

E83

IMS Web Connectivity - Ready, Set, Go!

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Terminology

Applet	Java program stored on a webserver, that runs inside a Java-compatible browser such as Netscape Navigator
AER	Application Execution Region
DDF	Distributed Data Facility
DRDA	Distributed Relational Database Architecture
IDE	Integrated development environment
IMS Connect	IMS TCP/IP OTMA Connection, previously known as ITOC
JAR	Java Archive: aggregates many files into one
JDK	Java Development Kit
JVM	Java Virtual Machine
ODBA	Open Database Access
OTMA	Open Transaction Manager Access
RRS	Resource Recovery Services
SDK	Software Development Kit
Servlet	Java program that resides on and executes on a Web server
Stored Procedure (SP)	A user-written application program, that can be invoked through the use of the SQL CALL statement
XCF	Cross System Coupling Facility (MVS)

Agenda

- Java Terminology & WebSphere Level Set
- What are the Pieces?
- Why VisualAge for Java?
- Why Stored Procedures?
- How Do You Connect to the Data?
- Sample Servlet Development Review

A Picture Says a '1000' Words

Bookmarks Location: <http://wtsc47oe.itso.ibm.com:98/servlet/imsservletbuilder.IMSAccountServlet>

Enter Customer ID:

Name:

Address:

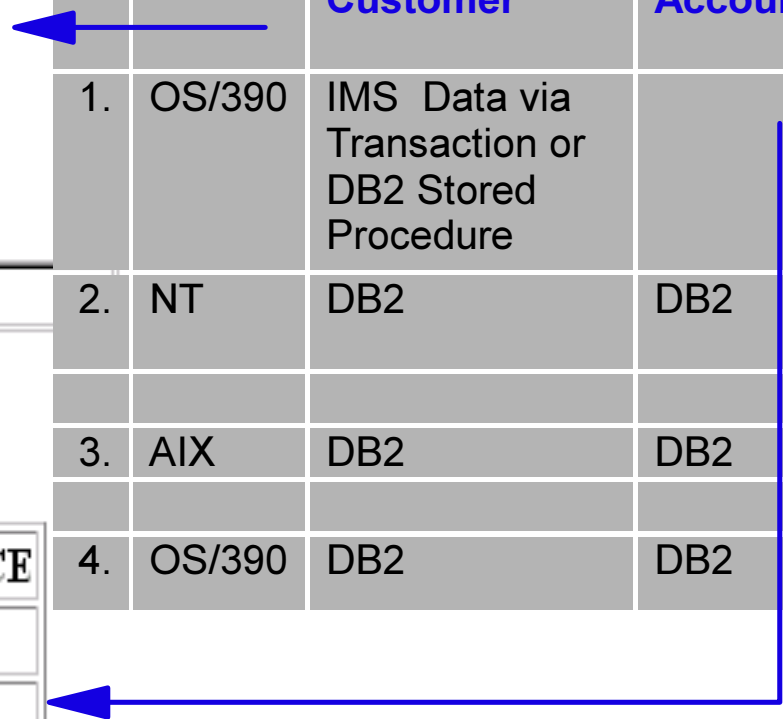
City, State:

Country:

Email:

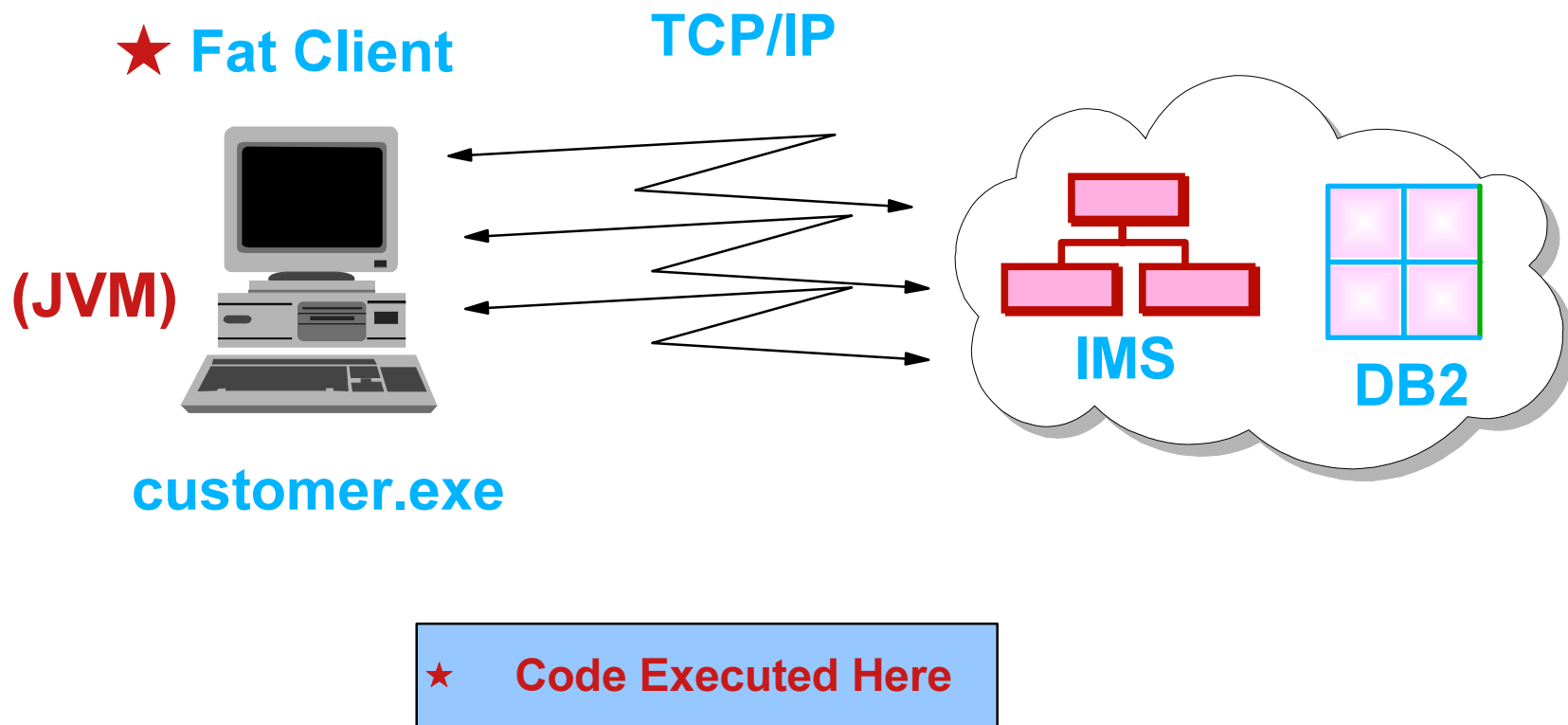
		Customer	Account
1.	OS/390	IMS Data via Transaction or DB2 Stored Procedure	
2.	NT	DB2	DB2
3.	AIX	DB2	DB2
4.	OS/390	DB2	DB2

ACCOUNT.ACCT_NUMBER	ACCOUNT.BALANCE
3	700.00
14	10000.00
15	10000.00



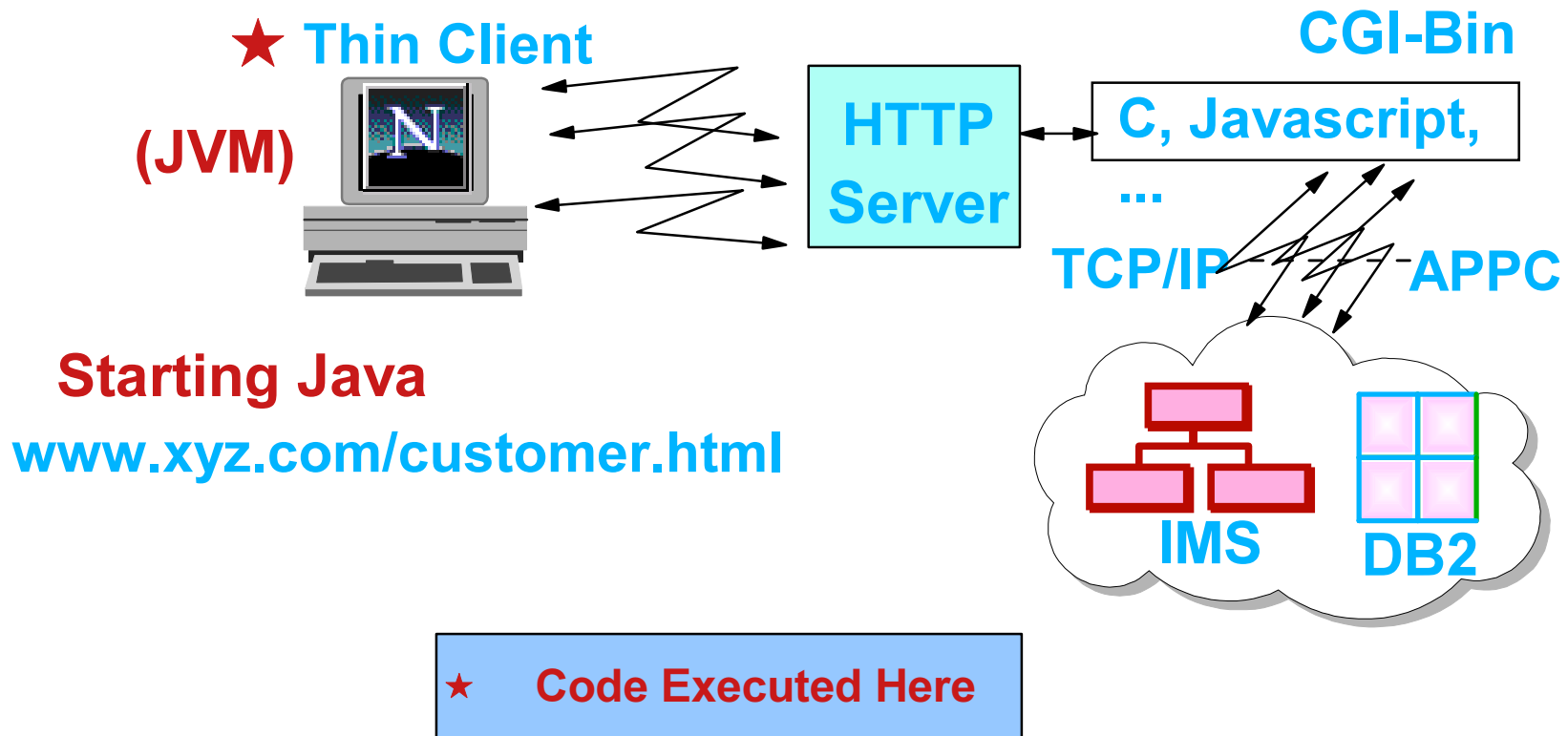
Java Application

- Stored and executed in the same location



Java Applet

- Stored in a Web Server, executed in a Web Browser
- Requires a browser Java Virtual Machine (JVM)

