



# Accelerate IMS Application Modernization with New Integration Capabilities

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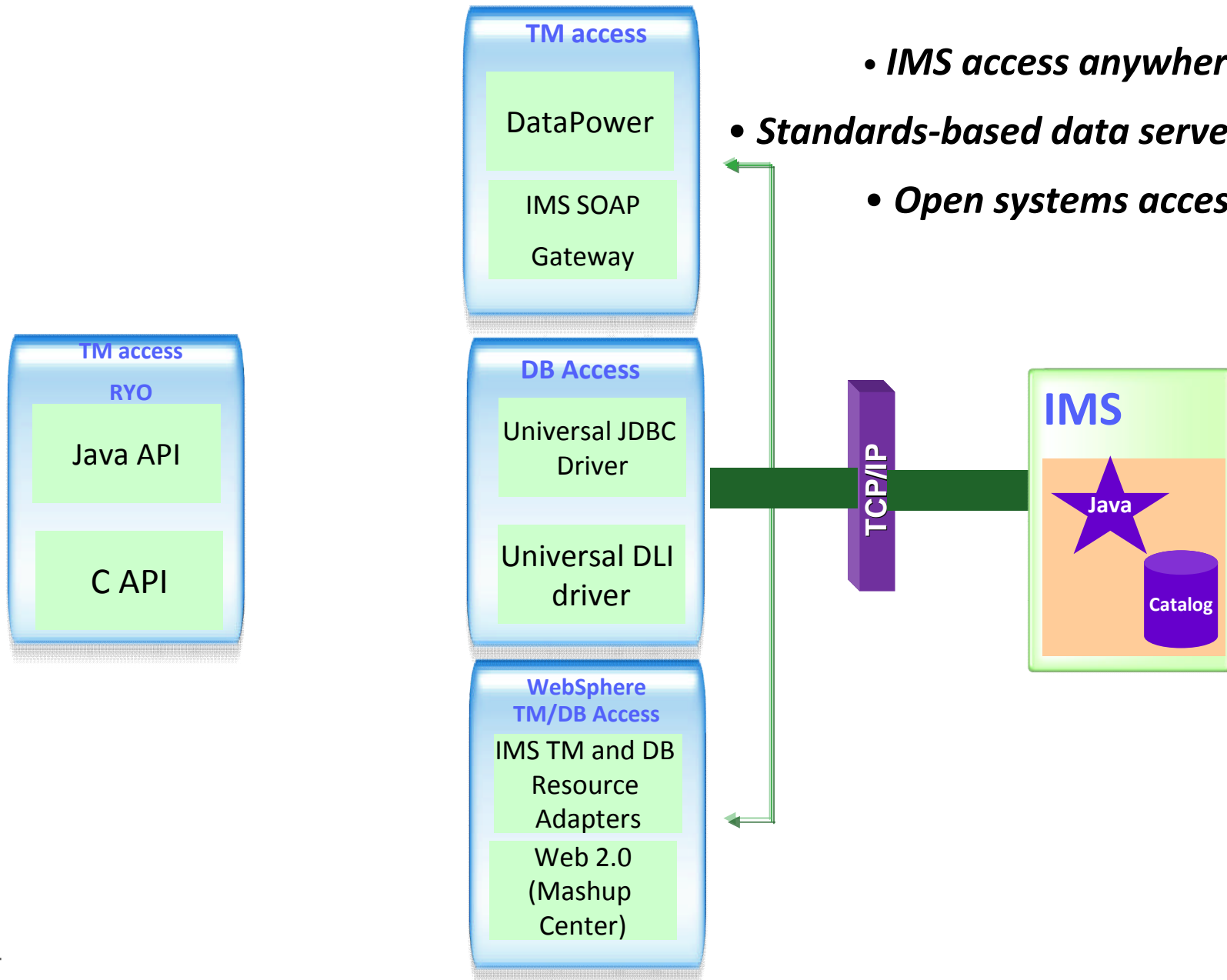


## Agenda

### IMS modernization overview

- **IMS transaction management solutions**
  - Integration opportunities and futures
- **IMS database solutions**
  - Integration opportunities and futures
- **DataPower and IMS connectivity**
  - Current and future

