



Data Management Tools

IMS Tools & IMS V12 Migrations

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Agenda

- **IMS Tools Portfolio**
- **Support for Fast Path Secondary Index**
- **Version Upgrade Acceleration**
- **Added material**
 - IMS Tools Support for IMS V12

IMS Tools modernization and autonomics



IMS Database Solution Pack for z/OS

IMS DB Reorganization Expert
 - Unload, Load, Index Build,
 Prefix Resolution/Update
 IMS HP Image Copy
 IMS HP Pointer Checker
 IMS Library Integrity Utilities

IMS Fast Path Solution Pack for z/OS

IMS HP Fast Path Utilities
 IMS DB Repair Facility
 IMS HP Image Copy
 IMS Library Integrity Utilities

IMS Recovery Solution Pack for z/OS

IMS HP Image Copy
 IMS Database Recovery Facility
 IMS HP Change Accumulation
 IMS Index Builder
 IMS DRF Extended Functions

IMS Performance Solution Pack for z/OS

IMS Connect Extensions
 IMS Performance Analyzer
 IMS Problem Investigator

IMS Tools Base for z/OS

Data Base Administration

- IMS HALDB Toolkit
- IMS Sequential Randomizer Generator

Utility Management

- IMS Online Reorganization Facility
- IMS Cloning Tool
- IMS Database Control Suite

Backup and Recovery

- IMS HP Image Copy
- IMS DEDB Fast Recovery
- IMS Recovery Expert V2

Performance Management

- IBM Transaction Analysis Workbench
- IMS Buffer Pool Analyzer
- IMS Network Compression Facility

System / TM Administration

System Administration

- IMS Command Control Facility
- IMS ETO Support
- IMS HP Sysgen Tools
- IMS Queue Control Facility
- IMS Workload Router

Transaction Manager Administration

- IMS Configuration Manager
- IMS Sysplex Manager

Application Management

- Batch Terminal Simulator
- Batch Backout Manager
- Program Restart Facility

Regulatory Compliance

- Guardium S-TAP for IMS
- IBM Infosphere Guardium Data Encryption for DB2 and IMS Databases



Fast Path Secondary Indexing Support

- IMS FP Solution Pack Support
- IMS Recovery Solution Pack Support



Overview of IMS FP Secondary Index

■ IMS FP Secondary Index support

- Provides secondary index capability for DEDB
 - similar to that for full-function database (not exactly same)
- Has capabilities that are not available with secondary indexes for full-function databases
 - such as *user data partitioning* and *multiple secondary index segments*

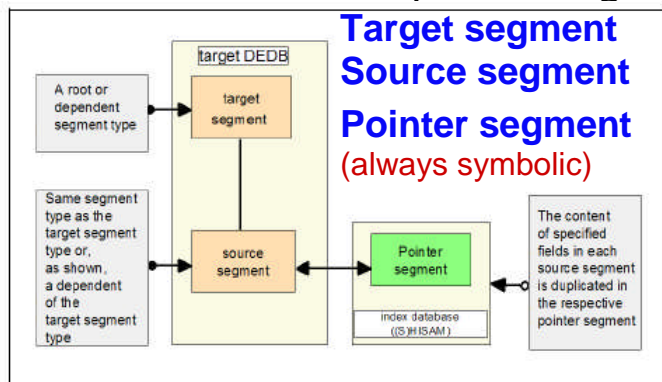


Figure 3-4 Target, source, and pointer segment

Non-unique keys with overflow or unique keys with various options (SUBSEQ=, DDATA=, /CK, ...)

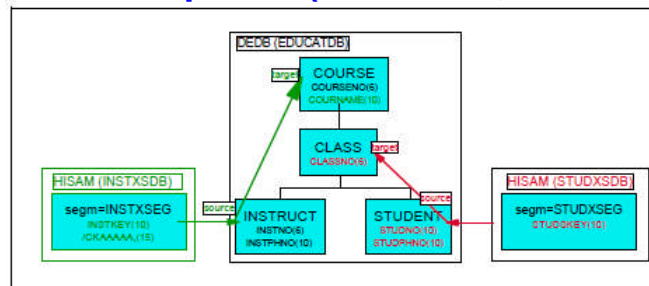


Figure 3-8 Secondary indexes on DEDB

User partitioning using a user partition selection exit routine

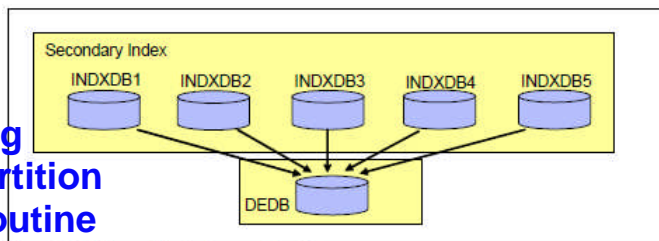


Figure 3-16 User partitioning for secondary indexes

Multiple secondary index segments

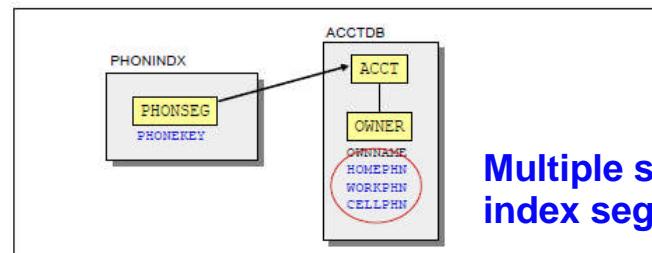


Figure 3-17 Multiple secondary index segments

(Source: All figures are cited from the Redbook "IBM IMS Version 12 Technical Overview")

Challenges when you exploit FP Secondary Index

- An **index pointer segment** is created by IMS when a target segment is inserted by an IMS application program
- So, if you want to build an FP secondary index, you would need to
 1. Write a program that builds index pointer segments, or
 2. Unload the DEDB segment data and reload them with an IMS application using a new DBD in which the secondary index is defined
- The first method includes, at least, reading segments in the (to-be-)indexed DEDB to find all relations of **target and source segments** and data that need to build index pointer segments with referring to **various secondary index options defined in the DBD**

- The second method is easier than the first one, but can take significantly longer time
- In either method, you would need to implement a method that assure integrity of the index and its consistency with the DBD

- HISAM secondary index pointer with a unique key

Delete byte	Search	Subsequence (optional)	Duplicate data (optional)	Symbolic pointer concatenated key	User data (optional)
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- HISAM secondary index pointer with a non-unique key

Duplicate key pointer	Delete byte	Search	Subsequence (optional)	Duplicate data (optional)	Symbolic pointer concatenated key	User data (optional)
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- SHISAM secondary index pointer

Search	Subsequence (optional)	Duplicate data (optional)	Symbolic pointer concatenated key	User data (optional)
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Figure 3-19 Secondary index segment layouts

(Source: The figure is cited from the Redbook ["IBM IMS Version 12 Technical Overview"](#))

Solutions provided by FP Solution Pack

- **FP Advanced (FPA) tool** provides the capability of
 1. *Building* secondary indices (the **INDEXBLD** function)
 - Multiple secondary indices in one job step with higher performance than loading segments into the target DEDB by using an IMS application program
 2. *Verifying* integrity of index pointer segments in secondary indexes (the **INDEXDBD** option of the ANALYZE function)
 3. Supporting the **IB(BLD_SECONDARY(...))** capability of DRF for the recovery of indexed DEDB areas
 - FP secondary indexes can be rebuilt during DEDB area recovery

Business Benefits

- Improved productivity by high performance index building/rebuilding
- Protection from loss of business caused by corrupted or inconsistent indexes
- Faster recovery from a failure in an indexed DEDB

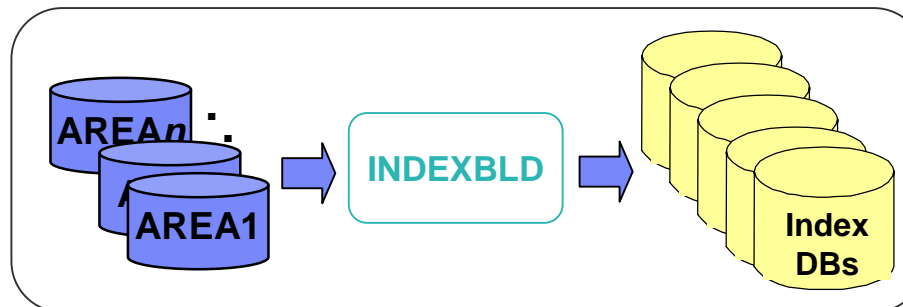
Building multiple secondary indexes at a time

■ FPA INDEXBLD function

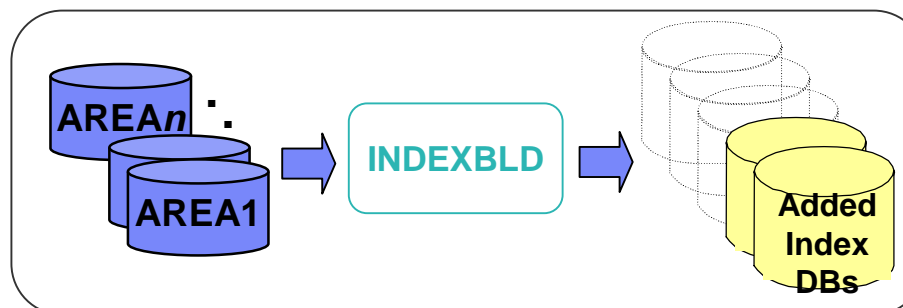
- Can build all secondary indexes for a DEDB when the secondary indexes are defined against the existing DEDB (**INDEXDBD=ALL**)
- Can build only the added or broken secondary indexes

```
//FPA      EXEC PGM=HFPMAIN0
//STEPLIB DD DISP=SHR,DSN=FPSP.SHFPLMD0
//        DD DISP=SHR,DSN=IMSVS.SDFSRESL
//        DD DISP=SHR,DSN=IMSVS.PGMLIB
//IMSACB  DD DISP=SHR,DSN=IMSVS.ACBLIB
//IMSDALIB DD DISP=SHR,DSN=IMSVS.MDALIB
//IMS     DD DISP=SHR,DSN=IMSVS.DBDLIB
//HFPSYSIN DD *
GLOBAL DBRC=YES
INDEXBLD DBD=DEDBJN22,ITASKCTL=4,
IAREA=[ALL|(area1,area2,...)],
INDEXDBD=[ALL|(indexdb1,indexdb2,...)]
/*
```

