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IMS, Fit For the Future

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IMS – One of the Key IBM z/OS Middleware

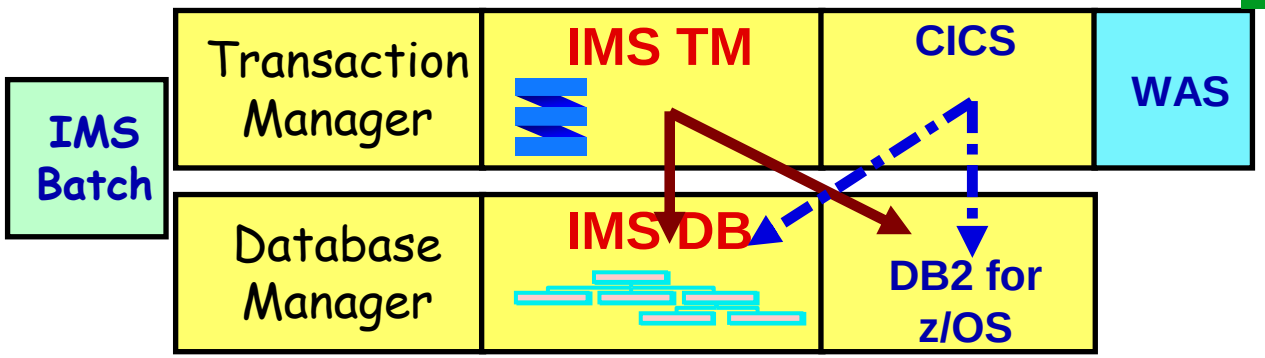
- **What is IMS?**
  - IBM's leading On-line **Transaction** & **Database** Management Software
  - Backbone of the world's enterprise computing - Mission critical applications
- **IMS is made up of two main parts**
  - IMS Database Manager
    - For data and batch processing
  - IMS Transaction Manager
    - For transaction and batch processing
  - And in addition, an IMS Batch standalone environment
    - Independent z/OS address space
    - No access to the IMS Online subsystem

IMS V11
GA 11/2009

IMS V12
QPP Ann 11/2010

Information Management

z/OS and Core Business Applications



Agenda

- **IMS Positioning**

- **IMS System – Built to manage Critical Enterprise Assets**
- **IMS Applications – Renovate, Leverage and Grow**
- **IMS Databases – Why NOT?**

IMS Position in IBM Smarter Planet

NEW INTELLIGENCE

"Data is exploding and it's in silos"

IMS & Information Integration

IMS & Operational BI

SMART WORK

"New business and process demands"

IMS & Business Process Mgmt

DYNAMIC INFRASTRUCTURE

"My infrastructure is inflexible and costly"

IMS & Parallel Sysplex

GREEN & BEYOND

"Our resources are limited"

IMS & Autonomics

DB2 | IMS DB | VSAM

DM Tools | Optim | Cognos

InfoSphere *Classic* Federation & Replication

WAS | IMS TM | CICS

Rational | Datapower | BRMS

Mashup | Business Event & Business Monitor

Master Data management

Tivoli

IMS TOOLS

z/OS
Parallel Sysplex
Security Server
WLM
Lowest TCO

System z | Data Compres. | De-duplication

IMS Position in the Smarter Computing Domains

Many different workloads which can benefit of the power of IMS!

- **Event driven business models**
- **High message processing rates**

Message Driven

TM – generation of Business Events
TM – Inbound and outbound integration with WMQ

- **Business on a global scale**
- **Huge transaction rates and high database activity**

Transaction Processing

Leading On-line Transaction & Database Management System
TM - Easy integration with BRMS, Events, MDM

- **Business on the Web**
- **Java front ends**

Web Facing

TM – Numerous callin & callout capabilities
DB – JDBC access to hierarchical data from every platforms (distributed or z/OS)
Web 2.0 support or how to quickly transform IMS assets into RESTful Services

- **ERP, CRM, Financials, etc.**
- **Custom or Packaged applications**

Data Processing

DB – Smarter data management
DB – Smarter data governance
DB – Smarter operational BI

- **Periodic business cycles**
- **Limited batch windows**

Batch Processing

Efficient Batch management thanks to z/OS capabilities
Highly parallel processing

And More …

IMS - State of the Business

- **IMS usage continues to increase across all customers 20%/year**
  - Smaller IMS customers: 150% growth over last 5 years
  - Medium IMS customers: 80% growth
  - Large IMS customers: 40% growth

- **We see an acceleration in projects around mainframe modernization and server consolidation**
  - IMS connectivity – integration & service enablement
  - IMS application modernization
  - IMS Business value assessment

- **IBM investment in IMS remains strong (almost 30% growth in past 4 years)**
  - Looking to expand in China, Russia and India

- **Overall IMS Customers**
  - 65% IMS TM/DB
  - 32% IMS DB only
  - 3% IMS TM only

- **Top 50 IMS Customers**
  - 43 run IMS TM/DB
  - 3 are IMS TM only
  - 3 are DBCTL
  - Over 50% run with SMQ
  - 27 are Fastpath

IMS "Value Proposition"

40+ years of Continuous Core Systems Improvement & Innovation

- **High Volume at Lowest Cost / TX for Mission Critical Work**
  - Remarkable performance that translates to the most cost efficient run-time environment
  - Reusing IMS transactions and data saves money!
- **"Gold standard" for high performance & scalability**
  - 29,000 trans/sec lab benchmark on IMS 11/z10 with DB update
  - Customers have routinely handled peaks of 100 million transactions in a day.
- **Very High Availability**
  - Large bank: 1.75 hours of down over 10 years of which 1.5 was planned; 0 hours of down time over the last 3 years
  - Have seen in other customers (3000+ days no unplanned outages)
- **"Bulletproof" System Recoverability**
  - Smooth restarts with no data loss
  - Focus on outage prevention
- **Database Manager specifically designed for low runtime costs**
  - ½ MIPS and ¼ storage compared to relational technology

The IMS Strategy

Cost savings

- **Do more with less!**
  - Reduce CPU utilization
  - Work in memory (above the bar)
  - Remove expired workload

Quality of Services

- **Infrastructure improvements for the Future!**
  - Performance is NOT an option!
  - Capacity - Supporting workload consolidation
  - And also availability, serviceability, security

Simplification

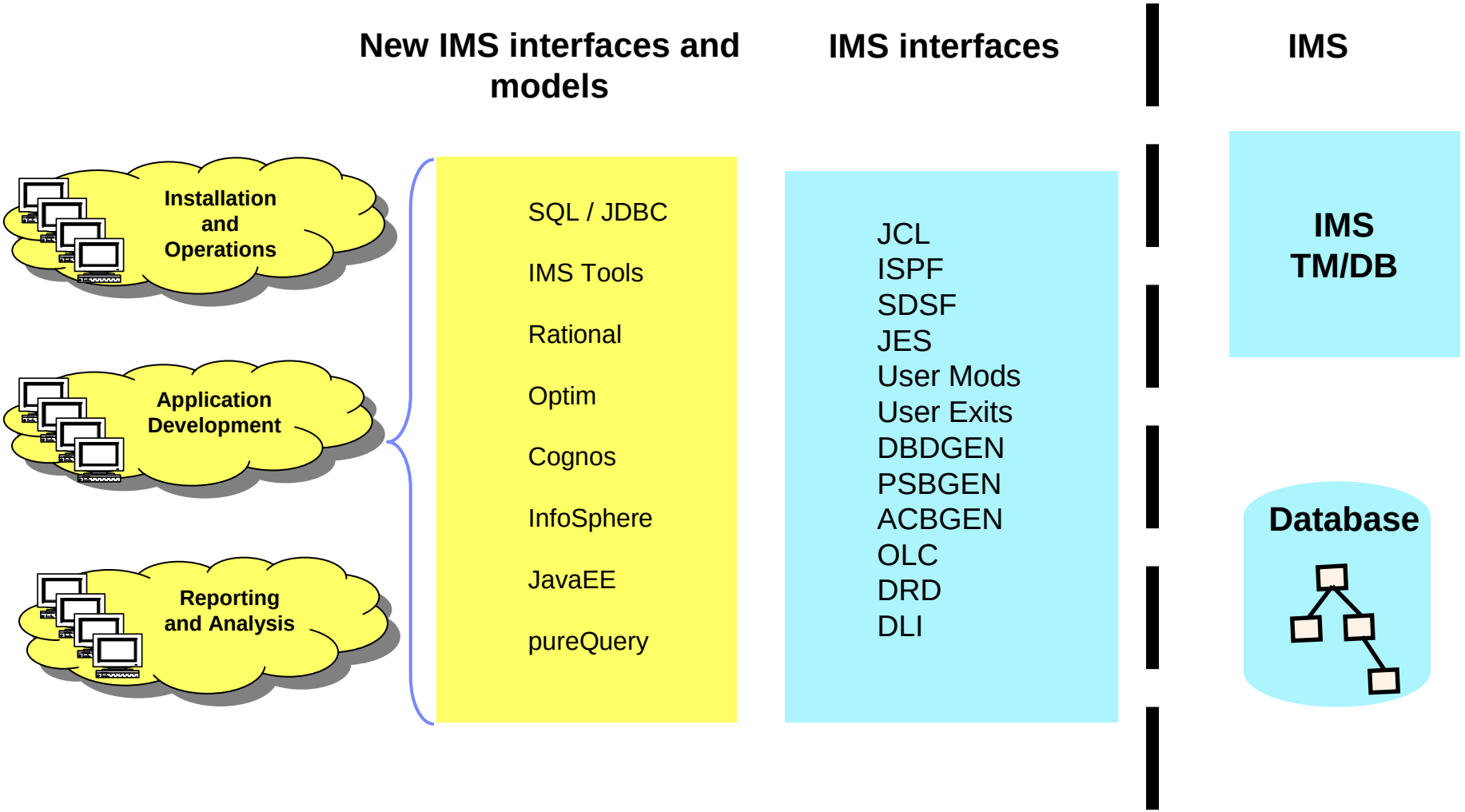
- **Simplifying IMS utilization (management of IMS systems as well as IMS application development)**
  - More intuitive UIs and interfaces to talk to IMS
  - More autonomic IMS Tools
  - To address the changing skills profiles in customers

Integration

Openness

- **Enhance and simplify integration of IMS assets with SOA and other Web solutions**
  - Support of SOA standards
  - Support of Web 2.0 for lightweight integration and rapid web application assembly

IMS Simplification Strategy



Reduce the need for special, in-depth IMS skills

IMS Evolution – Main Line Items

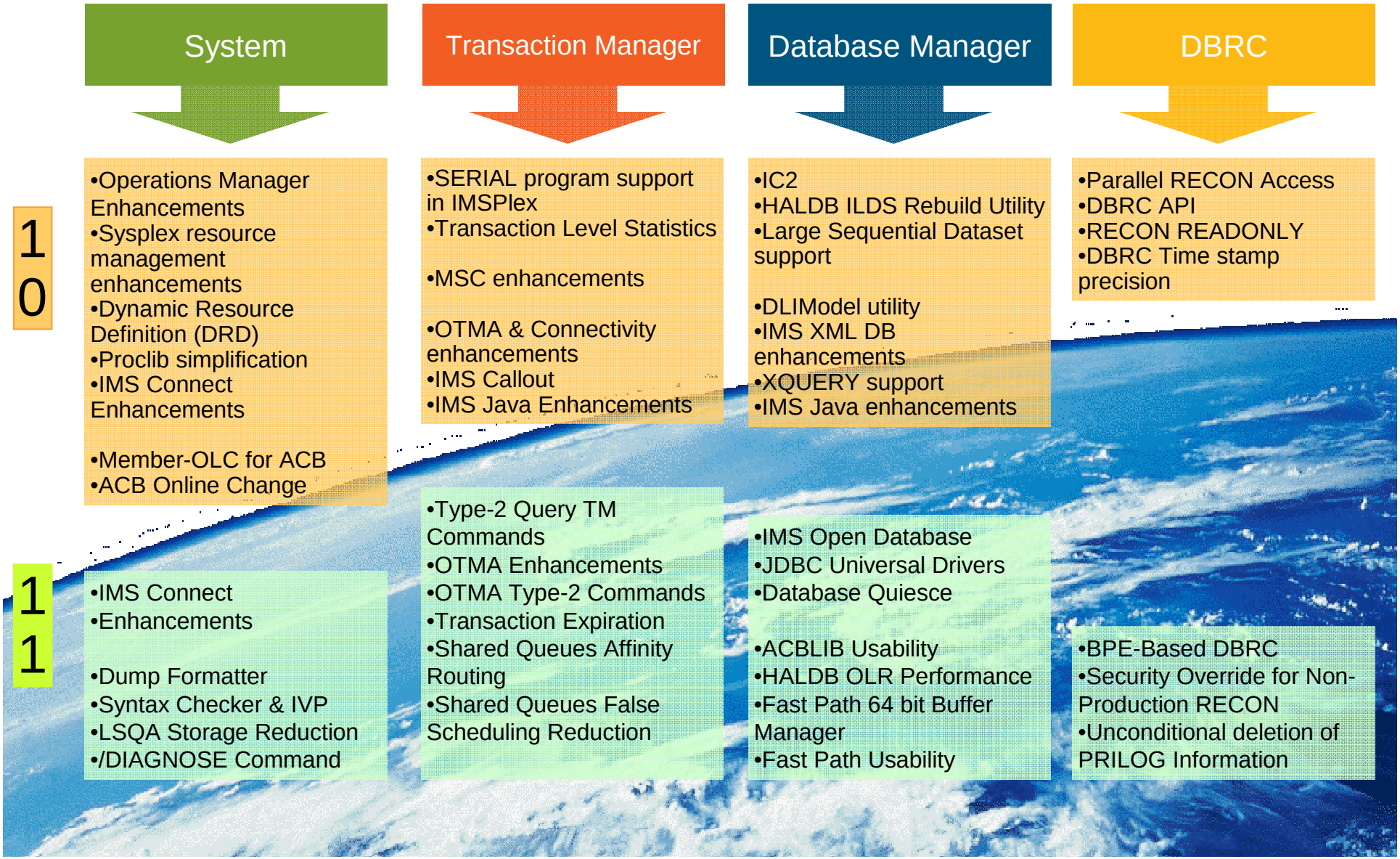
- **IMS 7 – went out of support in September 2005**
  - High Availability Large Database – The IMS partitioning solution
  - IMS Java – 1st Step
- **IMS 8 – GA in October 2002 – End of Support September 2008**
  - IMS Java – 2nd Step
  - New architecture for better Parallel Sysplex operation management – CSL 1st Step
- **IMS 9 – GA in October 2004 – Withdrawn from Marketing September 2009 – End of Support November 2010**
  - Online Reorganisation without restrictions for HALDB – 1st Step
  - Storing XML in IMS Databases
  - IMS Java – 3rd Step
  - Distributed JDBC access to IMS Databases
- **IMS 10 – GA in October 2007**
  - Dynamic resource definition
  - Operation management enhancements
  - SOA Connectivity enhancements including IMS async and sync callout capability
  - Extensive use of the Common Service Layer – CSL 2nd Step
- **IMS 11 – Available in October 2009**
  - IMS Open Database for IMS database access in z/OS IMSPlex or from distributed environments
  - Quiesce function to reduce the complexity in establishing a recovery point for a database
  - Online Reorganisation without restrictions for HALDB – 2nd Step
  - IMS Connect, OTMA enhancements

Supported Versions of IMS

IMS 12

- **IMS 12 – QPP Announced in October 2010**
  - FP Secondary indices
  - IMS repository

IMS 10 & 11 Highlights



	System	Transaction Manager	Database Manager	DBRC
10	•Operations Manager Enhancements •Sysplex resource management enhancements •Dynamic Resource Definition (DRD) •Proclib simplification •IMS Connect Enhancements •Member-OLC for ACB •ACB Online Change	•SERIAL program support in IMSPlex •Transaction Level Statistics •MSC enhancements •OTMA & Connectivity enhancements •IMS Callout •IMS Java Enhancements	•IC2 •HALDB ILDS Rebuild Utility •Large Sequential Dataset support •DLIModel utility •IMS XML DB enhancements •XQUERY support •IMS Java enhancements	•Parallel RECON Access •DBRC API •RECON READONLY •DBRC Time stamp precision
11	•IMS Connect •Enhancements •Dump Formatter •Syntax Checker & IVP •LSQA Storage Reduction •/DIAGNOSE Command	•Type-2 Query TM Commands •OTMA Enhancements •OTMA Type-2 Commands •Transaction Expiration •Shared Queues Affinity Routing •Shared Queues False Scheduling Reduction	•IMS Open Database •JDBC Universal Drivers •Database Quiesce •ACBLIB Usability •HALDB OLR Performance •Fast Path 64 bit Buffer Manager •Fast Path Usability	•BPE-Based DBRC •Security Override for Non-Production RECON •Unconditional deletion of PRILOG Information

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- **IMS Applications – Renovate, Leverage and Grow**
- **IMS Databases – Why NOT?**

IMS TM/DB in Perspective

- **IMS Transaction**
  - No presentation layer
  - Access to Resource Managers (RM)
    - IMS DB, DB2, MQ
  - Very simple design
    - Get Input Message
    - RM calls
    - ISRT Output Message

