An Overview of IMS Version 9

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IMS V9 Highlights - Major Items

- **Availability**
  - Integrated Online Reorganization for HALDBs
- **System scalability and capacity**
  - Fast Path DEDB Area Open/Close Enhancements
  - Multi-Area Structure Support for SVSO DEDBs
- **Usability**
  - Type-2 Database Commands
  - MNPS Replacement for XRF Uservar
- **Manageability**
  - System Generation and Install Enhancements
  - DBRC API
- **Application development**
  - Storage and retrieval of XML documents in existing and new IMS databases

IMS V9 Highlights - Major Items…

- **Application Development …**
  - Integrated IMS Connect function
    - *Functionality of IMS Connect V2R2 is integrated into IMS V9*
      - Included in System Services FMID – HMK9900

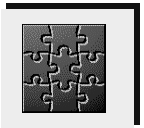
IMS V9 Integrated Online Reorganization

HALDB – The Database for the 21st Century

- Introduced in IMS Version 7
  - *Database records are grouped into Partitions*
    - A single database consists of 1 or more partitions
    - Hierarchic structure is maintained within a partition
    - Partition is selected based on High Key or Partition Selection Exit
  - *Partition independence is maintained*
    - Each partition can be managed independently --commands,scheduling, utilities
  - *HALDB extends capacity significantly*
    - Each partition can be size of non-partitioned db
    - Up to 10 Data Set Groups per partition
    - 1001 partitions maximum

How Big?
4 Gig (dataset size)
x 1001 (partitions)
x 10 (datasets per partition)
- ~ 40 Tera Bytes
•Over 6600 bytes - for each person on earth!

Phase Two...in IMS Version 9

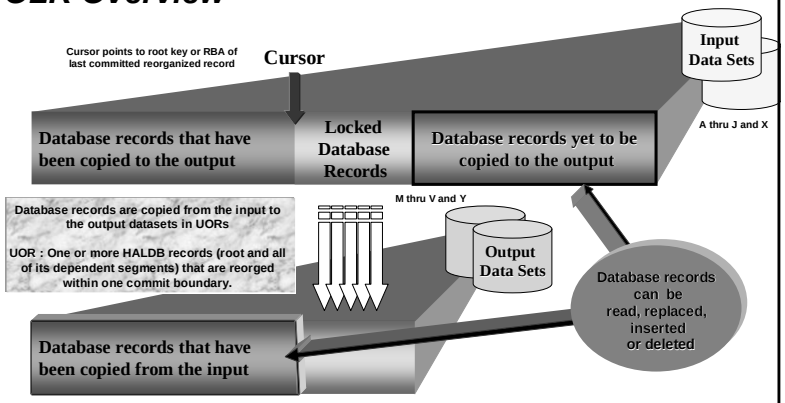


- **Integrated OnLine Reorganization of HALDBs**
  - ❖ Standard part of IMS V9
    - *Not a feature, product, tool etc.*
  - ❖ HALDB OLR provides 100% availability of the largest databases in the world!
  - ❖ OLR provides non-disruptive reorganization of HALDB PHDAM and PHIDAM partitions
    - *Partitions, partition or entire DB can be reorganized*
    - *Applications are unaffected*
      - They never get data unavailable conditions
      - Concurrent IMS updates are allowed while OLR is active
      - Concurrent data sharing updates are allowed
  - ❖ Planned data outage not required

Phase Two...in IMS Version 9...

