IMS 12 “Short” Overview

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IMS 12 is Generally Available!

- IMS Version 12 “Generally Available” on 28th October 2011

IMS 12: Faster than ever!
IMS 12 delivers double-digit gains in performance, throughput, and simplicity
IMS Version 12 Performance Evaluation Summary

- Whitepaper “IMS Version 12 Performance Evaluation Summary”
  - Detailed results of SVL internal performance tests
  - Environment, functions tested, MIPS and throughput results

Available for download from ibm.com/software/data/ims/
IMS Roadmap

- IMS 12 supports migration/coexistence from/with IMS 10 and IMS 11.

- **Current IMS Releases**
  - IMS 10 Generally Available in October 2007
  - IMS 11 Generally Available in October 2009
  - IMS 12 Generally Available in October 2011

- **IMS 12+1 Planning and Design**

- **IMS 12+2 Planning**

- **Gentle Reminders**
  - IMS 9 GA October 2004, Service was discontinued on 7th November 2010

  - IMS 10 was withdrawn from marketing on 12th September 2011 (Announcement Letter, ZP11-0254)

  - **IMS 10 will be withdrawn from service** on 12th November 2012 (Announcement Letter, ZP11-0341)
Discontinuance of Support

- IMS Version 11 is the last version of IMS that supports the Knowledge Based Log Analysis (KBLA) facility

- IMS Version 12 is the last version to support the SECURITY macro
  - Initialization parameters can be used to specify most of the SECURITY macro keyword values
  - Initialization parameters for the RCLASS and SECCNT keywords will be delivered through the IMS Service process (PM48204/UK74051)
    - It’s recommended that the startup parameters be used
IMS 12 Main Highlights

**Database Management**
- IMS Catalog
- Dynamic Full Function Database Buffer Pools
- CICS Open Thread TCB Support (Threadsafe)
- FF DB Storage Enhancement
- Usability and Serviceability Enhancements

**Transaction Management**
- IMS to IMS TCP/IP Communications
- MSC TCP/IP Support
- OTMA TCP/IP Support
- IMS Connect Enhancements
- CM0 Message Enhancement
- Send Only w/ACK for Callout
- OTMA Security Enhancements
- APPC/OTMA Sync SQ

**System**
- IMS Repository for Dynamic Resource Definition
- IMPORT Command Enhancements
- Logger Enhancements
- Extended Address Volume Support for non-VSAM
- Member OLC Enhancement

**Fast Path**
- DEDB Secondary Indexing Enablement
- 64-bit Buffer Manager Enhancements
- Usability and Serviceability Enhancements

**DBRC**
- Usability and Serviceability Enhancements
- Migration/Coexistence
Smarter Database Management
IMS Enterprise Suite Explorer for Development

- **New Face of IMS …Simplifying IMS application development**
  - GUI-based framework for consistent and integrated tools across environment
  - Eclipse-based
  - Follow-on product for DLIModel 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 to DBDs
  - Generation of DBD and PSB source

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

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

**Download the IMS Explorer**

ibm.com/ims

→ Click on IMS Enterprise Suite

→ Download now
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 Catalog - Background

- **Customers needs not being met**
  - No trusted online source for both IMS database and application metadata information

- **Customers can’t leverage newer IMS database functions**
  - Large scale deployment of IMS Open Database is difficult
  - JDBC metadata discovery APIs are insufficient
    - Can’t visualize and report on databases, generate SQL queries, query database contents, generate pureQuery applications, etc.

- **Customers limited to database metadata generated by IMS Explorer and/or DLIModel Utility**
  - Current Java metadata classes are …
    - not trusted and inflexible
    - offline and not guaranteed to be current
    - lacking application information
    - not easy to manage for large scale Open Database solutions
    - hard to maintain and keep in sync with IMS resources
    - deployed everywhere
What is Metadata?

- **Business metadata**
  - Business rules, definitions, terminology, glossaries, algorithms and lineage using business language
  - Audience: Business users

- **Technical metadata**
  - Defines source and target systems
    - Table & Column / Segment & Field structures and attributes
    - Derivations and dependencies
  - Audience: Specific tool users, AD, BI, ETL, profiling, modeling

- **Operational metadata**
  - Information about application runtime
    - Frequency, record counts, component by component analysis and other statistics
  - Audience: Operations, management and business users

Literally, “data about data” that describes your company’s information from both a business and a technical perspective
IMS Catalog - Solution

- **A Key component of the IMS growth strategy**
  - Simplification
  - Integration

- **Provide a trusted, online source for IMS database and application metadata information**

- **Uses an IMS Database to store the IMS metadata information**

- **Allows for better scalability of Open Database by removing the local metadata requirement**

- **Benefits**
  - Offers a trusted and comprehensive view of IMS database metadata managed by IMS using standard interfaces
    - JDBC/SQL and DLI
  - Opens up metadata discovery and exchange for IMS Open Database and the IMS Explorer for application developers
  - Permits future IMS integration with IBM tools
    - COGNOS
    - Optim Development Studio
    - Rational Asset Analyzer
    - InfoSphere Data Architect
  - Enables scalable and flexible IMS Open Database solutions
    - Applications no longer need to maintain local Java metadata
    - Applications can reference the online IMS Catalog
Before the IMS Catalog

