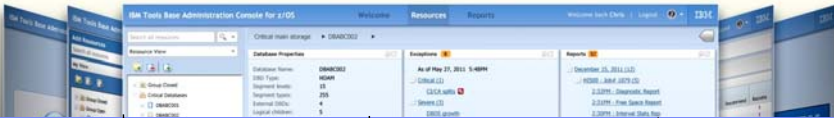# IMS Tools & IMS V12 Migrations

1

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

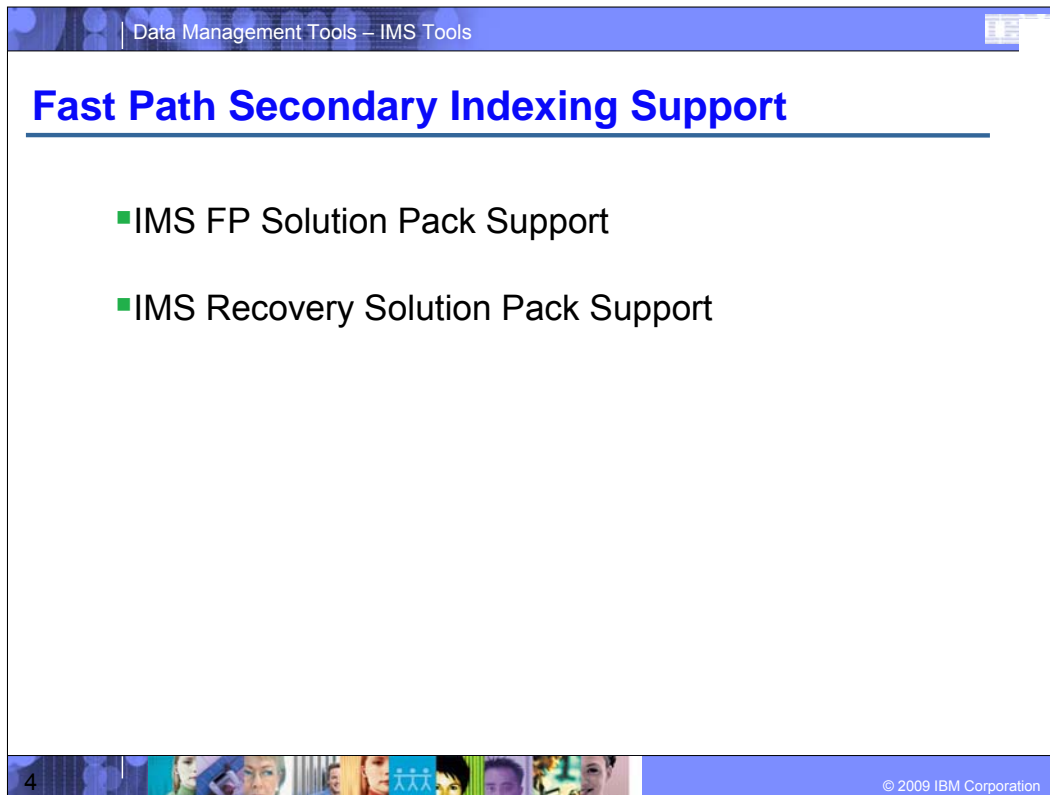|			
Data Base Administration	▪IMS HALDB Toolkit ▪IMS Sequential Randomizer Generator	**System / TM Administration**	**System Administration** ▪IMS Command Control Facility ▪IMS ETO Support ▪IMS HP Sysgen Tools ▪IMS Queue Control Facility ▪IMS Workload Router
Utility Management	▪IMS Online Reorganization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

3

© 2009 IBM Corporation

IBM has been in the IMS Tools business for YEARS! At one point we had over 40 individual IMS Tools available. The major areas where IMS Tools provide support and assistance to our IMS customers are – Database Administration, Utility Management, Backup and Recovery, Performance Management, System and Transaction Management Administration, Application Management, and Regulatory Compliance.

With the introduction of the IMS Tools Solution Packs in 2010 we are consolidating, integrating, and reducing our portfolio. The IMS Solution Packs makes it easier for our customers to get what they need in the areas of their biggest pain points.

