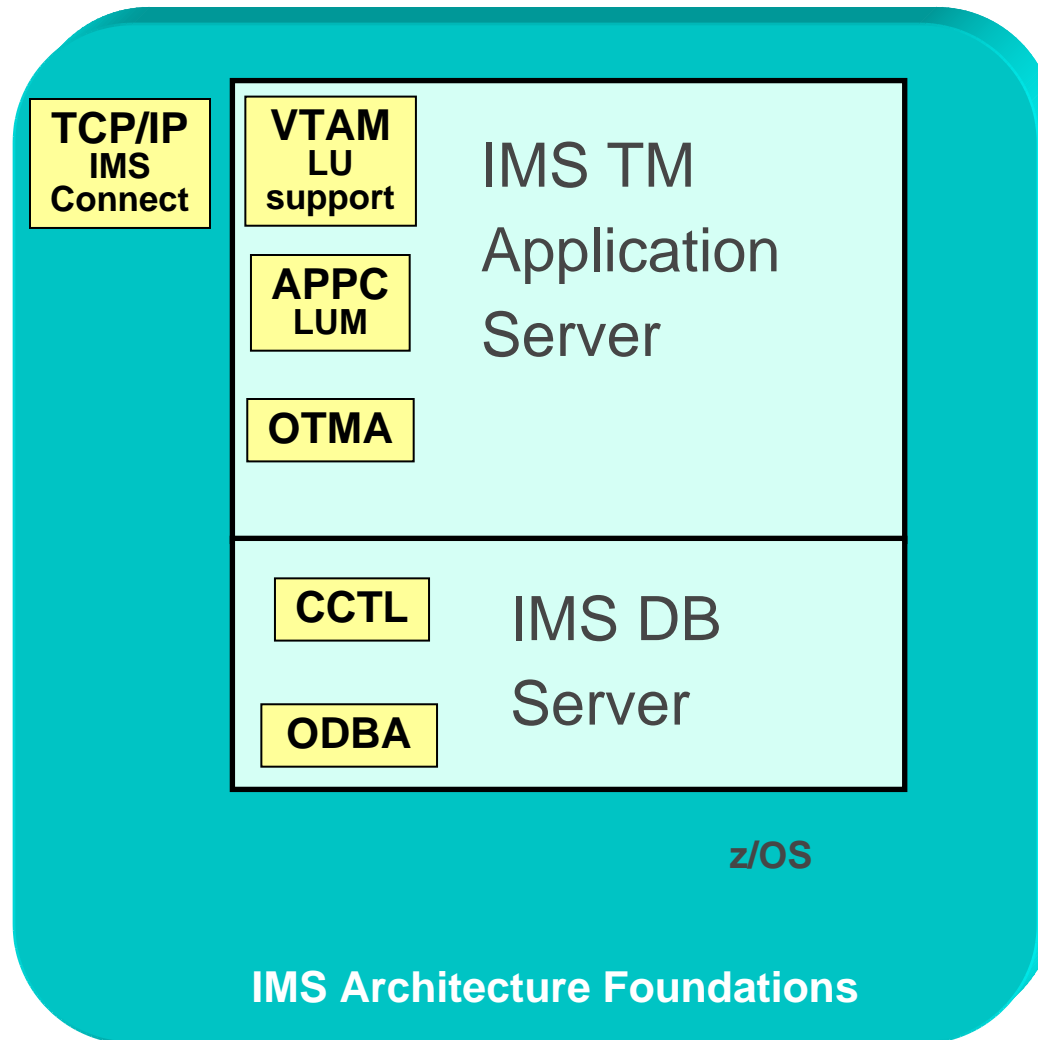


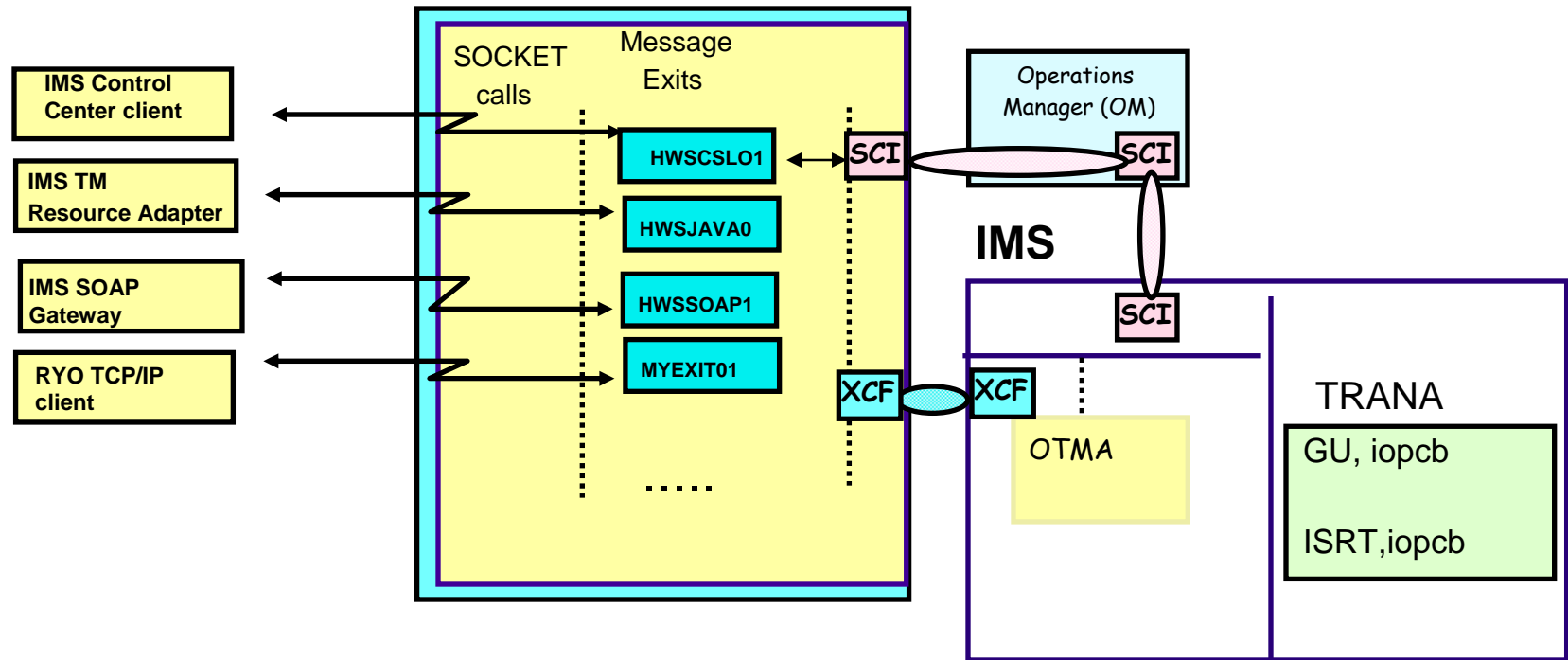
The IMS Integration Suite – What When Where Why Who and How questions answered.

IMS Architecture - Understand the Building Blocks



IMS V9 Integrated Connect Function

IMS Connect



Input message LL|ZZ|TRANCODE|LASTNAME

Output message LL|ZZ|LASTNAME|FIRSTNAME

Application Protocols

▲ Synchronization level (Sync_level)

- ▶ NONE
- ▶ CONFIRM
- ▶ SYNCPOINT

▲ Commit modes

- *Commit_then_send (Commit mode 0)*
 - ▶ Output is sent as a result of syncpoint
 - ▶ Always uses sync_level of CONFIRM
 - ▶ Output is queued until client sends an ACK

- *Send_then_commit (Commit mode 1)*
 - ▶ IOPCB output is sent before syncpoint
 - ▶ Sync_level can be either NONE , CONFIRM or SYNCPOINT

Commit Processing Summary

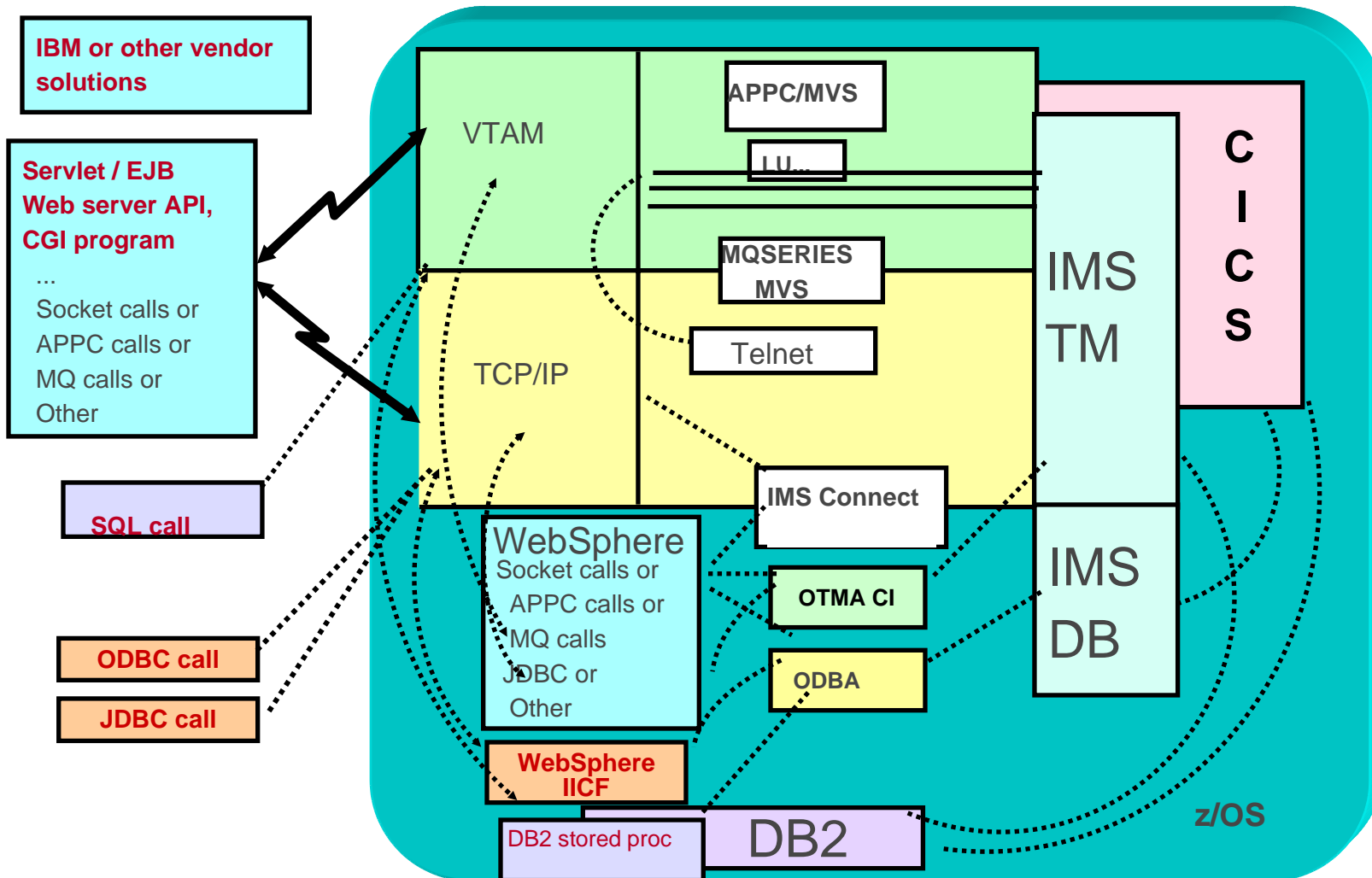
Variables

Commit-Then-Send

Send-Then-Commit

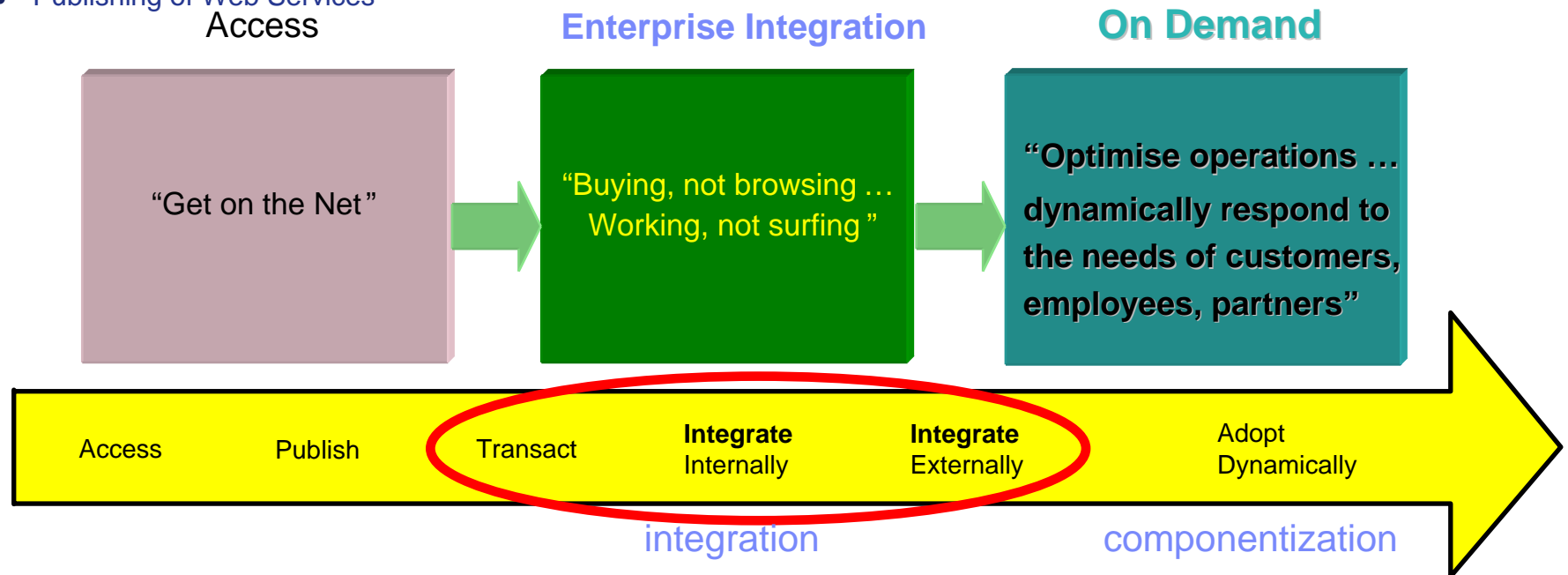
Conversational	Not Supported	Supported
Fast Path	Not Supported	Supported
Non-conversational and non-Fast Path	IMS commits and enqueues output to client.	IMS sends output to the client and then commits.
Enqueue the input ?	Yes	Yes
Enqueue the output ?	Yes	Yes

IMS Architecture Foundations The Usage



Phases of e-business adoption

- Provide static information to a browser
- Provide dynamic information to a browser
 - ◆ with access to backend systems
- New Internet Applications
- Business to business "transactional" processing
- Publishing of Web Services

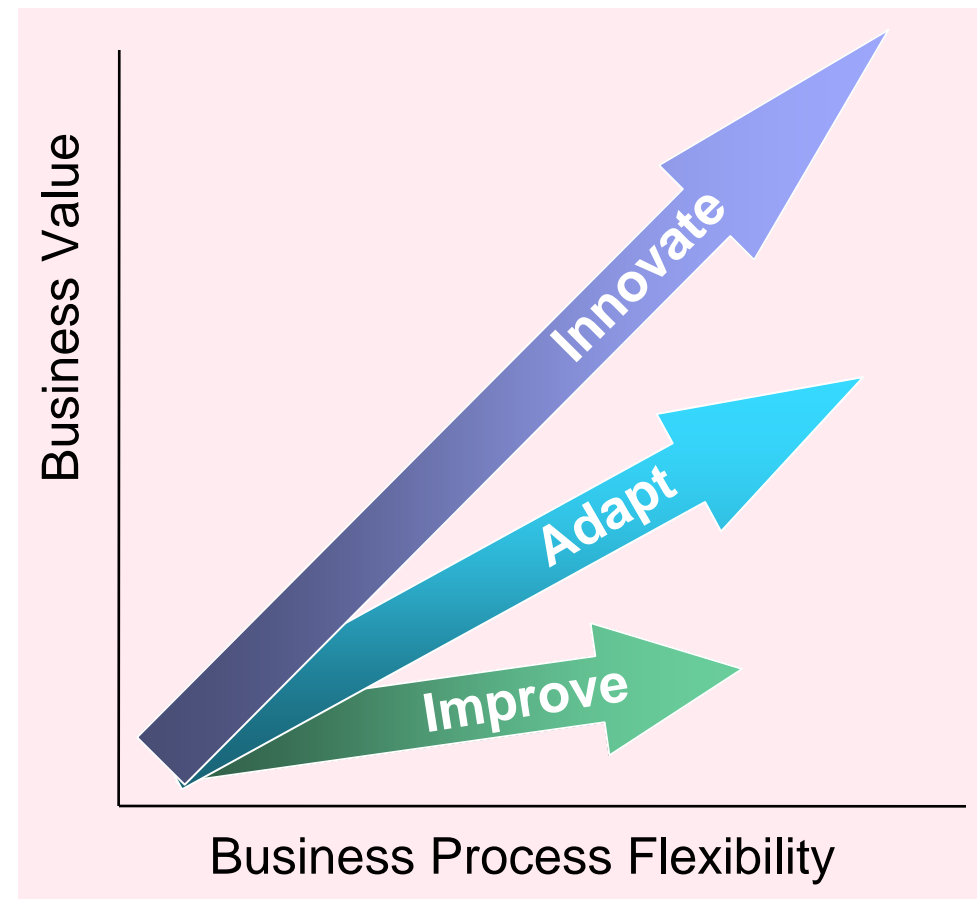


Styles of Transformation

- **Improve**
 - ◆ re-face applications to enhance the user experience
- **Adapt**
 - ◆ re-use applications as part of a larger solution
- **Innovate**
 - ◆ re-engineer applications to reflect business processes

The basic business processes have not changed. So all three styles of transformation should exploit existing applications.

“To move towards an on-demand business, customers need to transform their technical infrastructure from unique, single purpose applications to shared resources”

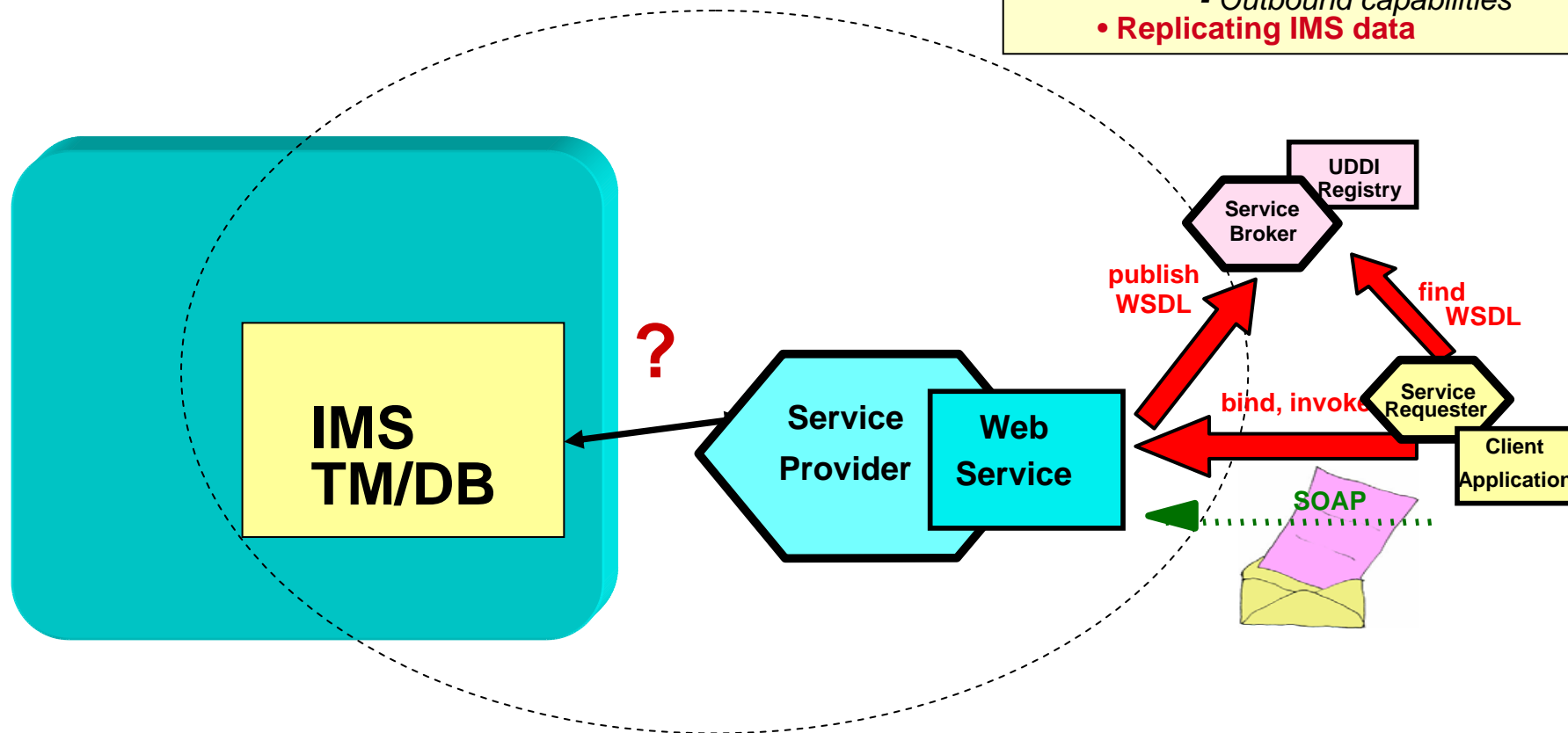


The Challenge

- How to access IMS resources as web services

REQUIREMENTS

- **Access to IMS transactions**
 - Direct connection model
 - Messaging and Queuing model
- **Access to IMS data**
 - Inquiry (read-only) or Update
- **Access from IMS applications**
 - Outbound capabilities
- **Replicating IMS data**



IMS Integration Suite – What is it?

