Getting the most out of your IMS Environment

May 2011
The Business Value of Middleware … allowing Evolution
z/OS Middleware

- **z/OS Transaction Monitors (TM)**
  - IMS TM - Information Management System Transaction Manager
  - CICS - Customer Information Control System
  - WebSphere Application Server for z/OS

- **z/OS Database Management System (DBMS)**
  - Hierarchical – IMS Database Manager, also called DL/I
  - Relational – DB2

- **Messaging oriented middleware (MOM)**
  - WebSphere MQ
Agenda

- IMS Evolution Over Time

- Getting the Most out of the IMS System
  - Built to manage Critical Enterprise Assets

- Getting the Most out of your IMS Applications

- Getting the Most out of your IMS DB assets
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

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

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

- **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

- IBM investment in IMS remains strong
  - Looking to expand in China, Russia and India
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
- $\frac{1}{2}$ MIPS and $\frac{1}{2}$ storage compared to relational technology
The IMS Strategy

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

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

- **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

- **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

New IMS interfaces and models

- SQL / JDBC
- IMS Tools
- Rational
- Optim
- Cognos
- InfoSphere
- JavaEE
- pureQuery

IMS interfaces

- JCL
- ISPF
- SDSF
- JES
- User Mods
- User Exits
- DBDGEN
- PSBGEN
- ACBGEN
- OLC
- DRD
- DLI

IMS

IMS TM/DB

Database

*Reduce the need for special, in-depth IMS skills*
Simplification and Modernization is now a significant part of the strategy for all the IBM products across the z Platform

- All core functions will continue to be supported through ISPF
- IBM IMS Tools will have Eclipse or Browser interface

* Distributed Access Infrastructure

*NOTE:* - Virtual Segments are not shown

21.50.53

Administrators
Developers

IMS Tools Simplification & Modernization Strategy
IMS Integration & Openness Strategy
No additional cost, while leveraging open standards

**Modernize, reuse and expand IMS transaction**

- Simplify writing IMS Connect User-written applications
- Light-weight web service provider and consumer solution for IMS
- Full Java EE, web service and SOA access to and from IMS transactions
- Modernize, web and SOA enable MFS-based IMS transactions
- Create feeds and integrate IMS transactions with Web 2.0 app

**Open and direct access to IMS Data**

- IMS Enterprise Suite Connect API
- IMS Enterprise Suite SOAP Gateway
- IMS TM Resource Adapter
- IMS MFS Web Solutions
- IMS Web 2.0 Solutions
- IMS TM
- IMS DB
- MFS
- COBOL, PL/I, C, ASM
- Java
- DL/I Data
- XML Data
- WAS
- Write/Run IMS applications in Java, leveraging new skills
- Store/Retrieve XML data in IMS Databases

- IMS Enterprise Suite DLIModel Utility
- IMS Open DB and Universal JDBC drivers
- IMS Universal DB Resource Adapter
- IMS DB Web Services
- IMS Web 2.0 Solutions
- WAS
- Provide visual view of IMS data and generate metadata classes for new application development
- Access IMS Data using SQL directly from z/OS and distributed platforms via IMS Connect
- Access IMS Data from Java EE app
- Expose an IMS database query as a Web Service
- Create feeds and integrate IMS data with Web 2.0 app

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

- **IMS 12** – QPP Announced in October 2010
  - FP Secondary indices
  - IMS repository
IMS 10 & 11 Highlights

**System**
- Operations Manager Enhancements
- Sysplex resource management enhancements
- Dynamic Resource Definition (DRD)
- Proclib simplification
- IMS Connect Enhancements
- Member-OLC for ACB
- ACB Online Change

**Transaction Manager**
- SERIAL program support in IMSplex
- Transaction Level Statistics
- MSC enhancements
- OTMA & Connectivity enhancements
- IMS Callout
- IMS Java Enhancements
- Type-2 Query TM Commands
- OTMA Enhancements
- OTMA Type-2 Commands
- Transaction Expiration
- Shared Queues Affinity Routing
- Shared Queues False Scheduling Reduction

