Evénements IMS en France – 2012

- **Une journée IMS TM – 6 Mars 2012**
  - Cross brand avec Rational & Tivoli & WebSphere

- **Téléconférence – 1 heure en Lotus Connection – 10:00 à 11:00**
  - 10 Avril - IMS Explorer – Le Pourquoi & La Demo
  - 29 Mai – Les Solutions d'intégration des Applications IMS

- **Une journée IMS DB – 14 Juin 2012**
  - Guest Star: Kyle Charlet, IMS Lab
  - Cross brand avec InfoSphere & Optim

- **GSE IMS en France**
  - 19-janv.-12 – IMS HALDB
  - 29-mars-12 – IMS SOA
  - 7-juin-12 – IMS Performance

- **Une journée securité et gouvernance des données – Septembre 2012**
  - IMS & DB2
  - Guardium pour Audit
  - Guardium pour Encryption

- **Téléconférence – 1 heure en Lotus Connection – 10:00 à 11:00**
  - 25 Septembre - Nouveautés du Perf Pack – Vous y avez droit!

- **IMS Symposium – Germany – 12 au 15 Novembre**
  - **http://www.ibm.com/training/conf/ims**

- **GSE IMS en France**
  - 13-sept.-12 – Disaster recovery
  - 22-nov.-12 – Experiences IMS 12

Une Journée IMS DB – Jeudi 14 Juin 2012

		For IT architects, LOB architects	
09:00	09:30	**Café d'accueil**	
09:30	10:15	**La valeur d'IMS Database Manager**	Helene Lyon
10:15	11:00	**IMS Catalog – Why and How?**	Kyle Charlet (en anglais)
		Pause	
11:30	12:15	**Intégration des données IMS Solutions InfoSphere**	Jean-Baptiste Chautard
12:15	13:30	**Déjeuner**	
13:30	15:00	**Intégration des données IMS** *Open Database & Universal DRDA Driver* *IMS Explorer for Dev*	Kyle Charlet (en anglais) Hélène Lyon
15:00	15:15	**Pause**	
15:15	16:15	**Solutions de backup & recovery pour IMS DB**	Isabelle Bruneel
16:15	17:00	**Gouvernance des Données IMS**	Claudine Bouloc

Helene Lyon

helene.lyon@fr.ibm.com

DE, European IMS Architecture Team Technical Executive

# Value your IMS Databases in Today's World
June 2012

IMS Middleware – All You Need in One

- **A z/OS middleware that inherit all strength of zEnterprise**

- **A Messaging & Transaction Manager**
  - Based on a messaging and queuing paradigm
    - Asynchronous data flow
    - A real benefit in case of surge of traffic, or in case of unavailability of users to receive their transaction answers.
  - High-volume, rapid response transaction management for application programs accessing IMS and/or DB2 database, MQ queues
    - Managing the application programs — dispatching work, loading application programs, providing locking services
  - "Universal" Application Connectivity
    - Manages input and output messages from everywhere - 3270s, APPC, TCP/IP, WebSphere MQ, SOAP, web 2.0, etc.

- **A Batch Manager**
  - Standalone z/OS batch support
  - Batch processing region centrally managed by the IMS control region
    - Managing the batch-oriented programs — providing checkpoint/restart services

- **A Database Manager**
  - Central point of control and access for the IMS databases based on a hierarchical database model
    - Used by companies needing high transaction rates
  - Now provide an IMS catalog to contain all DB-related metadata
  - Now provide a "Universal" Database Connectivity based on JDBC / DRDA

z/OS Database Manager Positioning
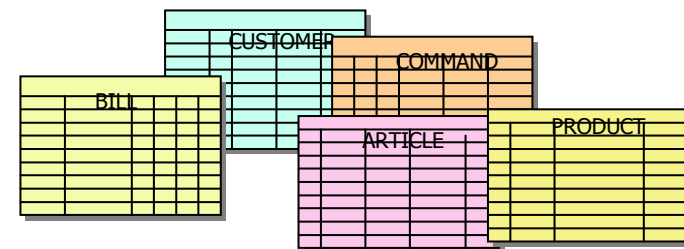
- **Hierarchical**
  - Operational Data
  - Utmost performance
  - Real time mission critical work
  - Bill of materials applications
  - Complex data structures with many levels
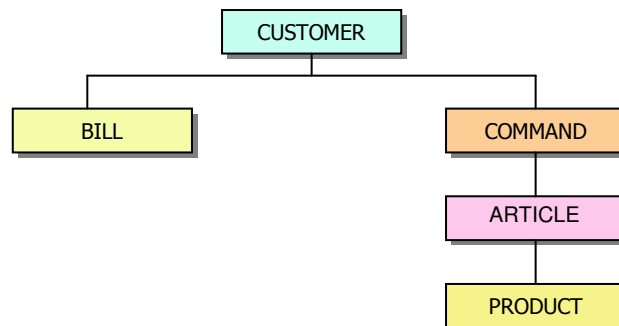
- **Relational**
  - Tabular data
  - Temporal data
  - Warehousing
  - Complex queries
  - Decision support

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

IMS DB in Perspective

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
Access from CICS and IMS applications, from Batch	IMS since early days
Open Access and Data Integration	DRDA Universal Driver with 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 – Guardium Tools
Audit for every access	IMS Tools – Guardium Tools
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 IMS – Towards Active / Active solution	InfoSphere IMS Replication
Replication to Relational	InfoSphere *Classic* Replication Server & *Classic* CDC
Publication of DB Changes	InfoSphere *Classic* Data Event Publisher
Operational Business Analytics & Reporting	COGNOS & SPSS

How to advertise IMS Database value?

- **Whitepaper from IDC**

- **A Platform for Enterprise Data Services: The Proven Power and Flexibility of IMS from IBM.**
  - This whitepaper includes the key benefits of IMS in a mainframe environment, and customer experiences from Fiducia, Telcordia, GAD and N. America's largest retail bank.
    - http://download.boulder.ibm.com/ibmdl/pub/software/data/sw-library/ims/idc-power-of-ims.pdf

> This white paper considers the need for alternatives to the relational model in dealing with certain classes of data required in these applications. It outlines the limitations inherent in the relational data management approach in dealing with certain workloads and use cases — limitations that make the relational database management system (RDBMS) a less than ideal choice for some SOA and Web-based applications. The document looks at common prejudices regarding the mainframe computing environment in general and IMS in particular. It shows how well-established technology is not necessarily "old technology" but can be just what's needed to achieve operational and service-level agreement (SLA) requirements.

IMS 12 Education

- **Register … Please**

- **Get the material**

- **Listen**

- **And Relisten** ☺

System z Events

IBM IMS 12 – Technical Education on Enhancements and Migration Planning Series

Teleconference
→ Register Now

Highlights

Topics include:

- Industry standard tools and interfaces that reduce your time to market

- Optimizing system performance and resilience

- Support for cross-solution integration in modern enterprise architectures

- Lowering the total cost of ownership of your IT

Speakers: Suzie Wendler, IMS Advanced Technical Skills, IBM Software Group
Kenneth Blackman, IMS Advanced Technical Skills, IBM Software Group
Diane Goff, IMS Advanced Technical Skills, IBM Software Group
Nancy Stein, IMS Advanced Technical Skills, IBM Software Group
Angelique Greenhaw, IMS Advanced Technical Skills, IBM Software Group
Glenn Galler, IMS Advanced Technical Skills, IBM Software Group

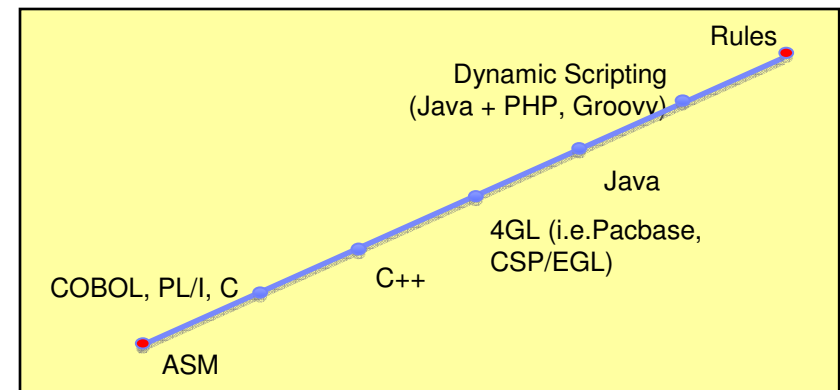**Broadcast dates:** June 26, 27 and 28

Agenda

- **Smarter Application Development**

- **Smarter Data Management**

- **Smarter Data Governance of Enterprise Data**

- **Smarter Data Integration thru federation, publication, replication**

- **Smarter Business Analytics solutions on Operational Data**

Remember … z/OS Languages

- **Compilers exploit new hardware instructions introduced by System z**
  - z/OS XL C/C++
  - Enterprise COBOL for z/OS
  - Enterprise PL/I for z/OS
  - 135 new / changed instructions

```
                                                        Rules
                              Dynamic Scripting
                              (Java + PHP, Groovy)
                                            Java
                                      4GL (i.e.Pacbase,
                                      CSP/EGL)
        COBOL, PL/I, C        C++
      ASM
```

- **Code generated by the compilers is highly tuned for System z**

- **Boost in performance of applications running on System z**

- **z/OS compilers product pages**
  - Enterprise COBOL for z/OS http://www-01.ibm.com/software/awdtools/cobol/zos/
  - Enterprise PL/I for z/OS http://www-01.ibm.com/software/awdtools/pli/plizos
  - z/OS XL C/C++ http://www-01.ibm.com/software/awdtools/czos/
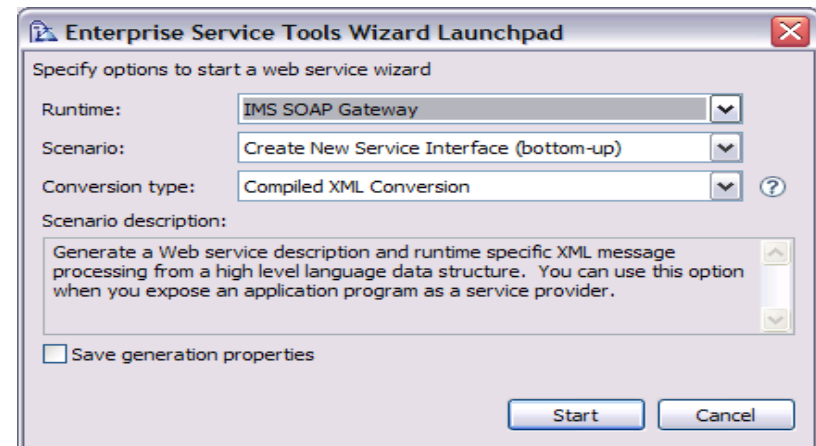 - Java http://www-03.ibm.com/systems/z/os/zos/tools/java/

Addressing IMS Programmer Skills Issues

- **Rational Developer for System z (RDz) provides the best platform for traditional IMS application program maintenance and development**
  - COBOL, PL/1, etc, … the advanced compiler technologies!
  - Snippets to simplify IMS API coding for IMS message queues and IMS databases access
  - Integration with IMS Explorer for Development, eclipse-based tool

- **New z/OS applications 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**
  - Support for java standard DB API, JDBC to access IMS databases
  - Relational metadata management
    - Created with IMS Explorer for Development
    - Stored/ accessed in/from IMS Catalog

- **And also**
  - Look at the low-cost IBM Rational Development and Test for System z
    - A personal, local test environment for mainframe developers to create and test their code changes in a isolated and controllable environment while reducing the consumption of mainframe MIPS for development activities.
  - Look at Rational Asset Analyzer
    - Gain intellectual control of applications
    - Gain transparency into outsourced development

Enhancing z/OS Application Development Experience
With Rational Developer for System z (RDz)

- **Eclipse-based application development tool for modernizing and developing System z applications**
  - COBOL, PL/I, C, C++, HL Assembler, Java
  - Supports IMS, CICS, Batch, USS, etc.
  - Interactive access to z/OS system
  - Access PDS and run JCL from your workstation

- **Premier IBM Integrated Development Environment for development and test of IMS applications**
  - Drag-and-drop code snippet function for IMS DLI calls

- **Also supports IMS SOA enablement**
  - Enables CICS and IMS applications for Web Services and SOA
  - Built-in wizard for SOAP Gateway and Web 2.0
  - Generate XML COBOL/PLI converters for XML transformation
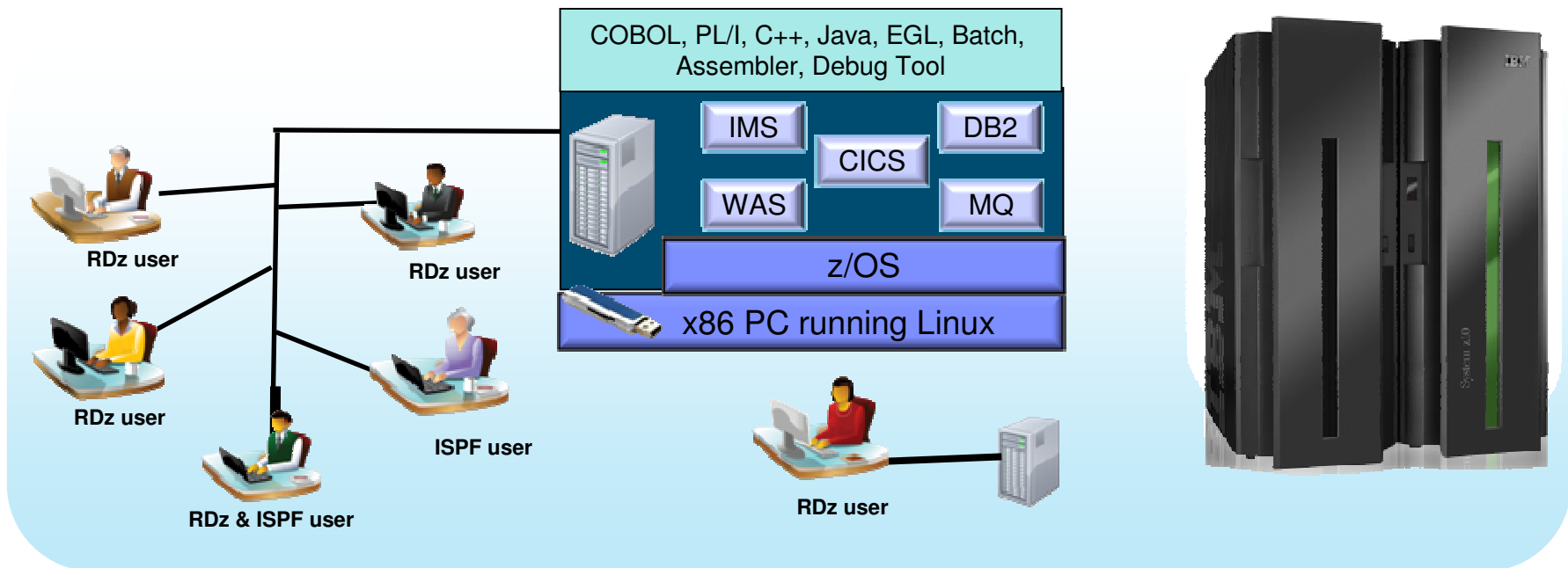 - Generate WSDL, correlator files for Web Services access

Enterprise Service Tools Wizard Launchpad

Specify options to start a web service wizard

Runtime: IMS SOAP Gateway

Scenario: Create New Service Interface (bottom-up)

Conversion type: Compiled XML Conversion

Scenario description:

Generate a Web service description and runtime specific XML message processing from a high level language data structure. You can use this option when you expose an application program as a service provider.