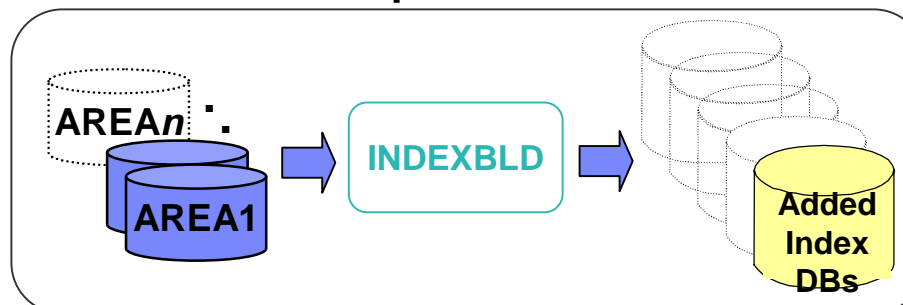
Build all indexes for a DEDB



Build selected indexes of a DEDB



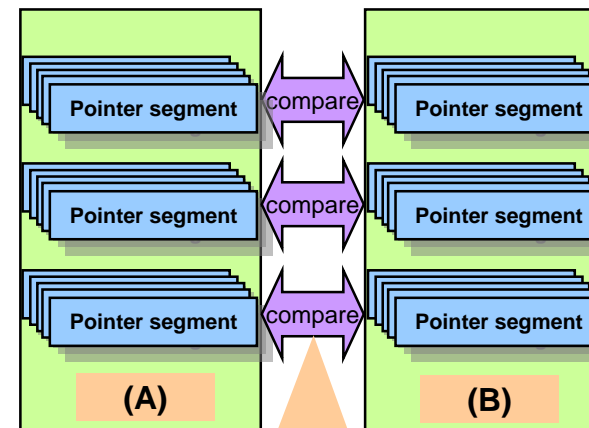
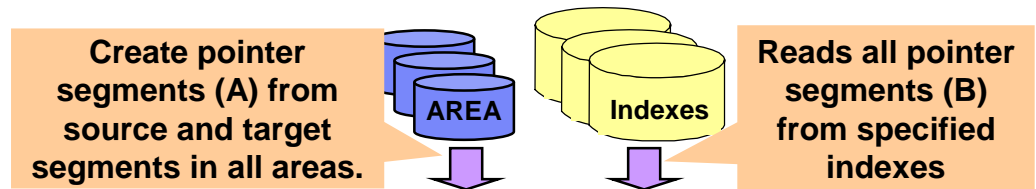
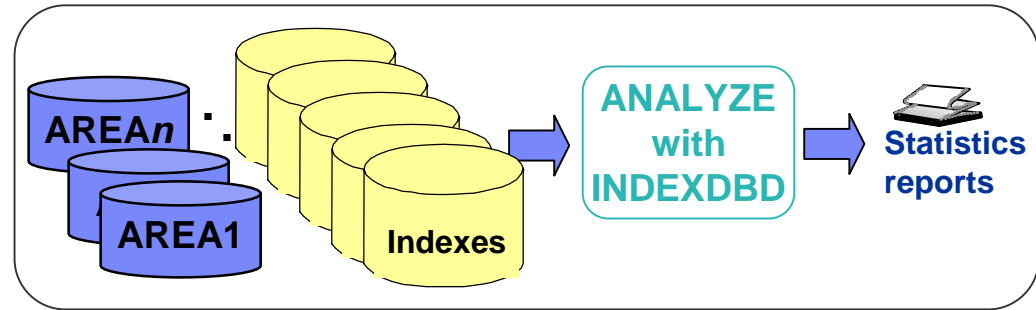
Build indexes for specific areas



Analyzing one or multiple secondary indexes

- **FPA ANALYZE function with INDEXDBD option**

- Verifies the integrity of the index pointer segments in secondary index specified in the option, in addition to verifying the integrity of all IMS physical pointers in DEDB areas



Compare (A) and (B)

```

//HFP      EXEC PGM=HFPMAIN0
//STEPLIB DD DISP=SHR,DSN=FPSP.SHFPLMD0
//         DD DISP=SHR,DSN=IMSVS.SDFSRESL
//         DD DISP=SHR,DSN=IMSVS.PGMLIB
//IMSACB  DD DISP=SHR,DSN=IMSVS.ACBLIB
//IMSDALIB DD DISP=SHR,DSN=IMSVS.MDALIB
//HFPSYSIN DD *
GLOBAL DBRC=YES
ANALYZE
  DBD=DEDBJN22, PTRCHKLVL=FULL,
  IAREA=ALL,
  INDEXDBD=[ALL | (indexdbd1,indexdbd2,...)]
REPORT
/*
    
```

Mandatory option for index analysis

PTRCHKLVL=FULL

Recovering an indexed DEDB and its secondary indexes

- Database Recovery Facility supports IB option for indexed DEDB

Recovering all areas of an indexed DEDB with rebuilding all secondary indexes for the DEDB

```
//DRF EXEC DRFMASCF
//SYSIN DD *
REPORT (RPTTYPE=SEP,DRFUNIT=SYSDA,DRFHLQ=TEMPDS)
DRFIAX(DRFIDXCF)
UTILGBL( FSPREF(DEIX),ITASKCTL(1),OTASKCTL(1))
ADD DB(DEDBJN30) IB(BLD_SECONDARY(ALL))
START ERROR(STOP)
/*
```

Recovering a specific area of an indexed DEDB with rebuilding specified indexes

```
//DRF EXEC DRFMASCF
//SYSIN DD *
REPORT (RPTTYPE=SEP,DRFUNIT=SYSDA,DRFHLQ=TEMPDS)
DRFIAX(DRFIDXCF)
UTILGBL( FSPREF(DEIX),ITASKCTL(1),OTASKCTL(1))
ADD AREA(DEDBJN23,DB23AR1) IB(BLD_SECONDARY(FPSI2AHD,FPSI2AH1))
START ERROR(STOP)
/*
```

Notes:

- This capability is available with DRF that is packaged in **Recovery Solution Pack V1.1**
 - APAR PM36306 is required
- This capability is also supported by FP Solution Pack V1.1
 - APAR PM37894 is required

Version Upgrade Acceleration

- **IMS Cloning Tool**
- **IMS Configuration Manager**
- **IMS Queue Control Facility**
- **IMS Performance Analyzer**
- **IMS Problem Investigator**



IMS Cloning Tool

Smooths the IMS migration path!



Database and Storage Administration Trends and Directions

- **Large DB2 and IMS systems require high availability**
 - Fast and non-intrusive backup and cloning facilities are required
 - Fast recovery and cloning capabilities are required to minimize downtime and promote high availability
 - Most backup, recovery and cloning solutions do not leverage storage-based fast-replication facilities
- **Storage-based fast-replication facilities are under-utilized**
 - Tend to be used by storage organizations
 - Tend not to be used by database administrators (DBAs)
- **Storage aware database products**
 - Allow DBAs to use fast-replication in a safe and transparent manner
 - Provide fast and non-intrusive backup and cloning operations
 - Simplify recovery operations and reduces recovery time
 - Simplify disaster recovery procedures

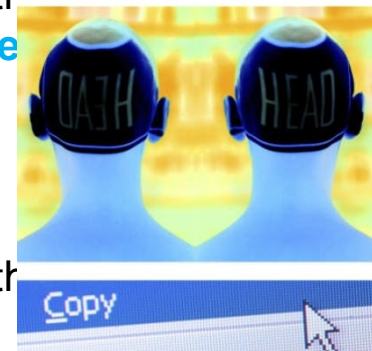


Database and Storage Integration Operational Advantages

- **Reduce backup, recovery, and cloning administration costs**
- **Reduce host CPU and I/O resource utilization**
- **Perform backups and create clone copies instantly**
- **Fast restore and parallel recovery reduces recovery time**
- **Simplify disaster recovery operations and procedures**
- **DBMS and storage-based fast-replication integration**
 - Leverage storage processors and fast-replication investments
 - IBM, EMC, HDS, STK
 - Expose fast-replication capabilities to the DBAs *safely and transparently* using “*storage-aware*” database utilities
- **Provide a sophisticated infrastructure and metadata to manage the DBMS and storage processor coordination**

Cloning Terminology

- **A clone is an exact replica**
 - Clone an IMS system by volume
 - Clone an IMS database by data set
- **IMS system skeleton cloning automation (*by volume*)**
 - Clones an IMS system (**no data**)
 - The act of replication the system, making the system accessible, and then using the replica in lieu of the original system **without requiring a system generation**
- **IMS system cloning automation (*by volume*)**
 - Clones a complete IMS system including all its databases
 - The act of replicating the data, making the replica accessible, and then using the replica in lieu of the original data **without requiring a system generation**
- **IMS database refresh automation (*by data set*)**
 - Refreshes specific databases
 - The act of replicating the data, making the replica accessible, and then using the replica in lieu of the original data



Use Cases for Cloning IMS Systems or Refreshing IMS Databases

- **Offload business reporting to an IMS clone**
 - Improve production performance
 - Run pointer checker utility from the clone
- **Create or refresh test, development, or quality assurance environments**
 - Development refresh
 - To stage data-warehouse loads
- **Aid in problem determination**
 - Troubleshoot a production problem
 - **Test new releases of IMS**
 - Apply maintenance and verify integrity before applying to production
- **Refresh databases into a previously cloned IMS skeleton**

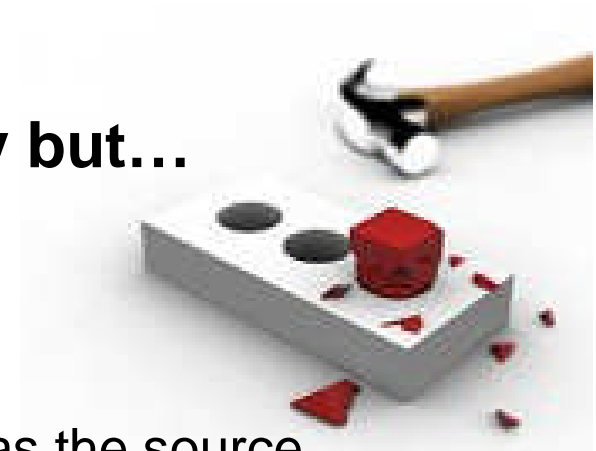


Cloning IMS System Skeleton Test New Releases of IMS

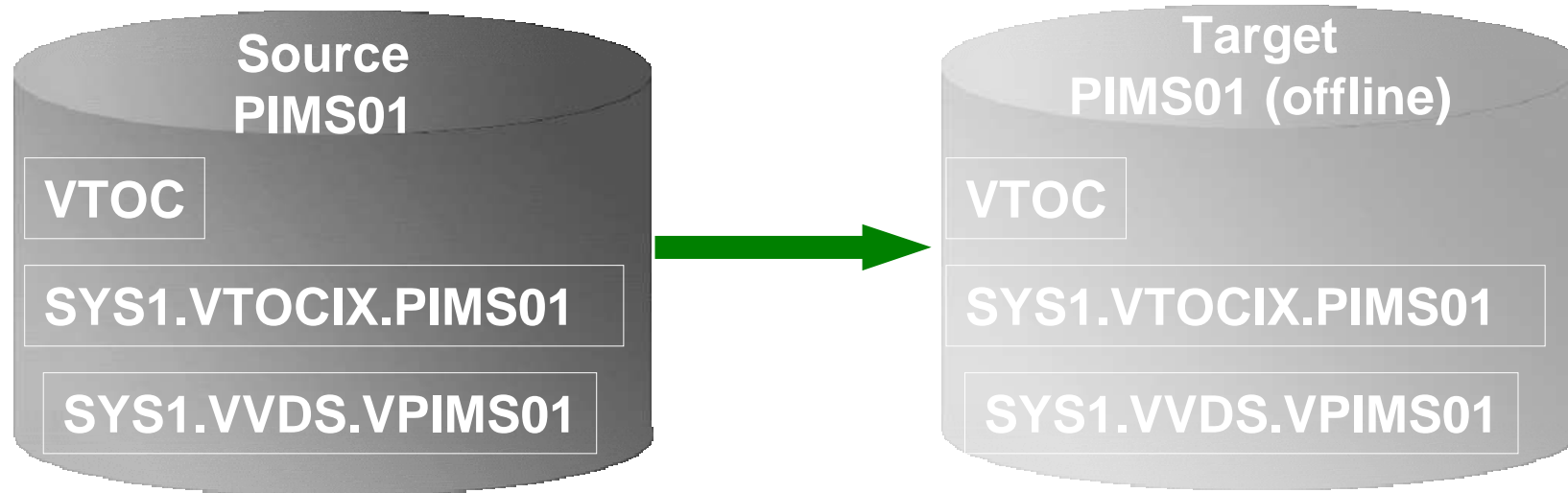
- **Quickly create an IMS Skeleton (system only, no data) for sandbox testing**
 - IMS Cloning Tool fast creation of IMS system skeleton
 - Install IMS V12
 - Run IVP testing
- **Copy applications that were problematic in the past into the skeleton environment and test**
- **Copy critical applications into the skeleton environment and test**
- **Test IMS 12 new features – example the new Fast Path Secondary index functions**
- **Load vendor products / home grown software and test**
- **Apply IMS 12 to the general test bed and test**
- **Easily and quickly repeat clone of skeleton as you roll out the new version of software to environments with different configurations**

Challenges to Data Access On the Same or Shared LPAR

- **IMS system cloning is best done using volume replication**
- **Volume data is replicated fast and easy but...**
 - How do you access the cloned data?
- **Inherent Problems:**
 - VOLSERS may have the same volume names as the source
 - Volume VTOC, VTOCIX and VVDS may be the same or different
 - Data set names are the same on source and target volumes
 - If you want to access the data from a common LPAR, how do you access the data?



