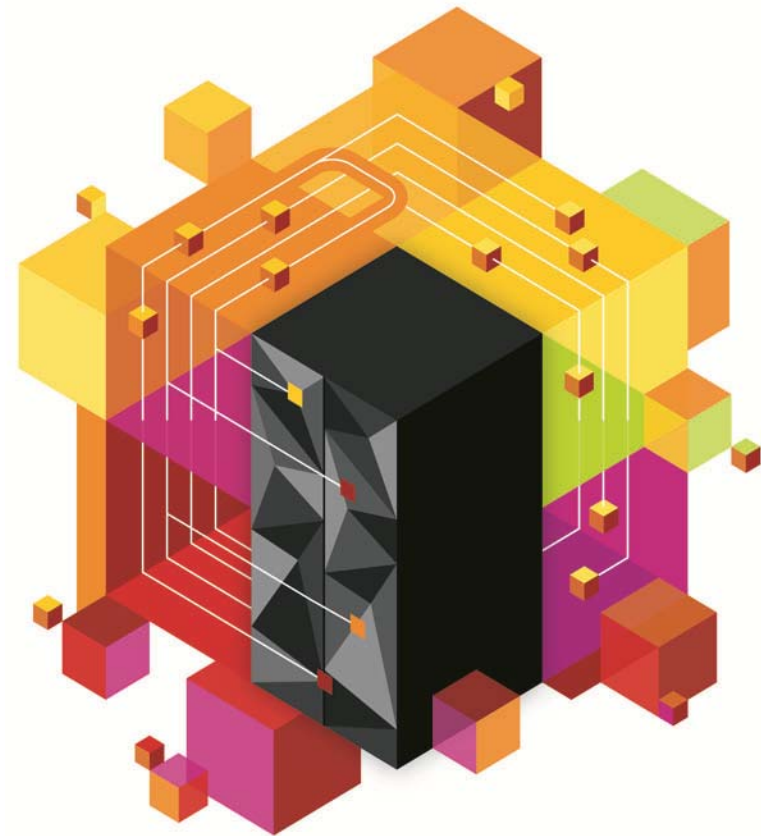




IBM zEnterprise Technology Summit

Accelerate IMS application
Modernization





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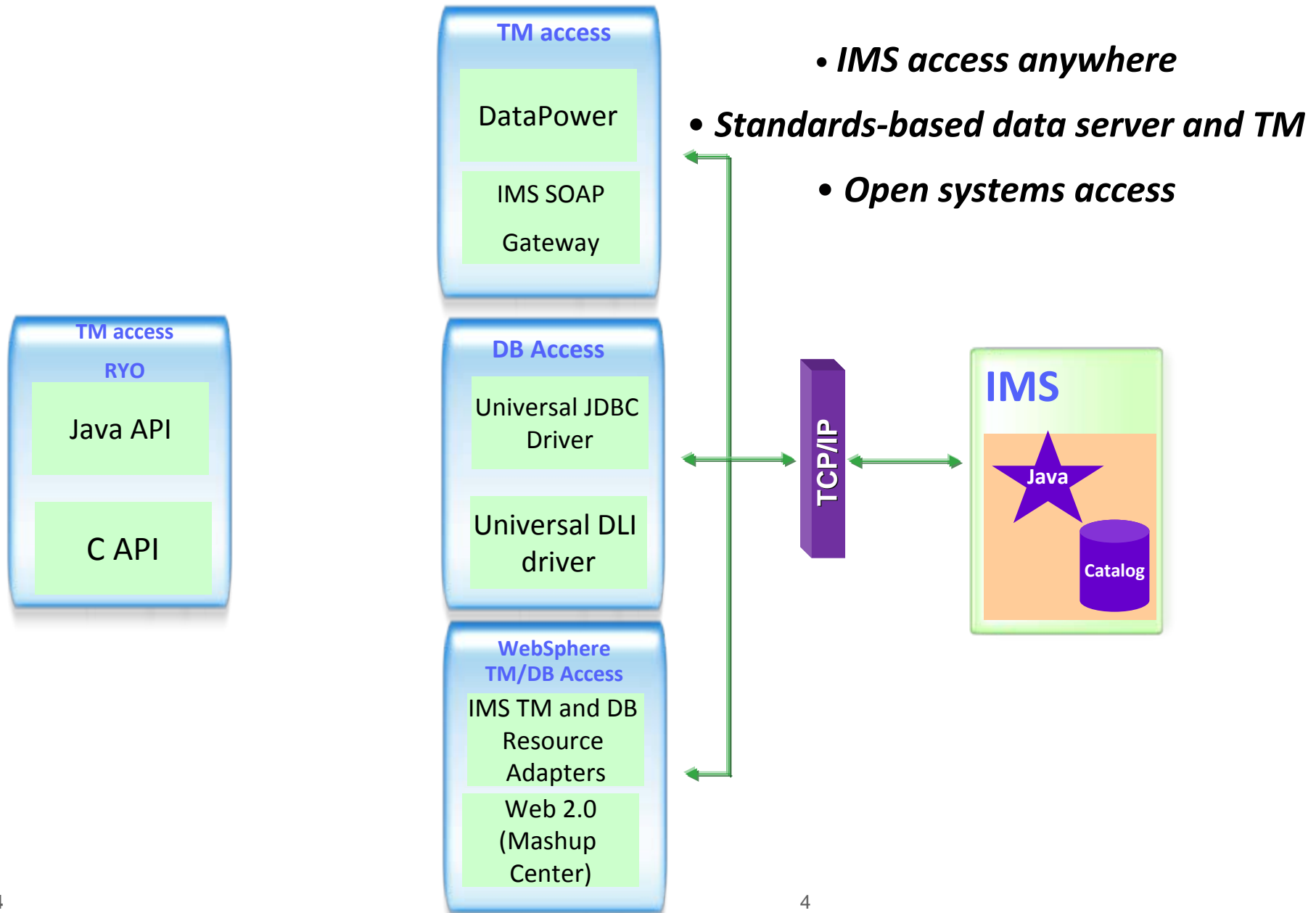