# IMS Modernization Solutions

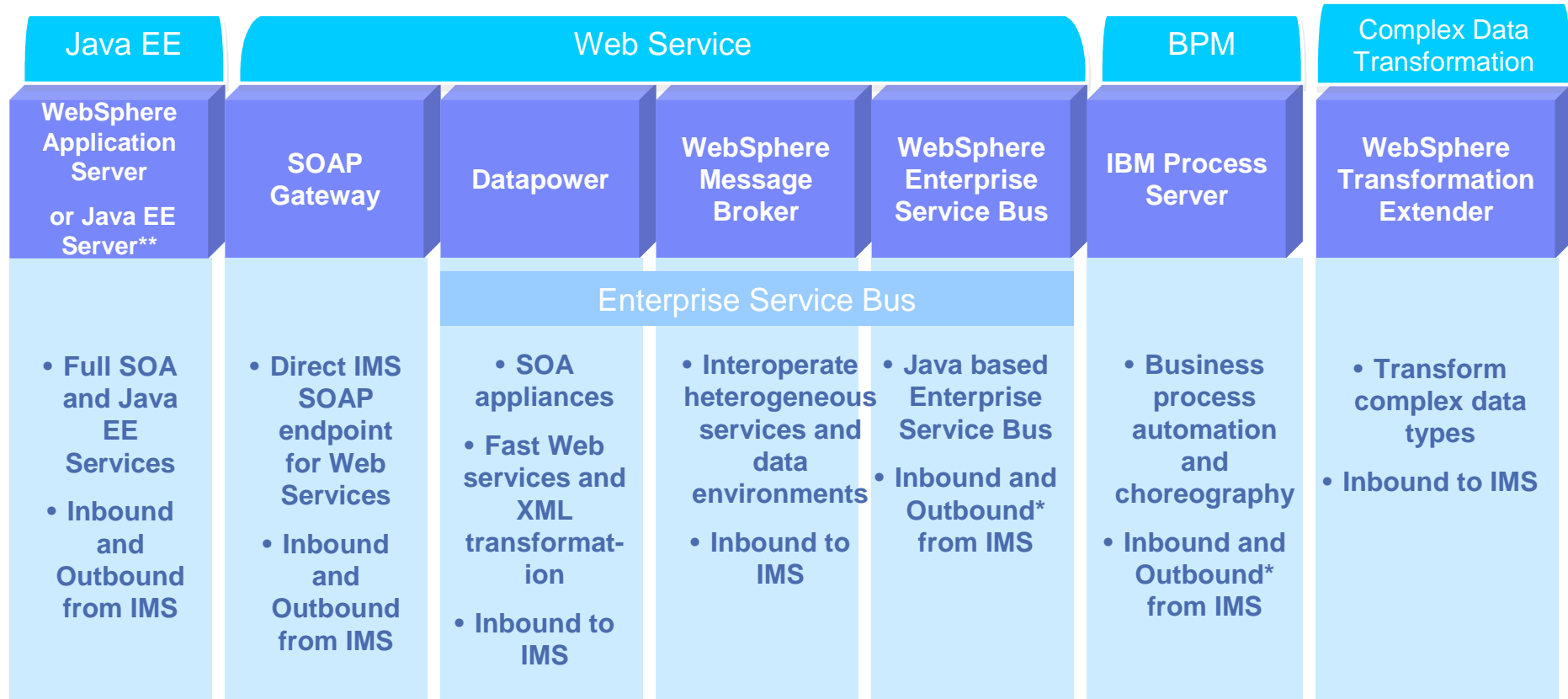


- *IMS access anywhere*
- *Standards-based data server and TM*
- *Open systems access*



# IMS TM Connectivity and Integration

Many IBM application servers already provide built-in support for IMS transaction access today



\*Additional coding may required. \*\*Subset of functions supported with conditional support



# IMS TM Resource Adapter

- **Access IMS transaction with full Java EE and SOA support**
  - Customer-proven IMS modernization solution for over a decade
  - Industry-standard Java EE Connector Architecture (JCA/J2C) compliant
  - Integrate with a variety of Java EE or WebSphere-based servers with built-in QoS support (2PC, connection pooling, security management)
  - Support both call-in and callout from IMS
  - Support rapid application development with Rational tooling
  - Recommended to use with Java EE or WebSphere servers
  
- **Recent key enhancements**
  - Support non-IBM Java EE server (e.g. Weblogic, JBOSS) and WebSphere Application Server Community Edition
  - Callout enhancements
    - Retrieve callout messages from more than one IMS data stores with a single message-driven bean (MDB)
    - Auto reconnect for both IMS data store and IMS Connect connection failures



# IMS Enterprise Suite SOAP Gateway

- **Enable IMS transactions as both web service providers and consumer**
  - Not an application server; not JEE container
  - Support industry web service standards
    - HTTP(S), SSL, SOAP, WSDL, WS-Security
  - Support both call-in and callout from IMS
  - Run on z/OS, zLinux, Windows
- **Recent key enhancements**
  - Advanced Installation
  - Top-Down PL/I Provider support
  - Major security enhancements: AT-TLS, Custom Authentication Module, SAML 1.1 / SAML 2.0
  - Significant performance improvement
  - End-to-end transaction tracking and monitoring



## IMS Enterprise Suite Connect API

- **Simple callable interfaces to send/receive messages to/from IMS Connect**
  - Java, C and C++ support
  - Normally use in Roll-Your-Own application that does not run in an application server
  - Extensible profiles that define connections and interactions
  - User does **not** have to understand:
    - Sockets programming
    - IMS Connect IRM headers and flags
  - Support all IMS Connect functions
- **Simplifies development of new IMS Connect client applications to access IMS transactions**





## IMS Callout

- **IMS application callout to external application and web services**
  - New DL/I ICAL to synchronously callout from IMS
  - Enable IMS to synchronously and asynchronously callout to Java applications and web services
    - IMS TM Resource adapter, SOAP Gateway and Connect API
- **Recent enhancements**
  - Better diagnostics information for ICAL failure
  - Immediate Resume TPIPE timeout when no message available for Nowait and NoAuto modes
  - Notify client with an error when a late or invalid ACK received by OTMA after ICAL timeout
  - Clean up unused ICAL TPIPEs after two IMS checkpoints
  - Enhanced /DISPLAY command to display accumulated ICAL count



## Java dependent region deployment

### Java dependent region resource adapter

- Allows new IMS transactions (JMP, JBP) to be written in Java and managed by the IMS transaction manager
- Complete Java framework for applications operating in an IMS container
  - Message queue processing
  - Program switching
    - Deferred and immediate
  - Transaction demarcation
  - GSAM support
  - Additional IMS call support necessary for IMS transactions
    - INQY
    - INIT
    - LOG
    - Etc
- Shipped with type 2 Universal drivers



# IMS Open Database

## Solution statement

- **Extend the reach of IMS data**
  - Offer scalable, distributed, and high-speed local access to IMS database resources

## Value

- **Business growth**
  - Allow more flexibility in accessing IMS data to meet growth challenges
- **Market positioning**
  - Allow IMS databases to be processed as a standards-based data server