Challenges to Data Access On the Same or Shared LPAR - Volume ID Issues

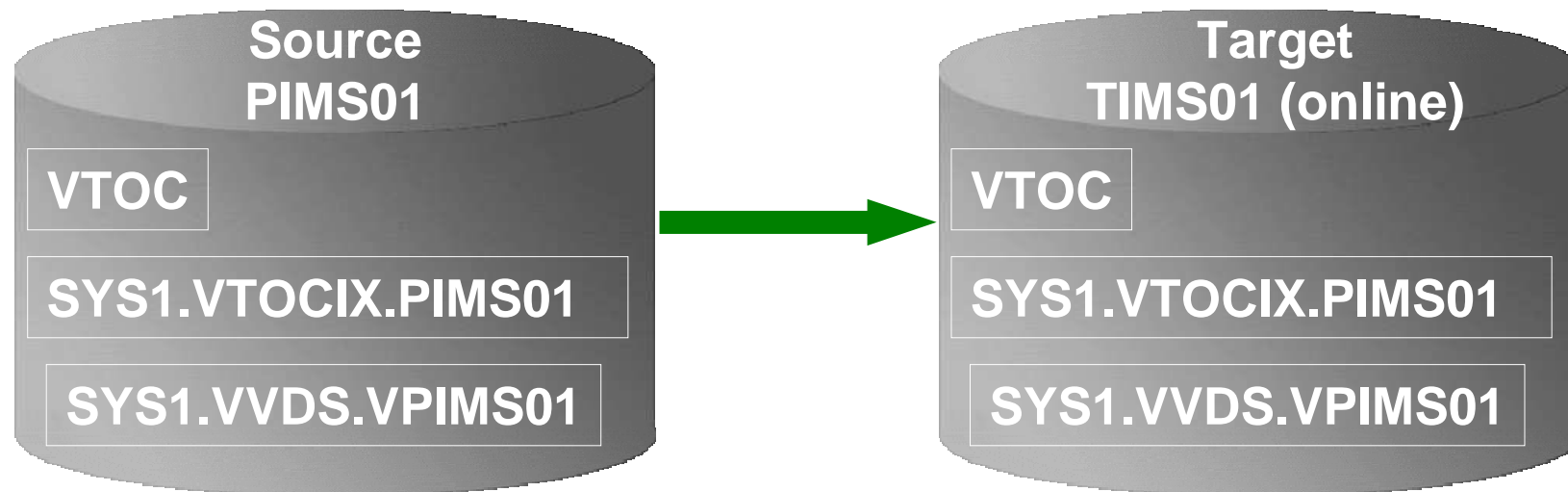


Result:

1. Source PIMS01 keeps its original VOLSER on the target volume
2. VTOC, VTOCIX, and VVDS *reflect* PIMS01
3. The target volume is offline because it has the same VOLSER as the source. It could be brought online on another non-sharing system to use the clone
4. Target volume can't be used on the same or shared disk LPAR without re-labeling the volume.

Challenges to Data Access

On the Same or Shared LPAR - Volume ID Issues (2)

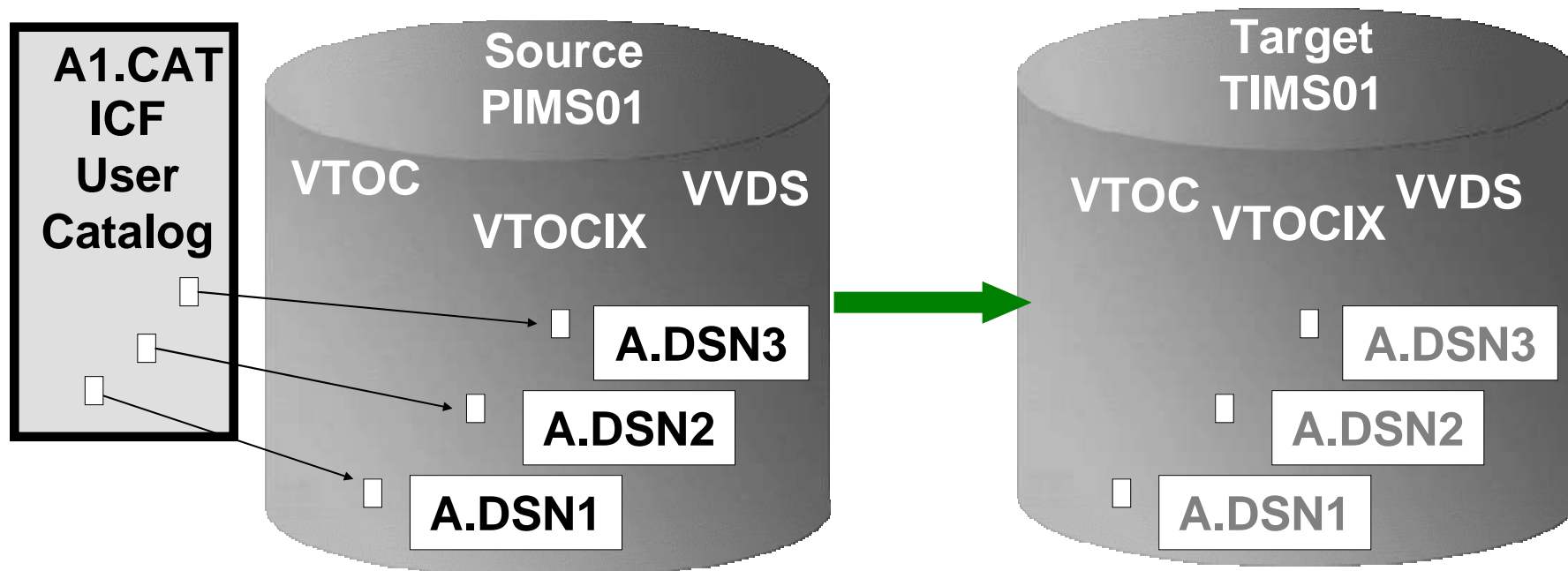


Result:

1. Source PIMS01 becomes new VOLSER TIMS01 on the target volume
2. VTOC, VTOCIX, and VVDS *reflect* PIMS01

Challenges to Data Access

Data Set Name and Cataloging Issues



Result:

1. Data sets on the volume are copied, but keep their original name
2. Only the source data sets are cataloged; even if the catalog is on the cloned volumes, it isn't connected to the system's master catalog

IMS Cloning Tool Provides Data Access On the Same or Shared LPAR

▪ **Solution – IMS Cloning Tool** — the *Key to Data Access*

– Provides *access to data sets* on target volumes

- Renames the VTOC, VTOCIX, and VVDS to match the target volume
- Renames and catalogs all data sets to a new HLQ
- Adjusts target IMS system to accommodate and accept the cloned data

– Solution to enable the use of the data sets on the target volumes on the same image

- No more complicated cloning
- No more requirement for a separate image



Cloning IMS System Skeleton

Test New Releases of IMS

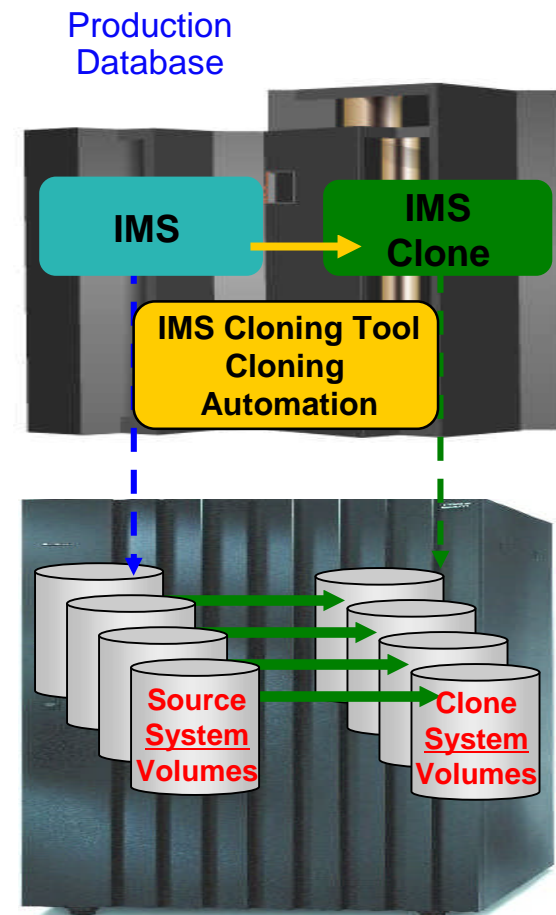
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- **Copy critical applications into the skeleton environment and test**
- **Test IMS 12 new features – example the new Fast Path Secondary index functions**
- **Load vendor products / home grown software and test**
- **Apply IMS 12 to the general test bed and test**
- **Easily and quickly repeat clone of skeleton as you roll out the new version of software to environments with different configurations**
 - Prevents environmental issues not found in the original testing.