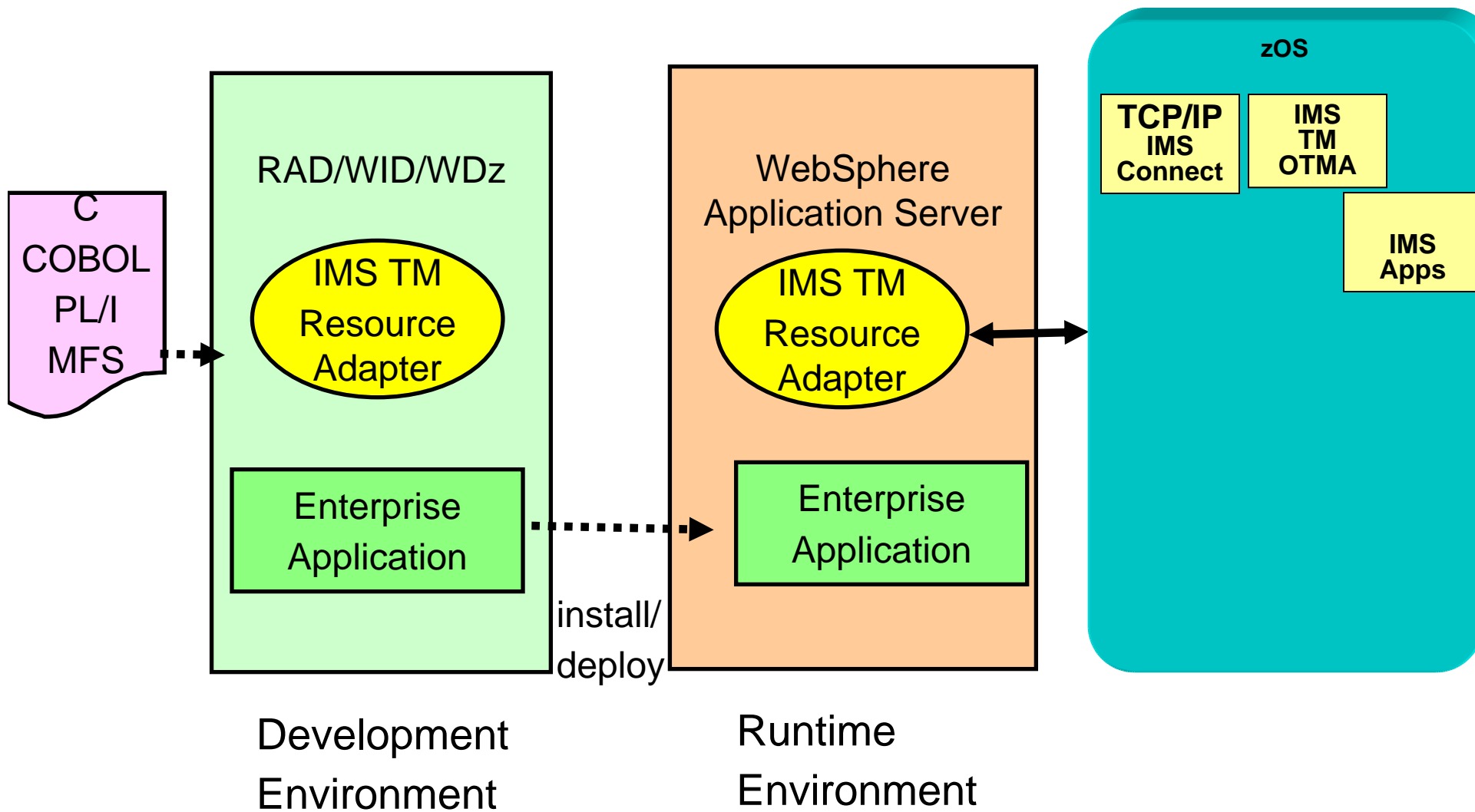
- IMS middleware functions and tools for On Demand Integration
 - ◆ Enable Connectivity to IMS TM and IMS DB
 - ◆ Require IMS V9 +
- Generally Available
 - ◆ <http://www-306.ibm.com/software/data/ims/toolkit/>

IMS Integration Suite – What is available?

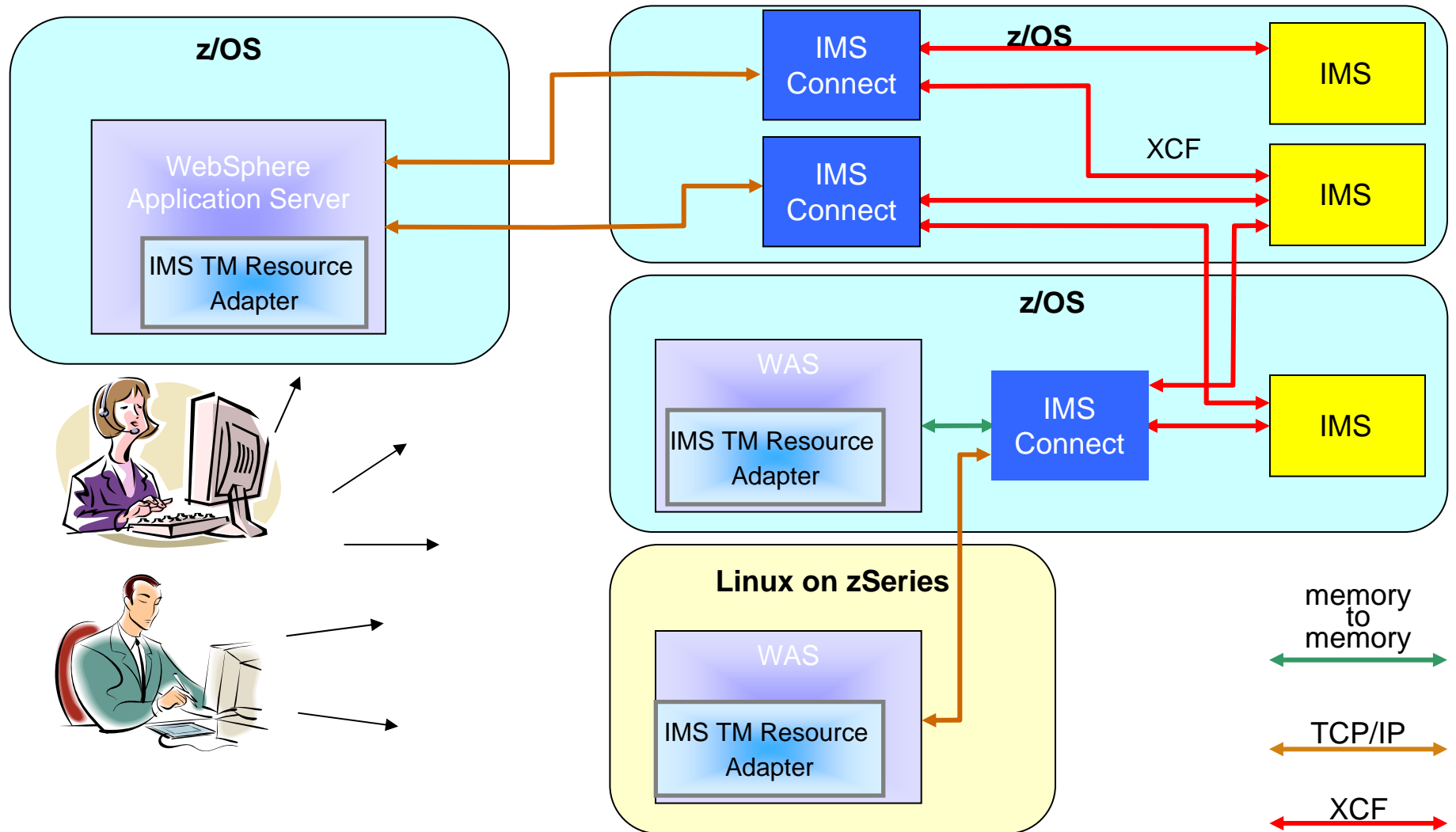
- IMS TM Resource Adapter
 - ◆ IMS Connector for Java
- IMS SOAP Gateway
- IMS MFS Web Support
- IMS DB Resource Adapter
 - ◆ IMS JDBC Connector
- IMS DLIModel utility
- IMS XML DB

IMS TM Resource Adapter

IMS TM Resource Adapter Overview



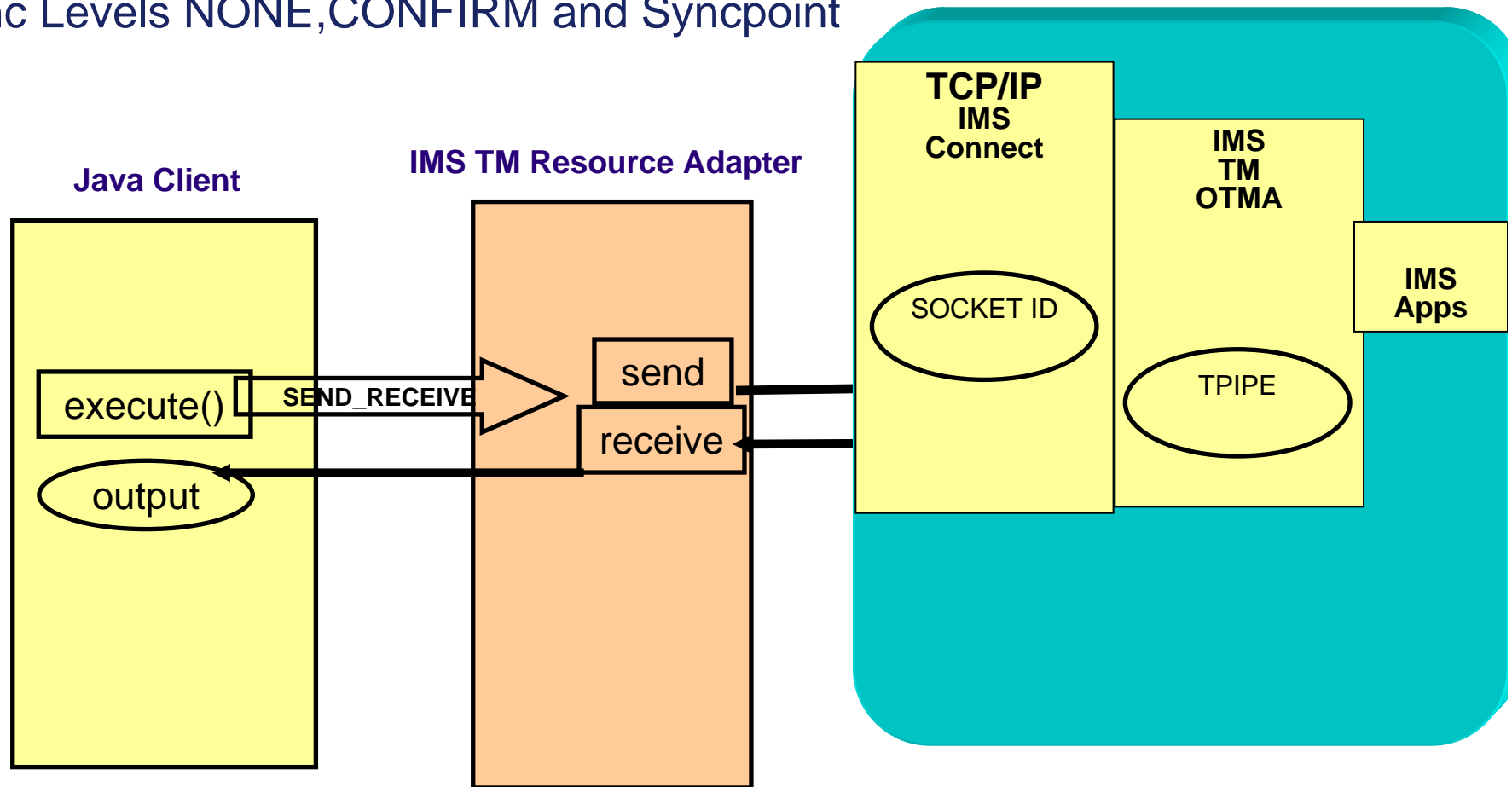
WebSphere, IMS Connect and IMS



IMS TM Resource Adapter - Connectivity

Commit Mode 0 and 1

Sync Levels NONE, CONFIRM and Syncpoint



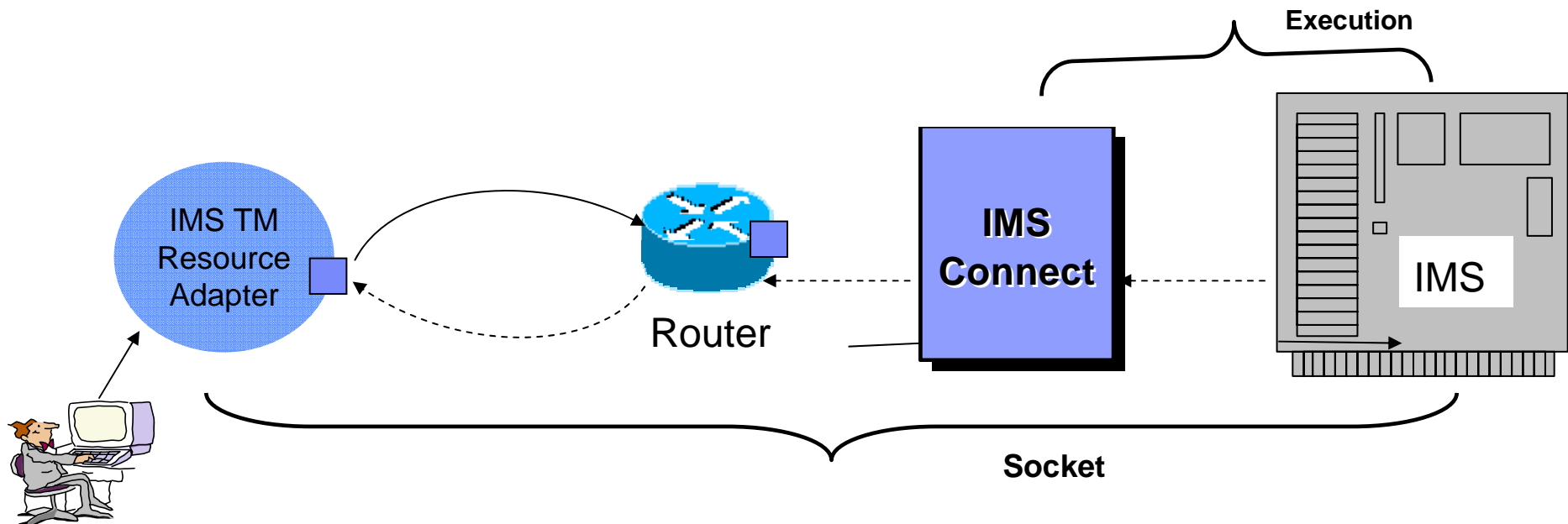
Timeout

Execution timeout

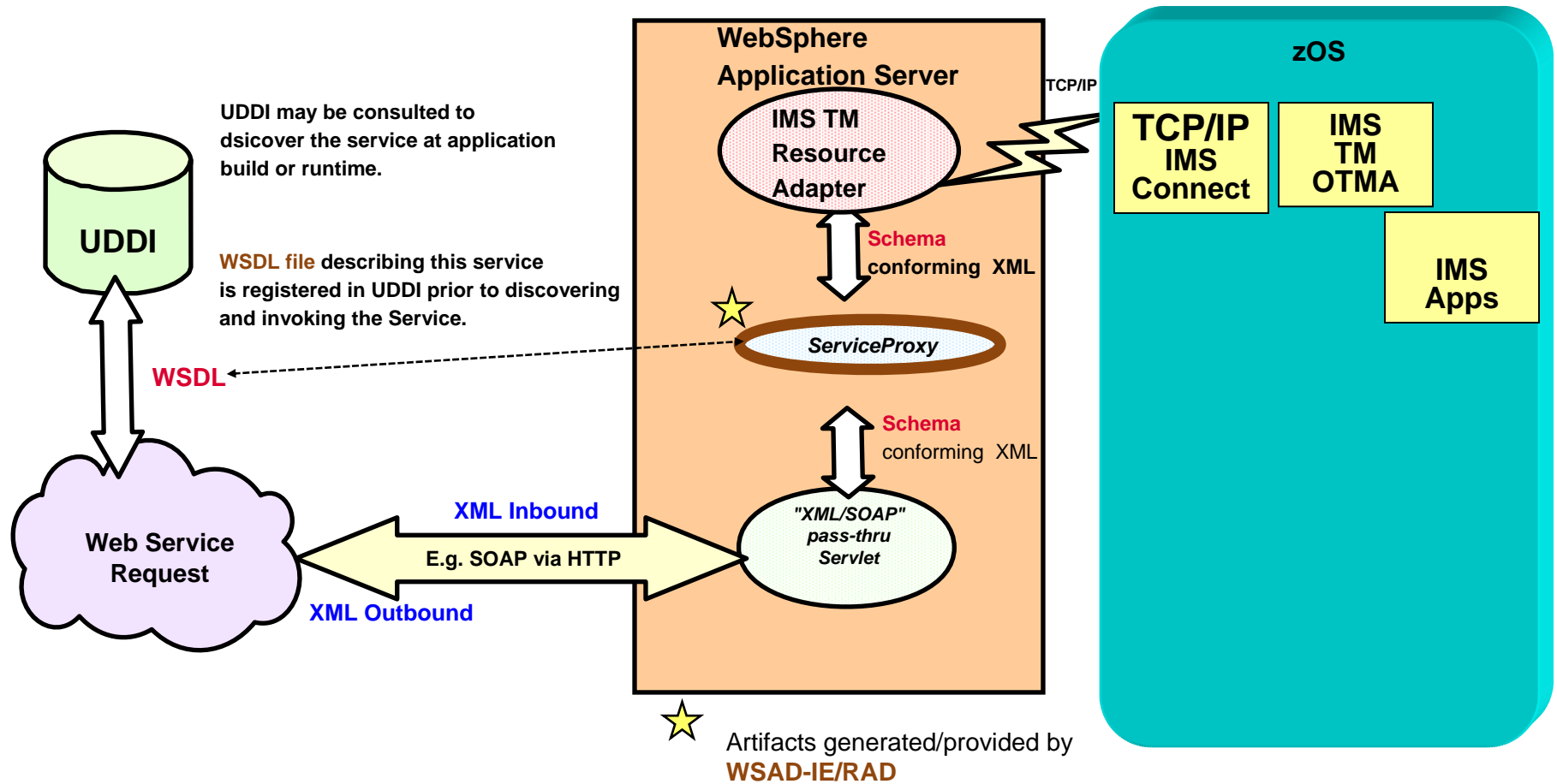
- Represents how long IMS Connect should wait for IMS to return the output of a transaction.
- IMS hangs
- Set per interaction.

Socket Timeout

- Represents how long IMS Resource adapter should wait for IMS Connect to return.
- Network problems
- Set per interaction.

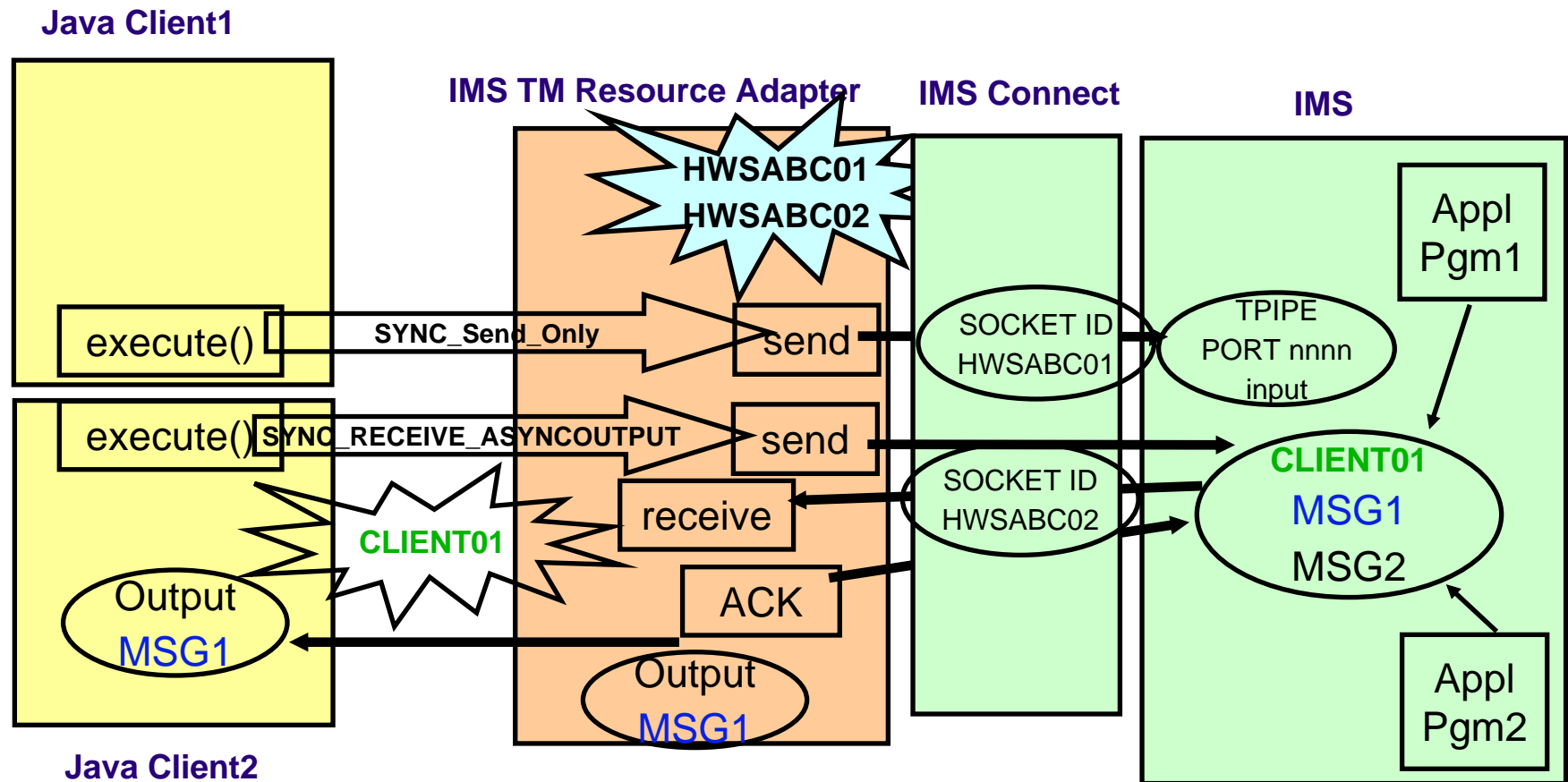


SOAP using IMS TM Resource Adapter



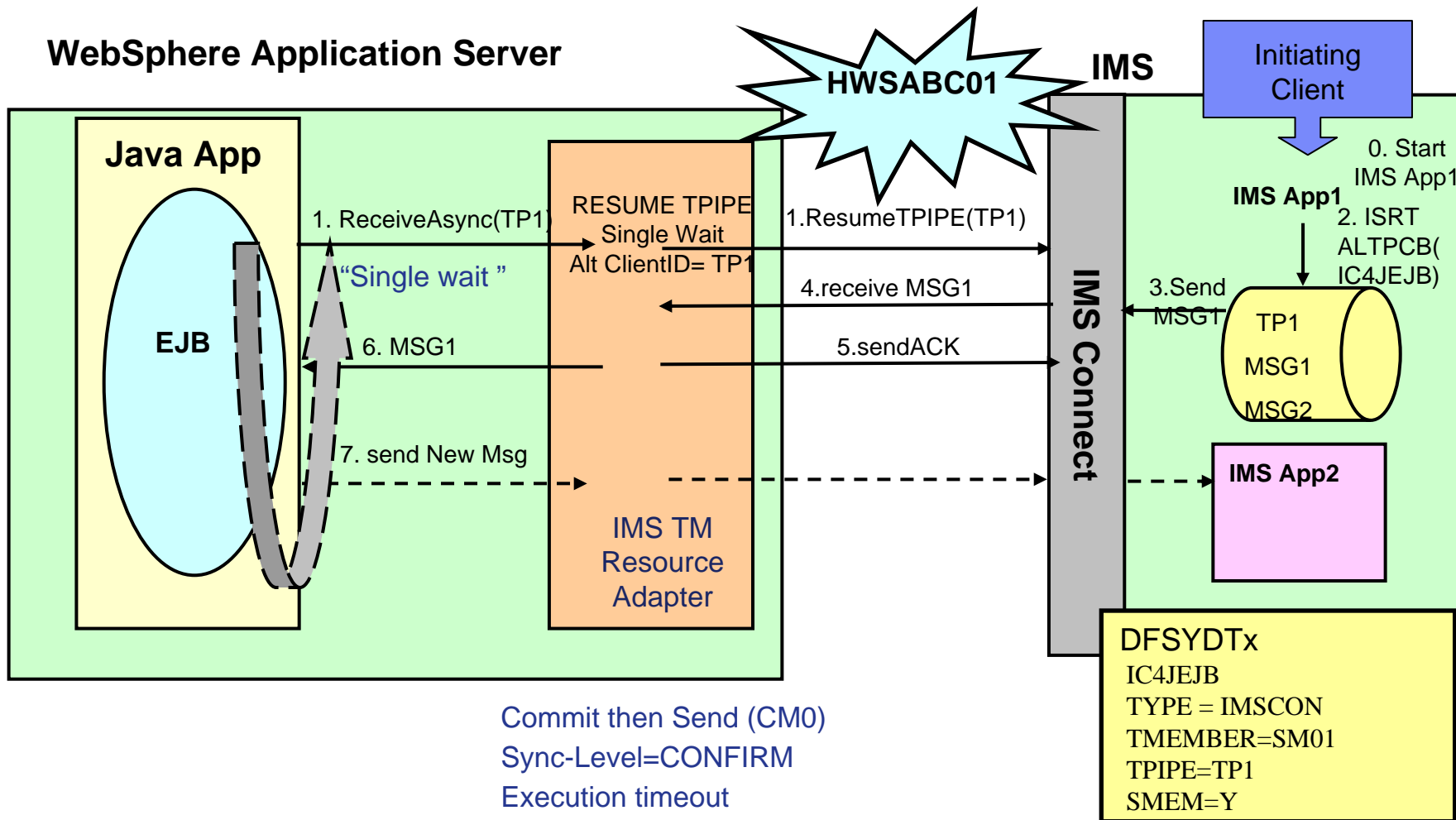
IMS TM Resource Adapter

- Retrieve output using alternate clientID



“Single wait ” and “Single no wait”

