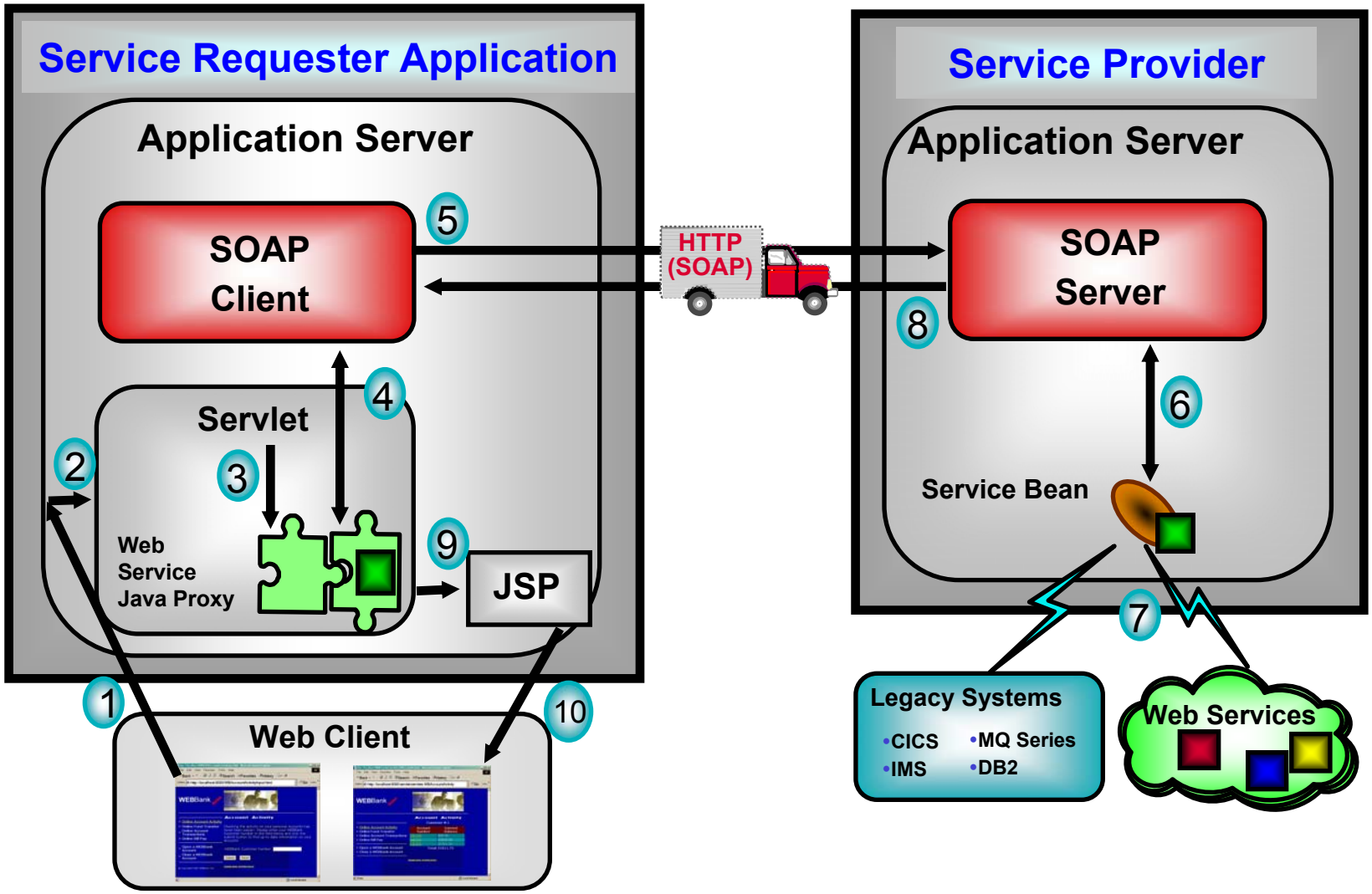
Increases business for the Company



Integration of Processes

© 2008 IBM Corporation

Web Services Runtime View



© 2008 IBM Corporation

Solutions where SOA is not the best architecture

- For high performance requirements
  - Communications using SOAP/XML are time consuming
- For the transfer of large amounts of data
  - XML data can get huge
- If transaction security is required
  - Two phase commit has to be implemented in the logic
- For real time direct access to data
  - SOAP is program to program communication