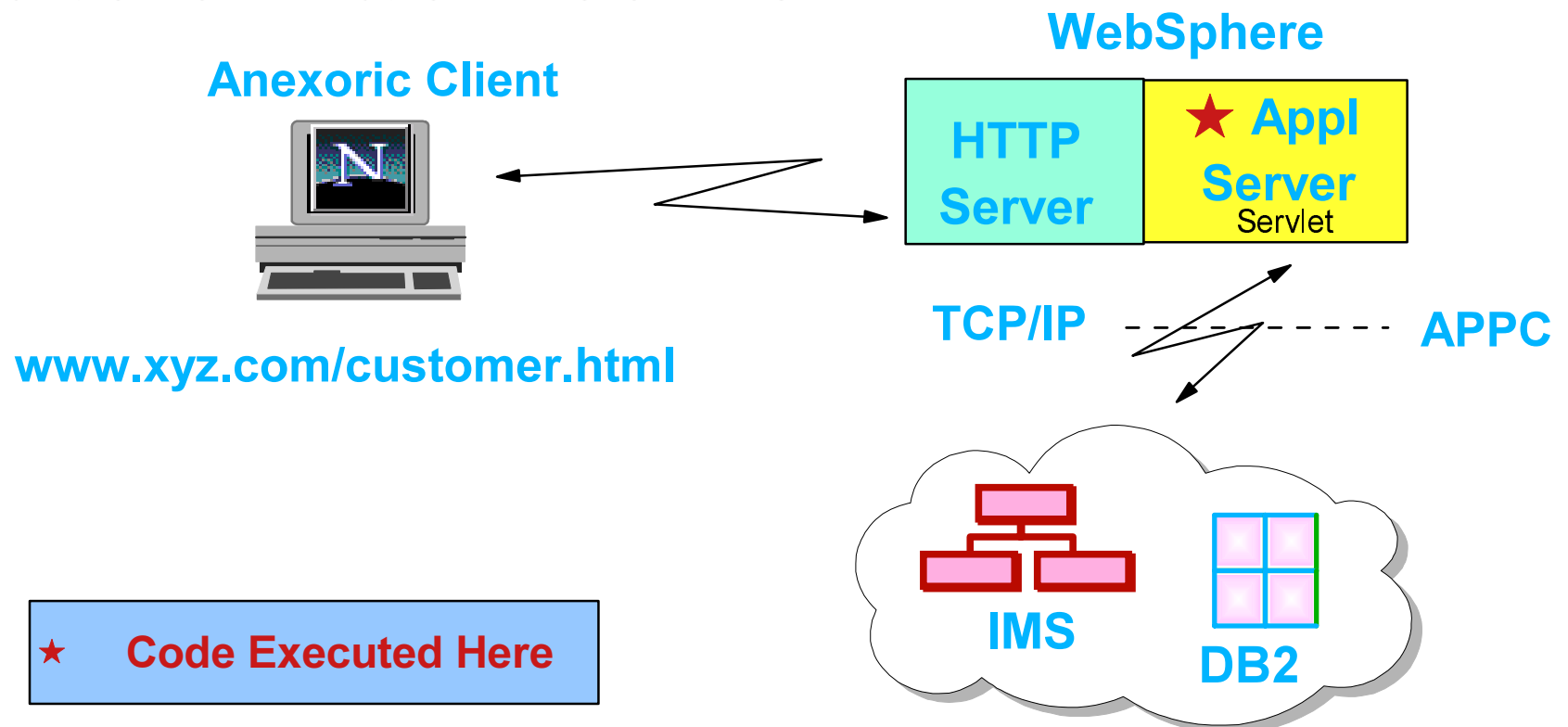


Starting Java
www.xyz.com/customer.html

★ **Code Executed Here**

Java Servlet

- Stored in and executed in an Application Server, launched from the Web Server
 - ▶ Code resides near the data
- Uses any browser
 - ▶ No Java Virtual Machine

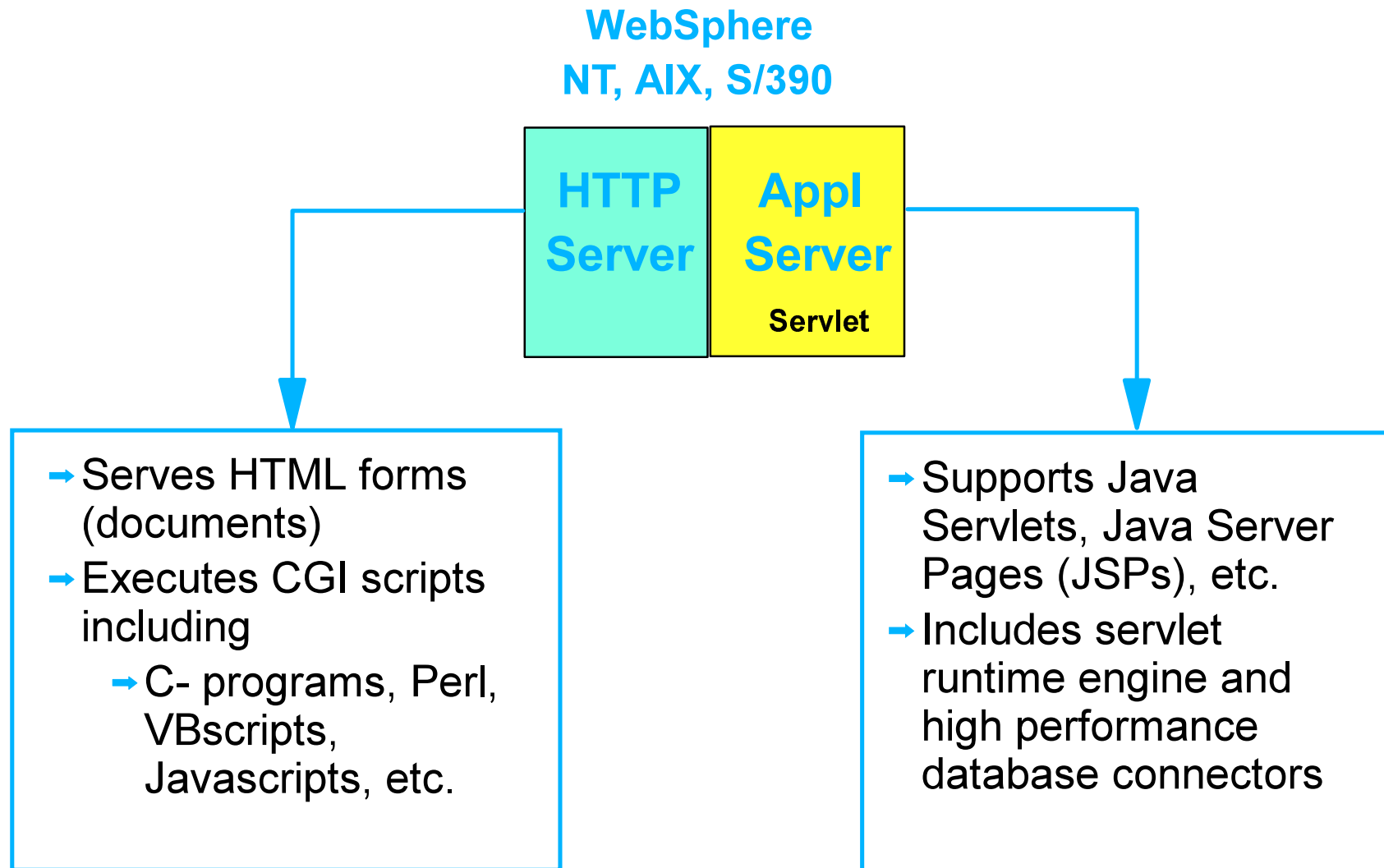


What is WebSphere?

- Products for deploying and managing high performance web sites
 - ▶ HTTP Web Server
 - ▶ WebSphere Application Server
 - ▶ WebSphere Studio
 - ▶ WebSphere Commerce Suite
 - ▶ WebSphere Performance Pack
 - ▶ WebSphere Catalog Architect
 - ▶ WebSphere Cache Manager

What is WebSphere? ...

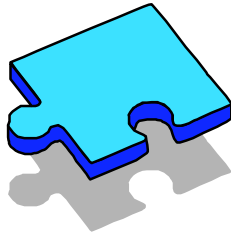
- Scalable and runs on multiple platforms



What are the Pieces?

Development

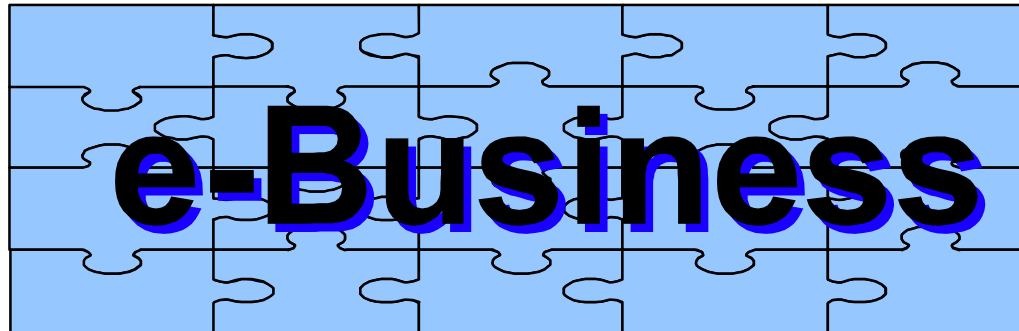
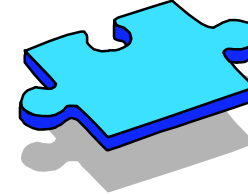
VisualAge
for Java



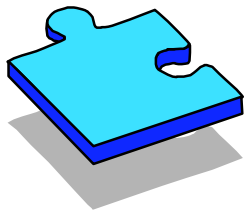
DB2 Stored
Procedure
Builder

Deployment

WebSphere
S/390 NT



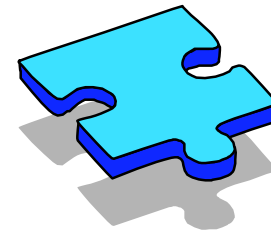
DB2
NT



DB2
OS/390

DB2
AIX

Data



IMS
Transaction

IMS Data
via
ODBA

The Pieces Are

- Development

- ▶ VisualAge for Java

- GUI Development tool

- ▶ DB2 Stored Procedure Builder

- Stored Procedure Builder for SQL Procedure Language and Java Stored Procedures

The Pieces Are ...