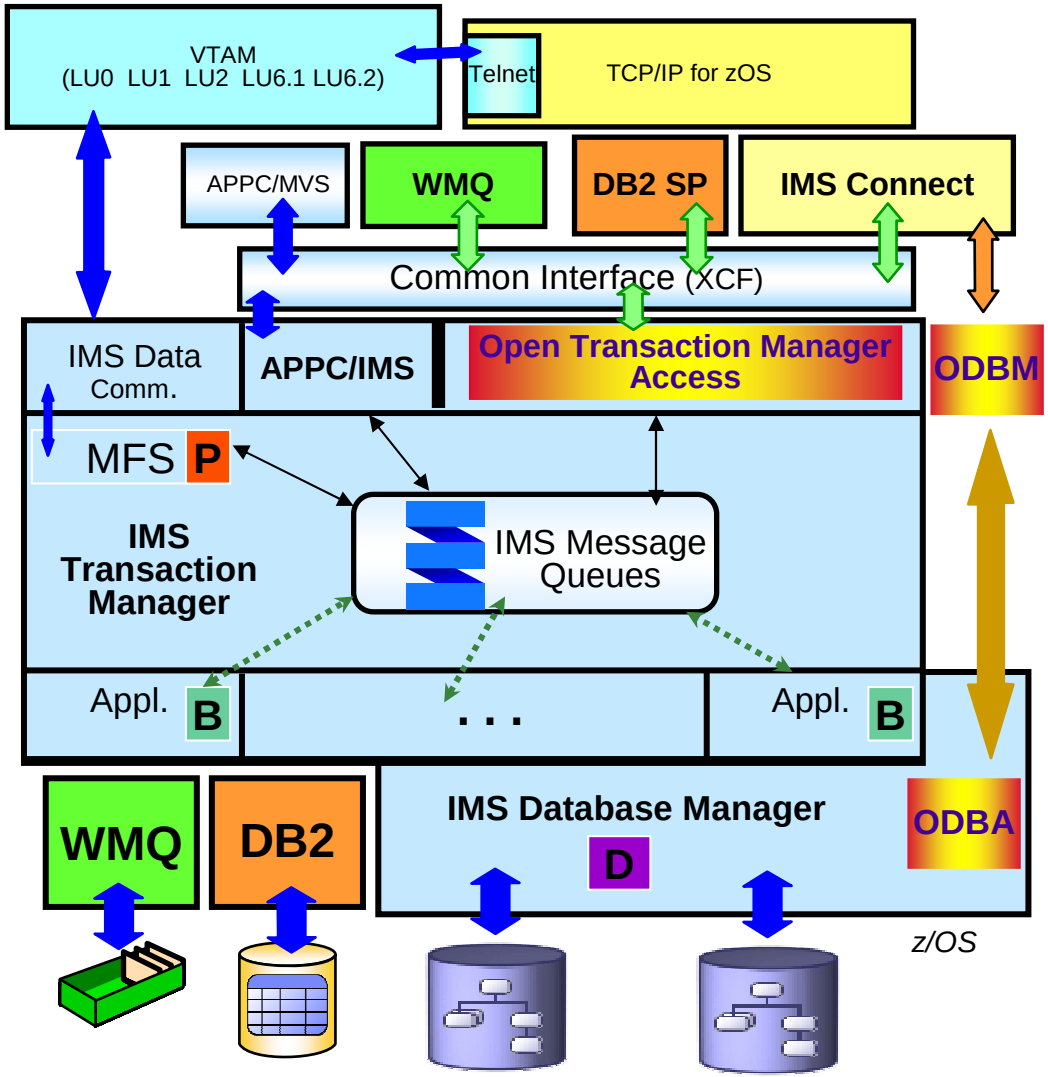
B

- **IMS Database**
  - Hierarchical design
  - JDBC access
  - XML datastore

D

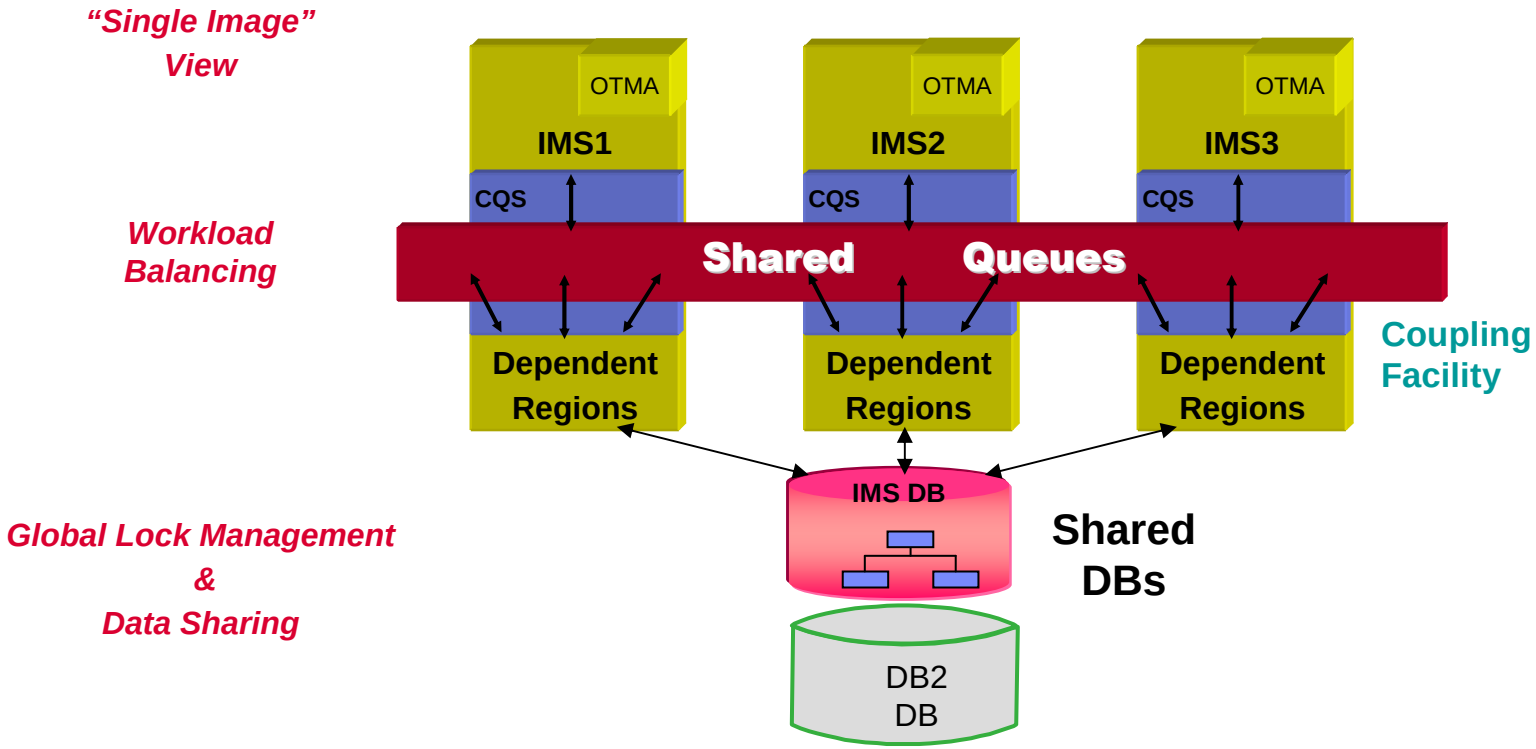
- **IMS MFS**
  - Description of input and output messages and device map
  - Not used in client/server implementations

P



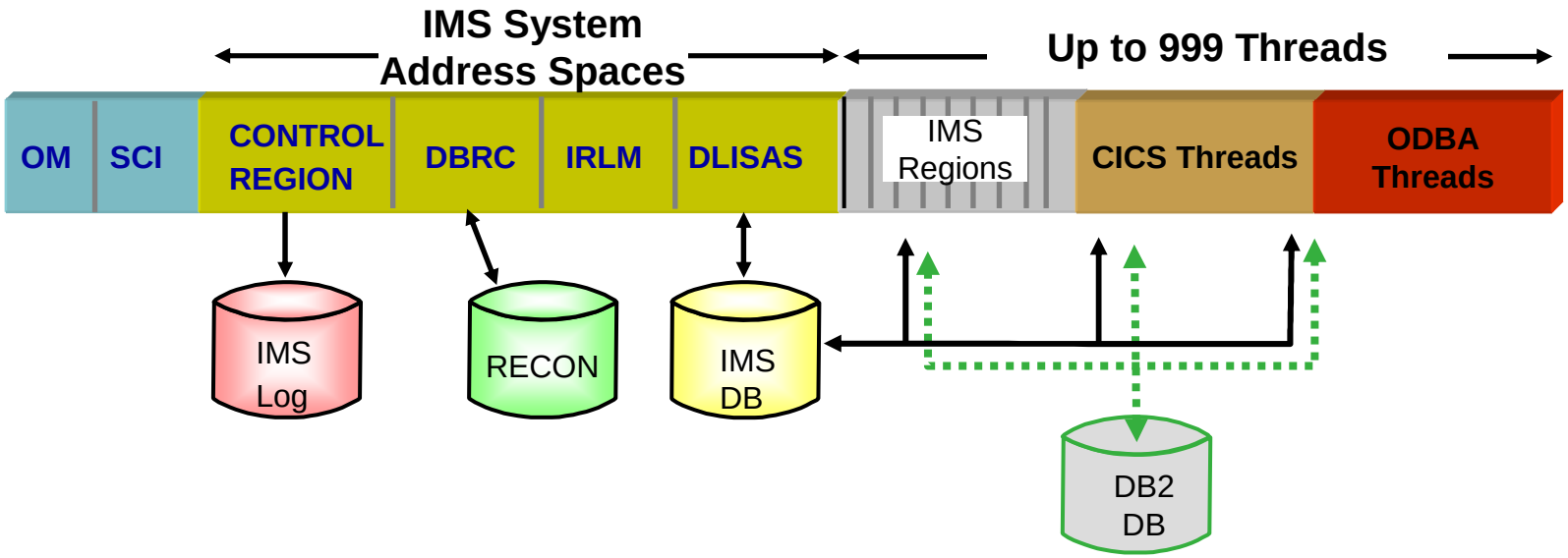
Scalability and Availability for IMS Applications

- **Exploitation of System z Parallel Sysplex**
  - Data Sharing with IMS DB and DB2
  - Shared IMS Queues
  - VTAM Generic Resources
  - TCP/IP Sysplex Distributor
- **Users of Shared Queues**
  - Can maintain IMS service across both planned and unplanned outages
  - Experience automatic load balancing



Extreme Performance for IMS DB Concurrent Access

- **Highly Parallel Architecture exploiting System z**
  - An IMS control region with multiple system address spaces, each with multiple tasks
  - Transactional access from z/OS and from distributed
    - IMS, CICS, DB2 Stored procedures
    - WAS on z/OS or on distributed using JDBC API and Open Database
  - Batch programs (called BMPs or JBPs) can also be run concurrently
    - IMS standalone batch also supported



Enhancements related to Traditional Values

10

- **TM Manageability**
  - Enhanced performance of communications between distributed IMS systems using Multiple Systems Coupling (MSC Bandwidth)
  - Enhanced logging of accounting statistics (transaction level statistics)
  - Increased robustness for MQ and TCP/IP integration
- **DB Manageability**
  - Parallel RECON Access - Data sharing, rather than serial accesses, of IMS's DB sharing and recovery control dataset
  - Image Copy support of Snapshot/Flash Copy
- **System Manageability**
  - Rewritten IMS performance utilities
  - Automatic notification (emails and phone text messages) of IMS abends
    - With URLs for immediate analysis of the problem
- **etc. etc. etc.**

11

- **TM Manageability**
  - Transaction expiration
    - Option to discard a transaction before execution on the basis of age
- **DB Manageability**
  - Database Quiesce to ease creation of recovery point
  - DBRC enhancements (BPE support, cleanup, …)
  - FP scalability with DEDB 64-bit buffer manager
  - HALDB online reorganization performance improvement
- **System Manageability**
  - Enhancement in user exit interface
  - Enhancement in dump formatting and problem diagnosis
- **etc. etc. etc.**

Simplification for IMS System Programmers

- **Traditionally, all resources available in an IMS DB system – databases, programs – have had to be predefined**
  - Specified with Assembler macros in the IMSGEN, and assembled/linked into MODBLKs dataset
  - MODBLKs dataset can be refreshed while IMS is online
    - New definitions introduced by operational procedure, “Online Change”

      Library switch which causes all processing to be quiesced!
- **IMS 10 introduces “Dynamic Resource Definition” (optional)**
  - Resource definitions removed from IMSGEN
    - Only a handful of IMSGEN macros remain and system generation process is quick and simple
  - Existing resources read from MODBLKs and saved in a “repository”
  - Resources added, changed or deleted by SPOC commands, and without system quiesce
    - Simpler to do and with enhanced system availability
- **Various other IMS 10/11/12 enhancements further simplify systems management and enhance resource availability**

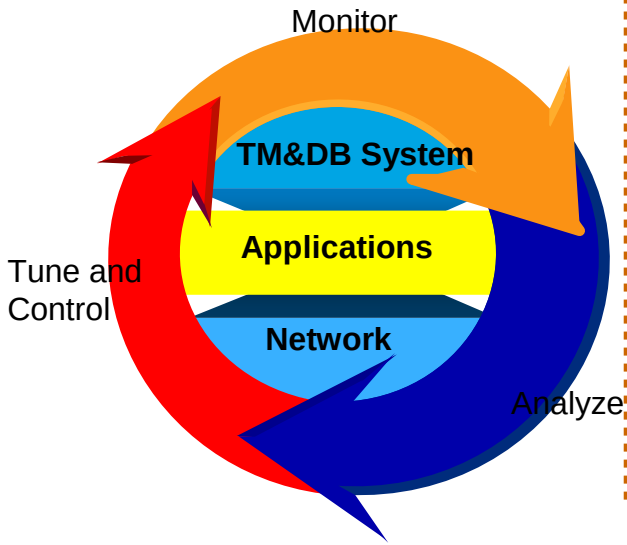
IMS System and Application Debugging

- **Traditionally, system programmers are knowledgeable to monitor and tune IMS systems and applications to obtain optimal performance and lowest cost.**
- **Now they have to manage end-to-end application development debugging!**
- **IMS Performance Solution Pack increases their productivity and allows them to do tasks that have never been possible!**

IMS is at the heart of the enterprise. Consequently, when a performance issue occurs often the tendency is to blame….. IMS.

IBM Transaction Analysis Workbench for z/OS

Integrated CICS and IMS performance management and problem determination, including also related system and subsystems.

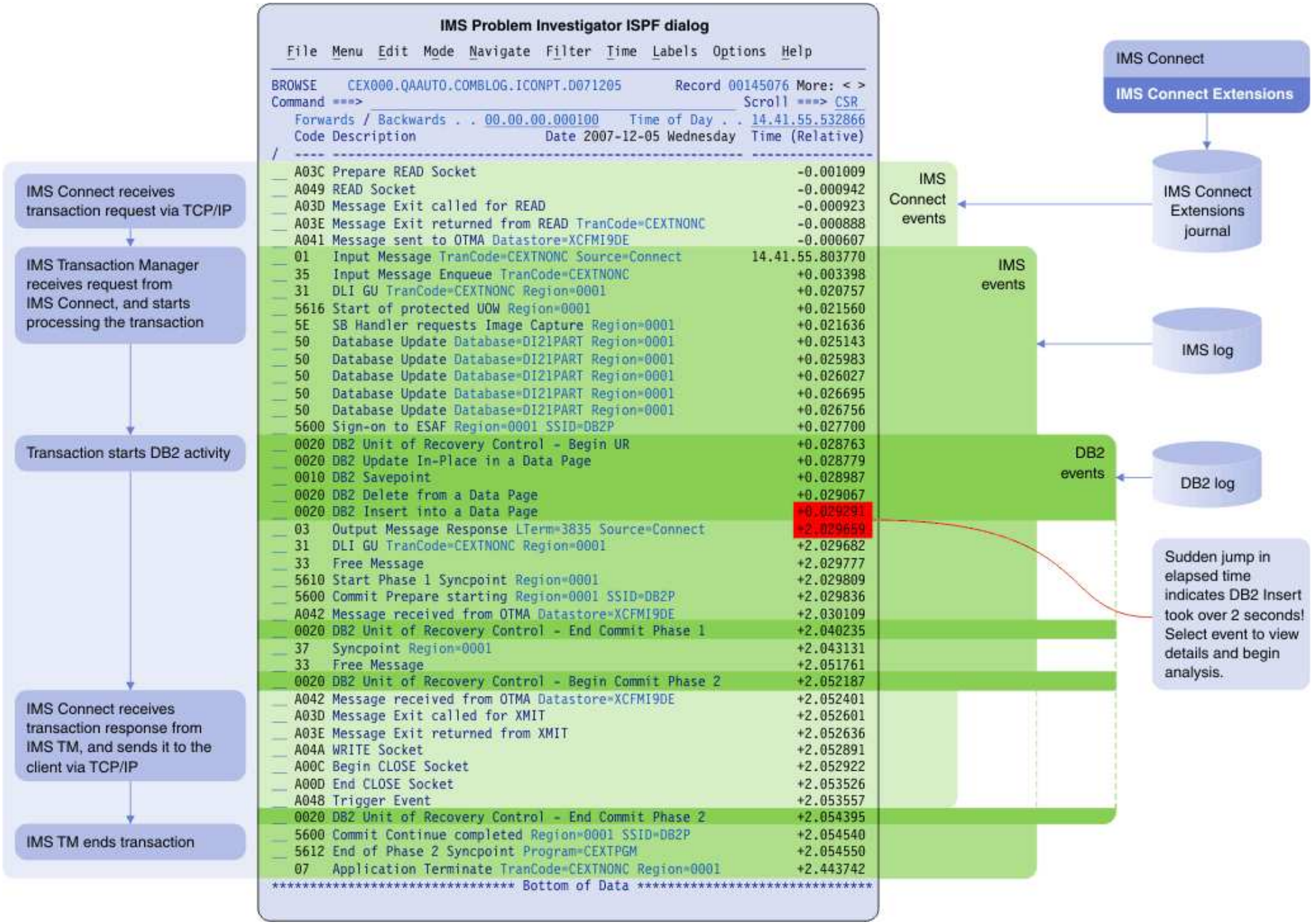


IMS Performance Pack

IMS Connect Extensions

IMS Problem Investigator

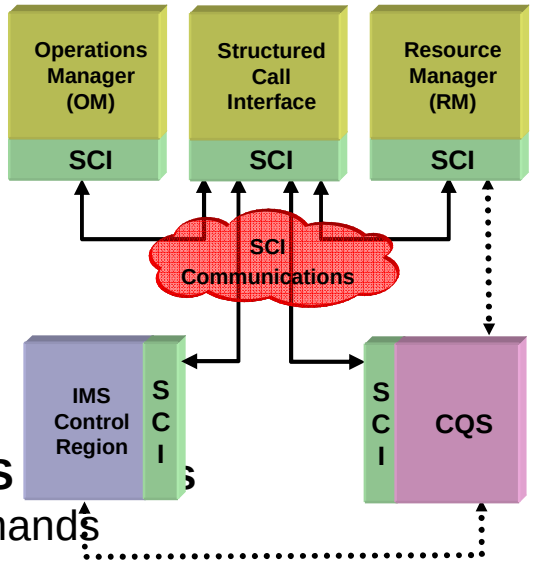
IMS Performance Analyzer



Simplification for IMS Operators

Type 2 Commands:
- CREATE (CRE)
- DELETE (DEL)
- EXPORT (EXP)
- IMPORT (IMP)
- INIT
- QUERY (QRY)
- QUEUE
- TERM
- UPDATE (UPD)

- **New IMS commands**
  - Simple standard syntax providing a consistent and modern look-and-feel
    - QRY DB NAME(A*) SHOW(ALL)
    - CREATE DB NAME(CUSTADD,CUSTUPD)
      SET(ACCTYPE(EXCL) RESIDENT(N))
  - In addition to the old commands
    - /DIS DB dbname
  - Must be entered at a SPOC into an Operations Manager
    - Based on the “Common Service Layer” architecture



- **Tivoli and automation solutions are, of course, standard for IMS**
  - But there will always remain the need for manual operator commands