•It's tough times out there, our customers are focused on survival and reducing costs. With Solution Packs, customers can have an all-in-one solution at low cost. They can get the additional tools with what they already have!

   With this, IMS further modernizes operations. Take advantage of what you have with IMS, evaluate operations – use best practices, position yourself for the future up turn. Tools is right there with them. Tools offer major benefits when sold as solution packages – Tools facilitate best practices, they offer outstanding ROI benefits – as solutions, they reduce TCO, and they enable growth.

•IMS Database Solution Pack is all your database utilities, and your end-to-end reorganization solution all under the umbrella of a Database Solution Pack. Why should we ever have a customer who owns HP Unload and not HP Load? We shouldn't. This pack delivers high performance tooling from the first Unload to the final Image Copy and re-building of indexes coupled with the parallel processing and policy based execution of the new IMS DB Reorganization Expert (which is essentially IPR with conditional execution now added). The IMS DB Solution Pack does not replace any of the component products. The component products, while included in this solution, will remain orderable as separate products.

3

Data Management Tools – IMS Tools

Fast Path Secondary Indexing Support

- IMS FP Solution Pack Support

- IMS Recovery Solution Pack Support

4   © 2009 IBM Corporation

•Slide 3 cont.

•EVERY IMS Tools Solution pack requires the IBM Tools Base which is a no-charge PID product
Knowledge Base, IMS Tools Generic Exits, Policy Services, Distributed Access Infrastructure, an
Base.

•The Tools Base Administration Console consolidates a variety of key IMS information into a sing
required. With the graphical interface, you can rapidly interpret database statistics to find opportu

•The Tools Base Autonomics Director automates ongoing database monitoring and maintenance
in your IMS environment and which are candidates for monitoring by Autonomics Director. The T

•As of today (Feb 2012) only IMS Database Solution Pack and IMS Fast Path Solution Pack sup

For more information on ALL the IMS Tools, please visit the IMS Tools website - http://www-01.ib
replays), technical conferences, and more. From this web page, you can go to all our technical a
LindedIn and other IMS Communities.

IMS Tools Sales Kits are available at the Software Sellers Workplace – check it out.

IBM

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
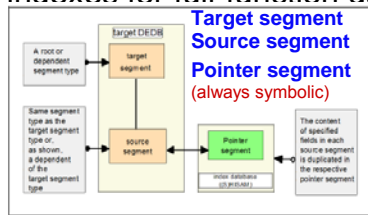

Target segment
Source segment
Pointer segment
(always symbolic)

Figure 3-4 Target, source, and pointer segment

Non-unique keys with overflow or unique keys with various options (SUBSEQ, DDATA, /CK, …)
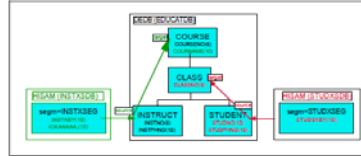
Figure 3-8 Secondary indexes on DEDB

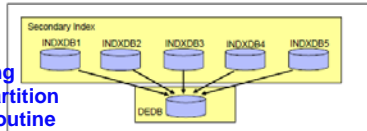User partitioning using a user partition selection exit routine

Figure 3-16 User partitioning for secondary indexes
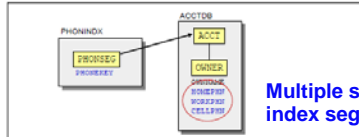
Multiple secondary index segments

Figure 3-17 Multiple secondary index segments

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

5

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*

- 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)

- 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)

- SHISAM secondary index pointer

Search	Subsequence (optional)	Duplicate data (optional)	Symbolic pointer concatenated key	User data (optional)

Figure 3-19   Secondary index segment layouts

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

6

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

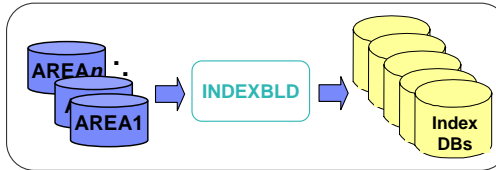- Faster recovery from a failure in an indexed DEDB