■ Data

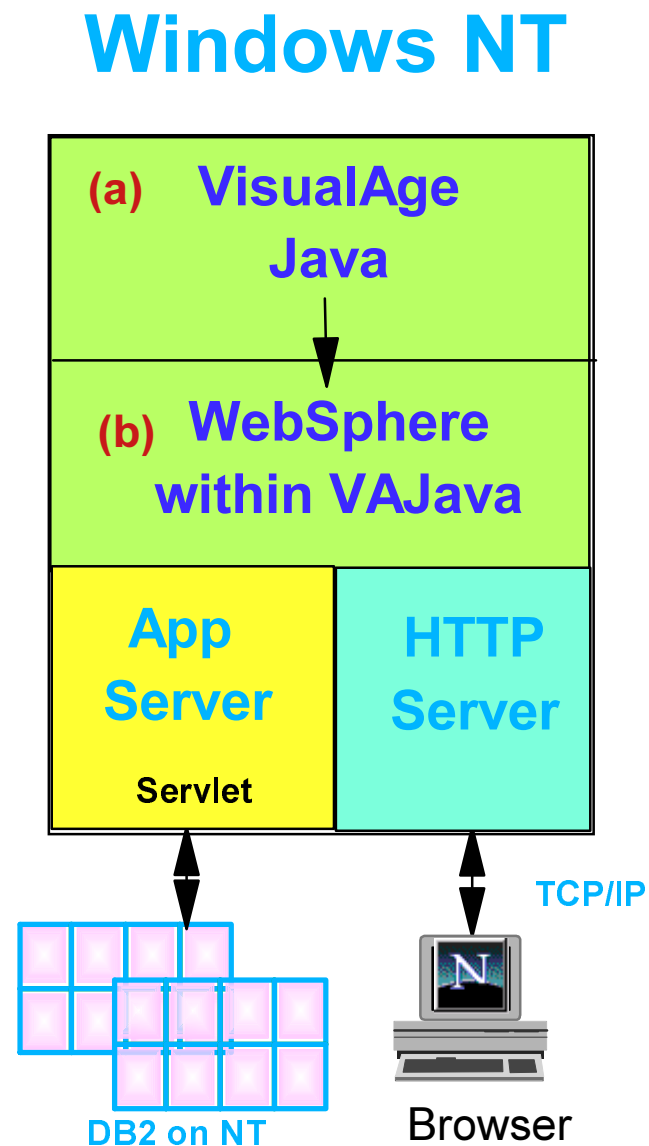
- ▶ IMS Connectivity
 - IMS Connect for transactions
 - DB2 Stored Procedure to IMS via ODBA
- ▶ DB2 Connectivity
 - DB2 Client Configuration Assistant

The Pieces Are ...

- Deployment
 - ▶ WebSphere
 - HTTP (Web) Server and Application Server
 - NT, AIX, and S/390

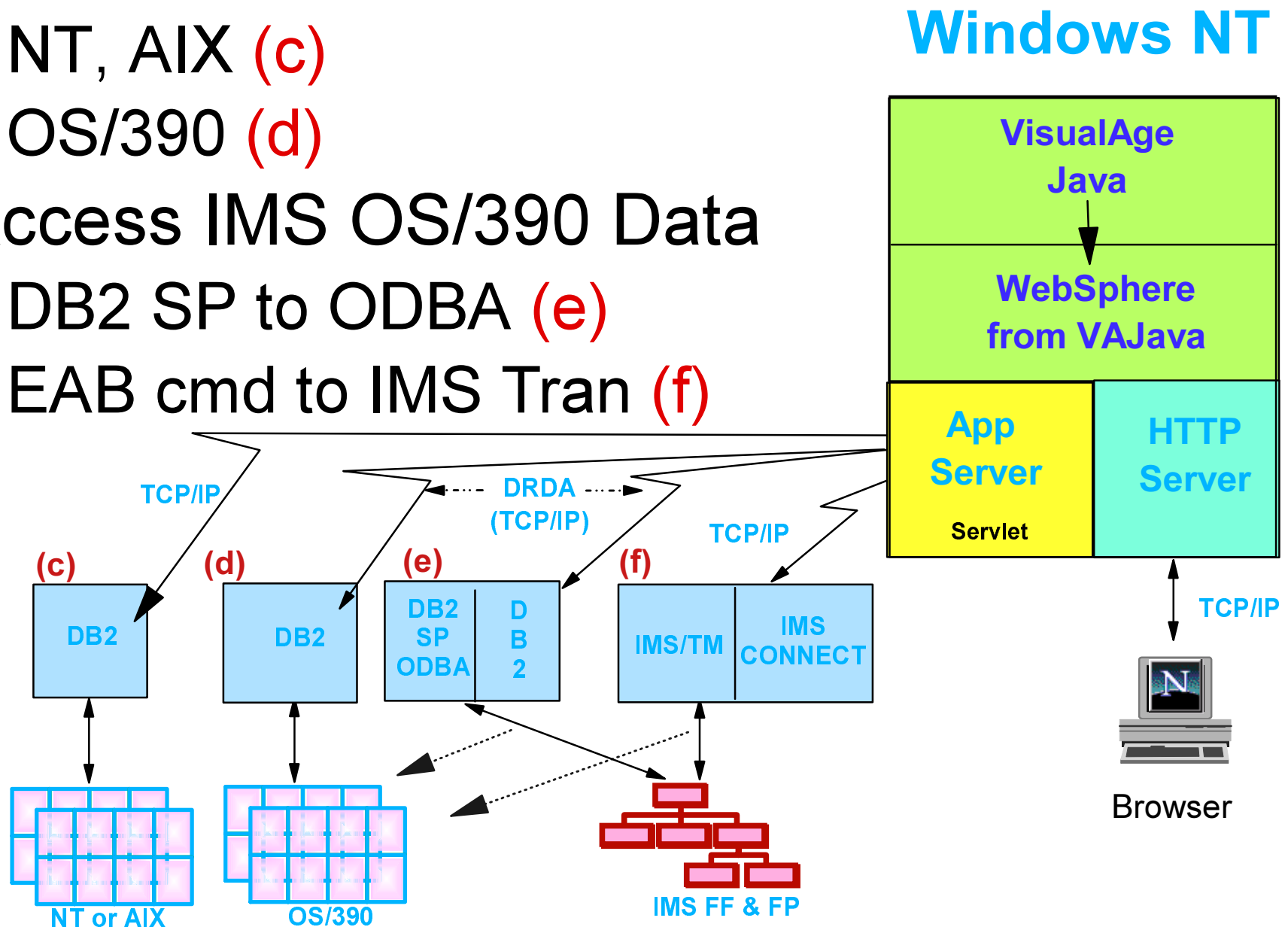
How the Pieces Fit - Step 1

- VisualAge for Java to create servlet (a)
 - ▶ Initial access to DB2 on local NT
- VisualAge for Java WebSphere Test Environment (b)
 - ▶ First level tests for Steps 1 and 2



How the Pieces Fit - Step 2

- Access DB2 Data
 - ▶ NT, AIX (c)
 - ▶ OS/390 (d)
- Access IMS OS/390 Data
 - ▶ DB2 SP to ODBA (e)
 - ▶ EAB cmd to IMS Tran (f)



How the Pieces Fit - Step 3

- Deploy on WebSphere
 - ▶ Export files to WebSphere on NT, AIX, or S/390 (g)

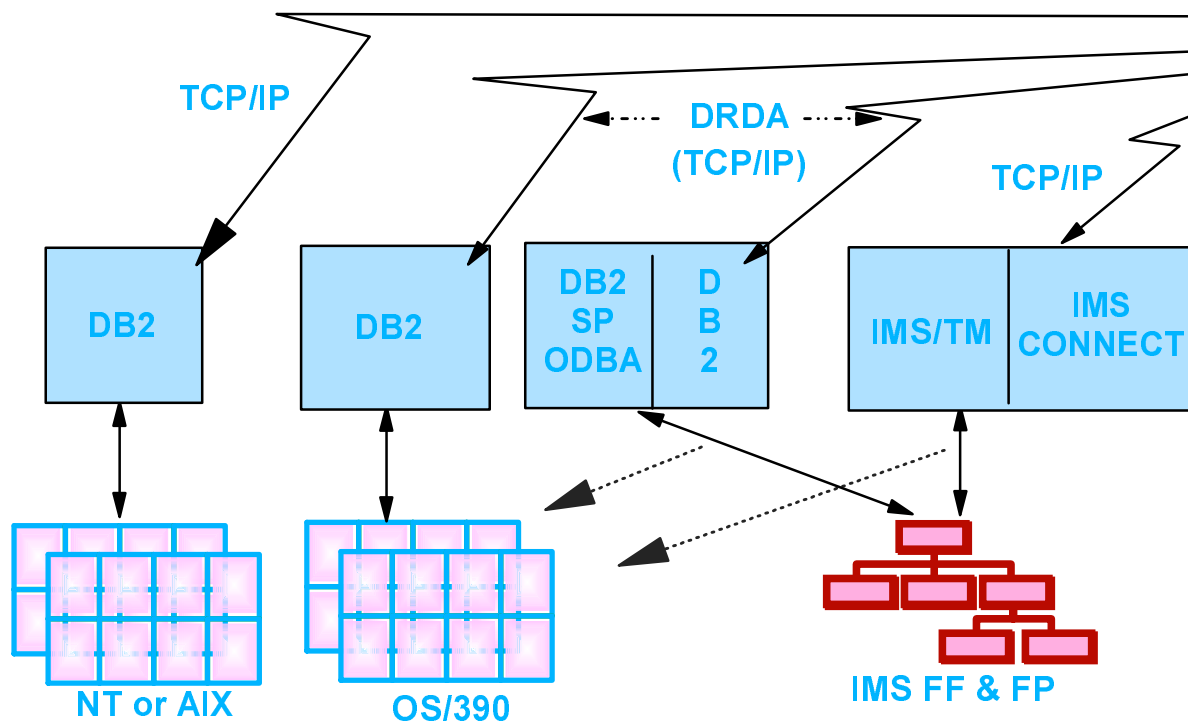
End User



TCP/IP



WebSphere (g)
NT, AIX, S/390



Why VisualAge for Java?

- Portable and Scalable

- ▶ NT, AIX, and S/390

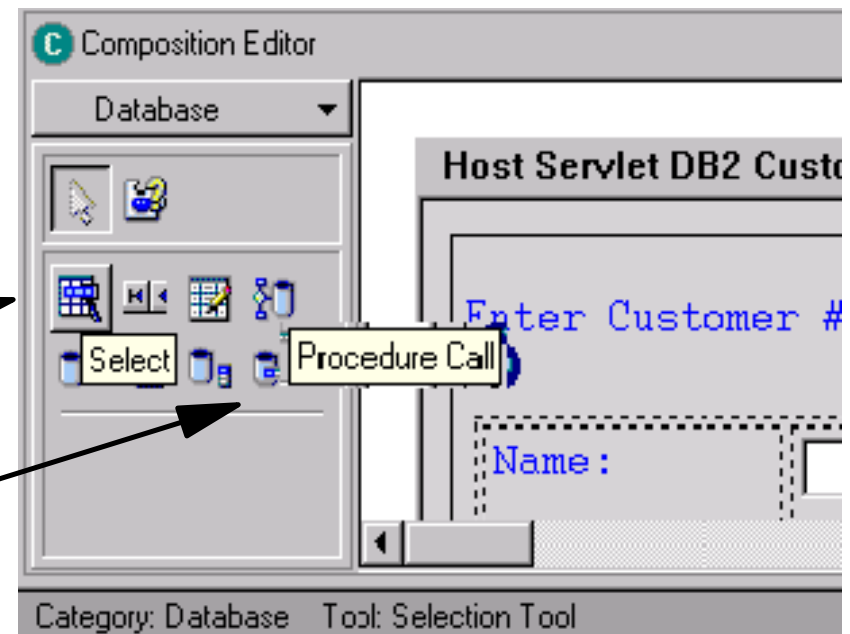
- Includes Connectors

- ▶ IMS, CICS, MQSeries, Tivoli, etc.



- Includes Beans

- ▶ Select - Access DB2
- ▶ Procedure Call - Access DB2, IMS, etc.
- ▶ Modify - Update data



Why VisualAge for Java? ...