Agenda

IMS modernization overview

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

IMS Modernization Solutions





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

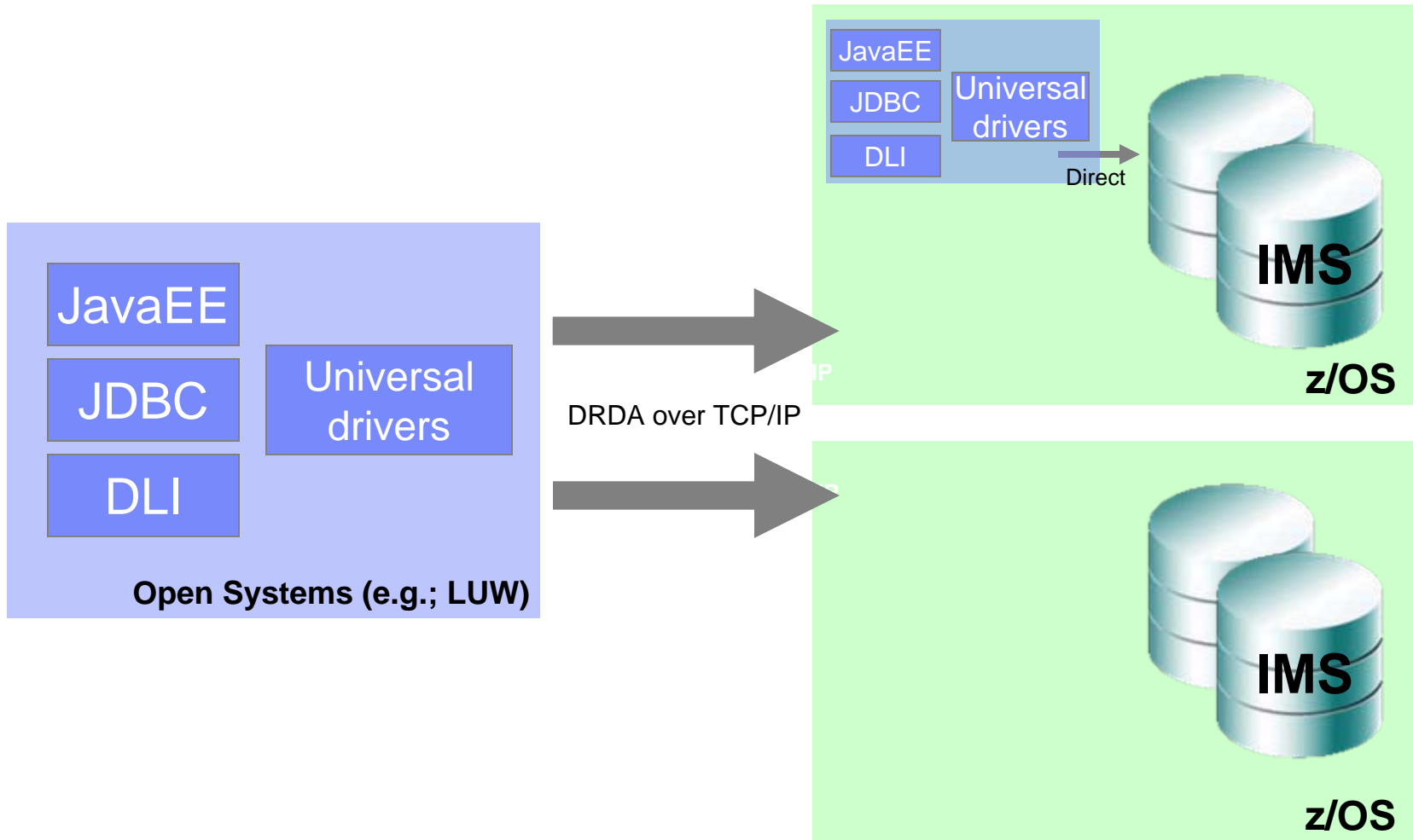
Key differentiators

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

Enables new application design frameworks and patterns

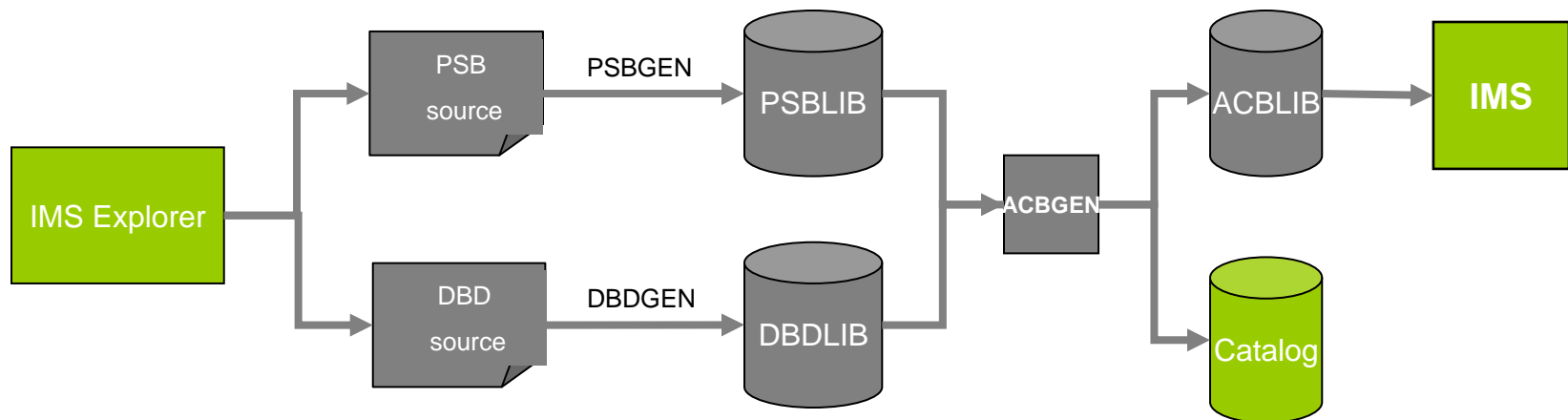
- **JCA 1.5 (Java EE)**
- **JDBC**

IMS Open Database



IMS 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 support

- Including similar connection parameters as DB2 for commonality across IBM drivers
- More to come

Continued integration across the IBM portfolio

Maps

Mapping support

- A Map is metadata that describes how a field (or set of fields) are mapped for a particular segment instance