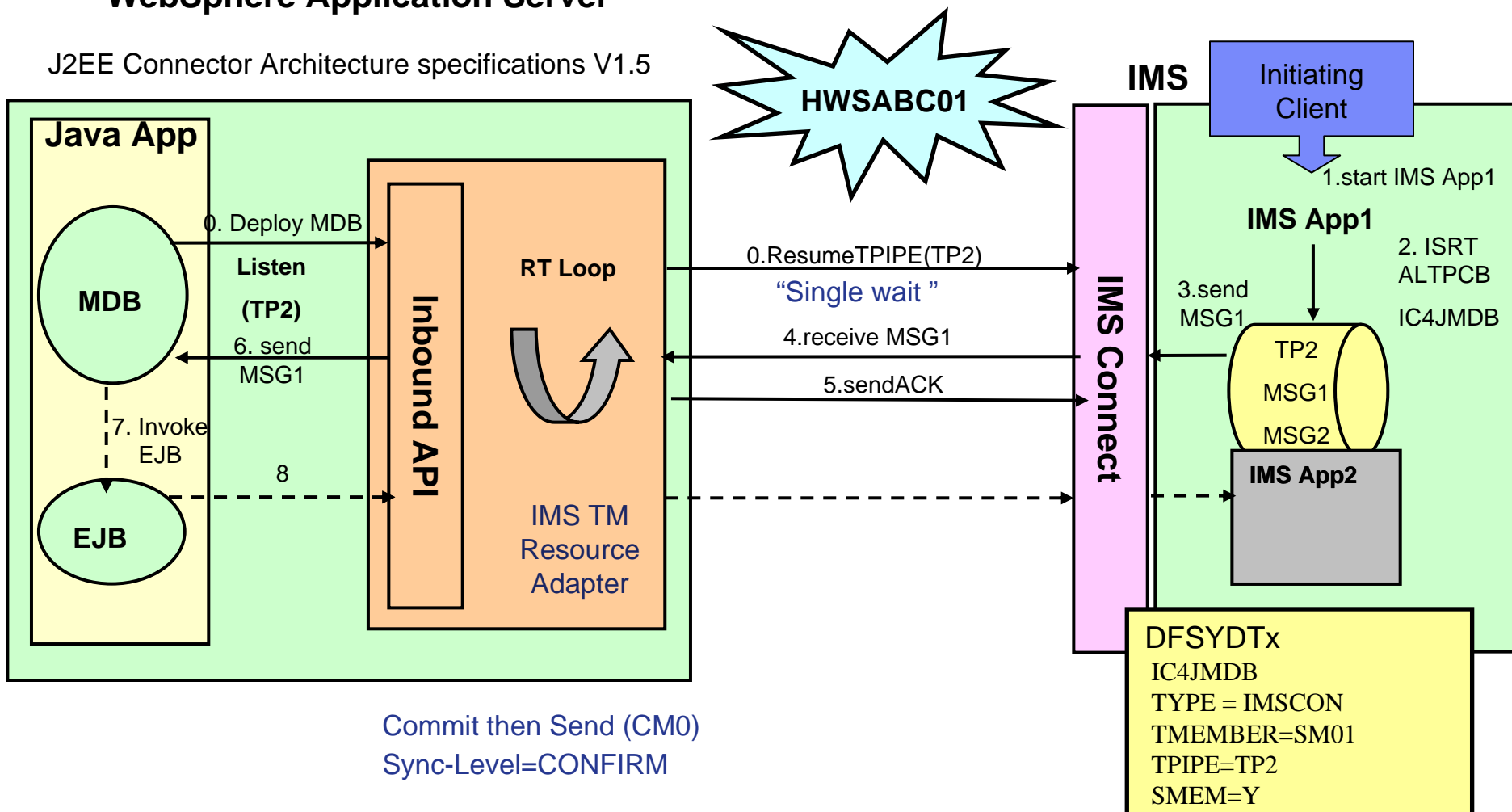
Asynchronous Callout to EJB



Asynchronous Callout to MDB

WebSphere Application Server

J2EE Connector Architecture specifications V1.5



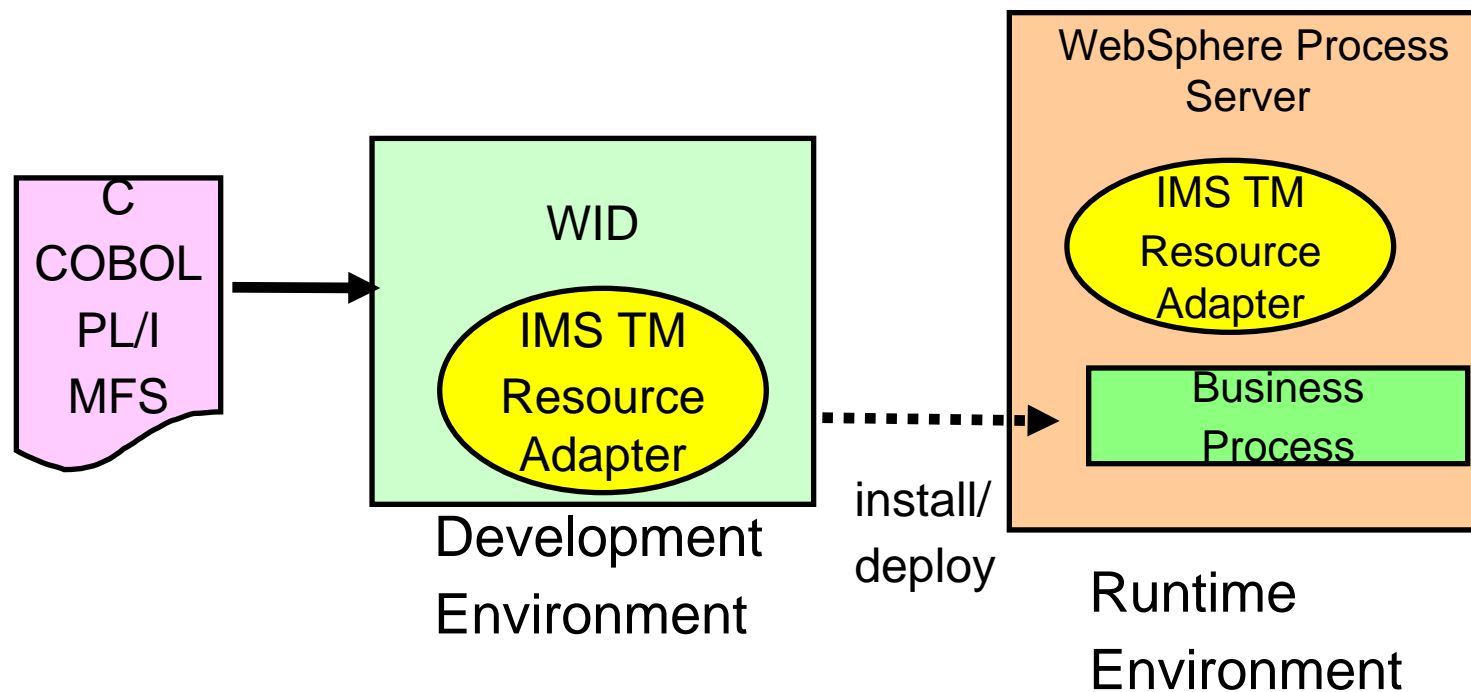
IMS TM Resource Adapter

- RACF Password Change
 - ◆ Provides ability to change RACF password using IMS TM Resource Adapter
- Implementation
 - ◆ IMS Connect V10 Client Password Change Request
- Benefits
 - ◆ Customers can now change their RACF password after expiration

```
LLLL | IRM | OTMA | LLZZ HWSPWCH old-password/new-password1/new-password2 | EOM
```

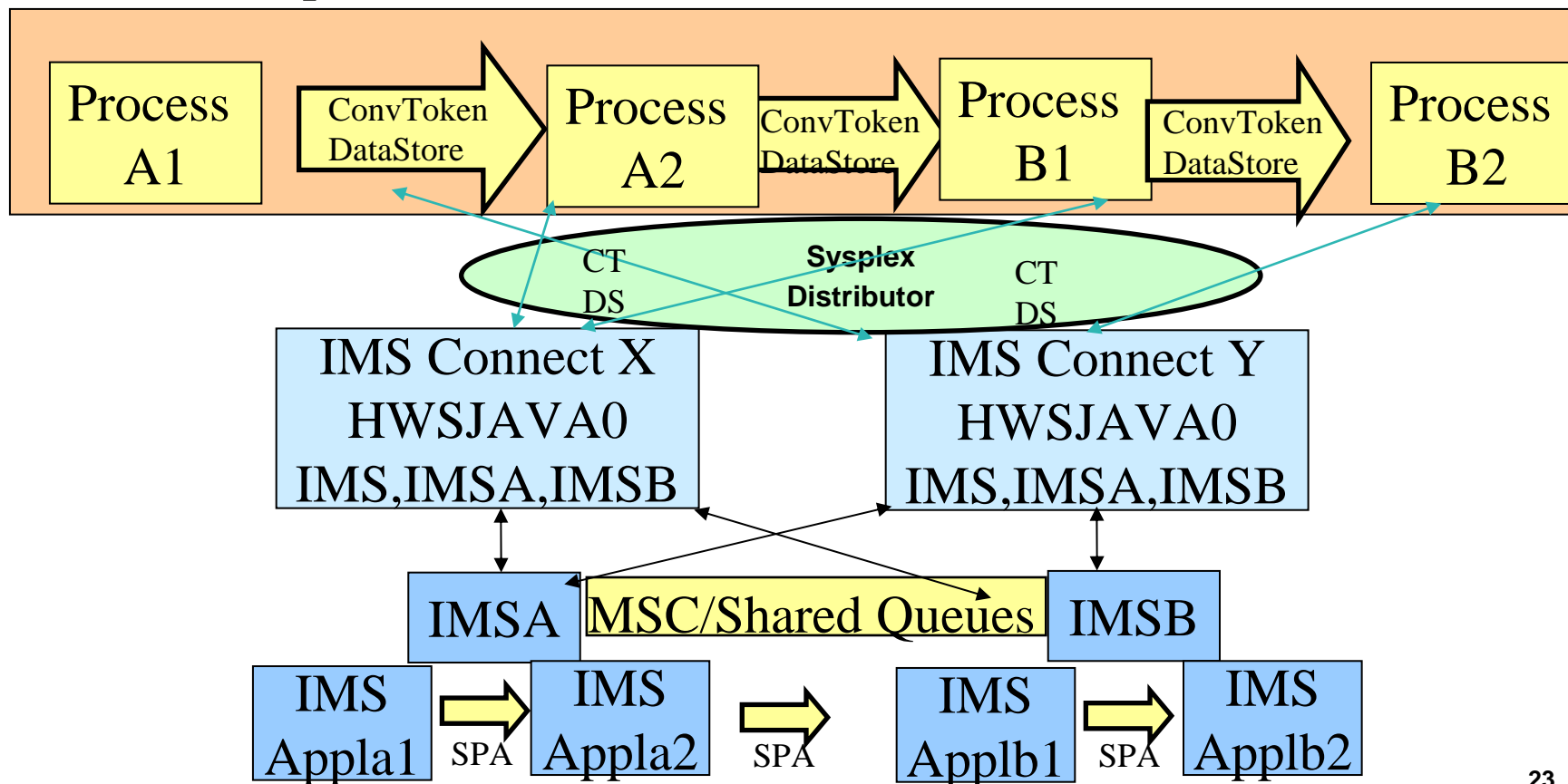
IMS TM Resource Adapter

- IMS SOA Composite Business Application support
 - ◆ Provides multi-connection IMS Conversational Transaction support
 - Only available to IMS TM Resource Adapter clients
 - Supports WebSphere Process Server Business Process Flows



IMS SOA Composite Business Application support

WebSphere Process Server



IMS SOAP Gateway

PID number: 5655-R04

SOAP

• What is SOAP?

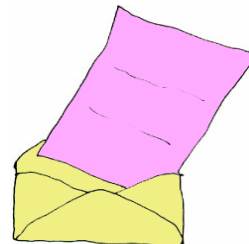
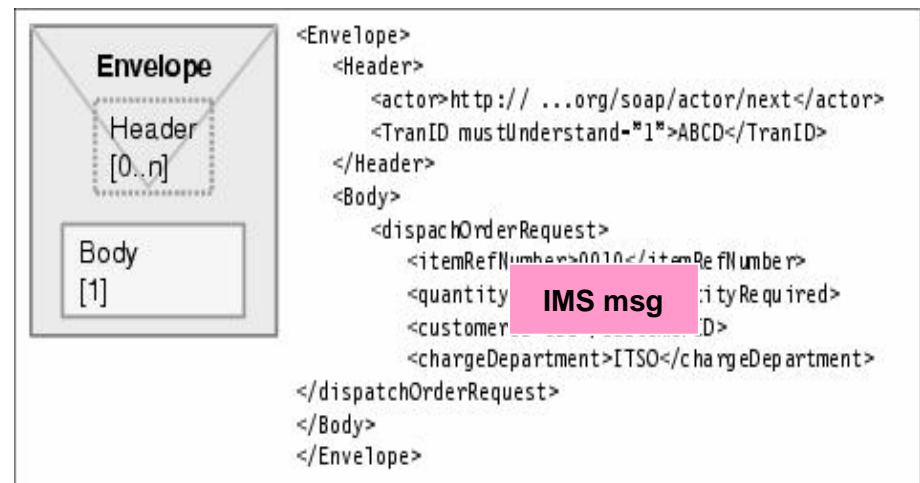
- ◆ An XML-based protocol for exchange of information
- ◆ Not tied to any operating system, transport protocol, programming language, or component technology
 - Most commonly run over HTTP
- ◆ Based on an open standard to facilitate interoperability

A SOAP message consists of an **ENVELOPE** that contains an arbitrary number of headers and one body that carries the payload (application message)

- The **Header** tells *who* must deal with the message and *how* to deal with it.
- The **Body** tells *what* has to be done: e.g. The application message

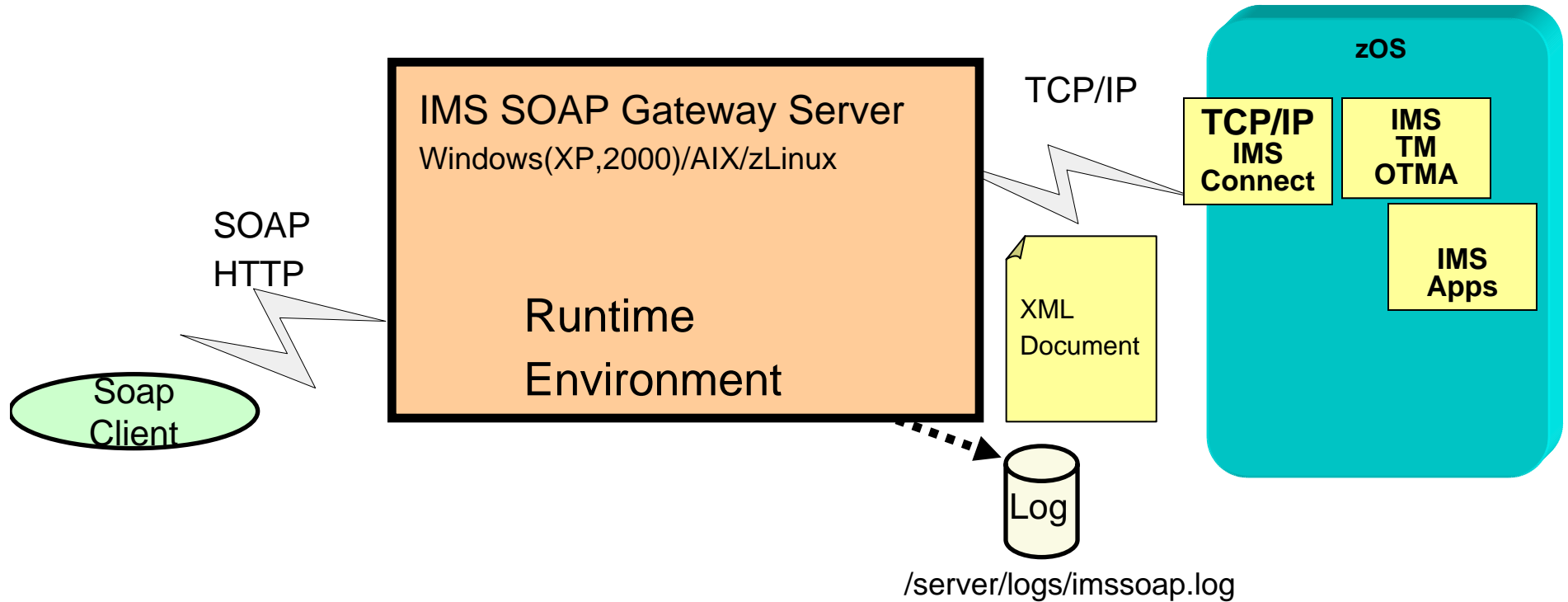


SOAP is a protocol to access a Web Service



IMS SOAP Gateway overview

Enables IMS applications to inter-operate outside of the IMS environment using SOAP protocols



IMS SOAP Gateway Deployment Utility

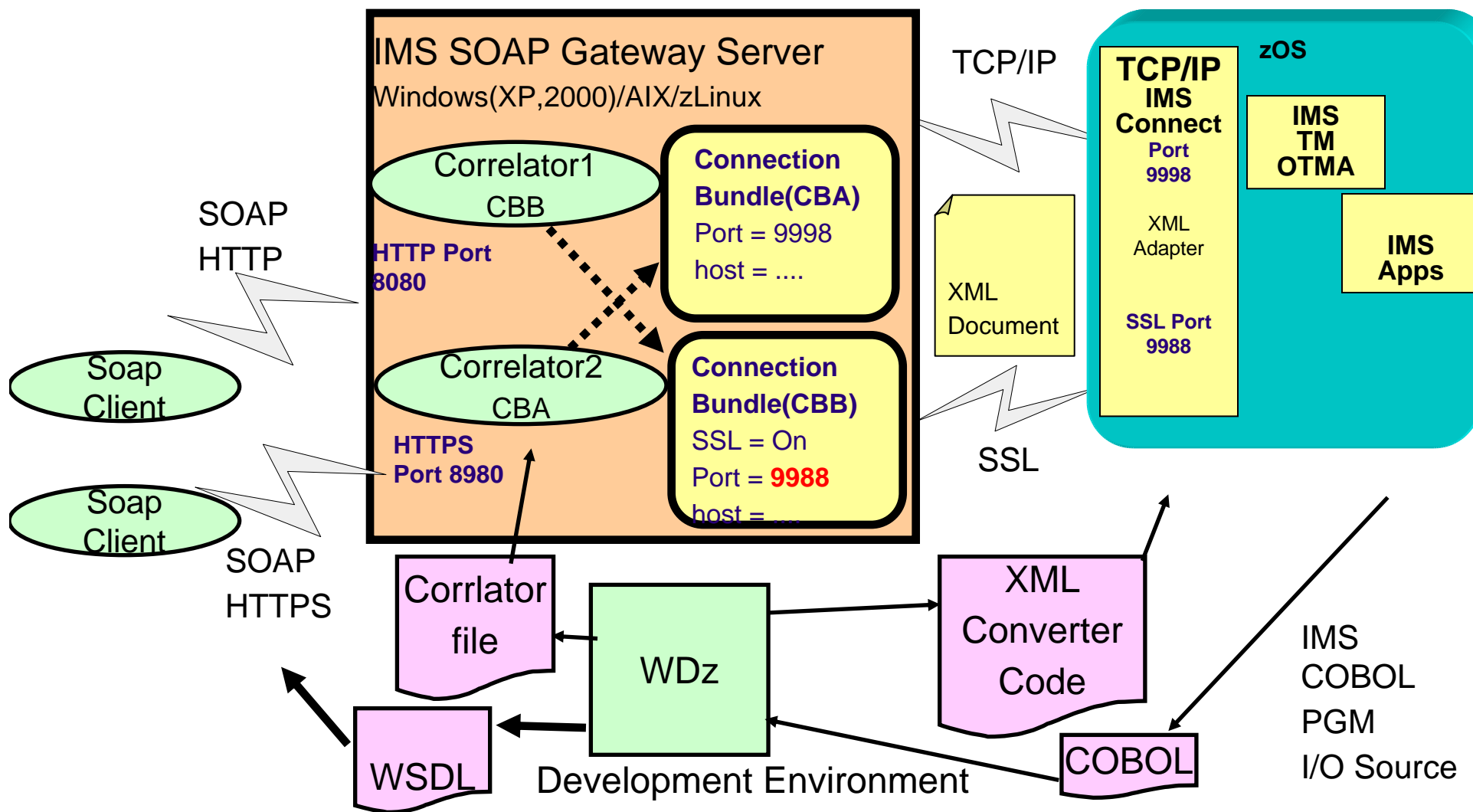
- The Deployment Utility has the following Options.

```
=====
Enable your IMS application as a Web Service :
  Task 1: Enable your IMS application as a Web Service from start to finish

Administrative tasks :
  Task 2: Start IMS SOAP Gateway
  Task 3: Stop IMS SOAP Gateway
  Task 4: Update IMS SOAP Gateway properties
  Task 5: Create, Update or View correlator properties for Web Service
  Task 6: Create, Update, Delete or View connection bundle
  Task 7: Deploy the WSDL file
  Task 8: Generate Java client code
  Task 9: Undeploy Web Service
  Task 10: Exit deployment utility

=====
> Enter your selection here:
```