☐ Save generation properties

Start   Cancel

** Unwarranted two complimentary copies of RDz for IMS 10+ users

Download from IMS web page at IMS SOA Integration Suite

Rational Development and Test Environment for System z
The ultimate in modern application development for System z

COBOL, PL/I, C++, Java, EGL, Batch, Assembler, Debug Tool

IMS   CICS   DB2

WAS   MQ

z/OS

x86 PC running Linux

RDz user

RDz user

RDz user

ISPF user

RDz & ISPF user

RDz user

- Increase availability of z/OS testing environment and resources
  - Liberate developers to rapidly prototype new applications
  - Develop and test System z applications anywhere, anytime!
  - Eliminate costly delays by reducing dependencies on operations staff
- Improve quality and lower risk via automation, measurement, and collaboration
- Focus on what is required for the change at hand, then scale

Note: This Program is licensed only for development and test of applications that run on IBM z/OS. The Program may not be used to run production workloads of any kind, nor more robust development workloads including without limitation production module builds, pre-production testing, stress testing, or performance testing.

IMS Explorer for Development - *Simplifying IMS application development!*

- **Easier visualization and editing of IMS Database and Program (PSB) Definitions**
  - Provide graphical editors to:
    - Display IMS database hierarchical structures
    - Display/create/edit PSBs
    - Change/add fields on a DBD
  - Import COBOL copybooks and PL/I data structures to a database segment*
  - Generate DBD and PSB source
  - Generate metadata needed by Java applications and for SQL access from Explorer

- **Ability to easily access IMS data using SQL statements**
  - Leveraging IMS 11 Universal JDBC driver and Open Database

- **Connectivity to the z/OS system**
  - Browse a Data Set and submit JCL
  - Import and export DBD and PSB source files from a Data Set to the IMS Explorer, and vice-versa

Requires RDz 8.0 or later

IMS Explorer for Development – View Examples

Much easier to understand the database structure

z/SO Perspective

SQL & result sets

IMS Explorer for Development – Software Requirements

- **The IMS Explorer supports IMS Version 10 and later**

- **For SQL access to an IMS database from IMS Explorer, you must have IMS Version 11 or later on your host system with Open Database implemented**

- **To import COBOL and PL/I data structures, the IMS Explorer must be installed into Rational Developer for System z Version 8.0 or later**

- **The IMS Explorer supports cross-product integration (shell-sharing) with the following products:**
  - Rational Developer for System z Version 8.0.3 or later
  - IBM Optim Development Studio Version 2.2.1.1 or later
  - IBM Problem Determination Tools Plug-ins for Eclipse

IMS Explorer for Development	RDz shell-sharing environment				non-RDz environment			
	Open Database		IMS Catalog		Open Database		IMS Catalog	
	WITH	WITHOUT	WITH	WITHOUT	WITH	WITHOUT	WITH	WITHOUT
Visualization/editing of PSB, DBD	X				X			
Access z/OS system - Files & Sysouts	X (through RDz's native function)				X			
Download & Upload PSB & DBD from z/OS	X				X			
SQL access	X		X	X	X		X	X
Cobol and PLI import	X	X	X	X				
Import source from Catalog (when Catalog-enabled)	X		X		X		X	

IMS Explorer for Development – Runtime Access

- **Distributed Relational Database Architecture (DRDA)**
  - Set of protocols and functions for client and database servers connectivity
  - Communication protocol
  - Two-Phase commit protocol
  - Security

SQL code
or
result set

IP
DDM
DLI

Distributed Data Management : DRDA protocol

DDM
DLI

DLI

SQL

IMS Connect is the server for DRDA messages sent via the TCP/IP protocol

Windows

z/OS

IMS

IMS Explorer

IMS Connect

ODBM

IMS Universal Database Driver

T C P I P

T C P I P

TCPIP

S C I

S C I

O D B A

PC

CTL

IMS DB

IMS Catalog – Storing IMS DB technical metadata
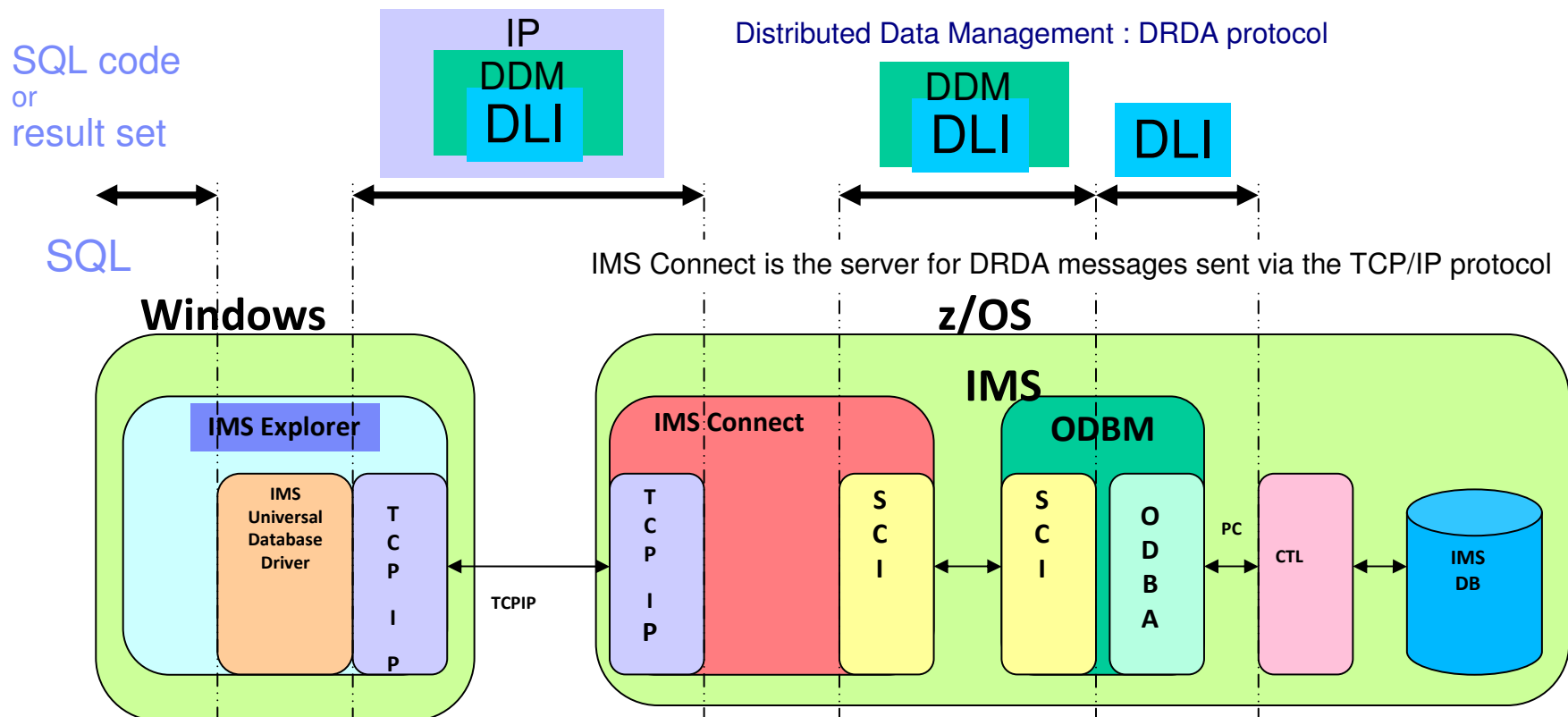
Available April 23rd 2012

- **Before IMS Catalog**
  - Databases partially defined in DBD
    - Only searchable fields needed by applications
    - Remaining segment data is not defined
    - DBD metadata: DB structure, physical definition, segment, fields
  - Remaining database definition in applications
    - COBOL copybook maps segment data
    - Applications can have different segment mappings
    - Application metadata: application defined fields, encodings, redefines, user defined types, structures

- **IMS 12 Catalog Support**
  - Utility to populate catalog
  - ACBGEN populates ACBLIB and catalog
    - Populate ACBLIB with standard ACB info and extended info
    - Populate catalog with extended info
  - Key points
    - Only way to update catalog is via the ACBGEN process
    - Extended info stored in ACBLIB members for recoverability
    - Extended info is acquired via the IMS Explorer

DB Client Route

© 2012 IBM Corporation
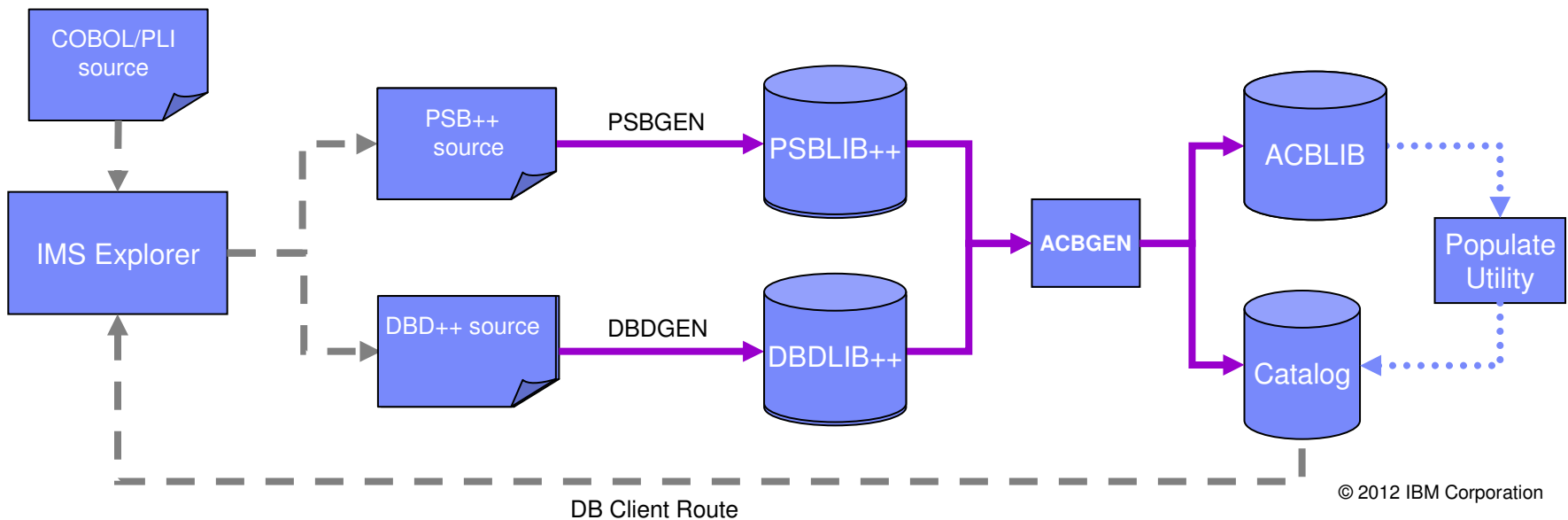
Enhancing IMS DB Openness and Integration

- **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
  - In external high level language DB2 Stored Procedures - COBOL, PL/I, C, C++, Assembler, REXX, and Java

- **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 – Full DRDA Support

- **Using IMS DB to store XML data**
  - Like IMS DB, XML data is hierarchical
    - It is simple to map IMS data into XML documents.
    - All IMS databases are Virtual XML Databases