7

Building multiple secondary indexes at a time

- **FPA INDEXBLD function**

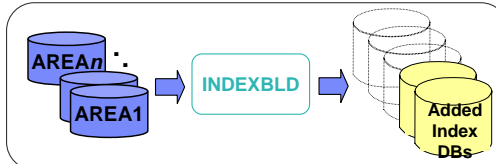 - Can build all secondary indexes for a DEDB when the secondary indexes are defined against the existing DEDB (INDEXDBD=ALL)

  - 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|(indexdbd1,indexdbd2,…)]
/*
```

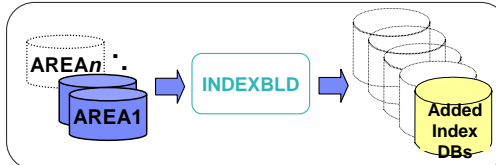**Build all indexes for a DEDB**

AREA*n* . . AREA1 → INDEXBLD → Index DBs

Build selected indexes of a DEDB

AREA*n* . . AREA1 → INDEXBLD → Added Index DBs

Build indexes for specific areas

AREA*n* . . AREA1 → INDEXBLD → Added Index DBs
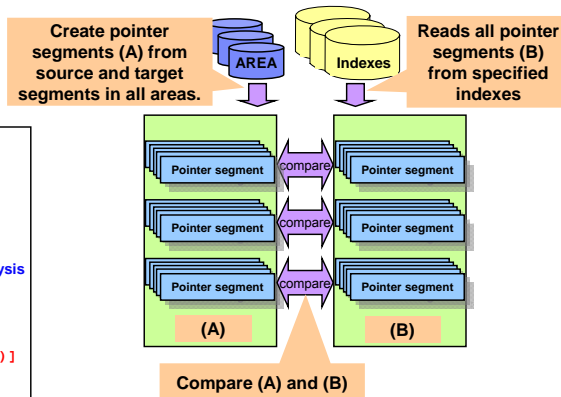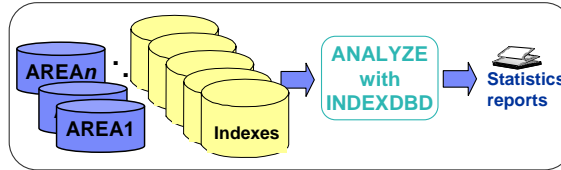
8

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

AREA*n* : AREA1 Indexes → ANALYZE with INDEXDBD → Statistics reports

Create pointer segments (A) from source and target segments in all areas.

Reads all pointer segments (B) from specified indexes

AREA Indexes

Pointer segment — compare — Pointer segment
Pointer segment — compare — Pointer segment
Pointer segment — compare — Pointer segment

(A)   (B)

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,        Mandatory option for index analysis
    IAREA=ALL,
    INDEXDBD=[ALL|(indexdbd1,indexdbd2,...)]
  REPORT
/*
```

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

10

IBM

Version Upgrade Acceleration

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

When we are doing IMS Version upgrades, it is important to get it right. So we move the new IMS version into a test bed. We need to figure out the new parameters – new and old. In order to do some stress testing of the new version it is ideal if we could capture some real workload and replay it in the new version. Once we have done that we want to see the differences in performance. Being able to get reports showing before / after performance lets us know what to expect If we come across any issues, it is useful to be able to do an investigation and get more details.

11

Speaker

2012

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 <u>not</u> 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

13

- To achieve high availability (indented bullets)

- Storage-based fast-replication facilities allow data to be copied quickly and without affecting running applications. These copy processes are offloaded to the storage processor and do not use host CPU and I/O resources to copy the data saving valuable resources.
  - Typically, storage-based fast-replication tools like IBM FlashCopy, EMC TimeFinder/Clone or TimeFinder/Snap, and HDS ShadowImage have been used by storage organizations and not database administrators because:
    - they can wipe out a volume if not used correctly
    - And typically, DBA's don't know storage, they're too busy managing databases

- We've developed 'storage-aware' data management tools that integrate storage-based fast-replication facilities with database management systems to provide fast and non-intrusive DB2 and IMS cloning and system level backup solutions that allow DBAs to use fast-replication in a safe and transparent manner.
  - We provide both SMS storage group and Volser masks as a way to identify the source and target volumes. In doing so, it isn't really any different than what the storage team provides you with today to enable you to allocate data sets. They don't have to worry that a UCB address is accidentally typed in and neither do DBA's. The storage team assigns an SMS storage group or provides you with volser masks and the products execute fast replication using those. In addition, simulate capabilities provide the exact volumes you are working with.