- Runs in TM/DB or DBCTL System
  - ❖ Executes in DLISAS Address Space
- Secondary Indexes and Logical Relationships
  - ❖ Database with secondary indexes can be reorged
    - *PSINDEX itself cannot be reorged*
  - ❖ Database with logical relationships can be reorged
  - ❖ ILDS (ILEs) updated with new target RBAs
- Coordination is provided through the DBRC facility

OLR Overview

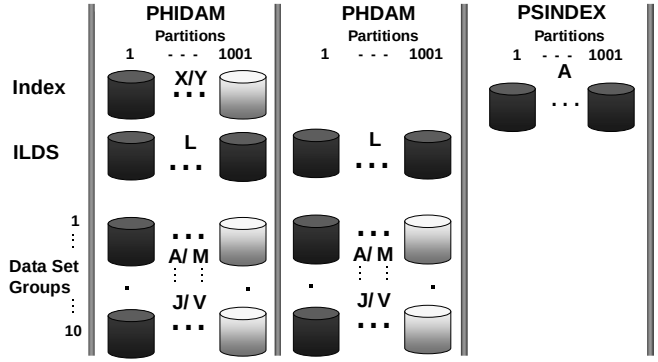


IMS V9 Integrated HALDB Online Reorganization

Changed Terminology in IMS V9
type-1 = traditional, "classic" command
type-2 = IMSplex command, "enhanced" command

- Solution Highlights
  - ❖ INIT/TERM/QRY/UPD OLREORG commands
    - *type-1 and type-2 command support for OLR*
  - ❖ Dual data sets during cursor-based reorganization
    - *Allows concurrent data sharing updates while OLR is active - nondisruptive reorg*
    - *Utilities and DBRC support for dual data sets*
    - *Eliminates planned data availability outage*
  - ❖ Pacing of OLR via INIT command RATE parameter
    - ***INIT OLREORG...SET(RATE(100))...***
    - ***UPD OLREORG...SET(RATE(50))...***

Naming Convention



IMS V9 Integrated HALDB Online Reorganization

- **OLR Migration Considerations**
  - ❖ OLR capable (OLRCAP) set via the **`CHANGE.DB`** DBRC command
  - ❖ V8 OLR Coexistence SPE required
    - *V8 data sharing updaters can access V9 DB being OLRed*
  - ❖ V7 ***will not*** access V9 OLR-capable HALDB or its partitions

IMS V9 Fast Path (FP) Enhancements

- FP Shared VSO Multi-Area Structure
  - ❖ Provides capability to have a structure populated by more than one area
  - ❖ A new way to define SVSO multi-Area CF structures with keywords `MAS` / `NOMAS` in **`INIT/CHANGE.DBDS`** cmds
- FP Area Open/Close Enhancements
  - ❖ New options that improve AREA Open/Close/preOpen performance
    - *Restart all areas previously stopped due to an IRLM Disconnect, at IRLM reconnect time (FPRLM)*
    - *Reopen all areas, at IMS restart, that were open at the time of the previous shutdown (FPOPN)*

Additional IMS V9 Fast Path (FP) Enhancements

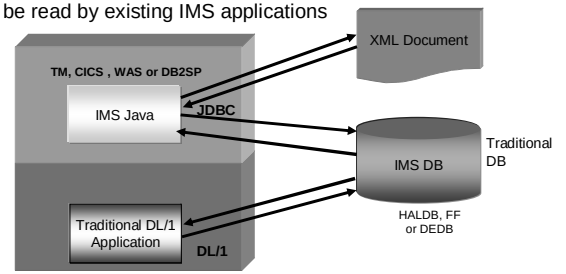
- EMHQ Structure now optional in IMS V9
- FP Serviceability/Usability Enhancements
  - ❖ Allow online forward recovery activation with /STA DB command
  - ❖ Respectively add AREAname & #processed CIs into various msgs & SCAN job output
  - ❖ Bypass the need for dataspace when no VSO
  - ❖ Add FP log rec DSECTs in ILOGREC
  - ❖ Add new FP Table Trace similar to DL/I table trace format
  - ❖ Add SDEP statistics to x'5937' log record
  - ❖ Add NBA/OBA values for the associated dependent region to x'5937' log record
  - ❖ Add EPST/EMHB/ESRT to x'6706' log record
  - ❖ ADD STOPAFTERALL # parameter to HSRE utility
  - ❖ Enhance FP HSSP diagnostics
  - ❖ FP Abend reduction (U3275, U2484, U0732, U3999)