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IMS Application Programming

- **Rational Developer for System z (RDz) provides the best platform for IMS application program development and maintenance**
  - COBOL, PL/1, C/C++ as well as Java
  - Advanced compiler technologies!
  - Version 8 provides support for the zEnterprise including z/OS, Linux, AIX
- **Existing COBOL & PL/I applications can take benefit of Java Interoperability**
- **New IMS programs can also be written in Java**
  - IMS transactions and online batch
  - CICS transactions
  - DB2 stored procedures
  - Java applications in WebSphere Application Server
- **Java programs can (recommended!) see IMS databases as Relational Databases and use SQL calls to access the data**
  - IMS supports the java standard DB API, JDBC
  - Necessary relational metadata created with GUI tool (DLIModel Utility)
    - Included now in IMS Enterprise Suite
- **All IMS Java programs can exploit zAAPs**

Remember … z/OS Languages

Advanced compiler technology
Greater performance with z196

- **Cobol with IBM Enterprise COBOL for z/OS V4R2**
  - http://www.ibm.com/software/awdtools/cobol/zos/
  - Integrates COBOL applications with Web-oriented business processes and simplifies the componentization of COBOL programs
    - Supports Java interoperability by new object-oriented syntax
- **PL/I with IBM Enterprise PL/I for z/OS V4.1**
  - http://www.ibm.com/software/awdtools/pli/plizos/
  - Easier integration with IBM Debug Tool + Easier Java interoperability + XML parser + Integrated SQL preprocessor
  - Debugging improvements
- **z/OS XL C/C++ V1.12**
  - http://www-01.ibm.com/software/awdtools/czos/features/
  - Improved performance of applications without code change
- **Java**
  - http://www.ibm.com/servers/eserver/zseries/software/java/
  - Enable all "Application Execution Environments" to support Java based applications:
    - WAS, Transaction Servers ie. CICS & IMS, DB2 Stored Procedures
  - Enable connectivity to middleware, messaging queuing and Java Batch processing

IMS Application Development Environment on x86

- **Rational Developer for System z Unit Test feature can greatly enhance the way organizations develop, maintain and test mainframe applications.**
  - Based on the IBM z Personal Development Tool (zPDT)
  - Small-scale, personal test environment for developers that can run z/OS and z/OS middleware from IBM, but on an Intel or Intel-compatible (x86) personal computer (PC)
- **Features / Business Value:**
  - Develop and test z/OS applications on a desktop machine
  - Lower testing costs over traditional mainframe environments
  - Facilitates quick changes to test configurations during development

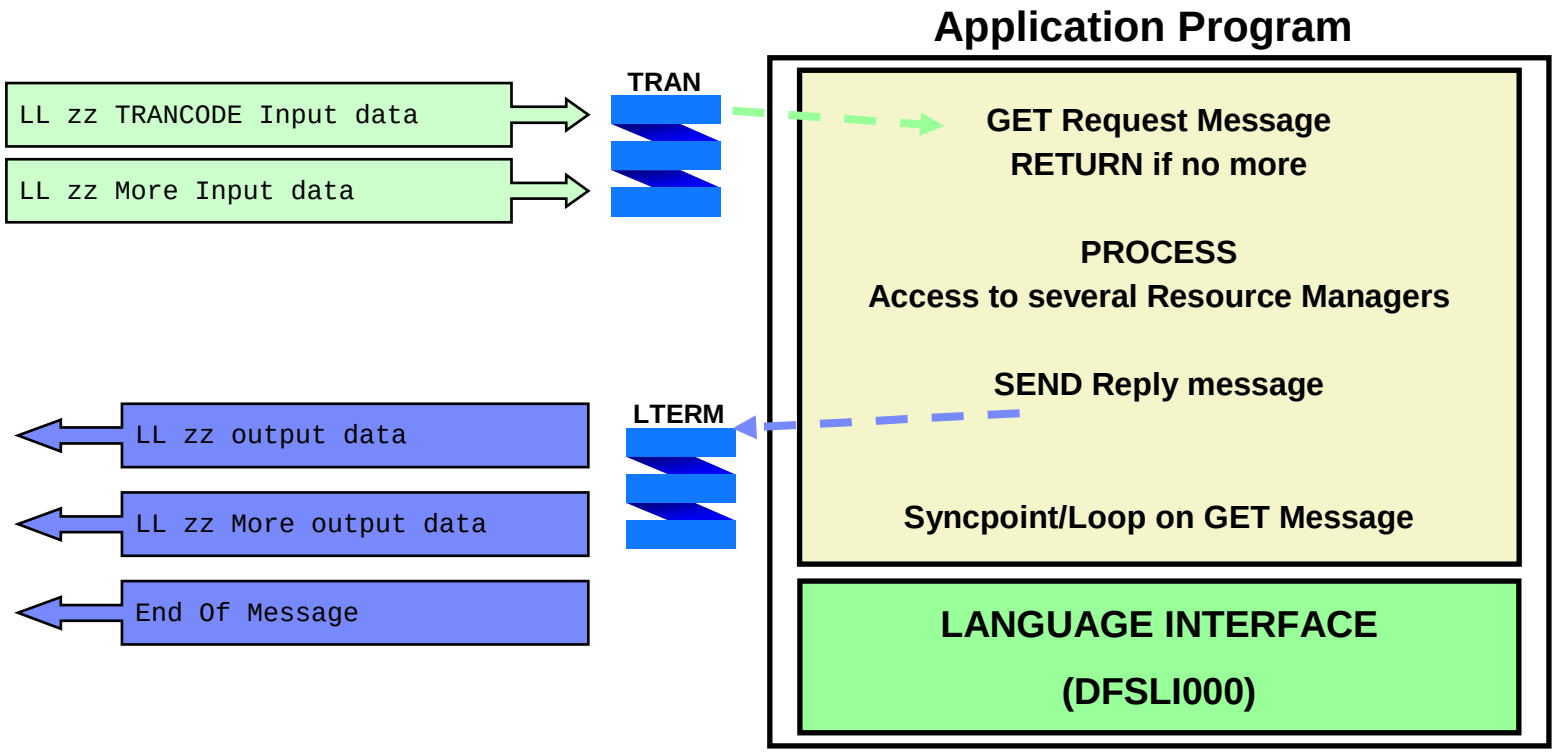
New!
Authorized for use in education as well

Virtualization of IMS Application Development Environment on z/OS

- **Standardware COPE mainframe virtualization solution for IMS integrates with RDz to enable additional productivity and cost savings for z/OS development projects.**
  - The Standardware COPE solution allows IMS development teams to virtualize their IMS test environments for potential savings in test resources, process time and set-up systems skills without associated application program changes.
  - The COPE JCL integration with IBM Rational Developer for System z used in conjunction RDz remote interactive testing, debugging and deployment capabilities can help achieve business objectives by making the IMS test deployment less CPU costly and more transparent for the developer .
- **More information about COPE can be found in the IMS Newsletter:**
  - http://www-931.ibm.com/bin/newsletter/tool/landingPage.cgi?lpId=2337&open&cm_mmc=6231-_-n-_-vrm_newsletter-_-11069_137321&cmibm_em=dm:0:18016073
- **Or at the Standardware site:**
  - http://www.standardware.com/index.php/site/products/

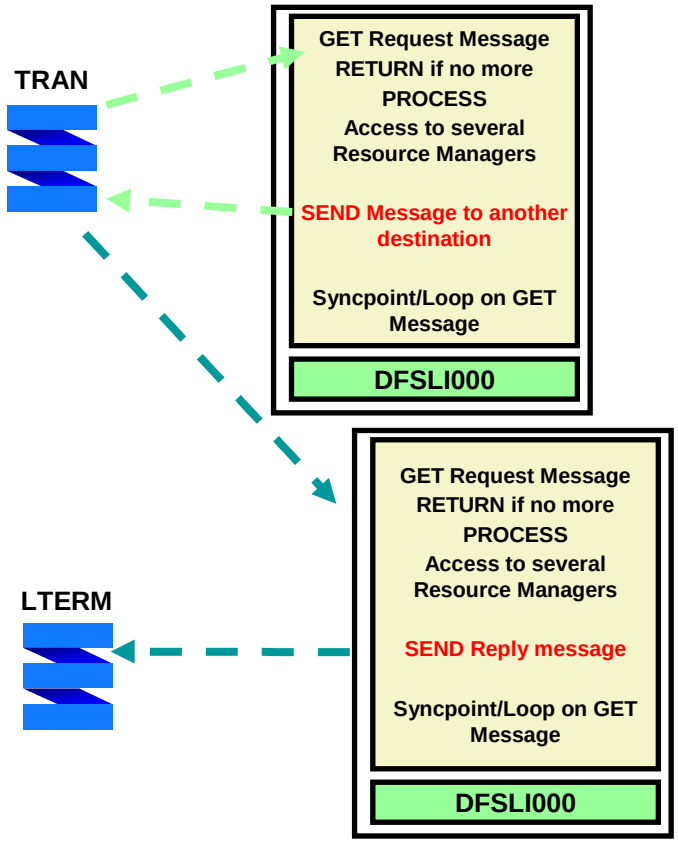
IMS Transactional Program Flows

- **Basic Flow**
  - Single or multi segment message
  - Input and Output data can be XML!

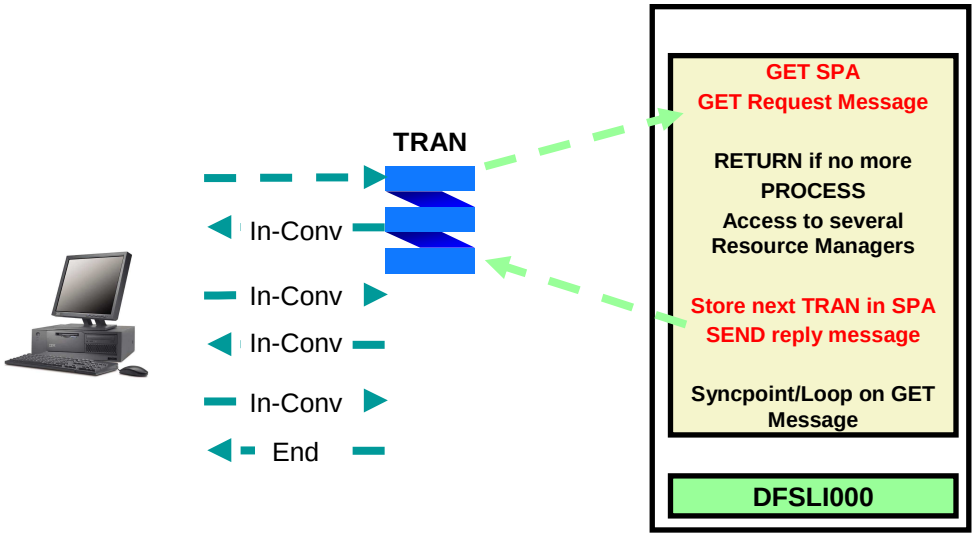


IMS Transactional Program Flows

- **Program to Program**



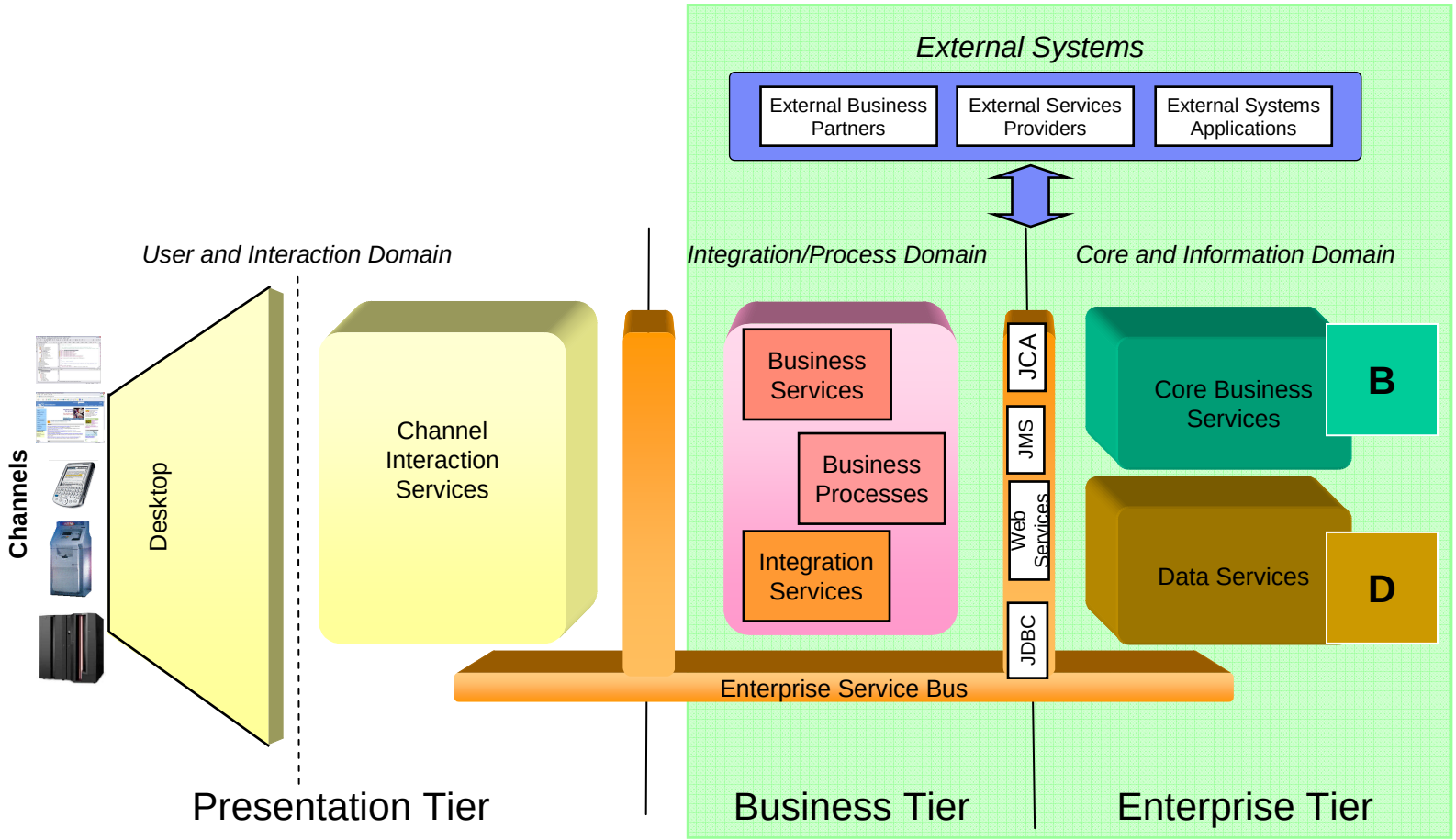
- **IMS Conversational flow**
  - Dialogs between a person at a terminal and IMS thru one or more application programs
  - Special SPA segment in the input/output message to keep context information



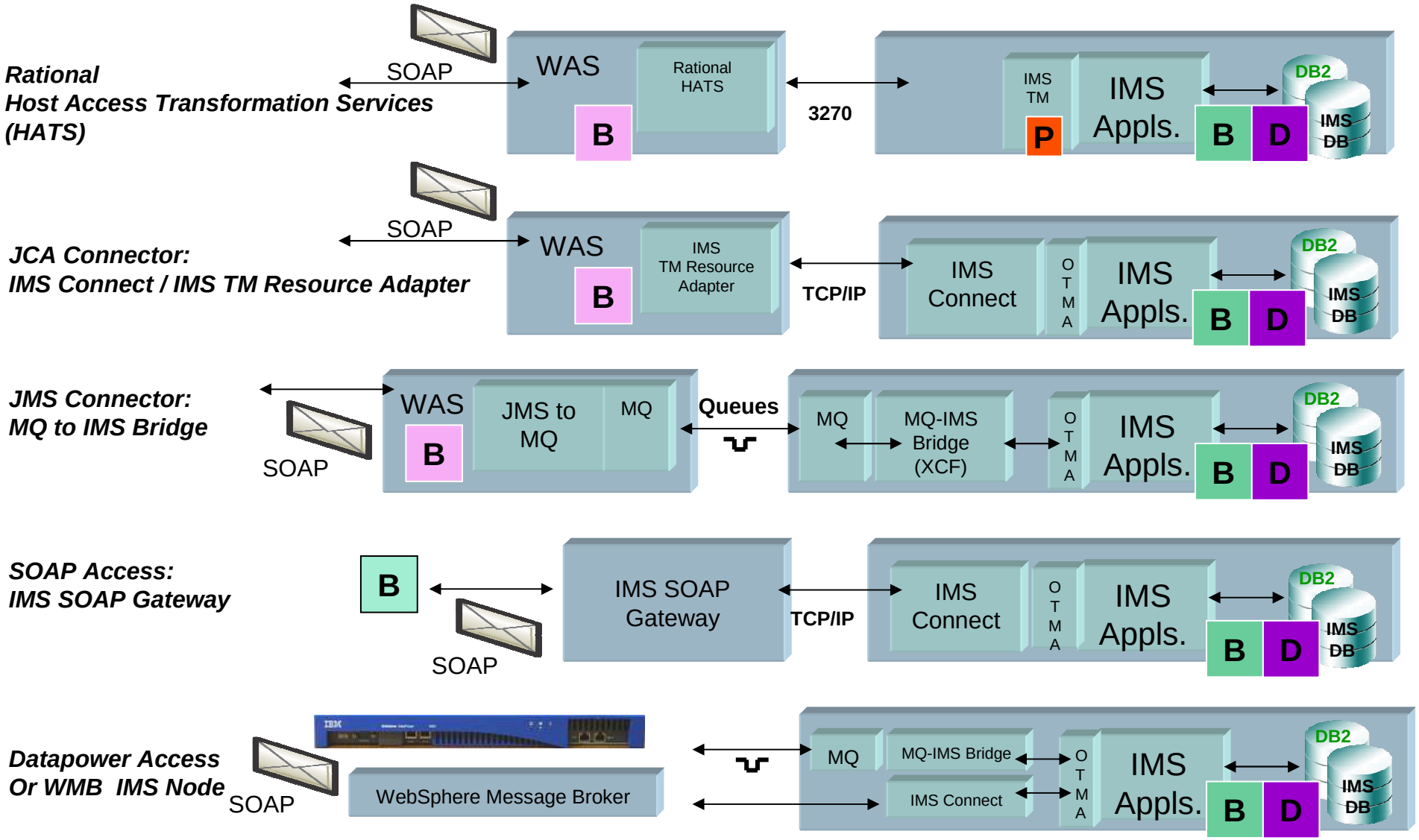
SOA with IMS Applications

- **When designing an SOA, much of the business logics to be deployed as services are already implemented in existing IT application systems**
  - And much of this run on the mainframe - Bottom-Up approach
- **New services may also be written**
  - It might be appropriate to write this as an EJB or Web Service.
    - For example, using IMS JDBC to directly access the IMS Databases.
  - But in many cases the best solution will be to create new IMS transactions – Top-Down approach
    - IMS as high performance business logic container
    - WAS & IMS collocation with WOLA for optimum performance
- **When the existing transaction does not exactly match the business requirement, the most efficient solution is to modify the existing transaction.**
  - Modify or add COBOL or PL/I logic
  - Add JAVA classes to existing COBOL or PL/I programs
  - Take benefit of a Business Rules management system
    - Business Rules mining using Rational Asset Analyzer
    - Creating rules in COBOL with “Rules for COBOL” feature
    - Or using Callout to execute Rules Services
  - Take benefit of Business Event management system
    - Generate events from IMS application
  - Study all Callin/Callout capabilities
  - Be creative ☺