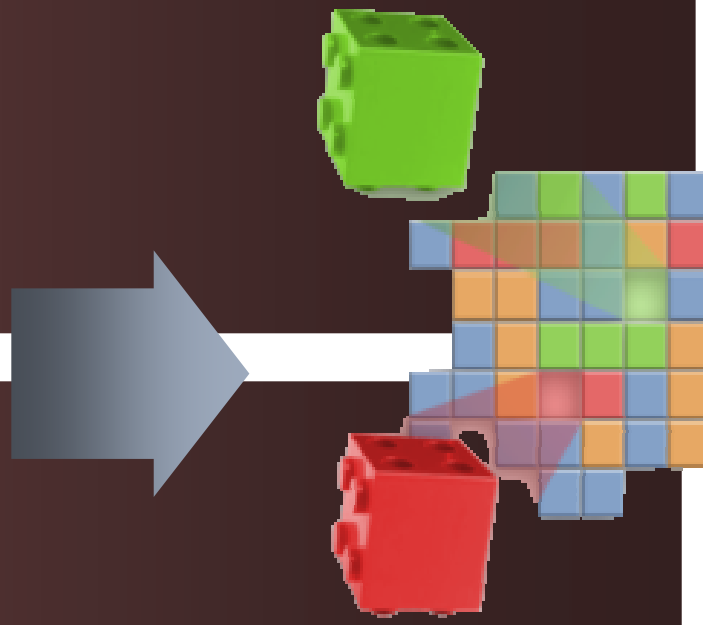
© 2008 IBM Corporation

Creating & Reusing Services - Greater Value through SOA

Create Flexible, Service-based Business Applications

Value

- Flexibility and elimination of duplication for reduced cycle times
- Expanded access to core applications
- Consultant studies have found it 5X less expensive to re-use existing applications than to write new applications*



Start with

- What services are needed to run your business?
- Identify high-value existing IT assets and service-enable them for reuse
- Fill in gaps by creating new services for today's business needs and future reuse
- Registry/repository to facilitate centralized access and control of reusable services

" With reuse, solving the next business problem can be done more quickly and efficiently."

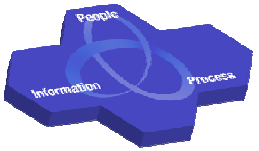
- Amy Wohl

** Software Productivity Research (SPR)*

© 2008 IBM Corporation

Reusing Services

Business Challenge: Leverage existing assets to improve business agility



Sysdat & Gautzsch

Reused existing RPG service based function to integrate with Amazon.de sales portal

Online in 3 weeks. ***ROI in < 3 months.***

WebSphere Business Integration Express, Partner Gateway

Acesita

Integrates mySAP and existing backend applications with **reusable service data**

Real-time views of critical cost and profit information for **better decisions**

IBM BCS, WebSphere MQ and Message Broker

Mainsoft and Comtec

Reuse .NET applications in open standards-based SOA with IBM Business Partner Mainsoft Solutions