**Database Manager**
- IC2
- HALDB ILDS Rebuild Utility
- Large Sequential Dataset support
- DLIModel utility
- IMS XML DB enhancements
- IMS Java enhancements
- IMS Open Database
- JDBC Universal Drivers
- Database Quiesce
- ACBLIB Usability
- HALDB OLR Performance
- Fast Path 64 bit Buffer Manager
- Fast Path Usability

**DBRC**
- Parallel RECON Access
- DBRC API
- RECON READONLY
- DBRC Time stamp precision
- BPE-Based DBRC
- Security Override for Non-Production RECON
- Unconditional deletion of PRILOG Information

**IMS Connect**
- Enhancements
- Dump Formatter
- Syntax Checker & IVP
- LSQA Storage Reduction
- DIAGNose Command
IMS 12 Highlights

Database Management
- Full Function Database
  - Extended Addressability Support (EAV) Support
  - FF Dynamic DB Buffers
  - FF DB Storage Enhancement
  - Additional FF Enhancements
- Fast Path
  - FP Buffer Manager 64 bit Enhancements
  - FP DEDB Secondary Index Enablement
  - Additional FP Enhancements
- DBRC
  - DBRC Enhancements
  - Migration/Coexistence

Systems Management
- IMS Repository and Usage for DRD Resources
- IMPORT Command Enhancement
- Logger Enhancements
- Syntax Checker Enhancements

Transaction Management and Connectivity
- IMS to IMS TCP/IP Communications
- MSC TCP/IP Support
- OTMA TCP/IP Support
- IMS Connect Type-2 Commands Support
- Additional Connect Enhancements
- OTMA Security Enhancements
- APPC/OTMA Synch SQ
- Enhanced CQS Traceability
Agenda

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- Getting the Most out of your IMS Applications

- Getting the Most out of your IMS DB Assets
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 run concurrently
    - IMS standalone batch also supported
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
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.

IMS Performance Pack
IMS Connect Extensions
IMS Problem Investigator
IMS Performance Analyzer
Simplification for IMS Operators

- **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 systems**
  - 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, maintenance and renovation
  - 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 benefit from 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 (IMS Enterprise Suite DLIModel Utility)

- All IMS Java programs can exploit zAAPs.
Remember … z/OS Languages

- **Cobol with IBM Enterprise COBOL for z/OS V4R2**
  - Integrates COBOL applications with Web-oriented business processes and simplifies the componentization of COBOL programs
    - Supports Java interoperability with new object-oriented syntax

- **PL/I with IBM Enterprise PL/I for z/OS V4.1**
  - Easier integration with IBM Debug Tool + Easier Java interoperability + XML parser + Integrated SQL preprocessor
  - Debugging improvements

- **z/OS XL C/C++ V1.12**
  - Improved performance of applications without code change

- **Java**
  - Enable all "Application Execution Environments" to support Java based applications:
    - WAS, Transaction Servers i.e. CICS & IMS, DB2 Stored Procedures
    - Enable connectivity to middleware, messaging queuing and Java Batch processing
Positioning IMS Assets in SOA Architecture

User and Interaction Domain
- Channels
- Desktop
- User Interface Services

Presentation Tier

Integration/Process Domain
- Channels Interaction Services
- Core Business Services
- Business Processes
- Integration Services

Core and Information Domain
- External Systems
  - External Business Partners
  - External Services Providers
  - External Systems Applications
- Data Services

Enterprise Service Bus

Business Tier
- External Systems
- Core Business Services

Enterprise Tier
When designing an SOA, much of the business logic to be deployed as services is already implemented in existing IT application systems
   – And much of this runs 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 co-location 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 Call in/Callout capabilities
   – Be creative 😊

“A study of 35 SOA projects across 11 industries worldwide revealed improved flexibility (100%), decreased costs (97%), reduced risk (71%), and increased revenue (51%).”