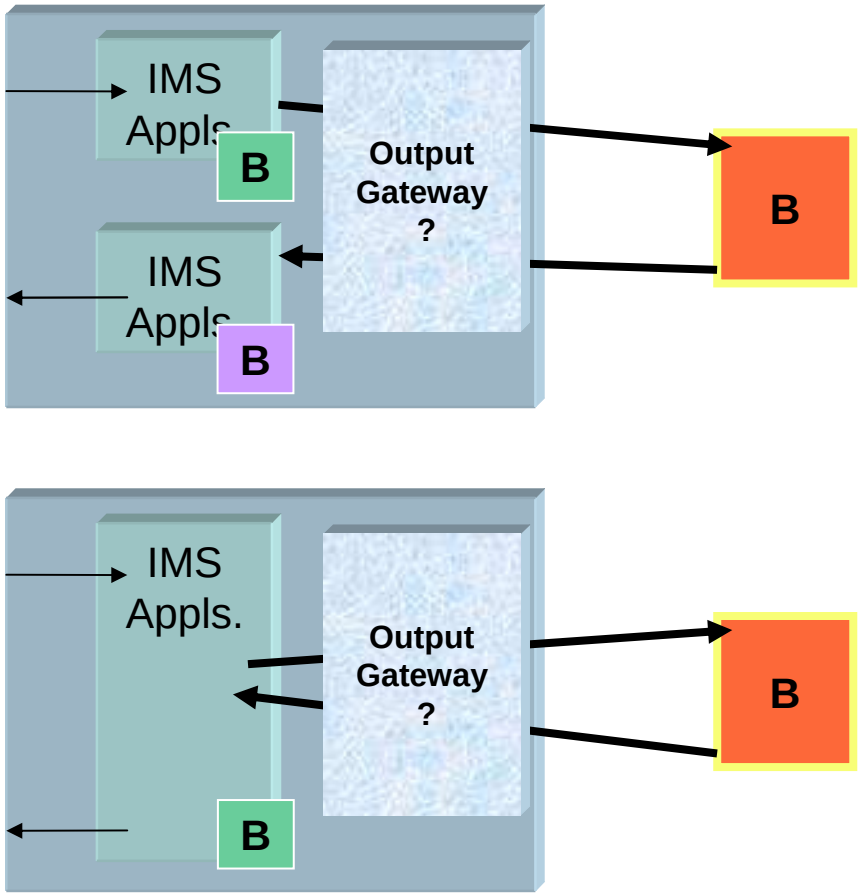
Positioning IMS Assets in SOA Architecture



IMS Transactions SOA Integration – Inbound



IMS Transactions SOA Integration – Outbound



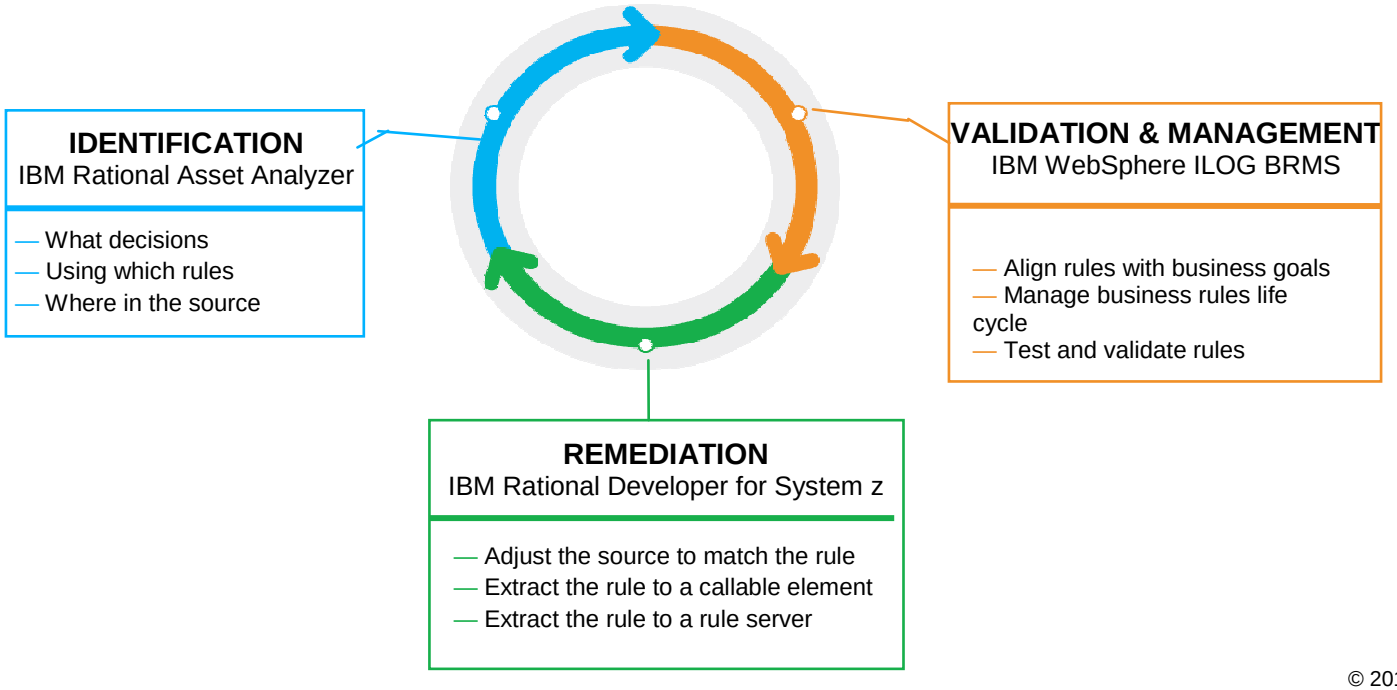
- **Asynchronous support with**
  - IMS Queue using ISRT ALTPCB
    - •Thru ICON, APPC/IMS, WebSphere MQ
    - •Thru IMS SOAP Gateway (IMS 10)
    - •Thru WAS & ITRA (IMS 10)
  - Explicit MQ API with WMQ as gateway
    - •Can also benefit of WebSphere Message Broker
  - Explicit APPC API
  - TCP/IP calls with IMS Connect
- **Synchronous (not in 2PC scope) support with**
  - New ICAL with IMS 10 supported by:
    - •IMS SOAP Gateway
    - •WAS & ITRA
  - Explicit MQ API with WMQ as gateway
  - APPC/IMS (also in 2PC scope)
  - SQL calls to DB2 stored procedures
    - •And DB2 SP can call a web service
- **And also IMS Java application capabilities**
  - Calling Java classes to call EJB or web services

IMS Transactions SOA Integration - Solution Summary

Standard architecture	Middleware	Capabilities	Recommendation
SOAP	IMS Connect (enhanced with IMS Connect Extension Tool) & IMS SOAP Gateway	Synchronous access over HTTP Inbound and outbound (with IMS 10) CM1 with sync-level=None No CM0 support NEW - NO maximum message size: IMS Connect supports multi segment message (32K limit for one single segment) No support for IMS conversational transaction	Still has some limitation today; work with IMS lab if you have specific customer requests
JCA	IMS Connect (enhanced with IMS Connect Extension Tool) WAS Server	Synchronous with Asynchronous output retrieve options Inbound and outbound (with IMS 10) CM0 and CM1 support NO maximum message size: IMS Connect supports multi segment message (32K limit for one single segment)	Most appropriate solution when service requester is JEE component and when high QoS required (2PC, connection pooling, identity propagation etc.)
JMS	MQ IMS Bridge WAS Server	Asynchronous, with almost-synchronous capabilities Inbound and outbound CM0 and CM1 support Assured delivery	Exploit JMS and WMQ for basic messaging and flowing Web services.
DataPower	IMS Connect (enhanced with IMS Connect Extension Tool) DP Appliance	Synchronous and Asynchronous Inbound CM1 with sync-level=None No CM0 support 32 KB limit (single segment) No support for IMS conversational transaction	Use as ESB gateway for security functions, message transformation and routing
WebSphere Message Broker	IMS Connect (enhanced with IMS Connect Extension Tool) WMB server	IMS Connect node available in addition to MQ support	Consider as option to service enable IMS applications when WMB is already used as enterprise ESB.

Bringing Agility to IMS transactions

- **Value of a Business Rules Management System**
  - Manage the business rules to be visible and easily maintained by business analysts
  - Provides a knowledge base that is accessible for application understanding and ongoing management.
  - Enable decision services for SOA and other modernization strategies
  - Reduce risk through reuse of proven, existing logic in a modernized architecture while rationalizing software assets that are misaligned with corporate priorities.



Accessing Operational master data in a z/OS environment

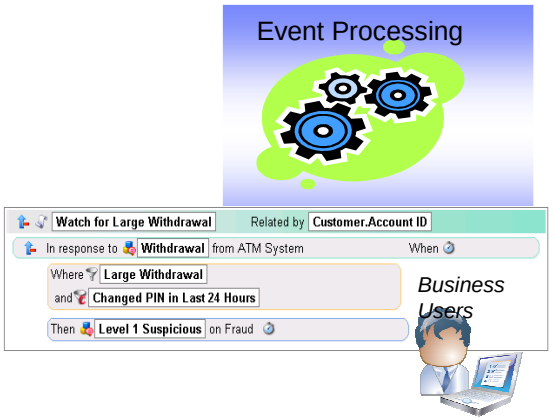
- **InfoSphere MDM Server**
  - High performance, high scalability foundation to access master data
    - Server and/or Data can be distributed or z/OS
  - Enabled as an SOA Library with 800 pre-packaged business services

- **When data in DB2 for z/OS, a COBOL Adapter enables COBOL programs to access Master Data Management Server services**
  - Both the MDM Server Central Transaction server (for Update request) and MDM Server “Query” Connect (for Read-only requests)
  - Based on MQ communication
  - More on MDM Server “Query” Connect
    - J2SE application (like a long-running batch job for z/OS) – WAS not prereq
    - Support for high transaction throughput (around 1000 tps)

Sending Business Event from IMS Application

- **There are 2 ways to send event from an IMS transaction:**
  - "event sending" done in the same commit scope than the IMS transaction. Therefore we can be sure that answer to the customer and event are in the same commit scope
  - "event sending" done during the transaction processing and before the transaction does the commit. It means that in case of transaction backout, the event would have been processed already
- **Event message is created by the IMS application**
  - Based on data included in IOPCB
  - Based on database content
  - Based on application logic
- **Event message is sent based on IMS Callout solutions**
  - Using IMS API
    - Enhanced with IMS SOAP Gateway Business Event Support
  - Using MQ API
  - Synchronous or asynchronous

WebSphere Business Events



Integrating IMS applications / data in Web 2.0 applications

- **Think of Web 2.0 as a concrete implementation of SOA philosophy, and more ;)**
  - And reuse existing IMS assets in new combinations
- **Using IBM enterprise mashup solutions**
  - IBM Mashup Center — a comprehensive mashup platform, supporting line of business assembly of simple, flexible, and dynamic web applications - with the management, security, and governance capabilities IT requires.
    - Create Atom feeds from both IMS transactions and IMS databases
    - Use tooling support from Rational Developer for System z and IMS Enterprise Suite DLIModel utility
  - IBM WebSphere sMash — provides an agile, dynamic scripting environment and an integrated runtime component for building and running REST-style services.
    - Access to IMS applications using IMS Enterprise Suite Connect API for Java
- **Offer for IMS Customers**
  - IBM Mashup Center V2 to IMS 10 & IMS 11 customers for free
  - Use limited to IMS and two SQL data servers in support of IMS solution

http://www-01.ibm.com/software/data/ims/mashup.html

Agenda

- **IMS Positioning**
- **IMS System – Built to manage Critical Enterprise Assets**
- **IMS Applications – Renovate, Leverage and Grow**
- **IMS Databases – Why NOT?**

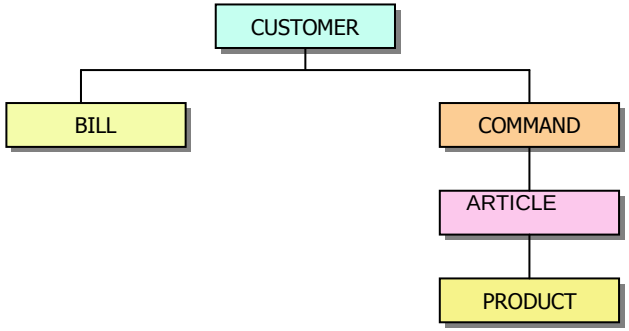
IMS DB in Perspective

Yes, We Can!!!

Native Quality of Services	
High Capacity	**HALDB & DEDB**
High Availability	**IMS Data Sharing**
Performance without CPU extra cost	**1/2 the MIPS and 1/2 the DASD of relational**
Application Development	
Multi-language AD support	**COBOL, PLI, C, … JAVA**
XML Support	**Decomposed or Intact**
Java SQL support (JDBC)	**IMS Java**
Open Access and Data Integration	**IMS 11 Open Database**
Data Management	
Advanced Space Management Capabilities	**DFSMS family**
Health Check	**Pointer validation & repair**
Backup and Recovery Advanced Solutions	**IMS Tools**
Reorganization for better performance	**IMS Tools**
Enterprise Data Governance	
Compression and Encryption	**IMS Tools**
Audit for every access	**IMS Tools – Guardium planned**
Data MAsking	**OPTIM Family**
Creation of Test databases	**OPTIM Family**
Information Integration & Data Synchronization	
Fast integration in Web 2.0 applications	**IMS 11 Open database**
Data Federation	**InfoSphere *Classic* Federation**
Replication to Relational	**InfoSphere *Classic* Replication Server**
Publication of DB Changes	**InfoSphere *Classic* Data Event Publisher**
Operational Business Intelligence	**COGNOS**

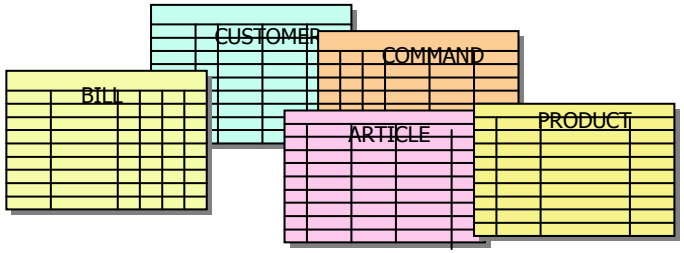
z/OS Database Manager Positioning

- **Hierarchical**
  - Operational Data
  - Utmost performance
  - Real time mission critical work
  - Bill of materials applications
  - Complex data structures with many levels



- **XML**
  - B2B
  - Document exchange and storage

- **Relational**
  - Warehousing
  - Complex queries
  - Decision support
  - Tabular data – accounting data



Enhancing IMS DB Openness and Integration

- **Access to IMS DB with traditional IMS API**
  - Using “DL/1 Calls” from traditional application, support for many languages
  - In CICS or IMS transactions, in IMS standalone batch or BMP

- **Access to IMS DB with relational API**
  - Using JDBC SQL calls for Java programs on z/OS or distributed
    - Implemented by IMS Java component of IMS
    - Distributed access enhanced with IMS 11 Open Database
    - Based on a relational view provided by DLI Model Utility

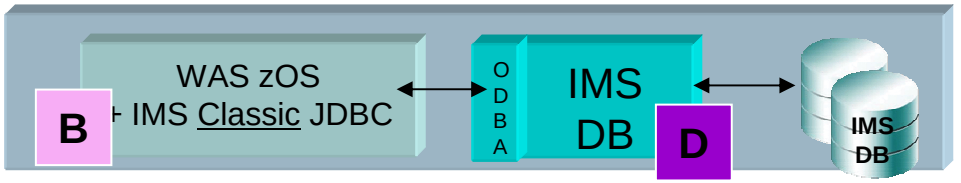
- **Access to IMS DB with XML API**
  - Like IMS DB, XML data is hierarchical
    - It is simple to map IMS data into XML documents.
    - All IMS databases are Virtual XML Databases.
  - XQUERY facility for Java programs since IMS 10

SQL “sees” IMS DB as a relational DB

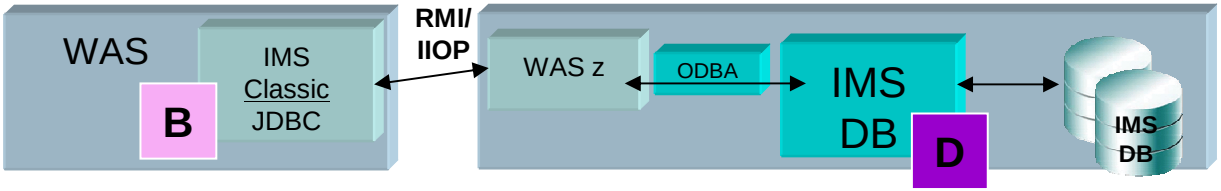
XQUERY “sees” IMS DB as an XML DB

IMS Databases – JDBC Connectivity Solutions

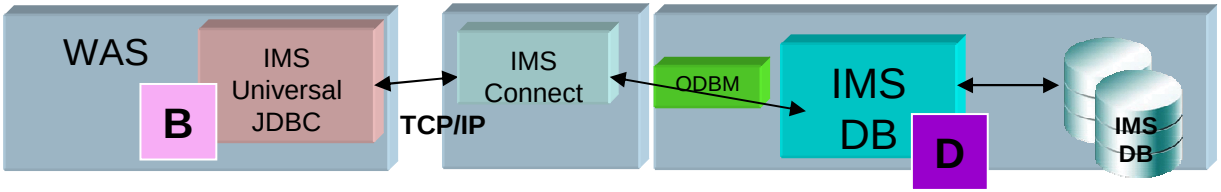
From WAS on z/OS using classic IMS JDBC



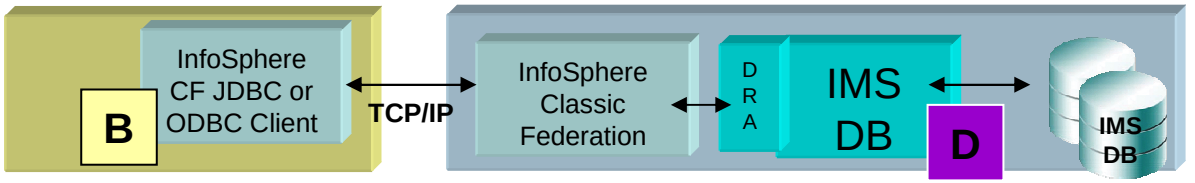
From WAS distributed using IMS distributed classic JDBC