- Metadata captures the various cases and for each case defines the set of fields to be used for that case
- Maps can be defined to the catalog
- Example
 - Insurance segment mapped multiple ways depending on value of a 'Policy Type' field

Policy Type	Property Type	Rooms	Value	Address	Make	Model	Year	Value	Color
M	-	-	-	-	Ford	Escort	1989	2K	Red
H	Single Family	5	500K	555 Disk Drive Way, 95141	-	-	-	-	-

Additional enhancements

- **SQL**

- FETCH FIRST <n> ROWS ONLY
- INNER JOIN <table2> ON <table1.col1> = <table2.col2>

- **Connection properties**

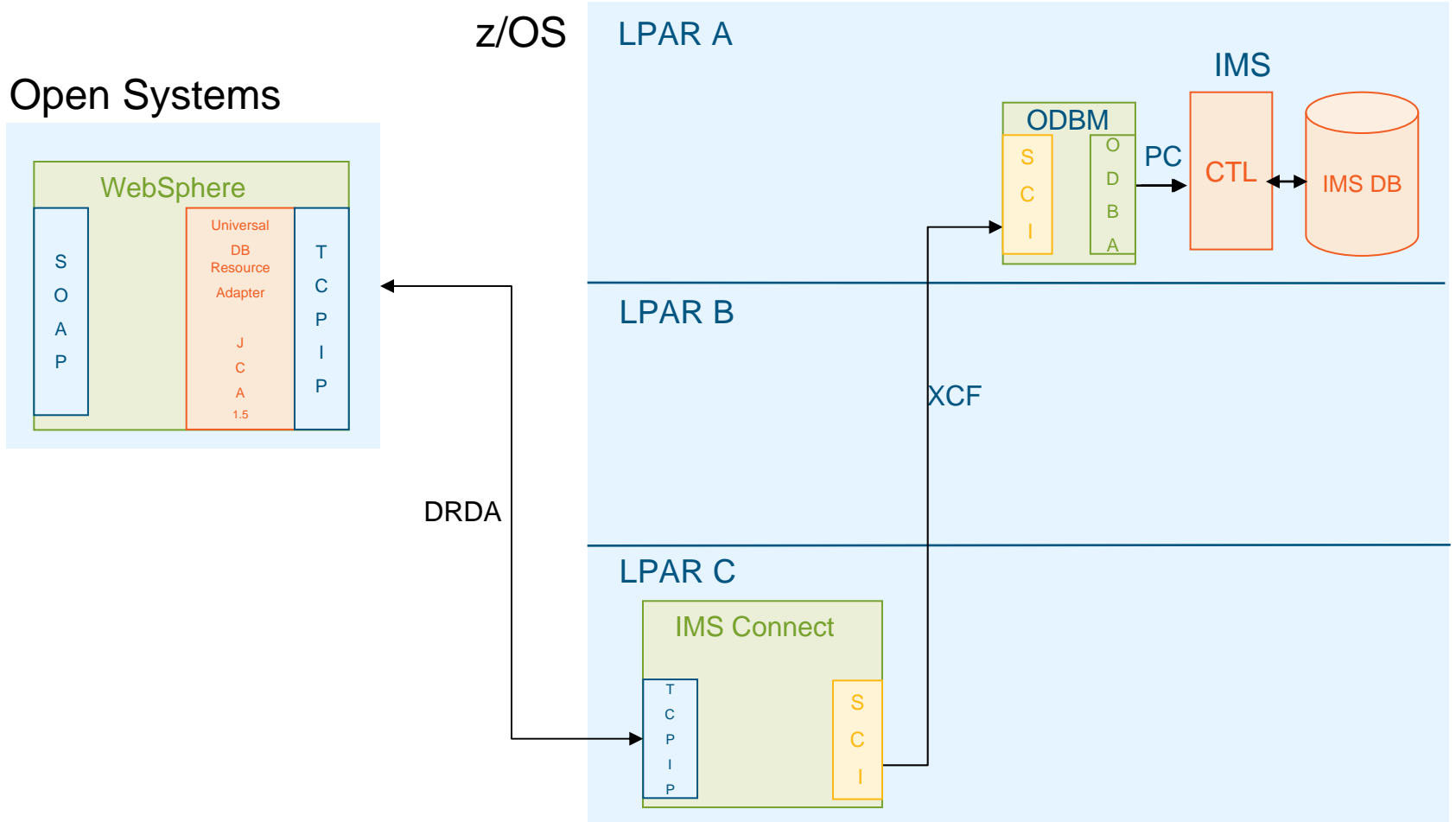
- currentSchema
- maxRows
- fetchSize
- Tracing
 - traceFile, traceFileAppend, traceDirectory, traceLevel