Clone IMS Systems Using IMS Cloning Tool

IMS system Skeleton Cloning (**Databases not included**)

- **Performs IMS system skeleton cloning automation**
 - System, no databases
 - Takes an existing IMS system (complete installation and system generation process completed) and creates a new, or cloned, IMS system from it without having to repeat the entire installation and system generation processes
 - Simplifies IMS cloning processes
 - Reduces cloning time and administration costs
- **Leverages fast replication facilities to clone data**
- **Performs rapid volume reconditioning and data set renaming on cloned system volumes to solve the data access challenges**
 - Target volumes retain their target volume label
 - Renames the VTOC, VTOCIX, and VVDS to match the target volume
 - Renames and catalogs all data sets to a new HLQ
- **Adjusts target IMS to accommodate and accept the cloned data**
 - IMS RECONS, PROCLIB, JOBS, JCL, MDA members



Pre-IMS System Cloning Steps

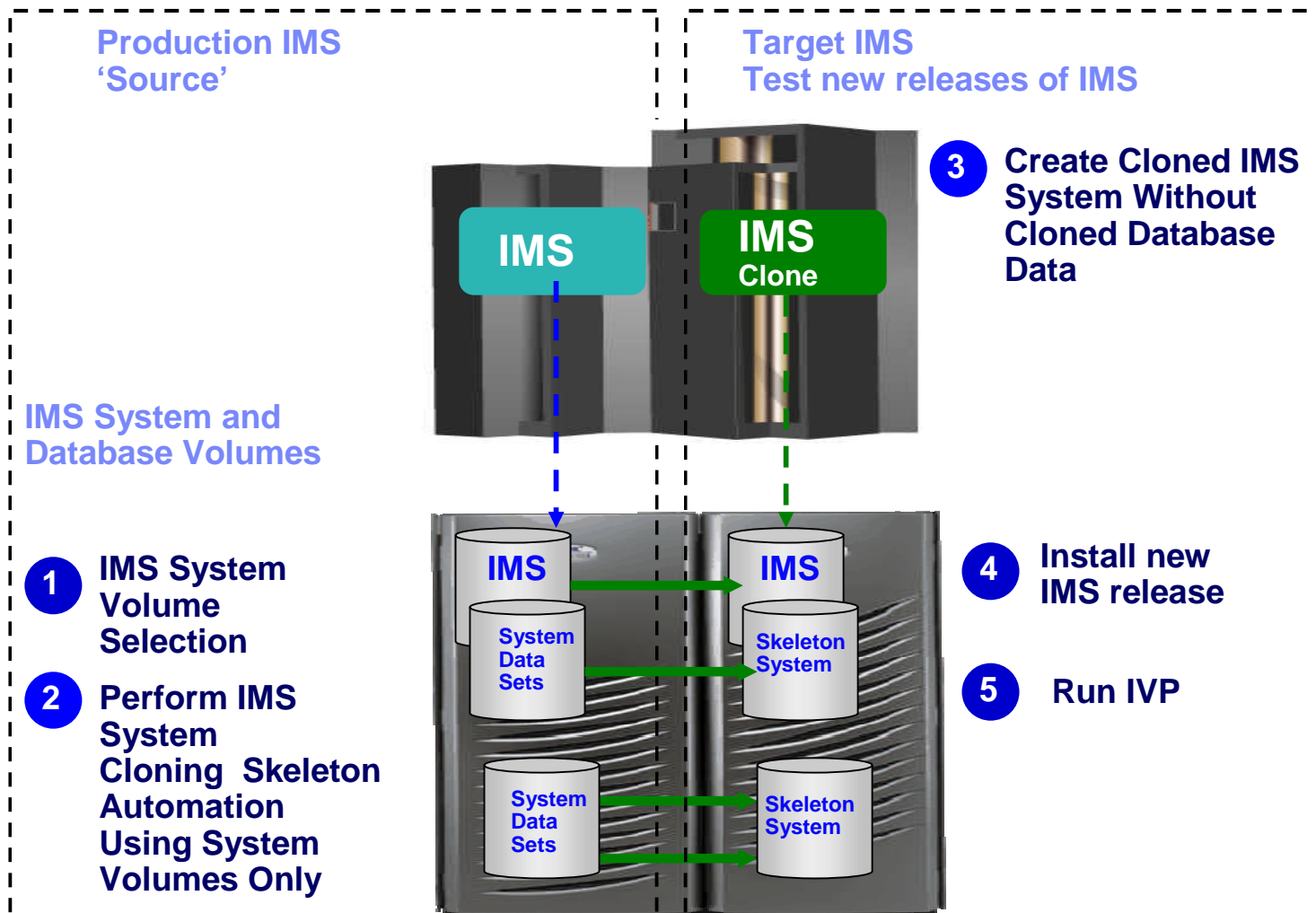
One Time Set Up - Target IMS System

- **User creation of target subsystem**
 - Determine what components and configuration options you want
 - Create target PROCLIB members in source PROCLIB
 - Create target IMS.JOBS members in source IMS.JOBS data set

- **By default, because the clone is an exact replica of the source, the clone would have the same components as the source**



Create an IMS Cloned System Skeleton



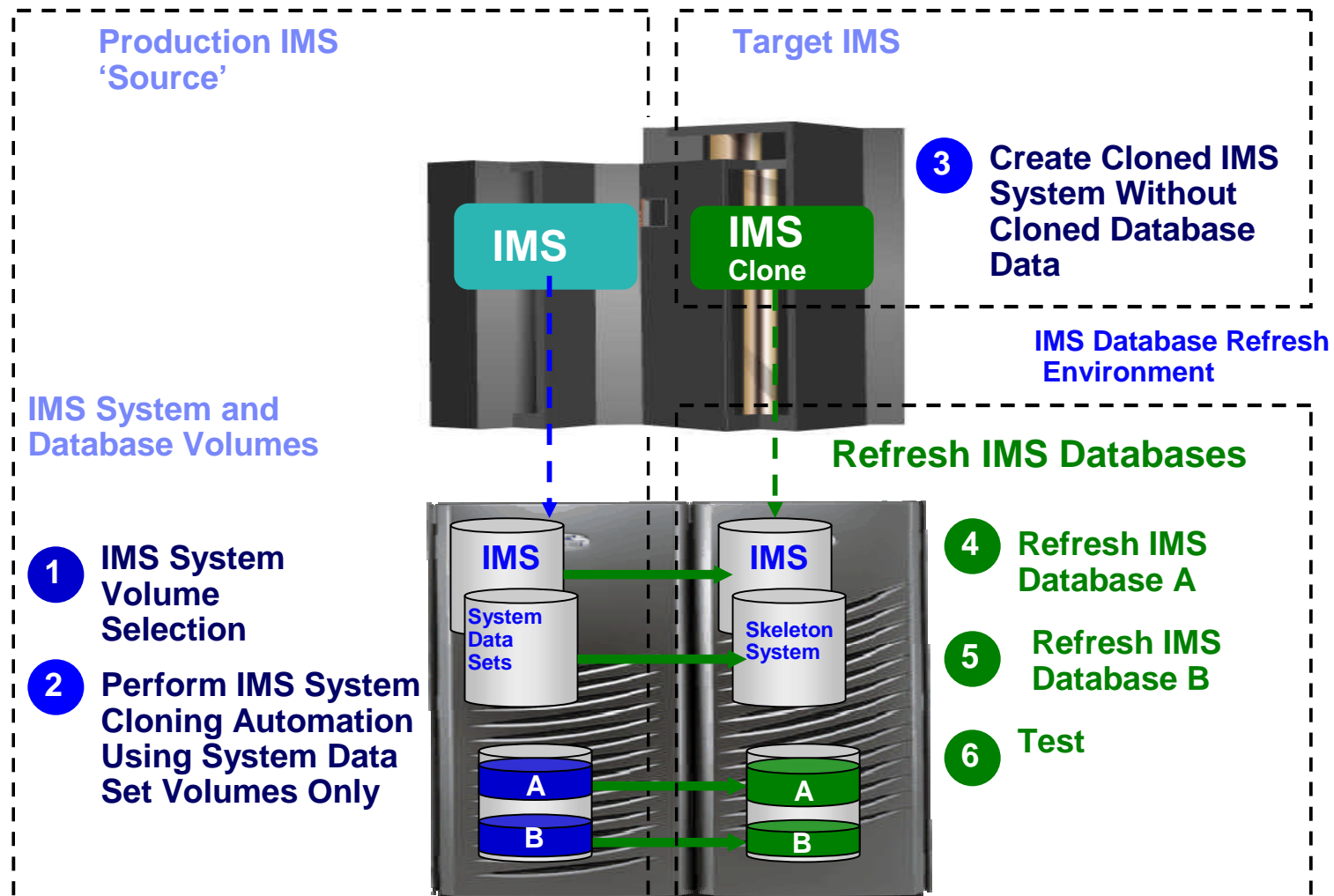
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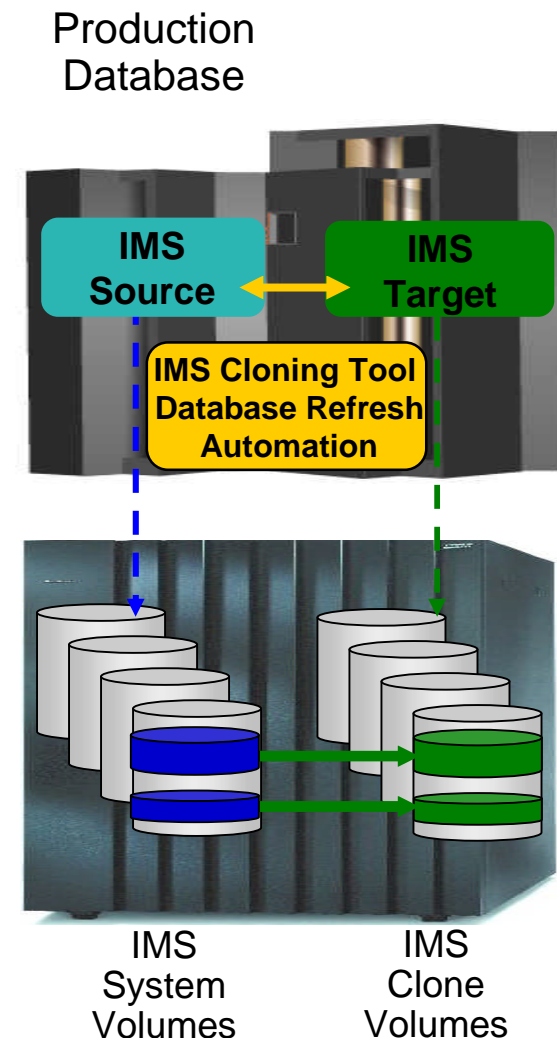
IMS Cloned System Skeleton Copy Databases for Application Testing



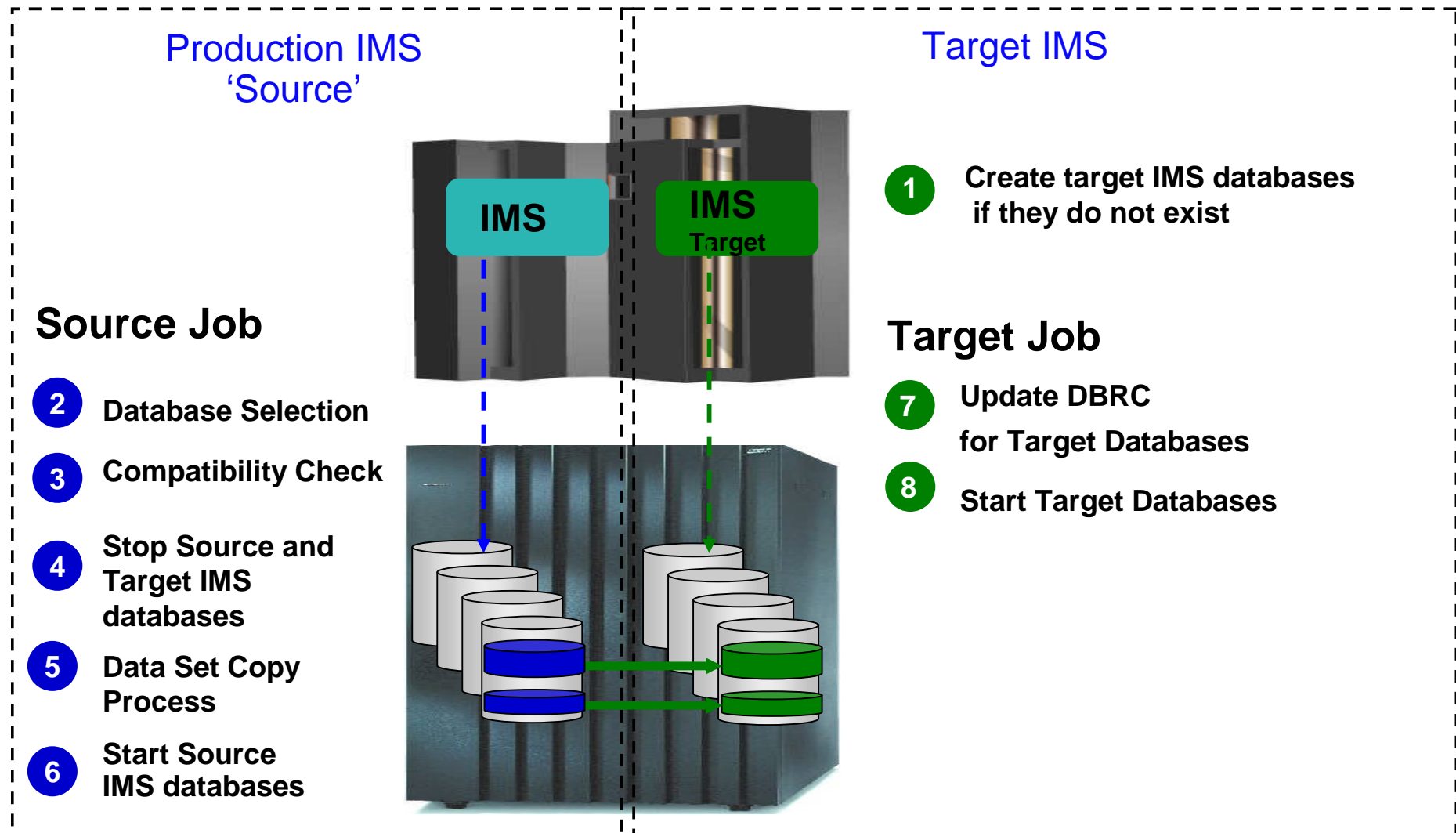
Refresh IMS Databases Using IMS Cloning Tool