IMS SOAP Gateway V9.2.1



IMS SOAP Gateway V9.2.1

•Server Properties

- ◆ Trace Level 1-5
- ◆ Log file /server/logs/imssoap.log
- ◆ HTTP port number
- ◆ HTTPs port number V9.2
- ◆ HTTPs keystore name V9.2
- ◆ HTTPs keystore password V9.2

• Connection Bundle file

- ◆ Connection Bundle Name
- ◆ IMS Connect hostname
- ◆ IMS Connect port number
- ◆ IMS Datastore ID
- ◆ User ID
- ◆ Password
- ◆ Groupname
- ◆ SSL Keystore name V9.2
- ◆ SSL Keystore password V9.2
- ◆ SSL Truststore name V9.2
- ◆ SSL Truststore password V9.2
- ◆ SSL Encryption level V9.2

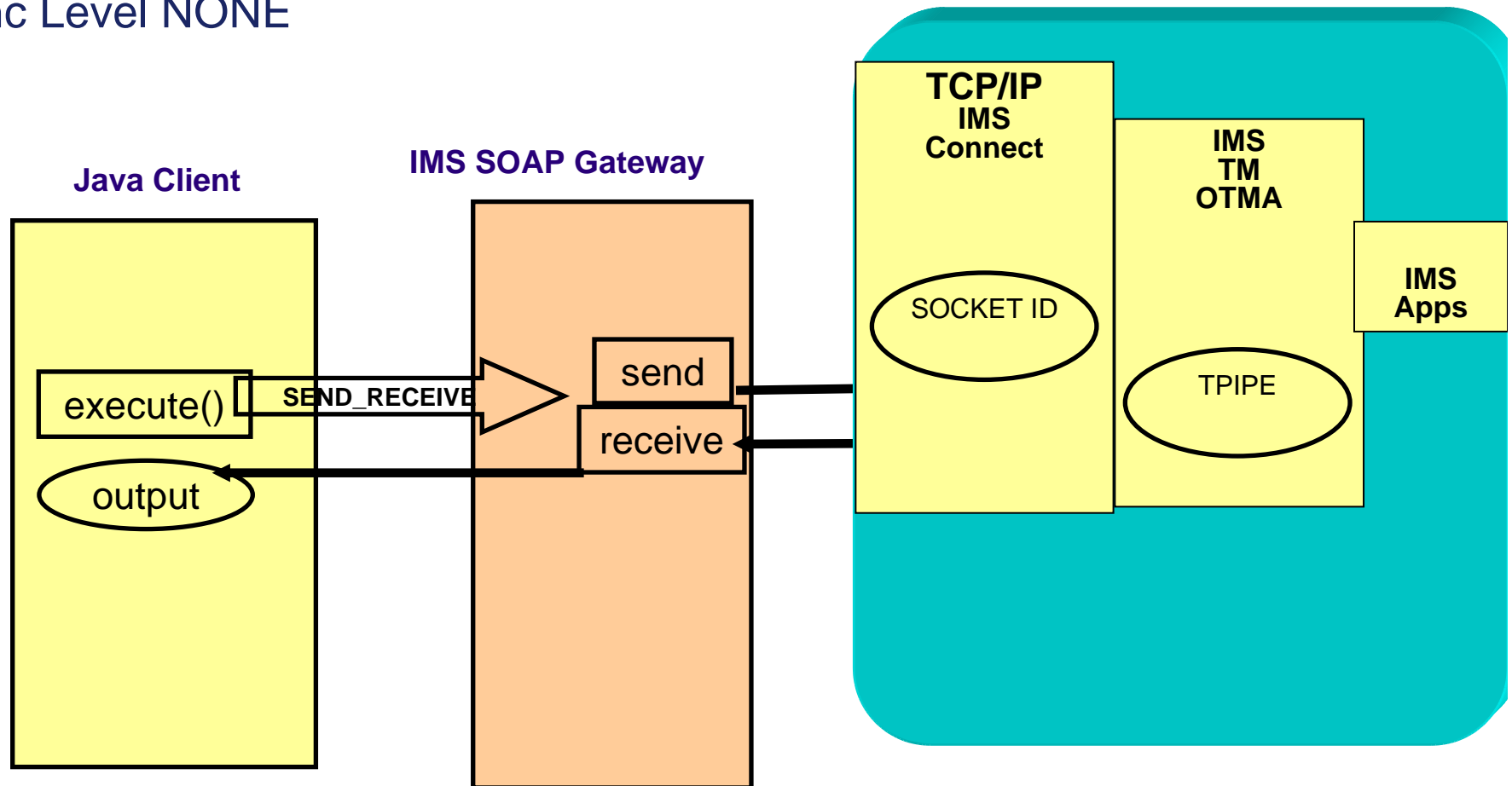
•Correlator File

- ◆ Connection bundle name
- ◆ Socket Timeout
- ◆ Execution Timeout
- ◆ Lterm name
- ◆ IMS transaction code
- ◆ Program Name V 9.2
- ◆ XML Adapter type V 9.2

IMS SOAP Gateway - Connectivity

Commit Mode 1

Sync Level NONE



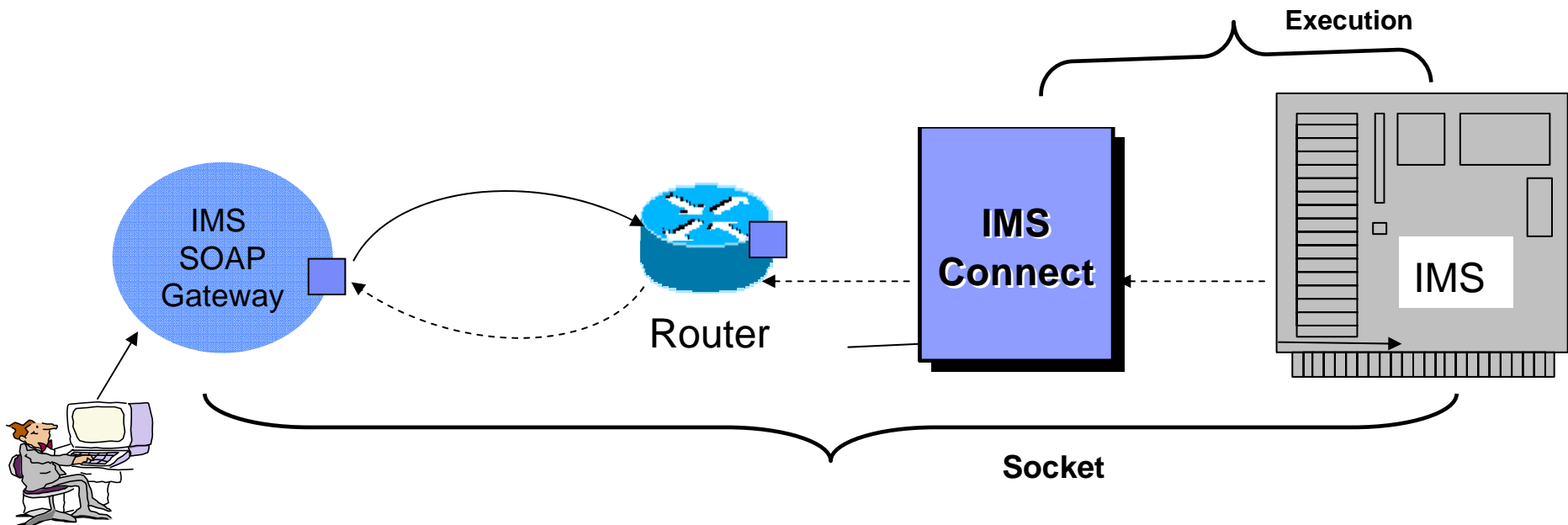
Timeout

Execution timeout

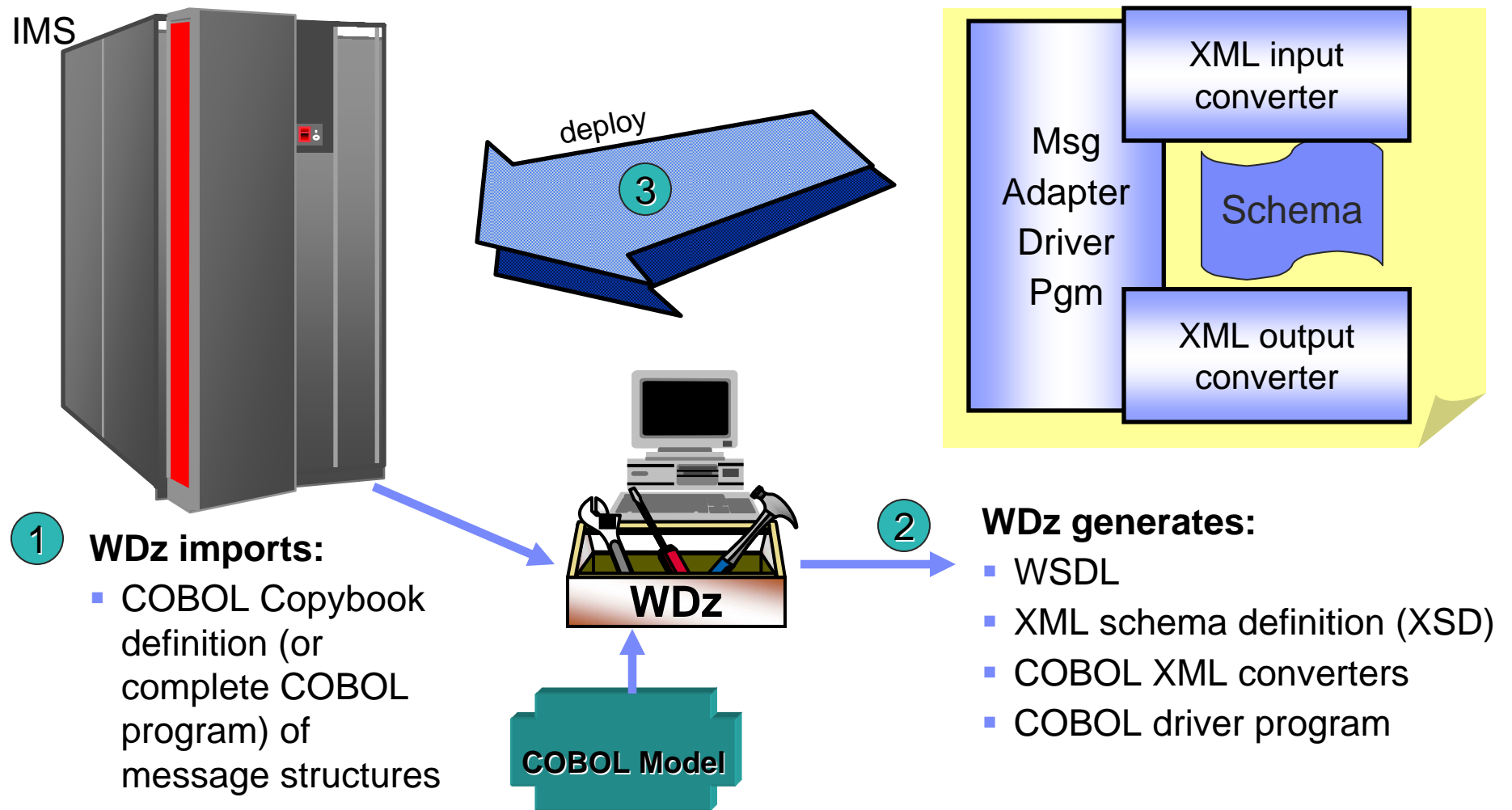
- Represents how long IMS Connect should wait for IMS to return the output of a transaction.
- IMS hangs
- Set per interaction.

Socket Timeout

- Represents how long IMS Resource adapter should wait for IMS Connect to return.
- Network problems
- Set per interaction.



WebSphere® Developer for zSeries®



XML Message based on IMS COBOL Data Structure

```
<?xml version="1.0" encoding="UTF-8"?>
.....
<element name="in_name1">
  <simpleType>
    <restriction base="string">
      <maxLength
        value="10"/>
    </restriction>
  </simpleType>
</element>
```

```
01 INPUT-MSG.
02 IN-LL      32          ( 2 bytes)
02 IN-ZZ      0          ( 2 bytes)
02 IN-TRCD    IVTNObbbb (10 bytes)
02 IN-CMD     DISPLAYb  ( 8 bytes)
02 IN-NAME1   LAST1bbbb (10 bytes)
```

b = blank

```
<?xml version="1.0" encoding="UTF-8"?>
.....
<element name="out_name1">
  <simpleType>
    <restriction base="string">
      <maxLength
        value="10"/>
    </restriction>
  </simpleType>
</element>
```

```
01 OUTPUT-MSG.
02 OUT-LL     PICTURE S9(3).
02 OUT-ZZ     PICTURE S9(3).
02 OUT-NAME1  PICTURE X(10).
02 OUT-NAME2  PICTURE X(10).
02 OUT-EXTN   PICTURE X(10).
02 OUT-ZIP    PICTURE X(7).
```

WebSphere® Developer for zSeries® – COBOL importer

The screenshot displays the IBM Rational Software Development Platform interface for editing a COBOL program. The main editor window shows the following code:

```

Line 29      Column 1      Insert
-----*A-1-B-----2-----3-----4-----5-----6-----7--|--8
*****
01 INPUT-MSG.
02 IN-LL      PICTURE S9(3) COMP.
02 IN-ZZ      PICTURE S9(3) COMP.
02 IN-TRCD    PICTURE X(10) .
02 IN-CMD     PICTURE X(8) .
02 IN-NAME1   PICTURE X(10) .
02 IN-NAME2   PICTURE X(10) .
02 IN-EXTN    PICTURE X(10) .
02 IN-ZIP     PICTURE X(7) .

01 OUTPUT-MSG.
02 OUT-LL     PICTURE S9(3) COMP VALUE +0.
02 OUT-ZZ     PICTURE S9(3) COMP VALUE +0.
02 OUT-MSG    PICTURE X(40) VALUE SPACES.
02 OUT-CMD    PICTURE X(8) VALUE SPACES.
02 OUT-NAME1  PICTURE X(10) VALUE SPACES.
02 OUT-NAME2  PICTURE X(10) VALUE SPACES.
02 OUT-EXTN   PICTURE X(10) VALUE SPACES.
02 OUT-ZIP    PICTURE X(7) VALUE SPACES.
02 OUT-SEGNO  PICTURE X(4) VALUE SPACES.
    
```

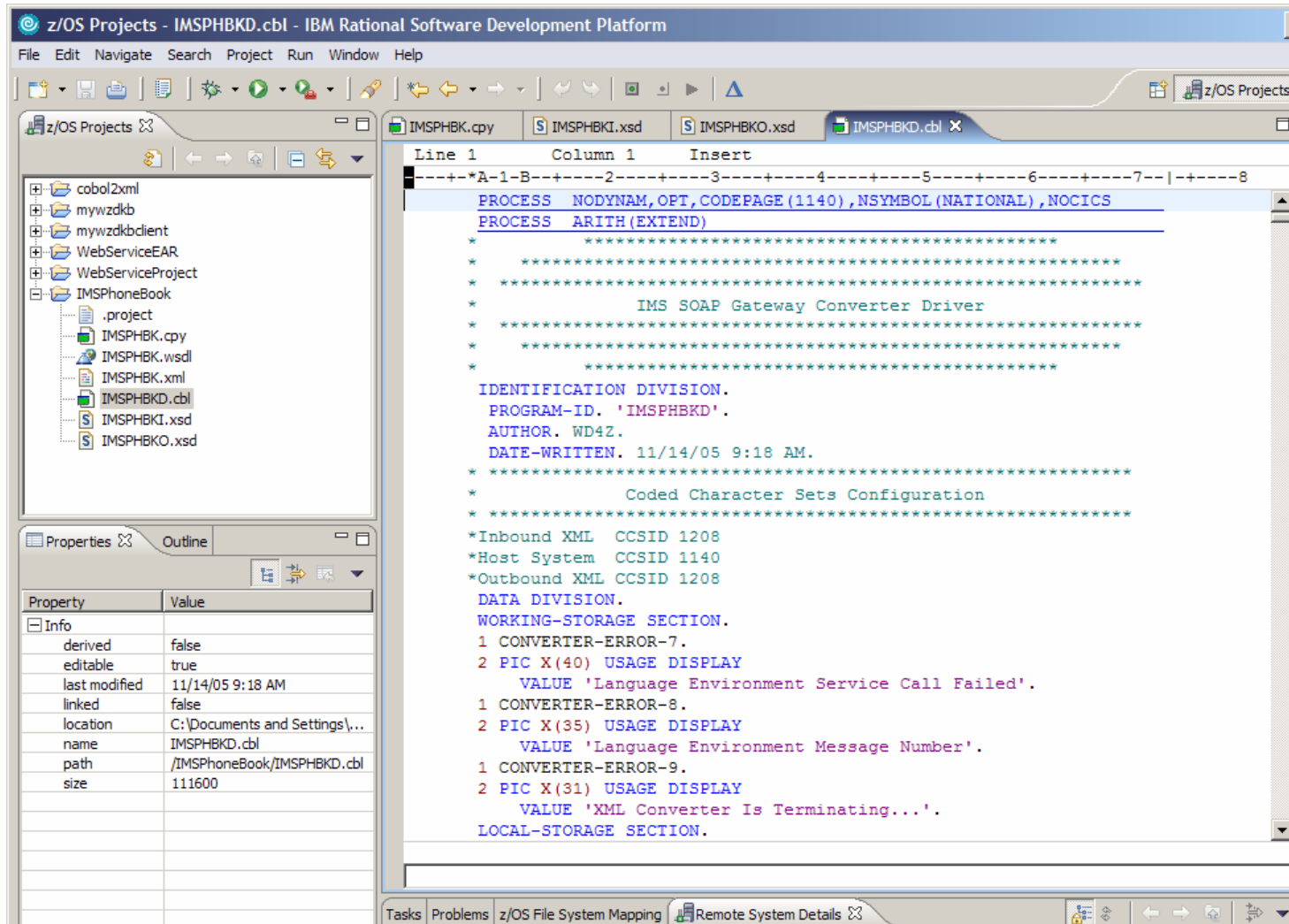
The left-hand pane shows a project tree with the following structure:

- z/OS Projects
 - cobol2xml
 - mywzdkb
 - mywzdkbclient
 - WebServiceEAR
 - WebServiceProject
 - IMSPhoneBook
 - .project
 - IMSPHBK.cpy

The bottom pane shows the Properties window for the selected file, IMSPHBK.cpy:

Property	Value
Info	
derived	false
editable	true
last modified	11/14/05 7:15 AM
linked	false
location	C:\Documents and Settings\...
name	IMSPHBK.cpy
path	/IMSPhoneBook/IMSPHBK.cpy
size	3059

WebSphere® Developer for zSeries® – COBOL Generated Converter Code



WebSphere® Developer for zSeries® – Generated XML

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:cbl="http://www.IMSPHBKI."
<complexType name="INPUTMSG">
  <sequence>
    <element name="in_11">
      <simpleType>
        <restriction base="short">
          <minInclusive value="-999"/>
          <maxInclusive value="999"/>
        </restriction>
      </simpleType>
    </element>
    <element name="in_zz">
      <simpleType>
        <restriction base="short">
          <minInclusive value="-999"/>
          <maxInclusive value="999"/>
        </restriction>
      </simpleType>
    </element>
    <element name="in_trod">
      <annotation>
        <appinfo source="http://www.wsadie.com/appinfo">
          <initialValue kind="SPACE"/>
        </appinfo>
      </annotation>
      <simpleType>
        <restriction base="string">
          <maxLength value="10"/>
        </restriction>
      </simpleType>
    </element>
  </sequence>
</complexType>

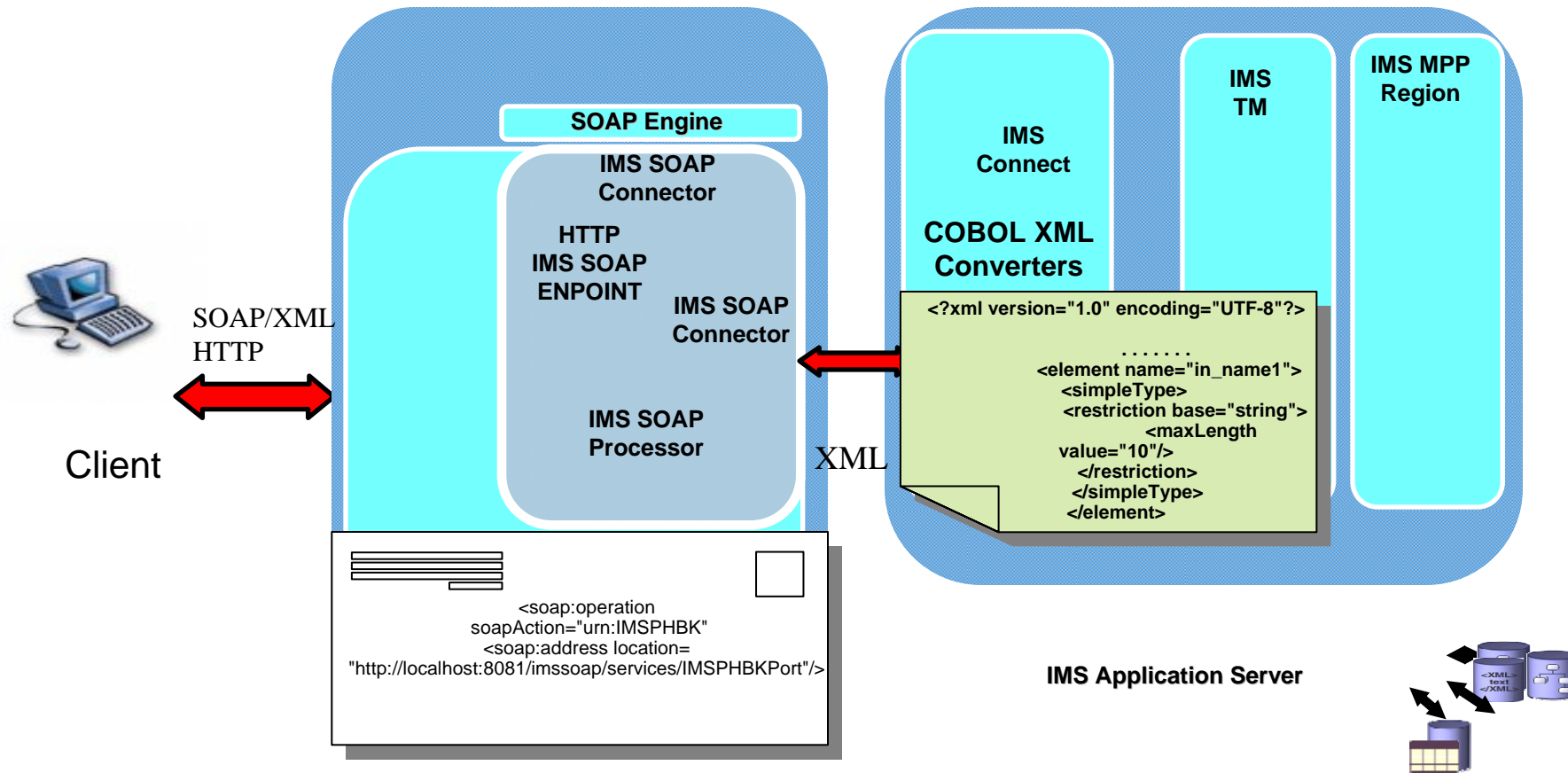
```

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:cbl="http://www.IMSPHBKI."
<complexType name="OUTPUTMSG">
  <sequence>
    <element name="out_11">
      <simpleType>
        <restriction base="short">
          <minInclusive value="-999"/>
          <maxInclusive value="999"/>
        </restriction>
      </simpleType>
    </element>
    <element name="out_zz">
      <simpleType>
        <restriction base="short">
          <minInclusive value="-999"/>
          <maxInclusive value="999"/>
        </restriction>
      </simpleType>
    </element>
    <element name="out_msg">
      <annotation>
        <appinfo source="http://www.wsadie.com/appinfo">
          <initialValue kind="SPACE"/>
        </appinfo>
      </annotation>
      <simpleType>
        <restriction base="string">
          <maxLength value="40"/>
        </restriction>
      </simpleType>
    </element>
  </sequence>
</complexType>