- **Variable length segment support**

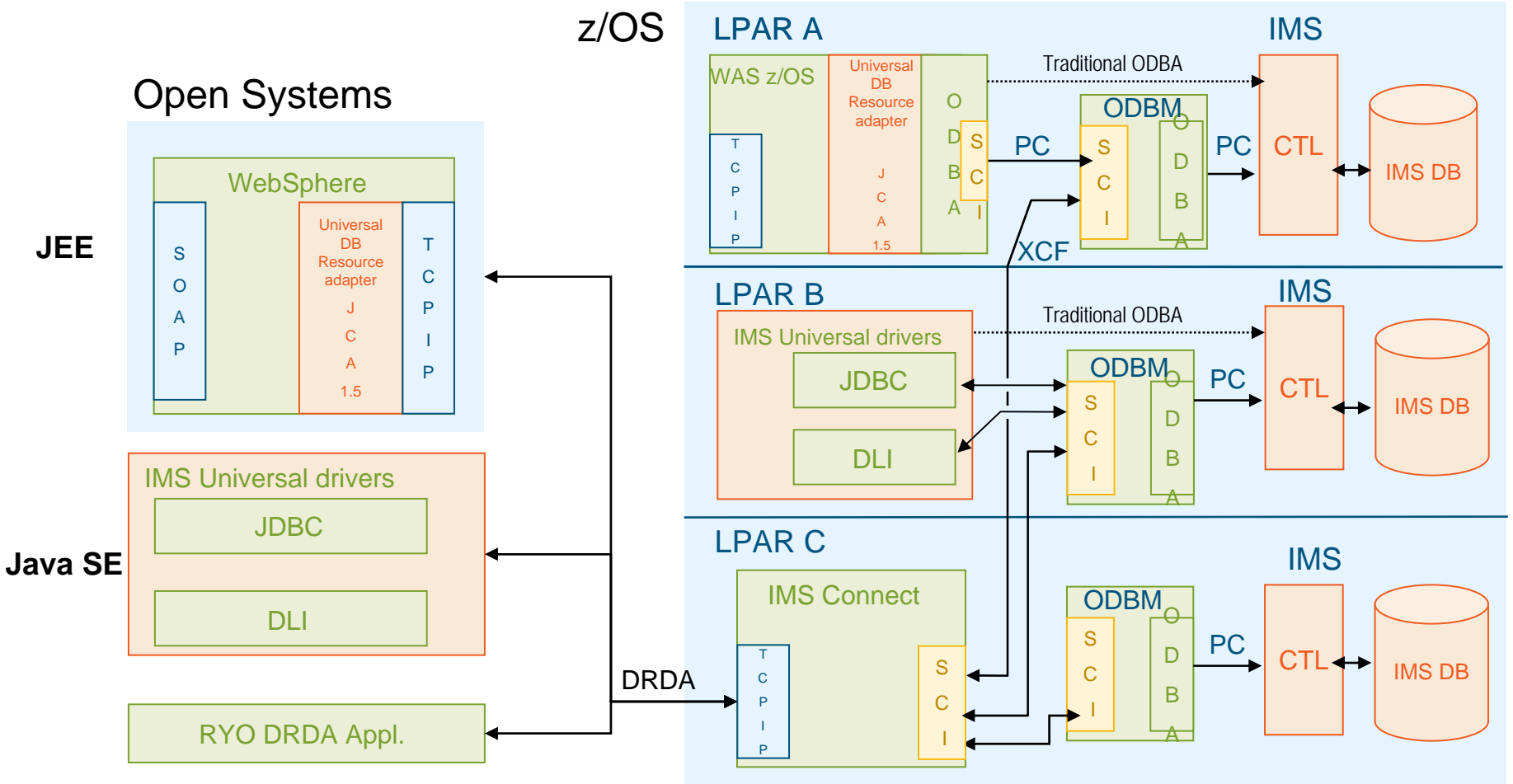
- VL segments contain a two byte length (LL) field that will identify the size of the segment instance
- Universal Drivers are now sensitive to the LL field of a VL segment and will manage the IO area of the segment instance on all CRUD calls

FIELD=PERSONAL_INFO (VLOB min length=82 max length=112)			
INNER FIELD=LENGTH (2 bytes)	INNER FIELD=NAME (30 bytes)	INNER FIELD=ADDRESS (50 bytes)	INNER FIELD=EMAIL (optional field 30 bytes)
112	RICHARD	555 Bailey Ave	tran@abc123.com
82	KEVIN	555 Bailey Ave	< does not exist physically on disk >