Database Refresh Automation

- **Performs automated IMS database refresh operations**
 - Fast refresh of IMS databases
 - IMS DB support (FF, HALDB, DEDB)
- **Verifies source and target database compatibility**
- **IMS data copied using storage-based data set fast-replication**
 - Target takes up the same amount of space as the source
- **Performs target system meta-data management**
 - Updates DBRC information for target databases



Refresh IMS Databases Using IMS Cloning Tool



Database Selection

■ Specify database names

- Finds the IMS subsystem name and whether it is active
- Finds the source and target databases and indexes
- Determines data set names for each database and index
- Verifies their existence

```
IMSDBREFRESH -
  IMS-SSID(ssids,ssid) -
  DBD(dbdname1,dbdname2) -
  INDEXES(Y) -
  REPLACE-TARGET-DS(Y) -
  AUTO-START-SOURCE-DB(Y) -
  AUTO-STOP-TARGET-DB(Y) -
  AUTO-START-TARGET-DB(Y) -
  GLOBAL NOFEOV
```

Compatibility

- **Verify compatibility between the source and target IMS**
 - Gets attributes of IMS databases and indexes from source and target IMS RECON, ACBLIB, and MDALIB data sets

Object type	Attributes that must be identical for source and target object
Database	Type, Access Method, Number of segments, data set groups, Blocksize, Randomizer Parameters
Partitioned Database	Number of Partitions, Partition Selection Routine, Keystng
Segment	Length, Key start and length, Uniqueness, Pointers, Edit Routine
Index	Csize, record length, DDATA, source and target segment codes, Sparse routine
Partitioned Index	Number of Partitions, Keystng

Copying HALDB Databases

- **Copying HALDB databases can be complex and can affect database availability**
 - IMS Cloning Tool makes copying HALDB databases fast and easy.
 - Uses storage-based fast-replication to copy the data instantly
 - Updates the target IMS RECON to reflect the same partition and reorg numbers as the source RECON
 - Primary and secondary indexes and ILDS can be copied to eliminate index and ILDS rebuild time
 - Manages partition number and gap sequencing



Cloning IMS System Skeleton

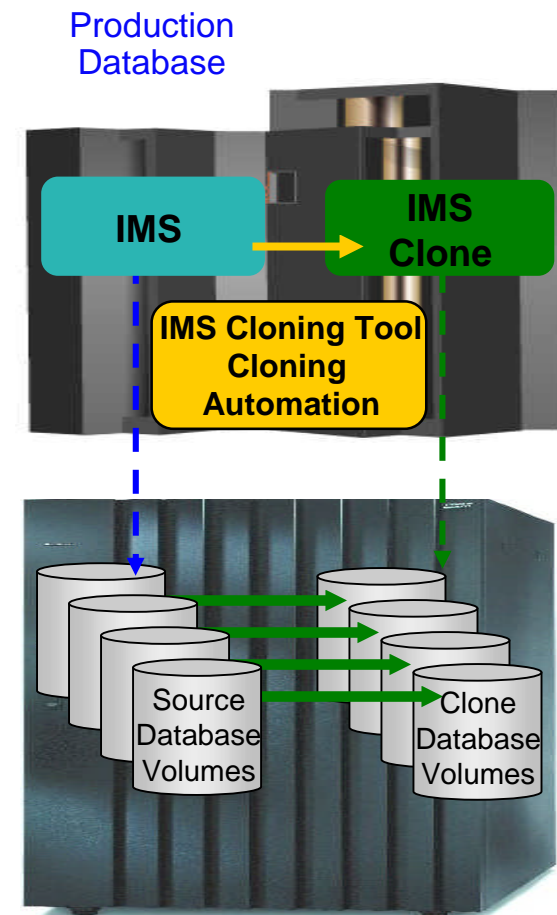
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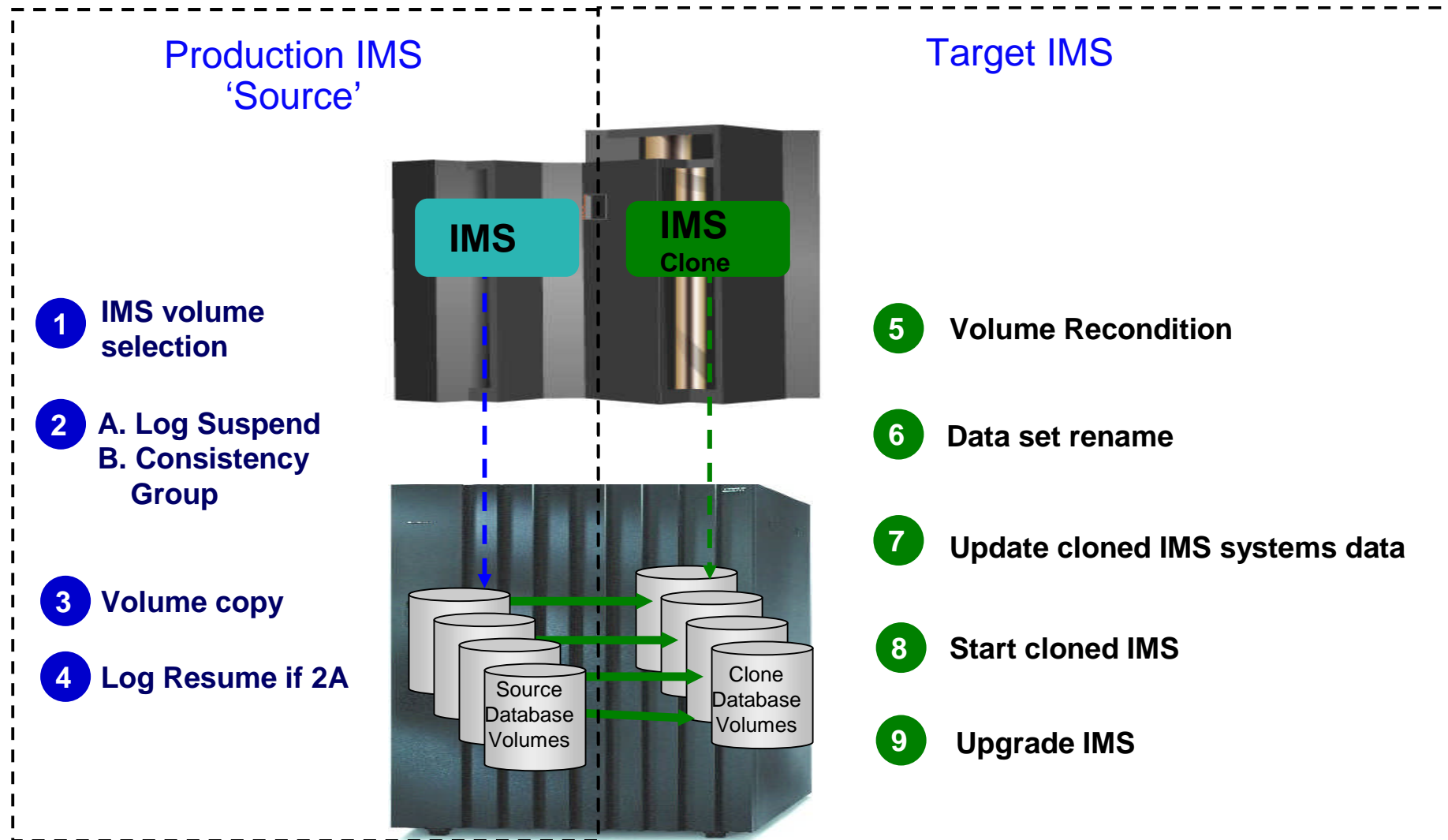
IMS System Cloning Automation

When a Full System Clone is Needed (Databases Included)

- **Performs IMS system cloning automation**
 - Takes an existing IMS system (complete installation and system generation process completed) and creates a new, or cloned, IMS system from it without having to repeat the entire installation and system generation processes
 - Simplifies IMS cloning processes
 - Reduces cloning time and administration costs
- **Leverages fast replication facilities to clone data**
 - Data can be cloned while online or offline
- **Performs rapid volume reconditioning and data set renaming on cloned volumes to solve the data access challenges**
 - Target volumes retain their target volume label
 - Renames the VTOC, VTOCIX, and VVDS to match the target volume
 - Renames and catalogs all data sets to a new HLQ
- **Adjusts target IMS to accommodate and accept the cloned data**
 - IMS RECONS, PROCLIB, JOBS, JCL, MDA members



IMS System Cloning Steps



Status of In-Flight Transactions

■ Status of In-Flight Transactions

- An online cloning solution often results in transactions in flight
- These in-flight transactions, cloned to the target system result in the same target system action that would happen on the source system if it were to have died at that same time and then restarted
- The target restart is essentially an emergency restart of a failed system



Cloned IMS System Updates

■ RECONS data sets

- Data set names, IMS subsystem IDs, and VOLSERs are updated in the following RECON records: header record, database data set records, online log records, and back-out records

■ **Optionally, the following RECON records are updated if they were on volumes that were cloned:**

- Image copy records, change accumulation records
- System log data set (SLDS) records
- Recovery log data set (RLDS) records



Cloned IMS System Updates

- **IMS PROCLIB and JOBS and user JCL libraries**
 - New values for IMSID, VOLSERS, and data set names in the JCL members within these libraries
- **MDA (MVS Dynamic Allocation) members for databases or system data sets, are updated to reflect the new data set names. Updates include:**
 - The RECON data sets
 - Online Log data sets (OLDS)
 - Write-ahead data sets (WADS)
- **If IMS data sharing is involved, each additional IMS data sharing member is updated**

IMS Support

■ IMS Support

- IMS online
- IMS offline
- IMS data sharing
- IMS data sharing with many to less members
- IMS data sharing to non-IMS data sharing



