B04

An Intro to IMS e-Business Solutions

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IMS Technical Conference
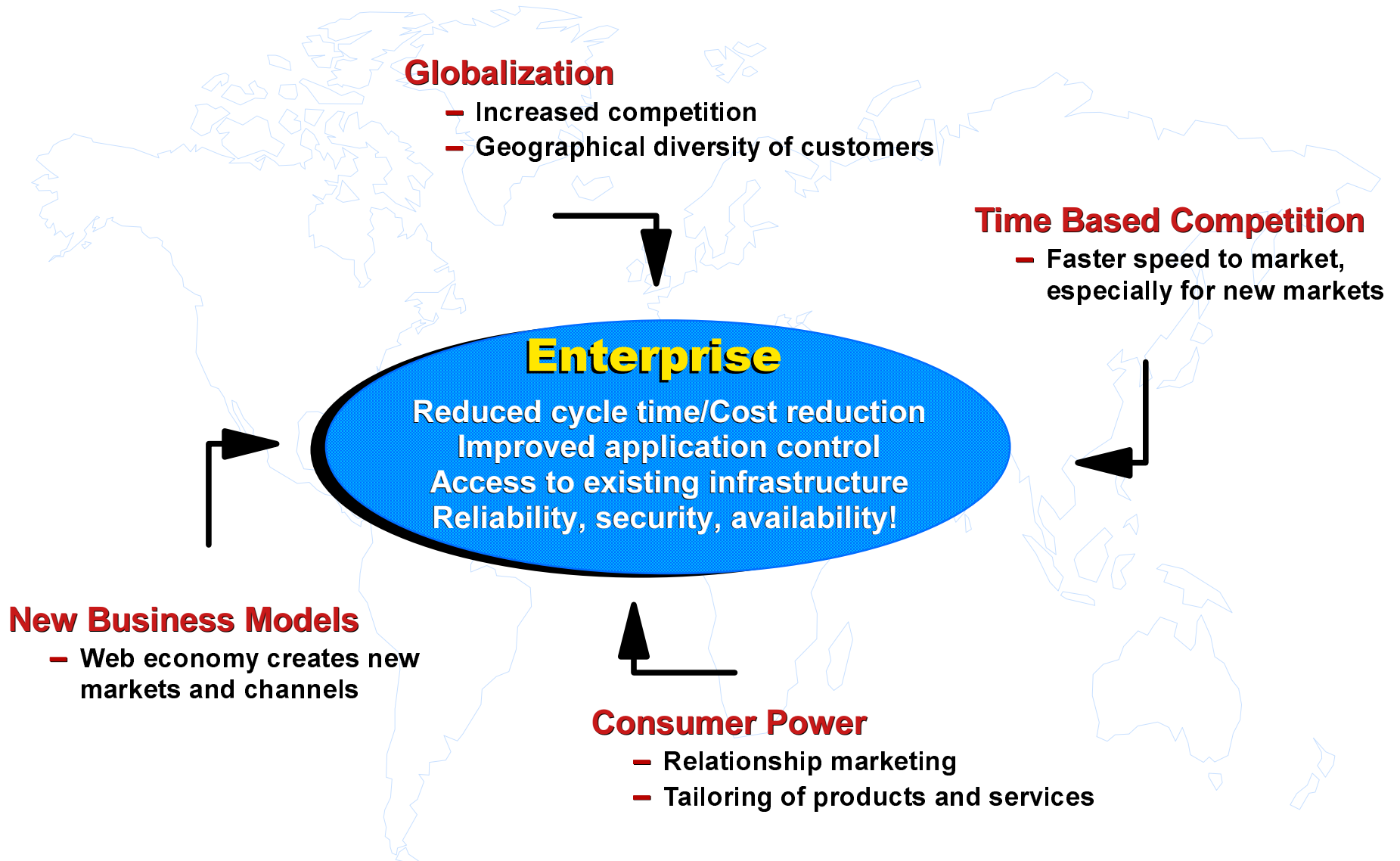
Miami Beach, FL   October 22-25, 2001
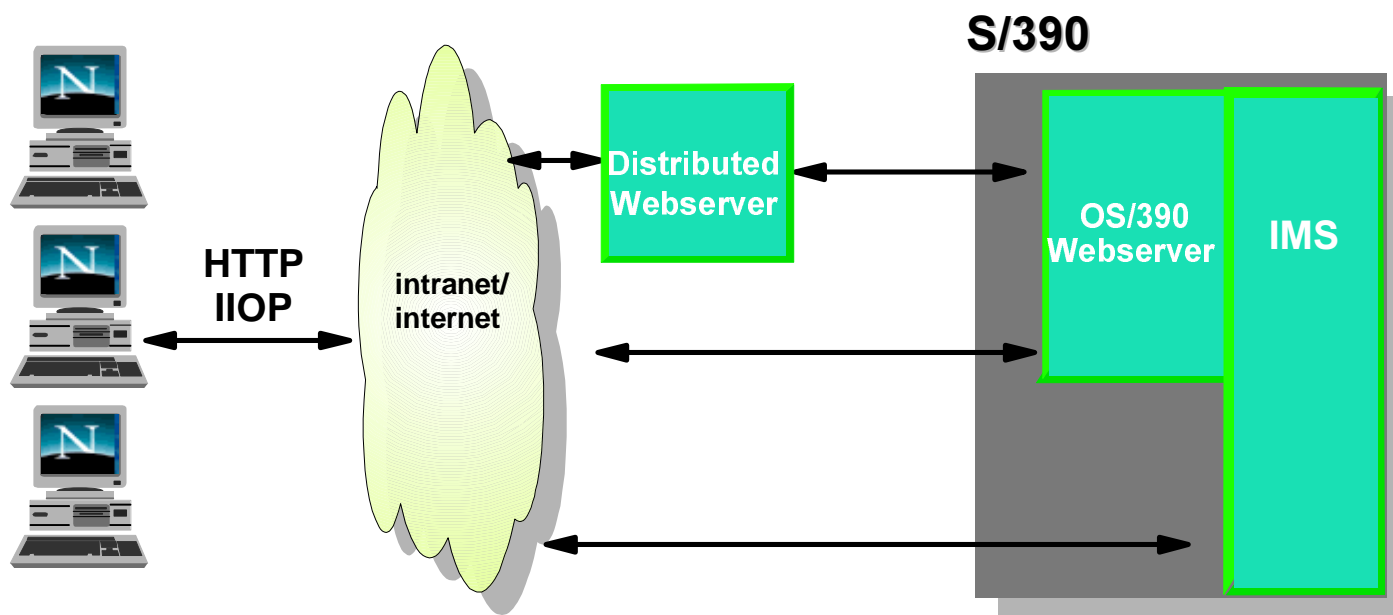
Topics