IMS XML DB Support

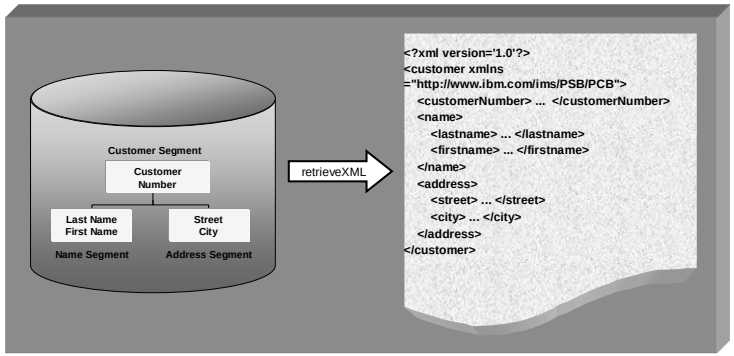
- User Requirements
  - *Retrieve existing IMS data in standard, easily exchangeable XML format*
  - *Store, Index, Search and Retrieve valid new XML documents into new or existing IMS databases*
- Benefits
  - *Provides rapid deployment of XML in IMS DB*
  - *Promotes data exchange with other applications*
  - *Join world-wide movement towards XML as data interchange language*
    - Ease of use and standard tooling

XML DB Highlights - Decomposed data

- Retrieve - Compose XML document from **any** existing traditional database
- Insert - Decompose XML docs back into same DB
- Same data can be read by existing IMS applications

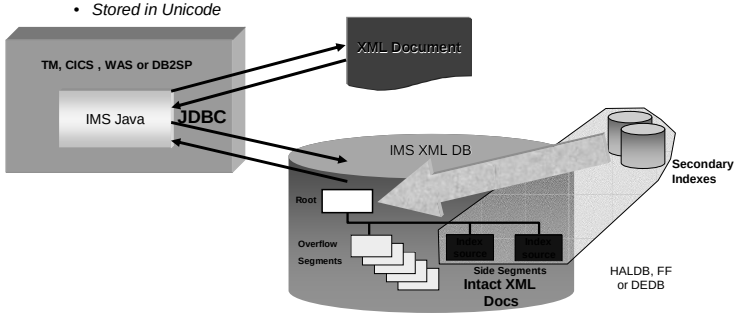


Decomposed XML Materialization

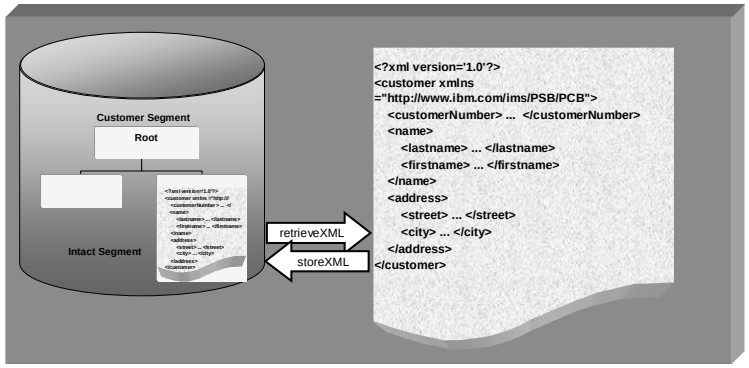


XML DB Highlights - Intact Data

- Insert/Retrieve/Delete new XML documents **INTACT** in new IMS databases
- **Intact data** is not expected to be understood by other IMS applications
  - *XML Documents span IMS segments*
  - *Stored in Unicode*