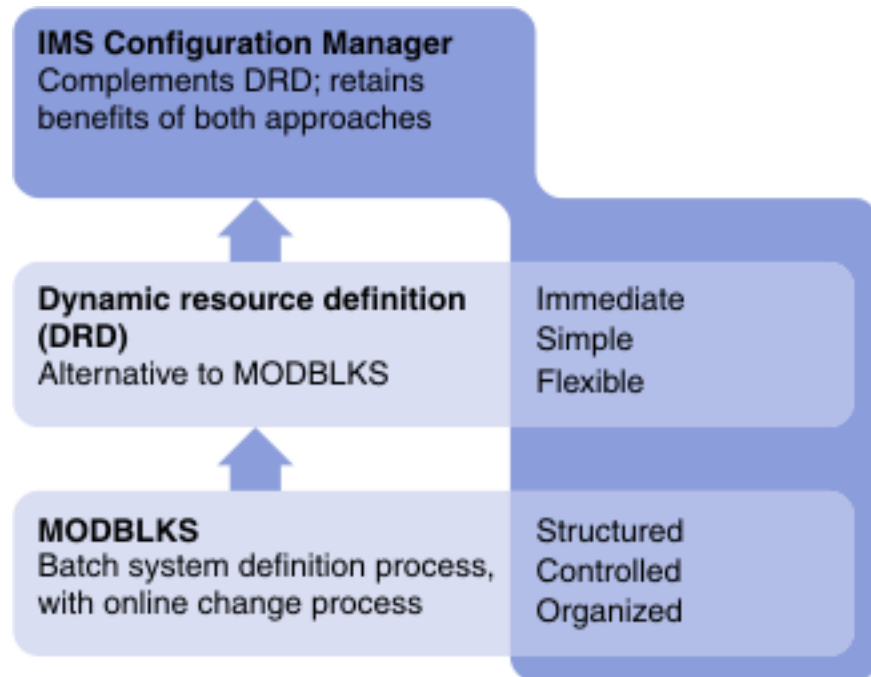
IMS Cloning Tool Session Summarization

- **IMS Cloning Tool simplifies and automates database administration tasks**
 - Integrates and coordinates database and storage activities
- **Promote high availability solutions**
 - IMS Cloning Tool clones IMS systems fast and effectively
 - IMS Cloning Tool provides fast and effective refresh operations
- **Integrates storage-based fast replication**
 - Provides fast and non-intrusive cloning operations
- **Offloads copy to the storage processor**
 - Reduces host CPU and I/O resource utilization



IMS Configuration Manager

- Create and update IMS resources with more frequently and more reliably while providing unparalleled levels of availability
- Provide greater autonomy for application developers
- Deskill the process of managing resources and parameters
- Integrate DRD into existing change management processes
- Automate install and backout with an intelligent resource installer
- A complete audit history of all install activity performed through the product



Parameter management

- **Enhanced parameter listing and search**
 - Semantic search: finds parameters and members based on keywords; identifies missing parameters and members
 - Listing of PROCLIB members that are active on a given system
 - Edit history for all members
- **Enhanced ISPF edit session that provides:**
 - Checking of parameter syntax
 - Ability to insert parameters from a model
 - Context sensitive help for all parameters
 - Retains many ISPF edit functions
 - Does not alter or modify the member in anyway (unless you explicitly add or modify parameters)
 - Allows you to back up members before saving them
 - In the future will be extended to perform checking of entire PROCLIBs



IMS Queue Control Facility

- QCF is our premier tool for managing IMS queues.
- In order to test new versions of IMS, the LOAD function can be used
- When you run LOAD as a migration aid, the LOAD function requeues messages across supported IMS releases
- You can load messages that are created on one supported release of IMS into another supported release of IMS if the following requirement is met. The source and destination resources (such as LTERMs, transactions, MSC names) that are involved must be defined on both IMS systems.

Select copy all messages

The screenshot shows a terminal window titled 'usr001 - [24 x 80]' with a menu bar (File, Edit, View, Communication, Actions, Window, Help) and a toolbar. The terminal content is as follows:

```

View Table_Actions Help
-----
1 1. Copy all messages displayed in table           1 to 7 of 43
Comma 2. Delete all messages displayed in table      ll ==> PAGE
Selec 3. Copy then delete all messages displayed in table
-----

Server . . . : QCF31                               APAR . . . : PK73944 08/10/31
IMS ID . . . : IMS1                               JDTE . . . : 2009.119
QCF Func . . : SUMMARY                           TIME . . . : 11:15:14
MSGQs . . . : ALL                                DATE . . . : 2009/04/29
Row actions: C - Copy D - Delete X - Copy/Delete L - List U - Unlock

Act Destination name      Structure/ Queue Primary
                        Queue Type Msgcnt Status
CTRL                   LOC      LT      173  _____
TSUED01                LOC      LT       18  _____
DESRZA70.A7CICHBT DFSASYN  LOC      AP       16  _____
T0910122               LOC      LT       12  _____
T0912056               LOC      LT        8  _____
L63SP2T1               LOC      LT        8  _____
T1LRPT01               LOC      LT        8  _____
CLIENT1 T3270LC        LOC      OT        8  _____
    
```

At the bottom of the terminal window, the status bar shows '04/012' and 'Connected to remote server/host stlv1.svl.ibm.com using port 23'. The Windows taskbar at the bottom displays the Start button, several open application windows (New Ope..., mvs1 - [2..., retain - [2..., spa - [24..., imsdv147 - ..., usr001 - ..., imsdv147 - ..., QCF3.1, Verizon W...), a 100% battery indicator, and the system tray with the date 'Wednesday 4/29/2009' and time '11:20 AM'.

Select option 3 from main menu - LOAD

```
usrtr001 - [24 x 80]
File Edit View Communication Actions Window Help
[Icons]
-----
Preferences Help
-----
                                QCF Main Menu
Option ==> 3_
Select an option or press END to exit.
Server . . : QCF31
IMS ID . . : IMS1
APAR . . : PK73944 08/10/31
JDTE . . : 2009.119
TIME . . : 11:24:26
DATE . . : 2009/04/29
More: +

Server and IMS selection
0 Select - Server and IMS to be used

Transaction Queue Interactive Functions
1 Status - IMS environment and queue statistics
2 Query - List destinations with queued messages
3 Load - Re-insert removed queued messages
3a View - View unloaded messages data set

Queue Overflow Protection Functions
4 Wait - List and operate on waited tasks
F1=Help   F3=End   F7=Up   F8=Down   F10=Actions  F12=Cancel

MA e                                05/015
Connected to remote server/host stlv1.svl.ibm.com using port 23
Print to Disk - Append
```

Can enter INCLUDE/EXCLUDE parameters (to select messages)

```

usr001 - [24 x 80]
File Edit View Communication Actions Window Help
View Table_Actions Help
-----
                Include/Exclude Parms
Press ENTER to continue or END to exit.
                                APAR . . . : PK73944 08/10/31
Server . . . : QCF31
IMS ID . . . : IMS1
QCF Func . . : LOAD

INCLUDE parms . . _ EXCLUDE parms . . _

F1=Help      F3=End      F7=Up      F8=Down      F10=Actions F12=Cancel
-----
T0910026      LOC   LT        4        0        4  _____
TSUED01       LOC   LT       18        0       18  _____
IMSUS06       LOC   LT        4        0        4  _____
VTAG3138      LOC   LT        2        2        4  _____
VTKK4838      LOC   LT        2        0        2  _____
L62TERM1      LOC   LT        4        0        4  _____
T0913029      LOC   LT        4        0        4  _____
-----
e
13/023
Connected to remote server/host stlv11.svl.ibm.com using port 23
Print to Disk - Append
  
```

Load report

```

usrtr001 - [24 x 80]
File Edit View Communication Actions Window Help
-----
Menu Utilities Compilers Help
-----
BROWSE      USRT001.T0040959.QCFPRINT          Line 00000000 Col 001 080
Command ==>                               Scroll ==> PAGE
LOAD function ended successfully
Page 1
Report: CQSCtrl001
                IMS Queue Control Facility V3R1 (5697-N50)
                CQS Controller Routine
                CQS Controller Control Records and Comments

                FUNCTION load
                END
                IQC2500I CQS Load Routine
                IMSID: IMS1
Page 2
Report: Load002
                IMS Queue Control Facility V3R1 (5697-N50)
                Messages Loaded to APPC Queue LU6.2 Destina
Destination      Primary      Secondary      Destination      Primary      Secondar
-----
A7CICHBT
  DFSASYNCR          16          0
L62IMS1
  DFSASYNCR          4          0
L62MVS1
F1=Help   F2=Split   F3=Exit   F5=Rfind   F7=Up     F8=Down   F9=Swap
F10=Left  F11=Right  F12=Cancel

e
05/015

```

Connected to remote server/host stlv1m1.svl.ibm.com using port 23

Print to Disk - Append



IMS Performance Analyzer

[IMS Performance Analyzer](#) provides comprehensive transaction performance and system resource usage reporting for your IMS systems.

- Analyze IMS transaction response time and identify performance bottlenecks, then tune your IMS system based on this information
- Measure the usage and availability of critical resources such as databases, programs, regions, buffers, and queues
- Plan for the operational management of IMS, including the scheduling of database re-orgs, monitoring adherence to service level agreements, charge-back accounting, and capacity planning
- Produce high level management summaries, graphical reports, and detailed traces for in-depth analysis of critical performance information help you

IMSPA – Key features

- Delivers end-to-end transit analysis for all types of transaction workloads, including shared-queues by merging sysplex log files
- Measures performance in IMS Connect, and combines it with the IMS log for a complete transaction lifecycle picture
- Provides comprehensive reporting of OMEGAMON for IMS Transaction Reporting Facility
- Provides an ISPF dialog and batch commands to best manage reporting requirements across your entire IMS enterprise.
- Allows you to design your own transit reports via the Report Forms feature
- Offers DBRC Log selection for quick and easy log report requests
- IMS Performance Analyzer complements [IMS Problem Investigator](#) in the investigation of IMS performance related problems.



Problem: How can you compare transaction performance when migrating from IMS V10 to V12?

Answer: Form-based reporting – design your report to compare one IMS V and V12 transaction performance side-by side

```
IMS Performance Analyzer 4.2 - Primary Option Menu
Option ==> █
0  IMS PA Profile      Customize your IMS PA dialog profile
1  System Definitions  Specify IMS and Connect systems and OMEGAMON files
2  Groups              Specify Groups of IMS and Connect systems (Sysplexes)
3  Report Sets         Request and submit reports and extracts
4  Expectation Sets    Define Expectation Sets (Log exception reporting)
5  Averages            Edit Averages data sets (Log exception reporting)
6  Object Lists        Define Object Lists
7  Distributions       Define Distributions
8  Graphing & Export    Graph or export Log Extract by Interval data
9  IMS Connect         Submit IMS Connect report requests
10 Report Forms        Define Report Forms
X  Exit                Terminate IMS PA
```

1. Define you IMS systems
2. Design a specialized V2V Report Form
3. Submit a report request using the V2V form
4. Review the report output

Design a specialized V2V Report Form

```

EDIT                               Summary Report Form - V2VFORM                Row 1 of 14 More: < >
Command ==>                         scroll ==> PAGE

Description . . . IMS V2V transaction profiling                               Page Width . . . 132
                                                                              Precision . . . 4
                                                                              Digit Grouping . SEC

/  Field      Sort
/  Name +     K   O  Func  Len  Description
---
/  TRANCODE  K   A   _____  8   Transaction Code
/  IMSVER    K   A   _____  4   Processing IMS Version
/  TRANCNT   _____  10  Transaction count
/  INPUTQ    _____  8   Input queue time
/  PROCESS   _____  8   Processing time
/  OUTPUTQ   _____  8   Output queue time
/  TOTALTM   _____  _____  Range
/  TOTALTM   _____  MAX   _____  From + To Report
/  INPUTQ    _____  RANGE  >0.1 PERCENT Seconds
/  TOTALTM   _____  RANGE  >0.5 PERCENT Seconds
/  CPU TIME  _____  8   CPU time
/  DBCALLS   _____  10  DB call count
/  RATESEC   _____  10  Transaction rate / second
/  EOR
***** Bottom of data *****