IBM Institute for Business Value
IMS Transactional Program Flows

- **All input messages into IMS go onto a queue**
  - There is one input queue for each transaction code

- **Without OTMA, output messages (ISRT IOPCB) get put onto a queue.**

- **With OTMA, client chooses a COMMIT MODE (1 or 0)**
  - Send reply directly (synchronously), bypassing the queues (called “Commit Mode 1” or “Send then Commit”)
    - If SEND fails, transaction program is backed-out.
    - Synchronisation flow depends on sync-level (None, Confirm, Syncpt)
  - Put reply on a named output queue and send it after application has committed (called “Commit Mode 0” or “Commit Then Send”)
    - If SEND fails, reply is still on queue and can be retrieved later
      - Assured Delivery of replies is available
    - Sync-level is always Confirm

- **IMS applications can create messages on any named output queue (using alternate PCB)**
  - Client can create CM0 services to read these asynchronous messages (Resume Tpipe)
    - For failed CM0 IOPCB reply or ALTPCB output
  - Integration with Business Event solutions
SOA Connectivity with IMS TM (Inbound to IMS)

WebSphere Servers
WAS, WPS, WESB, WTX and WMB

IMS TM Resource Adapter

IMS SOAP Gateway

WebSphere DataPower

IBM Mashup Center / WebSphere sMash

Connect API

MQ

WOLA

IMS Connect

IMS

OTMA

B

D

IMS DB & XML DB

DB2

Web 2.0 Client

RYO Client

MQ Client

WBM & DataPower

WAS – WebSphere Application Server
WOLA - WebSphere z/OS Optimized Local Adapters
WPS – WebSphere Process Server
WESB – WebSphere Enterprise Service Bus
WTX – WebSphere Transformation Extender
WMB – WebSphere Message Broker
SOA Connectivity with IMS TM (Outbound from IMS)

- **Asynchronous support with**
  - IMS API (ISRT ALTPCB)
  - MQ API
  - APPC API
  - TCP/IP calls with IMS Connect

- **Synchronous (not in 2PC scope) support with**
  - IMS API - New ICAL with IMS 10
  - MQ API
  - APPC/IMS (also in 2PC scope)
  - SQL calls to DB2 stored procedures
SOA Connectivity with IMS TM (Outbound from IMS) …

- Asynchronous and synchronous capabilities

WAS – WebSphere Application Server
WOLA - WebSphere z/OS Optimized Local Adapters
WBE – WebSphere Business Events
WBM – WebSphere Business Monitor
WMB – WebSphere Message Broker
RYO Server - .Net, BizTalk, Oracle SP, SAP, PayPal services, and any application server, etc.
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<th>Standard architecture</th>
<th>Middleware</th>
<th>Capabilities</th>
<th>Recommendation</th>
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<tr>
<td>SOAP</td>
<td>IMS Connect (enhanced with IMS Connect Extension Tool) &amp; IMS SOAP Gateway</td>
<td>Synchronous access over HTTP, Inbound and outbound (with IMS 10), CM0 support, No CM0 support, No support for IMS conversational transaction</td>
<td>Consider as option to service enable IMS applications when WMB is already used as enterprise ESB.</td>
</tr>
<tr>
<td>JCA</td>
<td>IMS Connect (enhanced with IMS Connect Extension Tool) WAS Server</td>
<td>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)</td>
<td>Most appropriate solution when service requester is JEE component and when high QoS required (2PC, connection pooling, identity propagation etc.)</td>
</tr>
<tr>
<td>JMS</td>
<td>MQ IMS Bridge WAS Server</td>
<td>Asynchronous, with almost-synchronous capabilities, Inbound and outbound, CM0 and CM1 support, Assured delivery</td>
<td>Exploit JMS and WMQ for basic messaging and flowing Web services.</td>
</tr>
<tr>
<td>DataPower</td>
<td>IMS Connect (enhanced with IMS Connect Extension Tool) DP Appliance</td>
<td>Synchronous and Asynchronous, Inbound, CM1 with sync-level=None, No CM0 support, 32 KB limit (single segment), No support for IMS conversational transaction</td>
<td>Use as ESB gateway for security functions, message transformation and routing</td>
</tr>
<tr>
<td>WebSphere Message Broker</td>
<td>IMS Connect (enhanced with IMS Connect Extension Tool) WMB server</td>
<td>IMS Connect node available in addition to MQ support</td>
<td>Consider as option to service enable IMS applications when WMB is already used as enterprise ESB.</td>
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- Getting the Most out of your IMS DB Assets
IMS DB in Perspective