- **Databases partially defined in the IMS DBD**
  - Only searchable fields needed by applications
  - Remaining segment data is not defined

- **Remaining database definition is within Applications**
  - COBOL COPYBOOKs and PL/I INCLUDEs map all the segment data
  - Applications can have different mappings for one segment

**IMS Database Metadata**

- **IMS**
  - PSLIB
  - ACBLIB
  - DBDLIB
  - PSB source
  - DBD source

- **User maintained**
  - COBOL/PLI source
  - DLIModel Utility or IMS Explorer generated
  - Java classes
With the IMS Catalog

- Database and program resources defined to an IMS system and relevant application information stored as metadata in an IMS catalog
  - Databases, fields, segments, data types, and more ...

- Changes are reflected in the IMS catalog when you create, alter or delete IMS resource or application information

- Updates to the IMS Catalog are done only via integrated IMS processes
  - Catalog Populate Utility (initial Catalog load and member update)
  - PSBGEN    - DBDGEN    - ACBGEN

- Catalog metadata can be used to
  - Enhance understanding
  - Improve consistency
  - Improve impact analysis
  - Improve productivity
  - Improve governance
Types of IMS Technical Metadata and Storage Method

- **DB**
  - PSB/DBD resources
    - Database structure definitions
    - Physical database definitions
    - Segment definitions
    - Field definitions
  - Application
    - Data types
    - Application defined fields
    - Encodings
    - Redefines
    - User defined types
    - Structures

- **TM**
  - MODBLKS resources
    - Databases
    - Programs
    - Transactions
    - FP Routing Codes
The IMS Catalog Database

- Contains metadata related to an IMS system’s databases
  - DBDs and PSBs and Application info

- IMS PHIDAM/OSAM HALDB database
  - Defined with 4 Data Set Groups (DSGs)
  - Has one Secondary Index

- Unique features
  - DBRC use is optional for the IMS Catalog HALDB database
    - Only HALDB that isn’t required to be defined in the DBRC RECONs
  - IMS can manage allocation/creation of catalog database data sets
    - Uses parameters in the “CATALOG” section of DFSDFxxx PROCLIB member

- IMS-provided information
  - DBD and PSB source code for the Catalog database
  - Object code for the Catalog DBDs and PSBs
Physical Catalog Structure

- **HEADER**
  - **RESERVED**
  - **RESERVED**
  - **PSB**
  - **RESERVED**

  - **DBD**
  - **RESERVED**
  - **PSBRMK**
  - **RESERVED**
  - **PCB**

  - **DSET**
    - **AREARMK**
    - **CAPXDBD**
    - **DBDRMK**
    - **DBDVEND**
    - **SEGM**

  - **DSETRMK**
    - **AREARMK**
    - **CAPXDBD**
    - **DBDRMK**
    - **DBDVEND**
    - **SEGM**

  - **FLD**
    - **CAPXSEG**
    - **LCHIL**

  - **FIELD**
    - **CAPXSEG**
    - **LCHIL**

  - **SEGM**
    - **SEGM**
    - **MAP**

  - **MAP**
    - **CASE**
    - **CMAR**

  - **CMAR**
    - **CMARR**
    - **CMARR**

  - **RESERVED**

- **DSG A**
- **DSG B**
- **DSG C**
- **DSG D**

Secondary Index

- **DFSCX000**
ACBGEN will populate ACBLIB and catalog in same UOW
- Populates ACBLIB with *standard* ACB info and *extended* info
- Populates the catalog with *extended* info

**Key points**
- Only way to update catalog is via the Populate Utility or ACBGEN process
- Extended info stored in ACBLIB members for recoverability
- Extended info is acquired via the IMS Explorer
Dynamic Full Function Database Buffer Pools

- IMS Full Function database buffers are the primary interface between the databases and IMS processing regions.

- Making the best use of buffers in the IMS subsystem is key for performance
  - The more requests for database access satisfied from the buffers, the fewer physical I/Os necessary.

- Prior to IMS 12
  - Buffers definitions are read from DFSVSMxx at IMS initialization. A restart of IMS is required to add new pools, or to change the number of buffers in a pool.