```

1. Summarize by Trancode and IMS version
2. Transit times – average and maximum
3. Input queue and Processing time – service levels using range function – % of transactions with processing time greater than 0.5 seconds
4. CPU time and DB call count
5. Transaction rate per second

Request a summary report using the V2V form

```

V2VREP - Transit Summary

Command ==> SUBMIT

Specify required view:
1. Report
2. Extract
3. Transit options

----- Report Interval -----
          YYYY/MM/DD  HH:MM:SS:TH
From      _____
To        _____

Reports Required:

  Type      Form +      Time      Totals      Digit      Tran      Report
  _____  _____  Interval  Level      Precision  Grouping  Mix      Width
1. REPORT  V2VFORM  00:01:00  0          4          SEC      1      118 <
2.          _____  00:01:00  0          3          NO       1
3.          _____  00:01:00  0          3          NO       1
4.          _____  00:01:00  0          3          NO       1
5.          _____  00:01:00  0          3          NO       1
  
```

1. Specify the Form name, V2VFORM created in Step 2, to request the required report
2. Submit the report request

Step 7. Analyze the report output

IMS V2V transaction profiling											
SUMM0001 Data from 11.30.00 01May2011 to 11.40.00 01May2011										Page 1	
Trancode	Proc Vers	Tran Count	Avg InputQ Time	Avg Process Time	Avg Total IMS Time	Max Total IMS Time	>0.1 InputQ Time	>0.5 Total Time	Avg CPU Time	Avg DBcall Count	Rate /Sec
ORDER	1010	14526	0.0281	0.4561	0.5751	1.5642	4.65%	56.12%	0.2092	17	24
ORDER	910	14518	0.0314	0.5672	0.7102	1.8174	7.27%	72.27%	0.2187	17	24
. . .											
PART	1010	17891	0.0451	1.6080	1.4415	3.2362	12.65%	97.21%	0.9812	251	29
PART	910	17869	0.0472	1.7182	1.7632	4,1346	15.32%	94.12%	1.1239	251	29

1. Processing of transactions performed, on average, better in IMS V11 than V12
2. 72% of IMS V11 transactions took longer than 0.5 seconds to complete, compared to only 56% in IMS V12
3. CPU time, on average, was slightly lower in IMS V12

At a glance, we can verify that our migration to IMS V12 does not negatively impact performance. In fact it has improved slightly!

IMS Problem Investigator: Format and navigate log files quickly and easily

- IMS PI allows you to interactively browse and analyze log records
- Instantaneous view of the logs
- Navigate by the time of day
- Select records to drill down right to the values of individual flag bits

1 Select a record to view all of its fields

```

Forwards / Backwards . . 00.00.00.000100   Time of Day . . 01.10.30.000000
Code Description                               Date 2006-03-17 Friday   Time (Local)
-----
S 01  Input Message                               01.10.56.574109
      UTC=17.10.56.568088 TranCode=ATMWDRAW Userid=NEWYORK LTerm=NEWYORK
      Terminal=NYATM001 OrgUOWID=I9DE/BE8300F4C92D4A23
-----
 08  Application Start                             01.10.56.574110
      UTC=17.10.56.574100 TranCode=ATMWDRAW Region=0002
      RecToken=I9DF/0000000300000000 RegTyp=MPP TClass=01 TPrty=08
-----

```

2 Zoom on a field to view a detailed description of its value

```

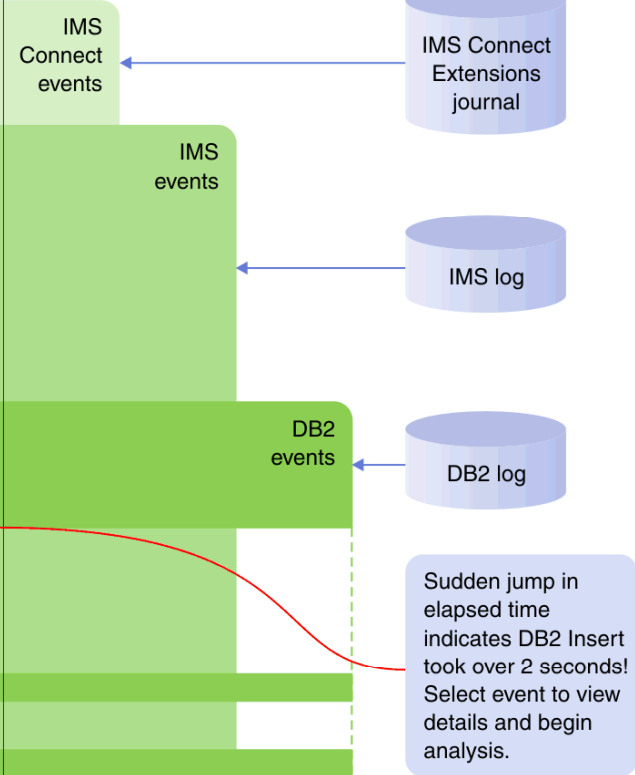
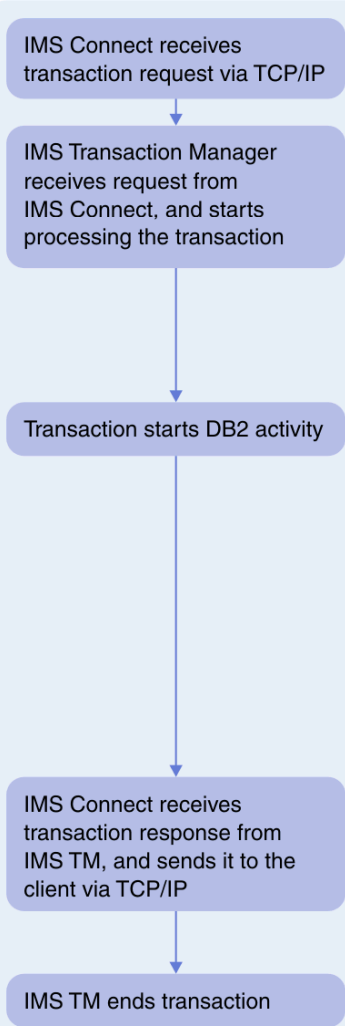
-----
31  DLI Form      <====> _____ +                               Format <====> FORM
     UTC ***** Top of data *****
     OrgL +0004 Code... 01   Input Message
-----
5616 Star +0166 STCK... BE8300EDBF897D01   LSN....
     Reg  Date... 2006-03-17 Friday   Time...
-----
03  Outp +0000 MSGLRLL... 0176   MSGLRZZ... 0000   MSGLCODE... 01
     UTC +0005 MSGFLAGS... C1     MSGDFLG2... 81     MSGFPADL... 94
     OrgL +0008 MSGMDRRN... 08000009   MSGRDRRN... 08000009   MSGPRFL... 0166
-----
+0012 MSGCSW      on   MSGDFLG3... 02
-----
Field Zoom
-----
+0007 MSGFPADL... 94  Prefix Additional Info Flag      A754C703
On      MSGFPRSP... 80  Response Mode                               A754C703
Off     MSGSACMD... 40  Scheduled APPL issued 'CMD'
Off     MSGAOIUE... 20  Message generated by AOI user exit
On      MSGSYSEG... 10  System Segment exists
Off     MSGSSPND... 08  Message is on SMB Suspend queue
On      MSGFPINR... 04  Input message is non-recoverable
-----
MSGDRBN... 00000000
tem ID = 81
MSGCFLG1... 00
MSGCQSF1... 00

```

IMS Problem Investigator ISPF dialog

```

File Menu Edit Mode Navigate Filter Time Labels Options Help
BROWSE CEX000.QAAUTO.COMBLOG.ICONPT.D071205 Record 00145076 More: < >
Command ==>> Scroll ==>> CSR
Forwards / Backwards . . 00.00.00.000100 Time of Day . . 14.41.55.532866
Code Description Date 2007-12-05 Wednesday Time (Relative)
/-----
-- A03C Prepare READ Socket -0.001009
-- A049 READ Socket -0.000942
-- A03D Message Exit called for READ -0.000923
-- A03E Message Exit returned from READ TranCode=CEXTNONC -0.000888
-- A041 Message sent to OTMA Datastore=XCFMI9DE -0.000607
-- 01 Input Message TranCode=CEXTNONC Source=Connect 14.41.55.803770
-- 35 Input Message Enqueue TranCode=CEXTNONC +0.003398
-- 31 DLI GU TranCode=CEXTNONC Region=0001 +0.020757
-- 5616 Start of protected UOW Region=0001 +0.021560
-- 5E SB Handler requests Image Capture Region=0001 +0.021636
-- 50 Database Update Database=DI21PART Region=0001 +0.025143
-- 50 Database Update Database=DI21PART Region=0001 +0.025983
-- 50 Database Update Database=DI21PART Region=0001 +0.026027
-- 50 Database Update Database=DI21PART Region=0001 +0.026695
-- 50 Database Update Database=DI21PART Region=0001 +0.026756
-- 5600 Sign-on to ESAF Region=0001 SSID=DB2P +0.027700
-- 0020 DB2 Unit of Recovery Control - Begin UR +0.028763
-- 0020 DB2 Update In-Place in a Data Page +0.028779
-- 0010 DB2 Savepoint +0.028987
-- 0020 DB2 Delete from a Data Page +0.029067
-- 0020 DB2 Insert into a Data Page +0.029291
-- 03 Output Message Response LTerm=3835 Source=Connect +2.029659
-- 31 DLI GU TranCode=CEXTNONC Region=0001 +2.029682
-- 33 Free Message +2.029777
-- 5610 Start Phase 1 Syncpoint Region=0001 +2.029809
-- 5600 Commit Prepare starting Region=0001 SSID=DB2P +2.029836
A042 Message received from OTMA Datastore=XCFMI9DE +2.030109
-- 0020 DB2 Unit of Recovery Control - End Commit Phase 1 +2.040235
-- 37 Syncpoint Region=0001 +2.043131
-- 33 Free Message +2.051761
-- 0020 DB2 Unit of Recovery Control - Begin Commit Phase 2 +2.052187
A042 Message received from OTMA Datastore=XCFMI9DE +2.052401
-- A03D Message Exit called for XMIT +2.052601
-- A03E Message Exit returned from XMIT +2.052636
-- A04A WRITE Socket +2.052891
-- A00C Begin CLOSE Socket +2.052922
-- A00D End CLOSE Socket +2.053526
-- A048 Trigger Event +2.053557
-- 0020 DB2 Unit of Recovery Control - End Commit Phase 2 +2.054395
-- 5600 Commit Continue completed Region=0001 SSID=DB2P +2.054540
-- 5612 End of Phase 2 Syncpoint Program=CEXTPGM +2.054550
-- 07 Application Terminate TranCode=CEXTNONC Region=0001 +2.443742
***** Bottom of Data *****
  