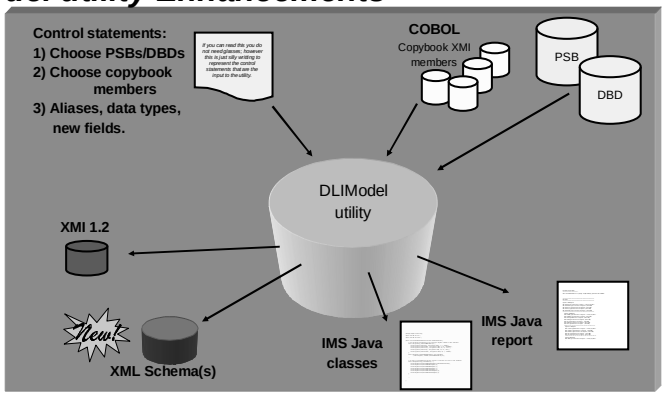
Intact XML document



XML DB - Setup and Execution

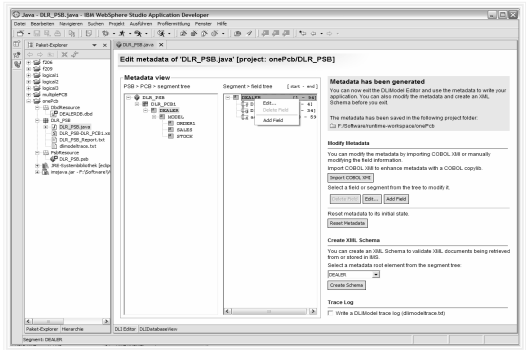
- Setup
  - ❖ Decomposed
    - *Run the DLI Model utility to generate an XML schema from the PSB/DBDs that matches the IMS database*
  - ❖ Intact
    - *Define database intact segments to match schema*
- Execution
  - ❖ An IMS Java application will issue these new IMS SQL JDBC User Defined Function (UDF) calls:
    - *retrieveXML() call*
    - *storeXML() call*

DLIModel utility Enhancements



DLIModel Utility GUI

- DLIModel utility *Graphical User Interface* Eclipse "plug-in"
  - ❖ Allows you to generate
    - *Schema*
    - *IMS Java metadata classes*
    - *Java Report*

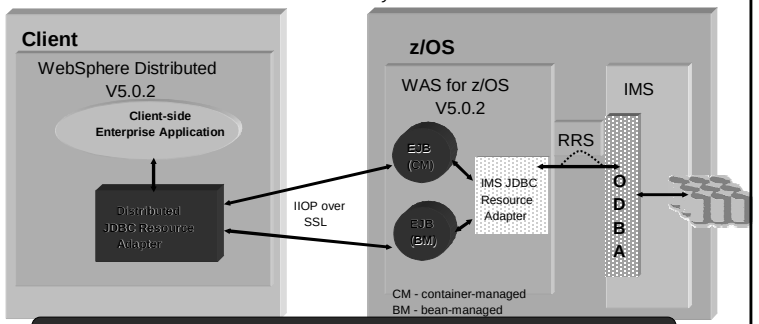


IMS Java Remote Database Services (RDS)

- Set of J2EE components that provide remote access to IMS data (IMS ODBA)
  - ❖ Consists of client-side and server-side components
  - ❖ Supports: Retrieve, Update, Delete, Insert
  - ❖ Provides an architected solution that allows remote Enterprise applications to issue JDBC calls to access IMS Databases
- Benefits
  - ❖ No need to develop or access a legacy z/OS application to have access to IMS data – ideal for application development in a WebSphere environment

IMS Java RDS …

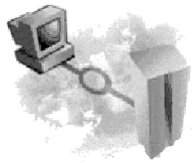
- ❖ IMS Java Remote Database Services
  - *From a client application deployed on a distributed WebSphere Application Server*
  - *Client-server communication handled by IMS Java*



IVPs can be used to test container & bean managed EJBs on WAS on a non-z/OS platform (see IMS Java Guide and Reference for details)

Other IMS Java Enhancements…

- IMS-DB2 interoperability
  - ❖ Supports DB2 access from an IMS JMP or JBP region
    - *Part of base IMS V9*
    - *IMS V8*
      - PQ73326 (UQ80615)
      - Prereq PQ73897 (latest level of IMS Java)
      - Prereq PQ75284 (IMS code using DB2's attachment facility)
    - *DB2*
      - DB2 V8 (PQ74629)
      - DB2 V7 (PQ69861)
  - ❖ Uses DB2 RRS attach facility
    - *Requires SSM= and RRS=Y in the IMS startup definitions*