- With IMS 12 you can change buffers dynamically without restarting IMS!
  - Read from the DFSVSMxx member of PROCLIB during IMS cold and warm start processing.
  - Use DFSDFxxx and dynamically update using UPDATE Command (add, replace, delete)
    - UPDATE POOL TYPE(DBAS) SECTION(VSAMFRI) MEMBER(001)
  - Multiple DFSDFxxx proclib members may be used depending on time of day or day.
Overview of Dynamic Full Function Database Buffer Pools …

IMS reads buffer definitions from DFSDFxxx when the UPDATE POOL command is issued

IMS PROCLIB

**DFSDF001** Member

<SECTION=VSAMFRI>

POOLID=(01,FIXDATA=YES, FIXINDEX=NO, FIXBLOCK=NO,STRINGNM=50, VSRBF=(2048,20,I), VSRBF=(4096,30,I,HSO,HS10))

POOLID=(02, VSRBF=(2048,10,D))

<SECTION=OSAMMON>

IOBF=(2048,10,N,N,OGEN)

IOBF=(8192,0,N,N,OGEN)

IMS CONTROL REGION

POOLID=01,FIXDATA=YES,FIXINDEX=NO, FIXBLOCK=NO,STRINGNM=50

VSRBF=4096,30,I,HSO,HS10

VSRBF=4096,5

VSRBF=2048,5

VSRBF=2048,20,I

VSRBF=1024,5

VSRBF=512,5

POOLID=(02, VSRBF=(2048,10,D))

IOBF=(8192,5,Y,Y,OGEN)

IOBF=(2048,5,Y,Y,OGEN)

IMS writes dynamic changes to RDS

IMS reads dynamic changes from RDS at /ERE

Restart Data set

**DFSVSMDMC** Member

POOLID=01,FIXDATA=YES,FIXINDEX=NO, FIXBLOCK=NO,STRINGNM=50

VSRBF=4096,5,I,HSO,HS10

VSRBF=4096,5

VSRBF=2048,5

VSRBF=1024,5

VSRBF=512,5

IOBF=(8192,5,Y,Y,OGEN)

IOBF=(2048,5,Y,Y,OGEN)

IMS reads buffer definitions from DFSVSMDxx at warm or cold start

1. SYSTEM INITIALIZATION

IMS reads e.g. <SECTION=VSAMFRI> from DFSDF001

2. IMS PROCLIB

3. IMS PROCLIB

4. IMS PROCLIB
UPD POOL TYPE(DBAS) Command Processing

- Changes to buffer pools are made only when all activity using the subpools that are to be changed, has been quiesced
  - VSAM and OSAM subpools are quiesced separately (not at same time)

- VSAM subpools are quiesced when all applications using the subpool have reached sync point
  - And updates have been flushed out
  - Applications are held at syncpoint
  - Newly scheduled applications that might require the pool are held

- OSAM Activity is quiesced by not allowing applications to take ownership of a new buffer in the subpool
  - When application releases ownership of a buffer to use a new buffer, it is quiesced
    - Note: an application can only own one buffer at a time
  - Updated buffers are flushed to DASD

- Affected pools are destroyed and rebuilt to new size

- No TIMEOUT parameter for UPDATE POOL command
  - No ability to interrupt the command once issued
Dynamic FF Buffer Pools – Business Value

- **Improve buffer pool management and system availability**
  - Eliminate system down time for modifications to buffer pool definitions

- **Improve application performance**
  - Allow more flexibility to adjust DB buffers to business needs

- **And also  …**

- **Increase capabilities to tune VSAM pools for database performance**
  - Thanks to another IMS 12 enhancement: support for up to 255 VSAM database buffer pools
    - Previous versions were limited to 16 pools

Note: z/OS 1.11 APAR OA32318/UA57798 & PM38518/UK68133 (IMS 12) are required
DRA Open Thread TCB Enablement for CICS Threadsafe

- The CICS-DBCTL interface, used by CICS applications to access IMS databases, is enabled to run on open TCBs
  - Provides benefits for applications that access IMS and which are already or can be made threadsafe
    - Applications that are already OPENAPI (running on L8 TCBs) will avoid four TCB switches for each call to IMS
    - EXEC DLI and CALL DLI calls from CICS can now be made without any TCB switching overhead

- Requires CICS TS 4.2 and PM31420/UK70991 (IMS 12)

- Benefits:
  - Eliminates costly TCB switches
  - Reduces CPU usage
  - Increases throughput for CICS / DBCTL users
  - Reduces use of 24-bit Local System Queue Area (LSQA)
IMS Storage Pool Enhancement

- **Storage for selected pools can now be page fixed in 64-bit real storage**
  - IMS PSB Scheduling pools (TM/DB, DBCTL, DCCTL)
    - PSB CSA pool  PSB Work pool
  - Pools related to Full Function Database usage (TM/DB, DBCTL)
    - DLI PSB pool  DMB pool  DB Work pool

- **Benefits:**
  - Could reduce use of 31-bit fixed real frames, relieves 31-bit real storage constraint and improve application scheduling performance
  - Customers with large database pools who previously could not page fix these pools due to storage constraints may now be able to page fix due to an increase in available real storage
Status Messages for DB Exit Routines

- **Issued for randomizer when (P)HDAM database is opened by command**
  - DFS2842I RANDOMIZER name FOR database IS LOADED|SHARED
    - ‘LOADED’ appears when routine is loaded from library
    - ‘SHARED’ appears when routine is already resident due to use by another database

- **Issued for randomizer when (P)HDAM database is closed by command**
  - DFS2838I RANDOMIZER name FOR database IS DELETED AND GONE|SHARED
    - ‘GONE’ appears when routine is deleted from memory
    - ‘SHARED’ appears when routine remains in memory and used by another database