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<td>IMS Data Sharing</td>
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<td>Performance without CPU extra cost</td>
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<td>Open Access and Data Integration</td>
<td>IMS 11 Open Database</td>
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<td>Pointer validation &amp; repair</td>
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<td>IMS Tools</td>
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<td>Reorganization for better performance</td>
<td>IMS Tools</td>
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<th>Compression and Encryption</th>
<th>IMS Tools – Guardium Tools</th>
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<td>IMS Tools – Guardium Tools (planned)</td>
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<td>Data Masking</td>
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<td>Creation of Test databases</td>
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<th>Fast integration in Web 2.0 applications</th>
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<td>InfoSphere Classic Federation</td>
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<td>InfoSphere Classic Replication Server &amp; Classic CDC</td>
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<td>Publication of DB Changes</td>
<td>InfoSphere Classic Data Event Publisher</td>
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| Operational Business Intelligence | COGNOS |
IMS High Availability Large Database (HALDB)

- **IMS High Availability Large Database (HALDB)**
  - Extends IMS Full Function database size
  - Up to 1001 Partitions x 10 data set groups x 4G = 40 Terabytes
  - Provides data availability through partition independence
  - Provides easier manageability with smaller partitions of the database

- **IMS HALDB Integrated Online Reorganization (OLR)**
  - Provides reorganization by partition of HALDBs with concurrent online update and availability
  - Provides recovery from system, IMS, media failure
  - Provides no outage - HALDB partition remains online and available during Reorganization
  - Users can adjust pace of OLR
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 – Full DRDA Support
    - Based on a relational view provided by IMS Enterprise Suite DLIModel Utility

- **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
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”
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 DB Universal Drivers - Type 2 and 4 Connections

Every IMS Connect and ODBM are members of the same IMSplex
## IMS 11 Open Database Environment …

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<th>Access method</th>
<th>Transaction type</th>
<th>Driver</th>
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<td>CCI API</td>
<td>Local</td>
<td>IMS Universal DB Resource Adapter with Local tran support (imsudbLocal.rar)</td>
</tr>
<tr>
<td></td>
<td>CCI API</td>
<td>XA</td>
<td>IMS Universal DB Resource Adapter with XA tran support (imsudbXA.rar)</td>
</tr>
<tr>
<td></td>
<td>JDBC</td>
<td>Local</td>
<td>IMS Universal JCA/JDBC driver version of the IMS Universal DB resource adapter with local transaction support (imsudbJLocal.rar)</td>
</tr>
<tr>
<td>Stand alone Java application</td>
<td>JDBC</td>
<td>Local or XA</td>
<td>IMS Universal JDBC driver (imsudb.jar)</td>
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<tr>
<td></td>
<td>DL/I</td>
<td>Local or XA</td>
<td>IMS Universal DL/I driver (imsudb.jar)</td>
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<td>Local or XA</td>
<td>IMS Java Dependent Region (JDR) Resource adapter (imsutm.jar)</td>
</tr>
<tr>
<td></td>
<td>Data access</td>
<td>Local or XA</td>
<td>IMS Universal JDBC driver or IMS Universal DL/I driver (imsudb.jar)</td>
</tr>
<tr>
<td>Non-Java Application</td>
<td>DRDA protocol</td>
<td>Local or XA</td>
<td>Use a programming language of your choice &amp; issue DDM command to IMS Connect</td>
</tr>
</tbody>
</table>
IMS Enterprise Suite 1.1 DLIModel Utility Plug-in

- **Graphical User Interface (GUI)**
  - Leverage Eclipse, Eclipse Modeling Framework (EMF) and Graphical Editor Framework (GEF)
  - Can be installed as a stand-alone function or on top of other Eclipse based products (i.e. RAD 7.5, RDz 7.5, Data Studio) using IBM Installation Manager

- **IMS Database Visualization Tool**
  - User can visualize an entire IMS PSB and DBD in a multi-page graphical editor.
    - Each PCB can be viewed, saved and printed individually. Each PCB editor shows the IMS DB hierarchy with the segments, fields, field types, etc.
  - User can also search an entire IMS PSB for a specific PCB, segment, or field.