- These products which include IMS Cloning Tool speed up and simplify cloning, backup, recovery, and disaster recovery operations.

13

IBM

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**

14

© 2009 IBM Corporation

'Storage-aware' cloning, and DB2 or IMS system level backup methodologies using storage-based fast-replication facilities have many operational advantages.

•They simplify cloning, backup and recovery strategies by using automation to coordinate database system operations with storage-based fast-replication facilities.

•Offloading the data copy process to the storage processors saves host CPU, I/O, and storage resources.

•DB2 or IMS systems can be cloned or backed up instantaneously and without affecting running applications. Database systems, application databases, or application table and index spaces can be restored instantaneously using storage processor fast-replication facilities.

•In addition, DB2 and IMS recovery operations can be performed in parallel to the restoration process to minimize recovery time and reduce application down time.

•These storage integrated products leverage storage-based fast-replication facilities from the leading mainframe storage vendors like IBM, EMC, and HDS and expose fast-replication facilities to DB2 and IMS DBAs in a safe and transparent manner.

_____save this for future _____

A database system level backup can be used to restore and recover your DB2 or IMS systems as a unit or to restore and recover particular applications, IMS databases or DB2 objects. Database system level backups provide an effective disaster restart business continuity solution that simplifies disaster recovery operations. Disaster recovery becomes as simple as restarting from a power failure.

Database products that implement a system backup methodology require a sophisticated meta-data infrastructure and must be able to leverage storage-based fast-replication facilities from the leading mainframe storage vendors like IBM, EMC, and HDS.

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 gene**

- **IMS database refresh automation (*by data set*)**
  - Refreshes specific databases
  - The act of replicating the data, making the replica accessible, and th 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
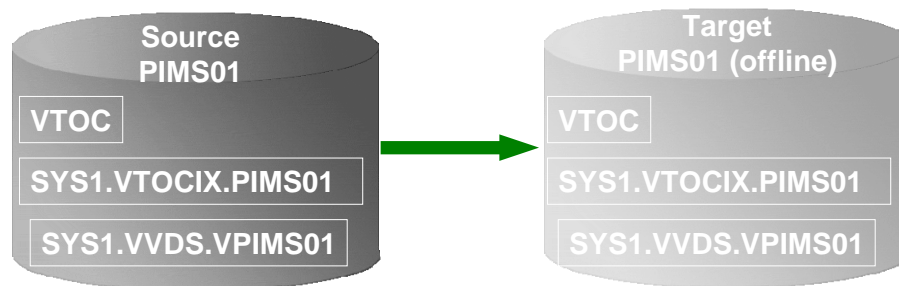## Test New Releases of IMS

- **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**

17   Prevents environmental issues not found in the original testing.

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 name
  - Volume VTOC, VTOCIX and VVDS may be t
  - Data set names are the same on source and
  - If you want to access the data from a commo
    you access the data?

13

18

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

Source PIMS01

VTOC

SYS1.VTOCIX.PIMS01

SYS1.VVDS.VPIMS01

Target PIMS01 (offline)

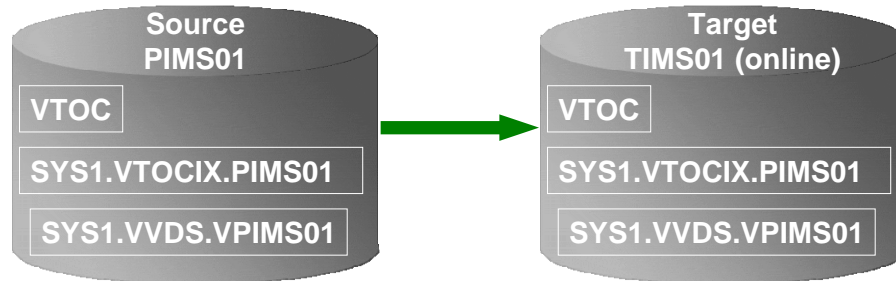VTOC

SYS1.VTOCIX.PIMS01

SYS1.VVDS.VPIMS01

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.