## Key differentiators

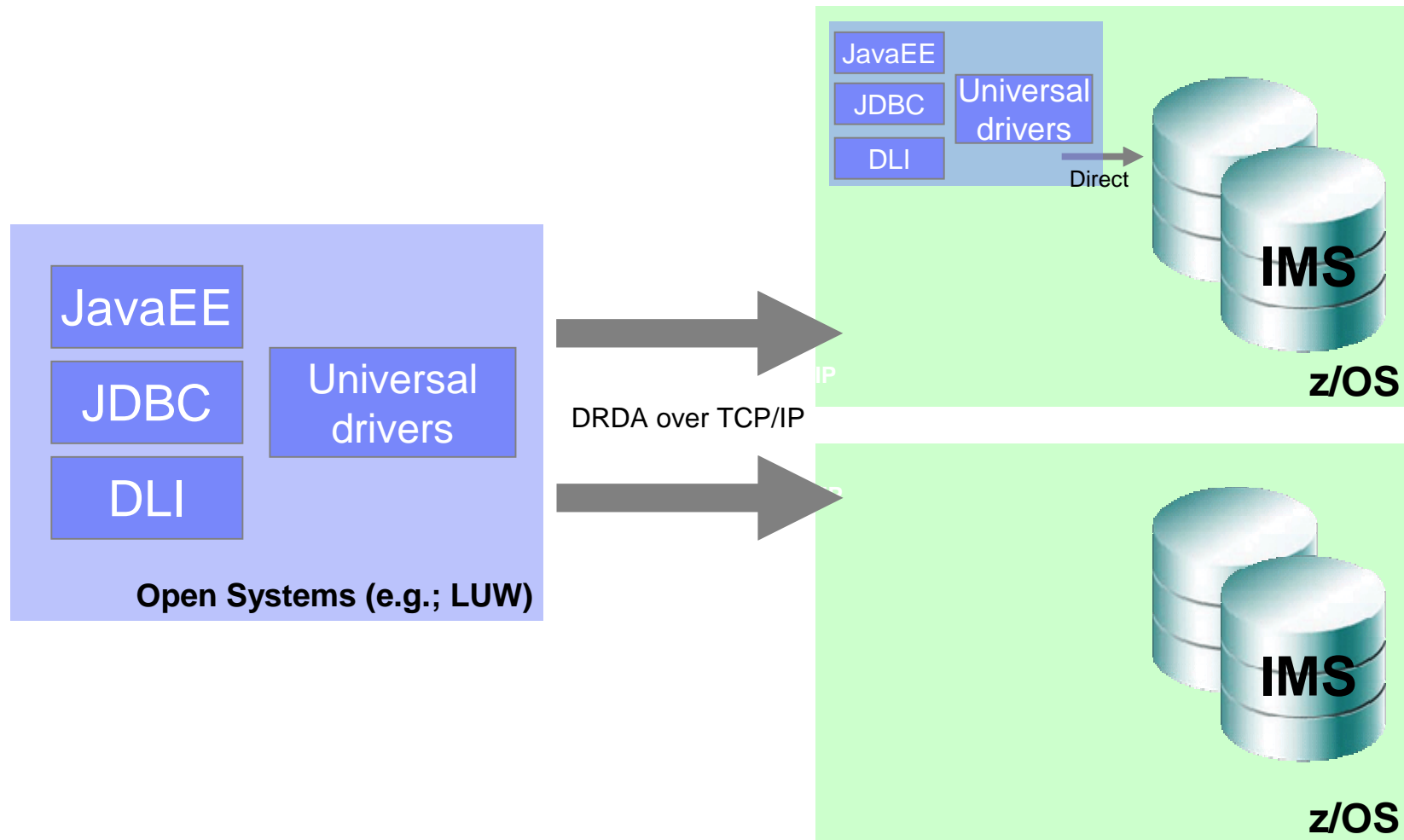
- **Standards-based approach (Java Connector Architecture, JDBC, SQL, DRDA)**
- **Solution packaged with IMS**