```

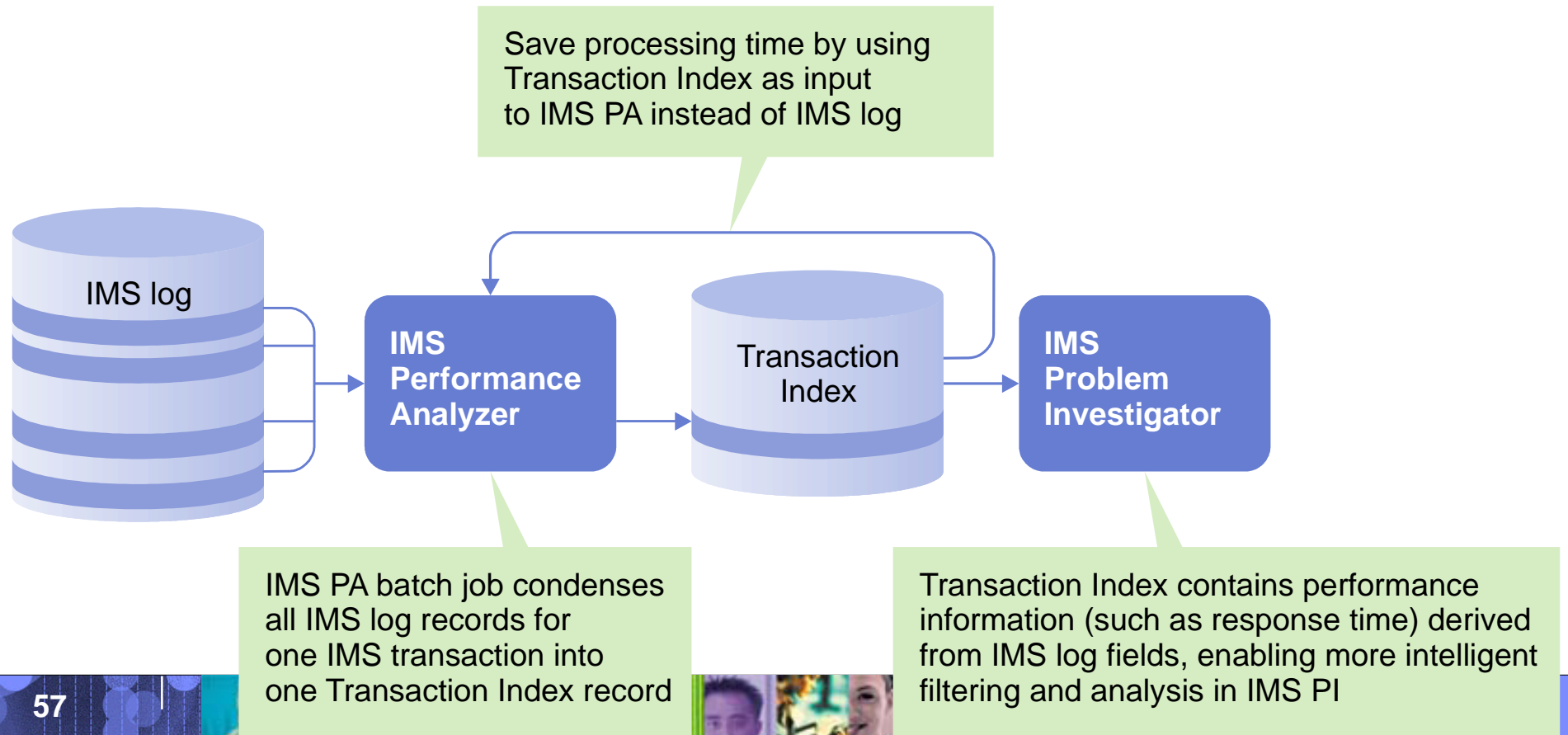


Transaction index

All the accumulated information from the IMS log about each transaction is condensed into a single transaction index record (created by IMS PA).

Use the transaction index as input into:

- IMS PA reporting - Instead of re-processing large SLDS log files
- IMS PI analysis - To enable more intelligent problem detection



Transaction index – locate a problem transaction

```

Conditions
Command ==> _____ Row 1 to 2 of 2
                          Scroll ==> PAGE
Code: CA01 Transaction

/  Field Name +      Oper Value +
-  TRANCODE         EQ   'MQATREQ1'
-  PROCESS          GT   1.0
***** Bottom of data *****
    
```

1. Locate all MQATREQ1 transactions with processing time > 1 sec

2. Track the transaction to view its lifecycle in the IMS log:

```

BROWSE      JCH.INDEX                      Record 00427482 More: < >
Command ==> FILTER                          Scroll ==> PAGE
Forwards / Backwards . . HH.MM.SS.THMIJU   Time of Day . . HH.MM.SS.THMIJU
Code Description                               Date 2009-07-10 Friday   Time (Relative)
-----
/ TX CA01 Transaction                          16.50.06.570728
   TranCode=MQATREQ1 Program=MQATPGM   Userid=FUNTRM07
   LTerm=FUNTRM07      Terminal=SC0TCP07 Region=0001
   OrgUOWID=IADG/C476657D88074C60      RecToken=IADG/0000002300000000
   CPU=0.033756        InputQ=0.000734  Process=1.204564
   TotalTm=1.305298   RegTyp=MPP        DBCalls=5
-----
01  Input Message TranCode=MQATREQ1      +0.000000
35  Input Message Enqueue TranCode=MQATREQ1 +0.000032
08  Application Start TranCode=MQATREQ1 Region=0001 +0.000631
5607 Start of UOR Program=MQATPGM Region=0001 +0.000632
05  DLI (GU) TranCode=MQATREQ1 Region=0001 +0.000638
31  DLI GU TranCode=MQATREQ1 Region=0001 +0.000697
    
```



IMSPI: Additional useability enhancements

Scrub Remove sensitive data from log records prior to reporting in dialog and batch.

Save While tracking a transaction in the dialog, save the log record result set to an extract file for later analysis

Comments Write comments in the Process list for your reference. Select the comment to process the log files

Log File	Rel	Filter
* JIM'S ODBM TEST CASES		
'CEX000.QADATA.#ODBM5.IBDJ.D100226'	111	08
'CEX000.QADATA.#ODBM5.D100226'	111	DRDA

Thank
YOU

IMS Tools Version/APAR

needed for IMS V12

IMS Tools Supporting V12

Product Name	VRM	Supported	Comments
Data Encryption	1.1.0	1/2011	No PTF Required
Data Refresher	1.1.0	1/2011	No PTF Required
DB/DC Data Dictionary	1.6.0	1/2011	APAR PM21922/UK62552
IMS ADF II	2.2.0	1/2011	No PTF Required
IMS Audit Management Expert	1.2.0	1/2011	APAR PM23505/UK63846
IMS Batch Backout Manager	1.1.0	1/2011	APAR PM26481/UK63935
IMS Batch Terminal Simulator	3.1.0	1/2011	APAR PM21925/UK62242
IMS Buffer Pool Analyzer	1.3.0	1/2011	APAR PM26490/UK63061
IMS Cloning Tool	1.1.0	1/2011	APAR PM25761/UK65463

IMS Tools Supporting V12

Product Name	VRM	Supported	Comments
IMS Command Control Facility	2.1.0	1/2011	APAR PM26222/UK63319
IMS Configuration Manager	1.3.0	1/2011	APAR PM28699/UK67912 (Formally named IMS Parameter Manager)
IMS Connect Extensions	2.2.0	1/2011	APAR PM24860/UK68052
IMS Database Control Suite	3.2.0	1/2011	APAR PM21517/UK64084
IMS Database Reorganization Expert	4.1.0	1/2011	Formally named IMS Parallel Reorganization, APAR PM22116/UK62553
IMS Database Solution Pack	1.1.0	1/2011	Customers must apply individual product PTFs
IMS DEDB Fast Recovery	2.2.0	1/2011	APAR PM22078/UK62375
IMS ETO Support	3.1.0	1/2011	APAR PM26223/UK63011
IMS Fast Path Solution Pack	1.1.0	1/2011	APAR PM21939/UK62565
IMS HALDB Toolkit	3.2.0	1/2011	APAR PM29913/UK63755

IMS Tools Supporting V12

Product Name	VRM	Supported	Comments
IMS HP Image Copy	4.2.0	1/2011	APAR PM21942/UK62577
IMS HP Load	2.1.0	1/2011	APAR PM22118/UK62579
IMS HP Pointer Checker	3.1.0	1/2011	APAR PM21945/UK62559 (for HP Pointer Checker) APAR PM25552/UK62558 (for Database Repair Facility)
IMS HP Prefix Resolution	3.1.0	1/2011	APAR PM22121/UK62343
IMS HP Sysgen Tools	2.2.0	1/2011	APAR PM26491/UK63062
IMS HP Unload	1.2.0	1/2011	APAR PM22119/UK62576
IMS Index Builder	3.1.0	1/2011	APAR PM22120/UK62546
IMS Library Integrity Utilities	2.1.0	1/2011	APAR PM21961/UK62602
IMS Network Compression Facility	1.1.0	1/2011	APAR PM26487/UK63060
IMS Online Reorganization Facility	1.2.0	1/2011	APAR PM30177/UK64372

IMS Tools Supporting V12

Product Name	VRM	Supported	Comments
IMS Performance Analyzer	4.2.0	1/2011	APAR PM24585/UK64657
IMS Performance Solution Pack	1.1.0	1/2011	Customers must apply individual product PTFs
IMS Problem Investigator	2.2.0	1/2011	APAR PM24662/UK65183
IMS Program Restart Facility	2.1.0	1/2011	APAR PM26493/UK63936
IMS Queue Control Facility	3.1.0	1/2011	APAR PM21241/UK62104
IMS Recovery Expert	2.1.0	1/2011	APAR PM27126/UK67993
IMS Recovery Solution Pack	1.1.0	1/2011	APAR PM23052/UK64046
IMS Sequential Randomizer Generator	1.1.0	1/2011	No PTF Required
IMS Sysplex Manager	1.3.0	1/2011	APAR PM21377/UK62374
IMS Tools Base	1.1.0	1/2011	APAR PM21167/UK62373
IMS Workload Router	2.7.0	1/2011	No PTF Required

IMS Tools with special circumstances

Product Name	VRM	Comments
IMS Audit Management Expert	1.1.0	New Release Required, EOS 4/30/2011
IMS Buffer Pool Analyzer	1.2.0	New Release Required, EOS 4/30/2011
IMS Connect Extensions	2.1.0	New Release Required, EOS 4/30/2011
IMS Database Recovery Facility	3.1.0	Customers must move to the IMS Recovery Solution Pack, 9/9/2011
IMS Database Repair Facility	1.2.0	Customers must move to the IMS Fast Path Solution Pack or IMS High Performance Pointer Checker V3.1, EOS 9/9/2011
IMS HD Compression Extended	2.2.0	Customers must obtain the IMS Tools Base, EOS 9/9/2011
IMS HP Change Accumulation	1.4.0	Customers must move to the IMS Recovery Solution Pack, EOS 9/9/2011
IMS HP Fast Path Utility	3.2.0	Customers must move to the IMS Fast Path Solution Pack , EOS 9/9/2011
IMS HP Image Copy	4.1.0	New Release Required, EOS TBD
IMS Parallel Reorganization	3.2.0	Customers must obtain IMS Database Reorganization Expert V4.1 or the IMS Database Solution Pack, EOS TBD
IMS Parameter Manager	1.2.0	Customers must obtain IMS Configuration Manager, EOS TBD
IMS Performance Analyzer	4.1.0	New Release Required, EOS 4/30/2011
IMS Problem Investigator	2.1.0	New Release Required, EOS 4/30/2011
IMS Recovery Expert	1.1.0	Customers must move to the IMS Recovery Solution Pack, renamed to IMS Database Recovery Facility Extended Functions, EOS 9/9/2011
IMS Sysplex Manager	1.2.0	New Release Required, EOS TBD
IMS Tools Knowledge Base	1.1.0	Customers must obtain the IMS Tools Base, EOS 9/9/2011
IMS Workload Router	2.5.0	New Release Required, EOS 4/30/2011
IMS Tools Online System Interface (TOSI)	All	Customers must obtain the IMS Tools Base, EOS TBD
IMS Generic Exits	1.3.0	Customers must obtain the IMS Tools Base, EOS TBD