```

IMS CONNECT COBOL XML



WebSphere® Developer for zSeries® – IMS COBOL Program Modifications

z/OS Projects - dfsivpxml.cbl - IBM Rational Software Development Platform

File Edit Navigate Search Project Run Window Help

*dfsivpxml.cbl X

Line 245 Column 3 Replace 76 changes

```

-----*A-1-B-----2-----3-----4-----5-----6-----7-----8
* CHANGE                IMS XML Conversion Service Interface
*****
1 IO-INT-SWITCH          PIC X.
1 INPUT-INT-LEN          PIC 9(9)  BINARY.
1 INPUT-INT              PIC X(16777210).
1 OUTPUT-INT-LEN         PIC 9(9)  BINARY.
1 OUTPUT-INT            PIC X(16777210).
1 CONVERTER-INT-RC      PIC S9(9)  BINARY.

PROCEDURE DIVISION USING IOPCB, ALTPCB, DBPCB.

MAIN-RTN.

        CALL 'CBLTDLI' USING GET-UNIQUE, IOPCB, INPUT-INT

INPUT-XML
        MOVE 'I' TO IO-INT-SWITCH
        CALL 'IMSPHBD'
            USING IO-INT-SWITCH INPUT-INT-LEN INPUT-INT
            INPUT-MSG CONVERTER-INT-RC

        IF CONVERTER-INT-RC NOT EQUAL ZERO

OUTPUT-XML
        MOVE 'O' TO IO-INT-SWITCH
        CALL 'IMSPHBD'
            USING IO-INT-SWITCH OUTPUT-INT-LEN OUTPUT-MSG
            OUTPUT-INT CONVERTER-INT-RC

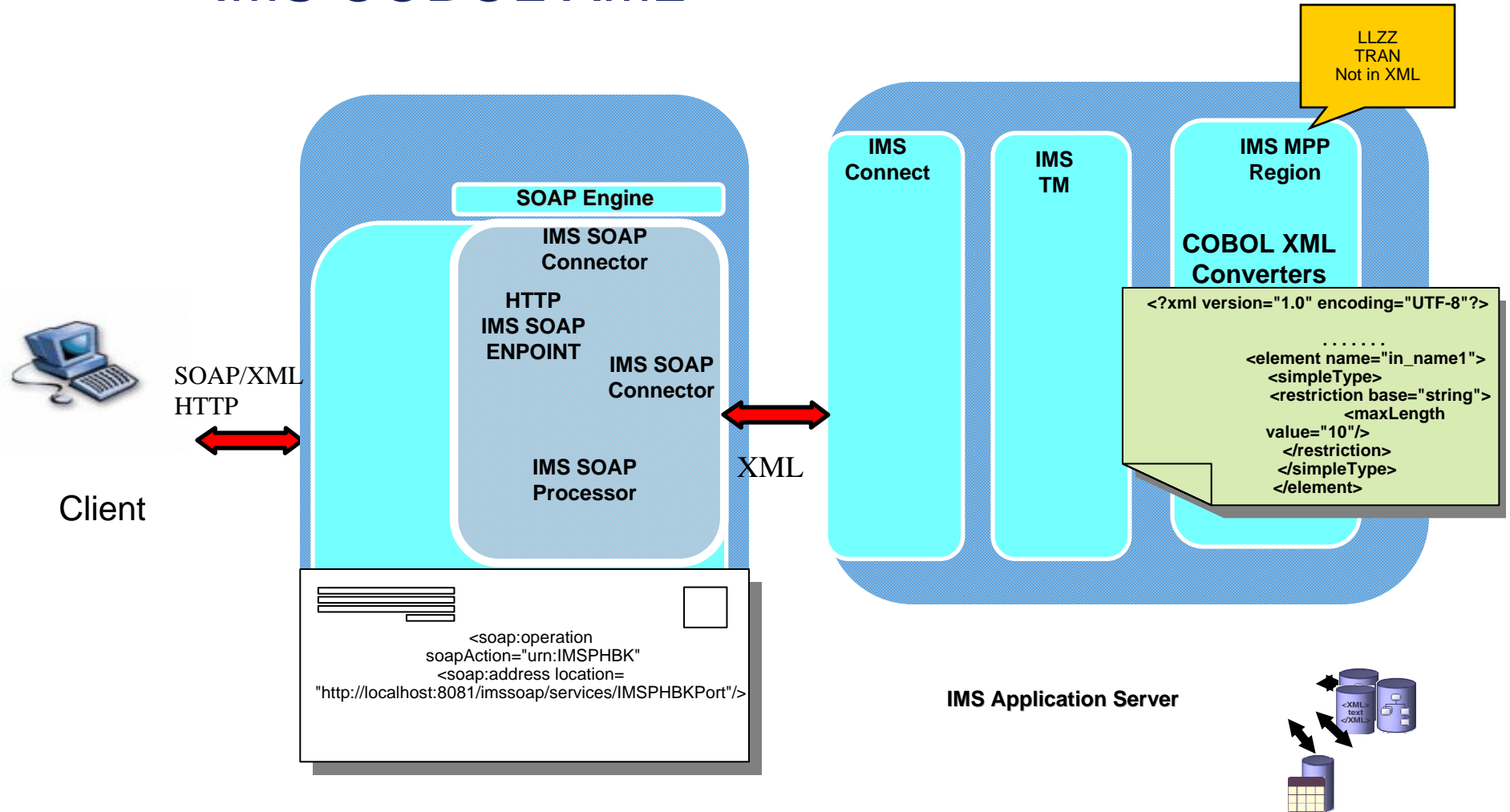
        IF CONVERTER-INT-RC NOT EQUAL ZERO
        CALL 'CBLTDLI' USING ISRT, IOPCB, OUTPUT-INT
    
```

XML Input Output Areas

Call Converter Driver

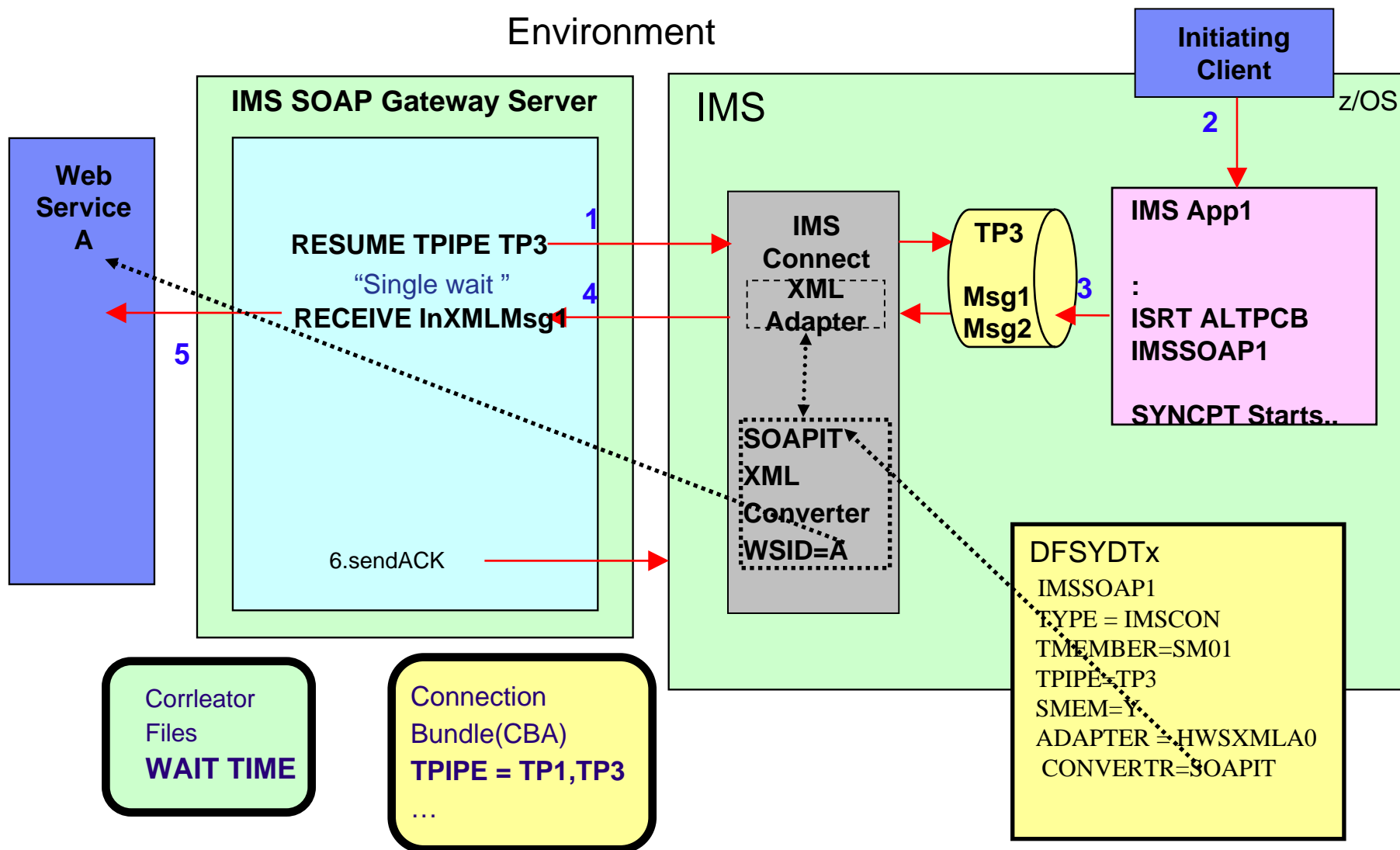
z/OS File System Mapping Remote System Details

IMS COBOL XML



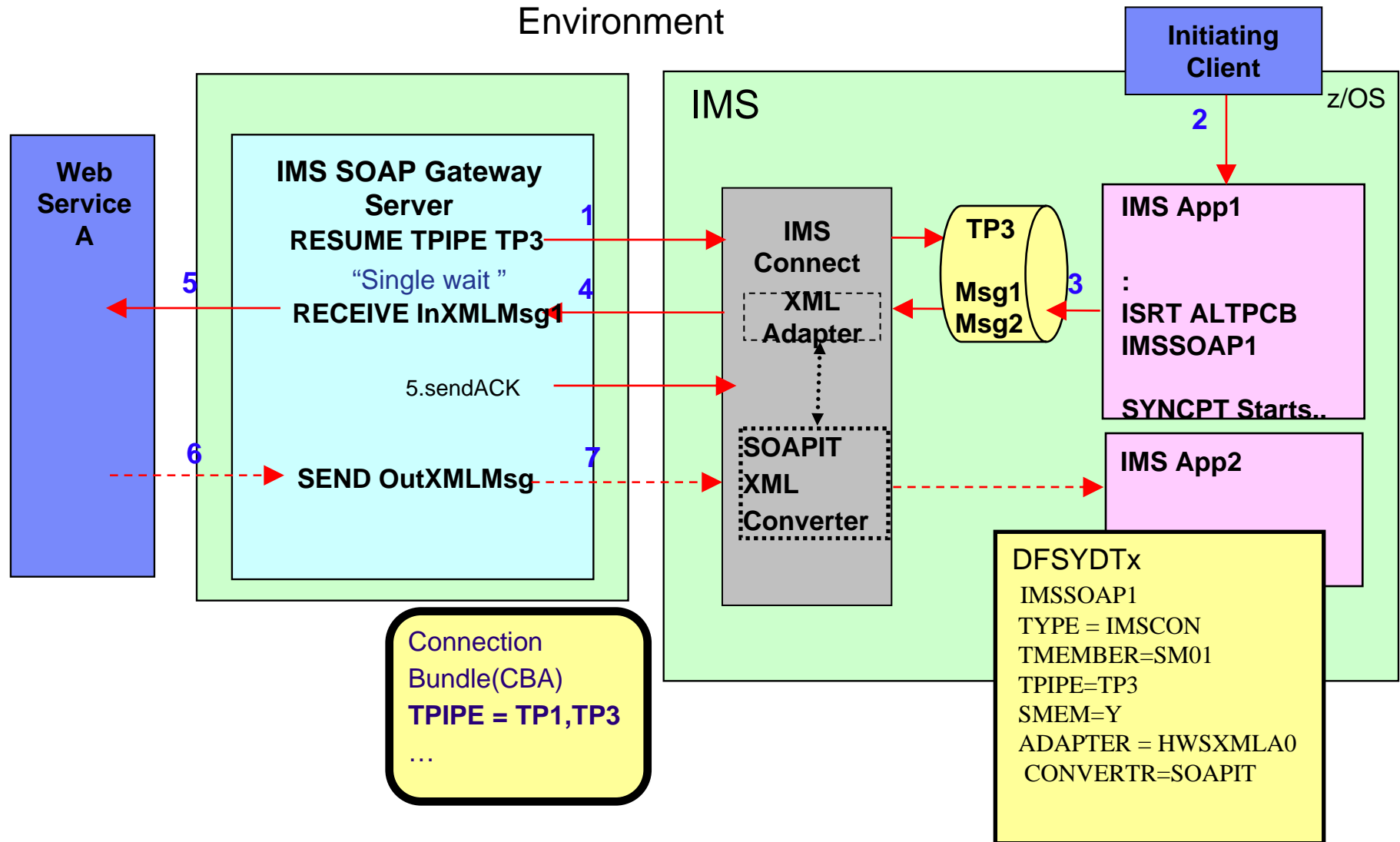
Asynchronous Callout to Web Service with XML Adapter

Runtime Environment

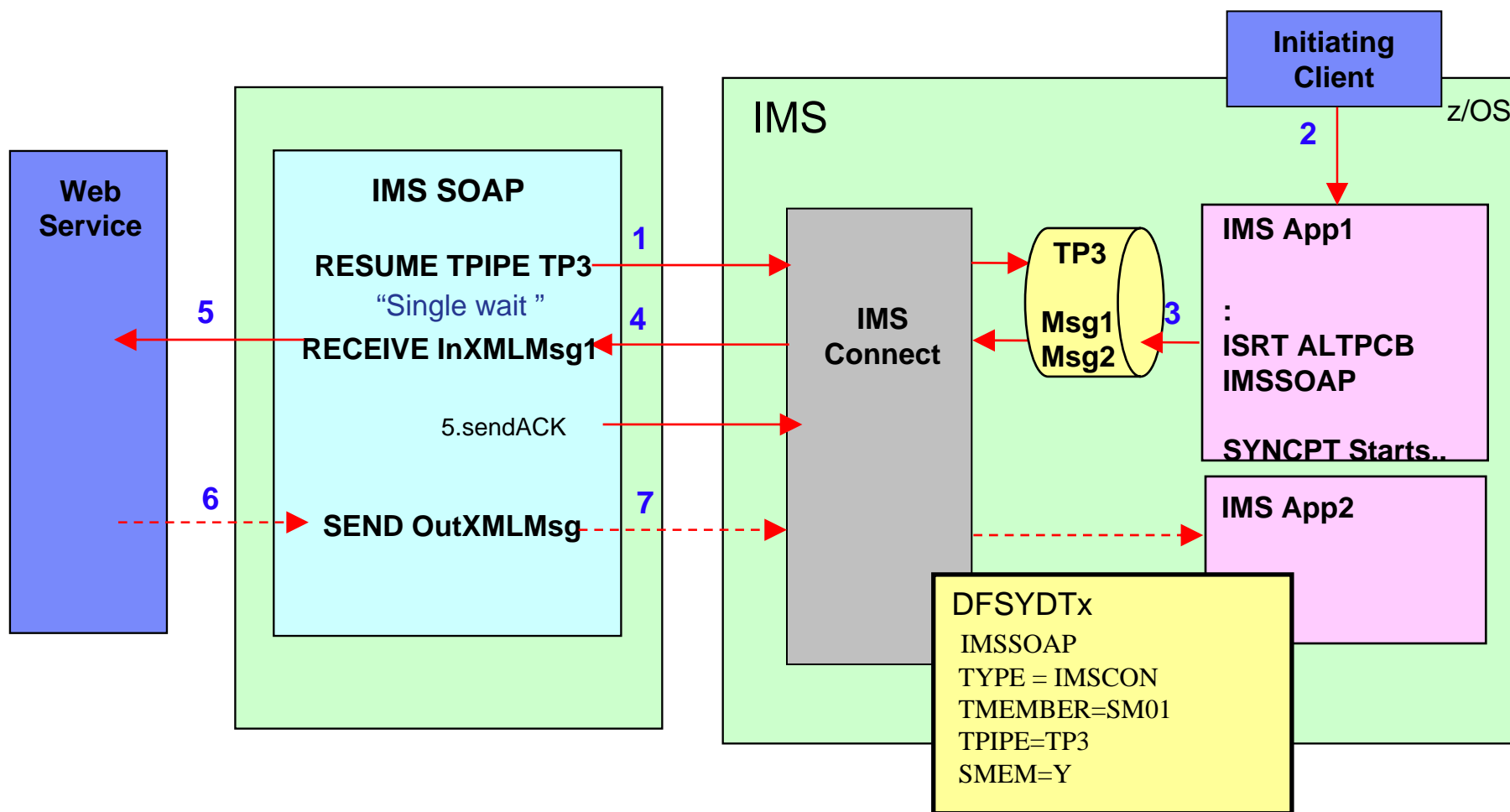


Asynchronous Callout to Web Service with XML Adapter with a response

Runtime Environment

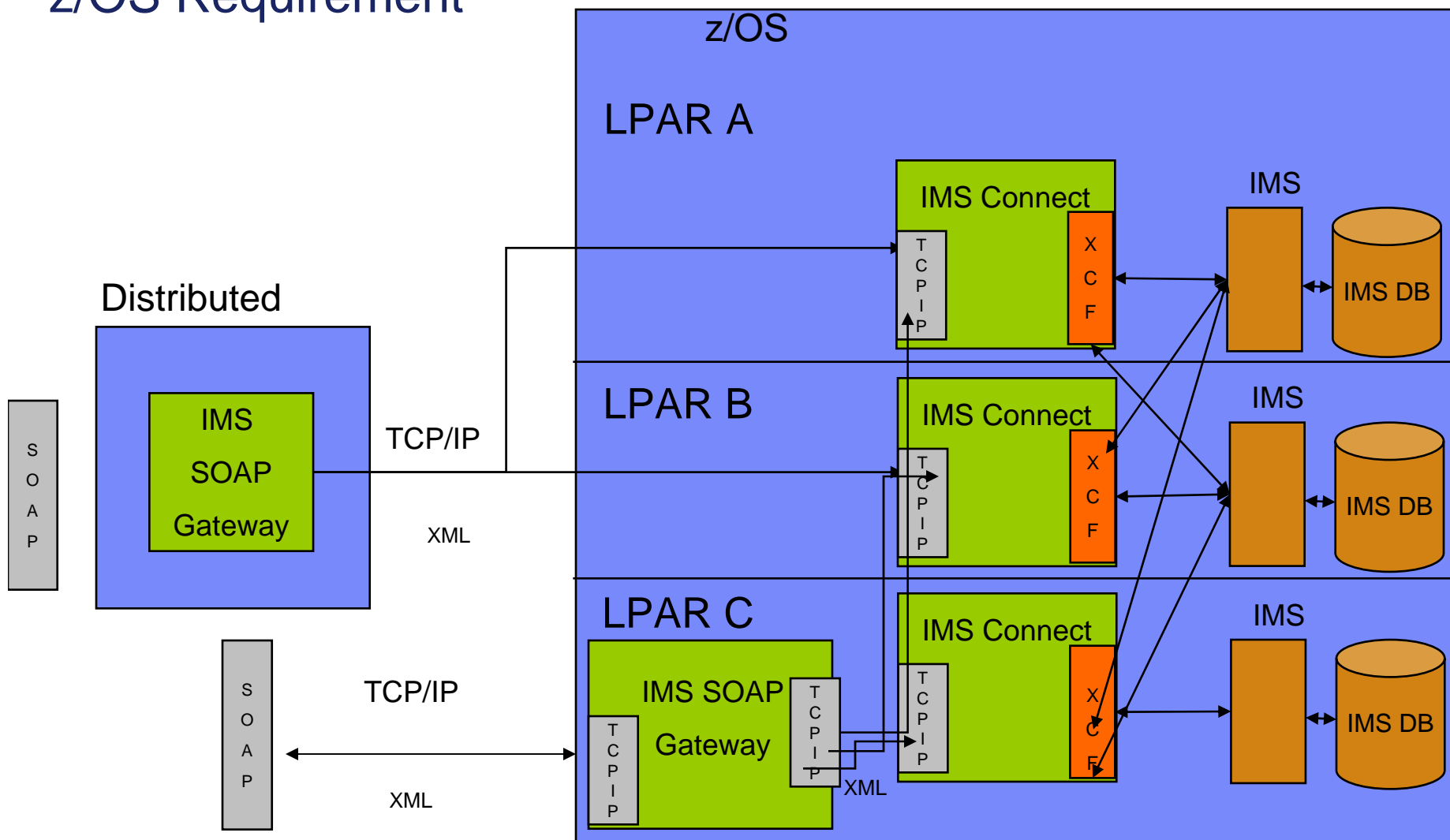


Asynchronous Callout to Web Service without XML Adapter



Note: IMS application needs to create XML data stream

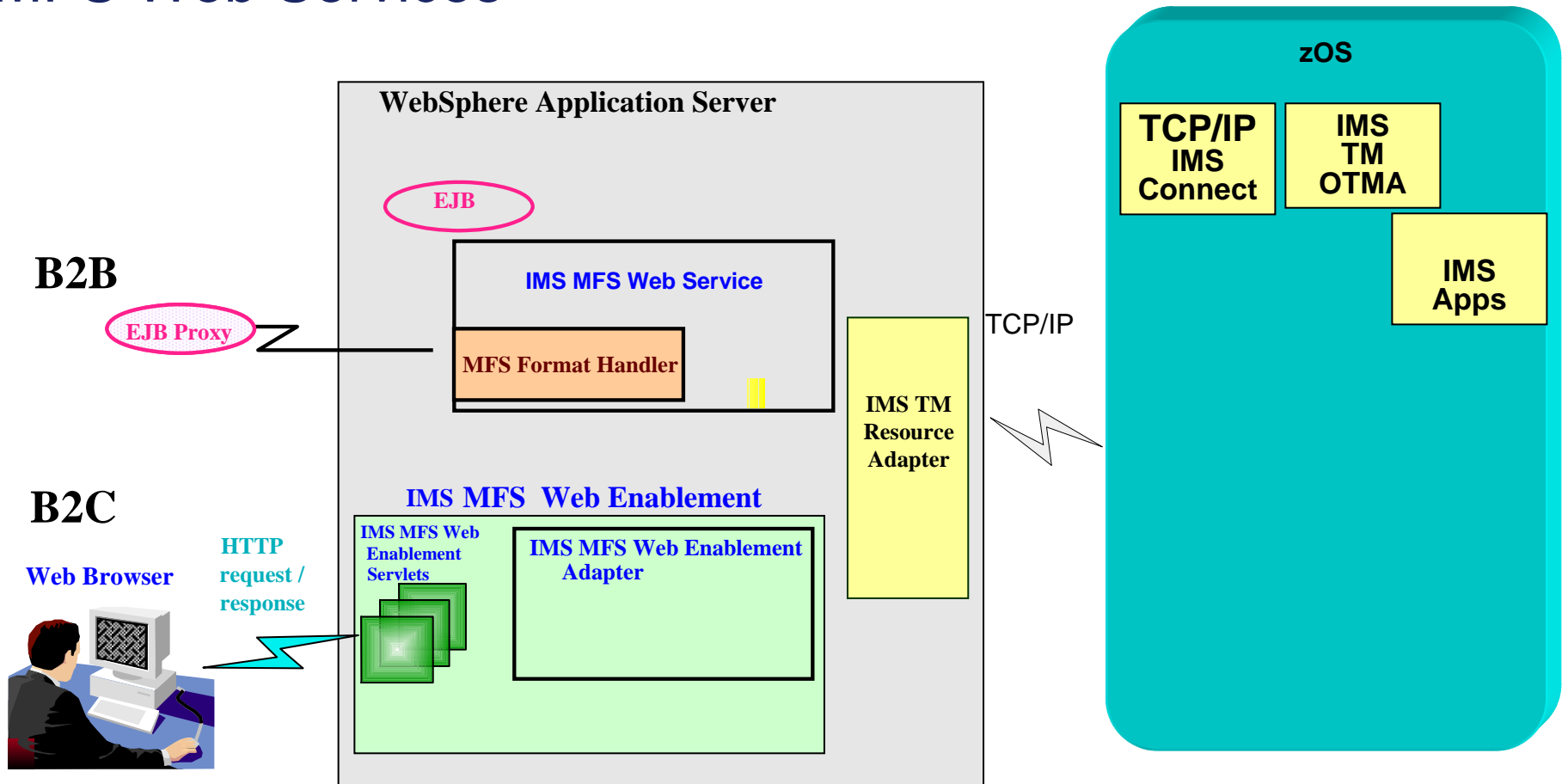
IMS SOAP Gateway runtimes z/OS Requirement