## Enables new application design frameworks and patterns

- **JCA 1.5 (Java EE)**
- **JDBC**

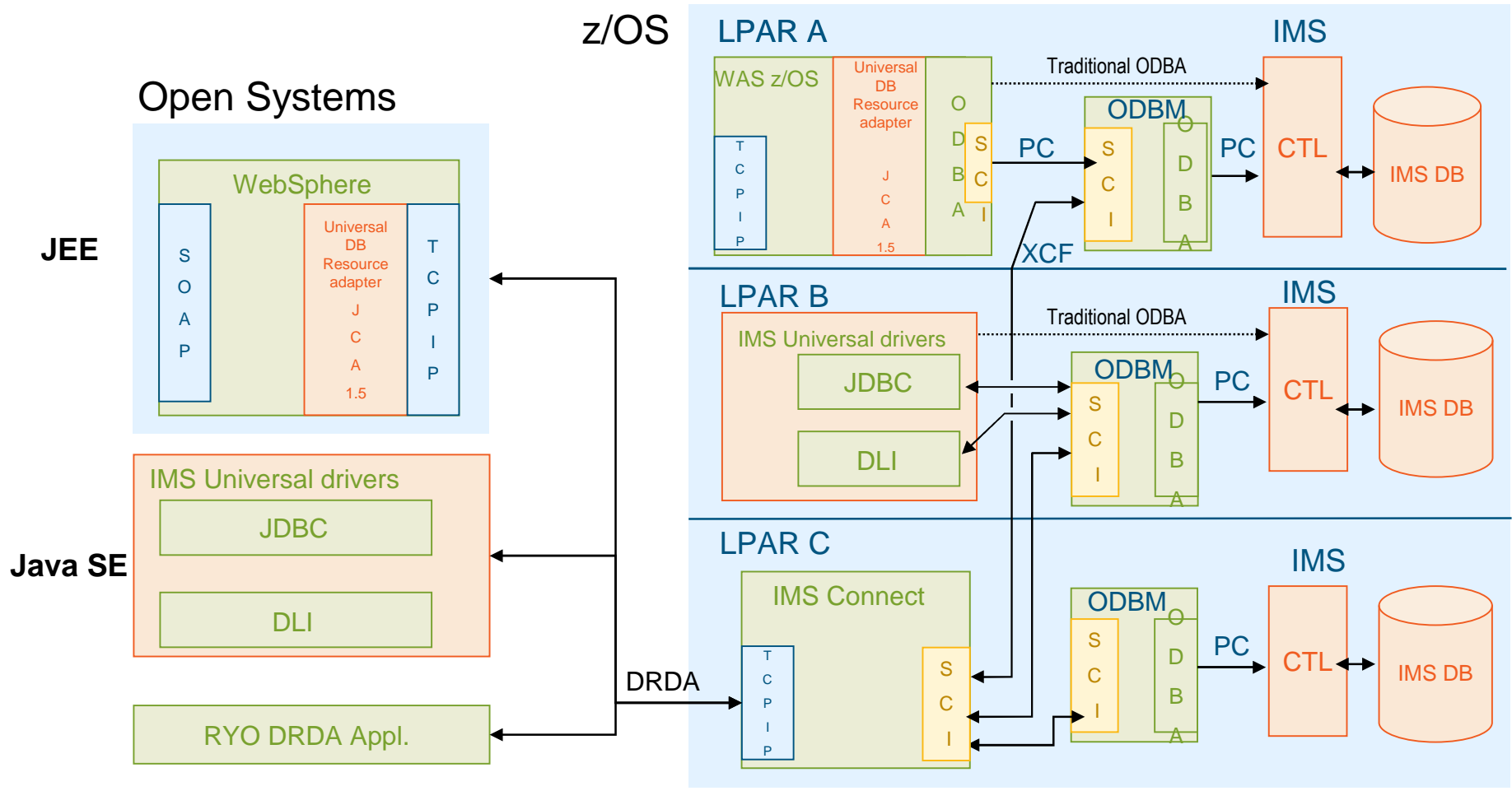


# IMS Open Database



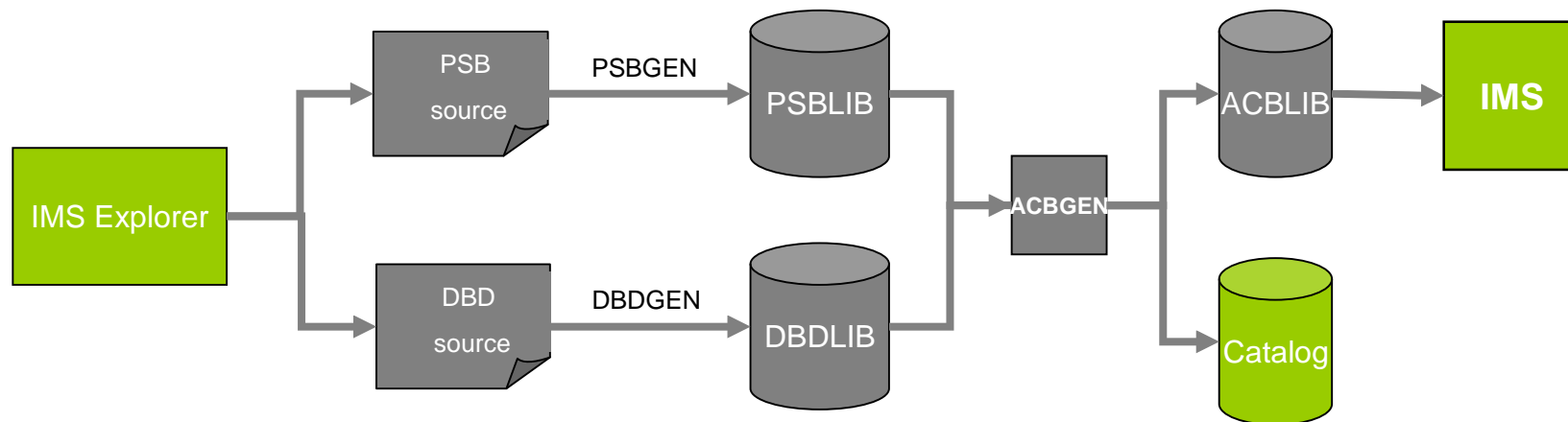


# IMS Open Database environment



# IMS 12 catalog

- Trusted IMS metadata information
- Comprehensive view of IMS database metadata (including application metadata) managed by IMS with standard access patterns (JDBC/SQL)
- Offers metadata discovery and exchange via IMS Open Database and the IMS Explorer for Application Development
- Scalable Open Database solution – large scale deployment into virtualized production and test environments
- Enables broad IMS integration into the IBM and non-IBM portfolio of tools (Optim Development Studio, Rational Asset Analyzer, InfoSphere Data Architect, etc)





# Open Database and the Universal drivers

## Deep synergy with the IMS catalog

- Direct access to IMS metadata in the catalog
- Virtual and cloud deployment capabilities
  - No longer file-system dependent for metadata
- Industry-leading data type support
  - Complex and flexible
- Mapping support

## Deep synergy with Java z/OS and z196

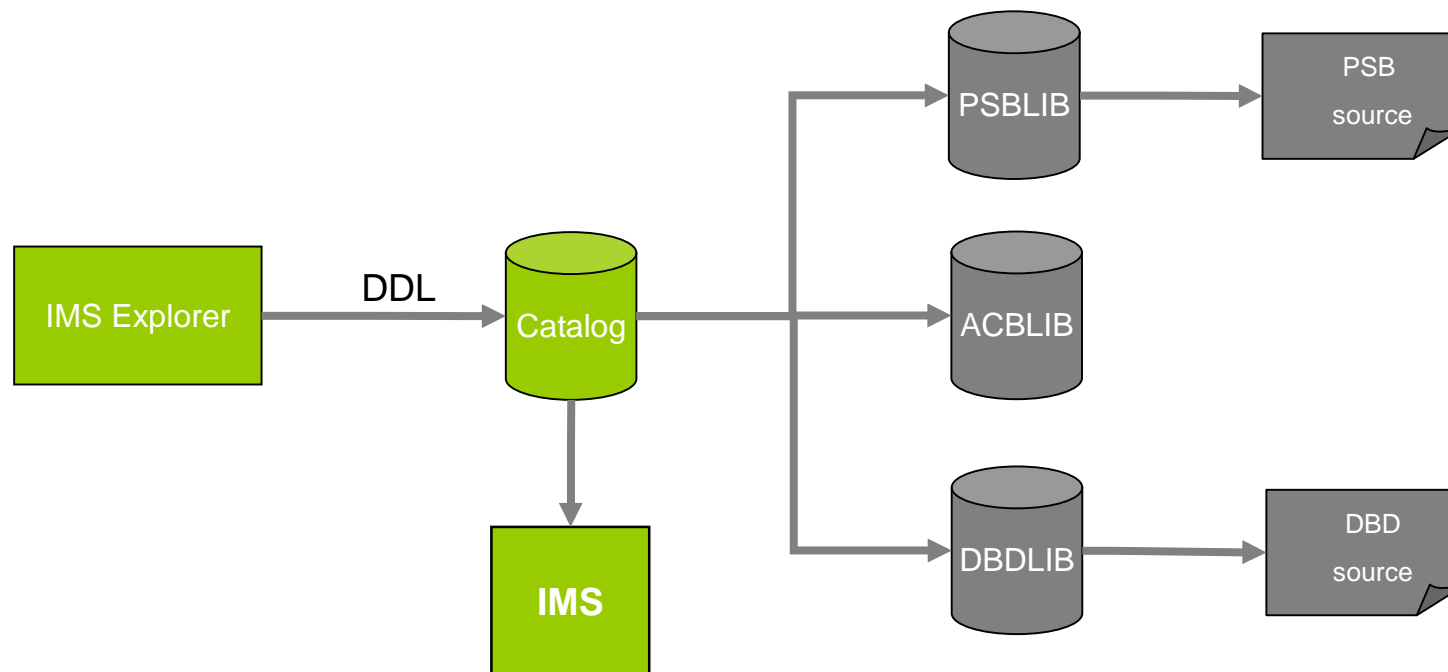
- Significant performance improvements
- Continued partnership with Java z/OS lab

## Continued SQL standardization and enhancements

- Including similar connection parameters as DB2 for commonality across IBM drivers
- Mapping, Variable length segments

## Continued integration across the IBM portfolio

## IMS catalog – intended support



IMS DB changes *start* with catalog

- IMS loads resource information from catalog
- ACBLIB/PSBLIB/DBDLIB updates will be the by-product of catalog updates
  - Tools that use these libraries can continue to operate, but should migrate to catalog
- PSB and DBD source can still be optionally generated from PSBLIB and DBDLIB