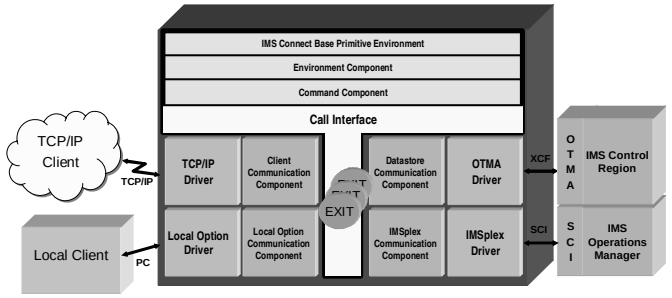
IMS Java Interoperability with Cobol

- Cobol
  - ❖ Requires Enterprise Cobol for z/OS V 3.2
    - *Object oriented syntax*
      - Cobol applications that run in a JBP or JMP must use the AIB interface
        - » All PCBs in the PSB must be named
    - *Also available in IMS V7 and IMS V8 (PQ69684 & PQ70354)*

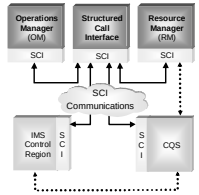
Integrated IMS Connect Function

Functionality of IMS Connect V2R2 is integrated into IMS V9

Included in System Services FMID – HMK9900



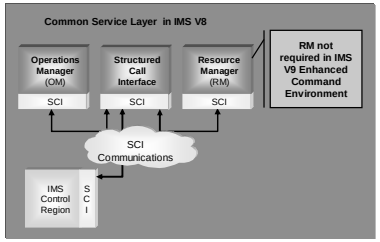
Common Service Layer



- IMS V8 introduced the CSL
  - Common Service Layer (CSL)
    - *An architecture, not an address space*
  - Three new address spaces built on the Base Primitive Environment (BPE)
    - ***Structured Call Interface (SCI)***
    - ***Operations Manager (OM)***
    - ***Resource Manager (RM)***
  - A new API provides communication between address spaces in the IMSplex
    - *the Structured Call Interface*
- Purpose
  - Improve the systems management capabilities of IMS systems running in an OS/390 or z/OS Parallel Sysplex

Enhanced Command Environment

- Resource Manager (RM) address space *not required* to support type-2 commands
- Allows the IMS control region to optionally start the SCI and OM address spaces




```
BROWSE    IMS.V9.DBDC.PROCLIB(DFSCGECE)
Command=>_____________________________
*--------------------------------------*
* IMS COMMON SERVICE LAYER MEMBER      *
*--------------------------------------*
CMSEC=N,            /* NO CMD AUTH CHECK*
IMSPLEX=PISC2,      /* IMSPLEX NAME     *
RMENV=N,
OMPROC=OMA,
SCIPROC=SCIA
```


IMS type-2 Database Commands

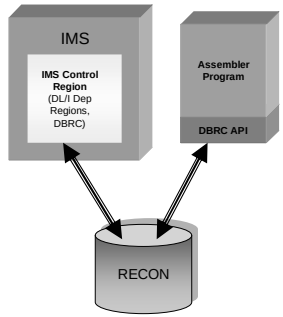
- IMS V9 further enhances the type-2 Commands introduced in IMS V8
- New commands issued from TSO SPOC, IMS Control Center or user written programs using the OM API:
  - **QUERY DB** - /DIS DB, /DIS STATUS DB
  - **UPDATE AREA** - /DBR AREA, /START AREA, /STOP AREA
  - **UPDATE DB** - /DBD DB, /DBR DB, /LOCK DB, UNLOCK DB, /START DB, /STOP DB
  - **UPDATE DATAGRP** - /DBR DATAGROUP, /START DATAGROUP, /STOP DATAGROUP
- Benefit
  - Command responses encapsulated by XML tags and can be sorted/manipulated by the user
- Focus on DB-related Commands viz QRY, UPD
  - UPD / QRY keywords and filters modified, name(wildcard) implemented