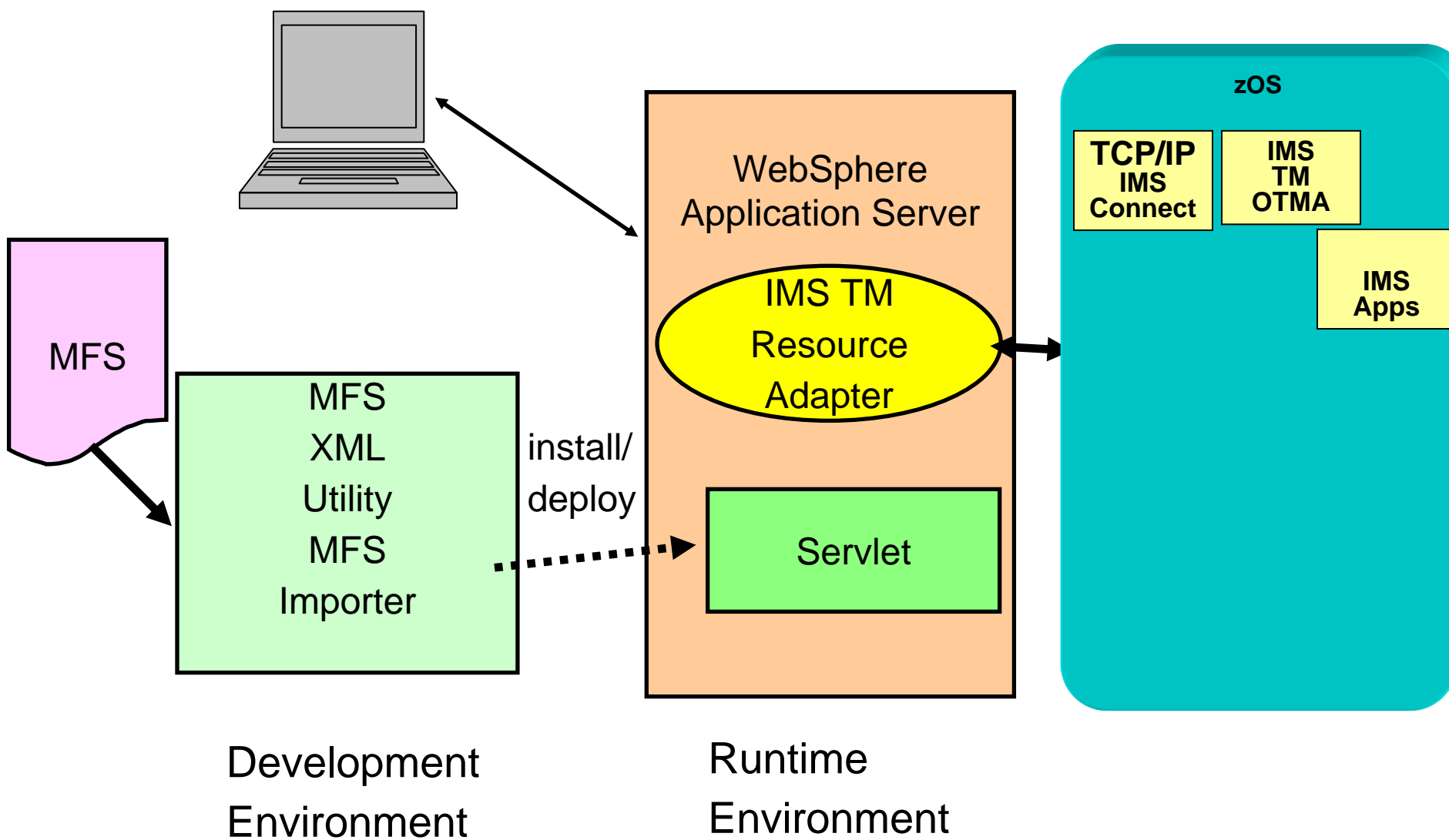
IMS MFS Web Support

IMS MFS Web Support

- MFS Web Enablement
- MFS Web Services

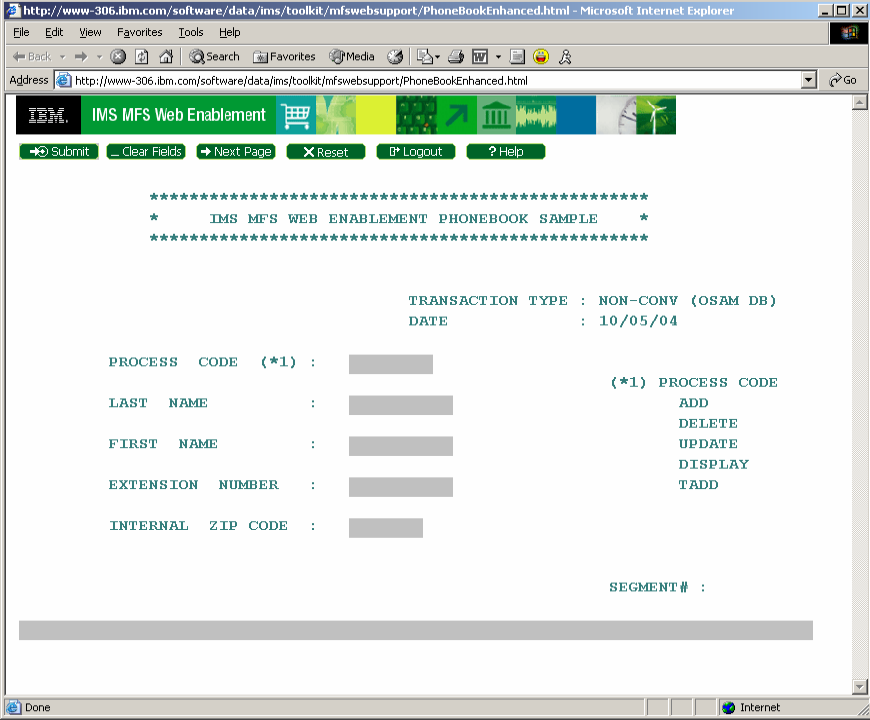
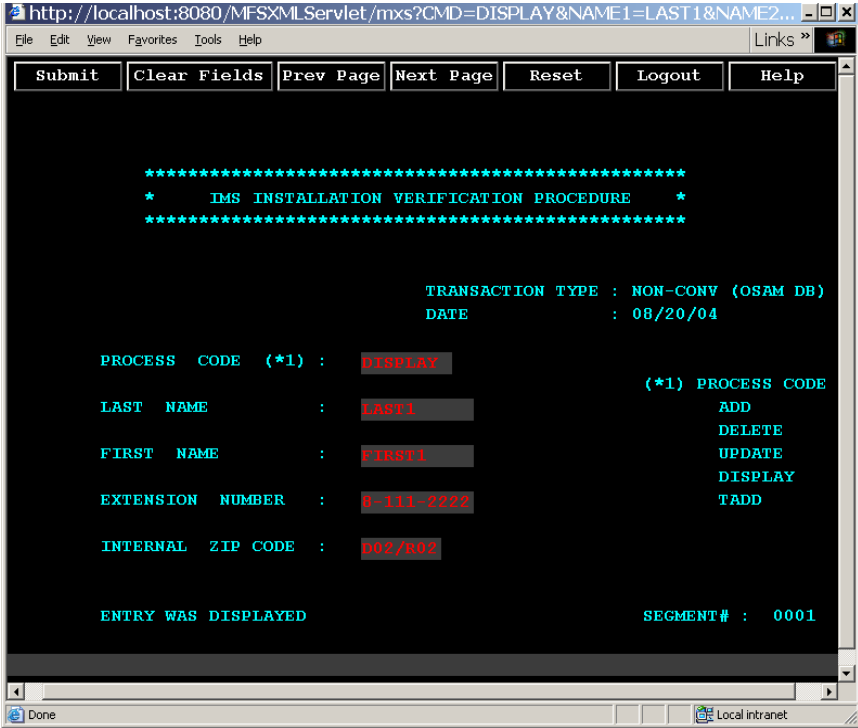


IMS MFS Web Enablement

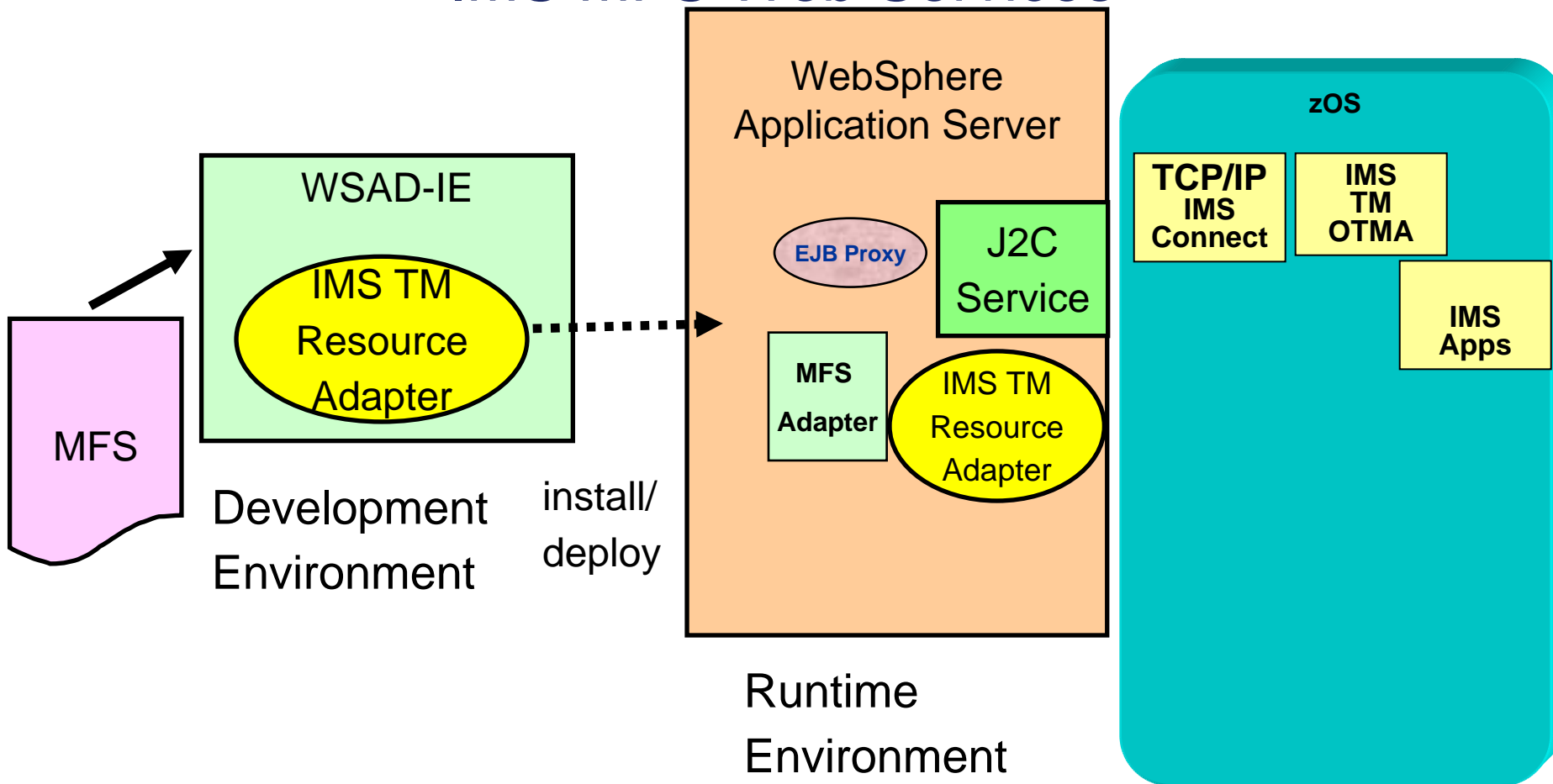


IMS MFS Web Enablement Functional Overview

- Provide **B2C** solution to web-enable existing MFS-based IMS business logic.
- Maintain conversational iterations.
- Provide simple and user-friendly user-interface development tool
- Render displays on new modern devices, e.g. browsers



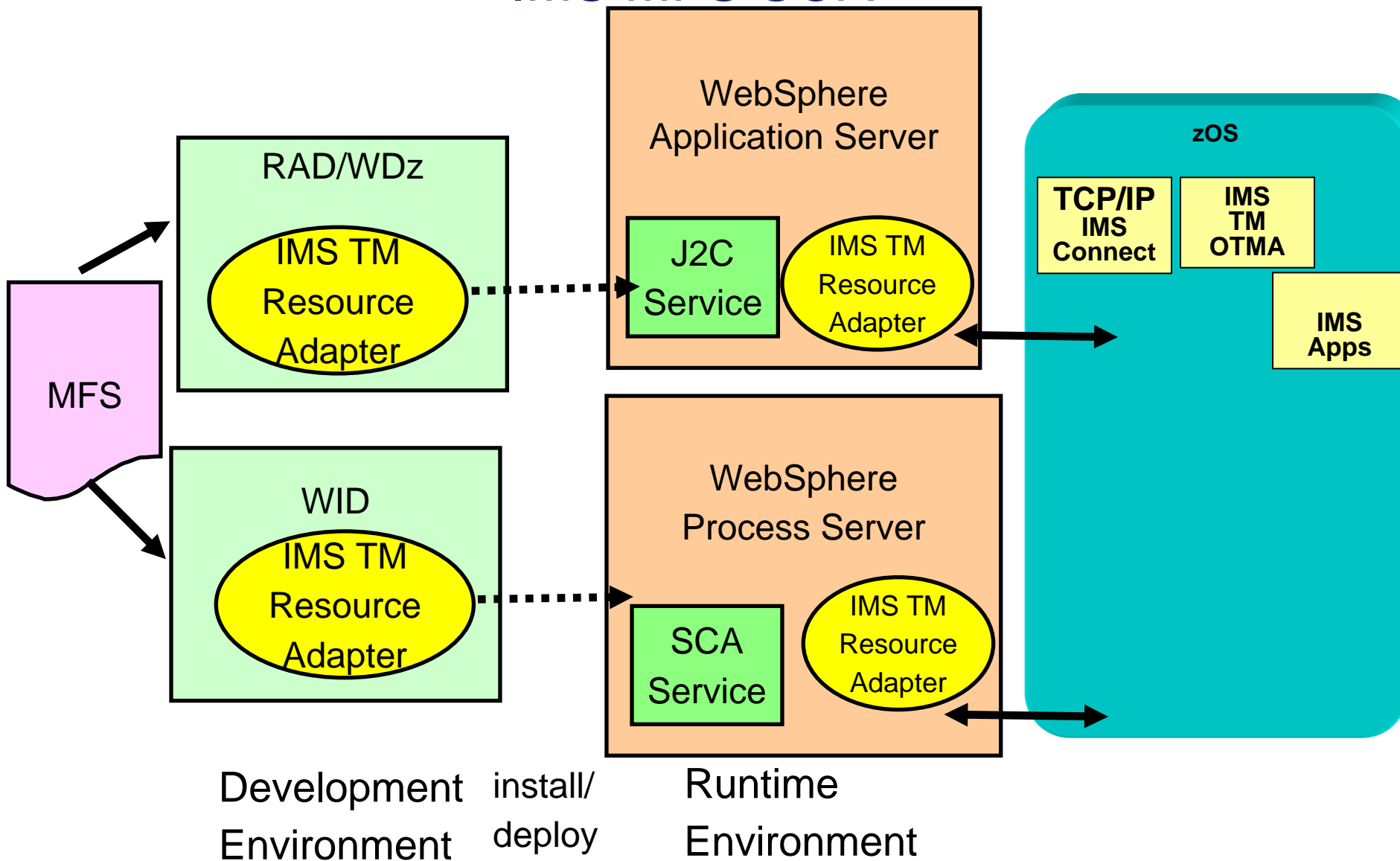
IMS MFS Web Services



IMS MFS Web Services

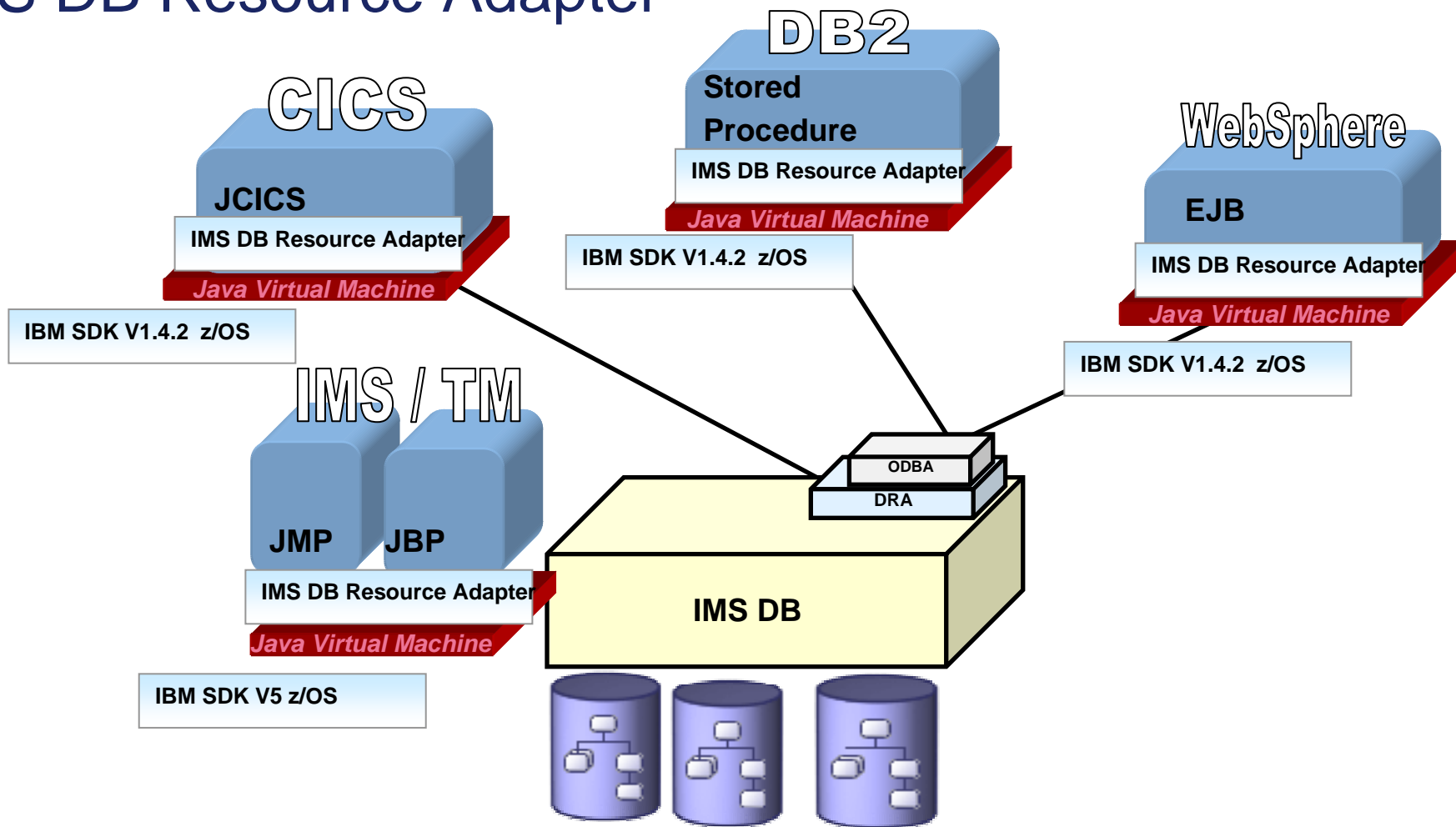
- IMS MFS SOA
 - ◆ Replaces IMS MFS Web Services solution
 - ◆ IMS SOA Composite Business Application support
 - Dependent on IMS TM Resource Adapter and IMS Connect
 - ◆ RAD/WID/WDz development environments
 - Migrate from WSAD-IE