IMS Databases – Universal Connectivity Solutions

Using IMS Universal JDBC driver (any platform) – IMS 11

| B |
| JavaEE |
| JDBC |
| DLI |

Universal drivers ←→ **TCP/IP** IMS Connect ←→ ODBM ←→ IMS DB **D** ←→ IMS DB

Using DB2 Stored Procedures

DRDA Client **B** ←→ **TCP/IP** DB2 Stored Procedures **B** ←→ D R A IMS DB **D** ←→ IMS DB
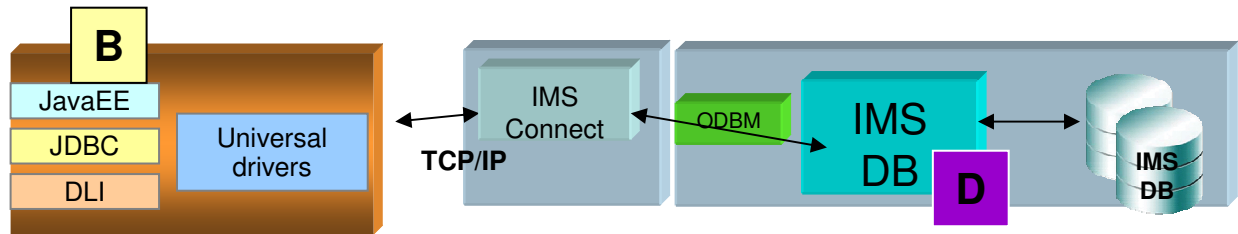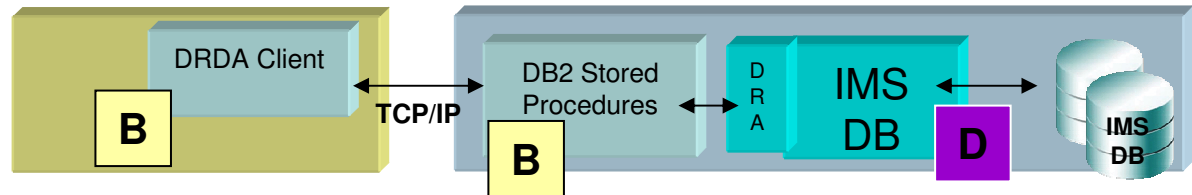
Using InfoSphere Classic Federation Server

InfoSphere CF JDBC or ODBC Client **B** ←→ **TCP/IP** InfoSphere Classic Federation ←→ D R A IMS DB **D** ←→ IMS DB

BILL
CUSTOMER
COMMAND
ARTICLE
PRODUCT

← **IMS Explorer for Dev IMS Catalog**

CUSTOMER
├── BILL
└── COMMAND
    └── ARTICLE
        └── PRODUCT
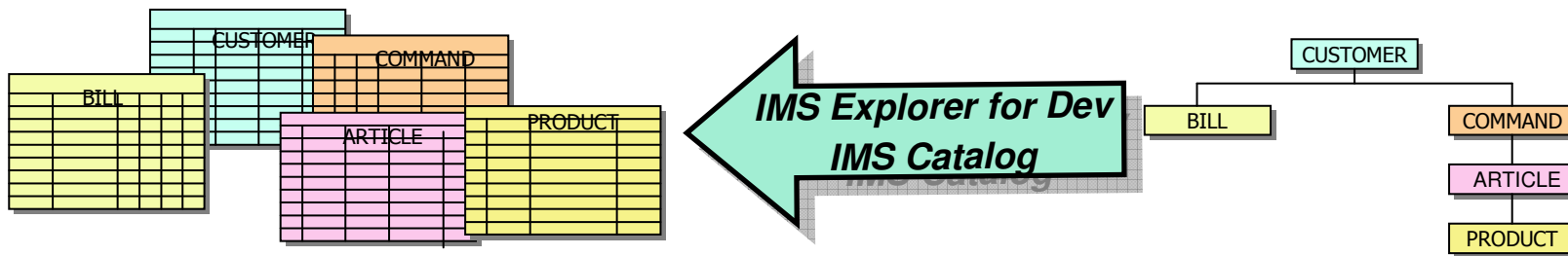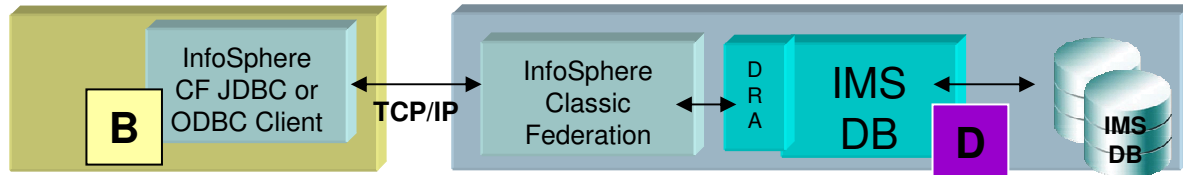
IMS DB Universal Drivers

- **Java drivers are resource adapters that enable access to IMS databases**
  - from z/OS and distributed (non-z/OS) platforms
  - SMP/E-installable

- **Two types of connectivity supported**
  - local connectivity to IMS databases on the same LPAR (type-2 connectivity)
  - distributed connectivity through TCP/IP (type-4 connectivity).

- **3 IMS Universal Drivers**
  - IMS Universal DB resource adapter
    - A Java EE Connector Architecture (JCA) 1.5-compliant resource adapter

  - IMS Universal JDBC driver
    - A Java Database Connectivity (JDBC) driver that implements the JDBC 3.0 API.

  - IMS Universal DL/I driver
    - A Java API for making calls with traditional DL/I programming semantics

IMS Open Database Overview

Application Types

DRDA RYO Client

CSL RYO Client

z/OS LPAR

Stand-alone* JDBC

Stand-alone* Java DL/1

e.g. WAS

JavaEE JDBC

JavaEE JDBC

CICS

SCI

SCI PC

D R D A **IMS Connect**

TCP/IP

SCI

ODBM

O D B A

IMS

IMS DB

e.g. DB2 SP IMS TM CICS

Stand-alone* JDBC

Stand-alone* Java DL/1

Java

Note: In addition, you can use the CCI programming style in a JEE environment to access IMS databases using either simple SQL calls (non-JDBC) or simple DL/1 calls

✱ In this context, "stand-alone" means "standalone Java SE"

DB2 Stored Procedures as z/OS Orchestration Layer

- **DB2 Stored Procedures provides clients the ability to work transparently with multiple server facilities such as IMS logic & data, DB2 data, VSAM, MQ messages**

- **Unique SQL CALL statement from JDBC or ODBC**
  - Alternative to B2B connection models (JCA, JMS, web services)
  - Easier development on distributed side
  - Results of work could be passed to the client using result sets (easily managed by desktop tools)
  - Failure on z/OS side reported by an SQL return code to the distributed application

- **Generated by tools**
  - Data studio for Native SP
  - RDz for COBOL/PLI SP

z/OS

WebSphere Application Server

IBM Data Server driver for JDBC or SQLJ

JDBC

DB2 Database Manager (DBM1)

DB2 Native SP

DB2 Native SP

ODBC

DSNAIMS & OTMA CI

DB2 External SP (Cobol, Java, ...)

IMS transaction

Business Rules (WODM)

IMS Databases

Presentation layer

.NET

IBM Data Server Driver for ODBC
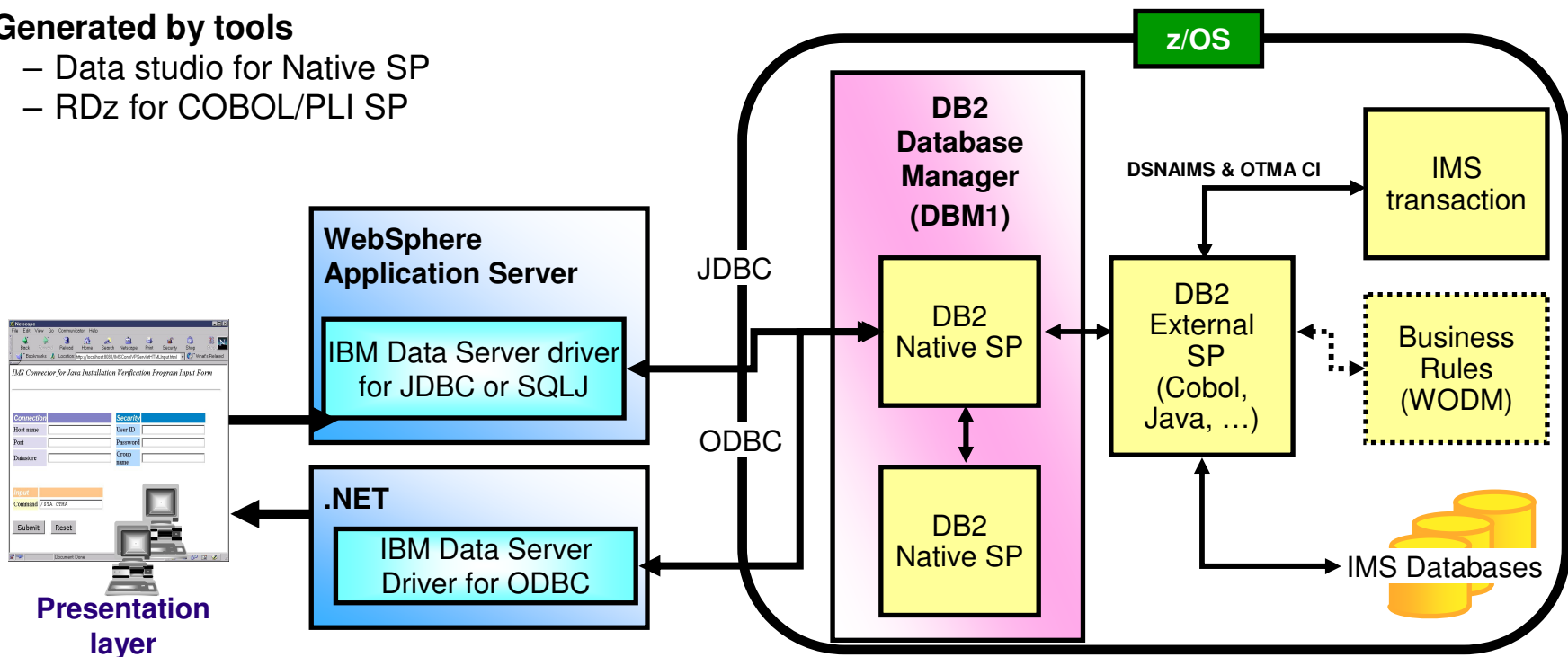
DB2 for z/OS Stored Procedures

- **A user-written program that can be called by an application with an SQL CALL statement.**

- **Stored procedure types**
  - Native SQL procedures
    - No need for specialist mainframe programming skills
    - Used for business logic except where complex arithmetic and/or string manipulation needed
    - Up to 60% zIIP offload when called remotely over DRDA over TCP/IP
  - External high level language procedures - COBOL, PL/I, C, C++, Assembler, REXX, and Java
    - Can execute business logic, SQL statements, use MQ API, …
    - Up to 5% zIIP offload when called remotely over DRDA over TCP/IP
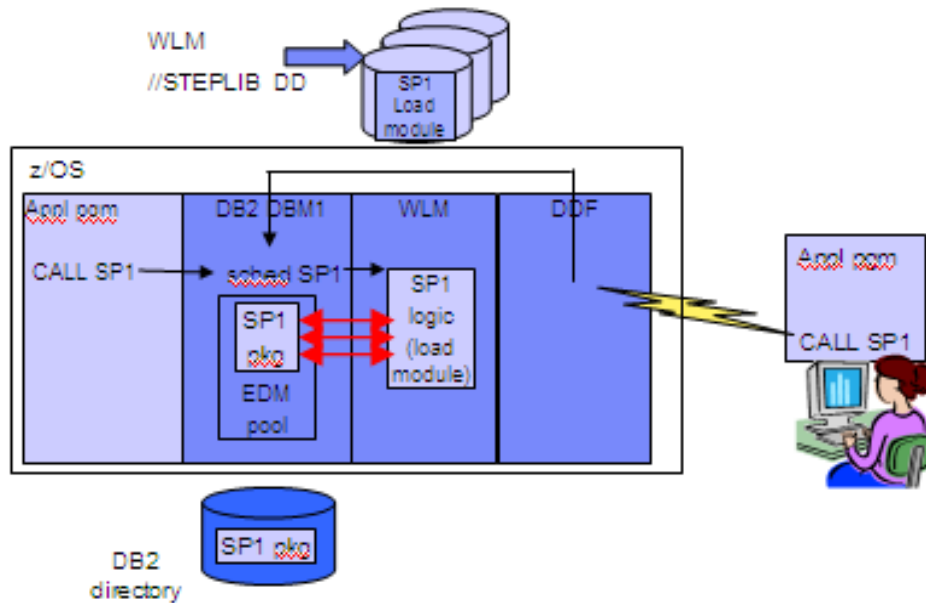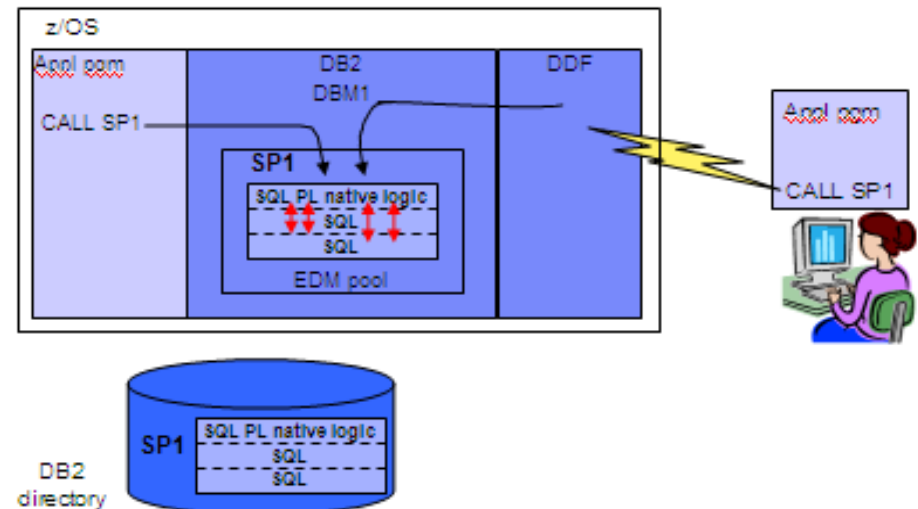
IMS Java and IMS XML Databases