RACF Enhancements for Replacement of SMU

- IMS V9 is the last release to support SMU security
- Version 9 introduces enhancements to the SAF interface to support:
  1. **Application Group Name (AGN) security**
  2. **Type 1 and Type 2 Automated Operator Interface (AOI)**
  3. **Terminal security for Time-Controlled Operations (TCO)**
  4. **MSC link receive security**
  5. **/LOCK and /UNLOCK commands**
  6. **Signon verification**
- Benefits
  - ❖ Overcomes limitations that prevent migration from SMU

DBRC API

- Stage a supported, Assembler interface to access information in the RECON
- DSPAPI Functions supported
  - ❖ Start/Stop the API environment
  - ❖ RECON Query
    - *RECON status, database, groups, log (RLDS, SLDS, OLDS), subsystem, and backout*
  - ❖ Release buffer storage after Query



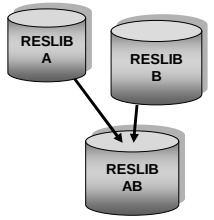
IMS Resource Definition Manageability Staging

- Requirement:
  - ❖ Reduce IMS System Generation time and effort

- History:
  - ❖ **IMS V4** stopped using sysgen to support major new function
  - ❖ **IMS V5/6** removed conditional assembly modules
  - ❖ **IMS V7** put non-conditional link-edit modules under SMP control
  - ❖ **IMS V8** removed RSR Feature install checking, provided Resource Manager/Global Online Change, Syntax Checker, Packaging, Installation, and IVP enhancements
  - ❖ **IMS V9** further reduces time and effort

IMS V9 Resource Definition Manageability

- Remove the restriction of maintaining RESLIBs for different system definitions
  - ❖ *V9 removes conditional linkedit load modules*
    - *Simplify IMS nucleus and VSCR*
  - ❖ *V9 supports generic DFSVC000 module*
    - Ability to override values with Control Region parameters
  - ❖ *Results: FP, Non-FP, DB/DC, DBCTL or DCCTL Systems can use the same RESLIB in V9*
- Simplify Extended Terminal Option (ETO) feature install
  - ❖ *In V9, IMSCTRL ETOFEAT is ignored*
  - ❖ *ETO Feature checking occurs at execution time rather than during system definition*



IMS V9 Migration Considerations

- IMS V9 supports migration from V7 and V8
  - *V7 and V8 DBRC Migration/Coexistence SPEs*
  - *V8 OLR Coexistence SPE*
- V9 is the last release to support SMU, BTAM
- V7 migration considerations to V8 (or V9)
  - *OTMA Compatibility SPE for prefix change PQ58631*
  - *MSC, QCF, Shared Qs Compatibility SPE PQ32932*
  - *DFSMSCE0 user exit replaces old MSC exits*
  - *UQ99327 needed for IMS V7 Change Accumulation migration to IMS V8*
  - *IMS V7 with PQ63491 to use IC2's with the "SameDataset" option created on IMS V9*
  - *IMS V8 was the last version to support the V5 format for SDEP CIs.*

IMS V9 Software Prerequisites and Migration SPEs

- IMS V9 Minimum Release Levels
  - z/OS V1R4 (5694-A01) with DFSMS
    - *RACF (included in separately orderable SecureWay Security Server), or equivalent, if security is used*
    - *High Level Assembler Toolkit (5696-234)*
  - IRLM V2.1 or higher if Data Sharing
  - CICS TS V1.3, V2.2
  - DB2 V6, V7, V8
- Migration SPEs
  - DBRC Migration/Coexistence SPE
    - *on IMS V7 - PQ72838 plus PQ67532 (V7)*
    - *on IMS V8 - PQ72840*
  - IMS V8 OLR Coexistence SPE (PQ78758) - see Info APAR II13800