- **IMS e-Business Strategy**

- **IMS Connect**

- **IMS Connector for Java**

- **Linux**

- **Open Database Access (ODBA)**

- **IMS Java**

- **XML**
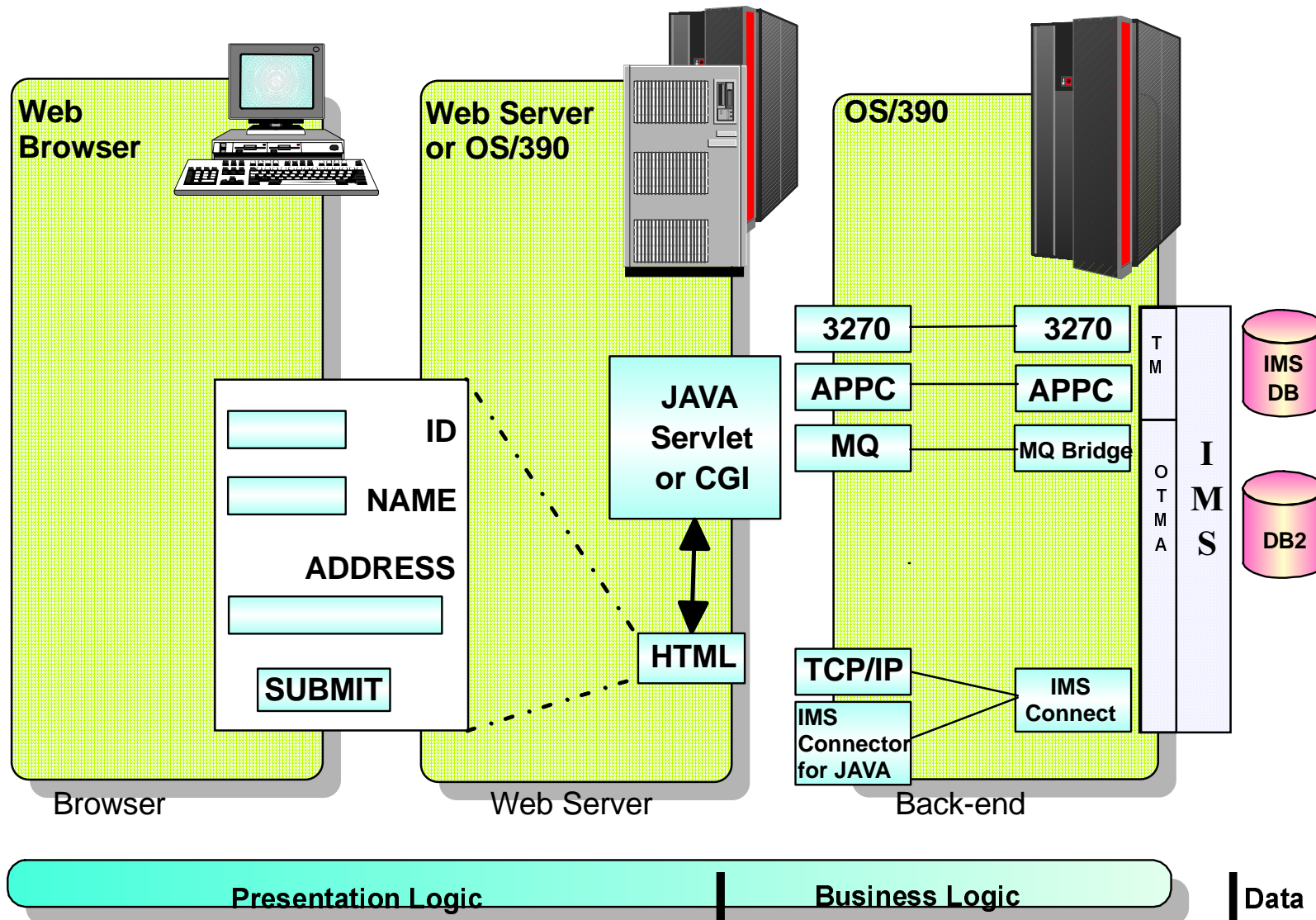
- **Summary**

Forces of Change

Globalization
- Increased competition
- Geographical diversity of customers

Time Based Competition
- Faster speed to market, especially for new markets

Enterprise
Reduced cycle time/Cost reduction
Improved application control
Access to existing infrastructure
Reliability, security, availability!

New Business Models
- Web economy creates new markets and channels

Consumer Power
- Relationship marketing
- Tailoring of products and services

IMS e-Business Strategy

S/390

Distributed
Webserver

OS/390
Webserver

IMS

HTTP
IIOP

intranet/
internet

- Enable Web Browsers to invoke IMS applications
- Full access to IMS transactions and data
- Leverage existing transactions
- Encourage new applications (Java)
- Support industry standards for tooling
  (Java, XML, CAM)

**Scalable
Reliable
High Performance**

Web Access and IMS Today

Web Browser

Web Server or OS/390

OS/390

ID		
NAME		
ADDRESS		
SUBMIT		

JAVA Servlet or CGI

HTML

3270 — **3270**

APPC — **APPC**

MQ — **MQ Bridge**

TCP/IP

IMS Connector for JAVA

IMS Connect

T M
O T M A

I M S

IMS DB

DB2

Browser

Web Server

Back-end

Presentation Logic | Business Logic | Data

Connection Components

- IMS Connectors
  - eNetwork Host On-Demand
    - CICS Connectors
    - MQSeries Connectors
  - JDBC

- Universal Web access to all IT assets

- Increased productivity of application developers

IMS e-Business Enablement Solutions

- **IMS Application Connectivity**
  - ► IMS Connect
  - ► WebSphere using the IMS Connector for Java
  - ► EJBs

- **Improved IMS Core Application Development**
  - ► Write IMS applications in Java and use JDBC

- **IMS Database Connectivity**
  - ► Open Database Access (ODBA)
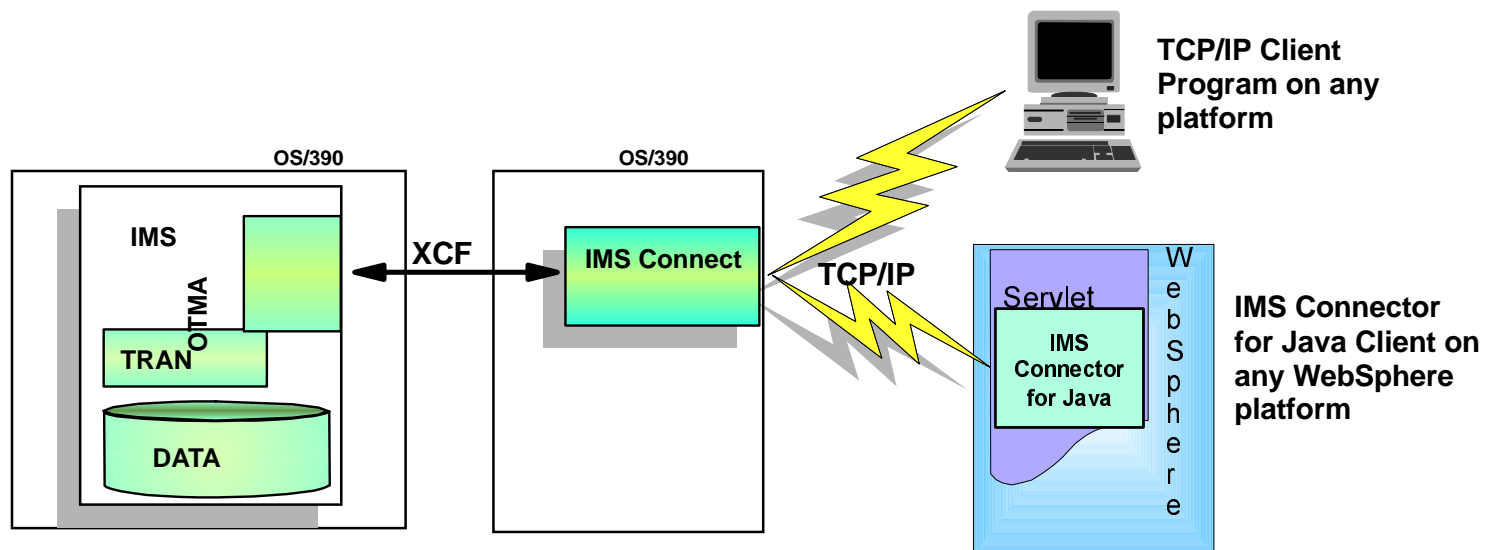 - ► JDBC calls to IMS data
  - ► EJBs for IMS data

- **IMS and XML**

IMS Connect

High Performance TCP/IP access to IMS

- **Provides e-business access to IMS Applications**
  - ▶ Can be used with a TCP/IP client on any platform
  - ▶ Applications can be developed without heavy workstation development effort when used with the IMS Connector for Java
- **Provides flexible communications and workload balancing between TCP/IP clients and one or more IMS systems (through OTMA)**
  - ▶ Separately managed address space with command interface
  - ▶ User & init exits offer a great degree of message flexibility

OS/390 — IMS — OTMA — TRAN — DATA — XCF — OS/390 — IMS Connect — TCP/IP — TCP/IP Client Program on any platform — Servlet — IMS Connector for Java — WebSphere — IMS Connector for Java Client on any WebSphere platform
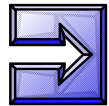
IMS Connect V1

- **Separately orderable, priced product that works with IMS V5, V6, and V7**
  - ► Improved performance with persistent sockets
  - ► Enhanced usability with asynchronous output support (V7 only)
  - ► Enhanced usability with user exit improvements
  - ► Increased serviceability with Dump Formatting enhancements
  - ► Maintained like IMS (SMP/E enhanced manageability)
- **Almost 6000 transactions per second throughput rate!**

Merita Bank in Finland

Challenge: Eliminate complex and error prone protocol conversion between TCP/IP based branch office network and SNA based host connection to IMS

Solution: IMS Connect

Benefits:
- Simplified network connections to IMS
- SNA Servers can be given up
- Increased availability and efficiency
- No changes needed in IMS applications

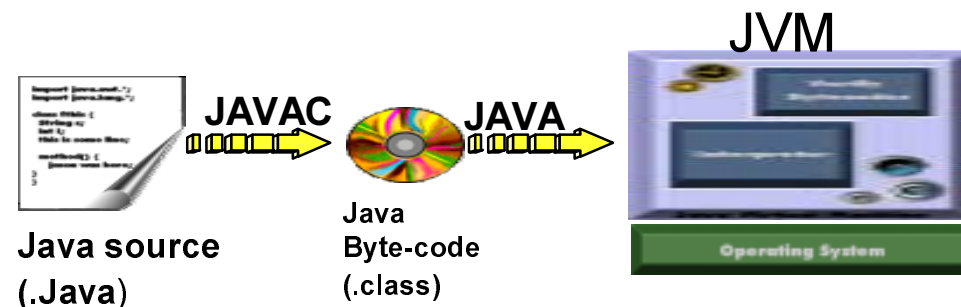# IMS Connect V1.2 - available 11/2/01

- **Recent IMS Connect Enhancements**
  - ► Local support for communication using Program Calls on OS/390
  - ► Unicode support
  - ► Enhanced usability with user exit improvements
  - ► ACK/NAK required notification support
  - ► Output message structure change

- **IMS Connector for Java J2EE Runtime support**

IBM

Java Technology

- **What is Java?**
  - ► **Object Oriented Programming Language**
  - ► **Write once, run anywhere**
  - ► **Requires Java Virtual Machine (JVM)**
    - − **the platform specific environment that enables Java to be Open**
  - ► **Designed for Web processing**
    - − **programs automatically understand about connecting to, sending and receiving data on the internet**
  - ► **Programmers use Java Development Kit (JDK)**

  - ► **To run, Java requires the Java Runtime Environment (JRE)**

JVM

JAVAC   JAVA

Java source
(.Java)

Java
Byte-code
(.class)

Operating System

JAVA Technology...