- **IMS Database Metadata Generation Tool**
  - It has been used to generate the necessary metadata that is consumed at runtime by the IMS Universal driver, XML DB and IMS DB Web services.
    - DLIDatabaseView for IMS Universal driver
    - XML schema for XML DB
    - Deployable artifacts (EAR and WSDL files) for IMS DB Web services via the DAS commands in a syntax assist and syntax highlight editor.
  - This tooling currently uses a bottom-up approach, parsing PSB and DBD source using either Control statements or Wizard panels. User can optionally import COBOL copybook and PL/I Include definitions to define field layouts for each segment.
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**
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.
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 current 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

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

*Two Rows of XML CLOBs in the ResultSet
```

```
SELECT retrieveXML(Dealer) FROM Order WHERE Order.Ordernum = '35'
```
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 Tools Base for z/OS
- HALDB Toolkit
- Sequential Randomizer Generator

IMS Tools Database Solution Pack for z/OS
- Online Reorganization Facility
- IMS Cloning Tool
- IMS Database Control Suite

IMS Fast Path Solution Pack for z/OS

IMS Recovery Solution Pack for z/OS
- IMS Recovery Expert
- DEDB Fast Recovery

Batch Terminal Simulator
- Batch Backout Manager
- Program Restart Facility

Data Base Administration

Utility Management

Backup and Recovery

Application Management

IMS TOOLS

Performance Management

Transaction & System Management
- Command Control Facility
- ETO Support
- HP Sysgen Tools
- Queue Control Facility
- IMS Workload Router

System Administration
- IMS Configuration Manager
- IMS Sysplex Manager

Regulatory Compliance
- IMS Audit Management Expert
- InfoSphere Guardium Data Encryption for DB2 and IMS Databases

IMS Enterprise Suite

IMS Tools Base for z/OS

IMS Database Solution Pack for z/OS

IMS Fast Path Solution Pack for z/OS

IMS Recovery Solution Pack for z/OS

Batch Terminal Simulator
- Batch Backout Manager
- Program Restart Facility

Data Base Administration

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IMS Enterprise Suite
Practices to minimize database outages

**Not So Good**
- Basic IMS core functions: HD Unload, HD Reload, etc.
- Clean ICs
- Creating Recovery Points with /DBRs

**Best**
- Smart Reorg with IMS Tools: IMS Database Solution Pack (Including 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
Agenda

- IMS Evolution Over Time
  
  - Getting the Most out of the IMS System
    - Built to manage Critical Enterprise Assets
  
  - Getting the Most out of your IMS Applications
  
  - Getting the Most out of your IMS DB Assets

Final Thoughts
Future Considerations

- **IMS Database revitalization**
  - Dynamic sizing of DB fields
  - Eliminate unload/reload
  - Store new types of data

- **Elimination of IMS generations and planned outages**

- **Continue focus on Usability & Simplification**
  - Expanded SQL support – COBOL, PL1
  - Web based GUI for operational access

- **Catalog for storing IMS DB metadata and artifacts**

- **Direct access from .NET, other distributed platforms**

- **Huge emphasis on cost savings – lower CPU, offload**

- **Active-Active IMS Replication**
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 limited
  - Publicise 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 11 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
For more information

- **IMS on the Web:**
  - [www.ibm.com/ims](http://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](http://www.ibm.com/support/techdocs)
    - (search on IMS)

- **IMS Version 9 was Withdrawn from Marketing on 7th September 2009**
  - See Announcement Letter [ZP09-0212](http://www.ibm.com/ims) issued 2nd June 2009

- **IMS Version 9 was Withdrawn from Service on 7th November 2010**