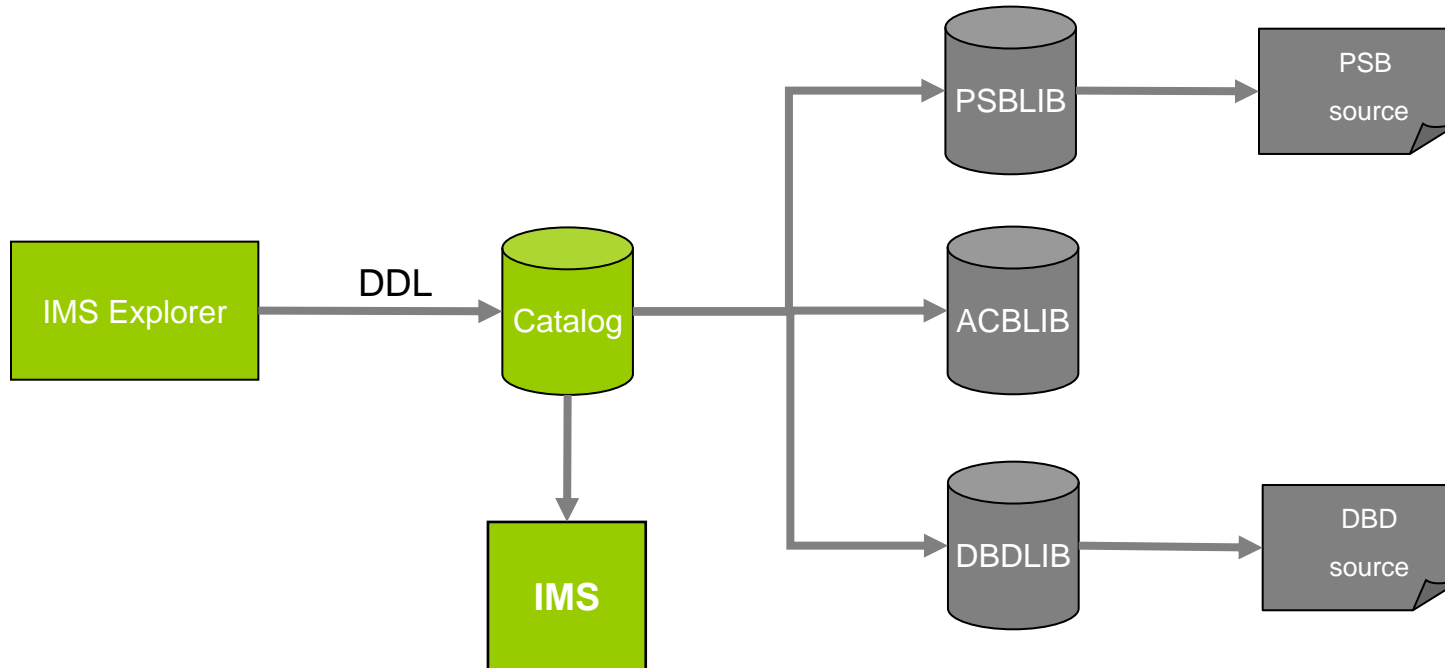
IMS Open Database environment



IMS Open Database environment



IMS catalog – intended support

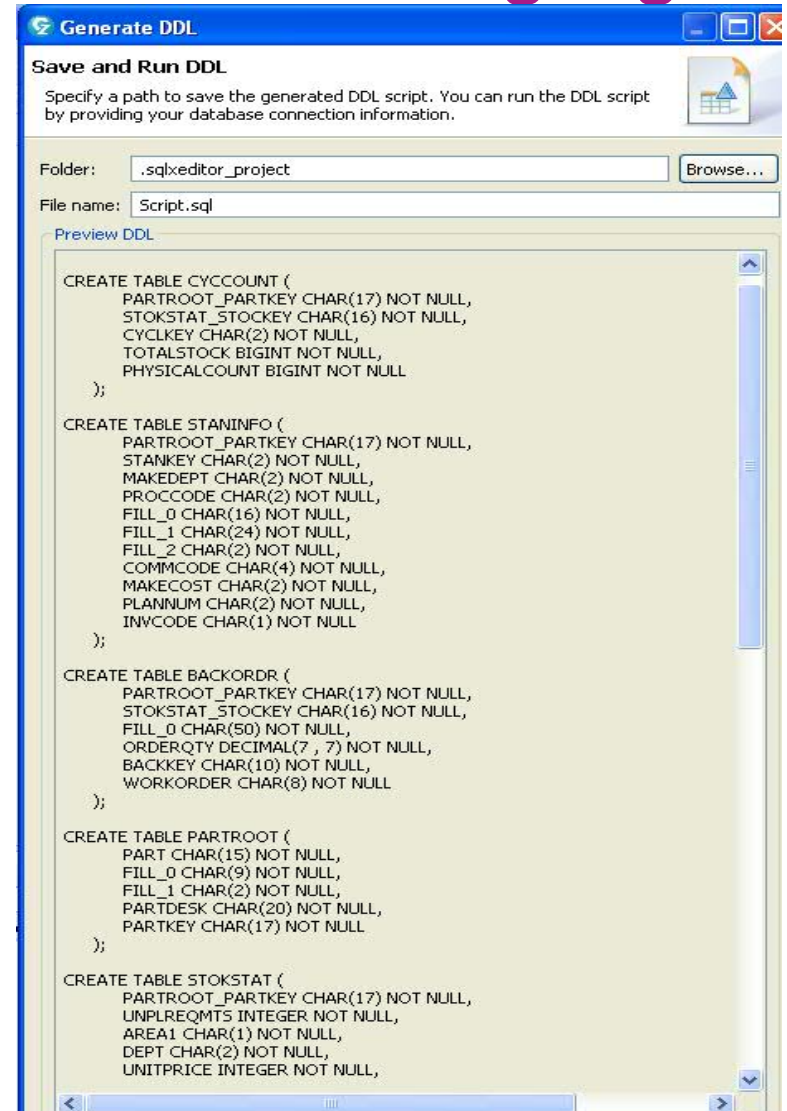


IMS DB changes *start* with catalog

- 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/DDL 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 Explorer for Development

```

$DDLT0 NEWJCL F1 V 80 Trunc=80 Size=96 Line=25 Col=1 Alt=0
====>
00022 U *****
00023 W T0 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 W T0 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 shows the Rational Application Developer environment with the following components:

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