•This slide shows an example of cloned volume data access challenges.

•On the left hand side we have a source volume. On the right hand side, we have the target volume.

•Note that the target volume label, VTOC, VVDS, etc. are all identical to the source volume.

•The target volume is offline and cannot be used.

19

Challenges to Data Access
On the Same or Shared LPAR - Volume ID Issues (2)

Source
PIMS01

VTOC

SYS1.VTOCIX.PIMS01

SYS1.VVDS.VPIMS01

Target
TIMS01 (online)
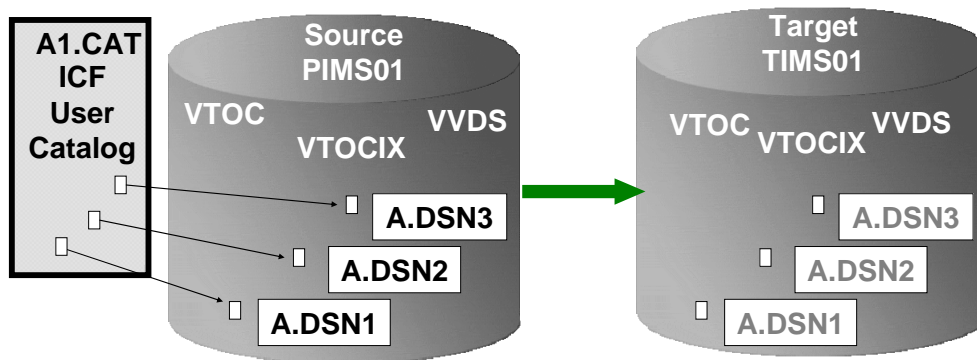
VTOC

SYS1.VTOCIX.PIMS01

SYS1.VVDS.VPIMS01

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

20

•In this example, the target volume label is different than the source label but the volume internals, VTOCIX, and VVDS are the same as the source. The target volume is online but cannot be used.

20

Challenges to Data Access
Data Set Name and Cataloging Issues

A1.CAT ICF User Catalog

Source PIMS01
VTOC
VTOCIX
VVDS
A.DSN3
A.DSN2
A.DSN1

Target TIMS01
VTOC VTOCIX VVDS
A.DSN3
A.DSN2
A.DSN1

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

This example shows that the data sets on the source volume, PIMS01, are already cataloged in an ICF catalog so the target volume data sets cannot be cataloged without being renamed first.

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

- **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**
  - Prevents environmental issues not found in the original testing.

23

23

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
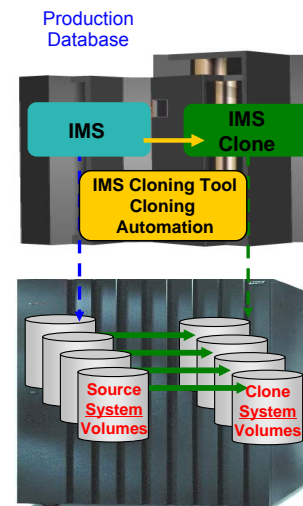 - Simplifies IMS cloning processes
  - Reduces cloning time and administration costs
- **Leverages fast replication facilities to clone data**
- **Performs rapid volume reconditioning and data set renaming on cloned system volumes to solve the data access challenges**
  - Target volumes retain their 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

Production Database

IMS → IMS Clone

IMS Cloning Tool Cloning Automation

Source System Volumes → Clone System Volumes

24

© 2009 IBM Corporation

Now we'll get into IMS Cloning Tool subsystem cloning. IMS Cloning Tool takes an existing IMS system and its databases and creates a new, or cloned, IMS system from it without having to repeat the entire installation and system generation processes

———

It leverages volume-based fast replication facilities to copy the data quickly, speed up the cloning process, and save host CPU and I/O resources

—————————————————————————

After the volumes have been copied, IMS Cloning Tool performs volume reconditioning on the copied volumes so they can be brought on-line to the same or different z/OS LPAR solving the challenges discussed in the previous slides. Data set names are changed on the copied volumes so they can be accessed from the cloned IMS system without z/OS ICF catalog conflicts. The volume reconditioning and data set renaming processes are performed fast and efficiently to reduce overall IMS system cloning time.