# Dynamic database - Data Definition Language

- SQL incorporates DDL to modify the schema of a database
- Authoring DDL is straight-forward with sophisticated tooling support in the industry
- SQL/DDDL can be used to update/add metadata in the catalog without the need of a GEN
  - Directly update the catalog
- IMS can be notified of such an update and load the new definitions
- It is our intention to offer this type of dynamic definition for IMS

```
CREATE TABLE CYCCOUNT (  
PARTROOT_PARTKEY CHAR(17) NOT NULL,  
STOKSTAT_STOCKEY CHAR(16) NOT NULL,  
CYCLKEY CHAR(2) NOT NULL,  
TOTALSTOCK BIGINT NOT NULL,  
PHYSICALCOUNT BIGINT NOT NULL  
);  
  
CREATE TABLE STANINFO (  
PARTROOT_PARTKEY CHAR(17) NOT NULL,  
STANKEY CHAR(2) NOT NULL,  
MAKEDEPT CHAR(2) NOT NULL,  
PROCCODE CHAR(2) NOT NULL,  
FILL_0 CHAR(16) NOT NULL,  
FILL_1 CHAR(24) NOT NULL,  
FILL_2 CHAR(2) NOT NULL,  
COMMCODE CHAR(4) NOT NULL,  
MAKECOST CHAR(2) NOT NULL,  
PLANNUM CHAR(2) NOT NULL,  
INVCODE CHAR(1) NOT NULL  
);  
  
CREATE TABLE BACKORDR (  
PARTROOT_PARTKEY CHAR(17) NOT NULL,  
STOKSTAT_STOCKEY CHAR(16) NOT NULL,  
FILL_0 CHAR(50) NOT NULL,  
ORDERQTY DECIMAL(7, 7) NOT NULL,  
BACKKEY CHAR(10) NOT NULL,  
WORKORDER CHAR(8) NOT NULL  
);  
  
CREATE TABLE PARTROOT (  
PART CHAR(15) NOT NULL,  
FILL_0 CHAR(9) NOT NULL,  
FILL_1 CHAR(2) NOT NULL,  
PARTDESK CHAR(20) NOT NULL,  
PARTKEY CHAR(17) NOT NULL  
);  
  
CREATE TABLE STOKSTAT (  
PARTROOT_PARTKEY CHAR(17) NOT NULL,  
UNPLREQMTS INTEGER NOT NULL,  
AREA1 CHAR(1) NOT NULL,  
DEPT CHAR(2) NOT NULL,  
UNITPRICE INTEGER NOT NULL,
```



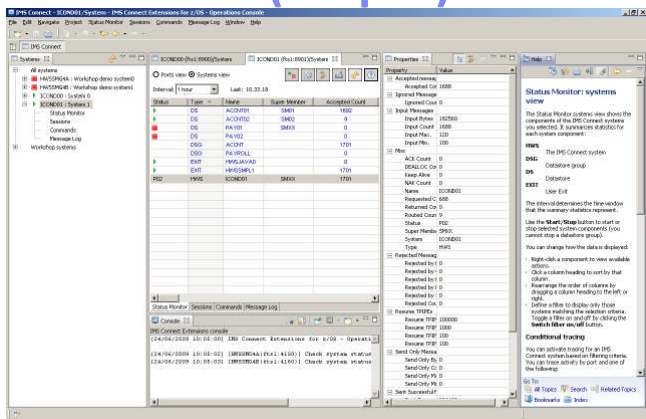
## Intended SQL engine investment

- **Current SQL engine is Java-based**
  - As a result only supports Java clients
- **IMS intends to invest in a native SQL engine**
  - Could support COBOL and PLI clients
    - Dynamic and even static SQL could be supported
  - Engine would require the IMS catalog



# IMS user interface enhancements

## IMS Explorer for Development (Eclipse)

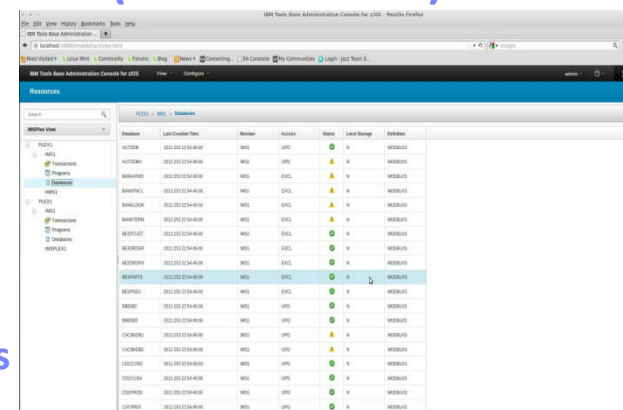


Developers

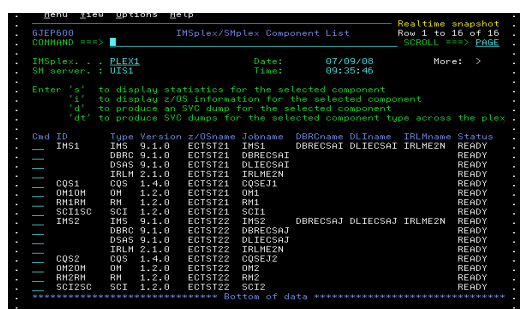


Administrators

## IMS Explorer for Administration (Web Browser)



ISPF



IMS



# IMS Explorer for Development

```
$DDLT0 NEWJCL F1 V 80 Trunc=80 Size=96 Line=25 Col=1 Alt=0
====>
00022 U *****
00023 WTO Start of the DDLT0 stream
00024 U status card has all 1's so all tracing is ON.
00025 U status card has 00002 so we use the second PCB in the PSB
00026 S 1 1 1 1 1 00002
00027 WTO Now doing GN through the database
00028 L GN
00029 E DATA KAA11**K1*
00030 E 01 K1 0005KAA11
00031 L GN
00032 E DATA KBBB11**K2
00033 E 02 K2 0011KAA11KBBB11
00034 L GN
00035 E DATA KAA31KEE31K31311131213131314131513KEE31K5R31
00036 E 03 K3K5 0021KAA11KBBB11KAA31KEE31
00037 L GN
00038 E DATA KAA31**K1*
00039 E 04 K1X 0026KAA11KBBB11KAA31KEE31KAA31
00040 L GN
00041 E DATA KAA31KEE32K31321132213231324132513KEE32K5R32
PF 1 FIG 2 SCREEN 2 3 QUIT 4 FILE 5 REPEAT 6 ADD
PF 7 BACKWARD 8 FORWARD 9 XFILE 10 LEFT 11 RIGHT 12 JOIN
```