- **Issued for partition selection exit routine when HALDB database is opened or closed by a command**
  - DFS2406I THE HALDB PARTITION SELECTION EXIT ROUTINE rname FOR THE HALDB dbname IS LOADED|GONE|SHARED
    - ‘LOADED’ appears when routine is loaded from library
    - ‘GONE” appears when the routine is deleted from memory
    - ‘SHARED’ appears when routine is already resident or remains in memory due to use by another database
Lock Timeout Message and Logging

- **IMS 12 adds optional DFS2291I diagnostic messages for lock timeouts**
  - Timeouts occur only with IRLM and IMS LOCKTIME specified
  - Previous IMS releases provide information only via RMF reports
  - Specified in DFSDSFxxx member

  ```
  <SECTION=DIAGNOSTICS_STATISTICS>
  MSG2291=ISSUE | SHORT | SUPPRESS
  
  - Multi-line message:
    ```
    DFS2291I LOCKNAME=0900004288800201D7
    DFS2291I DBNAME=DLVNTZ02 LOCKFUNC=GET LCL AND GBL ROOT LOCKS
    DFS2291I BLOCKER PST=0001 TRAN=NQF1 PSB=PMVAPZ12 TYPE=MPP
    DFS2291I BLOCKER TRANELAPSEDTIME=00:01:11 IMSID=IMS1
    DFS2291I BLOCKER RECOVERY TOKEN=IMS1 0000000200000000
    DFS2291I VICTIM PST=0002 TRAN=SHF1 PSB=PMVAPZ12 TYPE=MPP
    DFS2291I VICTIM TRANELAPSEDTIME=00:00:49 IMSID=IMS1
    DFS2291I VICTIM RECOVERY TOKEN=IMS1 0000000300000000
    ```
  - Or “Short” one line message:
    ```
    DFS2291I BLOCKER PST=0001 TRAN=NQF1 PSB=PMVAPZ12 TYPE=MPP
    ```

- **IMS 12 writes log record x’67D0’ subtype x’1B’ for lock timeouts**
  - Contains same information as the DFS2291I message

**Benefit:** Information on lock conflicts is more readily accessible
**Batch Data Sharing Abend Elimination**

- **Batch Data Sharing jobs survive CF cache structure access failures**
  - Previous releases produced U3303 abends when access to OSAM or VSAM cache structures failed
  - IMS 12 causes batch data sharing job to wait for a resolution of the structure problem
    - Message issued:
      
      ```
      DFS2404A AN ERROR WAS ENCOUNTERED WHEN ACCESSING THE COUPLING FACILITY. STRUCTURE xxxxxxxxxxxxxxxx RSN yyy
      ```

- **Benefit**
  - Improved availability and ease of use for batch data sharing jobs
  - Users may move and rebuild OSAM and VSAM structures while batch jobs are executing

---

**Note:** Now Batch like online systems, wait for the resolution of the problem.
HALDB Online Reorganization (OLR) Ownership Release

- IMS 12 adds capability to release ownership of an OLR when IMS terminates
  - IMS termination may be normal or abnormal
    - In previous IMS versions, OLR ownership was kept by a terminated IMS system
    - If OLR is owned by an IMS system, it may not be started or restarted on another IMS system

- Specification of ownership release default
  - Determined by parameter in DATABASE section of DFSDFxxx
    - RELOLOWNER – specified to release ownership
    - Absence of RELOLOWNER specifies that ownership is retained

- Default may be overridden by parameter on INIT OLREORG, /INIT OLREORG, UPD OLREORG or /UPD OLREORG command
  - OPTION(REL)

- Benefit
  - OLRs may be restarted on another available IMS
  - Caution: If an OLR is not owned by a terminated IMS system, it will not be automatically restarted when the IMS system is restarted
IMS 12 approaches 4 billion transactions a day, achieving over 46000 transactions per second in a single image Fast Path environment.
Fast Path DEDB Secondary Indexing

- IMS 12 provides the infrastructure to support secondary indexes for Fast Path DEDB databases

- Secondary indexes are full function databases (HISAM or SHISAM)

- Very similar, in concept, to full-function secondary indexing

- All index pointers are symbolic (concatenated keys)
  - Target segments always accessed via DEDB Randomiser and Root
  - DEDB Reorganisation does not require changes to the secondary indexes

- Secondary index key is built from 1 to 5 fields in source segment

- Secondary indexes are maintained by IMS
  - Index is updated when source segment is inserted, deleted, or replaced

- IMS provides no support for the creation of secondary indexes
  - A tool or program is required to add a secondary index
  - Have a look at IMS Fast Path Solution Pack for z/OS

- Fast Path secondary indexes have unique capabilities
  - User data partitioning
  - Multiple secondary index segments
User Data Partitioning

- Secondary index may be spread across multiple index databases – supports very large indexes
  - Each index database contains a range of keys
  - HISAM or SHISAM may be used

- Requires user partition selection exit routine
  - Routine assigns index entry to an index database

- Multiple index databases (partitions) must have same structure and attributes

IMS provides a sample partition selection routine, DBFPSE00

Secondary Index

<table>
<thead>
<tr>
<th>DEDB</th>
<th>INDXDB1</th>
<th>INDXDB2</th>
<th>INDXDB3</th>
<th>INDXDB4</th>
<th>INDXDB5</th>
</tr>
</thead>
</table>

PSELOPT= determines when ‘GB’ status code is returned for GN

LCHILD NAME=(segname, (db1name, db2name, ...)), PTR=SYMB

Specify PSELRTN= on DEDB XDFLD statement
Optionally specify PSELOPT= on DEDB XDFLD statement

XDFLD NAME=searchname, SRCH=fldname, PSELRTN=rtnname, PSELOPT=MULT|SNGL,...
Multiple Secondary Index Segments

- **One index may be based on different search fields**
  - Each search field creates index segment occurrence
  - Search fields must be in the same source segment
  - Search fields must be the same size
  - Example
    - Secondary index with entries for home, work and mobile phones

LCHILD NAME=(sisegname,sidbname),PTR=SYMB,MULTISEG=YES