—————————————————————————

After the volumes are copied, reconditioned, and data sets renamed, then the cloned IMS meta-data must be adjusted to accommodate the copied data. The IMS RECONS, IMS PROCLIB and JOBS libraries, MDA, members, etc. must be updated to reflect the new data set names in the cloned IMS system. So lets get into the details.

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**
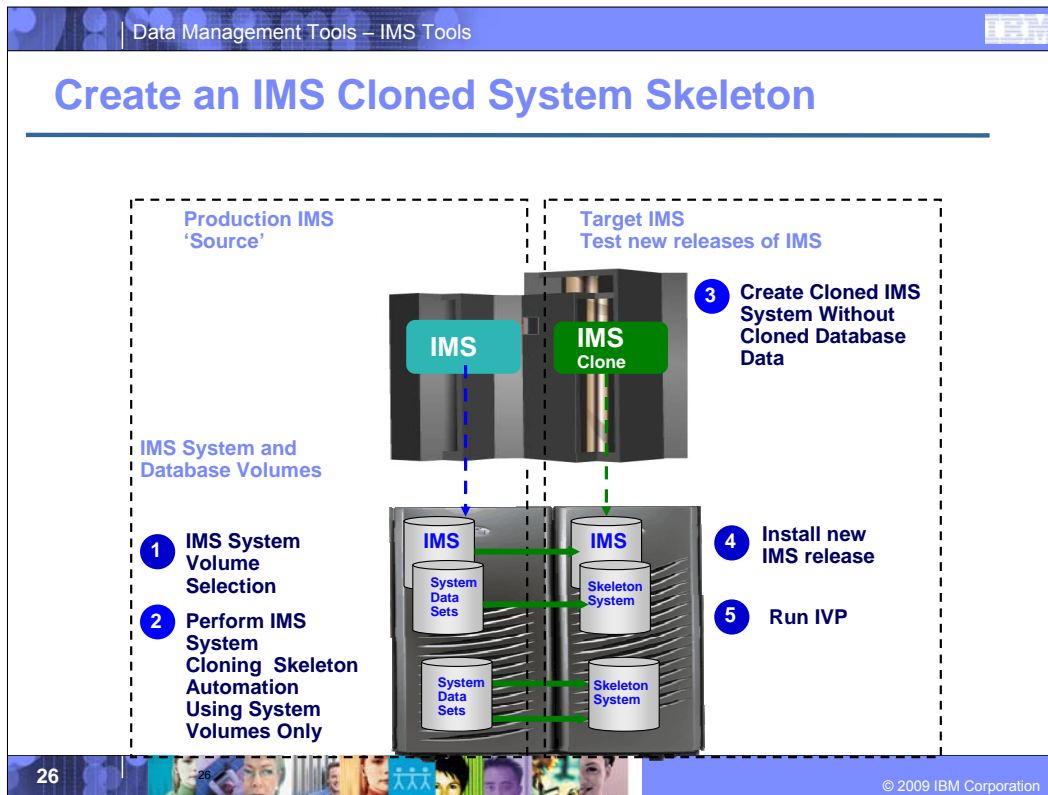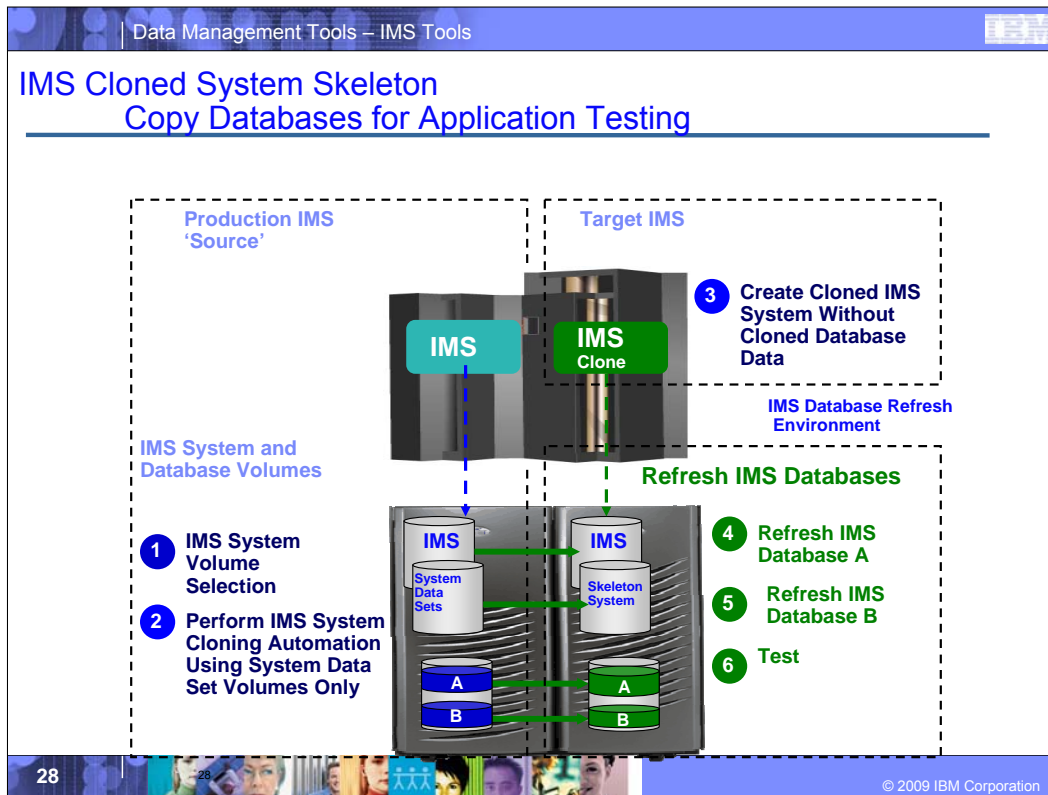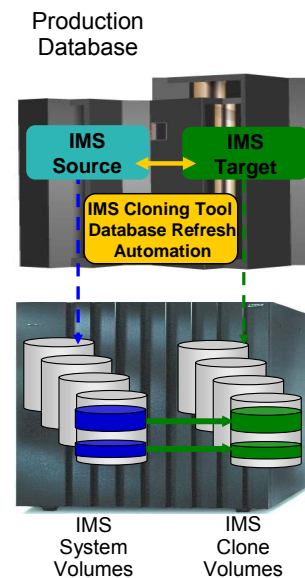
IMS Cloning Tool requires the target database definitions be set up in advance if they don't exist. One way to accomplish this is to create an IMS system skeleton. A cloned IMS system skeleton can be created such that the cloned IMS system contains all database definitions. The database data is not initially copied, it is copied when a database refresh operation is performed after the cloned IMS skeleton is created.