# IMS Explorer for Development



The screenshot displays the Rational Application Developer IDE for WebSphere Software, specifically the 'Data - IMS/Script1.sql' window. The interface is divided into several panes:

- Data Project Explorer:** Shows the project structure for 'IMS', including 'Data Diagrams', 'Data Models', 'Other Files', and 'SQL Scripts' (containing 'Script1.sql').
- Data Source Explorer:** Shows the database connection 'IMS (Generic JDBC 1.0)' and its schema 'PCB01', which includes tables like BILLING, DOCTOR, HOSPITAL, PATIENT, and PAYMENTS.
- SQL Editor:** Contains the following SQL query:

```
SELECT PCB01.PATIENT.PATNAME, PCB01.HOSPITAL.HOSPNAME
FROM PCB01.HOSPITAL, PCB01.PATIENT
```
- Table Schema Viewer:** Displays the structure of the 'HOSPITAL' and 'PATIENT' tables. The 'HOSPITAL' table has columns HOSPCODE, HOSPLL, and HOSPNAME. The 'PATIENT' table has columns HOSPITAL\_HOSPCODE, WARD\_WARDN, PATNUM, and PATNAME.
- Column Selection Dialog:** A dialog box for selecting columns for the query. The 'DISTINCT' checkbox is unchecked. The 'Columns' tab is active, showing a table with columns: Column, Alias, Output, Sort Type, and Sort Order. The columns 'PCB01.PATIENT.PATNAME' and 'PCB01.HOSPITAL.HOSPNAME' are selected in the 'Output' column.
- SQL Results:** A table showing the results of the query. The columns are 'Status', 'Operation', 'Date', 'Connection', 'Result1', and 'HOSPNAME'. The results are as follows:

Status	Operation	Date	Connection	Result1	HOSPNAME
✓	Succeed select * fro...	4/15/10 1:2...	IMS	1	BOB DAVIS
✓	Succeed	4/21/10 3:4...	IMS	2	KEVIN HITE
✓	Succeed	4/21/10 3:5...	IMS	3	MARIA QUERALES
✓	Succeed	4/21/10 3:5...	IMS	4	MAURICIO ADAMES
✓	Succeed	4/21/10 3:5...	IMS	5	WILLIAM LI
✓	Succeed SELECT PCB...	4/21/10 4:0...	IMS	6	ANNA LI
				7	DAPHNE STEELE
				8	HUGH WHITE
				9	ANDREA SMITH
				10	TORI GONZALEZ





# IMS Explorer for Development

```

*****
AUTOLPCB PCB TYPE=DB, DBDNAME=AUTOLDB, PROCOPT=AP, KEYLEN=100
SENSEG NAME=DEALER, PARENT=0
SENSEG NAME=MODEL, PARENT=DEALER
SENSEG NAME=ORDER, PARENT=MODEL
SENSEG NAME=SALES, PARENT=MODEL
SENSEG NAME=STOCK, PARENT=MODEL
SENSEG NAME=STOCSALE, PARENT=STOCK
SENSEG NAME=SALESPER, PARENT=DEALER
SENSEG NAME=SALESINF, PARENT=SALESPER
SENSEG NAME=EMPLINFO, PARENT=SALESPER

```

```

DBD NAME=AUTOODB, ACCESS=(HDAM, OSAM),
RMNAME=(DFSHDC40, 1, 5, 200)
DATASET DD1=DFSDLR
SEGM NAME=DEALER, PARENT=0, BYTES=61
FIELD NAME=(DLRNO, SEQ, U), BYTES=4, START=1, TYPE=C
FIELD NAME=DLRNAME, BYTES=30, START=5, TYPE=C SECINDX1 SEARCH1
FIELD NAME=CITY, BYTES=10, START=35, TYPE=C SECINDX1 SEARCH2
FIELD NAME=ZIP, BYTES=10, START=45, TYPE=C SECINDX1 SUBSEQ
FIELD NAME=PHONE, BYTES=7, START=55, TYPE=C SECINDX1 DUPD
LCHILD NAME=(SINDEXB, SINDEXT2), POINTER=INDX
XDFLD NAME=XFLD2, SEGMENT=MODEL,
SRCH=(MAKE, MODEL),
SUBSEQ=(YEAR, /SX1),
DDATA=COUNT
SEGM NAME=MODEL, PARENT=DEALER, BYTES=37
FIELD NAME=(MODKEY, SEQ, U), BYTES=24, START=3,
TYPE=C SECINDX2 SEARCH
FIELD NAME=MODTYPE, BYTES=2, START=1, TYPE=C
FIELD NAME=MAKE, BYTES=10, START=3, TYPE=C SECINDX2 SEARCH
FIELD NAME=MODEL, BYTES=10, START=13, TYPE=C SECINDX2 SEARCH
FIELD NAME=YEAR, BYTES=4, START=23, TYPE=C SECINDX2 SUBSEQ
FIELD NAME=MSRP, BYTES=5, START=27, TYPE=P
FIELD NAME=COUNT, BYTES=2, START=32, TYPE=P SECINDX2 DUPD
FIELD NAME=/SX1
SEGM NAME=ORDER, PARENT=MODEL, BYTES=74
FIELD NAME=(ORDNBR, SEQ, U), BYTES=6, START=1, TYPE=C
FIELD NAME=LASTNME, BYTES=25, START=7, TYPE=C
FIELD NAME=FIRSTNME, BYTES=25, START=32, TYPE=C
FIELD NAME=DATE, BYTES=10, START=57, TYPE=C
FIELD NAME=TIME, BYTES=8, START=67, TYPE=C
LCHILD NAME=(SINDEXA, SINDEXT1), POINTER=INDX
XDFLD NAME=XFLD1, SRCH=(LASTNME, FIRSTNME, ORDNBR),
DDATA=DATE
SEGM NAME=SALES, PARENT=((MODEL, ), (STOCK, PHYSICAL, AUTOODB)),
BYTES=85,
POINTER=(LPARNT, LTWINBWD, TWINBWD),

```

# IMS Explorer for Development

The screenshot displays the IMS Explorer for Development interface within the Eclipse Platform. The main workspace shows a hierarchical diagram of IMS data structures. The structures and their fields are as follows:

- DEALER** (Total length: 61): DLRNO, DLRNAME, CITY, ZIP, PHONE, EXCH, NUMB
- MODEL** (Total length: 37): MODTYPE, MODKEY, MAKE, MODEL, YEAR, MSRP, COUNT1
- ORDER1** (Total length: 74): ORDNBR, LASTNME, FIRSTNME, DATE
- SALES** (Total length: 85): SALENUM, SALDATE, LASTNME
- STOCK** (Total length: 46): STKVIN, COLOR, PRICE, LOT
- SALESPE** (Total length: 46): EMPNO

The interface includes a Package Explorer on the left showing the project structure, a Properties window at the bottom, and an Outline window on the right.