```
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```
DEDB Secondary Indexing – Business Value

- Access to DEDB via alternate key
- Processing of DEDB in alternate key sequence
- Access to data in secondary index without accessing the DEDB
- Reorganisation of DEDB independent of secondary indexes
- Support for very large secondary indexes
Fast Path 64-bit Buffer Manager

- **Introduced with IMS 11 (optional)**
  - Database buffers above the bar (in 64-bit storage)
  - Multiple subpools with different buffer sizes
  - Buffer pools dynamically expanded
  - Defined in DFSDFxxx PROCLIB member
  - Automatic allocation by IMS

- **Enhanced with IMS 12**
  - New optional parameter (FPBP64D=Y) to set initial start-up buffer pools to 25% of DBBF specification distributed among subpools based on the number of areas of each CI size
  - Dynamic pre-extension and compression of buffer pools
  - Additional buffers moved from ECSA to 64-bit storage
  - Enhanced QUERY POOL TYPE(FPBP64) command output

**Benefits**
- More user control
- Improved management of 64-bit buffers
- Enhanced use of 64-bit storage
FP Enhanced Logging

- **Option to reduce logging for asynchronous changed data capture**
  - Before IMS 12 asynchronous changed data capture writes ‘before’ and ‘after’ image log records (x’99’)
  - IMS 12 has option not to write these records for DLET calls or ‘before’ records for REPL calls for DEDBs
    - Specification on EXIT= parameter of DBD and SEGM macros in DBDGEN

- **Option to log entire segment for REPL calls of DEDBs**
  - ISRT and DLET always log the entire segment
  - Before IMS 12 only changed data in segment was logged for REPL calls
    - Specified in DBRC with new keywords for the INIT.DB, CHANGE.DB, INIT AREA, and CHANGE.AREA DBRC commands

**Benefits:**
- Optional log reduction for x’99’ data capture log records reduces logging overhead & improves performance where logging is a constraint
- Full segment logging can be used for disaster recovery tracking
Smarter System Management
IMS *without* Dynamic Resource Definition

- Each IMS system must have a definition of its resources
  - Databases, Transactions, Programs and Fast Path Routing Codes
    - The “MODBLKS resources”
  - Created in the MODBLKS dataset by the IMS System Definition process
    - Stage 1 input (Assembler Macros) can be very large and require careful management

- The definitions can be changed with Online Change, but:
  - Requires the complete set of resource definitions to be re-built every time
    - Even for a change of one attribute of one resource!
  - Requires all system processing to be quiesced for the MODBLKS library switch
    - Impacts service availability
IMS with Dynamic Resource Definition (DRD)

- When DRD is enabled, resources need only ever be created once
  - Kept in a Resource Definition Dataset (RDDS)

- Resources are NOT defined in IMS System Definition
  - Stage 1 input – especially with ETO – will be very small
  - IMS System Definition process will rarely be required …
  - … and will be much quicker

- Resources are updated at a SPOC with UPDATE commands, added with CREATE commands, and deleted with DELETE commands
  - No impact on availability of unchanged resources
  - All resources written to oldest RDDS at next system checkpoint

- Resource definitions are portable between RDDSs
  - Using EXPORT and IMPORT commands

DRD was introduced with IMS Version 10
Dynamic Resource Definition (DRD) Reminder

IMS MODBLKS

IMS SYSTEM

“Stored” Resources

Resource Definition Datasets (RDDS)

“Runtime” Resources

Control Blocks

DDIRs
PDIRs
SMBs
RCTEs

OM Interface

IMS

CREATE, DELETE, EXPORT, IMPORT, or UPDATE commands

OLDS

Log Records

DDIRs
PDIRs
SMBs
RCTEs

WARM or /ERE RESTART

Command and CHKPT Logging

DRD was introduced in IMS 10

First cold start after implementing DRD

1

Automatic Import (cold start)

2

Automatic export

3

4

5

Command and CHKPT Logging

Automatic export

EXPORT command

IMPORT command

IMPORT command

EXPORT command

.Resource Definition Dataset (RDDS)