- **Two Types of IMS XML Database**
  - Decomposed or Virtual XML DB
    - •A standard IMS DB, which has data automatically transformed into XML when retrieved (and v.v.)
  - Intact XML DB
    - •Where XML data is stored without transformation (i.e. with its XML tags) on the IMS DB

- **New XML DB implementation**
  - From the DLI interface used in V9 and V10 to the new Universal driver interface in V11 that Open DB implements.
  - Universal JDBC to replace RetrieveXML and StoreXML UDF

IMS PSB/DBD Source

DLIModel Utility

XML Schema

IMS DB

IMS Java Application

XML Document
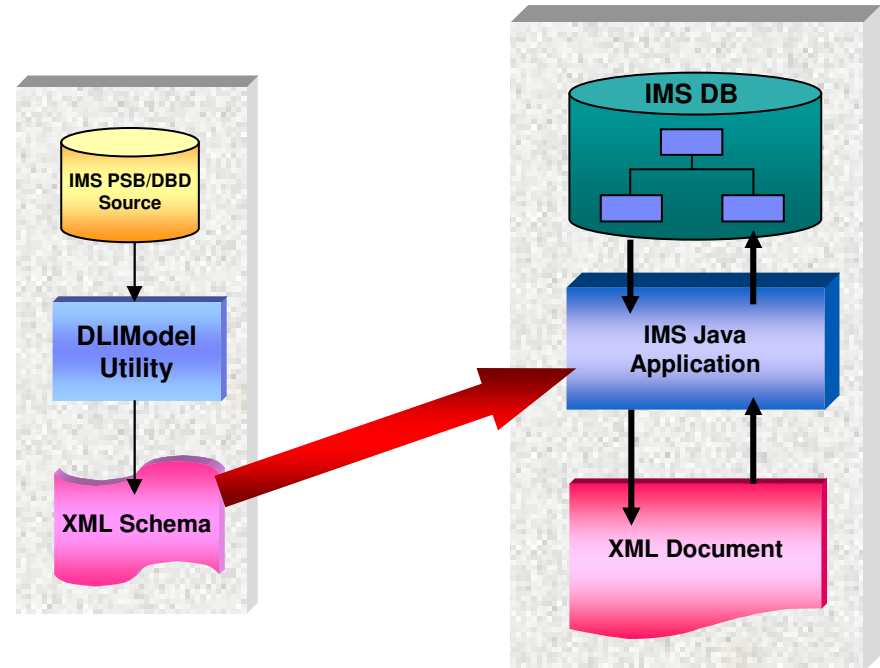
```
SELECT Dealer.DealerXML,
FROM Dealer, Order
WHERE Order.Ordernum = '35'
```

Two Rows of XML CLOBs in the ResultSet
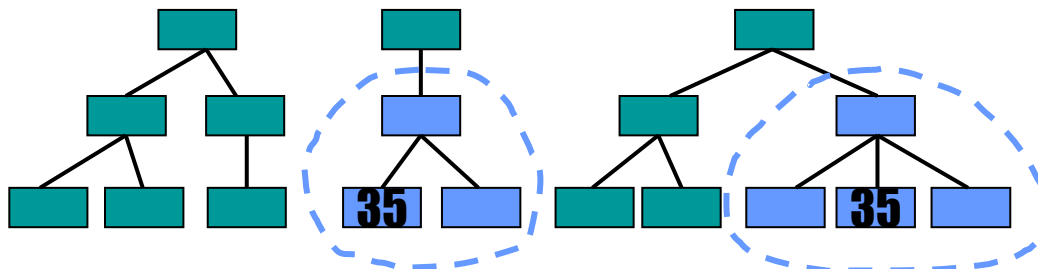
35

35

Agenda

- **Smarter Application Development**

- **Smarter Data Management**

- **Smarter Data Governance of Enterprise Data**

- **Smarter Data Integration thru federation, publication, replication**

- **Smarter Business Analytics solutions on Operational Data**

Extreme Performance for IMS DB Concurrent Access

- **Highly Parallel Architecture exploiting System z & Parallel Sysplex when high availability is needed**
  - 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 run concurrently
    - IMS standalone batch also supported

IMS System Address Spaces ← → ← **Up to 999 Threads** →

| OM | SCI | CONTROL REGION | DBRC | IRLM | DLISAS | IMS Regions | CICS Threads | ODBA Threads |

IMS Log

RECON

IMS DB

DB2 DB
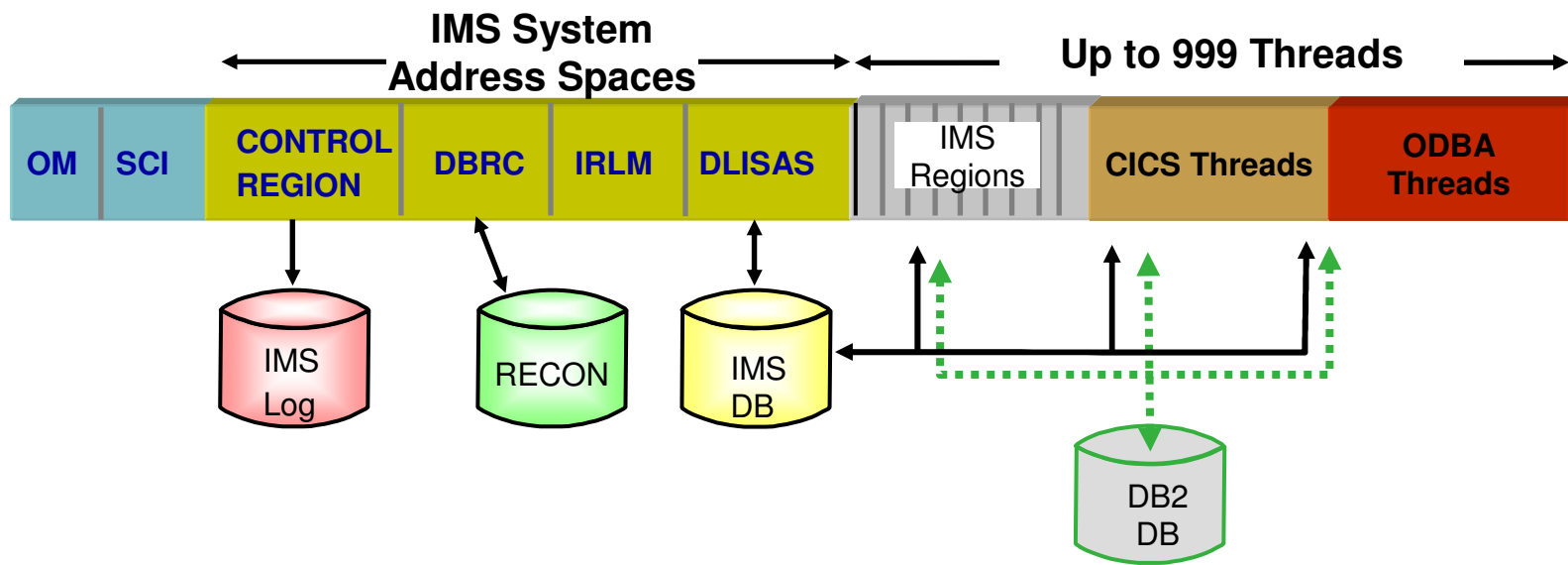
Addressing DBA Skills Issues

IBM's IMS Tools Strategy

DBA Time = €€€€€

- **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 – June 2012
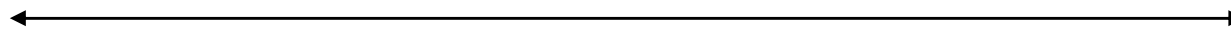
IMS Database Solution Pack for z/OS	IMS Fast Path Solution Pack for z/OS	IMS Recovery Solution Pack for z/OS	IMS Performance Solution Pack for z/OS
IMS DB Reorganization Expert - Unload, Load, Index Build, Prefix Resolution/Update **IMS HP Image Copy** **IMS HP Pointer Checker** **IMS Library Integrity Utilities**	**IMS HP Fast Path Utilities** **IMS DB Repair Facility** **IMS HP Image Copy** **IMS Library Integrity Utilities**	**IMS HP Image Copy** **IMS Database Recovery Facility** **IMS HP Change Accumulation** **IMS Index Builder** **IMS DRF Extended Functions**	**IMS Connect Extensions** **IMS Performance Analyzer** **IMS Problem Investigator**

IBM Tools Base for z/OS

Data Base Administration	▪IMS HALDB Toolkit ▪IMS Sequential Randomizer Generator	**System / TM Administration**	**System** ▪IMS Command Control Facility ▪IMS ETO Support ▪IMS HP Sysgen Tools ▪IMS Queue Control Facility ▪IMS Workload Router
Utility Management	▪IMS Online Reorganization Facility ▪IMS Cloning Tool ▪IMS Database Control Suite		**TM** ▪IMS Configuration Manager ▪IMS Sysplex Manager
Backup and Recovery	▪IMS HP Image Copy ▪IMS DEDB Fast Recovery ▪IMS Recovery Expert V2	**Application Management**	▪Batch Terminal Simulator ▪Batch Backout Manager ▪Program Restart Facility
Performance Management	▪IBM Transaction Analysis Workbench ▪IMS Buffer Pool Analyzer ▪IMS Network Compression Facility	**Regulatory Compliance**	▪IMS Audit Management Expert ▪IBM Infosphere Guardium Data Encryption for DB2 and IMS Databases

IMS DB - Maximizing IMS Database Availability

- **Practices to minimize database outages**

Not So Good ⟵————————⟶ **Best**

Basic IMS core functions:
- HD Unload,
- HD Reload,
- etc.

Clean ICs

Creating Recovery Points with /DBRs

Smart Reorg with IMS Tools:

IMS Database Solution Pack
- Including HP Unload, HP Load, etc.

IMS Fast Path Solution Pack

HALDB with HP Unload, HP Load, etc.

HALDB Online Reorg

High-Speed DEDB Direct Reorg

IMS Tools: Online Reorg Facility (ORF)

Fuzzy ICs

Eliminating Recovery Points with DRF

Creating Recovery Points with IMS 11 DB Quiesce

IMS Recovery Expert solution based on disk mirroring solutions

IMS DB - Comparison of Reorganization Solutions

Standard Offline Reorg Process

| Unload | Reload | Bld Sec. Index | Image Copy |

/DBR DB /STA DB
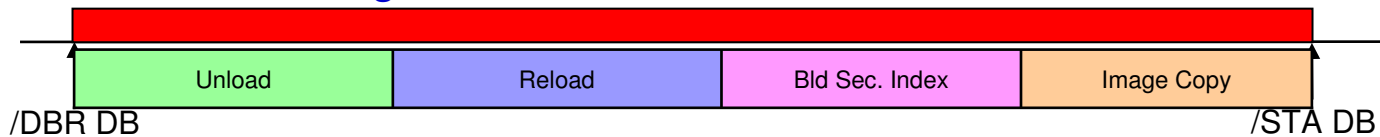
Offline Reorg Process using IMS Database Solution Pack

| Unload * |
| Reload * |
| Bld Sec. Index * |
| Image Copy * |

/DBR DB /STA DB
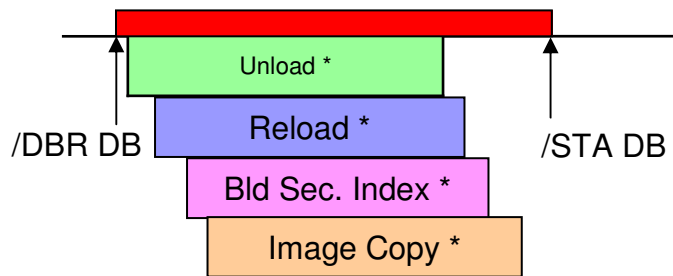
See Conditional Reorg with the new Smart Reorg capability!

Online Reorg Process using IMS Tools ORF

| Copy DB | Unload * | Reload * | Bld Sec. Index * | Image Copy * | Apply Changes |
| Capture Changes |

/DBR DB /STA DB
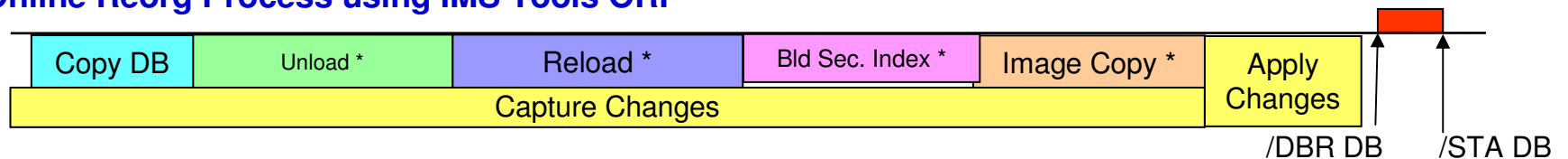
True Online Reorg Process for HALDB

| Unload |
| Reload |
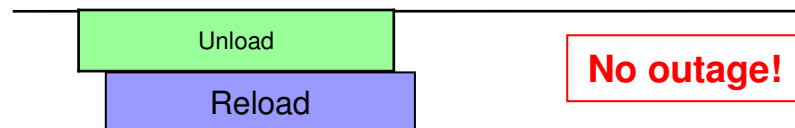
No outage!

= Database Outage

* Maximum Duration – Less with tools

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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**

Addressing IMS Simplification for System Programmers

- **Before IMS 10, each IMS must have a "MODBLKS"**
  - Databases, Transactions, Programs and Fastpath Routing Codes
  - Complete set of definitions rebuilt for any change.