IMS V9 will run on 64 bit capable processors – but does not pre-req them

IMS V9 Prerequisites…

- Hardware Prerequisites
  - >32K Tape Blocksize support requires the large block interface on 3480 Magnetic Tape, 3490 and 3490E Magnetic Tape Subsystems, or 3590 devices
- Other Software Prerequisites
  - RACF Enhancements for SMU replacement
    - *Requires an enhancement to RACF to add new security classes as default classes*
      - Optionally these can be added manually
  - MNPS Replacement for XRF
    - *Predatory takeover scenario requires an enhancement to z/OS*
  - Dynamic Allocation DSAB VSCR requires z/OS 1.5
  - IMS-DB2 Interoperability from a Java Dependent Region requires z/OS Resource Recovery Services and:
    - *PQ69861 (DB2 V7)*
    - *PQ74629 (DB2 V8)*
  - IMS Control Center for IMS requires:
    - *IMS Connect V1.2 or later & DB2 UDB Version 8, with Fixpak 5 or later*
    - *DB2 UDB Version 8.2, with Fixpak 6 or later is required for multi-version support (V8 & V9 in the same IMSplex)*
  - IMS Java Remote Database Services requires:
    - *IBM SDK for z/OS, Java 2 Technology Edition, V1.3.1 or later*
    - *The IMS DB subsystem and the programs that comprise the server tier must all run in the same logical partition (LPAR)*
    - *The server-tier EJB must run in WebSphere Application Server for z/OS, Version 5 or later. The middle-tier EJB can run in any WebSphere Application Server.*

Packaging

- IMS V9 product number - 5655-J38

FMID	Feature Description
HMK9900	System Services
JMK9901	Database Manager
JMK9902	Transaction Manager
JMK9903	Extended Terminal Option (ETO)
JMK9904	Recovery Level Tracking (RSR)
JMK9905	Database Level Tracking (RSR)
JMK9906	IMS Java
HIR2101	IRLM 2.1
HIR2102	IRLM 2.2

- Integrated IMS Connect function
  - Included in the IMS Systems Services FMID, HMK9900
- IMS Java Remote Database Services
  - Download IMS Java Files from IMS Website
    - **http://www.ibm.com/ims**

Some Key Dates

Product	Date	Announcement Letter
IMS V9 (5655-J38)	September 9, 2003 September 21, 2004	ZP03-0375 IMS V9 Announced ***ZP04-0409 IMS V9 GA announced as October 29, 2004***
IMS V8 (5655-C56)	October 16, 2001 October 25, 2002	ZP01-0518 IMS V8 Announced ZP02-0447 IMS V8 GA
IMS V7 (5655-B01)	October 27, 2000 September 8, 2004 August 3, 2004	ZP00-0488 IMS V7 GA ZP04-0249 IMS V7 Withdrawn from Marketing ***ZP04-0312 Withdrawal from Service announced for November 8, 2005***
IMS V6 (5655-158)	December 26, 1997 September 4, 2002 ***September 30, 2003***	ZP97-0463 IMS V6 GA ZP02-0255 IMS V6 Withdrawn from Marketing ***ZP02-0343 IMS V6 Withdrawn from Service***

IMS V9 and IBM Tools

- Web Matrix - Available at:
  http://www-1.ibm.com/support/docview.wss?rs=434&context=SSZJXP&uid=swg21167251&loc=en_US&cs=utf-8&lang=en+en
- Preventive Service Planning (PSP) Buckets
  - ❖ Have been updated with IMS V9 requirements
  - ❖ Available at:
    https://techsupport.services.ibm.com/server/390.psp390

Documentation

- IMS V9 Information:
  - ❖ Unlicensed publications included in DB2 Information Management Software Information Center for z/OS Solutions
    - **http://publib.boulder.ibm.com/infocenter/dzichelp**
  - ❖ Licensed and unlicensed publications available in PDF and Bookmanager formats from the IMS Website
    - **http://www.ibm.com/ims**
    - *Licensed IMS books require a valid IMS license or customer number to download*
  - ❖ New book
    - IMS V9: IMS Connect Guide and Reference
  - ❖ DLIModel utility info. moved to *IMS Version 9: Utilities Reference: System*.
  - ❖ *"An Introduction to IMS"* – ISBN # 0-13-185671-5
    - *Available from IBM Press, February, 2005*