```
SELECT PCB01.PATIENT.PATNAME, PCB01.HOSPITAL.HOSPNAME
FROM PCB01.HOSPITAL, PCB01.PATIENT
```
- Properties Window:** Shows the 'HOSPITAL' and 'PATIENT' tables with their respective columns and data types.
- SQL Results Window:** Displays the results of the query in a table with 10 records.

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

```
*****
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), XG
        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=(SINDXB, SINDEXT2), POINTER=INDX
XDFLD   NAME=XFLD2, SEGMENT=MODEL, XG
        SRCH=(MAKE, MODEL), XG
        SUBSEQ=(YEAR, /SX1), XG
        DDATA=COUNT
SEGM     NAME=MODEL, PARENT=DEALER, BYTES=37
FIELD   NAME=(MODKEY, SEQ, U), BYTES=24, START=3, XG
        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=(SINDXA, SINDEXT1), POINTER=INDX
XDFLD   NAME=XFLD1, SRCH=(LASTNME, FIRSTNME, ORDNBR), XG
        DDATA=DATE
SEGM     NAME=SALES, PARENT=((MODEL, ), (STOCK, PHYSICAL, AUTOODB)), XG
        BYTES=85, XG
        POINTER=(LPARNT, LTWINBWD, TWINBWD), XG
```

IMS - AUTPSB1.mdl - Eclipse Platform

File Edit View Navigate Search Project Run Window Help

Package Explorer Navigator AUTPSB1DatabaseView.java AUTPSB1.mdl

demo

- Diagrams
 - AUTPSB1.mdl
- IMSSource
 - AUTPSB1.psb
 - AUTPSB1.xml
 - DEALRDB.dbd
 - DEALRDB.xml
 - EMPDB.dbd
 - EMPDB.xml
 - EMPLDB.dbd
 - EMPLDB.xml
- XMLSchema
 - AUTPSB1-PCB1.xsd
 - AUTPSB1-PCB2.xsd
- demo
 - AUTPSB1DatabaseView.java
 - AUTPSB1JavaReport.txt

JRE System Library [jre1.4.2_08]

imsjava.jar - C:\eclipse3.0.1\ eclipse\plu

DEALER
Total length: 61

- DLRNO
- DLRNAME
- CITY
- ZIP
- PHONE
- EXCH
- NUMB

MODEL
Total length: 37

- MODTYPE
- MODKEY
- MAKE
- MODEL
- YEAR
- MSRP
- COUNT1

SALESPE
Total len

- EMPNO

ORDER1
Total length: 74

- ORDNBR
- LASTNME
- FIRSTNME
- DATE

SALES
Total length: 85

- SALENUM
- SALDATE
- LASTNME

STOCK
Total length: 46

- STKVIN
- COLOR
- PRICE
- LOT

Outline

PCB: PCB1 | PCB: PCB2

Properties

Property	Value