- **What is a JAVA Bean?**
  - ▶ A Java Bean is a reusable software component, similar to a JAVA class, that can be manipulated visually in a builder tool

- **What is an Enterprise Application Builder (EAB) Command ?**
  - ▶ A composite Java bean made up of other Java beans
  - ▶ An EAB command represents an interaction with a back-end system. For IMS, it sends transaction input data to an IMS application and it receives transaction output data from an IMS application
  - ▶ An EAB command is created using VisualAge for Java

- **What is an Enterprise Java Bean (EJB)?**
  - ▶ An EJB is a non-visual component of a distributed, transaction-oriented, enterprise application
    - – Exist on a server
    - – Can be assembled into applications by Developers
    - – Are deployed in EJB containers which provide a framework of common services
    - – Run on a EJB server which provides services such as load balancing and connections to back-end servers
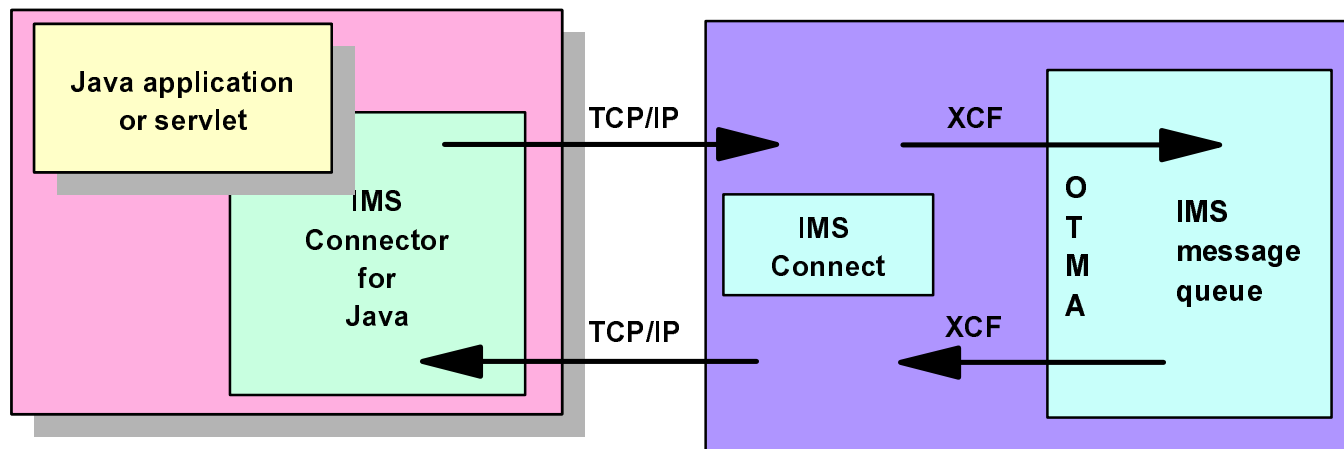
JAVA Runtime Environment

- **What is a JAVA Application?**
  - ► Runs in local JVM or Java compiler
  - ► General purpose processing
- **What is a JAVA Applet?**
  - ► Accessed via HTML
  - ► Uses a web browser based JVM
  - ► JAVA code downloaded from Web Server
- **What is a JAVA Servlet?**
  - ► Special purpose code written in JAVA
  - ► Normally creates HTML output
  - ► Runs in a Web Server
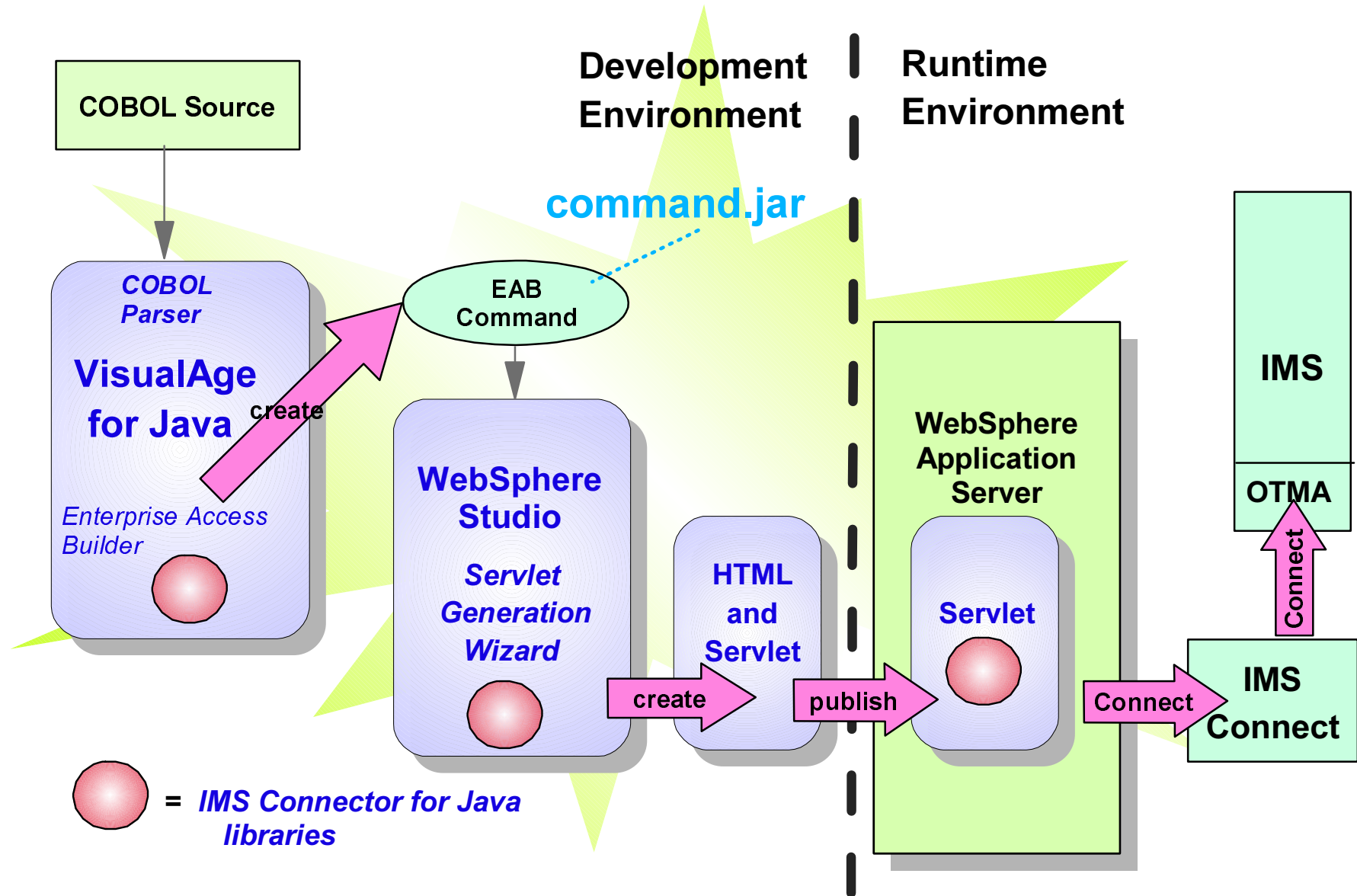 - ► Replacement for CGI-BIN

IMS Connector for Java

Helping IMS Users make the transition to e-business easier

- **Create Java applications or servlets that can access IMS transactions**
- **Provides CCF-compliant Java Class libraries which interact with IMS via IMS Connect**
- **Provides Java bean classes to aid in composing applications using the VisualAge for Java Command Editor**
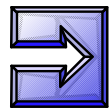- **Ships with *Visual Age for Java Enterprise Edition* as one of the IBM e-business Connectors**

Java application or servlet → IMS Connector for Java — TCP/IP → IMS Connect — XCF → OTMA → IMS message queue

Developing A Java Servlet

COBOL Source

Development Environment

Runtime Environment

command.jar

COBOL Parser

VisualAge for Java

Enterprise Access Builder

create

EAB Command

WebSphere Studio

Servlet Generation Wizard

HTML and Servlet

create

publish

WebSphere Application Server

Servlet

Connect

IMS Connect

IMS

OTMA

Connect

● = *IMS Connector for Java libraries*

Generali Insurance - Italy

Using IMS Connector for Java/IMS Connect/WebSphere

Challenge:
Web-enable insurance agent applications
Reuse existing application infrastructure
Take advantage of new technologies

Solution:
- IMS Connector for Java
- VisualAge for Java
- IMS Connect
- WebSphere Application Server

Benefits:
-No changes needed in IMS applications
- IMS Tools and WebSphere proved reliable and stable

Bekins - moving company

Using IMS Connector for Java/IMS Connect/WebSphere

Challenge:
- Web-based shipping and tracking business application for customers and retailers.
- Web enabled existing COBOL applications.
- Take advantage of new technologies