Non-system RDDS

“Stored” Resources

IMS System Definition Process

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IMS Repository and Usage for DRD Resources

- **A strategic IMS architectural direction**
  - Based upon BPE, CSL, IMSplex architecture

- **The IMS 12 “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
  - The Repository is comprised of multiple VSAM KSDSs

- **Functions**
  - 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 out to one or more active IMS systems
  - Allows repository resources to be “Queried” via command

**Benefits:**
Simplifies management of IMS resource definitions
Eliminates the need for managing multiple RDDSs for each IMS in an IMSplex
Repository Function Architecture Overview

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

IMS Control Region
“Runtime” Definitions

Batch ADMIN Utility (FRP BATCH)
Repository Server Commands (z/OS Modify)

RS Catalog Repository
Primary/Copy 1 Datasets Index/Member
Secondary/Copy 2 Datasets Index/Member

IMSRSC Repository
“Stored” Definitions
Primary/Copy 1 Datasets Index/Member
Secondary/Copy 2 Datasets Index/Member
Spare Datasets Index/Member

Audit Log

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Logging Enhancements

- **Extended Format Support for OLDS and SLDS (Optional)**
  - Allows OLDS and SLDS to be striped
    - Increased logging speed

- **Log buffers moved above the 2-gigabyte boundary (“bar”) in virtual storage (Optional)**
  - OLDS must be Extended Format and OLDS blocksize must be a multiple of 4096
  - Potentially frees substantial amount of ECSA

- **OLDS block size (Optional but recommended)**
  - BLKSZ parameter on OLDSDEF statement in DFSVSMxx member
  - Previously, it was set only from the data set characteristics

- **WADS Management changed to be more efficient (next slide)**

**Benefits**

- Increased logging rates
- ECSA constraint relief
- Simplified definitions
- Smaller WADS

Logging rates over 350 MB/sec were achieved using the IMS 12 Logger with 64-bit virtual buffering and SAM striping.
WADS Writes and Definition

- **The concept of WADS track groups is not used by IMS 12**
  - WADS should be sized to provide enough space for any OLDS buffers not yet written at any time plus one track

- **The WADS is treated as a wrap-around sequential dataset**
  - At each log check-write, all buffered log records which have not been written to OLDS or WADS, are blocked and written to WADS to follow the previous set of records

- **Performance**
  - WADS should be kept in cache in storage subsystem
    - More likely with the new design (fewer tracks)

- **Requirement:** You must preallocate and format the WADS on a DASD device that supports Extended Count-Key-Data (ECKD)

**Maximum WADS size before IMS 12 with 200 24K buffers:**

\[
\frac{\text{OLDS block size}}{\text{WADS segment size}} + 1 \times \text{no. of OLDS Buffers}
\]

\[
\left(\frac{24K}{4K} + 1\right) \times 200 = 1400 \text{ tracks}
\]

**Maximum WADS size with IMS 12 with 200 24K buffers:**

- 3390 Model 9 allows 56664 bytes per track
- \( \frac{56664}{24K} = 2 \) blocks per track
- \( 200 \text{ buffers} / 2 + 1 = 101 \text{ tracks} \)
Extended Address Volume (EAV)

- EAV is a volume with more than 65,520 cylinders
  - 3390 Model A
  - 1 to 262,668 cylinders
    - Architectural EAV maximum
  - Any data set may reside on the first 65,519 cylinders
  - Only data sets with EAV support may reside on cylinder 65,520 or above

Maximum Sizes

- **3 GB**
  - Max cyls: 3,339
- **9 GB**
  - Max cyls: 10,017
- **27 GB**
  - Max cyls: 32,760
- **54 GB**
  - Max cyls: 65,520
- **3390-3**
- **3390-9**
- **3390-27**
- **3390-54**

100s of TBs

EAV 3390-A
Extended Address Volume (EAV) Support

- Non-VSAM data sets can reside in Extended Address Space (EAS) on EAV volumes to satisfy growing DASD storage requirements
  - Requires z/OS 1.12 and above

- EAV support for the following non-VSAM data sets:
  - Overflow Sequential Access Method (OSAM) data sets
    • OSAM database data sets
    • Restart Data Set (RDS)
    • Message Queue blocks data set
    • Long and Short Message data set
  - IMS Online Log Data Sets (OLDS)
  - IMS log Write Ahead Data Sets (WADS)
  - IMS SPOOL data sets
  - BPE External Trace Data Sets
    • Specified on EXTTRACE in BPE configuration parameter member in Proclib

- Benefits:
  - Provide relief for systems running out of z/OS addressable disk storage
  - Allows more data sets on a single larger volume
  - Less need for multi-volume OSAM
  - Alleviate disk storage constraints providing greater scalability to grow business solutions
ACB Member Online Change Enhancement

- **New option** *(OPTION(NAMEONLY))* to allow ACB Member Online Change to only bring in PSB members and new DBD members
  - Specified in the NAME parameter of the INIT OLC command