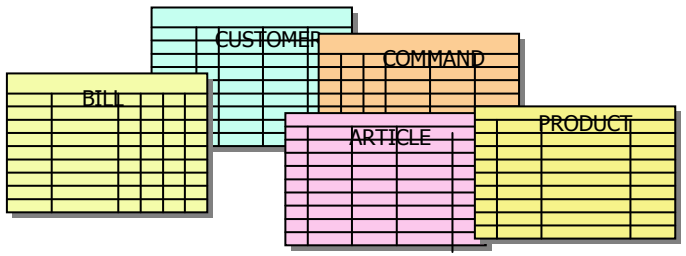


From WAS using IMS Universal JDBC driver (any platform) – IMS 11

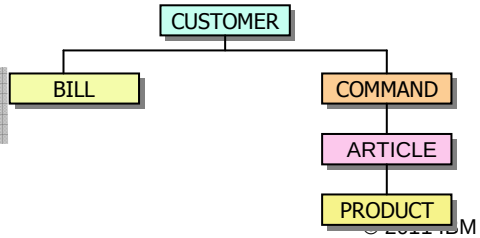


Using InfoSphere Classic Federation Server

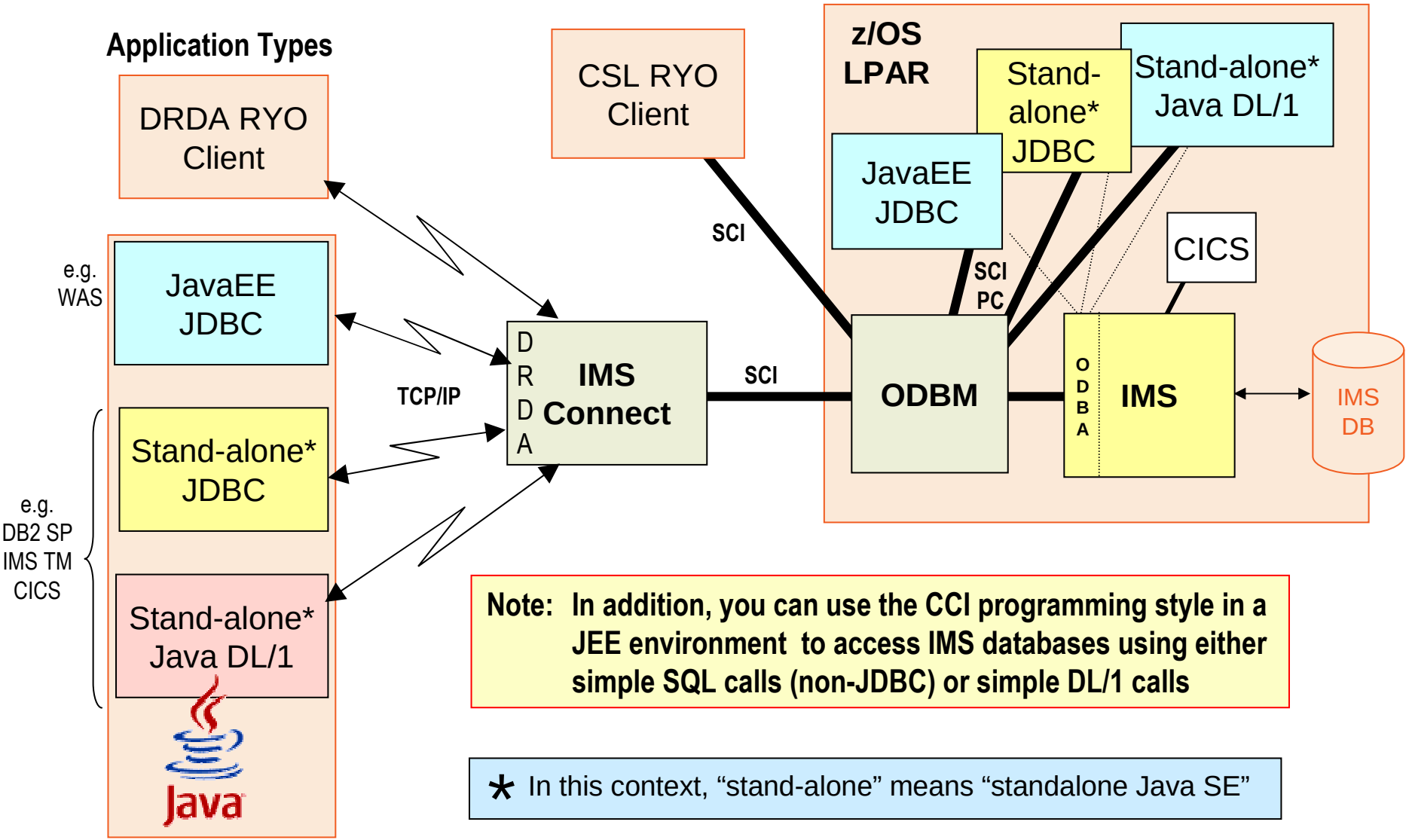




DLI Model Utility



IMS Open Database Overview



IMS Explorer for Development - Technical Preview

- **New Face of IMS …Simplifying IMS application development**
  - GUI-based framework for consistent and integrated tools across environment
  - Eclipse-based
  - Follow-on product for DLI Model Utility

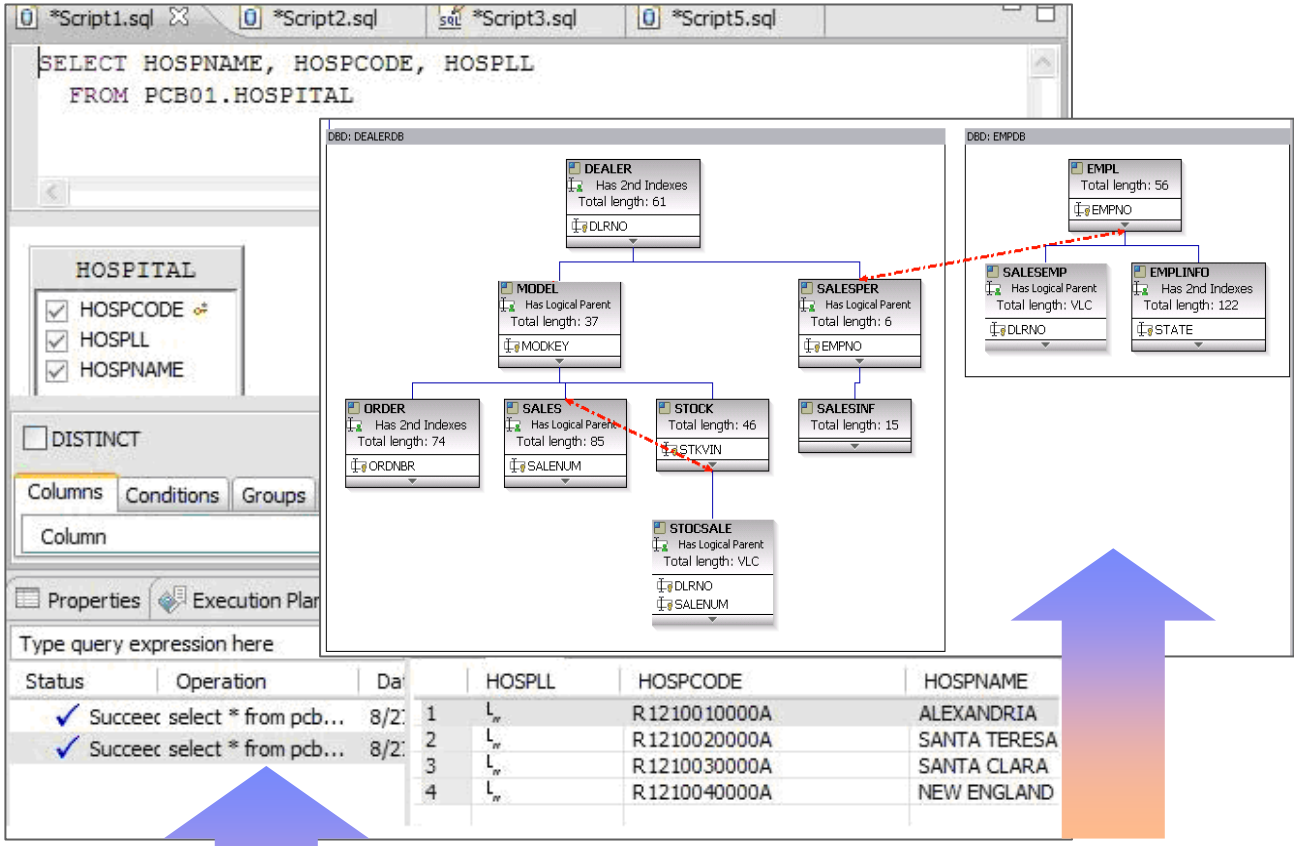
- **Easier visualization and editing of IMS Database and Program Definitions**
  - Graphical display of IMS segment hierarchy and database structure
  - Graphical editors to display/create IMS PSBs
  - Graphical editors to edit/add fields on a DBDs
  - Generation of DBD and PSB source

- **Ability to easily access IMS data using SQL statements**

IMS Explorer for Development - Technical Preview …

Graphically-driven editors to display and update IMS program and database definitions

Graphical interface to easily access and manipulate IMS data using standard SQL

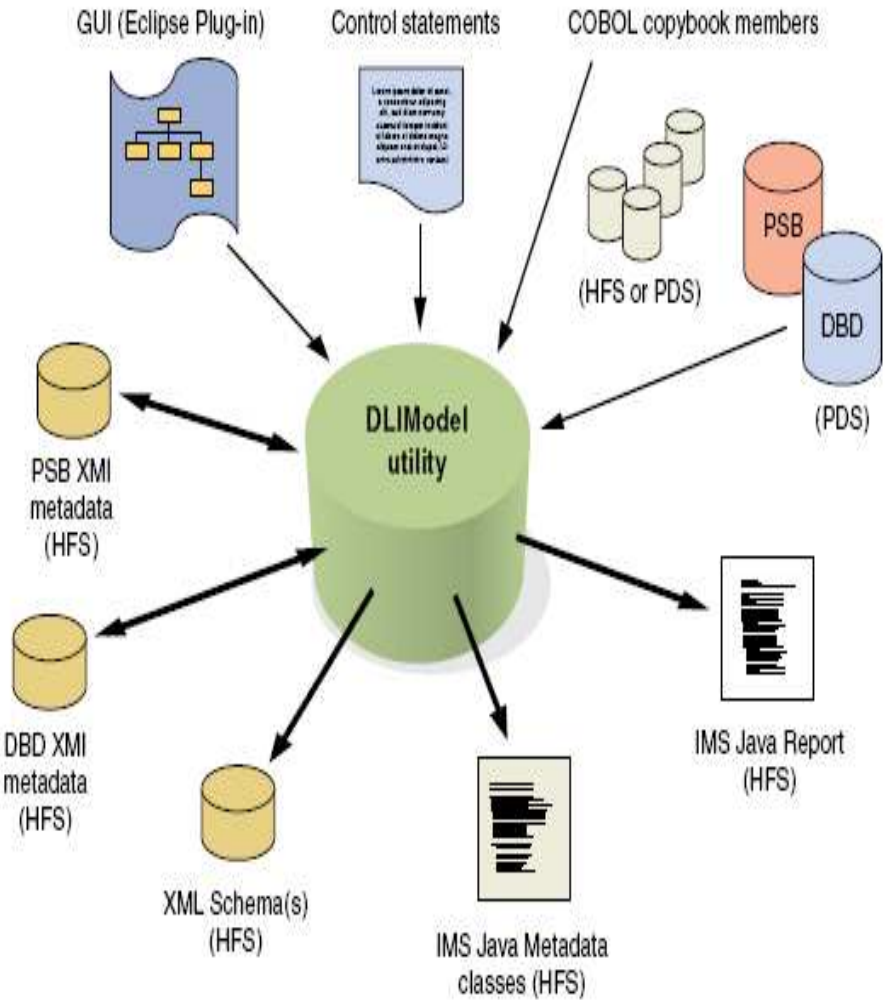


Generate SQL to access IMS data

See database relationships
Change DBD and PSB definitions

DLIModel Utility

- **IMS database visualization tool**
  - Visualize an entire IMS PSB
  - Can view each PCB individually
    - Hierarchy, segments, fields, types, etc
- **IMS database metadata generation tool**
  - Generates the necessary metadata that is consumed at runtime by IMS DB Resource Adapter, XML-DB support
    - Database metadata
    - XML schema
- **Bottom up tooling approach**
  - Parses PSB and DBD source
  - Optionally COBOL copybook definitions of segments
- **An Eclipse plug-in**

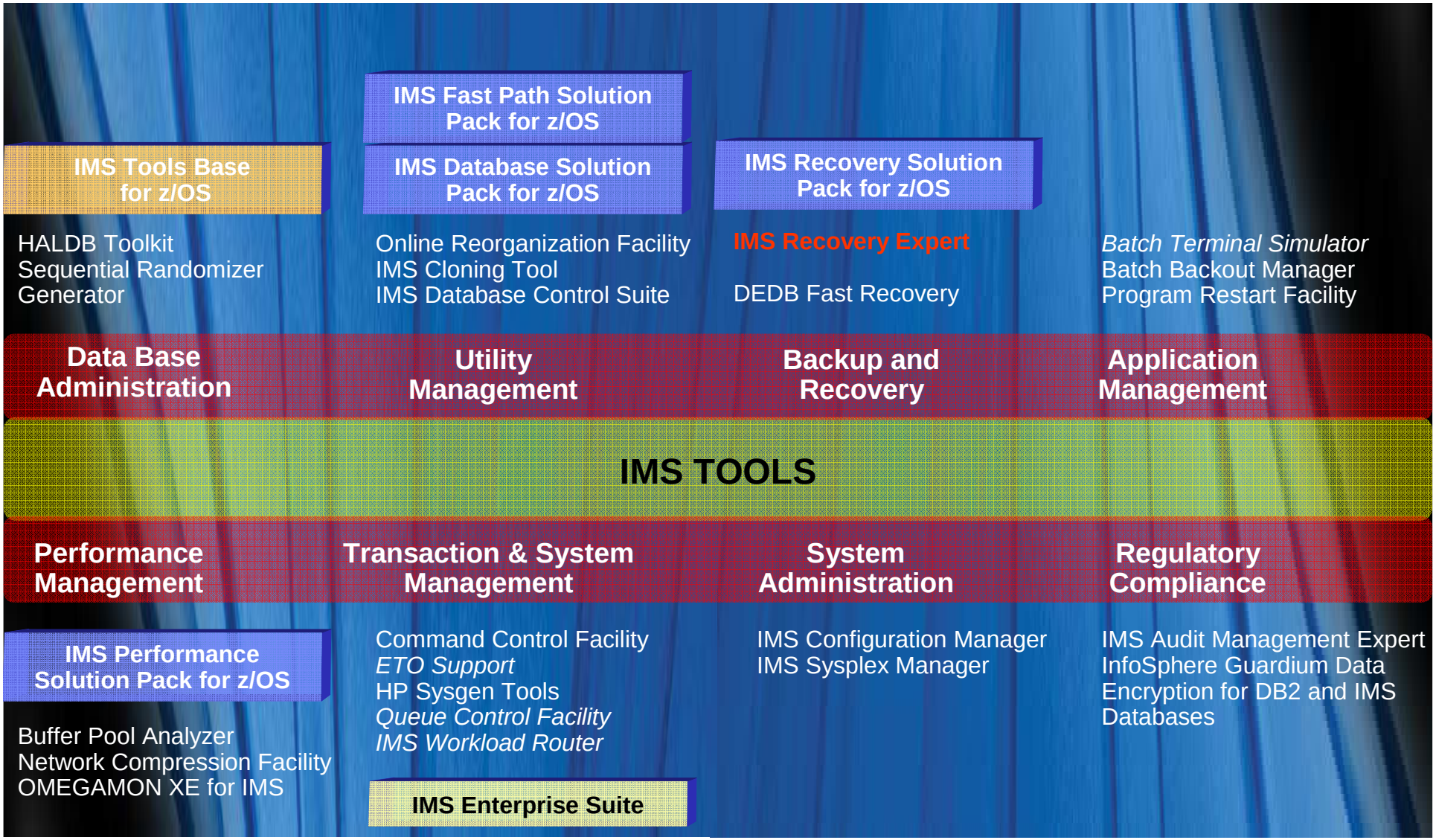


Simplification for IMS DB Administrator

Look at IBM's IMS Tools Strategy

- **Reduce the DBA skills and time needed to manage IMS DBs, and so …**
- **… reduce Total Cost of Ownership**
  - Optimizing IMS performance
  - Simplifying Reorganizations, Image Copy, Recovery
  - Complying with regulations and auditing requirements
  - Converting to and managing IMS High Availability Large DBs (HALDBs)
  - Autonomic DB Management
    - See IMS Tools Base Pack including ITKB and sensor data