Solution:
- IMS Connector for Java
- VisualAge for Java
- IMS Connect
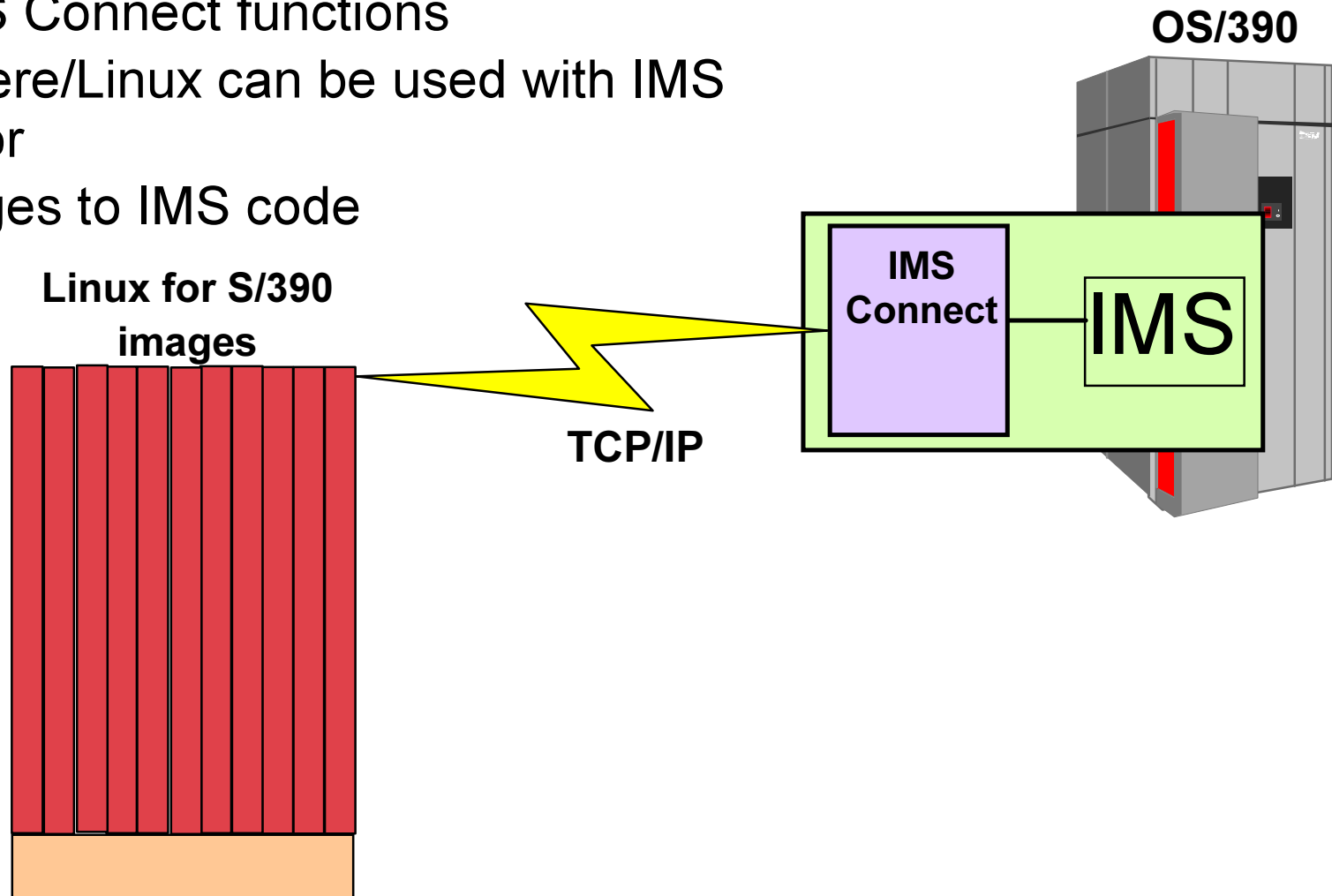- WebSphere Application Server

Benefits:
- Accelerated time to market by speeding the development process
- IMS Tools and WebSphere proved reliable and stable
- Leverage existing investments.

IMS Connect Support Linux for S/390
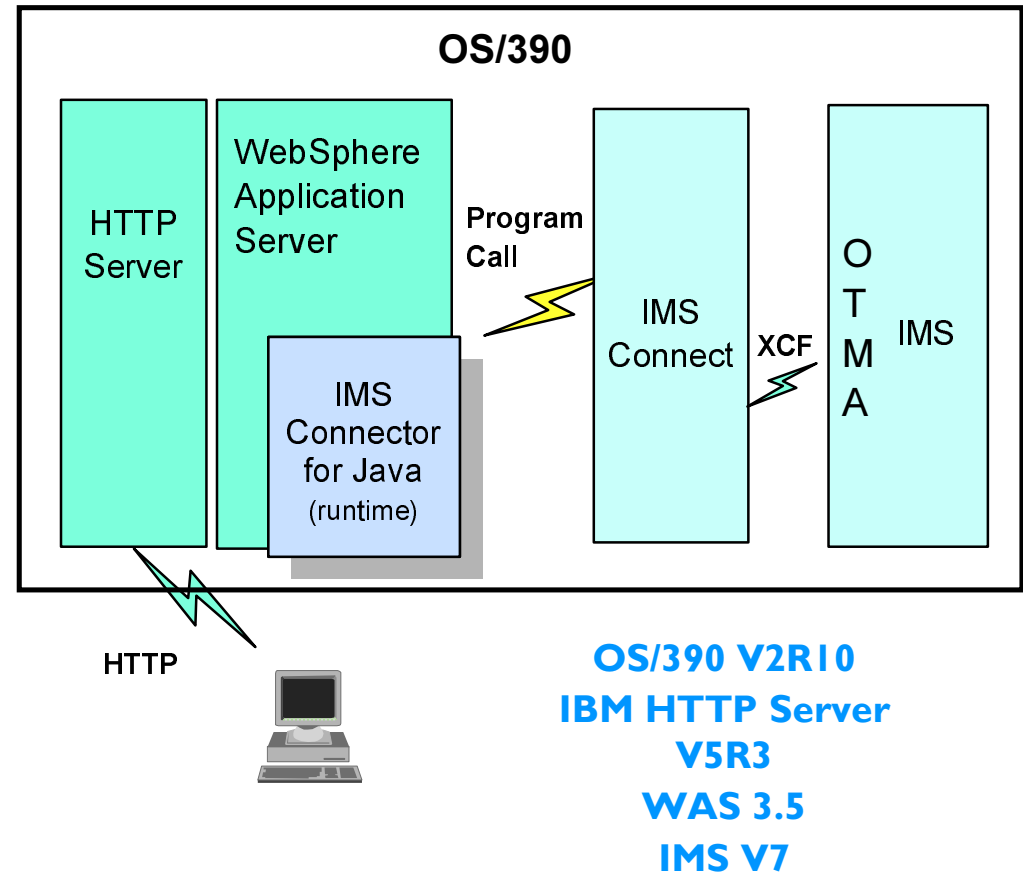
High Performance TCP/IP access to IMS

- Uses IMS Connect functions
- WebSphere/Linux can be used with IMS Connector
- No changes to IMS code

OS/390

Linux for S/390 images

IMS Connect

IMS

TCP/IP

IMS Connect/Connector - local option

- **New in IMS Connector for Java 3.5.3**
- **Non-TCP/IP communications between WebSphere and IMS Connect**
- **Same MVS image**
- **Requires: WAS 3.5, IMS Connect 1.1 with PQ45057**

OS/390

HTTP Server

WebSphere Application Server

IMS Connector for Java (runtime)

Program Call

IMS Connect

XCF

OTMA

IMS

HTTP

OS/390 V2R10
IBM HTTP Server V5R3
WAS 3.5
IMS V7

IMS Connector for Java - Performance

Over 1600 transactions per second throughput rate!
Scalable

■Measurement Goals
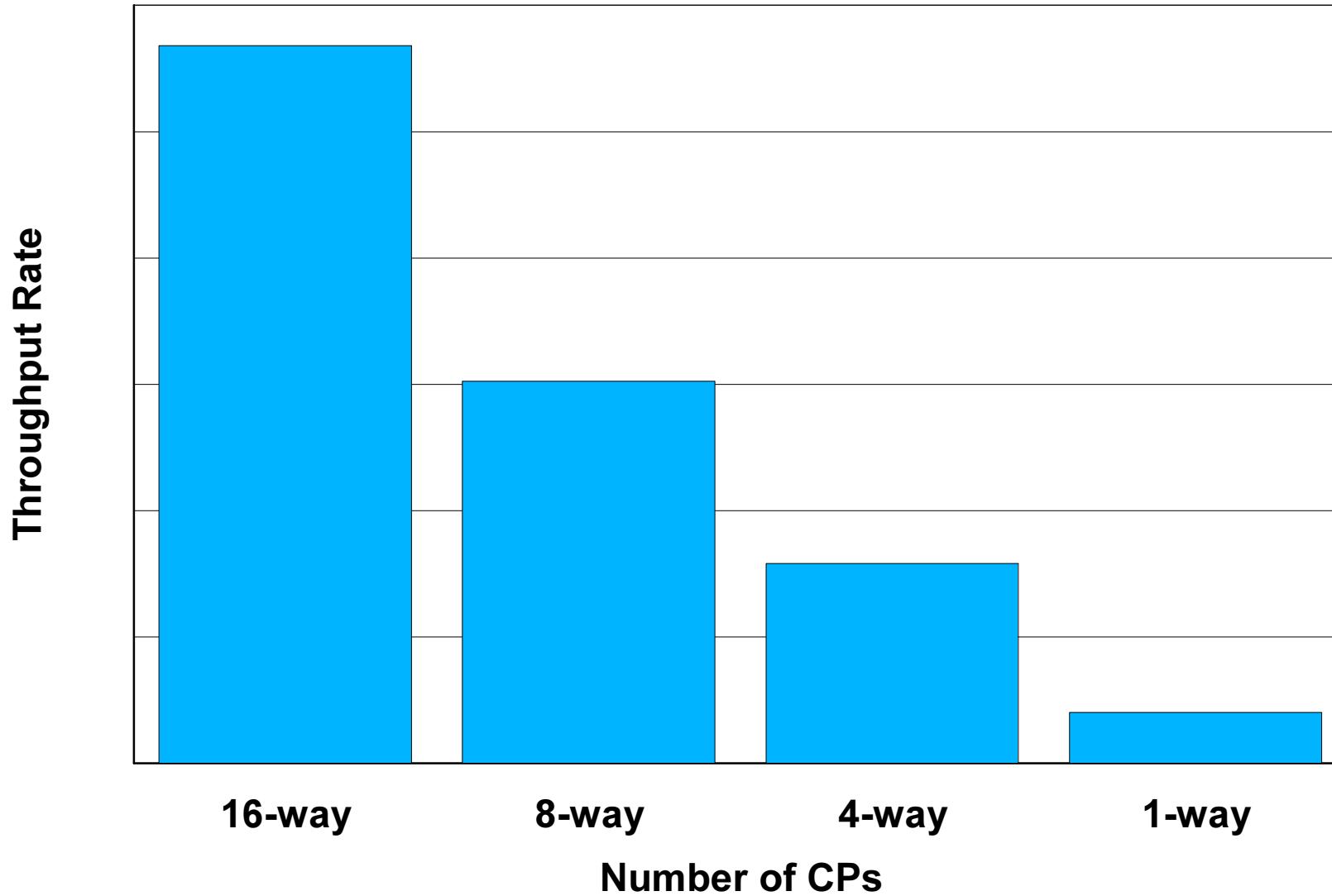
► Test the highest throughput that IMS Connector for Java can handle