- WebSphere Test Environ - Click 'Run'



Bookmarks Location: <http://127.0.0.1:8080/servlet/HostServlet.HostAccountServlet>

Enter Customer #:

Name:

Address:

City/State:

Country:

Email:

ACCOUNT.ACCT_NUMBER	ACCOUNT.BALANCE
16	500.50
17	20000.00

Port "8080" indicates Test Environment

Why Stored Procedures?

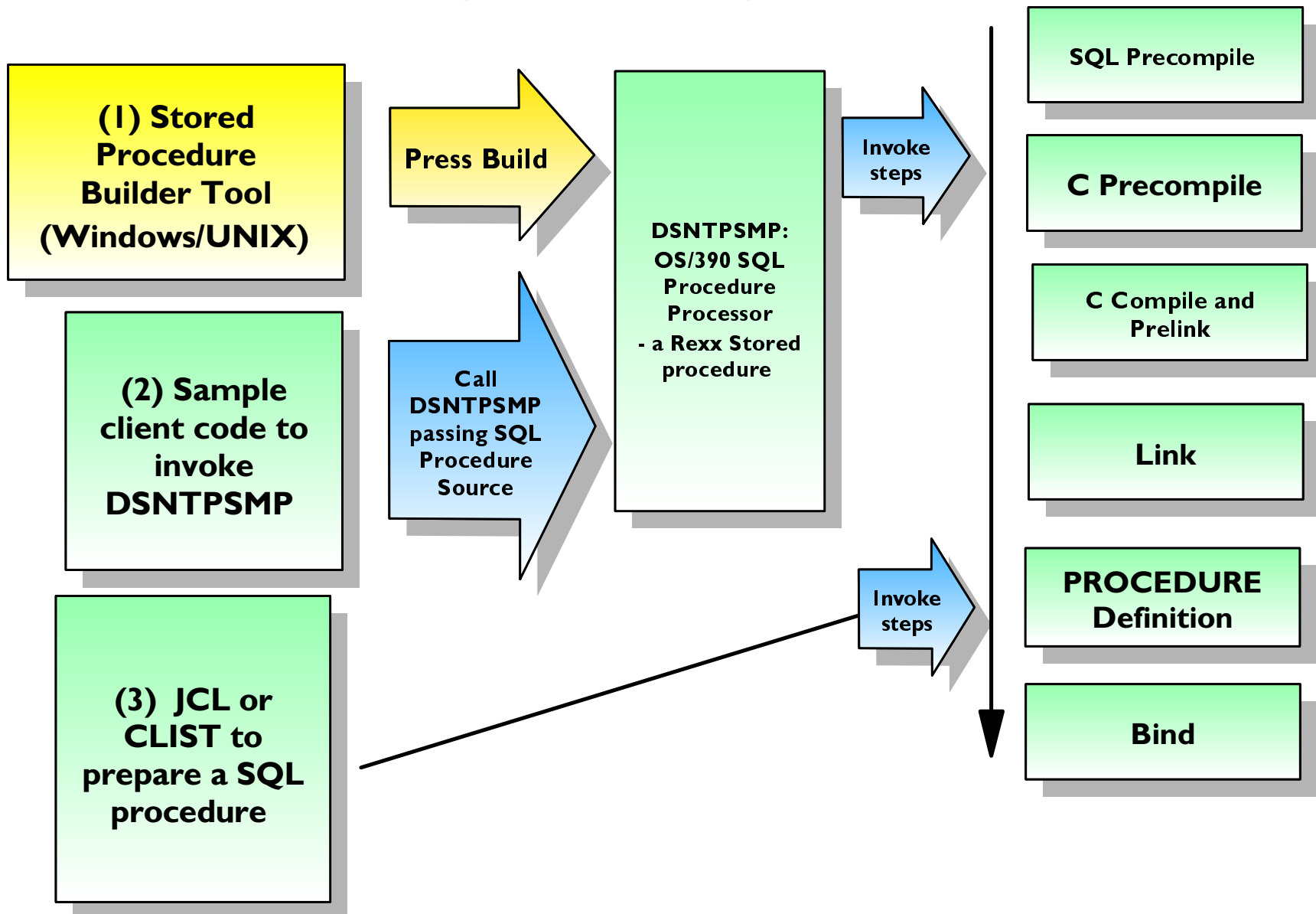
- Improved Application Security
 - ▶ Sensitive processing moved to server
 - ▶ End users do not need table privileges
- Simplified Application Maintenance
 - ▶ Business logic centralized at server
- Performance
 - ▶ Network traffic reduced
 - ▶ Lock contention easier to control

Why Stored Procedures? ...

- Tight Integration with Desktop Tools
 - ▶ Fully supported by JDBC, ODBC, SQLJ, etc.
- Java and SQL Procedure Language SPs supported by Stored Procedure Builder
 - ▶ Portable across platforms

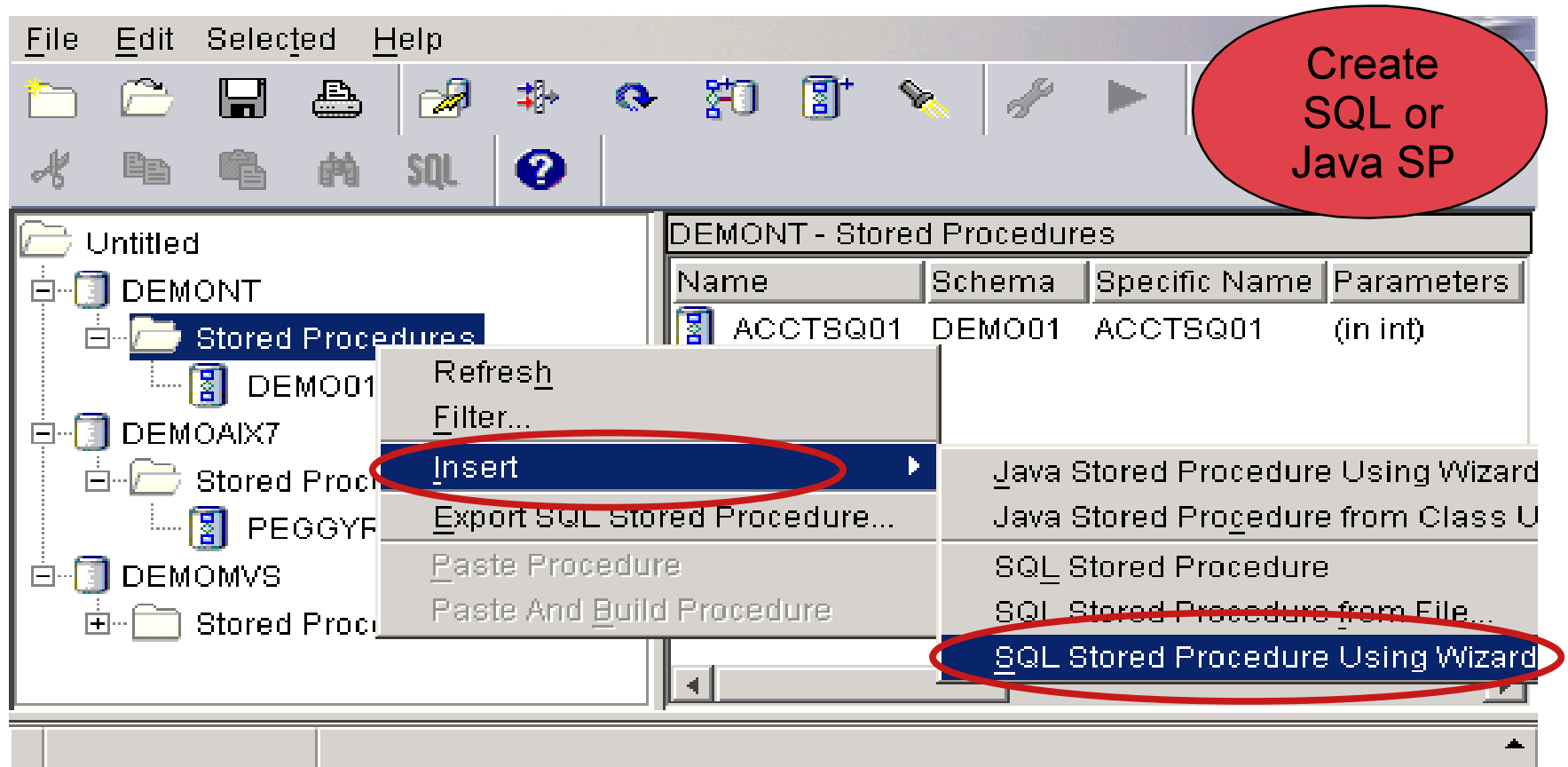
Why DB2 Stored Proc Builder?

- Simplified Programming and Build Process



Why DB2 Stored Proc Builder?...

- Creates, Builds, Debugs DB2 UDB SPs
- Launches from Multiple Tools
- Uses Wizards to create Java or SQL PL SPs



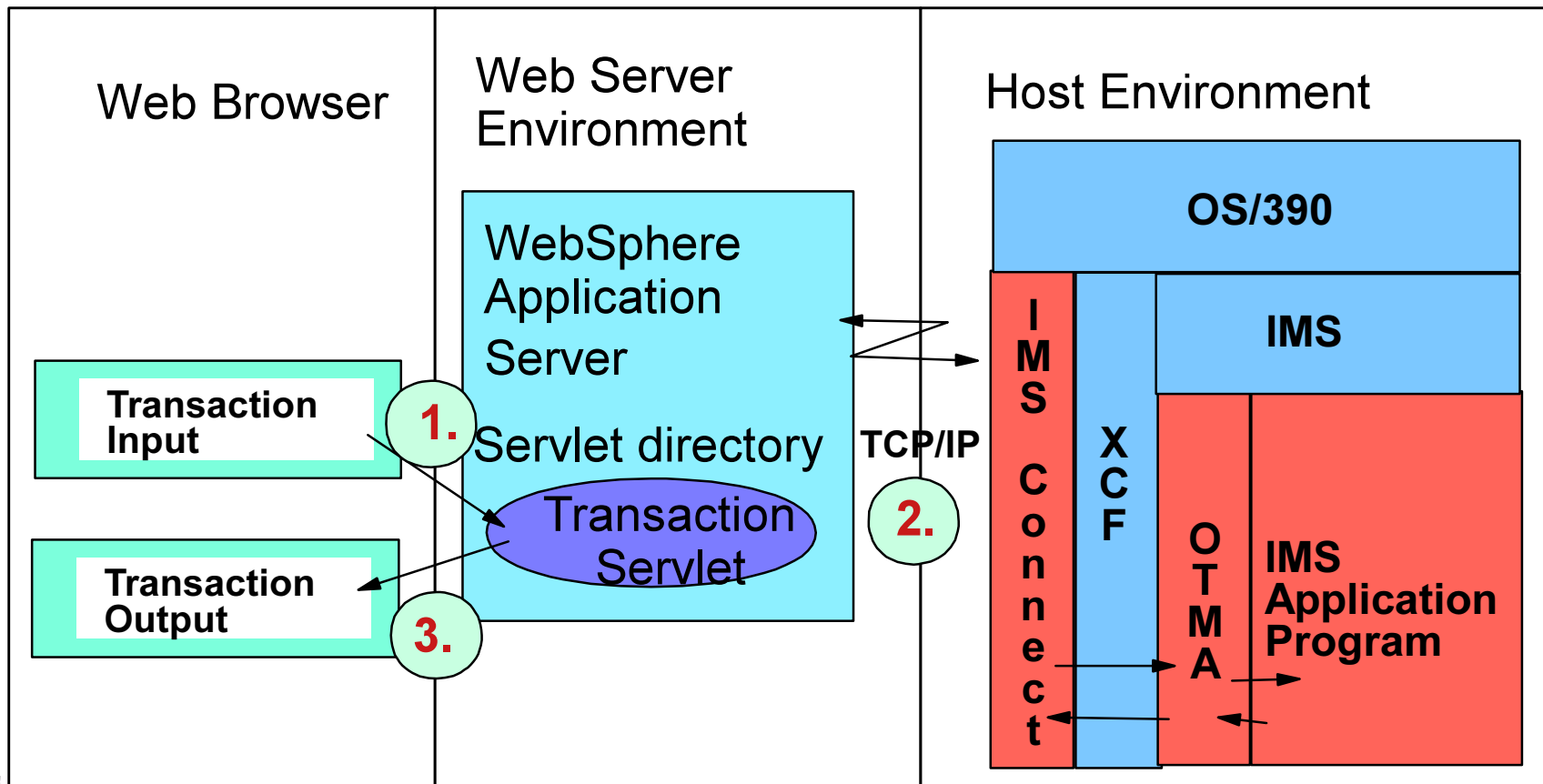
How Do You Connect to the Data?