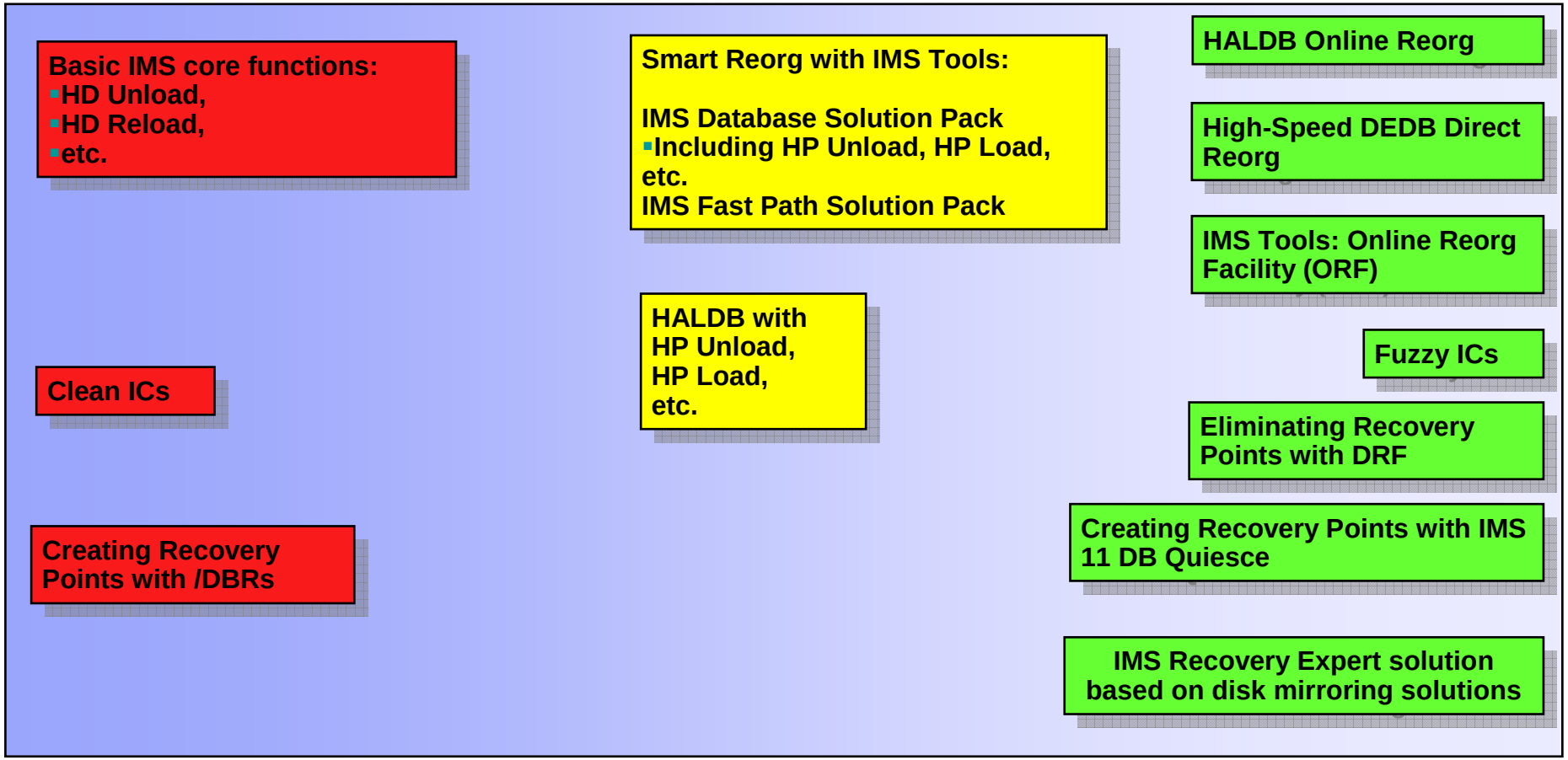
IMS Tools Product Portfolio 2011



IMS DB - Maximizing IMS Database Availability

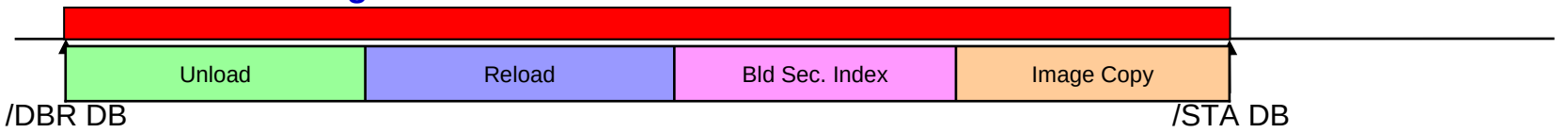
- **Practices to minimize database outages**

Not So Good ⟷ **Best**

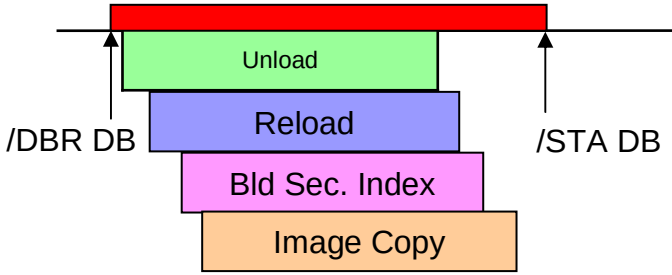


IMS DB - Comparison of Reorganization Solutions

Standard Offline Reorg Process

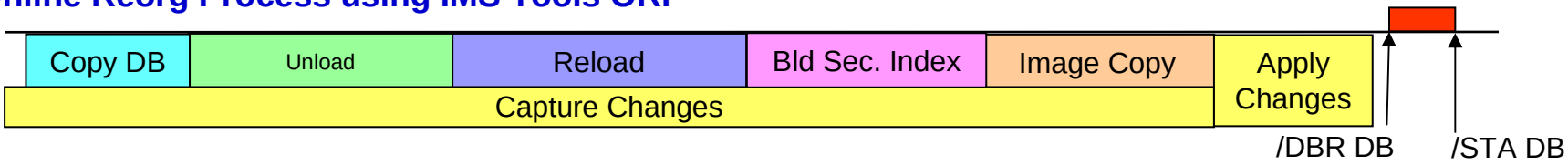


Offline Reorg Process using IMS Database Solution Pack

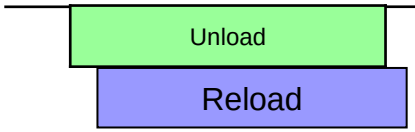


See Conditional Reorg with the new Smart Reorg capability!

Online Reorg Process using IMS Tools ORF



True Online Reorg Process for HALDB



No outage!

= Database Outage

IMS DB - Backup Solutions

- **Clean image copies**
  - Available with
    - Image Copy, Image Copy 2, and HPIC

      Image Copy 2 and HPIC can minimize the outage
- **Fuzzy image copies**
  - Available for OSAM and ESDSs with
    - Image Copy, Image Copy 2, and HPIC
  - Available for KSDSs with
    - Image Copy 2 and HPIC
  - Available for DEDBs with
    - Image Copy, Image Copy 2, HSSP, and HPIC
- **New system-level backup solution available with IMS Recovery Expert Tool**
  - For local recovery or DB cloning
  - For Disaster Recovery
  - Based on Disk Mirroring solutions

IMS DB – Recovery Solutions

- **Full recovery**
  - Due to DASD failure
  - Puts database back to its last state
  - RAID technology has eliminated the need for most of these
- **Timestamp recovery (to a previous state)**
  - Usually due to an application processing error
  - Related databases must be recovered to the same time
  - Database must be recovered to a recovery point
    - Time when there were no uncommitted updates

      No transactions in-flight
    - Exception for DRF (PointInTime Recovery capability)
- **Disaster recovery**
  - May be either full recovery or timestamp recovery
- **Most recoveries today are timestamp recoveries**

IMS DB – Recovery Solutions …

- **Preparing for timestamp recoveries**
  - – Creating recovery points
    - Database must be quiesced

      Typically done with /DBR command

      For data sharing, database must be quiesced on all systems at the same time

      DBRC enforces these rules

      Database data set cannot have an ALLOC record which spans the time
    - IMS 11 contains a Database Quiesce function

      Eliminates the need to /DBR the databases

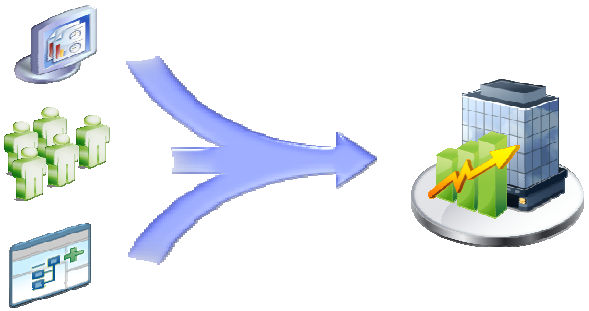
  - – Creating recovery points is a significant cause of database unavailability
    - Many installations /DBR their databases once every day for this purpose
    - Outages are not caused by failures

      They are caused to prepare for potential failures

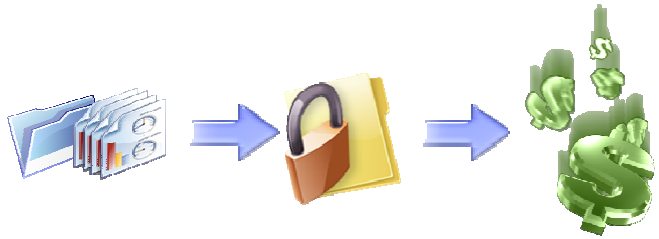
Information Governance Creates Order out of Information Chaos

Information Governance is the exercise of decision rights to optimize, secure and leverage data as an enterprise asset.

- **Orchestrate people, process and technology toward a common goal**
  - *Promotes collaboration*
  - *Derive maximum value from information*



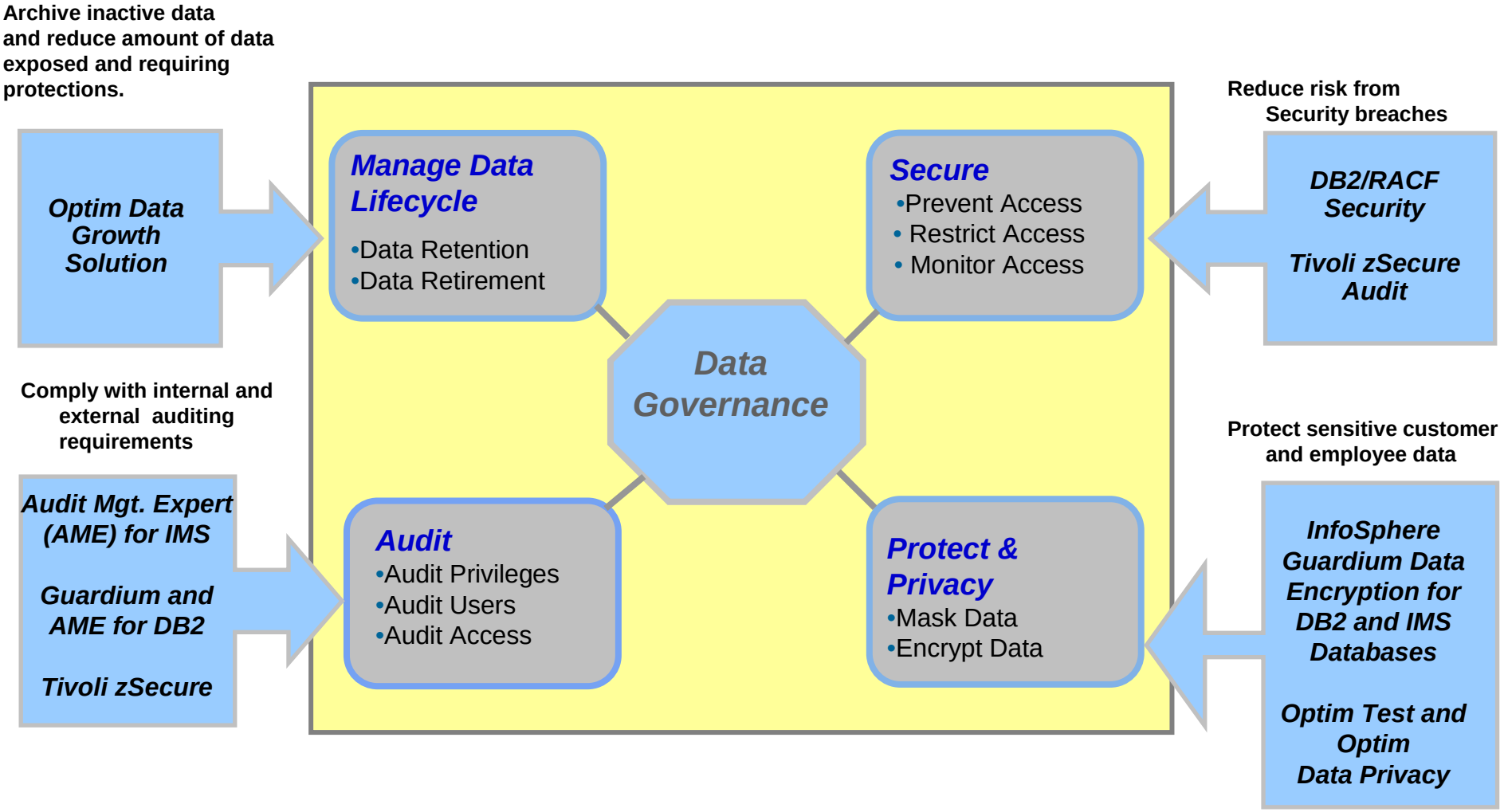
- **Leverage data as an enterprise asset to drive opportunities**
  - *Safeguards information*
  - *Ensure highest quality*
  - *Manage it throughout lifecycle*



Governing the creation, management and usage of enterprise data is not an option any longer. It is:

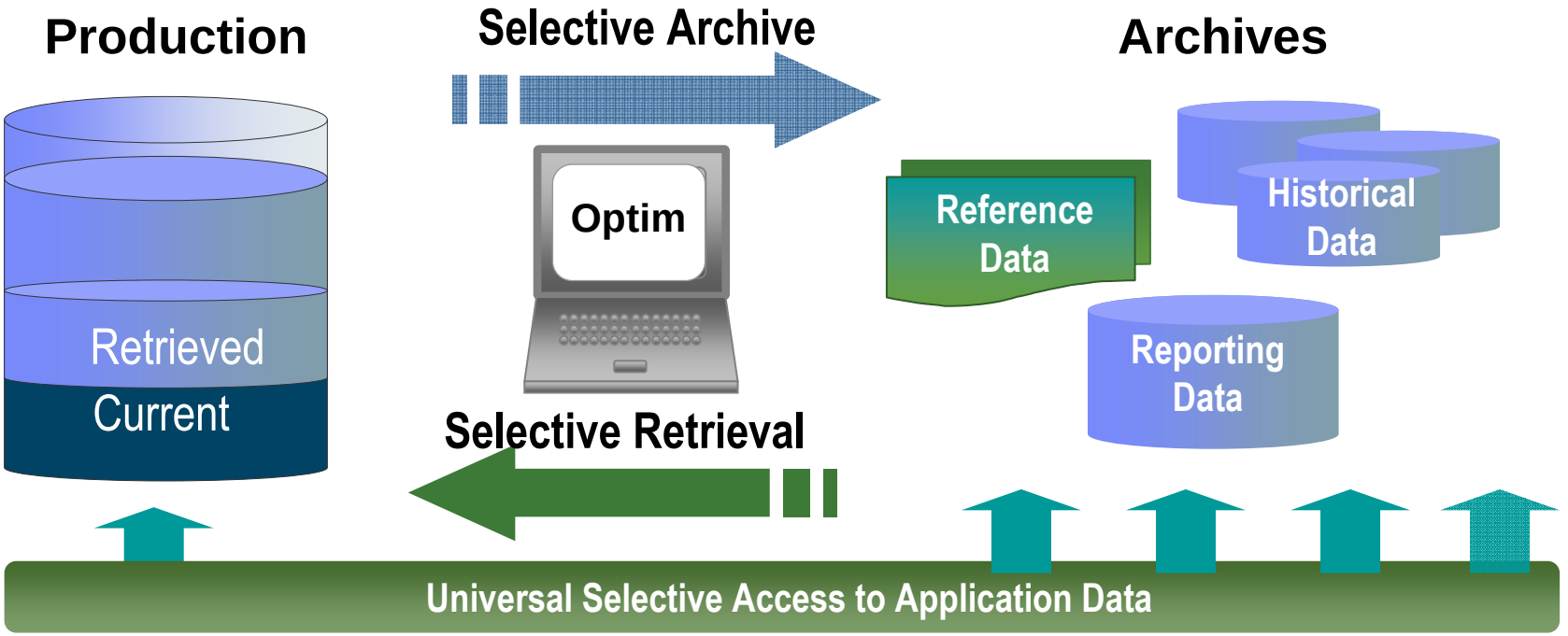
Expected by your customers ◆ Demanded by the executives ◆ Enforced by regulators/auditors

Enterprise Data Governance for System z



IBM is the only solution provider with an end to end comprehensive solution

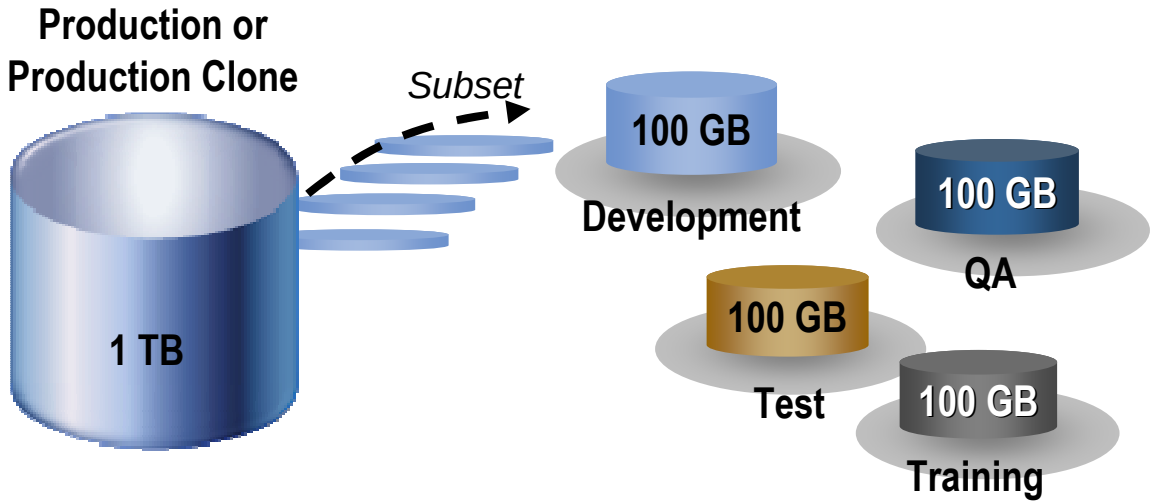
Managing Data Growth in Production – OPTIM Data Growth



- **Segregate historical data to secure archive**
- **Align performance to service level targets**
- **Reclaim underutilized capacity**
- **On z/OS: Support for DB2, IMS DB, VSAM**
  - IMS DB and VSAM support provided by Distributed Data growth based on Classic Federation on z/OS and InfoSphere Federation Server

Managing Test Data in Non-Production – OPTIM Test Data Management

- **Create right-sized test environments, providing support across multiple applications, databases and operating systems**
- **Deploy new functionality more quickly and with improved quality & customer satisfaction**
- **Compare results during successive test runs to pinpoint defects and errors**
- **On z/OS: Support for DB2, IMS DB, VSAM**



http://www-01.ibm.com/software/data/data-management/optim/core/test-data-management-solution-zos