► Evaluate local option enhancement added to IMS Connector 3.5.3

■Measurement Environment

► OS/390 2.10, IBM HTTP Server 5.3, WebSphere 3.5, SDK 1.3.0 and VA Java 3.5.3.

► IMS Connector for Java Local Option was used.

► IMS, IMS Connect, HTTP Server and WebSphere were on the IBM 2064-116 single image 16-way server.

► AKStress, a WebSphere development tool, was used to simulate the Web Browser clients.
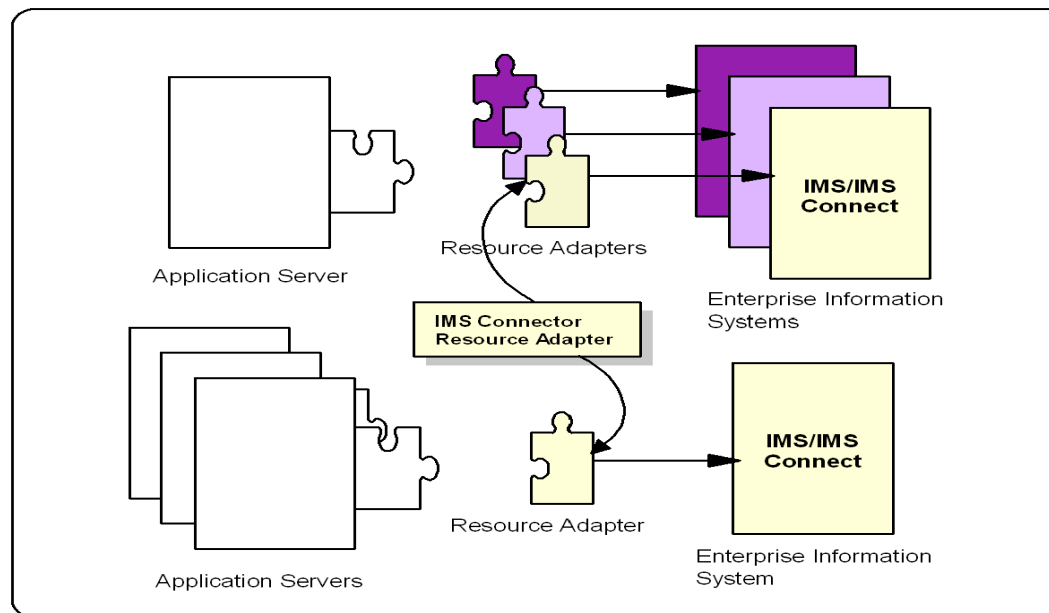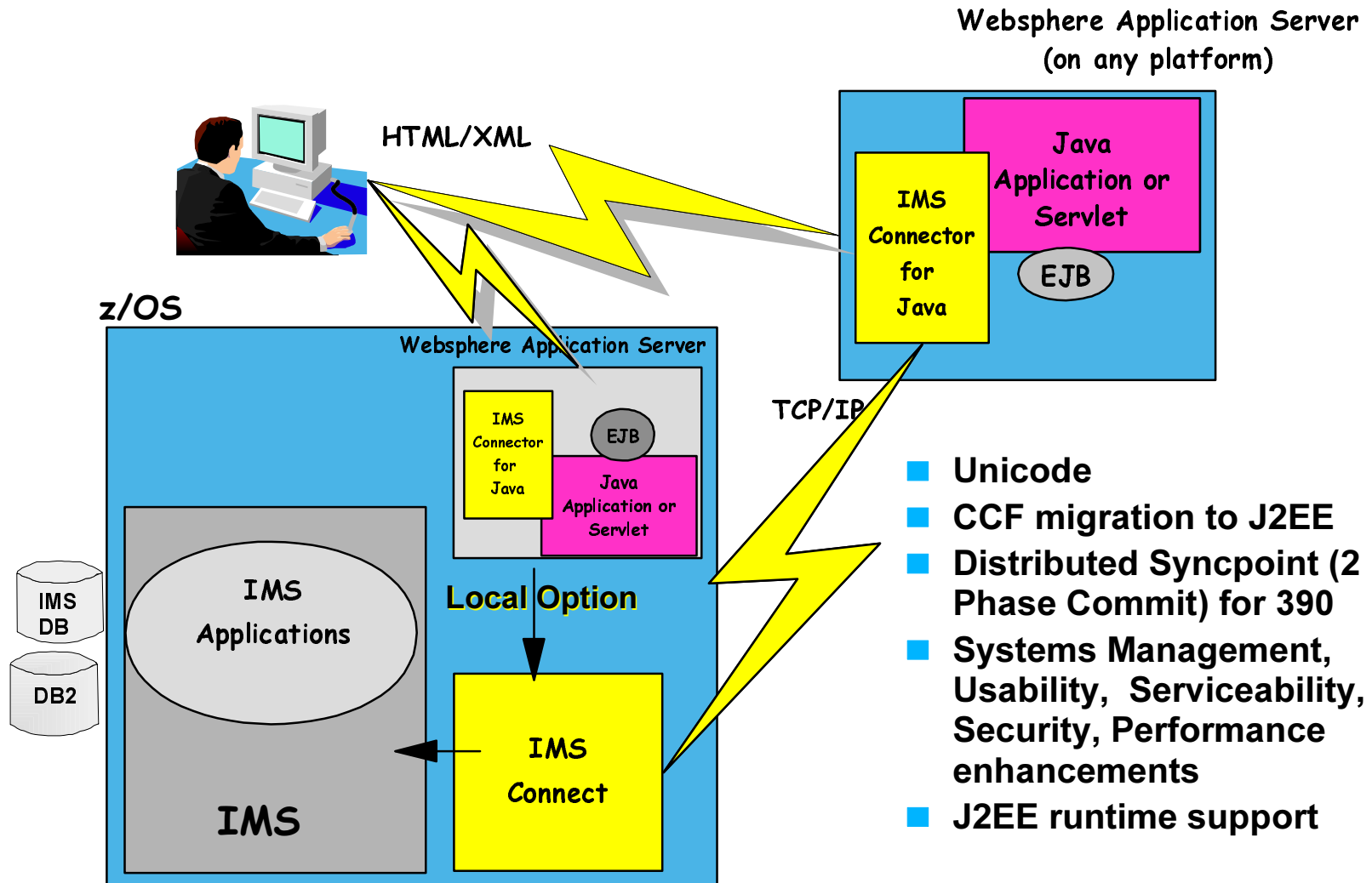
IMS Connector for Java
Local Option Scalability

Throughput Rate vs. Number of CPs bar chart showing decreasing throughput from 16-way, 8-way, 4-way, to 1-way.