IMS Information

- Information is available at http://www.ibm.com/ims
  - ❖ Presentations/Papers, Newsletters, Redbooks, Fact Sheets, Announce Letters, additional documentation
    - *IMS V9 Fact Sheet – GC18-7697*
    - *IMS V9 Release Planning Guide – GC17-7831-01 (October 2004)*
- IMS Redbooks/Redpieces
  - SG24-6398 IMS V9 Implementation Guide: A Technical Overview (not available yet)
  - SG24-6945 The Complete IMS HALDB Guide
  - SG24-6404 IMS Performance and Tuning Update
  - SG24-6514 IMS e-business Connectors: A guide to IMS Connectivity
  - SG24-6533 Ensuring Data Integrity Using IMS Tools
  - SG24-6574 IMS Installation and Maintenance Processes
  - SG24-6866 Using IMS Data Management Tools for Fast Path Databases
  - SG24-6908 IMS in the Parallel Sysplex Volume I: Reviewing the IMSplex Technology
  - SG24-6928 IMS in the Parallel Sysplex Volume II: Planning the IMSplex
  - SG24-6929 IMS in the Parallel Sysplex Volume III: IMSplex Implementation and Operations
  - *IMS Education at http://www.ibm.com/services/learning/us*
  - *Upcoming 2004 Conferences:*
    - IMS Technical Conference in Orlando, Florida, USA, November 1-4, 2004 (rescheduled)

IMS Version 9

- Providing quality through on-demand solutions

Integration

Manageability

Scalability

IMS V9 Enhancement Areas

Database Manager
- Integrated **Online Reorganization** of **HALDBs**
- **Fast Path DEDB Area Open/Close Enhancements**
- **Multi-Area Structure** Support for SVSO DEDBs
- FP Serviceability and Abend Reduction
- VSCR – dynamic allocation blocks and OLC modules
- DBRC and Logger Enhancements
- Greater than 32K Tape Blocksize Support
- HALDB Specific Partition Initialization
- Parallel Full Function DB Open Option
- **DBRC API**

Transaction Manager
- **MNPS** replacement of **XRF Uservar**
- OTMA Security and Serviceability Enhancements
- RACF Enhancements for **migration from SMU Security**
- Greater than 255 transaction classes
- Command Authorization Support for /RM commands
- LU type 3 logon option as ETO SLU1 or 3270P
- Notify CQS outage to Terminal Users

Manageability Enhancements
- **Type-2 Database Commands**
- Enhanced Command Environment
- /DIAGNOSE command for serviceability
- External Subsystem Enhancements
- EMHQ Structure Definition now Optional
- Online Change Copy Utility Enhancements
- Command Recognition Character Registration
- Fewer SNAP dumps to the Log
- IMS Application Menu
- KBLA

Application Development & Connectivity
- **Integrated IMS Connect function**
- **XML DB – JDBC/SQL** support for storage and retrieval of XML documents with existing and **new** IMS databases and DLIModel Utility enhancements
- IMS Java Remote Database Services
- Symbolic Checkpoint/Restart from Batch Java Regions
- Other IMS Java Enhancements
  - *SQL Enhancements*
  - *GSAM Support*
  - *IMS-DB2 Interoperability from a Java Dependent Region*

Installation and System Generation Manageability
- **Conditional link edit elimination**
- OLC modules moved
- ETO feature checking removed from SYSGEN
- Dynamic change of Type 4 SVC
- Dynamic Add of Resource Clean-up module
- Support for single SDFSRESL library
- **Syntax Checker** Enhancements
- **IVP Enhancements**

Addressing More than 50 Customer Requirements!