- **In IMS 10, DRD Dynamic Resource Definition has been introduced.**
  - Resources defined in a Resource Definition DataSet, <u>system scope</u>
  - Stage1 smaller
  - Resources dynamically modified with type2 commands or via ISPF panels
  - Portable with EXPORT and IMPORT between RDDS, and MODBLKS if needed.

- **IMS 12 provides an optional Repository:**
  - A single centralized store for the DRD resource definitions
    - IMS Resource Definition Data Set (RDDS) can continue to be used instead of or in addition to the repository
  - Enables IMS systems to manage, store, share, and retrieve resource definitions
    - Database, Program, Transaction, Routing Code and related descriptors
  - Allows DRD resource definition changes to be made in repository and rolled to one or more active IMS systems
  - The repository resources can be "Queried" via command
  - A strategic IMS architectural direction based upon BPE, CSL, IMSplex architecture

IMS System and Application Debugging

- **Traditionally, system programmers are knowledgeable in monitoring and tuning 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 related systems and subsystems.

Monitor

TM&DB System

Applications

Network

Tune and Control
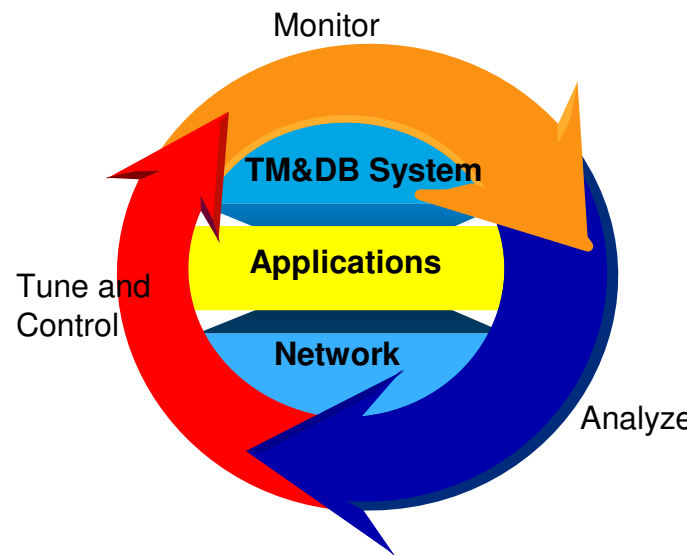
Analyze

IMS Performance Pack

IMS Connect Extensions

IMS Problem Investigator

IMS Performance Analyzer

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IMS Problem Investigator – IMS Open Database Environment

```
   File    Menu   Edit   Mode   Navigate   Filter   Time   Labels   Options   Help
   ----------------------------------------------------------------------------------
   IMSPI       CEX000.QADATA.REDBOOK.DRDAT111.ICON.D1003   Record 00000001 More: < >
   Command ===>                                              Scroll ===> CSR
      Forwards / Backwards . . 00.00.00.000100   Time of Day . . 16.46.22.845746
      Code Description                 Date 2010-03-31 Wednesday  Time (Elapsed)
   /  ---- --------------------------------------------------------- ----------------
   ___ A000 IMS Connect Extensions Control Information              13.26.14.140845
   ___ A05B DRDA 1041 EXCSAT-Exchange Server Attributes             20.29.409732
   ___ A05B DRDA 106D ACCSEC-Access Security                         0.000052
   ___ A05C DRDA 1443 EXCSATRD-Server Attributes Reply Data          0.000024
   ___ A04A WRITE Socket                                             0.000060
   ___ A05B DRDA 106E SECCHK-Security Check                          0.615160
   ___ A063 ODBM Security Exit called                                0.000142
   ___ A064 ODBM Security Exit returned                              0.000113
   ___ A05C DRDA 1219 SECCHKRM-Security Check Reply Message          0.000023
   ___ A04A WRITE Socket                                             0.000109
   ___ A05B DRDA 2001 ACCRDB-Access RDB                              0.627793
   ___ A05D ODBM begin Allocate PSB (APSB) Program=AUTPSB11          0.000022
   ___ A061 ODBM Routing Exit called                                 0.000010
   ___ A062 ODBM Routing Exit returned                               0.000160
   ___ A069 Message sent to ODBM
   ___ A06A Message received from ODBM
   ___ A05E ODBM end Allocate PSB (DPSB) Program=A
```

```
      File   Menu   Format   Help
      ---------------------------------------------------------------------------------
      IMSPI       CEX000.QADATA.REDBOOK.DRDAT111.ICON.D Record 00000021 Line 00000019
      Command ===>                                             Scroll ===> CSR
      Form    ===>         +  _  Use Form in Filter            Format ===> FORM
      +001D  Type....... 01           RQSCRR..... 0001

      +0020  Object..... 2001 ACCRDB-Access RDB
      +0020  Length..... +60          CP......... 2001

      +0024  Object..... 2110 RDBNAM-Relational Database Name
      +0024  Length..... +17          CP......... 2110
      +0028  Data....... 'AUTPSB11.ODB1'

      +0035  Object..... 210F RDBACCCL-RDB Access Manager Class
      +0035  Length..... +6           CP......... 210F          Data....... 2407

      +003B  Object..... 112E PRDID-Product-specific Identifier
      +003B  Length..... +20          CP......... 112E
      +003F  Data....... 'IMS OPEN DB V1.0'

      +004F  Object..... 002F TYPDEFNAM-Data Type Definition Name
      +004F  Length..... +13          CP......... 002F
      +0053  Data....... 'QTDSQL370'
```

Addressing IMS Operator Skills Issues

- **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

Operations Manager (OM)	Structured Call Interface	Resource Manager (RM)
SCI	SCI	SCI

SCI Communications

IMS Control Region	S C I		S C I	CQS
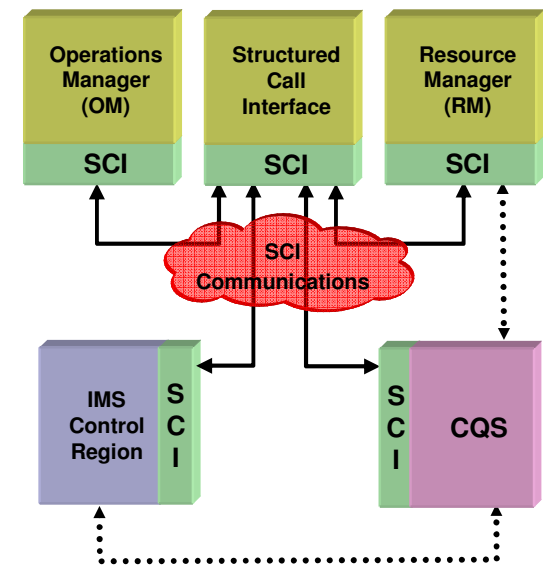
- **Tivoli and automation solutions are, of course, standard for IMS systems**
  - But there will always remain the need for manual operator commands

Agenda

- **Smarter Application Development**

- **Smarter Data Management**

- **Smarter Data Governance of Enterprise Data**

- **Smarter Data Integration thru federation, publication, replication**

- **Smarter Business Analytics solutions on Operational Data**

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.**
  - 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
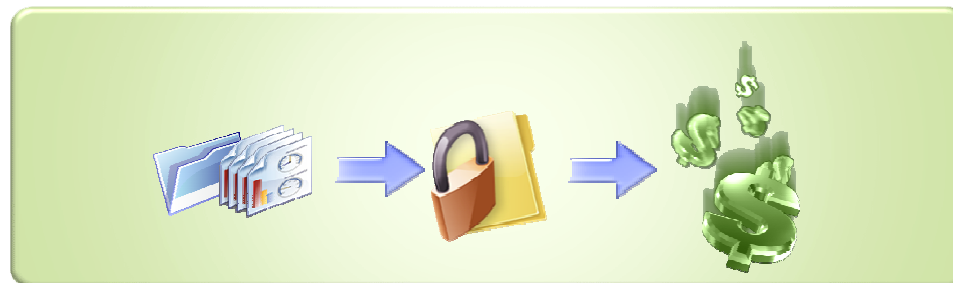
IBM Data Governance Software for z/OS and IMS

Manage Data Growth
- Data Retention
- Data Retirement

• **InfoSphere Optim Data Growth**

Secure
- Prevent Access
- Restrict Access
- Monitor Access

•**Security via RACF**
•**Tivoli zSecure Admin**

Secure

Data Growth

Data Governance

Protect Privacy

Audit
- Audit Access
- Audit Privileges
- Audit Users

•**InfoSphere Guardium S-TAP for IMS**
•**Tivoli zSecure Audit**

Audit

Protect Privacy
- Mask Data
- Encrypt Data

•**InfoSphere Optim Data Privacy**
•**InfoSphere Optim Test Data Management**
•**InfoSphere Guardium Data Encryption for IMS and DB2**

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

Managing Data Growth in Production – OPTIM Data Growth
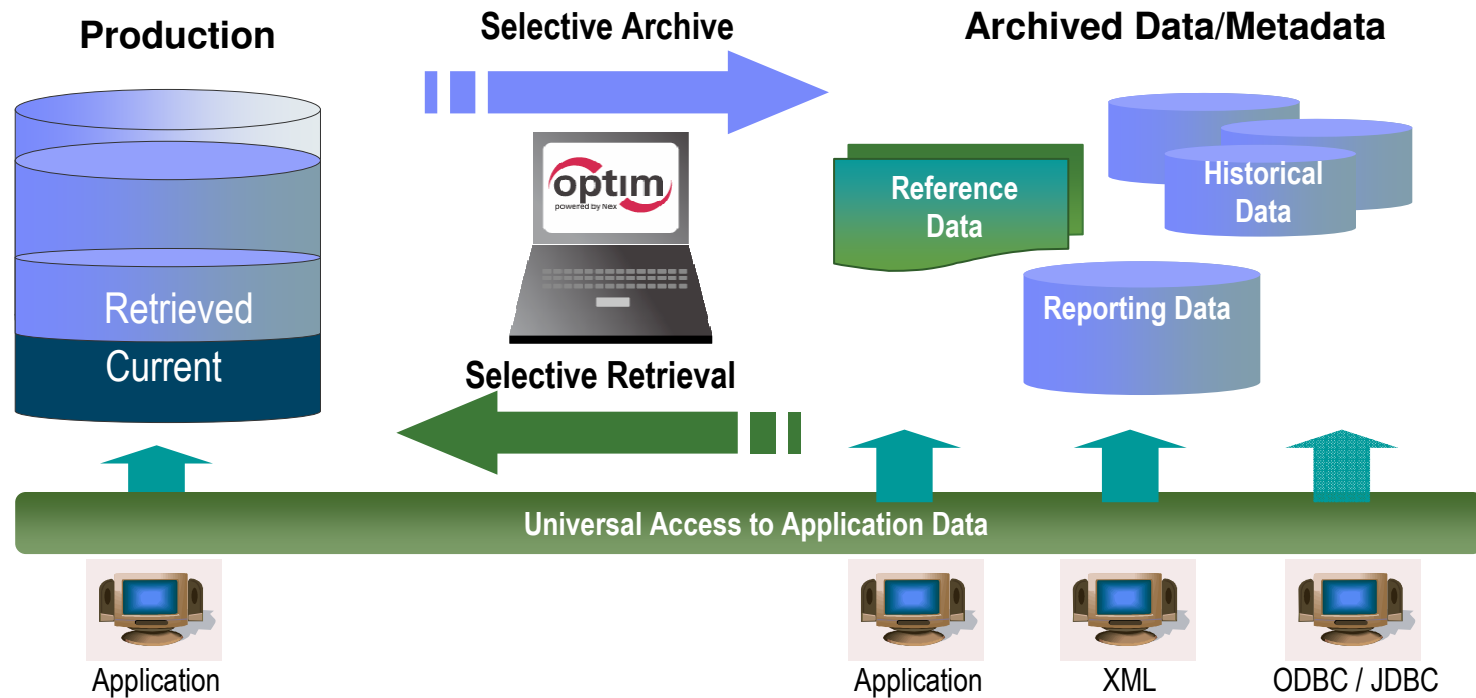
- **Segregate historical data to secure archive**

- **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
  - Native support on z/OS planned

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

Simplify Test Data Management

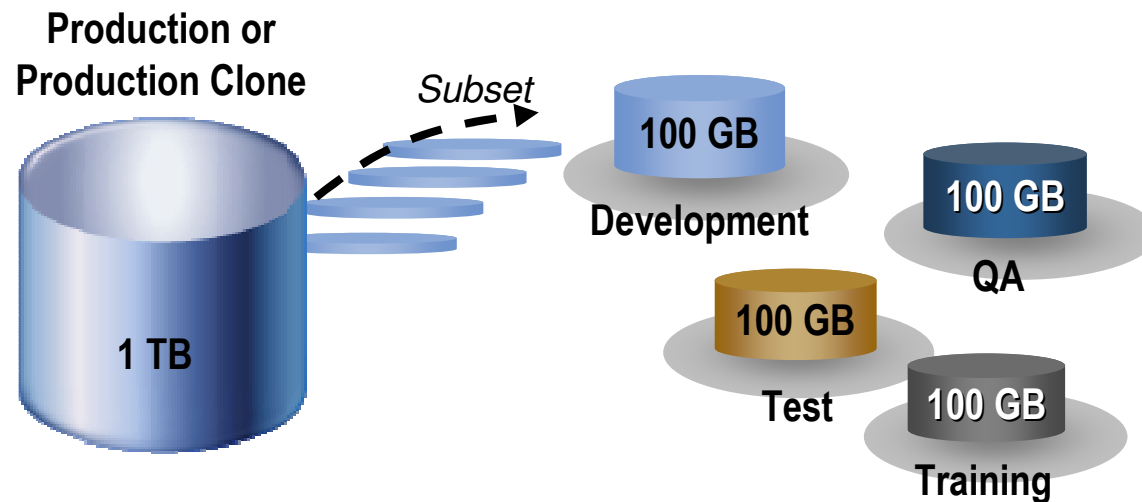- **Create right-sized test environments, providing support across multiple applications, databases and operating systems**