**Benefit:**
- Could provide significant performance enhancement when there are a huge number of ACB members in ACBLIB
  - Eliminates the process of determining the associated ACB members for the PSB and DBD members affected by the OLC, when the user knows it is not needed
Smarter Transaction & Connectivity Management
IMS to IMS TCP/IP Communications

- New communications between IMS systems using TCP/IP
  - via two IMS Connect instances

- Two types of use
  - MSC Physical Links
  - OTMA Support for Asynchronous IMS-IMS Communications
MSC Communications across a TCP/IP network

- MSC communicates with IMS Connect within an IMSplex to send/receive messages via the TCP/IP network
  - New physical link type MSPLINK TYPE = TCPIP
  - IMS Connect manages the TCP/IP communications
  - MSC manages the message processing
  - Structured Call Interface (SCI) used for communication
  - TCP/IP generic name support
    - Similar to VTAM Generic Resources

- Always uses the newer (IMS 10) “Bandwidth Mode”
  - Better buffering and logging to enhance performance
  - Performance Statistics available with QUERY command have been further enhanced

Benefits:
- Increased usability by allowing migration of links from SNA to TCP/IP
- Increased availability if VTAM/SNA and TCP/IP are used together for redundancy
- Potential increased MSC bandwidth
OTMA TCP/IP Connection Enhancement

- **OTMA**
  - Sends OTMA remote ALTPCB messages to IMS Connect using new destination information
    - OTMA destination descriptors or DFSYDRU0 exit Routine

- **IMS Connect**
  - Receives OTMA ALTPCB messages from a local IMS and sends them to the remote IMS Connect for processing in the remote IMS
    - Enhanced IMS Connect configuration specifications

ALTPCB destination is resolved using an **OTMA Destination Descriptor** or the **DFSYDRU0 exit**

IMS Connect configurations **define the connection to the remote Partner**

**Benefits:**
- Enhances connectivity
- Removes need for an intermediate gateway between IMSs
- Simplifies definition of remote IMS system as TCP/IP destination for OTMA transaction messages
IMS Connect Enhancements

- **QUERY IMSCON and UPDATE IMSCON type-2 command support**
  - Access to IMS Connect using a standardized command interface
  - Alias | Datastore | MSC | Racfuid
  - Client | IMSPllex | ODBM | RmtIMSCOn
  - Converter | Link | Port | SendClnt
  - UOR

- Ability to refresh XML converters for IMS SOAP Gateway without restarting IMS Connect

- Provide RACF Userid caching – reduces MIPS

- Return actual RACF return codes – more info for security errors

- Recorder Trace data capture – new trace points

- Commit Mode 0 (CM0) NoWait for ACK/NAK for RYO clients

- New READ client connection status

- Load modules for IMS-provided exits – no need to assemble/bind
Single ACEEs caching for Same User

- New capability creates, shares and caches a single ACEE associated with a RACF userid
  - Shared across multiple OTMA member clients (TMEMBER)
- New maximum ACEE aging value of 99,999 seconds (11.5 days) (previously 68 years!)

- More storage
- More RACF calls to create an instance of an ACEE
- Possible security exposure if a change has to be made to a user profile
  - Different versions of the ACEE based on which OTMA client is used
DFS2082I for CM0

- **A new commit-then-send (CM0) optional flag to request DFS2082**
  - Specified on an input CM0 transaction message
    - Triggers OTMA to send the DFS2082 message if
      *The IMS application does not reply to the IOPCB*
      *Nor message switches to another transaction*
  - To ease the migration from CM1 to CM0 client applications & reduce application timeout

**Diagram:**
- TMRA
- IMS Connect
- Vendor Appl.
- OTMA C/I
- WebSphere MQ
- DB2 Stored Procedure
- RYO Appl.
- MQ Appl.

**DFS2082 RESPONSE MODE TRANSACTION TERMINATED WITHOUT REPLY**

- Supported in V12
- To be supported

**OTMA**
- CM0 Input Transaction with TMAMHRSP set
- DFS2082 is Sent to OTMA client

**MPP**
- When no output and no program to program switch
Send Only with ACK for Synchronous Callout

- Send an acknowledgment to the provider of the service to indicate that the IMS application received the callout (DL/I ICAL) response
- Benefit: Allows the service to take action if IMS does not receive the message

---

**Server application**
(WAS app, SOAP service, DataPower app, RYO app, etc)

- Business Logic
  - Get callout
  - Send resp.
  - Business Service – Waits for ACK
  - Pass the IMS Confirmation to Other server

**Client application**

- IMS Connect
  - Response
  - Callout

**IMS Application**
Issues Callout Request

**New ACK flow**

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Enhanced APPC/OTMA Synchronous Shared Queues

- **Removed dependency on Resource Recovery Service (RRS) in a Shared Queues environment for**
  - APPC synchronous conversations and OTMA CM1 (send-then-commit) interactions
    - Applies only to synclevel=None | Confirm ; Synclevel=Syncpoint still requires RRS
    - IMS is the sync point manager rather than RRS