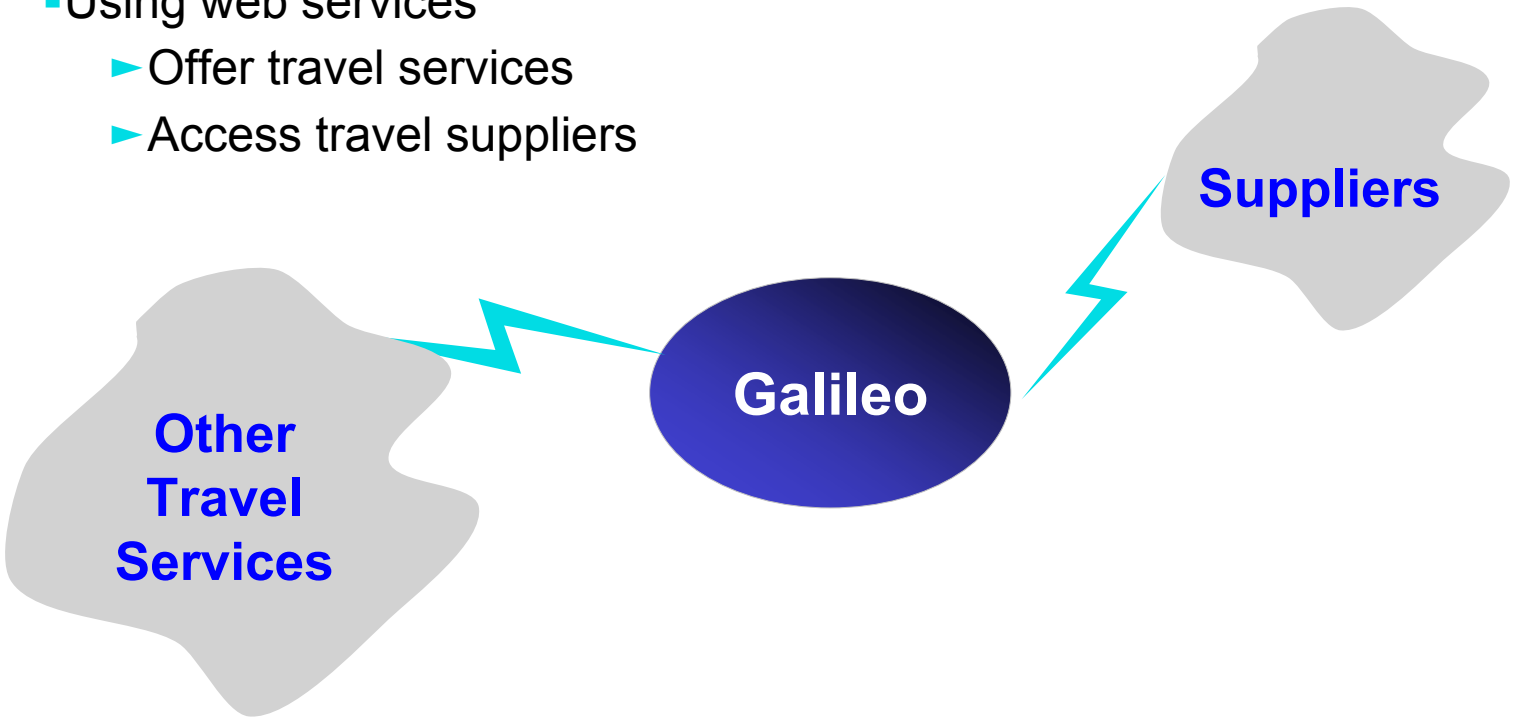
5x faster than rewriting the code from scratch

Mainsoft Visual MainWin, WebSphere Application Server

© 2008 IBM Corporation

Travel services

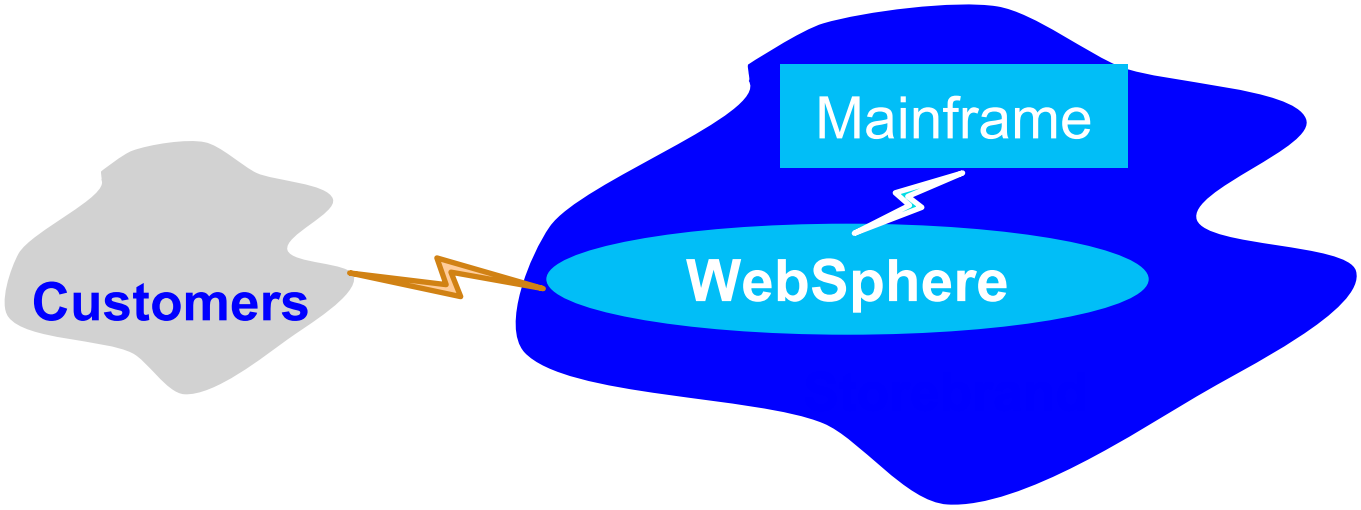
- One of the world's leading providers of electronic global distribution services (GDS) -- connecting more than 42,000 travel agency locations to 511 airlines, 37 car rental companies, 47,000 hotel properties, 350 tour operators and all major cruise lines in an electronic marketplace.
- Using web services
  - Offer travel services
  - Access travel suppliers