IMS MFS SOA

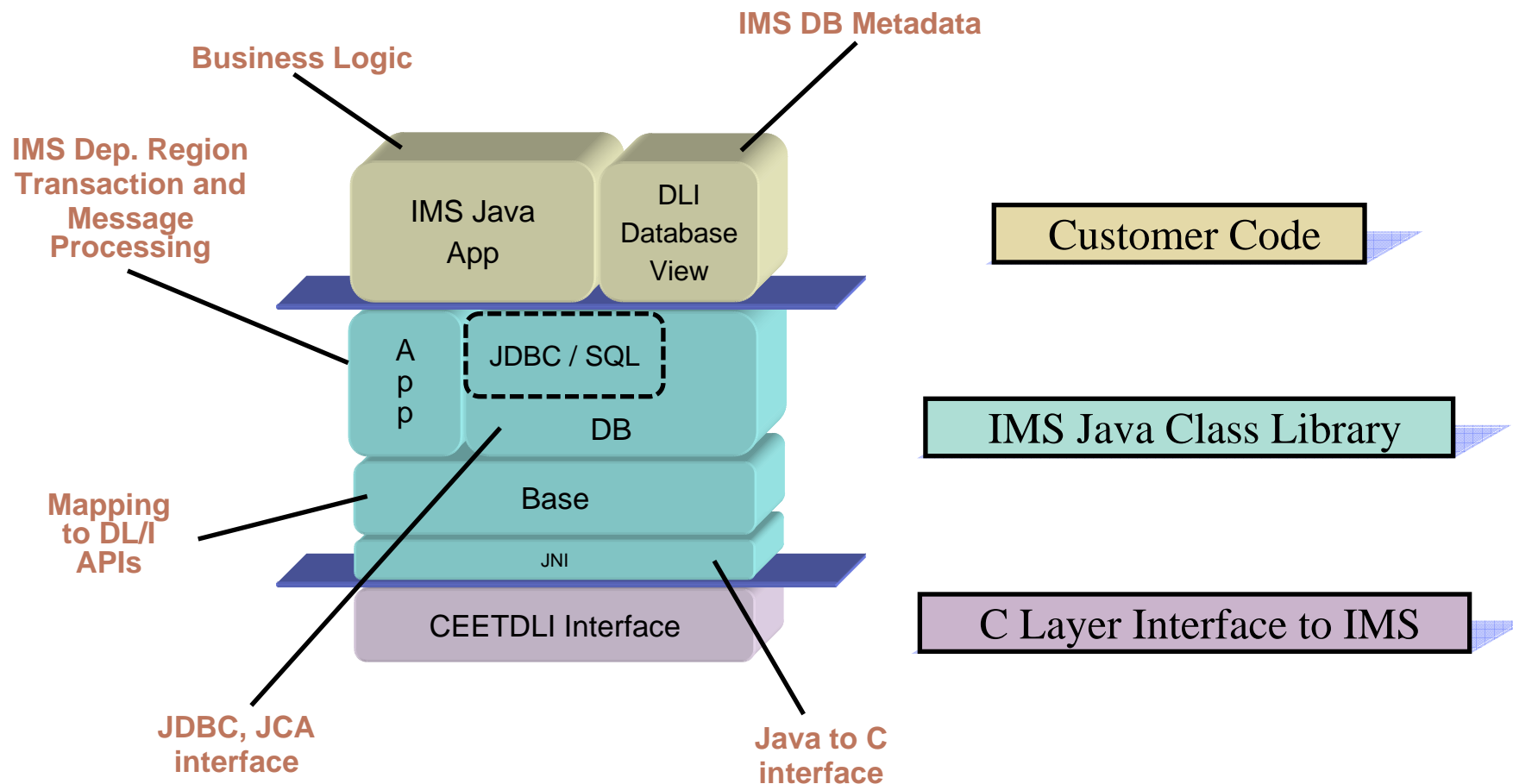


IMS DB Resource Adapter

IMS DB Resource Adapter

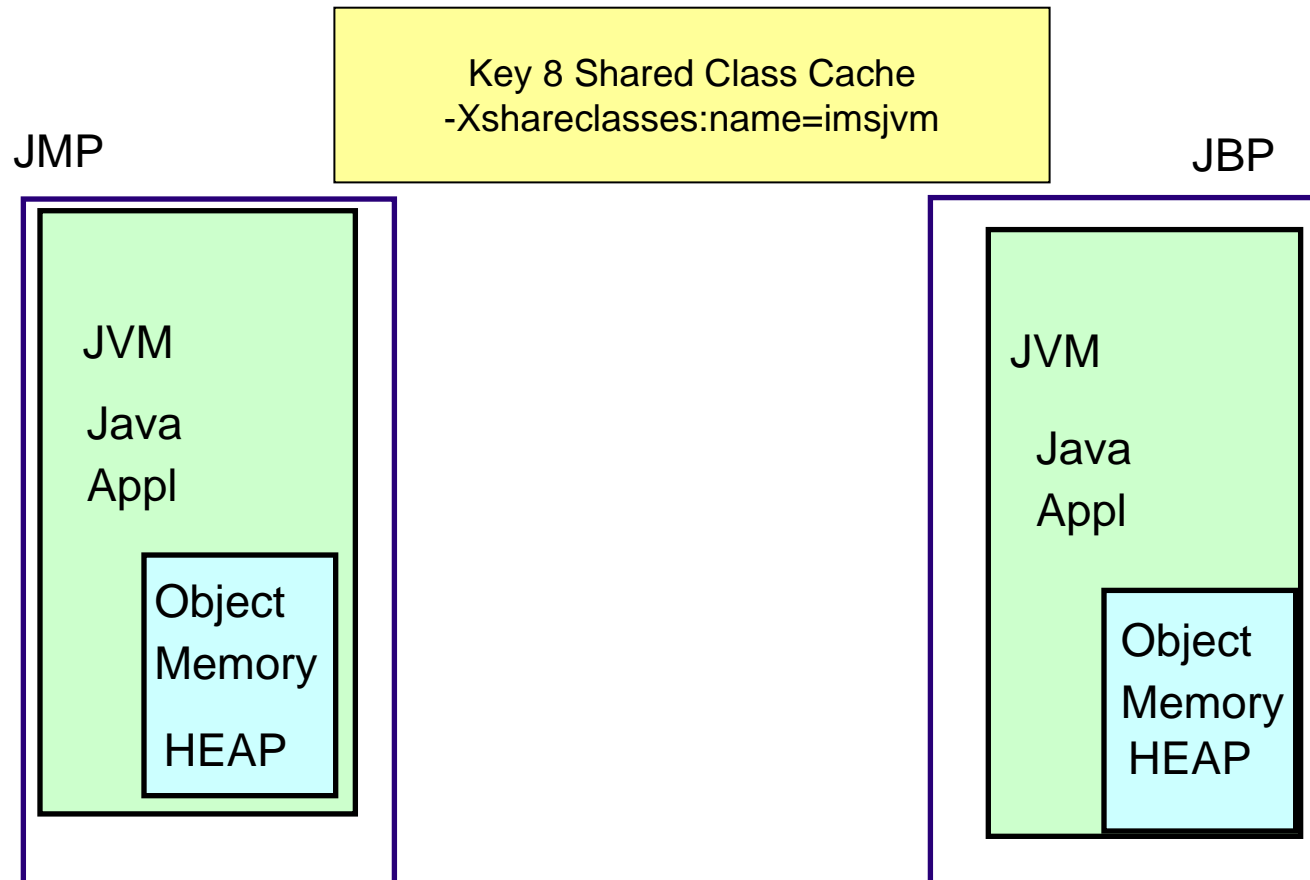


Java Class Library

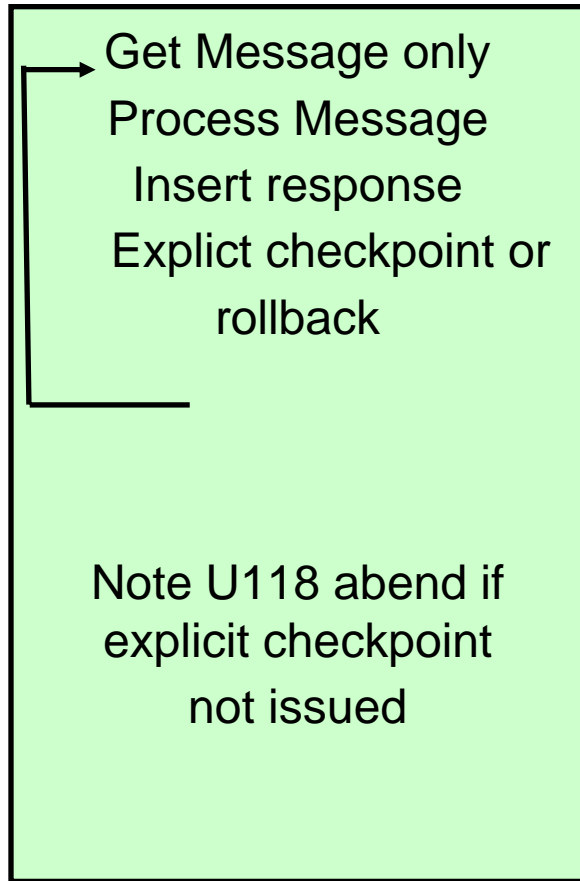


IMS DB Resource Adapter - SDK V5

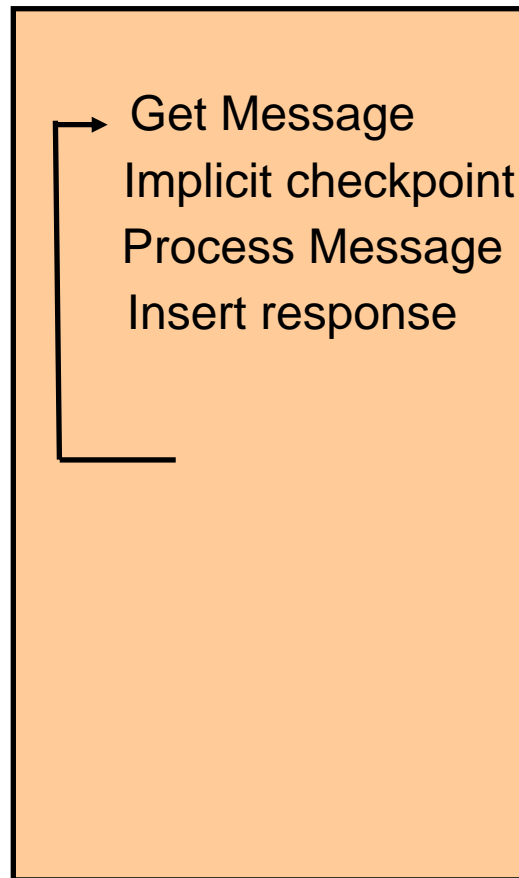
IMS Java Dependent Regions



JDR/COBOL Interoperability

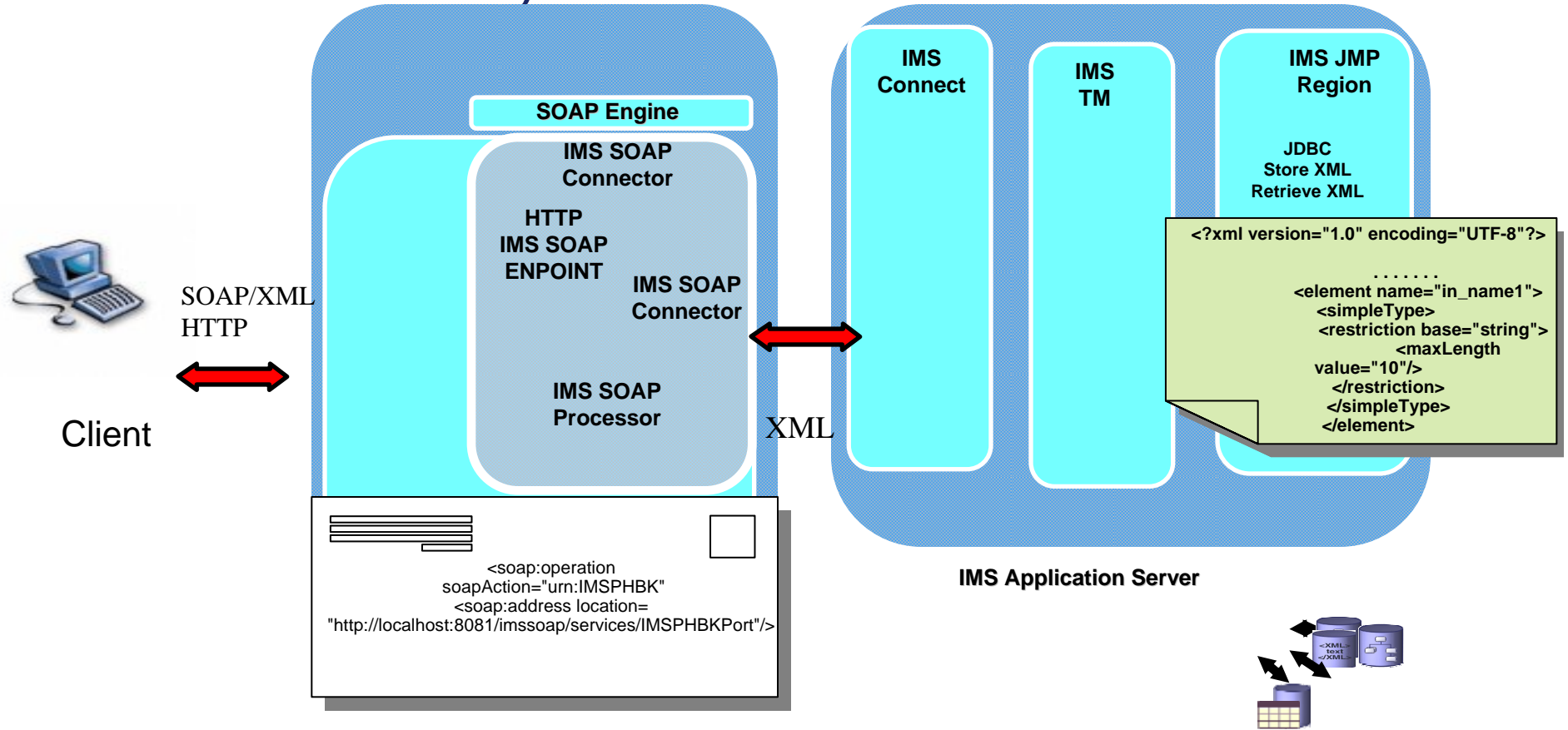


Current JDR
Explicit commit Model



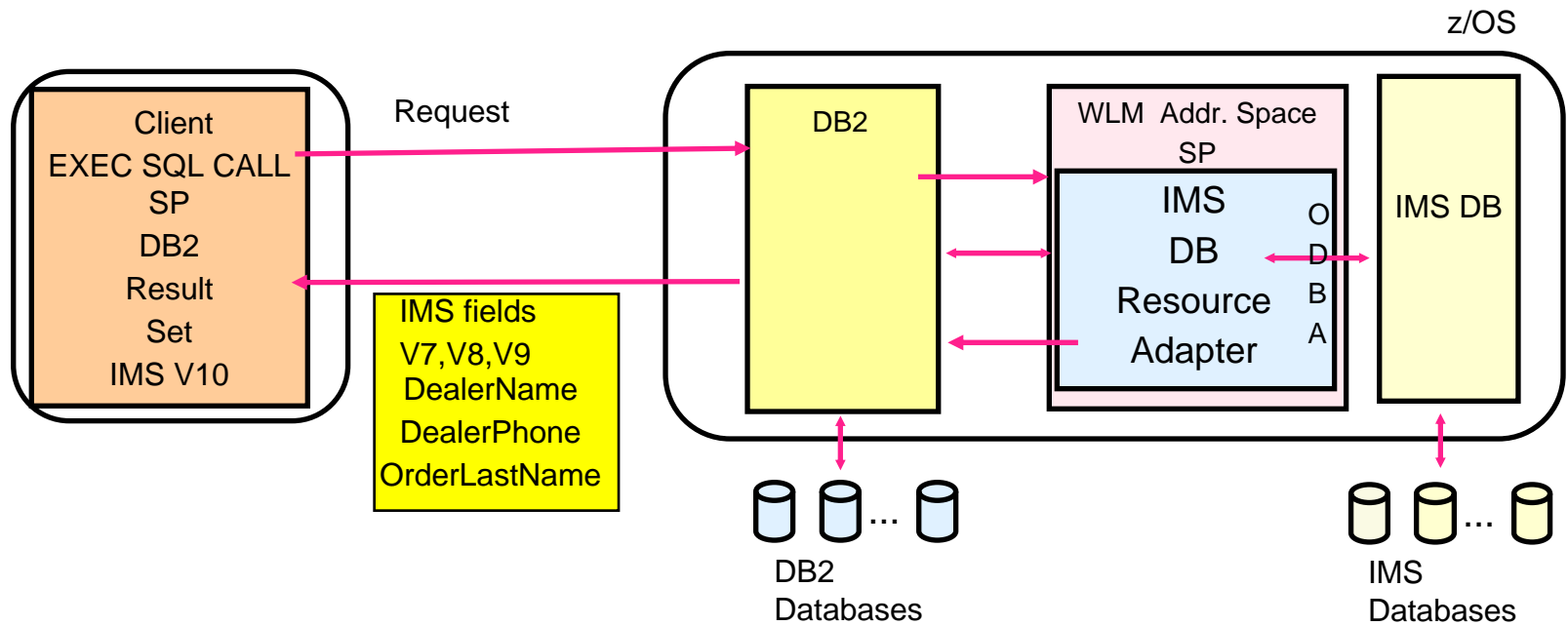
IMS V10 JDR
Standard commit Model

IMS DB Resource Adapter XML and IMS SOAP Gateway



IMS DB Resource Adapter

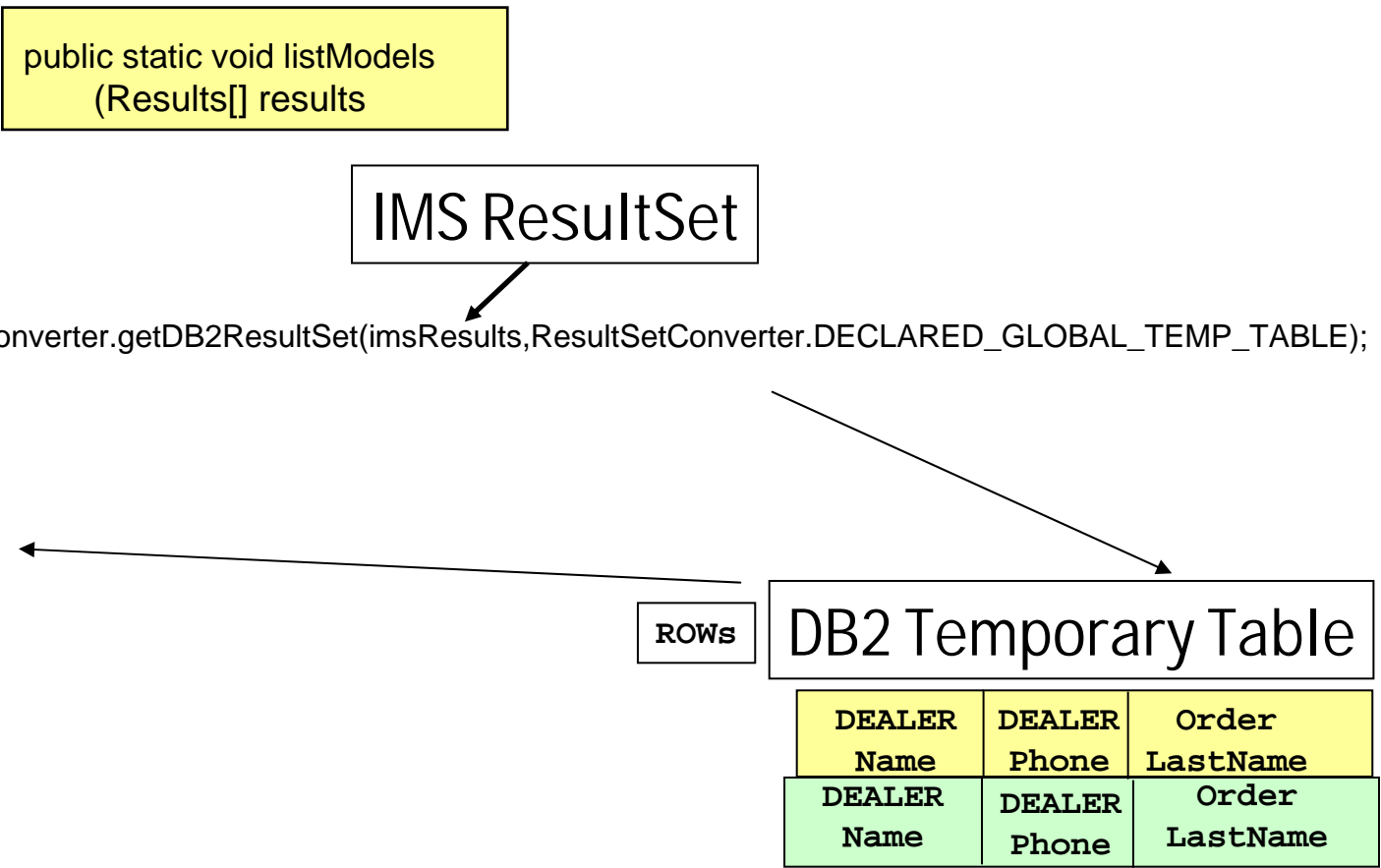
DB2 Java Stored Procedure Support



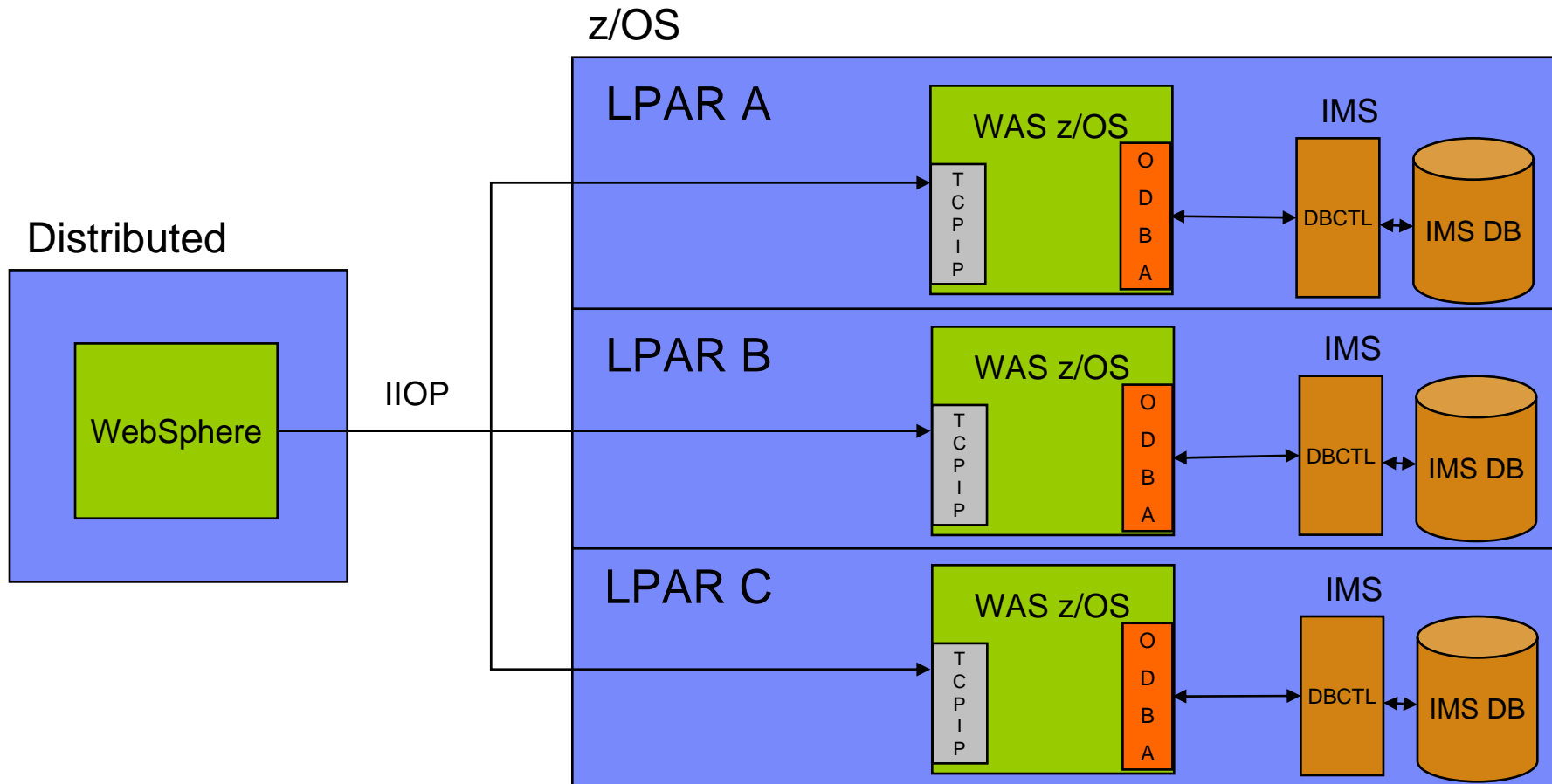
IMS DB Resource Adapter

DB2 Java Stored Procedure returning DB2 Result Set

SELECT Dealer.Name, Dealer.Phone, Order.LastName

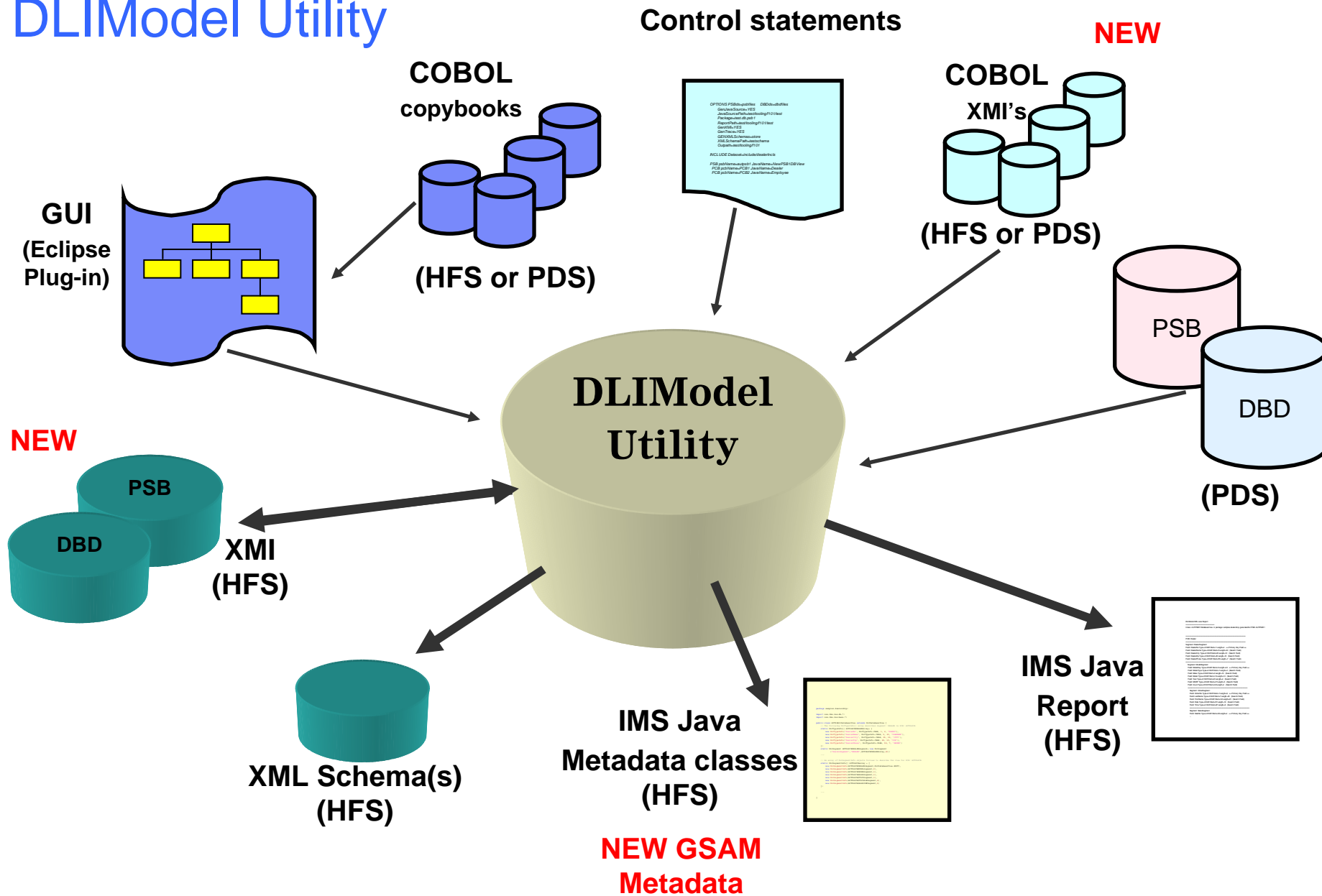


IMS DB Resource Adapter Distributed WAS and z/OS WAS



IMS DLIModel utility

DLIModel Utility



Solution – The IMS Perspective

IMS - NewPSB1DBView.mdl - Eclipse Platform

File Edit View Navigate Search Project Run Window Help

Package Explorer Navigator

NewPSB1DBView.java NewPSB1DBView.mdl

DealerSegment
Total length: 61
DealerNo
DealerName
DealerCity
DealerZip
DealerPhone

ModelSegment
Total length: 37
ModelKey

OrderSegment
Total length: 74
OrderNo

SalesSegment
Total length: 131
SaleNo

StockSegment
Total length: 46
StockVin

SalesInfo
Total length: ...

StockSaleSegment
Total length: 113
SaleNo
DealerNo
ModelKey
SaleDate
LastName

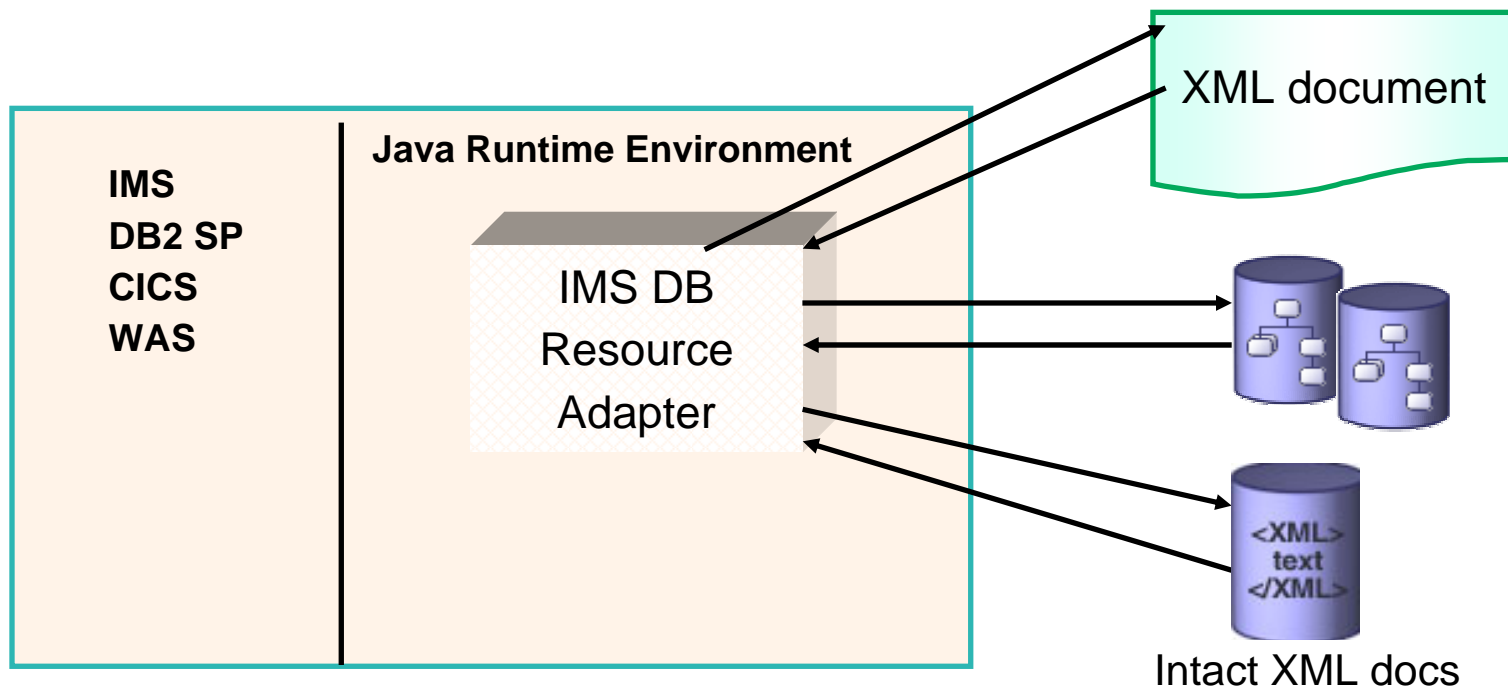
PCB: Dealer PCB: Employee

Property	Value
Segment	DealerSegment
.Alias	DEALER
.IMS Name	
.Length	61
Field0	[1 - 4]
Field1	[5 - 34]
Field2	[35 - 44]
Field3	[45 - 54]
Field4	[55 - 61]

IMS XML DB

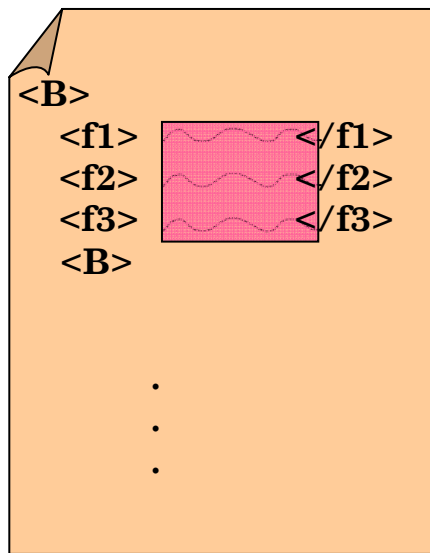
IMS DB Resource Adapter XML-DB

- Retrieve - Compose XML document from any existing traditional database.
- Insert - Decompose XML documents back into same DB.
- Insert/Retrieve/Delete new XML documents INTACT in new IMS databases.



IMS DB Resource Adapter XML V9 API

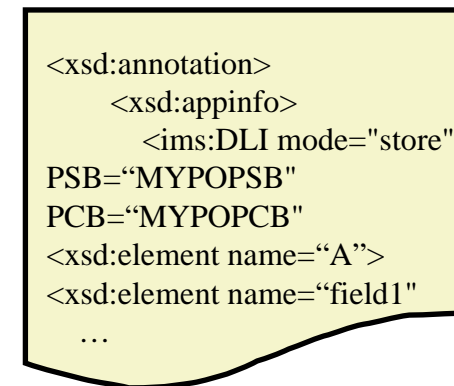
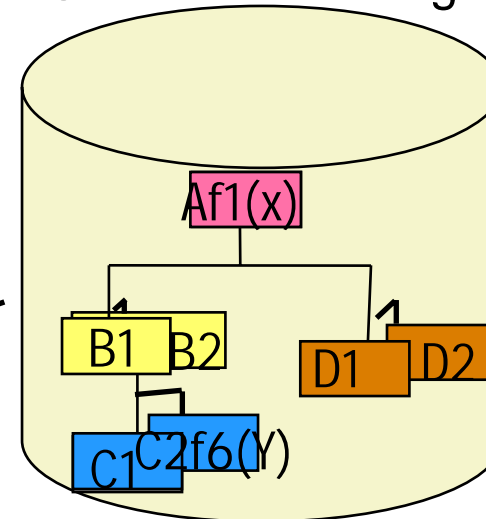
XML document



XML CLOB

SELECT `retrieveXML(B)`
FROM PCB

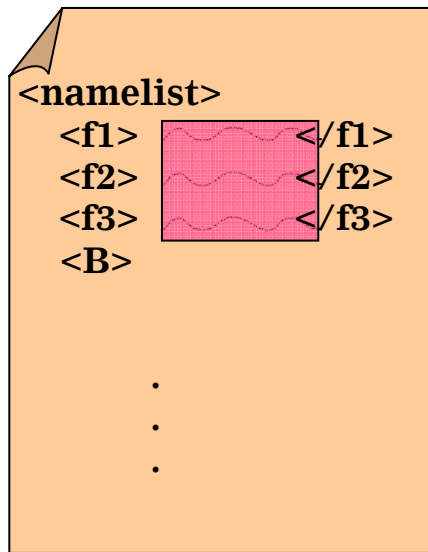
IMS database storage



DLI Model Generated
XML schema