- Access IMS data via:
 - ▶ VAJava Procedure Call Bean
 - DB2 Stored Procedure to ODBA to IMS
 - ▶ VAJava IMS Bean
 - IMS TM via IMS Connect and OTMA

- Access DB2 data via:
 - ▶ VAJava Data Access Bean
 - ▶ VAJava Procedure Call Bean
 - SQL Procedure Language or Java SP created with Stored Procedure Builder

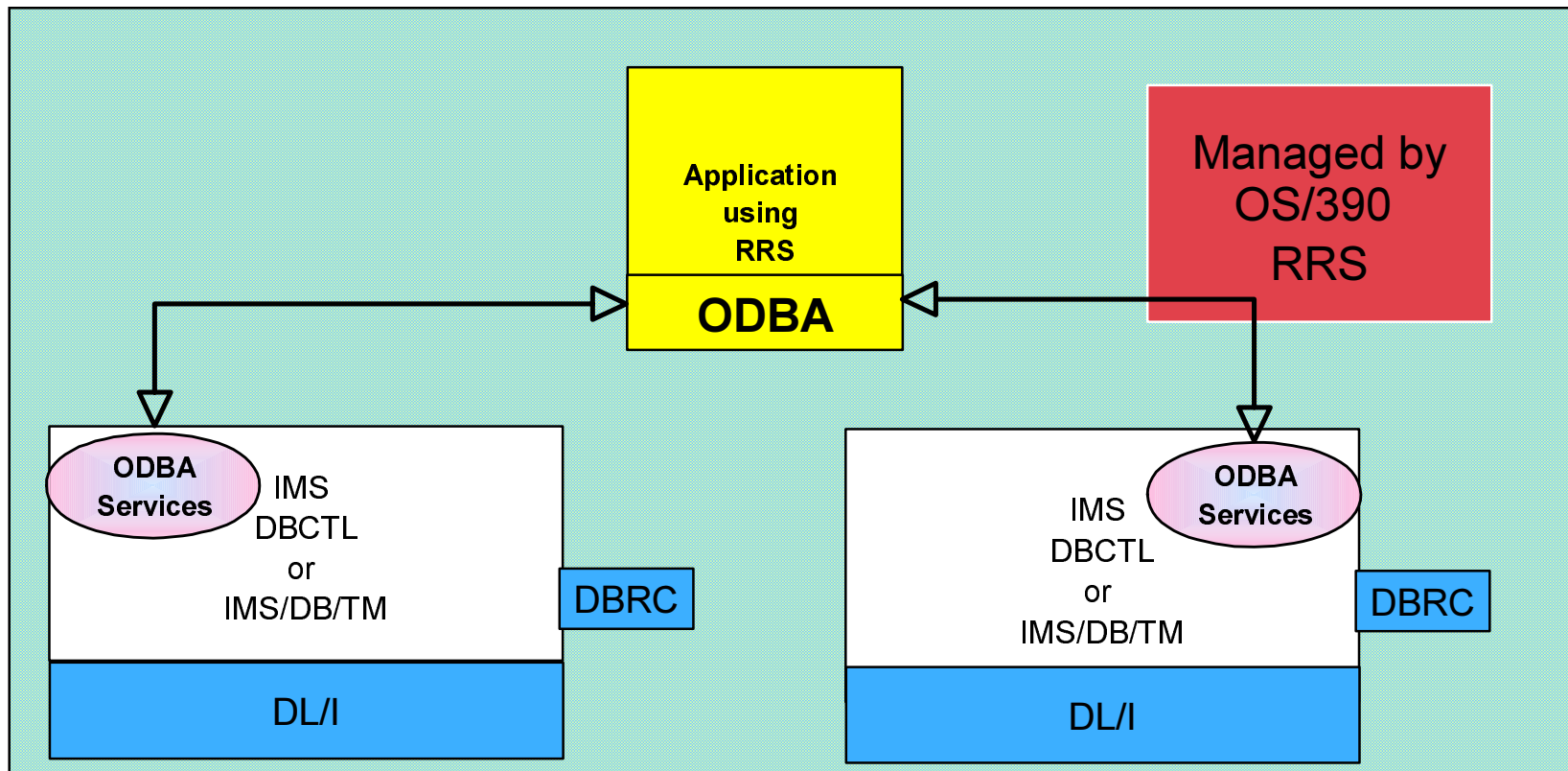
IMS Connectivity - IMS Connect

- Previously IMS TCP/IP Connector (ITOC)
- MVS Address Space:
 - ▶ Listening port to Client via TCP/IP
 - ▶ XCF services to IMS via OTMA



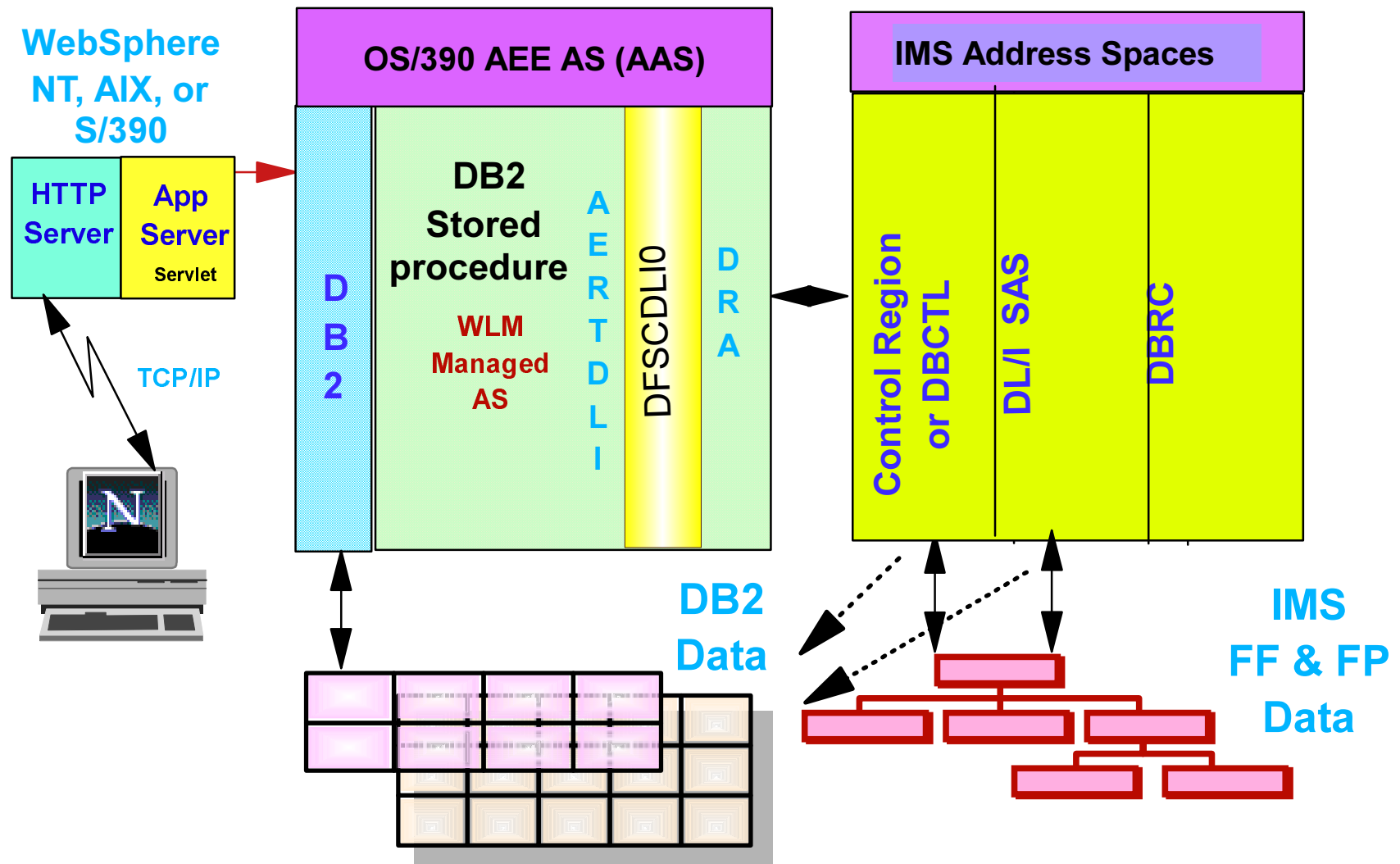
IMS Connectivity - ODBA

- ODBA Callable DL/I Interface Outside IMS/TM or CICS
 - ▶ RRS/MVS is required
 - ▶ Any Address Space using RRS can use ODBA