IMS J2EE Connector

- **Compliant to J2EE Connector Architecture**
  - ► Defines a standard architecture for connecting the Java 2 Platform Enterprise Edition (J2EE) platform to heterogeneous Enterprise Information Systems (EIS)s, e.g. IMS, DB2.
  - ► Based on IBM Common Connector Framework

Requirements - IMS Connect and Connector for Java

Websphere Application Server
(on any platform)

HTML/XML

IMS Connector for Java

Java Application or Servlet

EJB

z/OS

Websphere Application Server

IMS Connector for Java

EJB

Java Application or Servlet

Local Option

TCP/IP

IMS DB
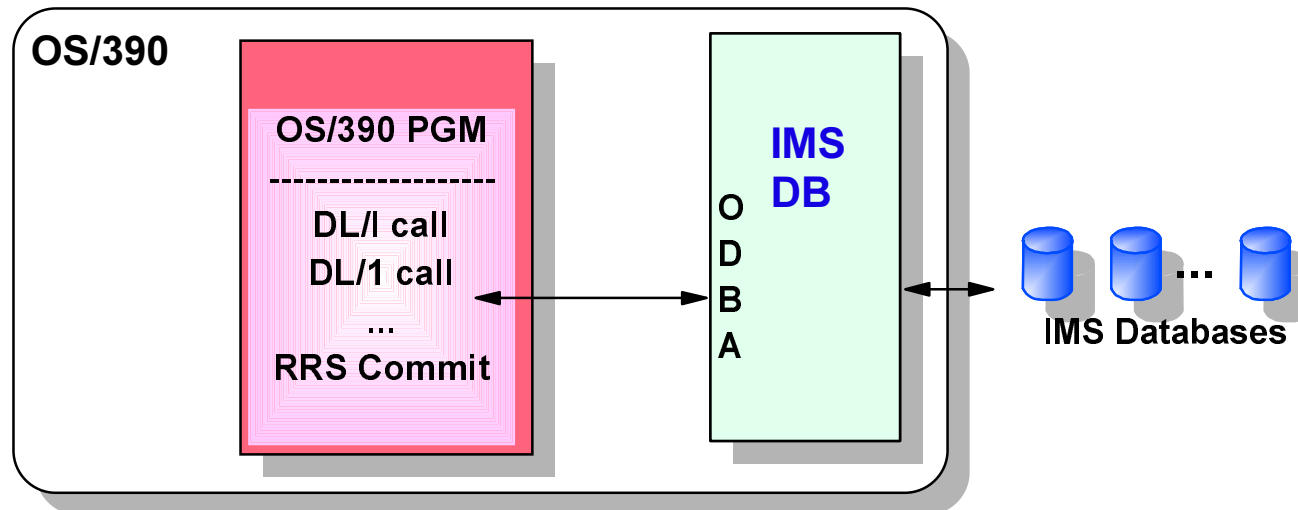
DB2

IMS Applications

IMS

IMS Connect

- Unicode
- CCF migration to J2EE
- Distributed Syncpoint (2 Phase Commit) for 390
- Systems Management, Usability, Serviceability, Security, Performance enhancements
- J2EE runtime support
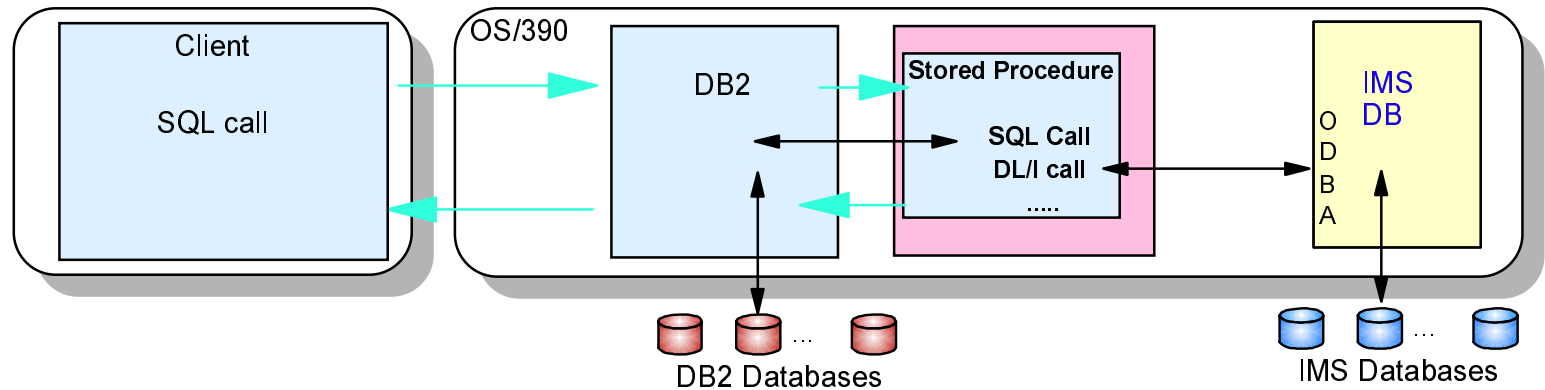
What is Open Database Access?

- A callable interface to access databases managed by IMS DB
- Provides another means for IMS users to access the valuable information stored in their IMS Databases.
- Provides for failure isolation and independent resource recoverability
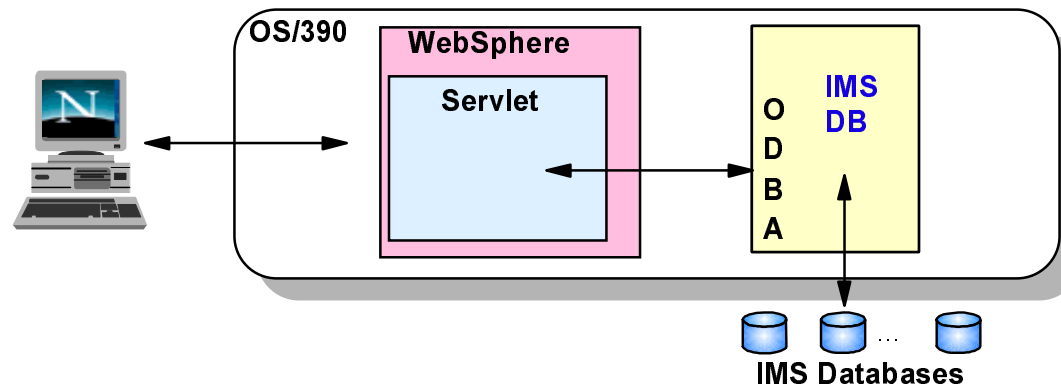- Syncpoint processing is coordinated through the use of OS/390 Resource Recovery Services (RRS)

OS/390

OS/390 PGM

DL/I call
DL/1 call
...
RRS Commit

IMS DB

O D B A

IMS Databases

IMS Open Database Access

- **IMS DB access from DB2 Stored Procedures**

OS/390

Client	DB2	Stored Procedure	IMS DB
SQL call		SQL Call DL/I call	O D B A

DB2 Databases

IMS Databases

- **IMS DB access from a Web Server**

OS/390

WebSphere
Servlet
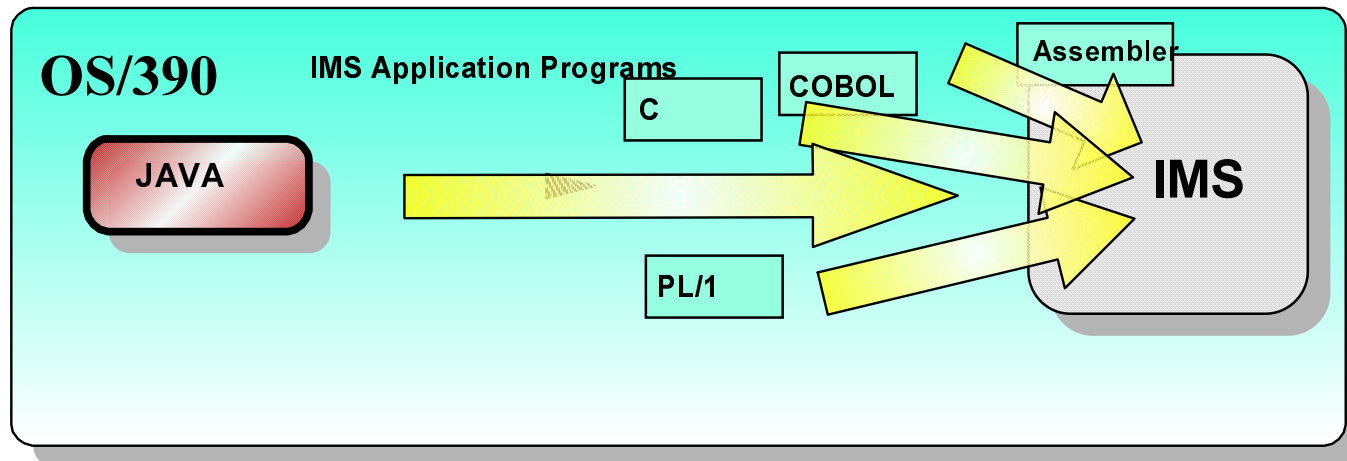
O D B A   IMS DB

IMS Databases

IMS Java

Integrated e-business Application Development in IMS
IMS V7 Supports Applications Written In Java !