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. The browser address bar indicates the URL is localhost:10080/imweb/tac/index.html. The main content area displays the 'Resources' section for 'PLEX2'. A search bar is visible at the top left. The left sidebar shows a tree view with 'PLEX2' selected, containing sub-items for 'I12A', 'Transactions', 'Programs', 'Databases', and 'IMSPLEX2'. The main table displays the following data:

Name	IMSpIex	Member	Type	SubType	Job	Status	Version	OS Image	CC
I12A	CSLPLEX2	OMBB10M	IMS	DBDC	IM12ACTL	READYACTIVE	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 interface. The browser address bar indicates the URL is localhost:10080/imweb/itac/index.html. The main content area displays a table of transactions for PLEX2 > I12A > Transactions. The table has columns for TranCode, Tran Status, CC, CMTM, FP, LCLS, MSGT, LQ, MBR, PGM, and PGM Status. The APOL15 transaction is highlighted with a mouse cursor.

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

IBM Tools Base Administration Console for z/OS - Mozilla Firefox

localhost:10080/imweb/itac/index.html

IBM Tools Base Administration Console for z/OS View Configure

Resources

Search

IMSPlex View

PLEX2

- I12A
 - Transactions
 - Programs
 - Databases
- IMSPLEX2

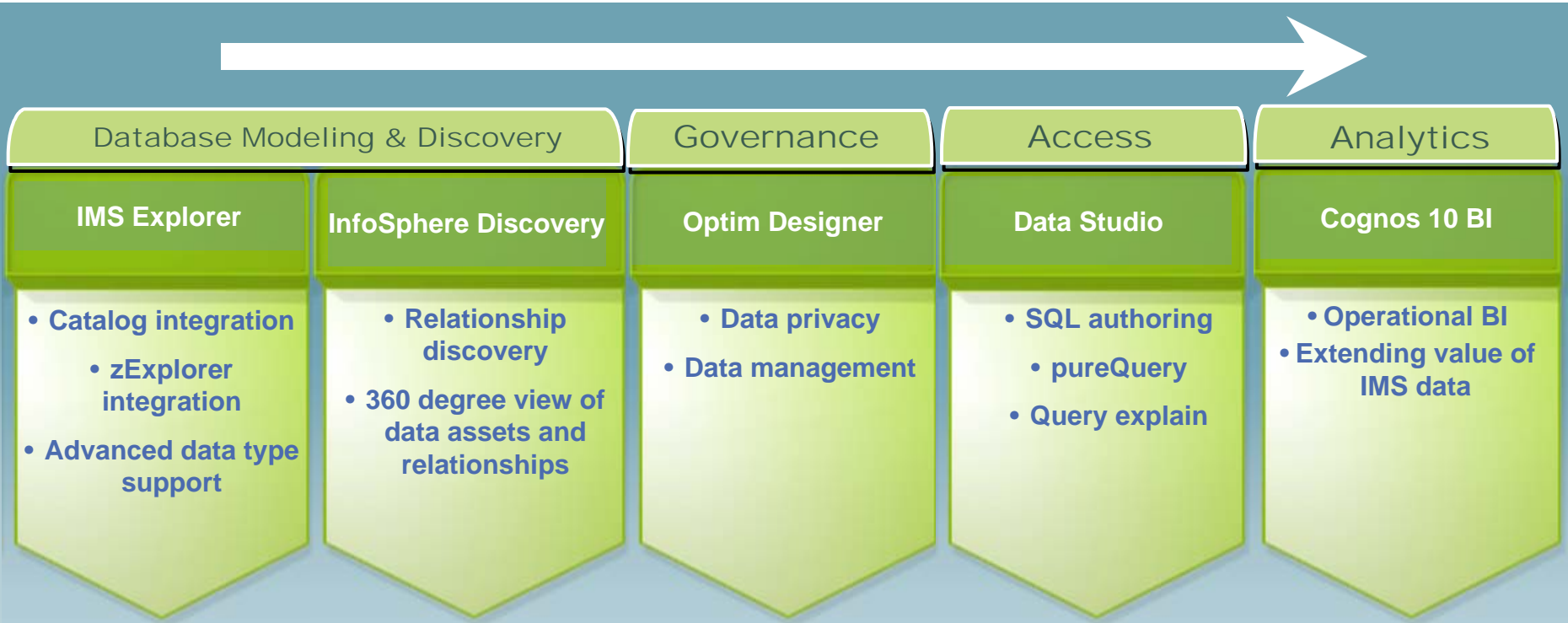
PLEX1

- IMS1
 - Transactions
 - Programs
 - Databases
- IMSPLEX1

PLEX1 > IMS1 > Databases

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



- Physical modeling & resource discovery
- Database resource creation



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

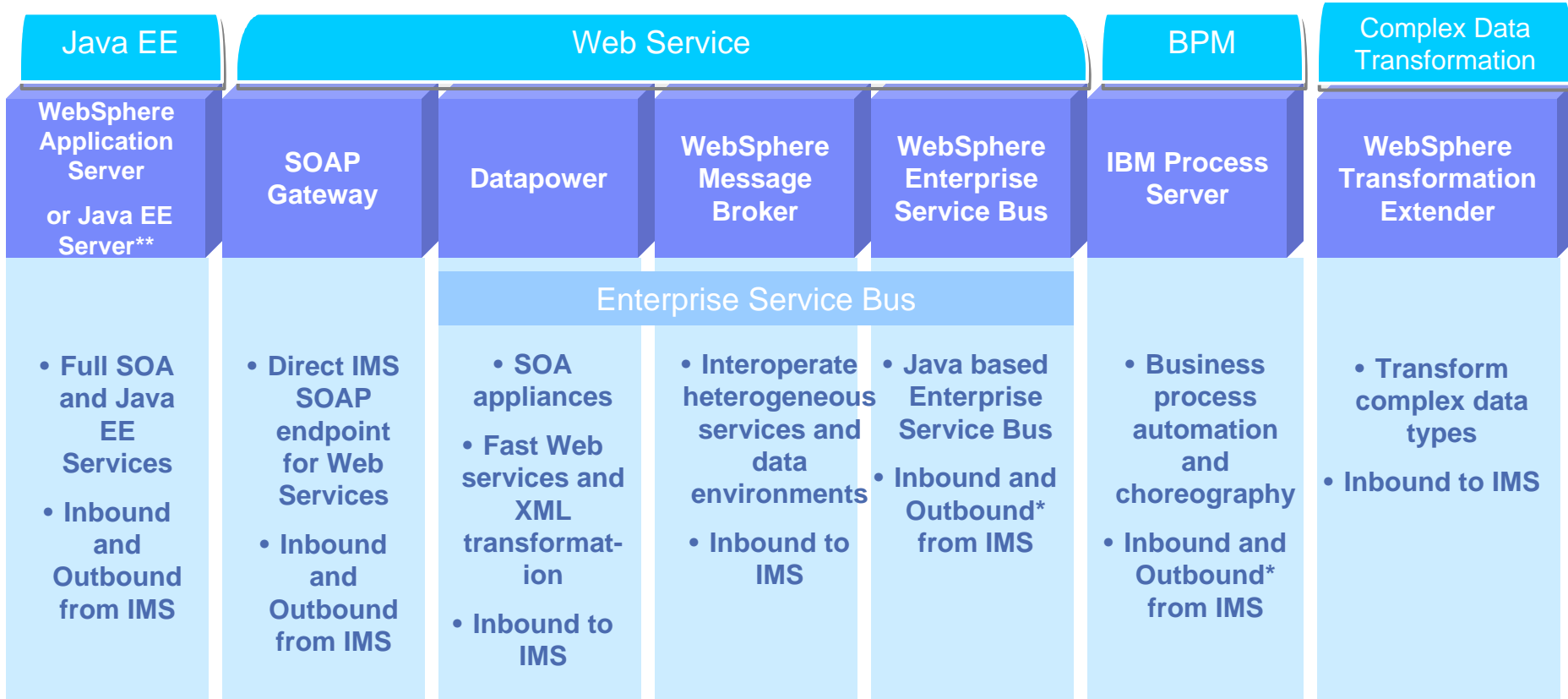
Java dependent region deployment

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 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**
 - Simplified installation with SMP on z/OS and IM (IBM Installation Manager) on distributed platforms
 - Top-Down PL/I Provider support
 - Enhanced Management Utility with task automation
 - Major security enhancements: AT-TLS, Custom Authentication Module, SAML 1.1 Unsigned/Signed, SAML 2.0 Unsigned
 - Significant performance improvement



IMS Enterprise Suite 2.2. SOAP Gateway enhancements

▪ **Advanced installation**

- Consistent installation story using IBM Installation Manager (IM) on all supported platforms
- Make the post-SMP installation process flexible using IM on z/OS