Data Masking and Protection - OPTIM Data Privacy

Ensure Data Privacy and Security

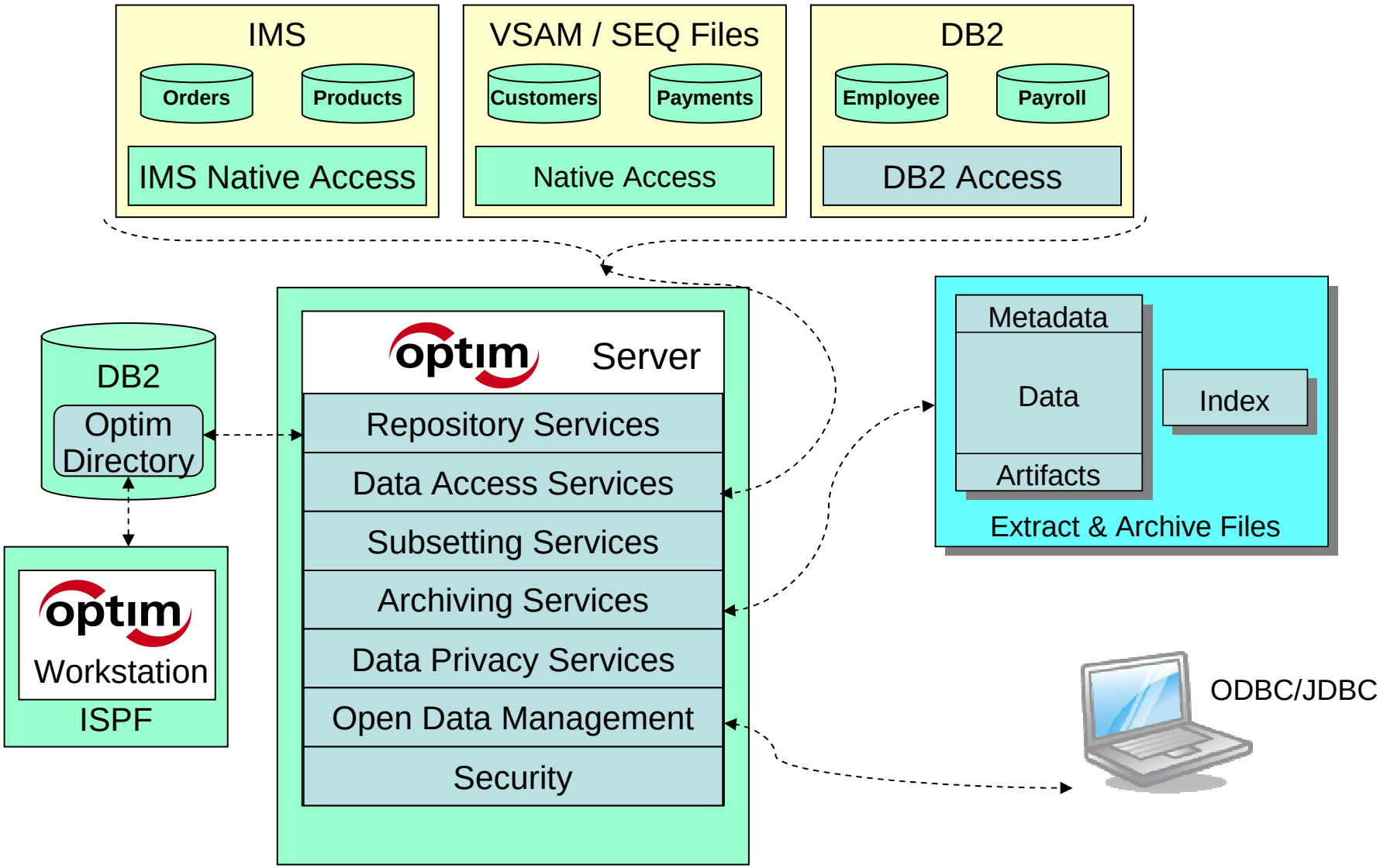
- **Reduce risk of exposure during data theft**
  - Fines and lawsuits
  - Avoid the negative publicity
  - Customer loss
  - Loss of intellectual property

- **De-identify for privacy protection**
- **Deploy multiple masking algorithms**
- **Provide consistency across environments and iterations**
- **No value to hackers**
- **Enable off-shore testing**
- **On z/OS: Support for DB2, IMS DB, VSAM**
  - Compare “before” and “after” images of test data for DB2

Personal identifiable information (PII) is masked with realistic *but fictional* data for testing & development purposes.

http://www-01.ibm.com/software/data/data-management/optim/core/data-privacy-solution-zos/

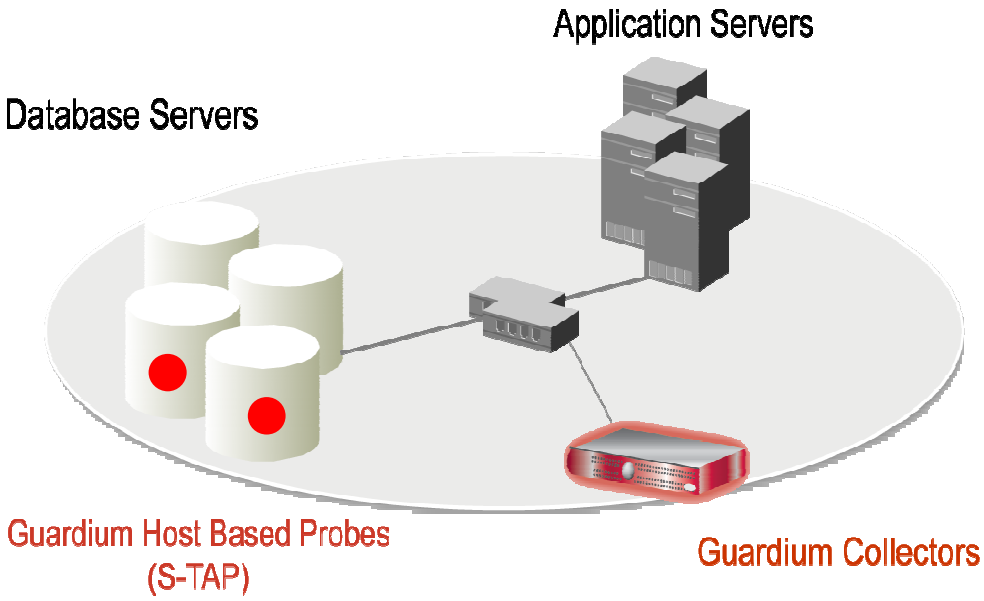
OPTIM Test Data Management and Data Privacy

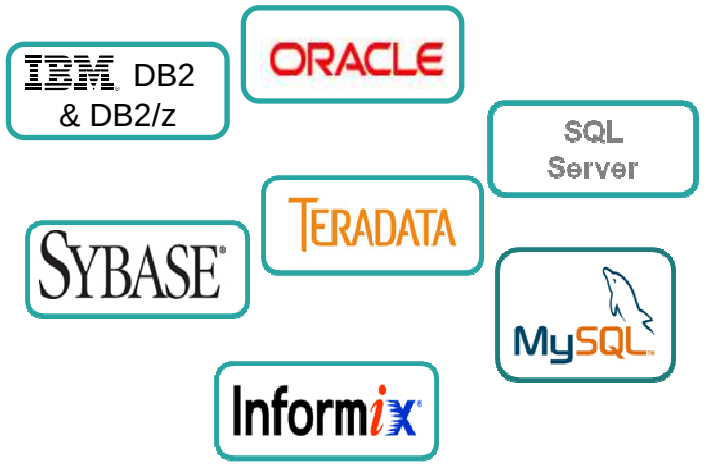


Secure & Protect High Value Databases - Guardium
Real-Time Database Monitoring

- **Non-invasive architecture**
- **Heterogeneous, cross-DBMS solution**
- **Does not rely on native DBMS logs**
- **Minimal performance impact (2-3%)**
- **No DBMS or application changes**

- **Activity logs cannot be erased by attackers or rogue DBAs**
- **Automated compliance reporting, sign-offs & escalations (SOX, PCI, NIST, etc.)**
- **Granular, real-time policies & auditing**
- **Locate and assess vulnerabilities in db security**

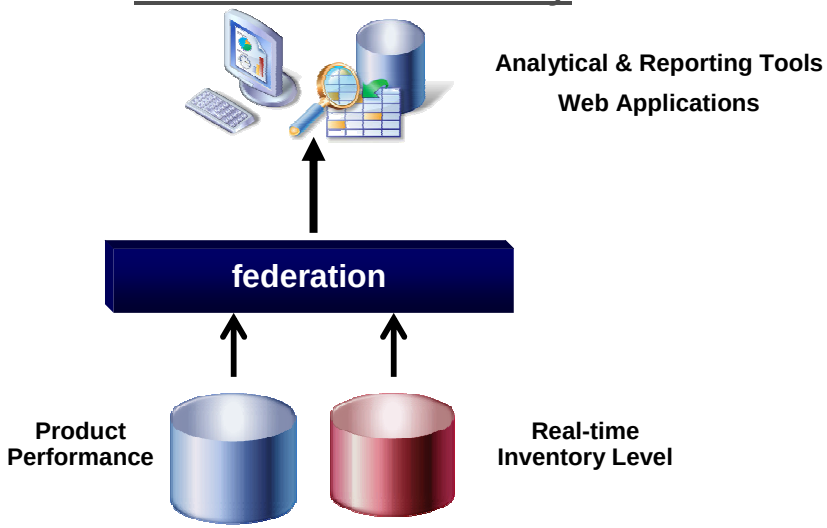




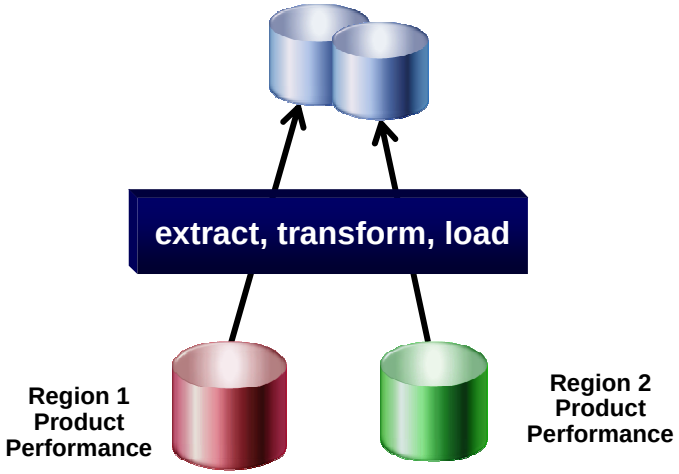
http://www-01.ibm.com/software/data/guardium/

Multiple Data Delivery Methods for Enterprise Needs

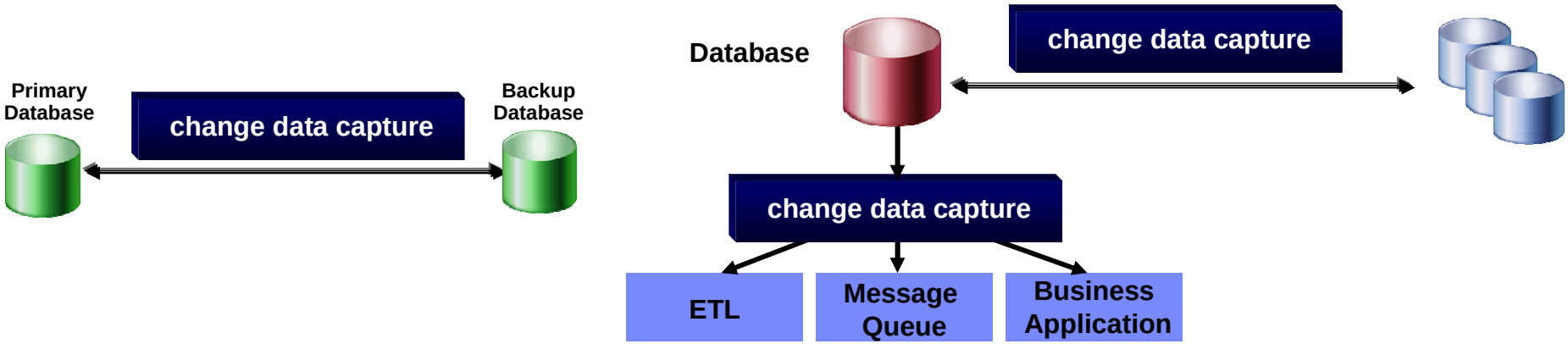
Virtual Data Delivery



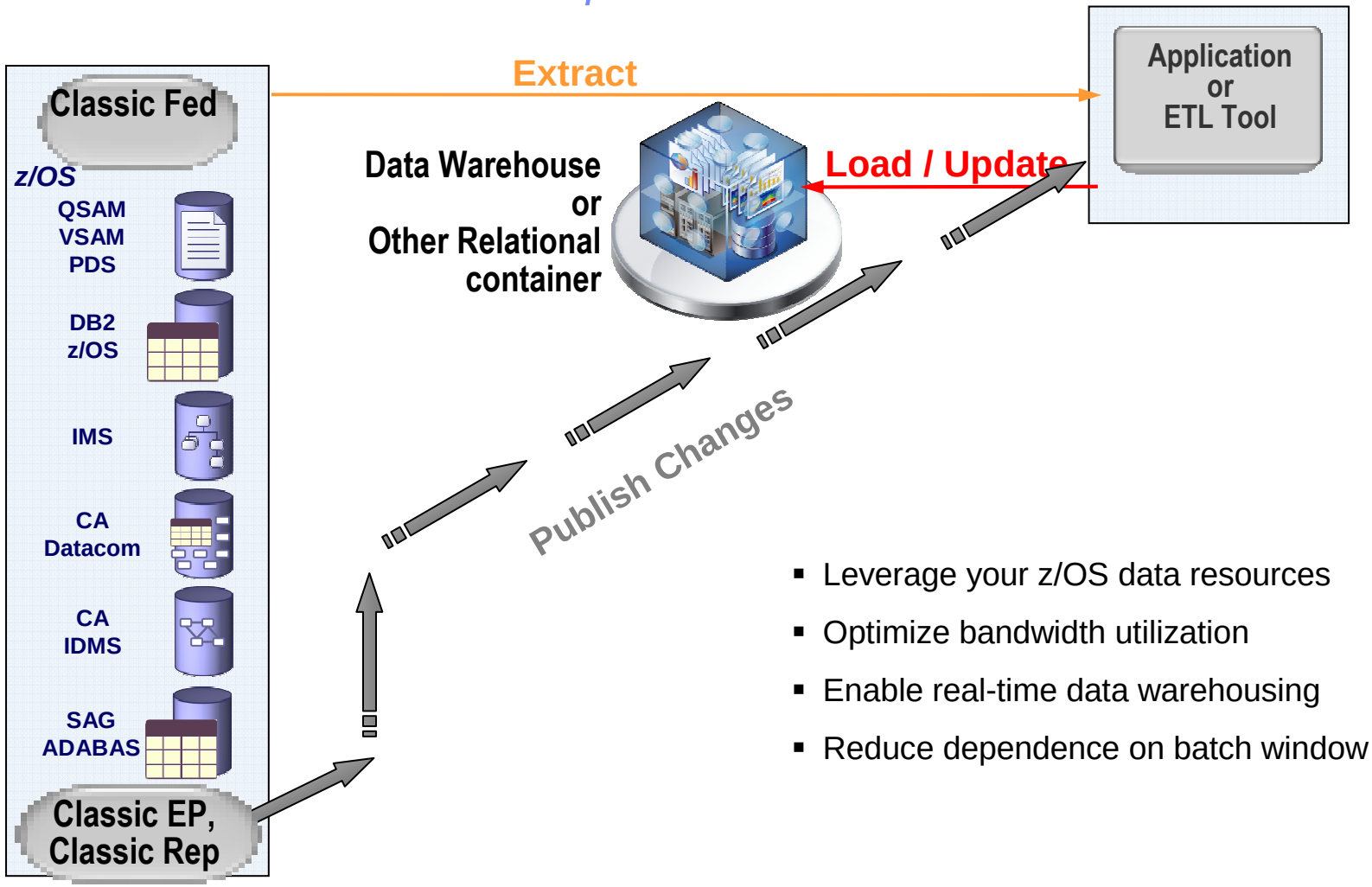
Bulk Data Delivery



Incremental Data Delivery



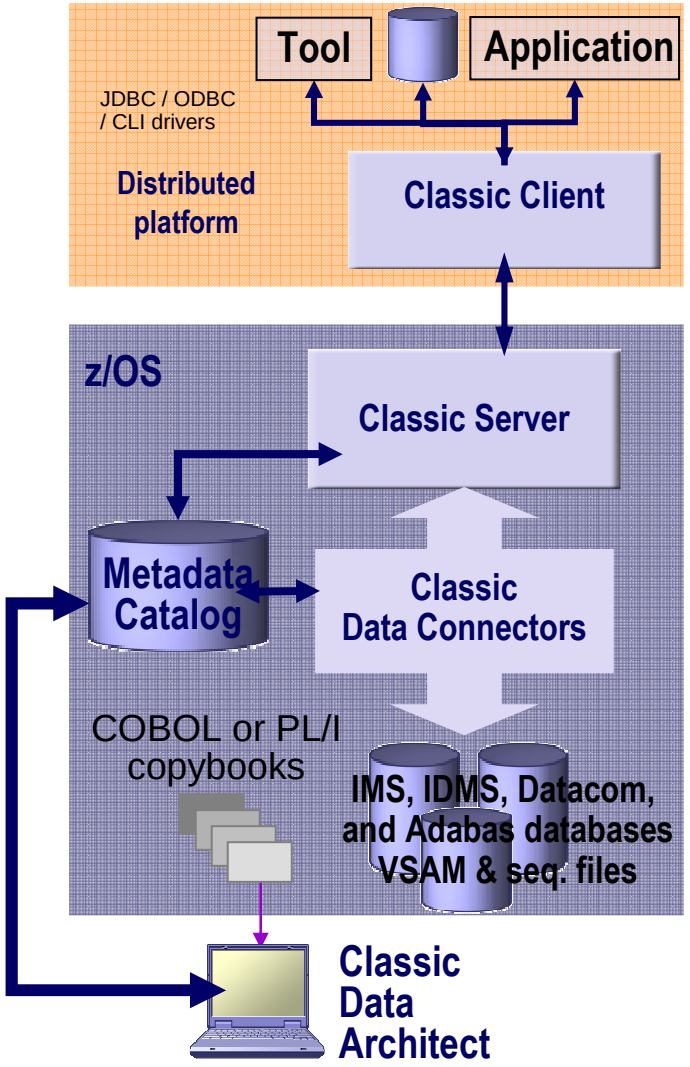
Leverage Critical "Classic" z/OS Data Resources in Today's Environment
Federation – Publication - Replication



- Leverage your z/OS data resources
- Optimize bandwidth utilization
- Enable real-time data warehousing
- Reduce dependence on batch window