- ▪ **Provides Class libraries for input-output message handling**

- ▪ **Uses JDBC for data access to DB2 <u>and</u> IMS DB**

- ▪ **Can use Host and workstation tools for development**

- ▪ **Compile using High Performance Java Compiler**

- ▪ **Create /edit/debug using VisualAge**

- ▪ **XML support provided through OS/390 XML Toolkit**

OS/390   IMS Application Programs

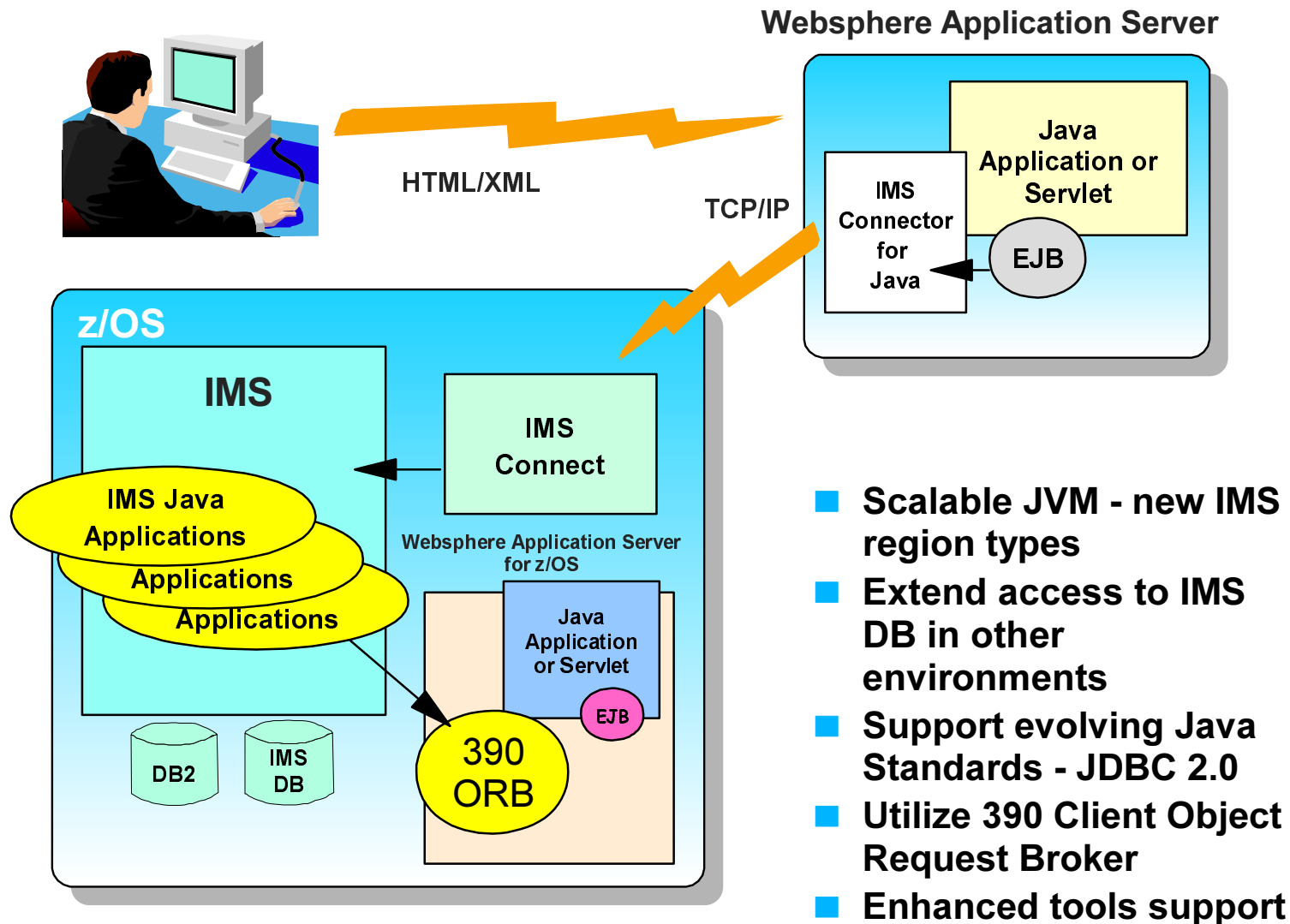JAVA   C   COBOL   Assembler

PL/1   IMS

IMS V7 Java

- **Objective - To provide a Java class library that:**
  - ► Is easy-to-use by experienced Java programmers
  - ► Provides the infrastructure for automated tool support and integration with VisualAge for Java
  - ► Robustly supports all major IMS capabilities
  - ► Provides best-possible Java performance

- **Supports**
  - ► Conversational and non-conversational transactions
  - ► MFS
  - ► Dependent regions, not Batch
  - ► JDBC 1.0 access to IMS DB
  - ► Will support JDBC/SQLJ 1.0 access to DB2
  - ► HPJ compiled (layered on LE/370 interface for C); no JVM support initially
  - ► Usable from VisualAge for Java's ET/390

Requirements - IMS Java

Websphere Application Server

HTML/XML

TCP/IP

Java Application or Servlet

IMS Connector for Java

EJB

z/OS

IMS

IMS Connect

IMS Java Applications

Applications

Applications

Websphere Application Server for z/OS

Java Application or Servlet

EJB

390 ORB

DB2

IMS DB

- Scalable JVM - new IMS region types
- Extend access to IMS DB in other environments
- Support evolving Java Standards - JDBC 2.0
- Utilize 390 Client Object Request Broker
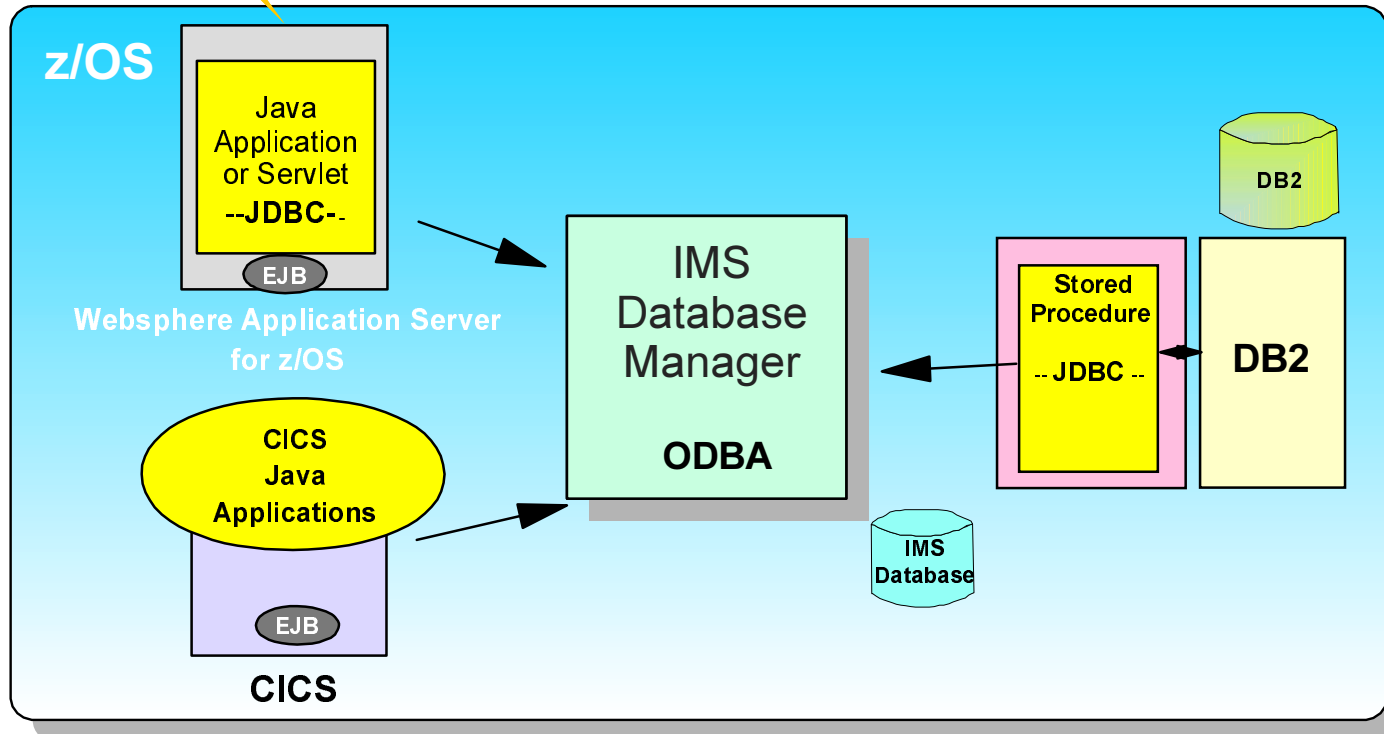- Enhanced tools support
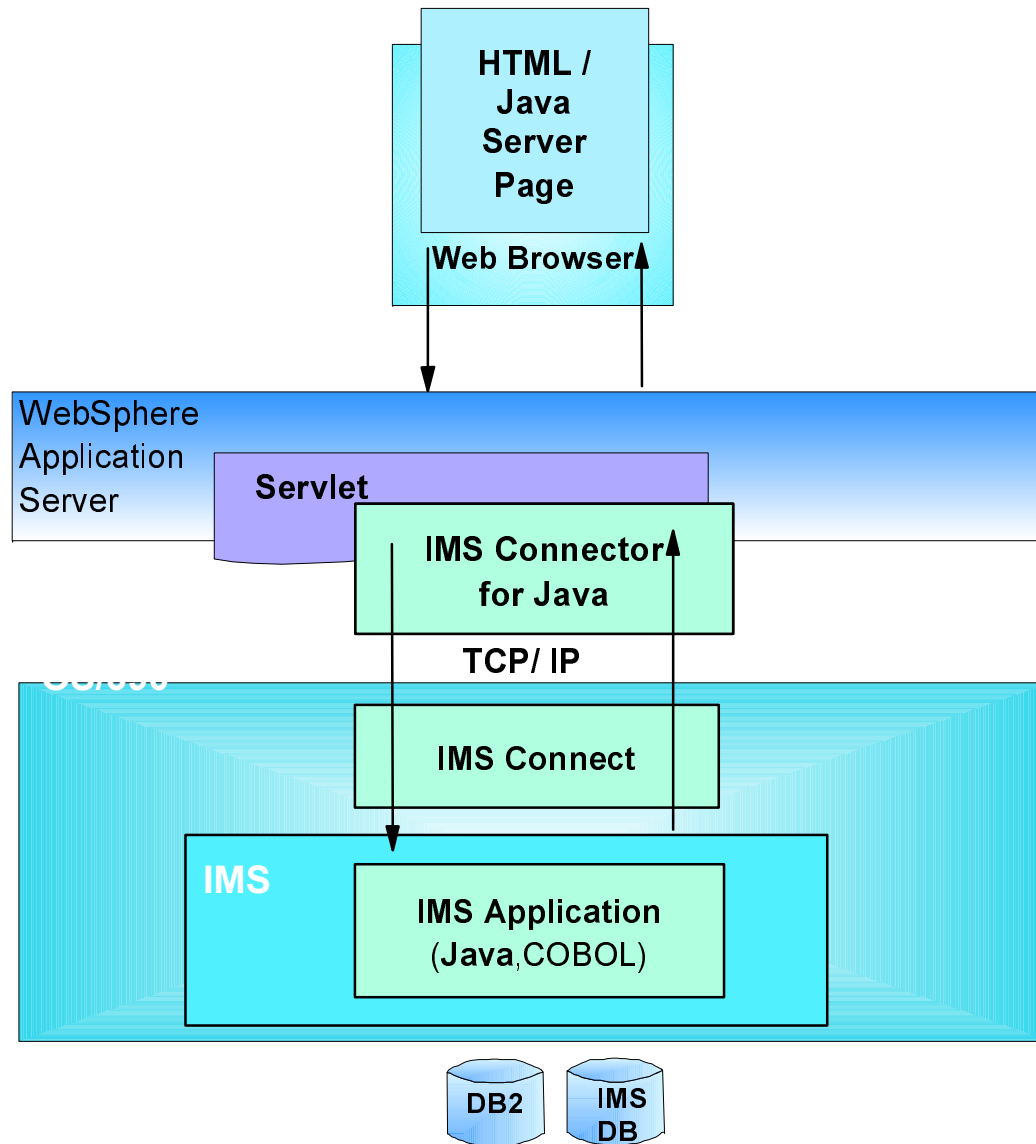
IMS Database Access (through JDBC)