IMS DB Resource Adapter V10 XQuery API

XML document



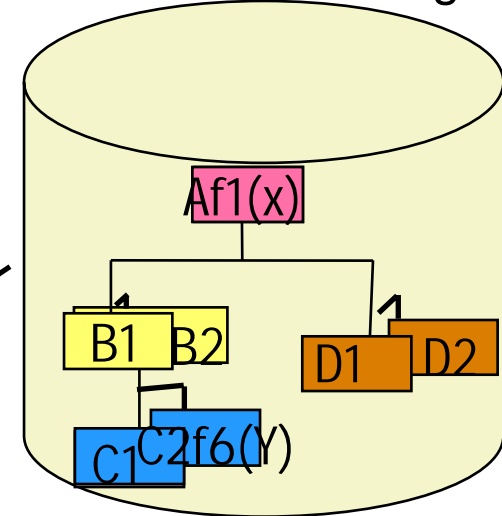
XML CLOB

```

SELECT retrieveXML( B,
  'for $x in /B
  where $x/@f1 = z
  return <namelist>
    {$x/B/f4}
  </namelist>')
FROM PCB

```

IMS database storage



```

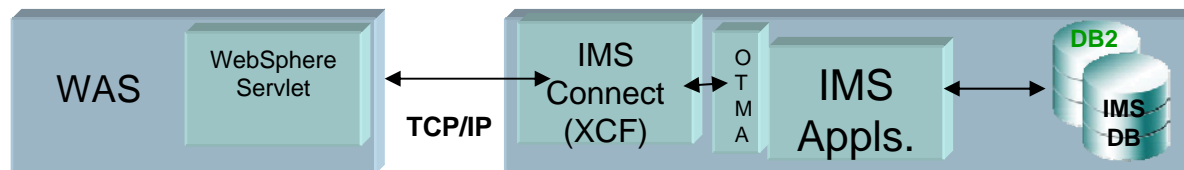
<xsd:annotation>
  <xsd:appinfo>
    <ims:DLI mode="store"
    PSB="MYPOPSB"
    PCB="MYPOPCB"
    <xsd:element name="A">
    <xsd:element name="field1"
    ...

```

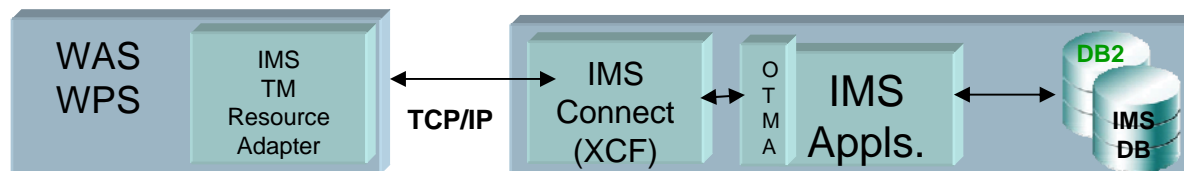
DLIModel Generated XML schema

Summary connectivity to IMS transactions and data

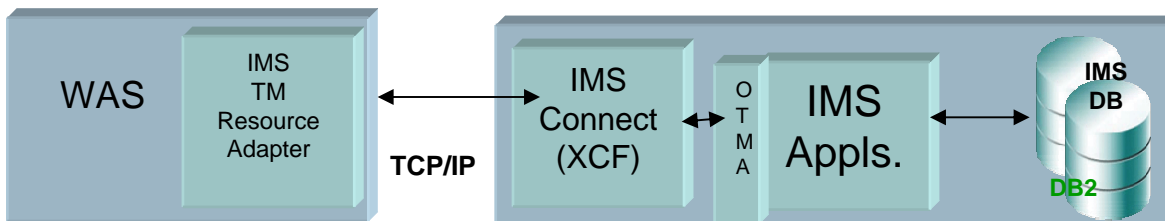
**IMS MFS Web Enablement
IMPROVE**



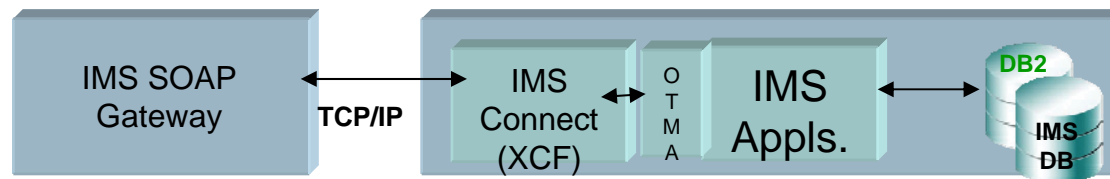
**IMS MFS SOA:
WAS/WPS
ADAPT**



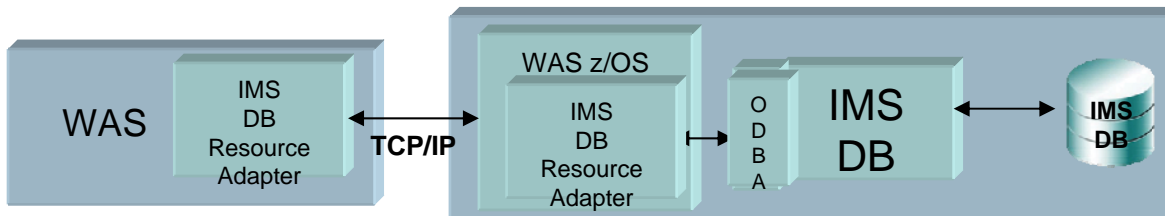
**J2C Connector:
IMS TM Resource Adapter
ADAPT/INNOVATE**



**SOAP Access:
IMS SOAP Gateway
ADAPT**

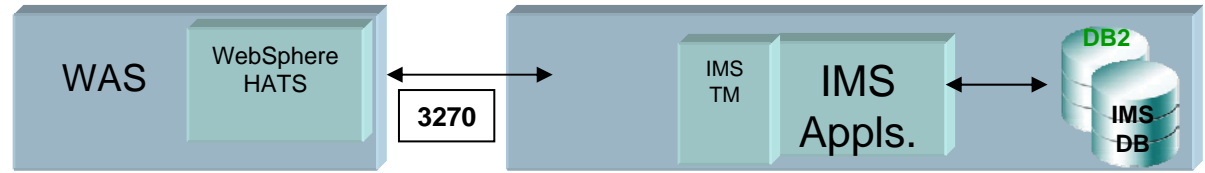


**IMS DB Resource Adapter:
WAS
ADAPT/INNOVATE**

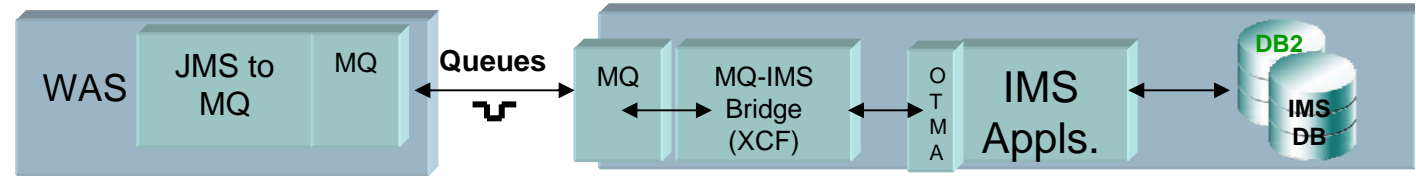


**WAS can be on z/OS, on zLinux or on any distributed platform.
Qualities of Services will vary.**

**WebSphere
Host Access Transformation Services
(HATS)
IMPROVE**



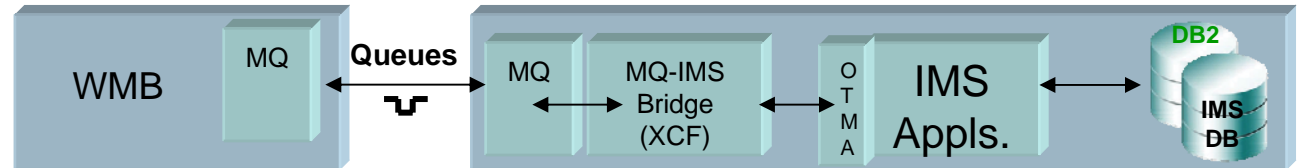
**JMS Connector:
MQ to IMS Bridge**



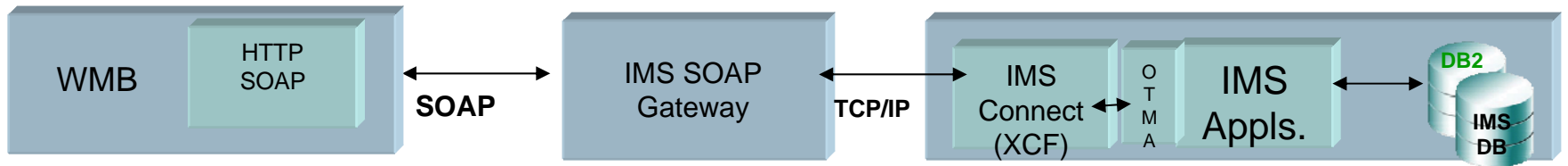
Connectivity to IMS transactions

Connectivity to IMS transactions and data with WMB

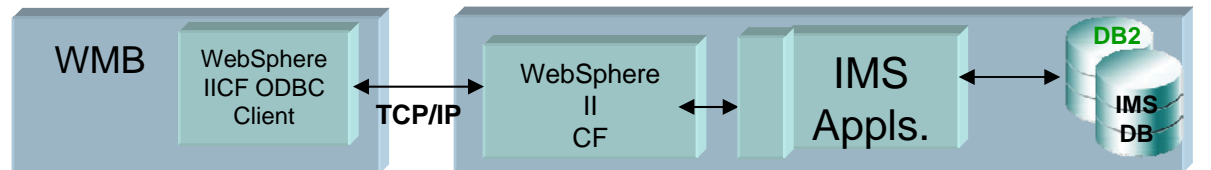
**WMB:
MQ to IMS Bridge**



**WMB SOAP Access:
IMS SOAP Gateway**



**ODBC Connector:
WebSphere II CF**



**WMB can be on z/OS, on zLinux or on any distributed platform.
Qualities of Services will vary.**

Summary

- The message:
 - ◆ **IMS continues to be a premier server**
 - Architected interfaces support standard access from the web
 - ◆ **New interfaces, products and tools from a variety of vendors provide access to IMS transactions and data**



- **Extremely High Availability and Overall Reliability**
- **Massive end-to-end Scalability**
- **Capacity on Demand**
- **Rock Solid Security**
- **Higher Utilization and Balanced System Design**
- **Advanced Virtualization Capabilities**
- **Highly Manageable, Responsive and Autonomic via Workload Manager and Intelligent Resource Director**
- **Utilizes Open and Industry Standards**
- **World-class Integrated Support**