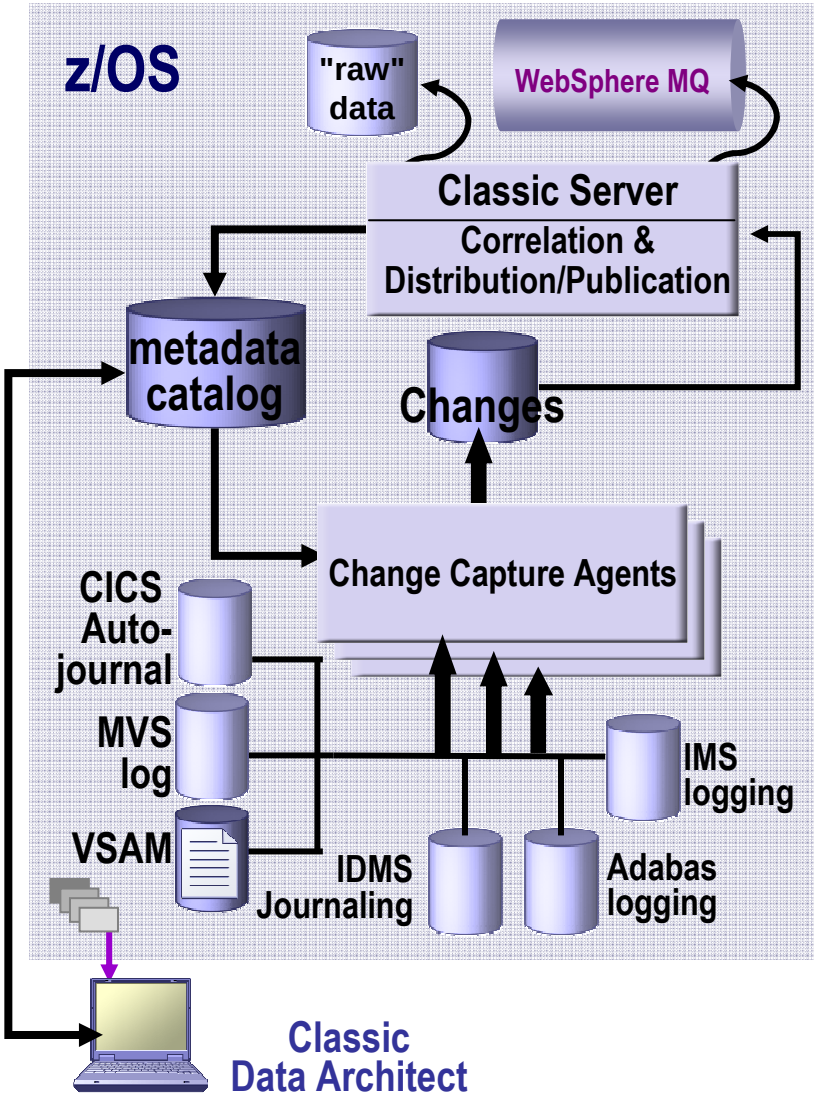
Federation - Access your IMS data as well as many others z/OS data

- **Read-from & write-to mainframe data sources**
  - Using standard ODBC, JDBC or Call-Level-Interface SQL
  - Without database/file unique API skills
- **Metadata-driven means**
  - No mainframe programming required
  - Leverages COBOL & PL/I copybooks, DBD source, etc.
- **Deliver mainframe data to**
  - Self-service portals … e.g. accurate account details
  - e-commerce solutions … e.g. up-to-the-second inventory
  - Reporting and analytical tools such as Cognos
  - Data transformation and cleansing tools such as DataStage and QualityStage for data warehousing, ODS, MDM, etc.



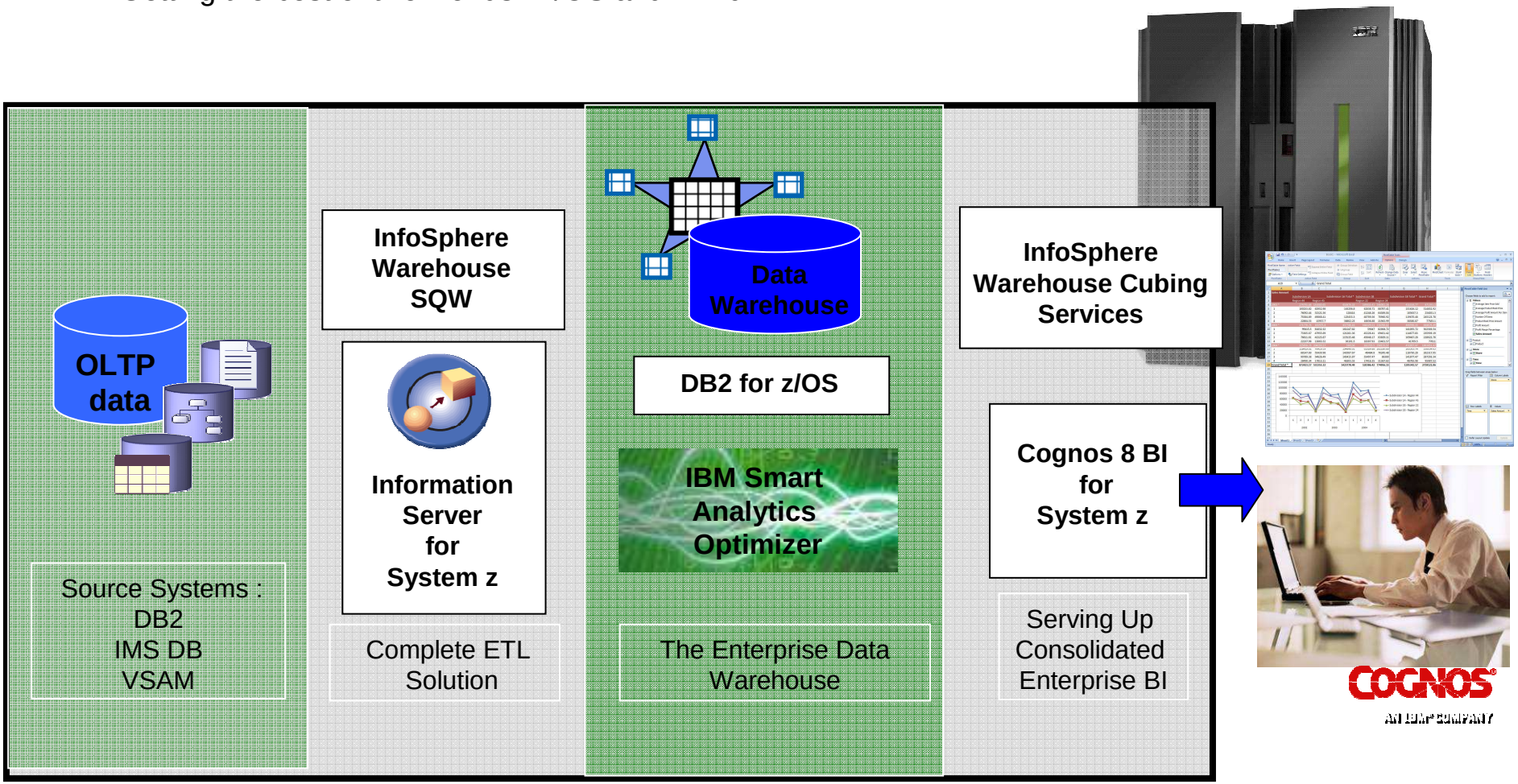
Publication - Capture and Publish IMS DB Changes

- **Near real-time changed-data capture & push to:**
  - ETL tool for incremental updating of a data warehouse
  - Application integration to drive downstream processes
  - Portals & other Web-based interfaces to stream live data
- **Capture data “events”**
  - Monitor source specific logs, journals, etc
  - Capture changes as they happen
  - Fully recoverable
- **Format data for optimized utilization**
  - XML for broad consumption
  - Delimited values to reduce message size
  - “Raw” format to optimize performance with DataStage
- **Deliver data for consumption**
  - WebSphere MQ for global delivery
  - File-based interface to optimize performance with DataStage



IBM Data Warehouse and BI System z Solution

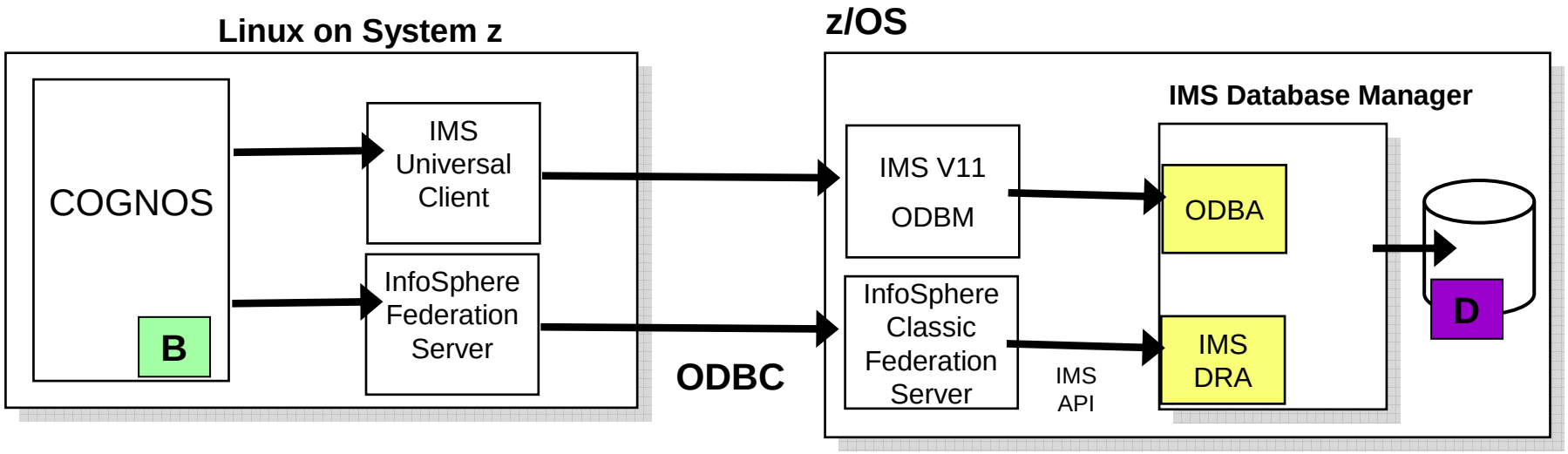
- **From traditional data warehousing to dynamic warehousing and operational BI**
  - Getting the best of two worlds: z/OS and zLinux



How to include IMS databases in Business Analytics solution?

- **Demonstrate access to IMS databases assets from business intelligence offering**
  - COGNOS as open, enterprise-class platform for PM and BI
  - IMS Databases as efficient hierarchical database manager hosting enterprise production data

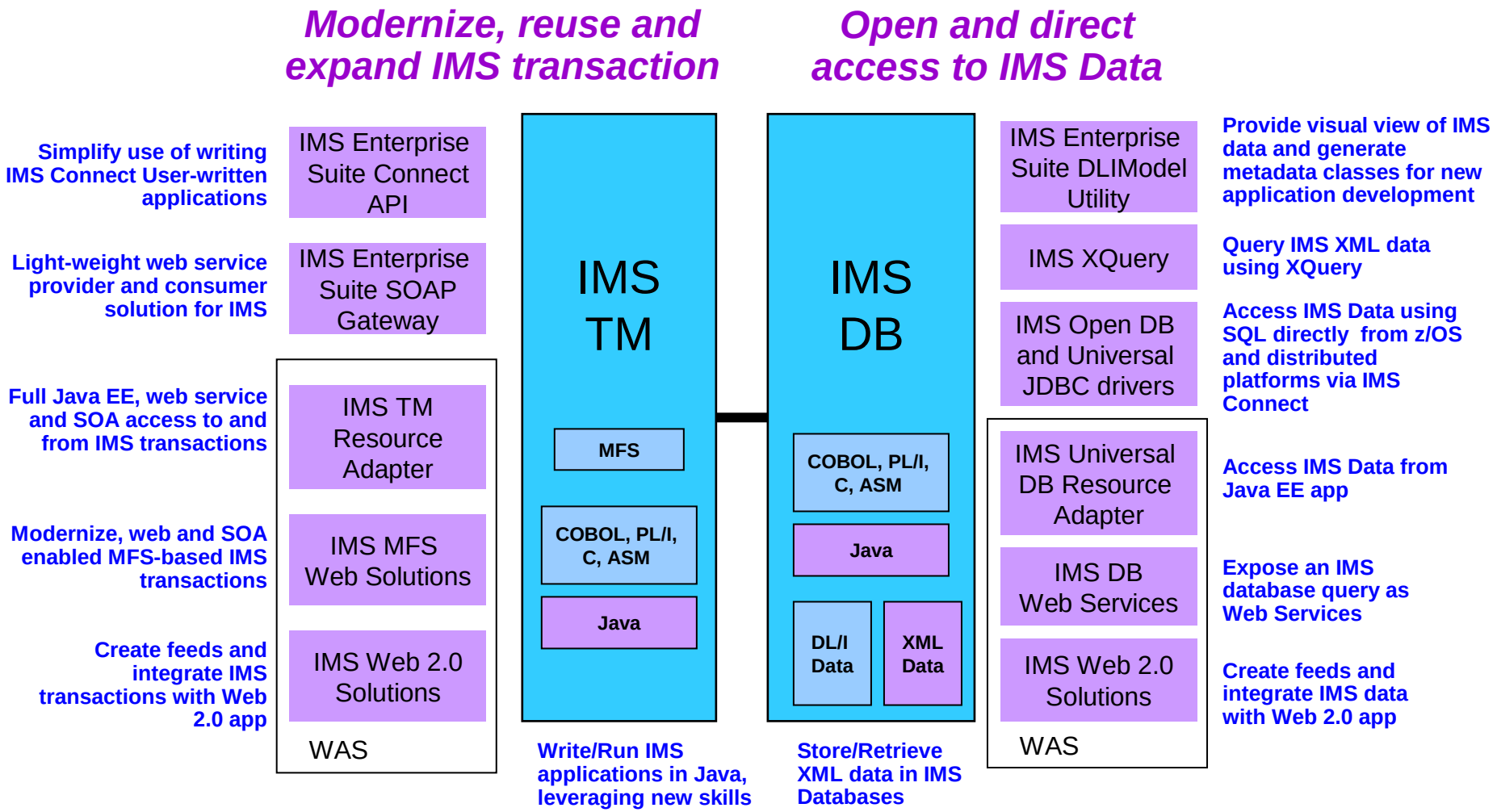
How do I access information scattered in disparate data sources?



The Message

- **IMS continues to be a premier server with architected standard interfaces**
  - New products and tools from a variety of vendors provide access to IMS transactions and data
- **SOA is revolutionizing the way businesses are being designed and run. For it to make sense:**
  - All assets must be easily accessible in a standard way
  - All data must be represented and manipulated in a standard way
- **Our goal is to leverage IMS as an integral part of the enterprise in the evolving business world through**
  - Addition of support for complimentary standards surrounding IMS connectivity, data representation, and application development
- **And to allow you to realize the promises of building a Service Oriented Architecture:**
  - Simplify the business environment
  - Respond to market changes more quickly and cheaply

Enhance IMS at no additional cost, while leveraging open standards



http://www.ibm.com/software/data/ims/toolkit/

Grow your IMS Business and Protect Investment

- **How to add new or expand existing IMS applications and IMS data?**
  - Target LOB applications architects & management
    - •Today awareness of “SOA-ing” IMS applications with this audience is nil
  - Publicize success stories internally
- **Back to IMS and z/OS basics messages**
  - Superior performance, bulletproof reliability
  - Don’t risk your business by moving off IMS
  - Value proposition:
    - •Growing transaction workload grows your revenue!
    - •More gateway on the LOB business logic and business data
    - •Drive demand for new function, justify V to V upgrades

Free IMS Lab-driven Customer Workshops

- **IMS Value Assessment**
  - Business and architectural review of IMS subsystem and applications with the goal of helping customers get more value out of their IMS investment
- **IMS V11 Migration Planning Seminar**
  - 2 day seminar reviewing the key features and functions of IMS with the goal of helping customers plan for IMS 11 migration
- **IMS SOA Workshop**
  - Technical education and discussion on IMS SOA capabilities allowing customers to service-enable and reuse their IMS assets (data and business logic)
- **IMS Database Workshop**
  - Technical education for application developers covering current IMS database capabilities which offer easier, scalable and standards based access to IMS data. The session includes lecture and hands-on lab exercises.
- **IMS Cobol, JAVA and PLI Application Development Workshops**
  - Technical education for application developers allowing them to test drive the latest tools to accelerate and simplify IMS application development; available for COBOL, PLI and JAVA developers

What is an IMS Value Assessment?

- **Free offering to analyze current IMS usage**
- **Identify ways to get more out of IMS investment**
- **Create opportunities to “Rethink” use of IMS**

System z Focus: Leveraging existing assets and platform capabilities

Ask Help from the NEW European IMS Architecture Team (IAT)

- **A NEW Team of "IMS Architecture" Specialists in Europe**
  - Technical Team Lead: Helene Lyon
  - Operate across Europe and Africa
- **Team Mission**
  - Confirm and secure existing IMS workload and seek opportunities to derive new benefit and workload on existing systems.
- **Job role**
  - Develop database and transaction management solutions that fully integrate and collaborate with existing IT systems in order to perform a business function, with a focus on the "right fit" positioning of the IMS DB and TM capabilities within those systems.
  - Establish and maintain strong technical relationships with client architect team with a focus on improving the satisfaction and technical health
  - Position the business value of System z & z/OS
- **Members 1Q2011**

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Enterprise Systems Program Overview

Systems Programming Track

Certificate	Offered
z/OS Associate Certificate	Spring and Fall
z/OS Professional Certificate	Fall only
z/OS Expert Certificate	Fall only

Application Programming Track

Certificate	Offered
COBOL Application Programming	Fall only
IMS Application Programming	Fall only
Assembler Language Application Programming	Spring only
DB2 Application Programming	Spring only

For more information

- **IMS 11 Release Planning Guide, GC19-2442**
  - Available from the Information Management Software for z/OS® Solutio
    http://publib.boulder.ibm.com/infocenter/imzic
- **IMS 11 Technical Overview**
  - http://www.redbooks.ibm.com/abstracts/sg247807.html?Open
- **IMS 11 Announcement Letters**
  - EMEA – ZP08-0416
  - US – 208-258
- **IMS Family Web site:**
  - ibm.com/ims
- **IMS Version 9 has been Withdrawn from Marketing on 7th September 2009**
  - See Announcement Letter ZP09-0212 issued 2nd June 2009
- **IMS Version 9 will be Withdrawn from Service on 7th November 2010**
  - See Announcement Letter ZP09-0318 issued 4th August 2009