- **Deploy new functionality quicker 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**

Production or Production Clone

Subset

1 TB

100 GB
Development

100 GB
QA

100 GB
Test

100 GB
Training

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

Data Masking and Protection - OPTIM Data Masking Option

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

SOCIAL SECURITY

001 02 0003

THIS NUMBER HAS BEEN ESTABLISHED FOR

JASON MICHAELS

SOCIAL SECURITY

101 22 3030

THIS NUMBER HAS BEEN ESTABLISHED FOR

ROBERT SMITH

- **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
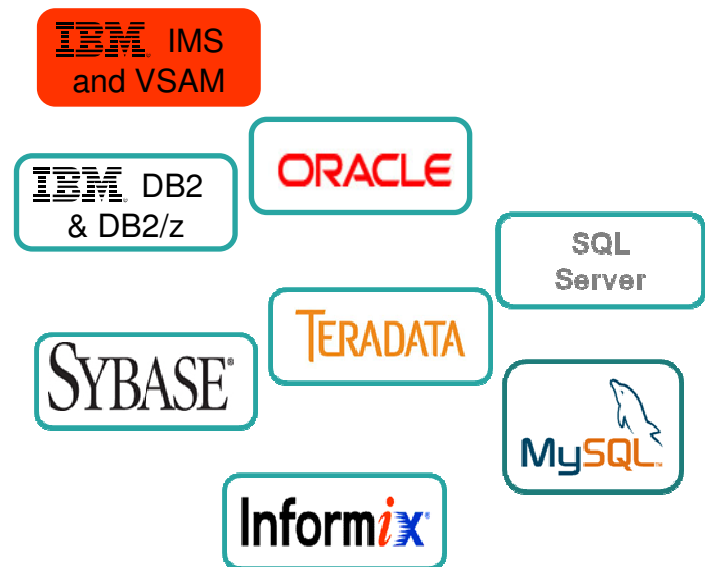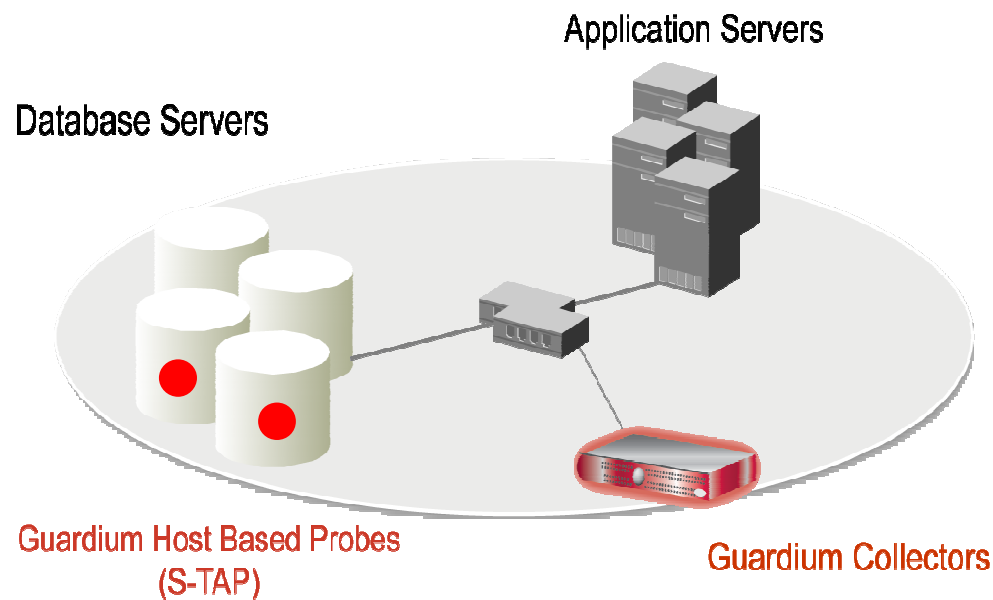
**Personal identifiable information (PII) is masked
with realistic _but fictional_ data for testing & development purposes.**

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

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**

Application Servers

Database Servers

IBM IMS and VSAM

IBM DB2 & DB2/z

ORACLE

SQL Server

TERADATA

SYBASE

MySQL

Informix

Guardium Host Based Probes (S-TAP)

Guardium Collectors

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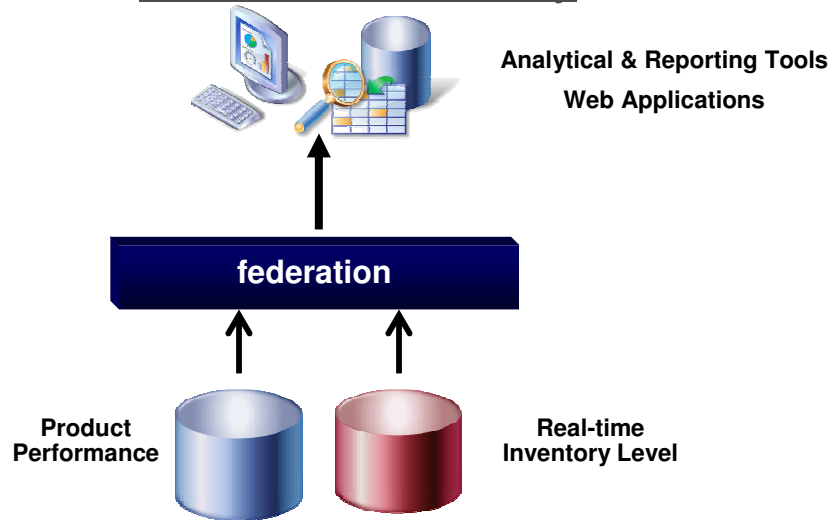
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Agenda

- **Smarter Application Development**

- **Smarter Data Management**

- **Smarter Data Governance of Enterprise Data**

- **Smarter Data Integration thru federation, publication, replication**

- **Smarter Business Analytics solutions on Operational Data**

Multiple Data Delivery Methods for Enterprise Needs

Virtual Data Delivery

Analytical & Reporting Tools

Web Applications

federation

Product Performance

Real-time Inventory Level

Bulk Data Delivery

extract, transform, load

Region 1 Product Performance

Region 2 Product Performance
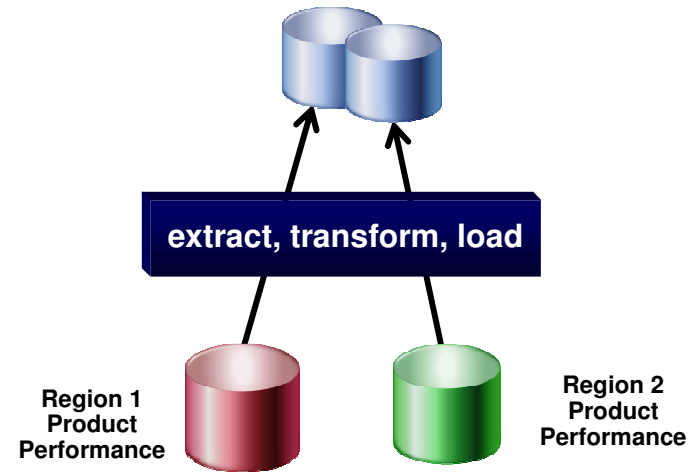
Incremental Data Delivery

Primary Database

change data capture

Backup Database

Database

change data capture

change data capture

ETL

Message Queue

Business Application
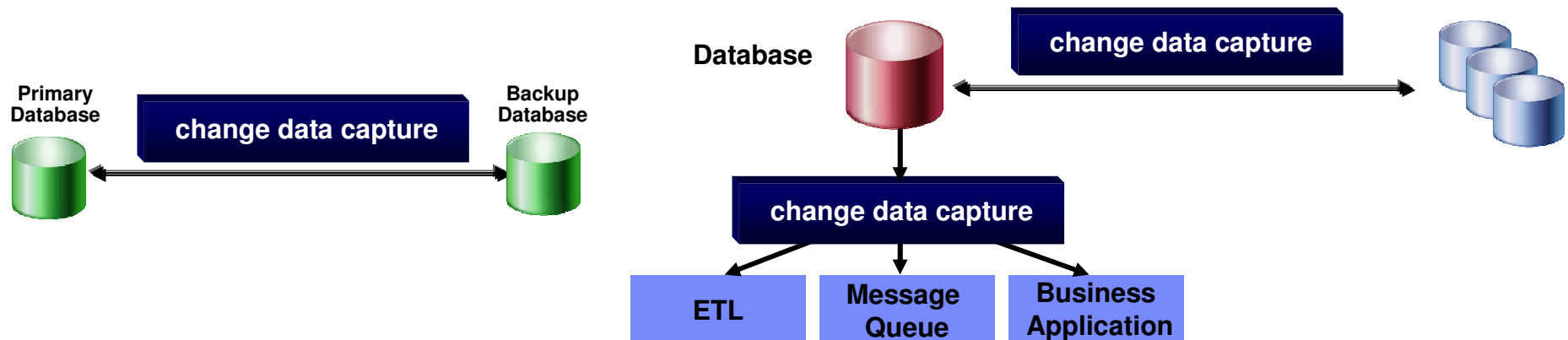
Leverage Critical "Classic" z/OS Data Resources
Federation – Publication - Replication

Extract

Classic Fed

z/OS

QSAM
VSAM
PDS

DB2
z/OS

IMS

CA
Datacom

CA
IDMS

SAG
ADABAS

**Classic EP,
Classic Rep**

Data Warehouse
or
Other Relational
container

Load / Update

Application
or
ETL Tool

Publish Changes

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

- **Proof Of Technologies (POT) available on request**
  - InfoSphere Classic federation for IMS
  - InfoSphere Classic Data Event Publisher for IMS
  - InfoSphere Classic Change Data Capture for IMS
  - Demo InfoSphere Classic Replication Server for IMS
  - Demo Infosphere IMS Replication (in creation)

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

- **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.

Tool | **Application**

JDBC / ODBC / CLI drivers

Distributed platform

Classic Client

z/OS

Classic Server

Metadata Catalog

Classic Data Connectors

COBOL or PL/I copybooks

Classic Data Architect

**IMS**, IDMS, Datacom, and Adabas databases VSAM & seq. files
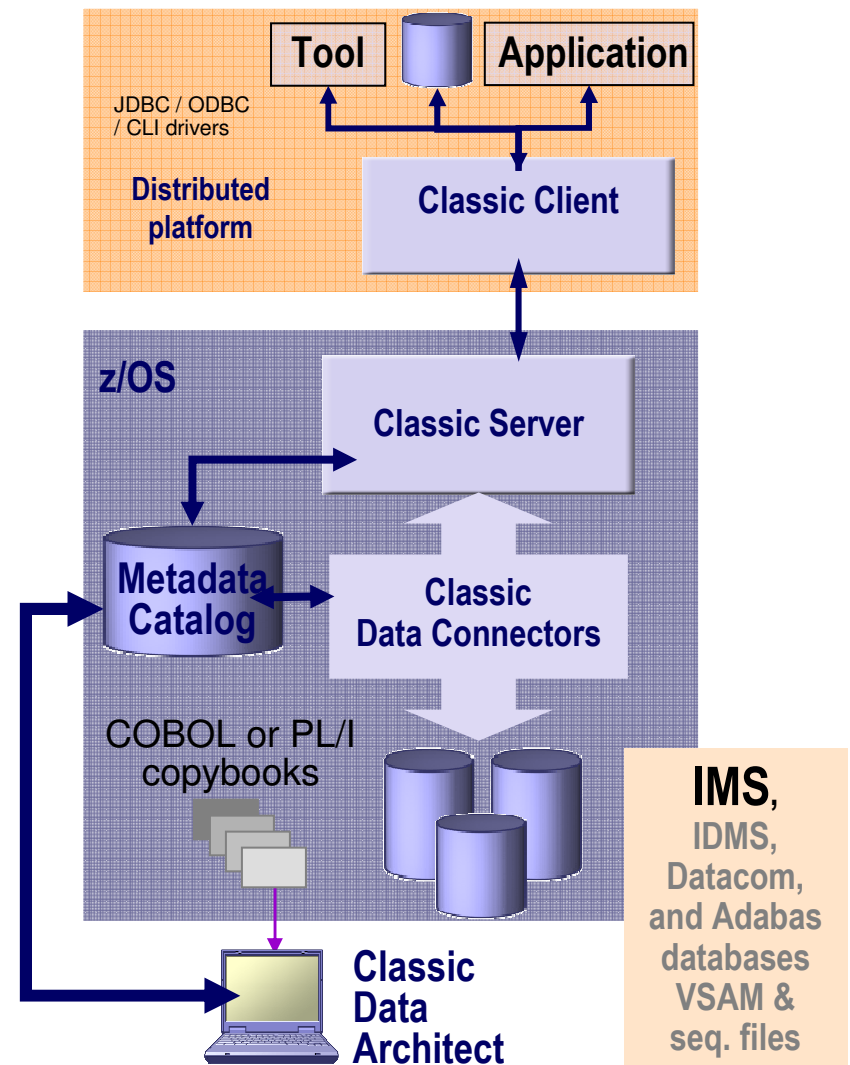
Publication - Capture and Publish IMS DB Changes