## IMS Explorer for Administration (intended direction)

- **Provide IMS system programmers and DBAs a state-of-the-art user interface to manage, configure, and deploy IMS systems**
- **Full operational control over all IMS address spaces**
- **Full command of IMS resources**
  - Programs, transactions, databases, etc
- **Immediately react to and resolve issues in the system**
- **Cloud-style IMS system management**
  - IMS region profiling, application profiling, application deployment





# IMS Explorer for Administration (intended support)

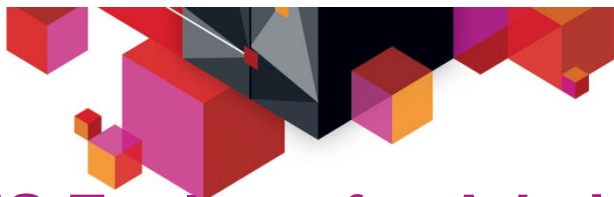
## IMSpIex at-a-glance

Immediate insight into properties of any given IMSpIex

Drill-down for advanced insight and action

The screenshot shows the IBM Tools Base Administration Console for z/OS interface. The browser title is "IBM Tools Base Administration Console for z/OS - Mozilla Firefox". The address bar shows "localhost:10080/imweb/tac/index.html". The page has a blue header with "Resources" and a search bar. The main content area displays a table of IMSplex members for PLEX2.

Name	IMSpIex	Member	Type	SubType	Job	Status	Version	OS Image	CC
I12A	CSLPLEX2	OMBB10M	IMS	DBDC	IM12ACTL	READY,ACTIVE	12.1.0	STLABB1	0
IMSPLEX2	CSLPLEX2	OMBB10M	IMSCON		IM12IC1A	ACTIVE	12.1.0	STLABB1	0



# IMS Explorer for Administration (intended support)

## Transaction insight

Transaction and program status immediately available

Operate directly on transactions

The screenshot shows the IBM Tools Base Administration Console for z/OS in a Mozilla Firefox browser. The browser address bar shows 'localhost:10080/imweb/itac/index.html'. The page title is 'IBM Tools Base Administration Console for z/OS'. The main content area displays a tree view on the left with 'PLEX2 > I12A > Transactions' selected. The main table lists transactions with columns: TranCode, Tran Status, CC, CMTM, FP, LCLS, MSGT, LQ, MBR, PGM, and PGM Status. The table contains 10 rows of transaction data.

TranCode	Tran Status	CC	CMTM	FP	LCLS	MSGT	LQ	MBR	PGM	PGM Status
ADDINV	✓		SNGL	N	1	MULTSEG	0	I12A	DFSSAM04	✗
ADDPART	✓		SNGL	N	1	MULTSEG	0	I12A	DFSSAM04	✗
APOL11	✓		MULT	N	9	MULTSEG	0	I12A	APOL1	✓
APOL12	✓		MULT	N	10	MULTSEG	0	I12A	APOL1	✓
APOL13	✓		MULT	N	9	MULTSEG	0	I12A	APOL1	✓
APOL14	✓		MULT	N	10	MULTSEG	0	I12A	APOL1	✓
APOL15	✓		MULT	N	9	MULTSEG	0	I12A	APOL1	✓
APOL16	✓		MULT	N	10	MULTSEG	0	I12A	APOL1	✓