HTML/XML

- Utilize IMS V7 Java code for JDBC access to IMS data from
  - Websphere
  - CICS
  - DB2 Stored Procedures

z/OS

Java Application or Servlet **--JDBC--**

EJB

Websphere Application Server for z/OS

CICS Java Applications

EJB

CICS

IMS Database Manager

ODBA

IMS Database

DB2

Stored Procedure **-- JDBC --**

DB2

Bringing It All Together

What is XML?

- **XML (Extensible Markup Language) is a new technology for web apps**
  - ►A text-based tag language, similar in style to HTML, but with user-definable tags
  - ►XML is a World Wide Web Consortium standard
  - ►XML simplifies business-to-business transactions on the web
  - ►XML's strength is data interchange
    - –XML makes it easy to send structured data across the web and between applications
- **XMI (XML Metadata Interchange) overcomes weakness of XML**
  - ►XMI uses tools to generate schemas (rules, grammar, tags) for you
  - ►This facilitates standardized application interchanges

HTML vs. XML

HTML

```
<p><b>Mr. Chip Becker
</b>
<br>
1001 Main Street
<br>
San Jose, CA  95001</p>
```

XML

```
<address>
<name>
<title>Mr.</title>
<first-name>Chip</first-name>
<last-name>Becker</last-name>
</name>
<street>1001 Main
Street<street/>
<city>San Jose </city>
<state>CA</state>
<zipcode>95001</zipcode>
</address>
```

Display on a browser

XSL

Mr. Chip Becker
1001 Main Street
San Jose, CA 95001

IMS Supports XML Today

- **MQSeries Integrator**
  - ▶ **Bridging XML and existing IMS applications**
    - – **Dictionary support for messages**
    - – **Routing and processing based on message content**

- **IMS C++ or IMS Java programs in V7**

  - ▶ **IMS users can write applications which use the XML toolkit for OS/390**
    - – **Tran code still must be EBCDIC, rest of data can be XML**
    - – **Java/C++ program can invoke XML parser to convert to non-tagged data**

US Utility Company

Building a cost-effective e-business Infrastructure with Java and XML

Challenge: Utility industry deregulation required differentiation by providing proliferating information to energy traders, providers, producers, consumers (eg. viewing account history online for reconciliation)
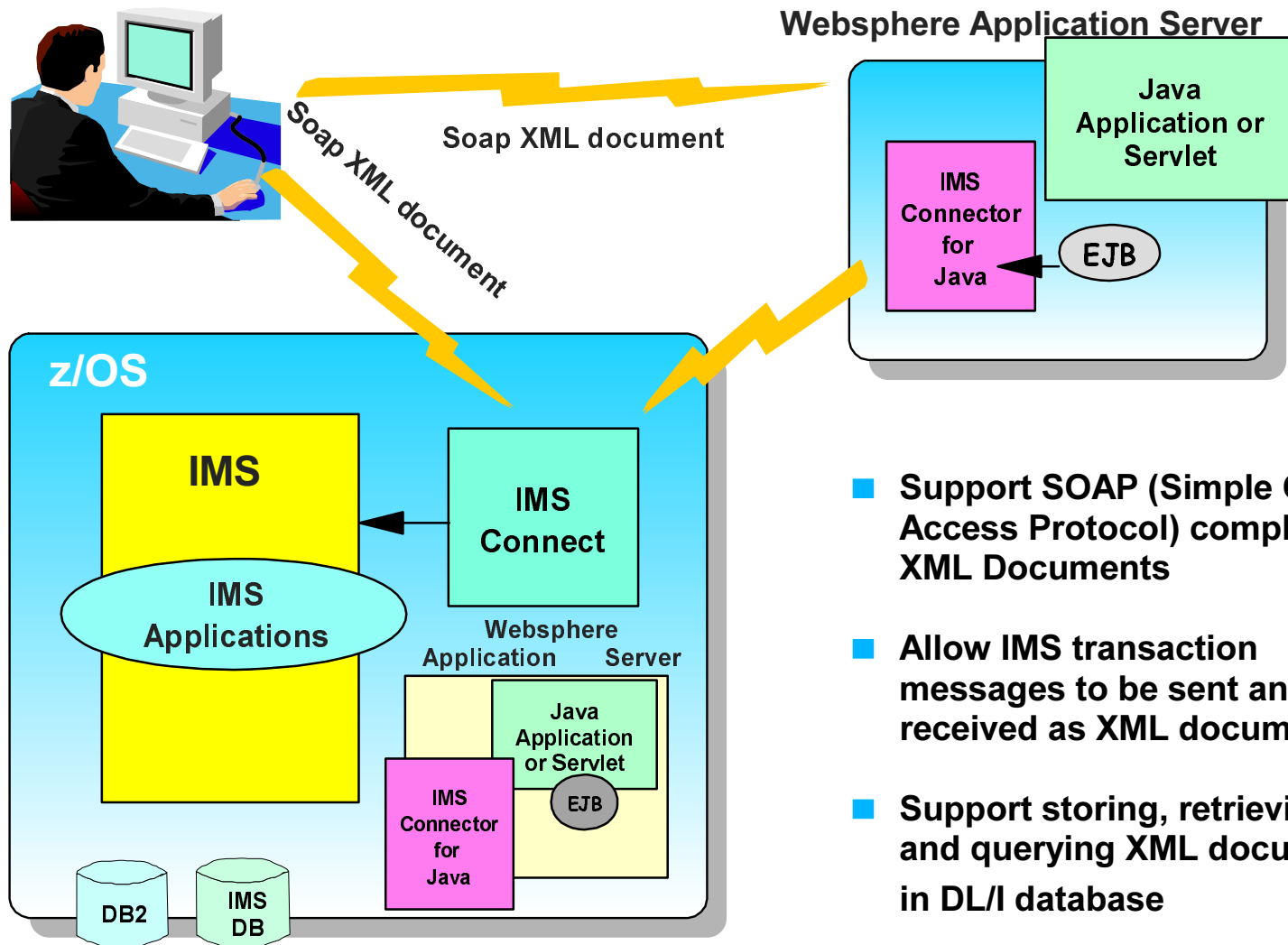
Solution: Establish generic e-business infrastructure based on thin-client architecture using XML and transaction processing between Internet client and existing IMS system through EJB, a Web Application Server Java Servlet, and MQSeries

Benefits: Enable device independence with respect to the client and to leverage its existing investment in legacy IMS transaction systems

Requirements - IMS XML

Websphere Application Server

Java Application or Servlet

IMS Connector for Java

EJB

Soap XML document

Soap XML document

z/OS

IMS

IMS Applications

IMS Connect

Websphere Application Server

Java Application or Servlet

IMS Connector for Java

EJB

DB2

IMS DB

- **Support SOAP (Simple Object Access Protocol) compliant XML Documents**

- **Allow IMS transaction messages to be sent and received as XML documents**

- **Support storing, retrieving, and querying XML documents in DL/I database**

IMS Connector Information

- **IMS Information available at http://www.ibm.com/ims**

- **IMS Redbooks available at http://www.redbook.ibm.com**
  - ► **SG24-6123-00 IMS Version 7 and Java Application Programming**

- **IMS Education available at http://www.ibm.com/services/learning/us**

- **IMS Consulting Services for migration and skills transfer, and Customized Offerings available at dmservices@us.ibm.com**

Summary

- **IMS is providing industrial strength e-business solutions**
  - ► **Connectors/gateways**
  - ► **Application Development improvements/tools**
    - – **Java**
    - – **XML**
  - ► **IMS is partnering with industry leading tools to provide our users with solutions they need**

IMS is ideal for e-business !