- **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
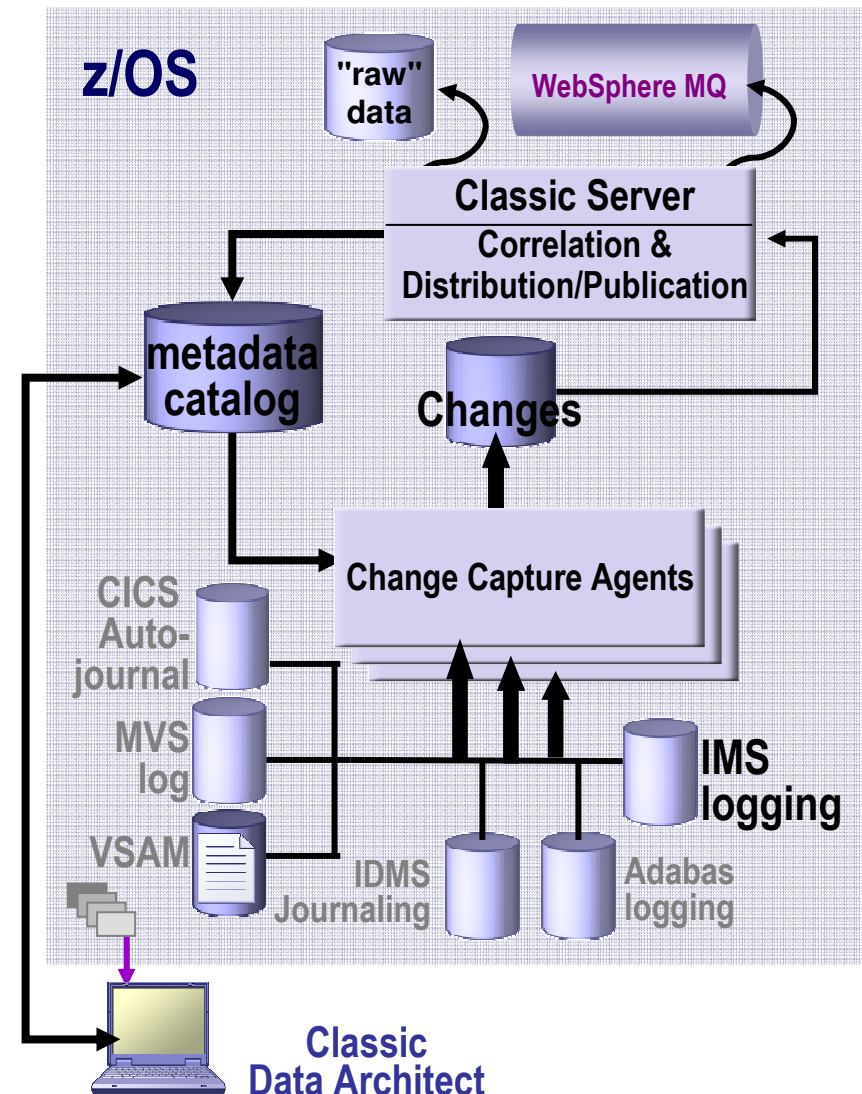
Replication – From IMS DB to Relational

- **High speed unidirectional replication for:**
  - Creating relational copies of nonrelational data
  - Assisting in DB modernization
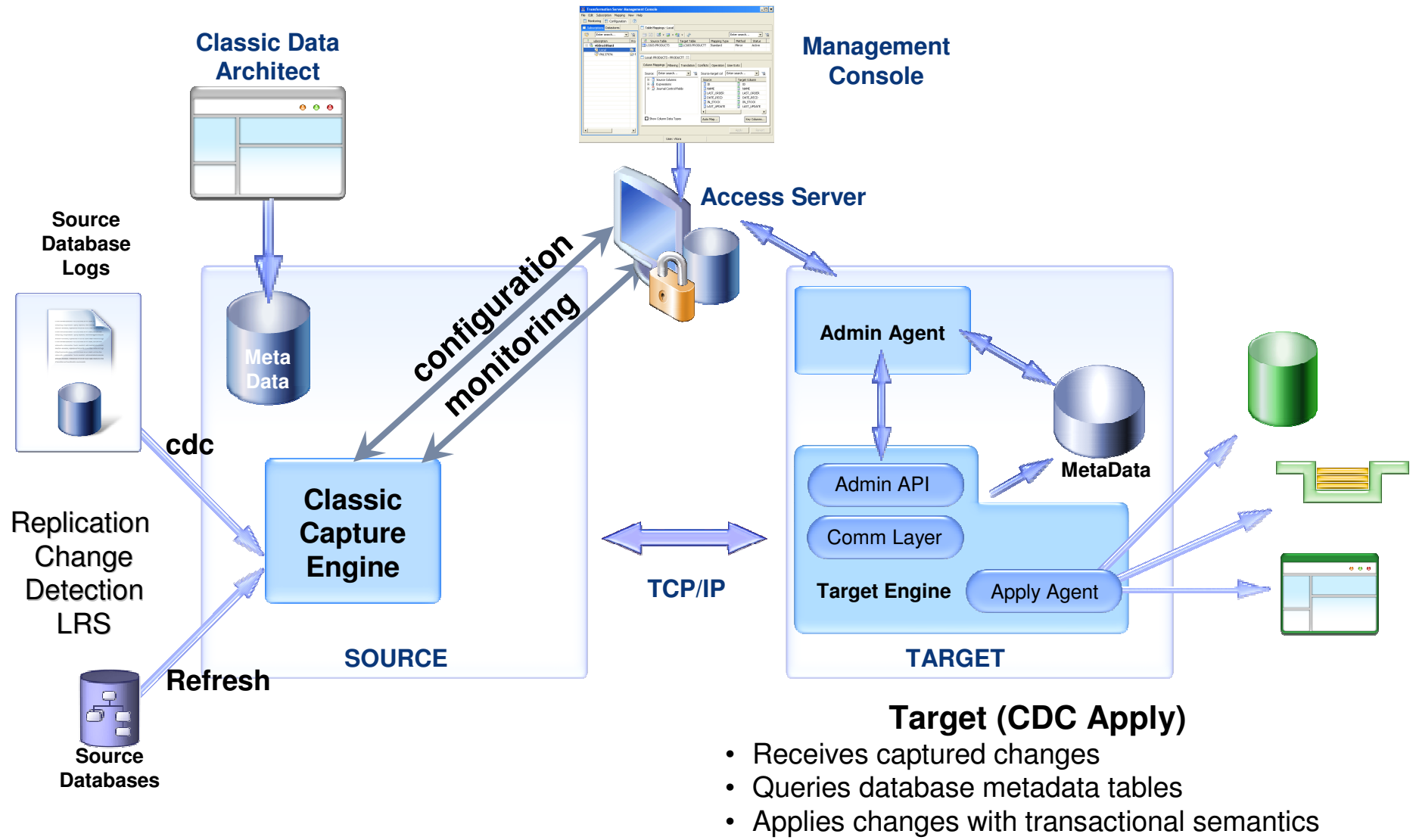 - Enabling high-availability VSAM environments
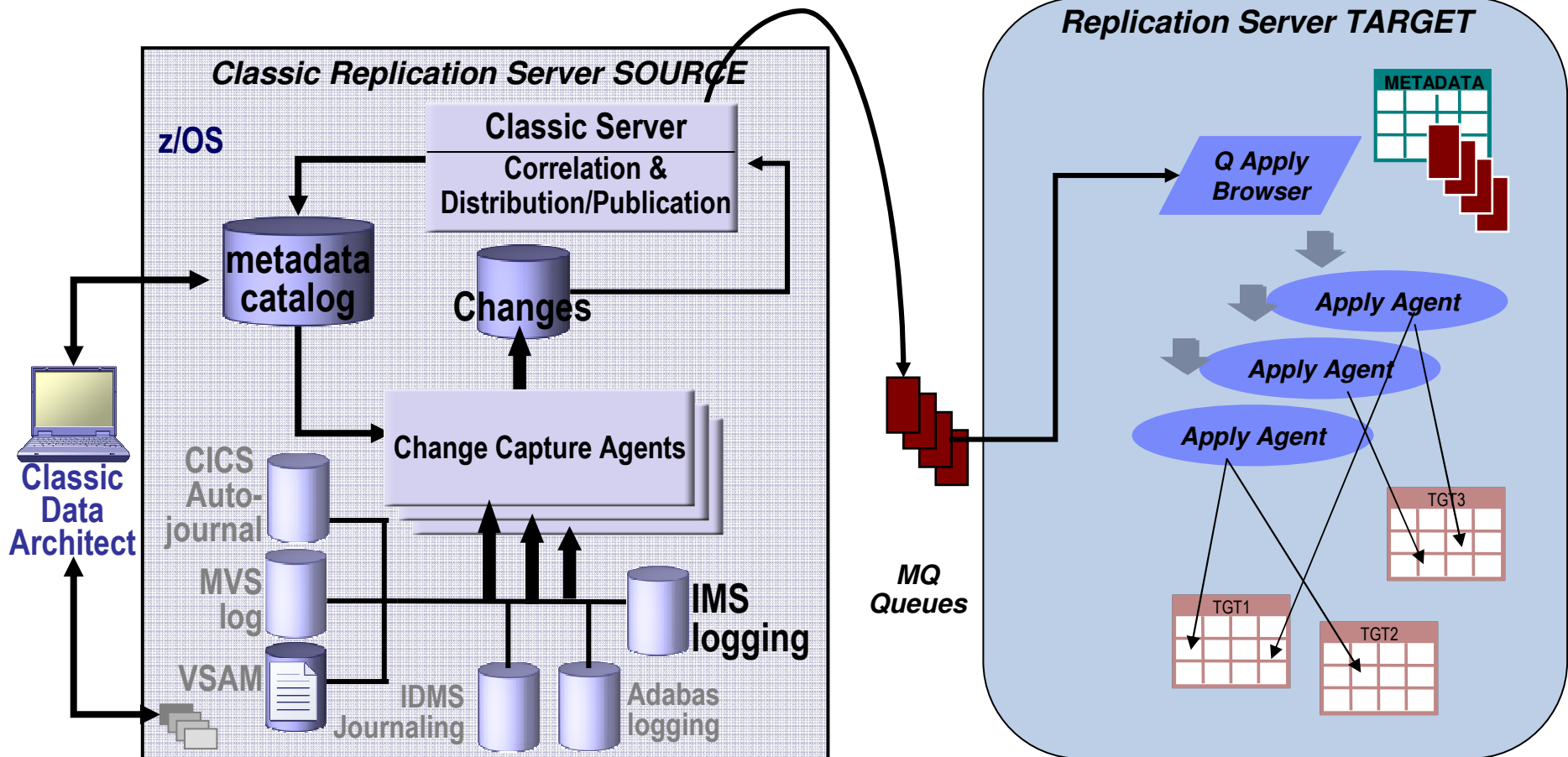
InfoSphere Classic CDC – Available June 2011

- **Enable IMS Databases on z/OS as InfoSphere CDC Sources**
  - Classic CDC provides the IMS SOURCE capabilities
  - TARGETing done by CDC on z/OS or LUW

- **Unidirectional movement of IMS data to**
  - Local or remote Relational DBMS
  - Message queues
  - Flat files
  - Transformation engines, e.g. InfoSphere DataStage

- **Classic CDC IMS "Capture" supports**
  - DB/TM, DBCTL, Batch DL/I
  - Capture x'99' log records

- **Basic replication monitoring in the initial release via the Management Console**

- **Multiple modes of incremental delivery**
  - Continuous mirroring
    - Apply data changes at the target as it is generated at the source
  - Scheduled end (periodic mirroring)
    - Apply net changes on a scheduled basis
  - Refresh
    - Apply a snapshot version of source system

InfoSphere Classic CDC

Classic Data Architect

Management Console

Access Server

Source Database Logs

configuration monitoring

cdc

Meta Data

Replication Change Detection LRS

Classic Capture Engine

Refresh

Source Databases

SOURCE

TCP/IP

Admin Agent

MetaData

Admin API

Comm Layer

Target Engine

Apply Agent

TARGET

Target (CDC Apply)
- Receives captured changes
- Queries database metadata tables
- Applies changes with transactional semantics

InfoSphere IMS Replication – Available June 2011

- **Unidirectional Replication of IMS data**
  - Release 1:
    - Conflicts will be detected
    - Manual resolution will be required
    - External initial load of target DB
    - Basic replication monitoring

- **Administration via Classic Data Architect & z/OS console commands**

- **IMS "Capture" supports**
  - DB/TM, DBCTL, Batch DL/I
  - Capture x'99' log records
  - Increase in log volume due to change data capture records

- **IMS "Apply" supports**
  - Serialization based on resources updated by unit of recovery
  - New IMS Replication Restart Database required