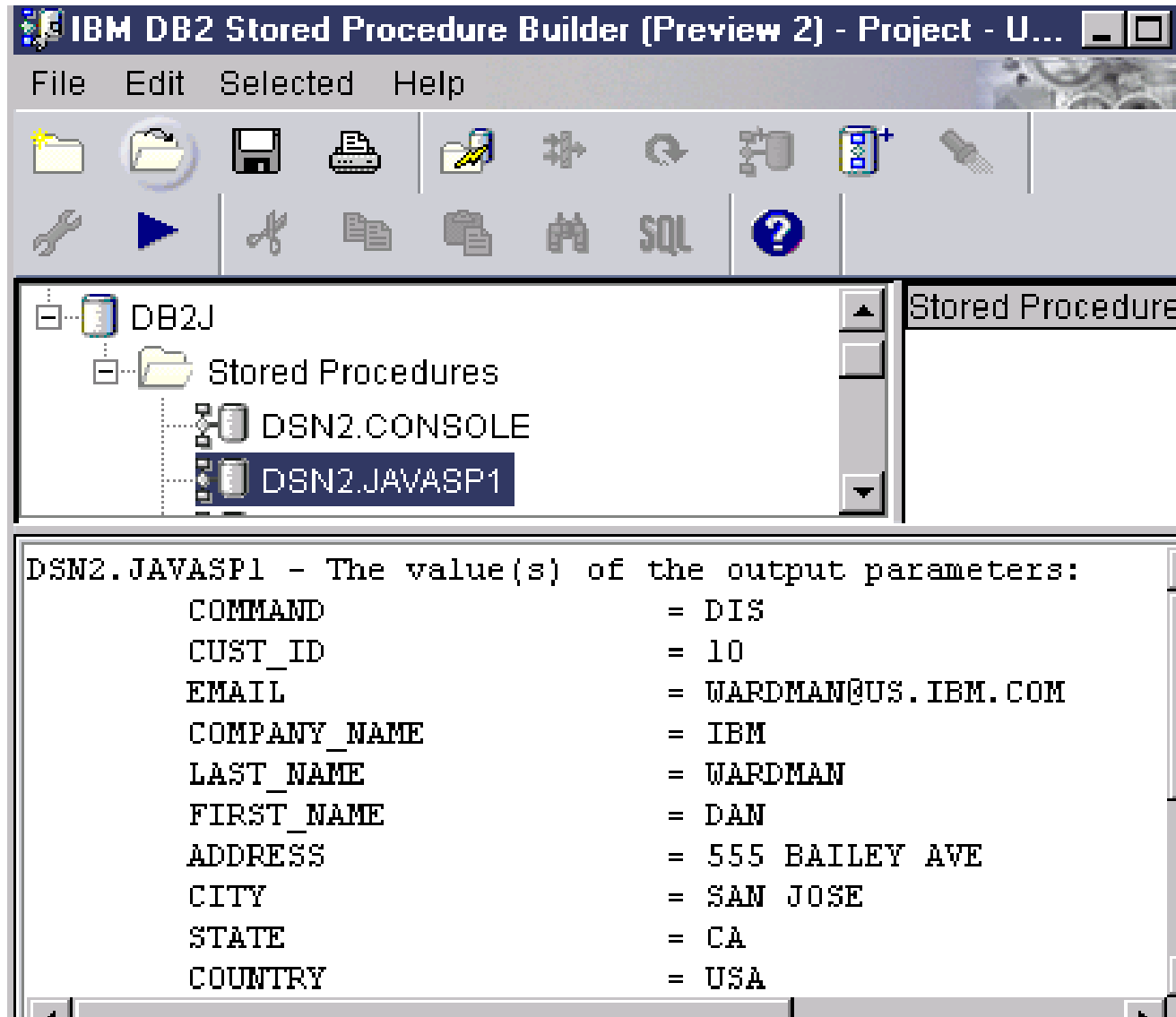
IMS Connectivity - DB2 SP

- DB2 Stored Procedure to ODBA to IMS Database



IMS Connectivity - DB2 SP ...

- SPB used to test DB2 COBOL Stored Procedure to IMS Data



DB2 Connectivity

- TCP/IP
 - ▶ DRDA - OS/390 Connection
 - DB2 Connect or similar product
 - ▶ Private Protocol - AIX, WIN, OS/2 Connection

- DB2 Connection Definition
 - ▶ DB2 Catalog statements from a DB2 Command Line Processor (CLP) window
 - ▶ DB2 Client Configuration Assistant
 - ▶ Information - DNS Host Name, TCP Listening Port, and Database Name

DB2 Connectivity - OS/390

- Information from OS/390 Console during DB2 Startup, **DSNL004I** Message:

DB2J DDF START COMPLETE

LOCATION DB2J
LU USIBMSC.SCPDB2J
GENERIC LU -NONE
DOMAIN WTSC47.ITSO.IBM.COM
TCPPOINT 33322
RESPORT 33323

From DB2
CLP
Window

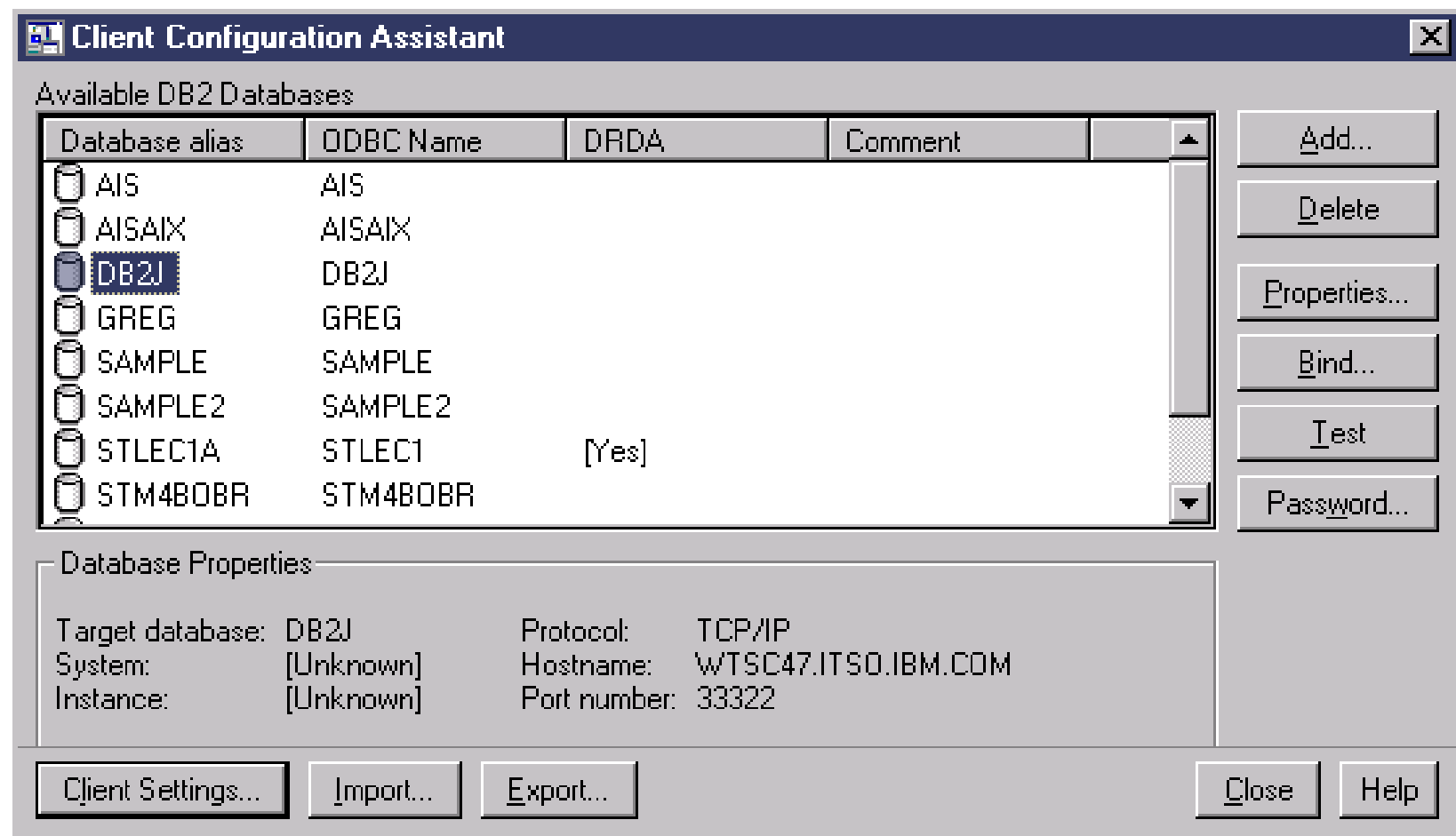
db2 catalog tcpip node TCP0000 remote WTSC47.ITSO.IBM.COM server 33322 ostype MVS
db2 catalog database DB2J at node TCP0000 AUTHENTICATION DCS
db2 catalog DCS database DB2J

NODENAME unique for each 390 system
connection in the DB2 directory



DB2 Connectivity

- Use Client Configuration Assistant
 - ▶ From DB2 Program Window
 - ▶ C:\SQLLIB\bin\db2cca.exe



Connectivity Background

- Objective
 - ▶ Demonstrate connectivity with an 'e-business Test Drive'
 - ▶ Mix and Match pieces - databases and platforms

- Skill Level
 - ▶ Non Programmer
 - ▶ Limited DB2 experience
 - ▶ Limited to extensive Windows NT, IMS/TM and IMS/DB experience

Query Servlet to IMS and DB2

1. Customer -DB2 NT
Account - DB2 NT
- WebSphere Test

2. Customer -DB2 390
Account - DB2 AIX
- WebSphere Test

3. Customer -DB2 390
Account - DB2 AIX
- WebSphere NT

4. Create Account NT SP
Copy to AIX
Access AIX SP
- WebSphere Test

5. Customer DB2 SP/ODBA IMS 390
Account DB2 390
- WebSphere NT

6. Customer - IMS Tran 390
Account DB2 AIX
- WebSphere Test

9. Customer -IMS Tran 390
Account - DB2 390
- WebSphere 390

8. Customer -DB2 390
Account - DB2 390
- WebSphere 390

7. Customer -DB2 390
Account - DB2 390
- WebSphere NT

Enter Customer #:

Name:

Address:

City/State:

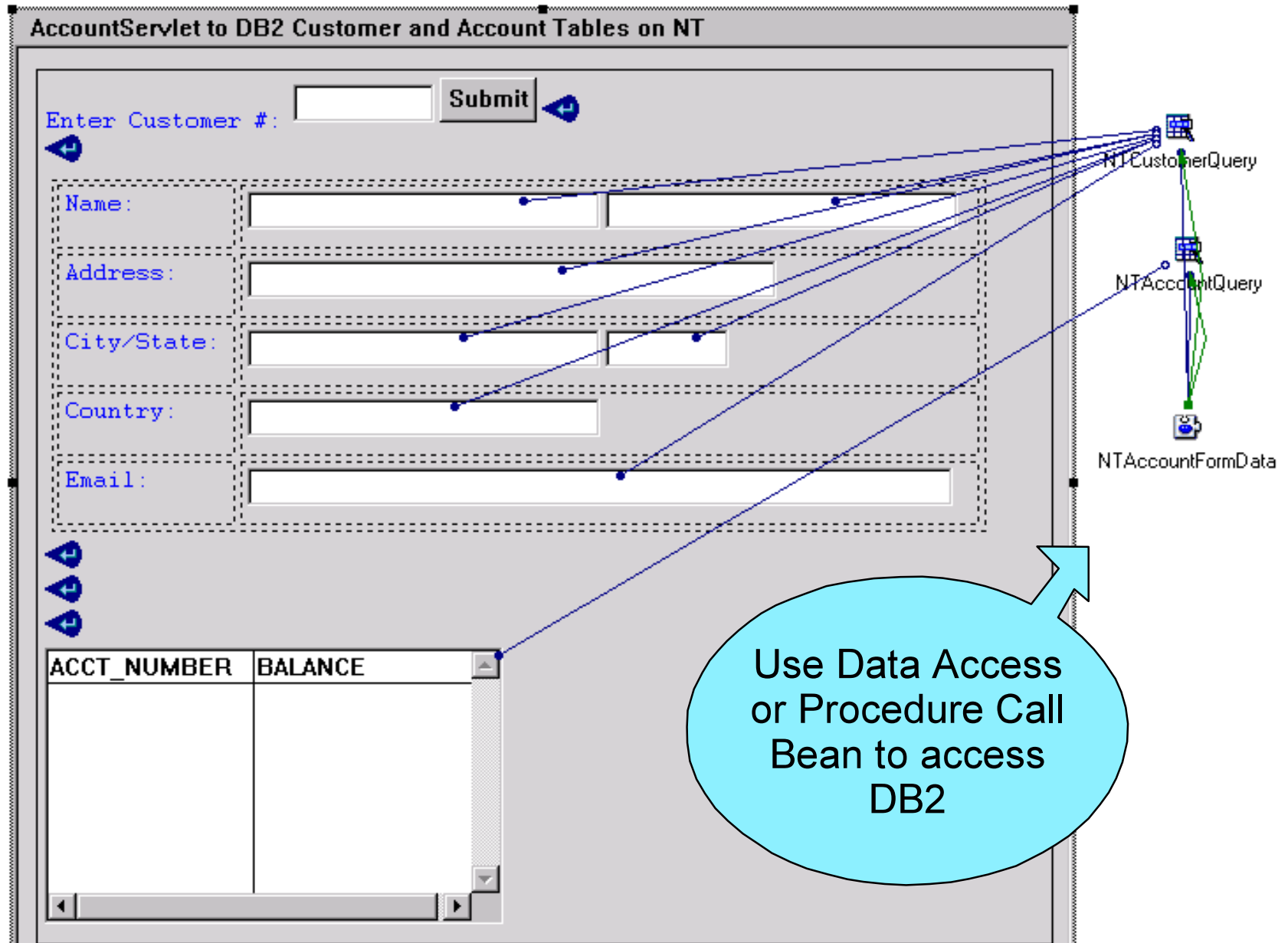
Country:

Email:

ACCOUNT.ACCT_NUMBER	ACCOUNT.BALANCE
20	500.50
21	500000.00

VJava Developed Servlets

- DB2 Customer & Account Tables - NT



Changing DB2 Platforms

- Once defined and added - just a few clicks



1. Click on AccountQuery bean
2. Click on query popdown
3. Select Connection, DB2J for OS/390
4. Click OK

The screenshot shows the 'NTAccountServlet - Properties' dialog box. The 'AccountQuery' bean is selected. The 'query' property is set to 'AccountListByCustomer:AISNT'. The 'readOnly' property is set to 'False'. The 'SQL & Connection specification' section is expanded, showing a list of connections. The 'DB2J' connection is selected. The 'URL' field contains 'jdbc:db2:DB2J'. The 'OK' button is highlighted.

Property	Value
beanName	AccountQuery
query	AccountListByCustomer:AISNT
readOnly	False

SQL & Connection specification

Reset...

Show expert features

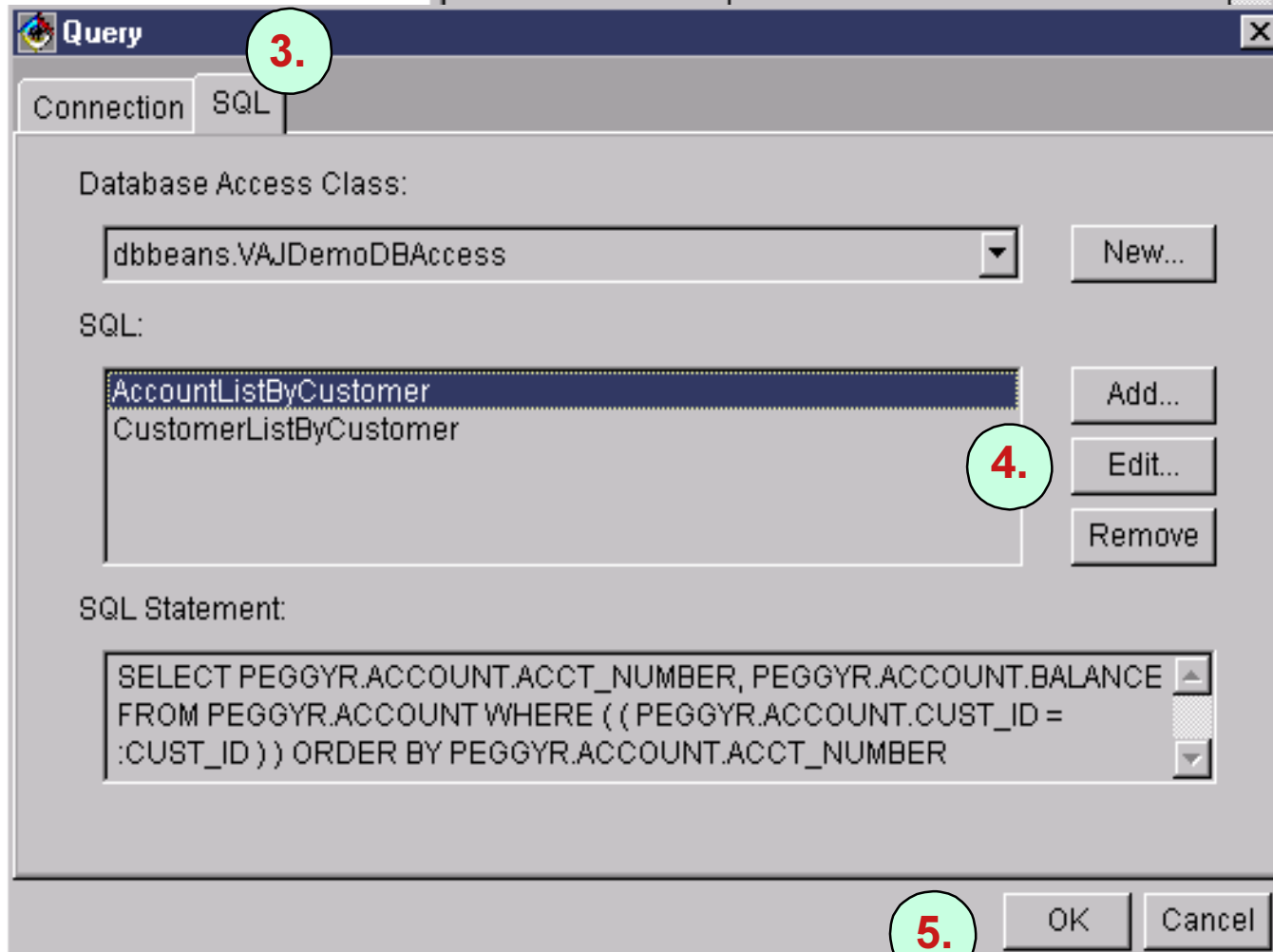
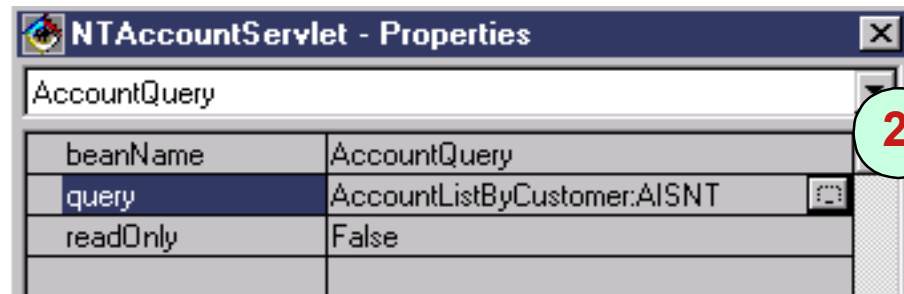
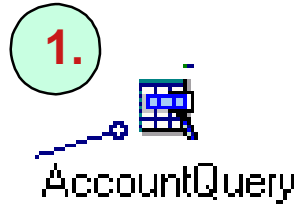
Connections:

- AISAIX
- AISNT
- DB2J**

URL: jdbc:db2:DB2J

OK Cancel

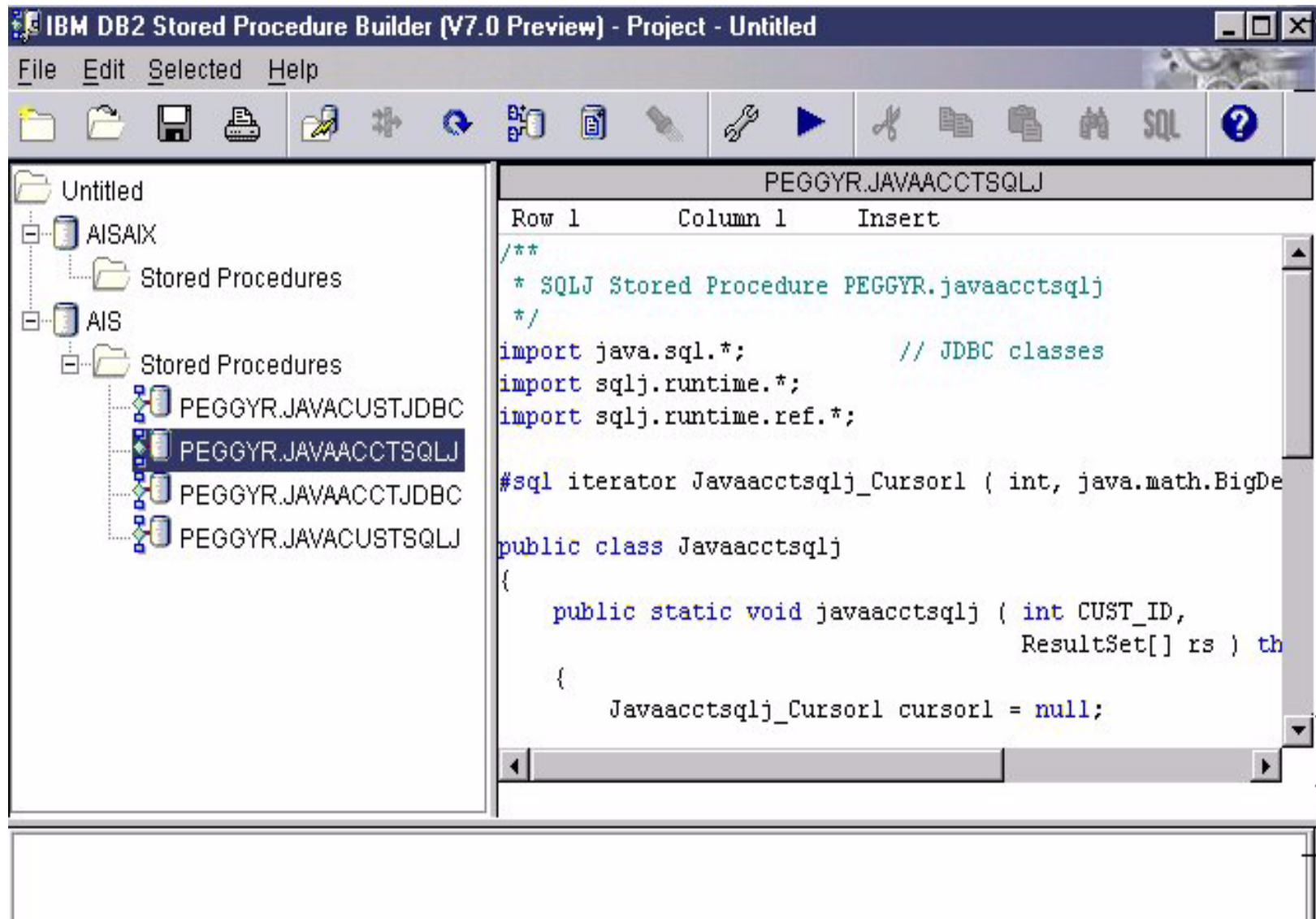
Changing DB2 Query



1. Click on AccountQuery bean
2. Click on query popdown
3. Select SQL tab
4. Add, Edit or Remove SQL statement
5. Click OK