- **Shared Queues Front-End and Back-End systems use XCF for communication**

**Benefits:**
Improved performance and simplified syncpoint process

**Note:** MINVERS 12.1 is required

40-50% improvements (CPU efficiency) were observed with IMS 12 APPC/OTMA Synchronous Shared Queues environments using XCF, compared with the same environments using RRS.
Smarter Database Recovery Control (DBRC)
DBRC Enhancements

- **VOLLIST, FILESEQ, and UNIT optional with CATDS**
  - When CATDS is specified, IMS 12 does not require VOLLIST, FILESEQ and UNIT
    - CATDS indicates that CA, IC and LOG data sets are cataloged

- **DELETE.LOG works even when no LOGALL record**
  - A PRILOG record should always have a corresponding LOGALL record
    - In some rare error cases the LOGALL did not exist
  - IMS 12 allows the DELETE.LOG INACTIVE|TOTIME command to be processed when the LOGALL record does not exist

- **Enhanced Serviceability for BPE-based DBRC Regions (optionally introduced in IMS 11)**
  - IMS 12 adds serviceability enhancements
    - ‘BPE’ is added to the output of LIST commands for BPE-base regions PRILOG, PRISLDS, SECLOG, SECSDLDS and SUBSYS records
    - BPE flag added to the DBRC API log and subsystem output blocks

- **GENJCL enhancements**
  - IMS 12 increases the number of user keys in skeletal JCL from 32 to 64
  - %DBTYPE keyword may be used when selecting DBDS allocation records
    - %DBTYPE will be set to FP, DLI or PDATA
    - This is similar to %SELECT DBDS in previous IMS versions

- **/RMLIST command output > 32K**
  - Only for commands entered through OM API for Online DBRC
  - Output size is only restricted by the DBRC private storage available for buffering the output message or OM limitations
DBRC Enhancements …

- **New NORCVINF keyword for LIST.DB and LIST.DBDS commands**
  - Suppresses recovery related information
    - ALLOC, IC, RECOV and REORG records are not listed

- **User information in IC, RECOV, REORG and CA records**
  - User data (up to 80 characters) is listed when the RECON record is listed (also available via the DBRC API)
  - Added by CHANGE and NOTIFY commands

- **CA retention period added to CA Group record**
  - Allows users to keep record of CA executions even when GRPMAX is exceeded

- **LIST.HISTORY enhancements**
  - Full precision timestamps are included; Additional HALDB information; Deallocation record indicates if deallocation was due to database quiesce (IMS 11)

- **LIST.RECON enhanced to show the number of registered databases**
  - DBRC has a limit of 32,767 registered databases
  - When RECONs are upgraded to IMS 12, DBRC creates a DMB Table Record to keep track of which Global DMB numbers are in use
Miscellaneous
## IMS Tool Compatibility Matrix

- For a list of IBM IMS tool compatibility with IMS 12

<table>
<thead>
<tr>
<th>IMS Tools</th>
<th>VRM</th>
<th>IMS V12 Support</th>
<th>Comments</th>
<th>PTF number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Encryption</td>
<td>1.1.0</td>
<td>X</td>
<td>No PTF required</td>
<td>N/A</td>
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<tr>
<td>Data Refresher</td>
<td>1.1.0</td>
<td>X</td>
<td>No PTF required</td>
<td>N/A</td>
</tr>
<tr>
<td>DB/DC Data Dictionary</td>
<td>1.6.0</td>
<td>X</td>
<td>PM21922</td>
<td>UK62552</td>
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<tr>
<td>IMS ADF II</td>
<td>2.2.0</td>
<td>X</td>
<td>No PTF required</td>
<td>N/A</td>
</tr>
<tr>
<td>IMS Audit Management Expert</td>
<td>1.1.0</td>
<td>X</td>
<td>New Release Required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.2.0</td>
<td>X</td>
<td>PM23505</td>
<td>UK63846</td>
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<tr>
<td>IMS Batch Backout Manager</td>
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<td></td>
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<td>X</td>
<td>PM26222</td>
<td>UK63319</td>
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</tbody>
</table>
Additional Information

- **IMS 12 Release Planning, GC19-3019-01**

- **IMS 12 Announcement Letters**
  - EMEA – [ZP11-0453](http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp)

- **IMS Newsletters:**

- **IMS Family Web site:**
  - [ibm.com/ims](http://ibm.com/ims)
Additional Information…

- IMS Version 12 Technical Overview

- IMS 12 Brochure
An Introduction to IMS – Second Edition

- Updated to include IMS 10, IMS 11 and IMS 12 functions
- Published March 23, 2012
External Webcasts

- **IMS 12 Faster than Ever!**
  - For more than four decades IMS™ on System z® and IMS Tools have protected IT investments as the undisputed leaders for mission-critical, enterprise transaction and data-serving workloads.

  *Replay of the Teleconference is available at: ibm.com/software/os/systemz/telecon/oct18/*

- **IMS 12 Performance Update**

  *Replay of the Teleconference is available at: ibm.com/software/os/systemz/telecon/10jan/*

- **IMS Catalog teleconference – 15th May 2012**

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