InfoSphere IMS Replication – Announced May 2011 …
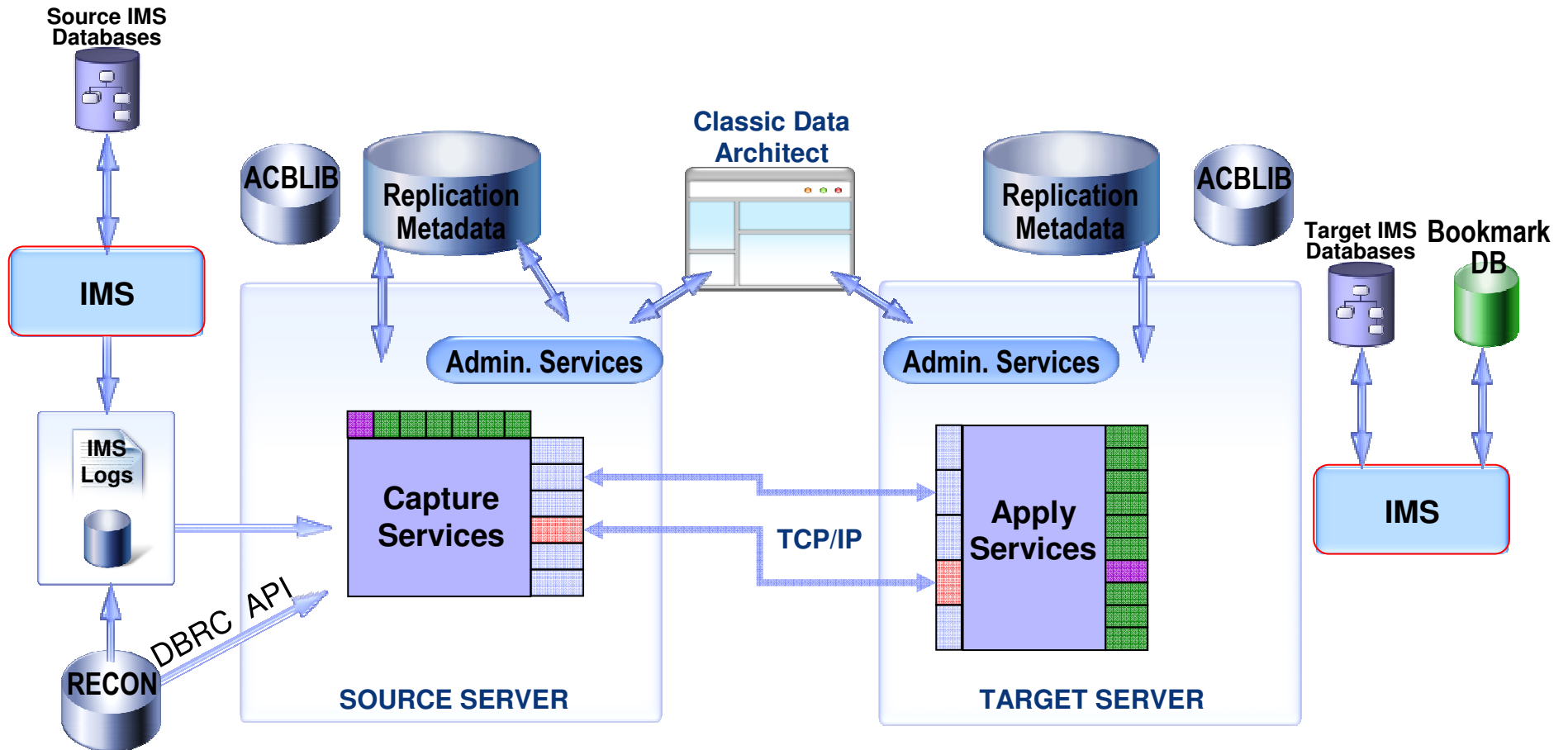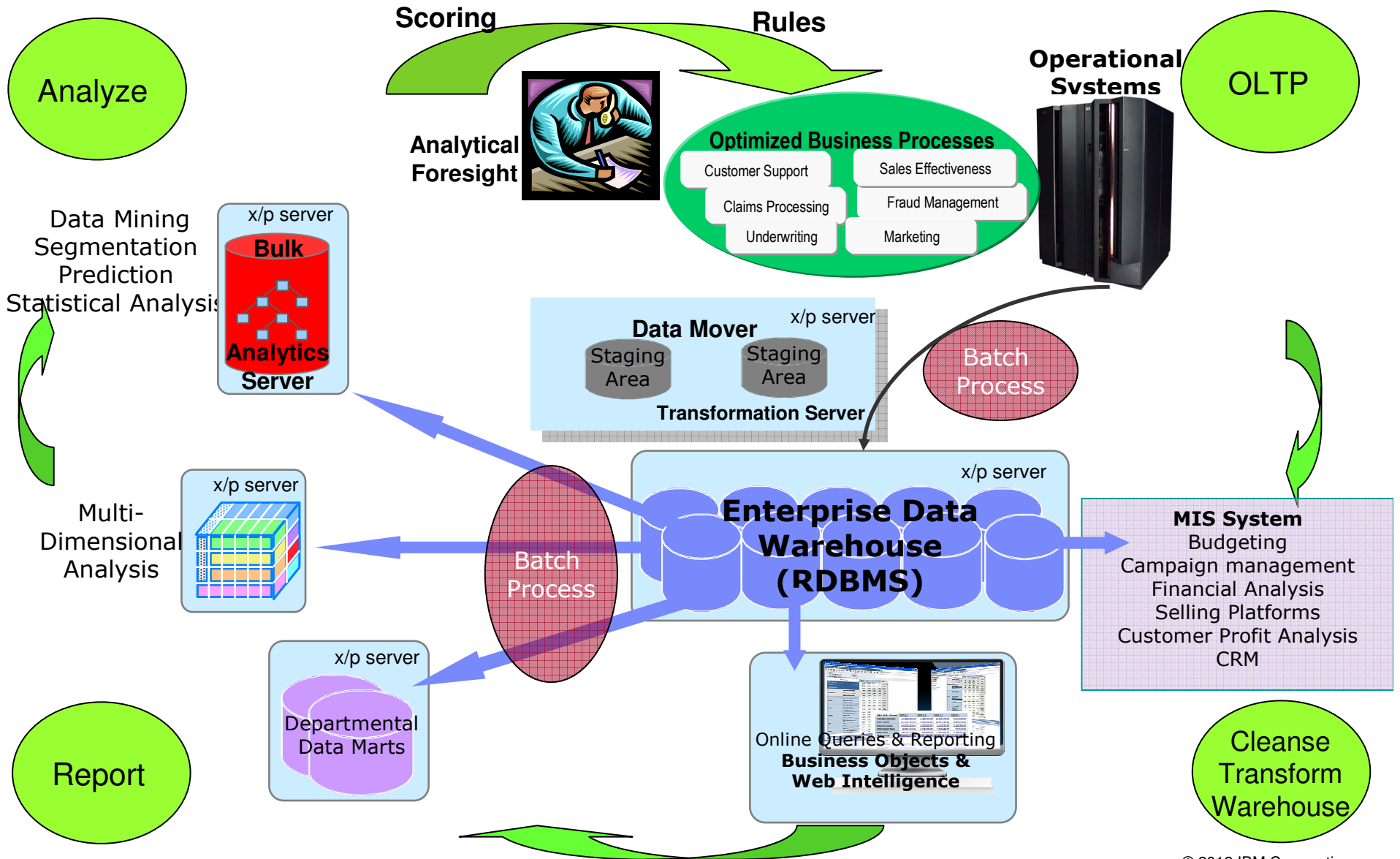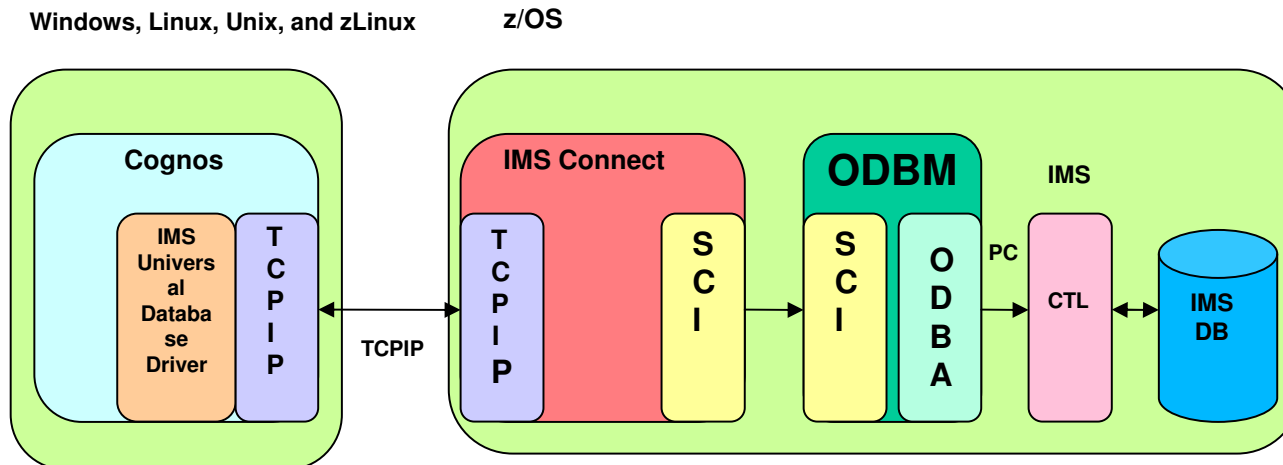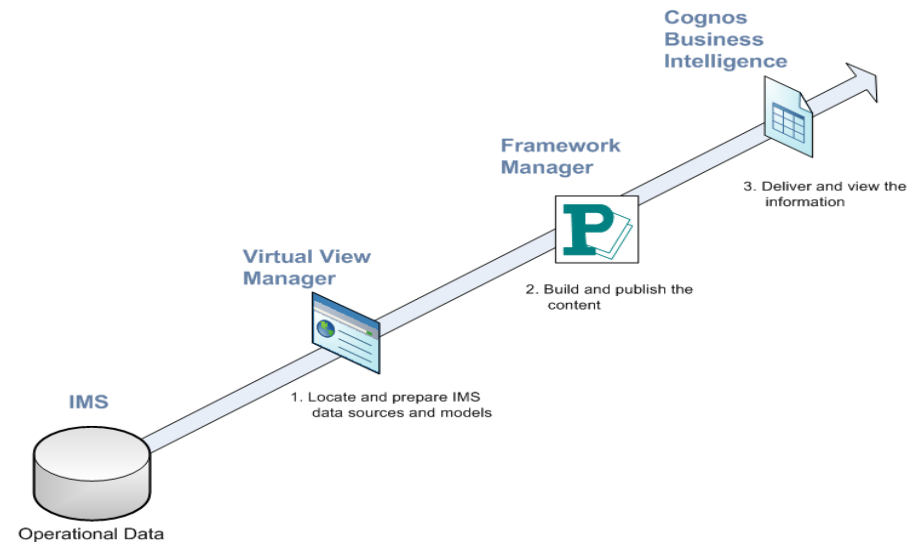
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Business Analytics Life Cycle – Async and Distributed (often ;))

Analyze

OLTP

Scoring

Rules

Operational Systems

Analytical Foresight

Optimized Business Processes

Customer Support	Sales Effectiveness
Claims Processing	Fraud Management
Underwriting	Marketing

Data Mining
Segmentation
Prediction
Statistical Analysis

x/p server

Bulk Analytics Server

x/p server

Data Mover

Staging Area

Staging Area

x/p server

Transformation Server

Batch Process

x/p server

Multi-Dimensional Analysis

Batch Process

Enterprise Data Warehouse (RDBMS)

MIS System
Budgeting
Campaign management
Financial Analysis
Selling Platforms
Customer Profit Analysis
CRM

x/p server

Departmental Data Marts

Online Queries & Reporting
Business Objects & Web Intelligence

Report

Cleanse Transform Warehouse

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Adding IMS database queries to a Business Analytics solution

- **Extending your Reporting and BI capabilities to IMS provides**
  - Real-time access to IMS data for report generating
  - Advantages of creating and managing business-related metadata and translating it into visual presentations
  - Knowledge to help decision makers know sooner, understand faster, and react quicker than the competition
  - Ability to compare performance across dimensions to spot trends and anomalies over time

Cognos Business Intelligence

Framework Manager

3. Deliver and view the information

Virtual View Manager

2. Build and publish the content

IMS

1. Locate and prepare IMS data sources and models

Operational Data

Windows, Linux, Unix, and zLinux　　**z/OS**

Cognos

IMS Universal Database Driver | TCPIP

TCPIP

IMS Connect

TCPIP | SCI

ODBM

SCI | ODBA

PC

IMS

CTL

IMS DB

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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 and the JDBC standard is supported by IMS database manager!
  - All data must be represented and manipulated in a standard way and IMS is providing the IMS Catalog for that.

- **Our goal is to leverage IMS Database Manager as an integral part of the enterprise in the evolving business world through**
  - Addition of support for complimentary standards surrounding IMS data 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

For more information

- **IMS on the Web:**
    - www.ibm.com/ims
    - IMS education schedule
    - Presentations, papers, newsletters, fact sheets, announce letters, redbooks
    - Schedule of seminars, webcasts and conferences

- **Additional technical support info at**
   - www.ibm.com/support/techdocs
        - (search on IMS)

- **IMS Version 10 will be withdrawn from Service in Nov 2012**
    - See http://www-01.ibm.com/common/ssi/ShowDoc.jsp?docURL=/common/ssi/rep_ca/7/897/ENUS911-147/index.html&breadCrum=DET001PT022&url=buttonpressed=DET002PT005&specific_index=DET001PEF502&DET015PGL002=DET001PEF011&submit.x=7&submit.y=8&lang=en_US

- **z Journal reports on IMS: Exciting Future Still Ahead – 09/2009**
    - http://www.zjournal.com/index.cfm?section=article&aid=1225
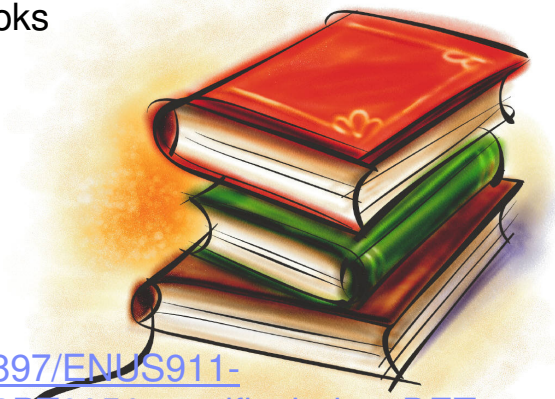
> IMS is a hierarchical database system, as opposed to relational database systems such as DB2, Oracle, and SQL Server. The hierarchical structure can make the database more rigid than a relational database, but IMS has been used successfully for decades at large financial institutions and other large organizations because it lets users retrieve stored data exceptionally quickly.

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