# IMS Explorer for Administration (intended support)

## Database insight

Status and attributes immediately available

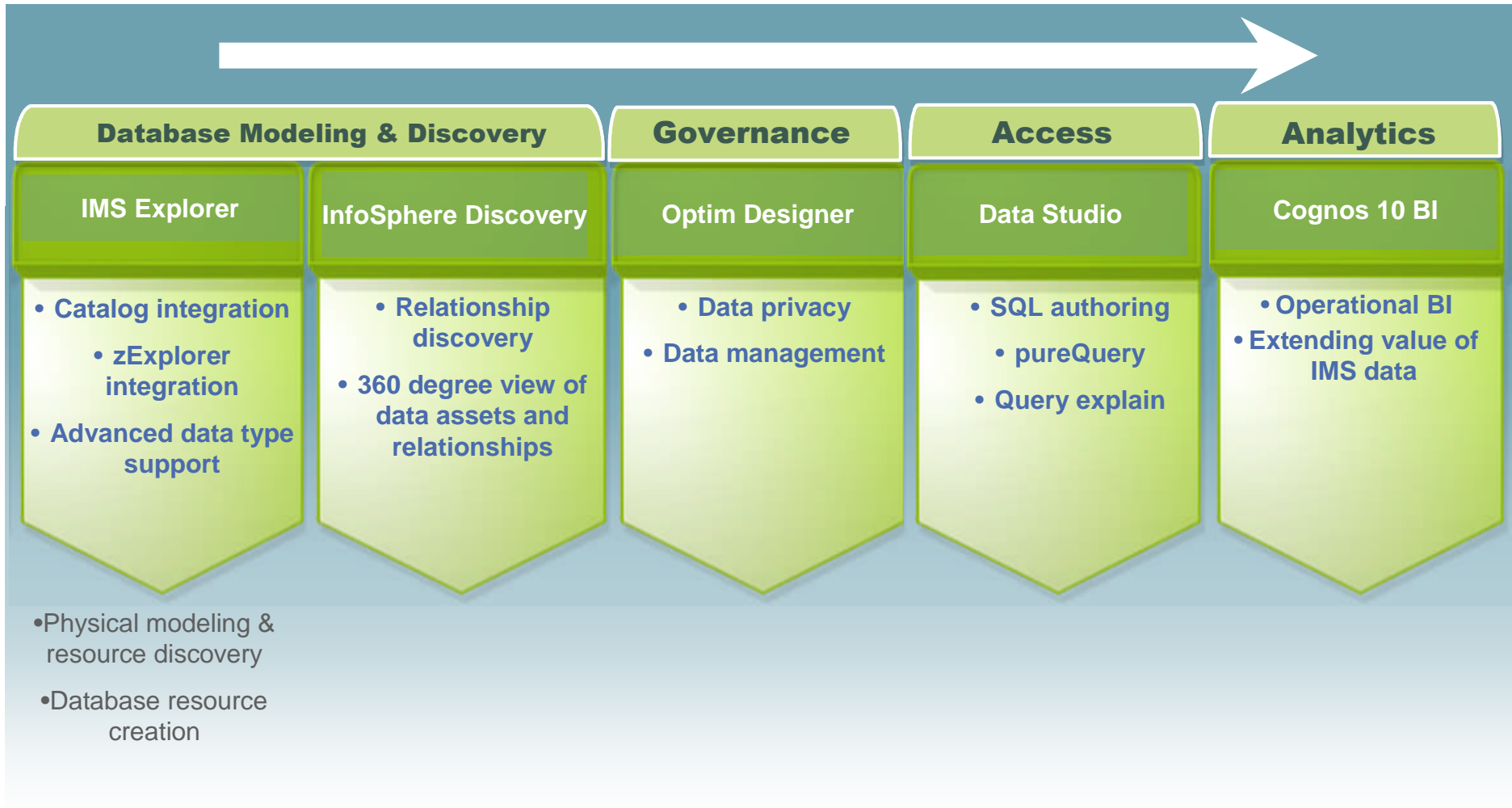
React and resolve issues

The screenshot shows the IBM Tools Base Administration Console for z/OS in a Mozilla Firefox browser. The page title is "IBM Tools Base Administration Console for z/OS - Mozilla Firefox". The browser address bar shows "localhost:10080/imweb/itac/index.html". The page has a navigation menu with "View" and "Configure" options. The main content area is titled "Resources" and shows a breadcrumb path "PLEX1 > IMS1 > Databases". A table lists database resources with columns: Database, Last Creation Time, Member, Access, Status, Local Storage, and Definition. The table contains 10 rows of data. The row for "BANKATMS" is highlighted in blue and has a yellow warning icon in the Status column. The left sidebar shows a tree view of the IMS structure, with "PLEX1 > IMS1 > Databases" selected.

Database	Last Creation Time	Member	Access	Status	Local Storage	Definition
AUTO DB	2012.254 11:30:48.48	IMS1	UPD	✓	N	MODBLKS
AUTO DBH	2012.254 11:30:48.48	IMS1	UPD	⚠	N	MODBLKS
BANKATMS	2012.254 11:30:48.48	IMS1	EXCL	⚠	N	MODBLKS
BANKFNCL	2012.254 11:30:48.48	IMS1	EXCL	⚠	N	MODBLKS
BANKLDGR	2012.254 11:30:48.48	IMS1	EXCL	⚠	N	MODBLKS
BANKTERM	2012.254 11:30:48.48	IMS1	EXCL	⚠	N	MODBLKS
BE2PCUST	2012.254 11:30:48.48	IMS1	EXCL	✓	N	MODBLKS
BE3ORDER	2012.254 11:30:48.48	IMS1	EXCL	✓	N	MODBLKS



## Intended portfolio integration





## Intended runtime integration

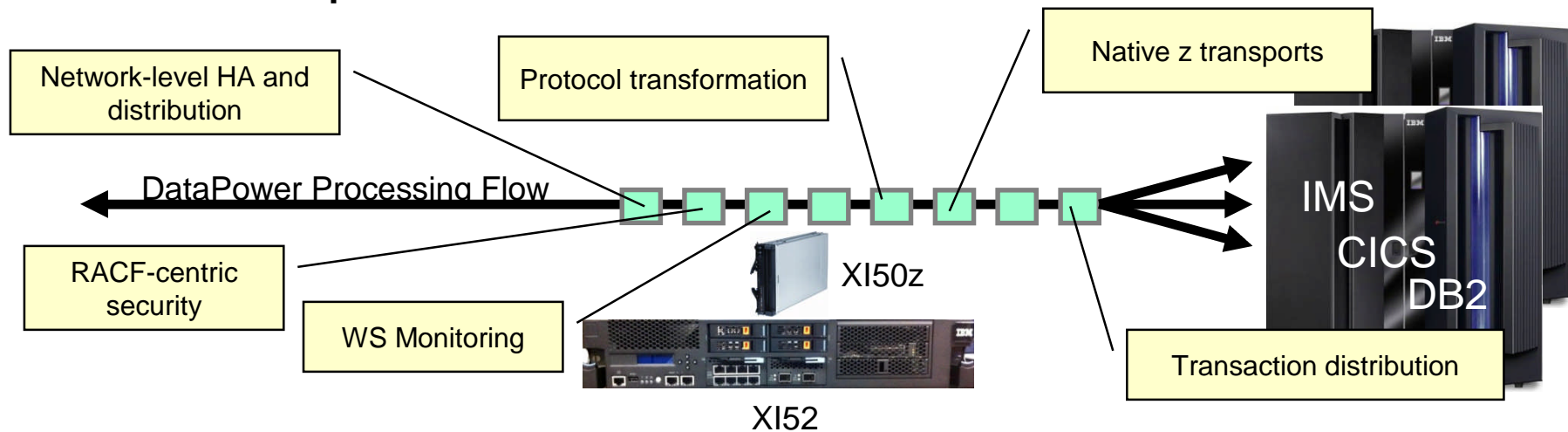
- **WebSphere Message Broker**
  - Leverage the JDBC driver support in WMB in order to offer access to IMS DB via the Universal JDBC driver
- **SAP**
  - SAP support for Java deployment accessing IMS DB using JDBC and SQL via the Universal drivers
- **.NET**
  - .NET data provider offering SQL access to IMS from the .NET platform
- **Data Power**
  - Leverage Universal JDBC driver support for IMS data access



# Premier System z web service enablement through DataPower SOA appliances

## IBM cross-brand initiative

- Deep synergy between DataPower, System z, Rational and Common Transformation tooling to support DataPower as the premier System z gateway for IMS, CICS and DB2
- Intended support for IMS DB access
- Intended support for top-down service approach for inbound and outbound IMS transactional requests





## IMS modernization - moving forward

- **Continued aggressive investment in**
  - Application modernization
  - Database modernization
- **Continued investment in integration opportunities**
- **Continued synergy with both software and hardware stack updates to maximize exploitation**
- **Continue to invest in solutions and technology which reduce the overall cost**



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