▪ **End-to-end transaction tracking and monitoring**

- Provide server “Health Check” statistics and log
- Provide transaction tracking log
- Enable end-to-end transaction tracking
 - Allow client applications to pass in user-specified or SOAP Gateway generated unique transaction message ID and propagate to IMS Connect and IMS OTMA

▪ **WS-Security**

- Inbound with SAML 2.0 (signed), Outbound with SAML 1.1, 2.0 (unsigned)

▪ **Enhanced server shutdown options**

- Immediate or Graceful (process all in-flight messages and come down gracefully)

Top-down, WSDL-first application development

- **Develop new IMS applications starting from a Web Services Description Language (WSDL) file**
- **Generate traditional programming language data constructs from WSDL or complex XML documents**
- **Top-down for IMS PL/I inbound request (available today)**
 - Rational Developer for System z (RDz) 8.0.3
 - Support top-down development scenario
 - Generate PL/I IMS application template, language structures and XML input/output converters
- **Intended support for Top-down PL/I Outbound and COBOL Inbound/Outbound**

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

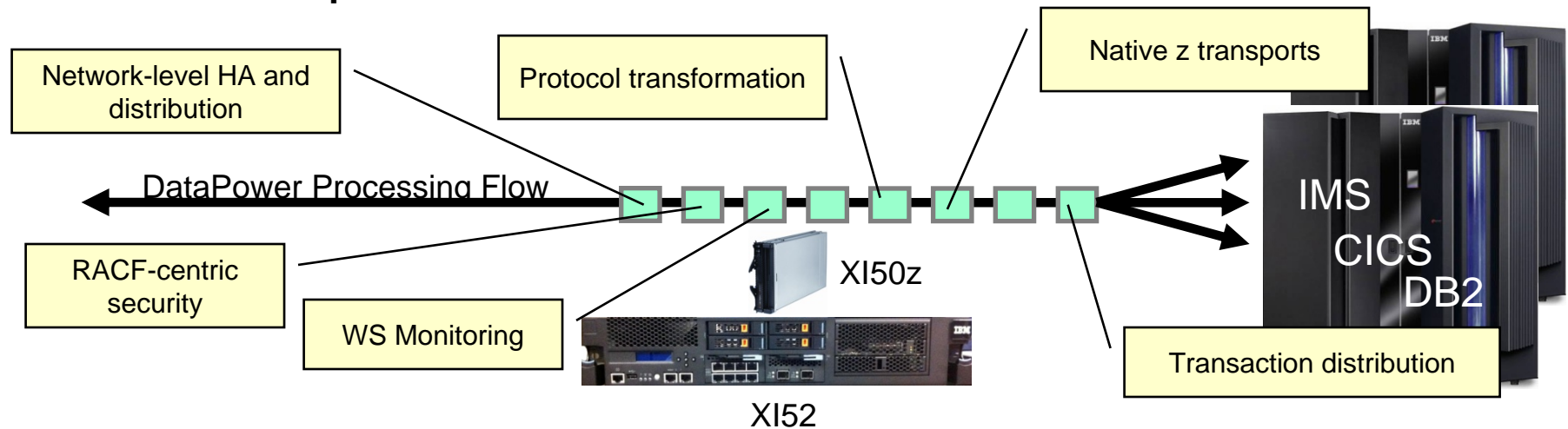
IMS 13 Callout enhancements

- **Synchronous program switch**
 - Extend IMS Synchronous Callout to invoke another IMS Application
 - DL/I ISRT continues to be used for asynchronous program switch
 - OTMA Descriptor enhanced to recognize an IMS transaction destination
 - Messages can be multi-segment
 - Value
 - Provides a single DL/I call interface to request a service regardless of where that service resides
 - Simplified integration and usability
- **OTMA Destination descriptor for WebSphere MQ asynchronous callout**
 - Expanded the current destination descriptor to support WebSphere MQ for asynchronous callout function
 - Value
 - Enhanced usability such that customer does not have to code OTMA routing exits

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**

An abstract graphic in the top-left corner composed of several 3D rectangular blocks in shades of red, pink, orange, and black, arranged in a cluster.

Wrap up