© 2008 IBM Corporation

Financial

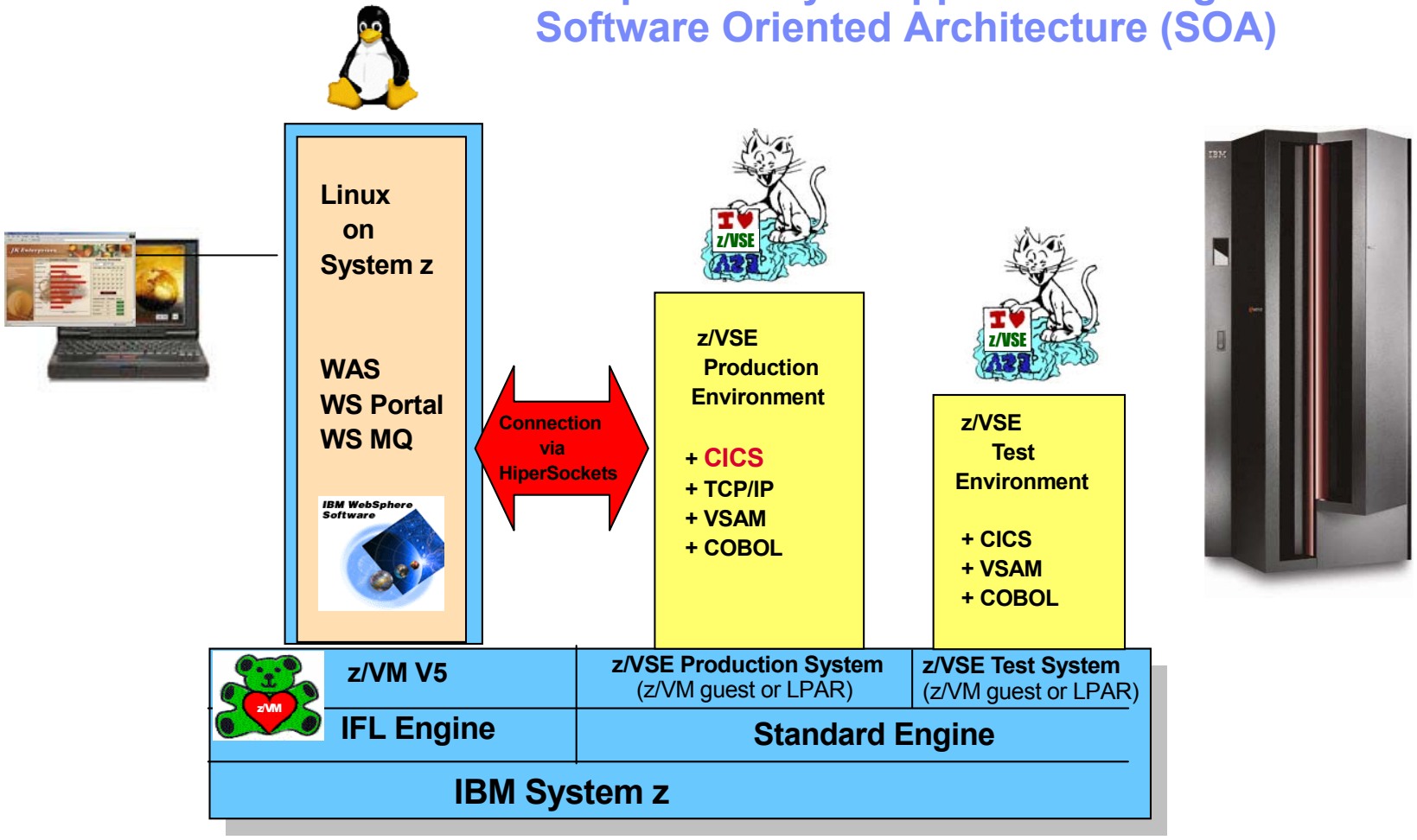
- A Financial and insurance holding company
- 6,500 companies with approximately 390,000 employees
  - Manually synchronize the records of those employees such that individual coverage could be accurately calculated for each employee under a variety of insurance schemes.
- Replace the manual process with an automated web services process
  - Extract information directly from payroll systems and transmit via web services requests to Storebrand where it is entered into Storebrand's mainframe