Create an NT Java SP with SPB

- Copy NT SP and Paste and Build on AIX



Use AIX Java SP for DB2 Access

1. Add a Procedure Call Bean from Database Palette

2. Name the Bean

3. Select DB2 system

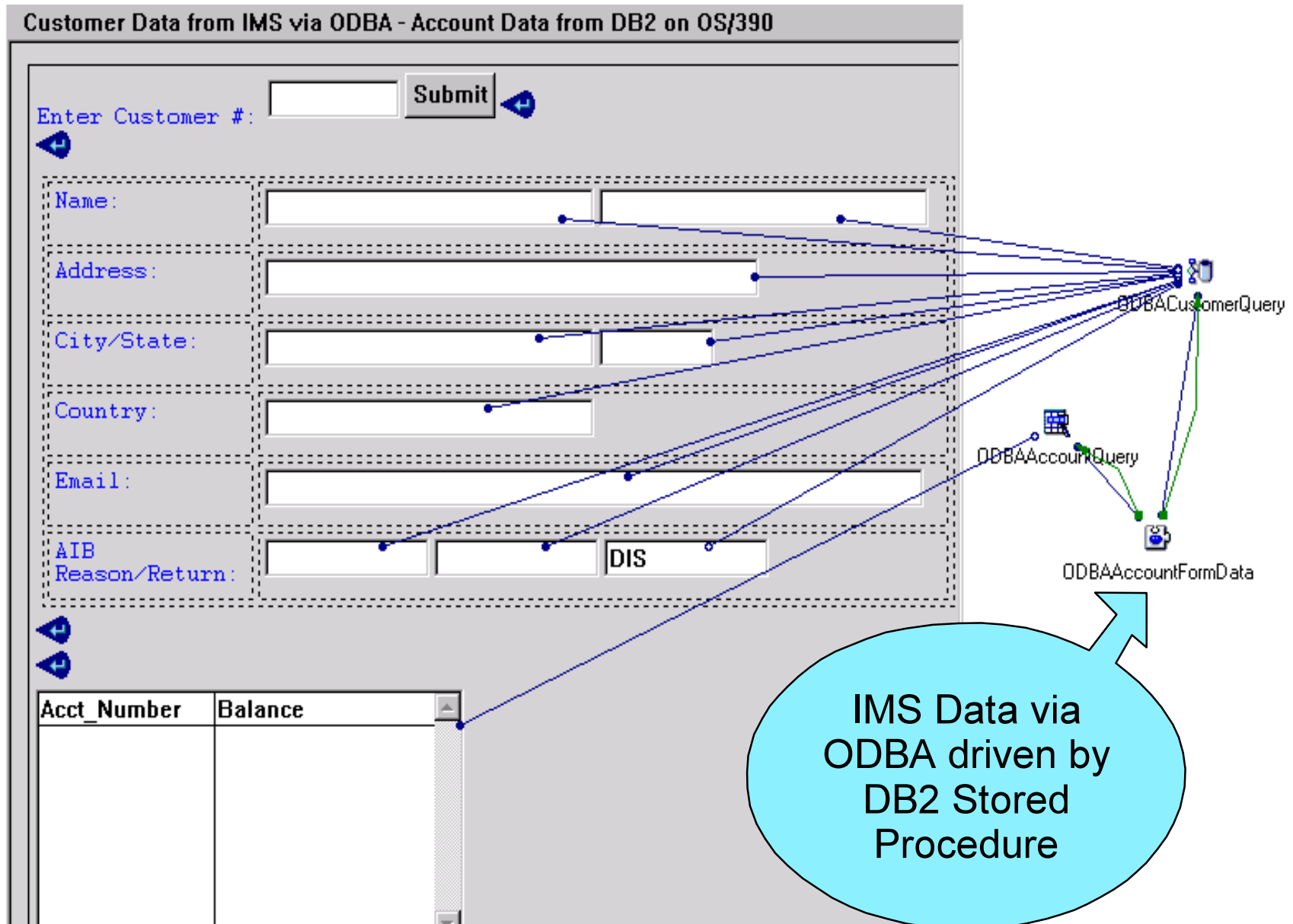
4. Select Query

The screenshot shows the following configuration details:

- Procedure Configuration:**
 - Database Access Class: `dbbeans.VAJDemoDBAccess`
 - SQL: `javaacctjdbc` (selected)
 - SQL Statement: `{ CALL PEGGYR.JAVAACCTJDBC(CUST_`
- NTAccountServlet - Properties:**
 - Bean Name: `AccountQuerySP`
 - Procedure: `javaacctjdbc:AISAIX`
 - readOnly:
- Procedure Configuration (Secondary):**
 - Database Access Class: `dbbeans.VAJDemoDBAccess`
 - Connections: `AISAIX` (selected), `AISNT`, `DB2J`
 - URL: `jdbc:db2:aisaix`

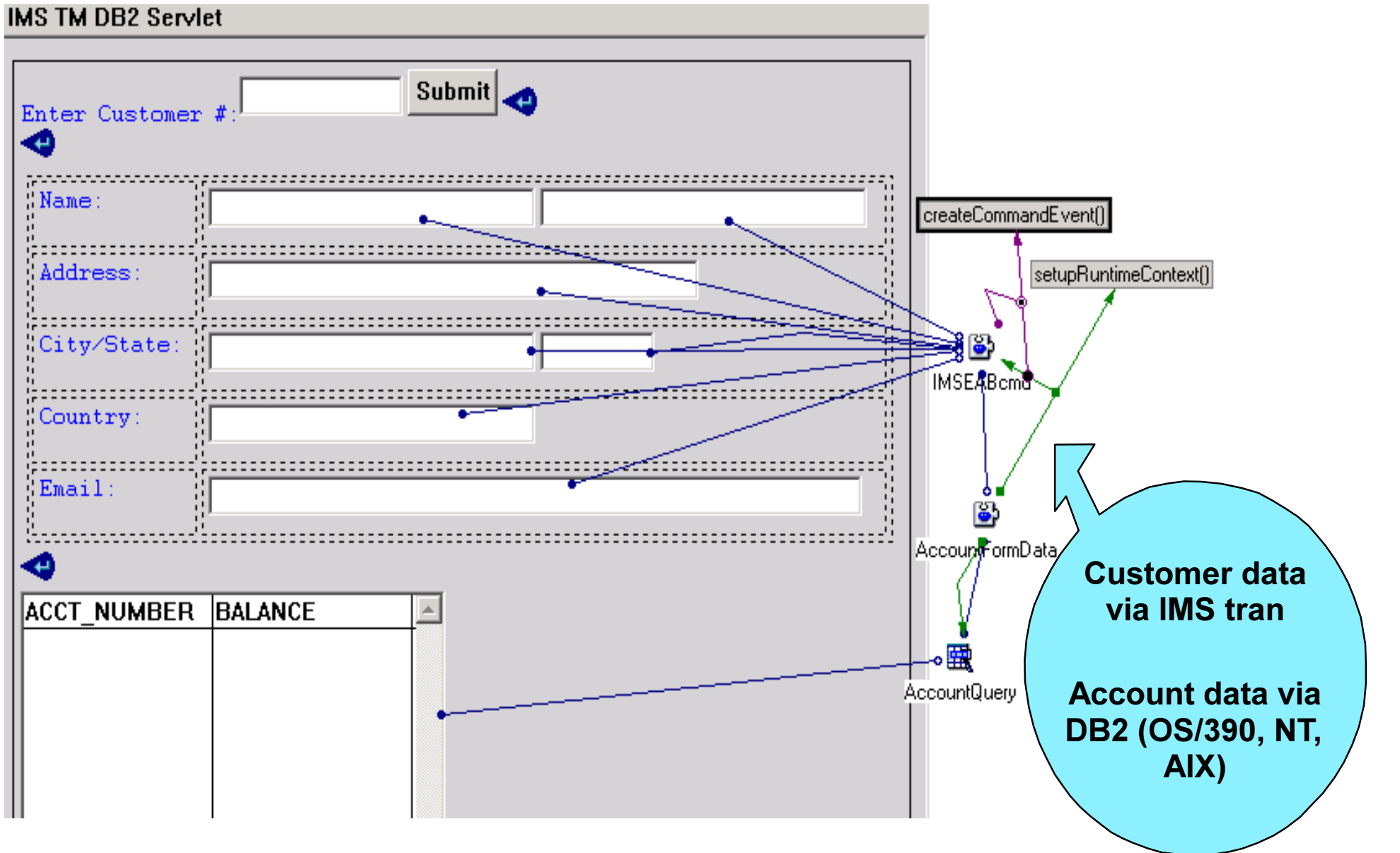
VJava Developed Servlets ...

- MS Customer DB and DB2 Account Table



VJava Developed Servlets ...

- IMS Customer DB and DB2 Account Table



Summary

- Similar Development GUI 'Look and Feel'
 - ▶ Wizards and SQL Assist
 - VisualAge for Java
 - DB2 Stored Procedure Builder
 - DB2 Control Center
- Datastore Easily Changed
 - ▶ Connect with Procedure Calls or Data Access Beans

Summary ...

- Platform Easily Changed
 - ▶ Good for development, scalability, availability, and performance
- Business Logic is the Focus for Programmers
 - Not how I get to my data

Reference Material

■ Manuals:

- ▶ **SG24-5471**: IBM WebSphere and VisualAge for Java Database Integration with DB2, Oracle, and SQL Server
- ▶ **SG24-5142**: Integrating Java with Existing Data and Applications on OS/390
- ▶ **SG24-5081**: Application Development with VisualAge for Java Enterprise
- ▶ **SG24-5759**: DB2 UDB for OS/390 Version 6 Management Tools Package
- ▶ **SG24-5485**: Developing Cross-Platform DB2 Stored Procedures: SQL Procedures and the DB2 Stored Procedure Builder

Reference Material...

■ Documents:

▶ **WebSphere Application Server**

– <http://www.ibm.com/software/webservers/appserv/library.html>

▶ **SQL Stored Procedures PDF**

– <http://www.ibm.com/software/data/db2/os390/sqlproc>

▶ **IMS TOC Connector for Java User's Guide**

– <http://www.ibm.com/software/data/ims/about/imstoc/document/index.html>

▶ **IMS Open Database Access (ODBA)**

– <http://www.ibm.com/software/data/ims/about/odba/odba.pdf>

Reference Material...

- IBM Learning Services Courses:
 - ▶ **CM750 - 3 days**
 - IMS Data Access Workshop for e-business
 - ▶ **CF750 - 3 days**
 - DB2 UDB Workshop for e-business
 - ▶ **B3106 - 5 days**
 - Application Framework for e-business
Technology Workshop