© 2008 IBM Corporation

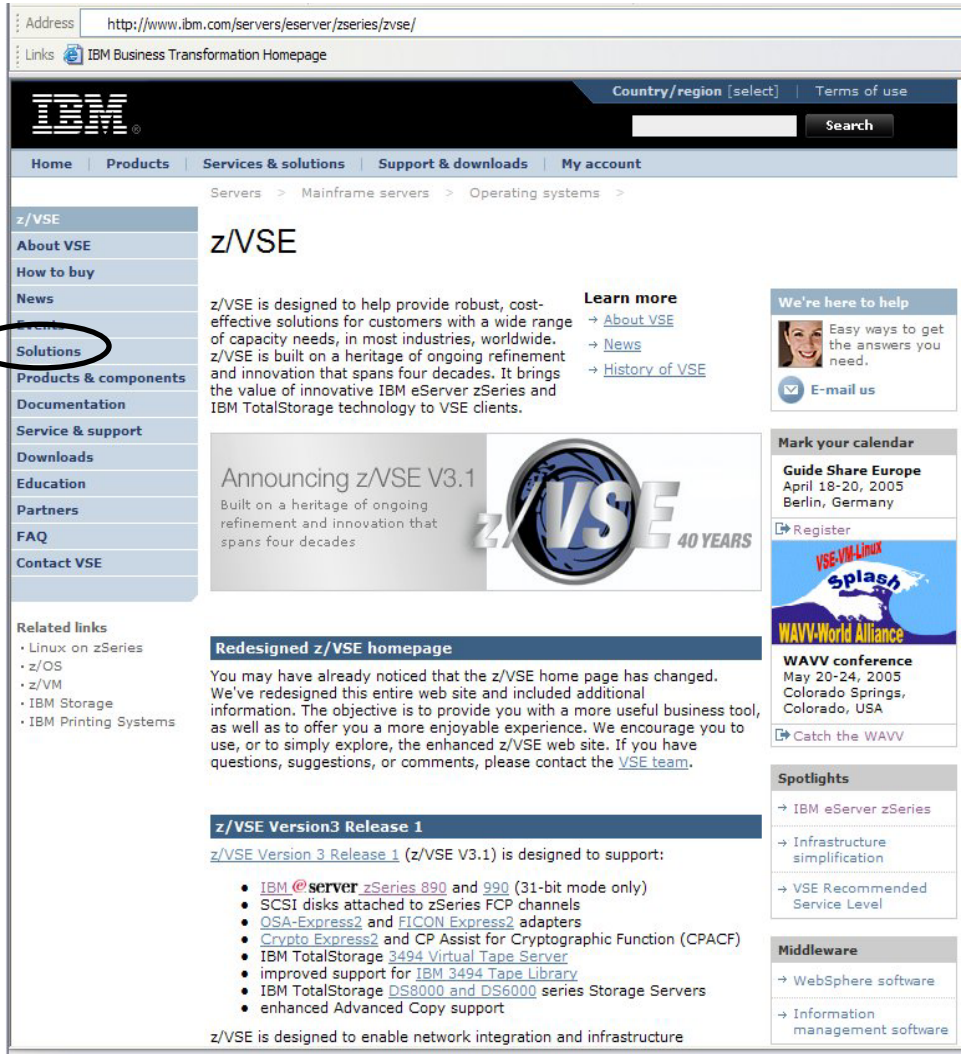
WebSphere Application Server for VSE Customers

The possibility of application integration and Software Oriented Architecture (SOA)



© 2008 IBM Corporation

Solutions on the new z/VSE homepage



http://www.ibm.com/servers/eserver/zseries/zvse/

© 2008 IBM Corporation

Documentation

- What is SOA?
  - http://www.ibm.com/developerworks/webservices/newto/
  - http://webservices.xml.com/pub/a/ws/2003/09/30/soa.html
- Web Services
  - http://www.ibm.com/servers/eserver/zseries/zvse/documentation/ebusiness.html#soap
- *z/VSE e-business Connectors, User's Guide (SC33-8231)*
  - http://www-03.ibm.com/servers/eserver/zseries/zvse/
- Web Services in VSE (zJournal.com)
  - http://www.zjournal.com/index.cfm?section=article&aid=281
  - http://www.zjournal.com/index.cfm?section=article&aid=320
  - Includes COBOL sample code

© 2008 IBM Corporation