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**
  - Prevents environmental issues not found in the original testing.

IMS Cloning Tool requires the target database definitions be set up in advance if they don't exist. One way to accomplish this is to create an IMS system skeleton. A cloned IMS system skeleton can be created such that the cloned IMS system contains all database definitions. The database data is not initially copied, it is copied when a database refresh operation is performed after the cloned IMS skeleton is created.

Data Management Tools – IMS Tools

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

Production Database

IMS Source → IMS Target

IMS Cloning Tool Database Refresh Automation

IMS System Volumes   IMS Clone Volumes

29

© 2009 IBM Corporation

•IMS Cloning Tool performs automated IMS database refreshes.

——————————————————————————————————

•It verifies that the source and target IMS databases are compatible before copying the data

——————————————————————————————————

•IMS Cloning Tool leverages fast replication data set facilities to copy the data quickly, speed up the refresh process, and save host CPU and I/O resources.

> •Data can be copied while the source database is running or stopped.

> •Slow copy mechanisms can also be used to copy the data but it negates the benefits of high availability

——————————————————————————————————

•The next step is to update the IMS meta-data
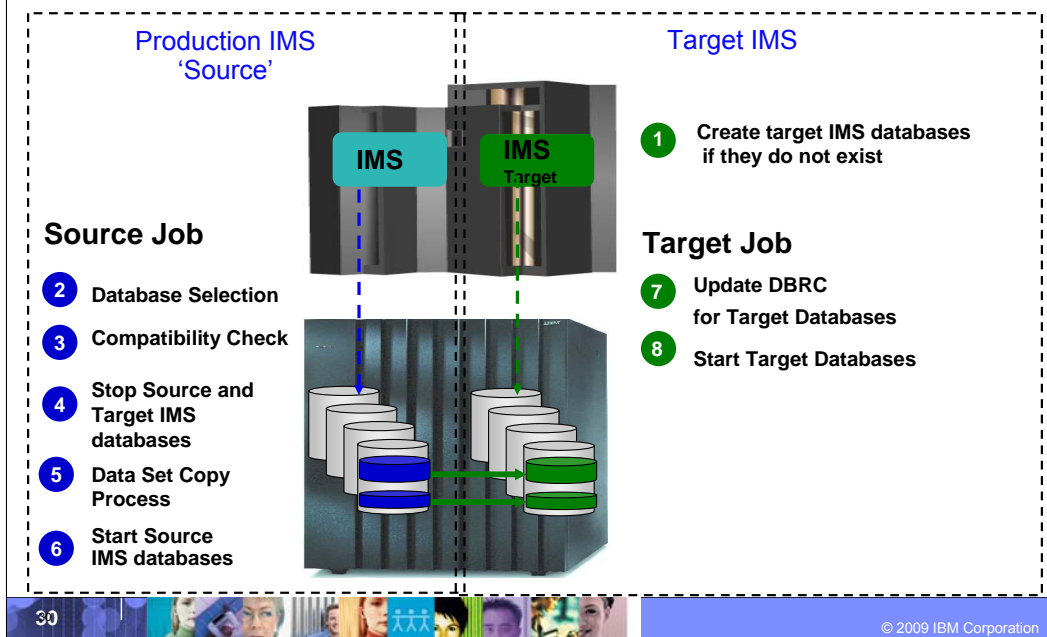
29

Refresh IMS Databases Using IMS Cloning Tool

Production IMS 'Source'

Target IMS

IMS

IMS Target

1 Create target IMS databases if they do not exist

Source Job

2 Database Selection

3 Compatibility Check

4 Stop Source and Target IMS databases

5 Data Set Copy Process

6 Start Source IMS databases

Target Job

7 Update DBRC for Target Databases

8 Start Target Databases

The left side of the slide represents the source IMS, in this case, a Production IMS system. The right side of the slide represents the target IMS system – where you want to refresh the IMS data to.

Step 1 – is on the target side. Talk about how the definitions need to exist in advance

Step 2 - The source databases to be refreshed are selected by database name. IMS Cloning Tool finds the IMS subsystem name and determines if it is active, then it finds the source and target databases and indexes (if the targets already exist), determines the data set names for each database and index and then verifies their existence

Step 3 - Checks are performed to ensure the characteristics of the source and target IMS databases are compatible. IMS Cloning Tool gets the attributes of the IMS databases and indexes from the source and target IMS RECON, ACBLIB, and MDALIB data sets. Some characteristics that are checked include: Type, Access Method, Number of segments, data set groups, Blocksize, Randomizer Parameters, etc.

Step 4 - The source and target databases are stopped (DBR commands automated). Optionally, the source databases can be copied while they are running to create a fuzzy copy. However, the fuzzy copy option does not guarantee transactional integrity on the refreshed copy.

Step 5 – Data sets are copied. For sites using FlashCopy or SnapShot, IMS Cloning Tool will invoke these copy facilities. For sites using EMC TimeFinder or Hitachi ShadowImage, IMS Cloning Tool will produce the output files describing source and target data set information so users can create their own data set fast-replication job streams.

Step 6 - The source IMS databases are started unless a fuzzy copy was specified in step four.

The following steps will be performed on the target IMS system.

Step 7 - If the target databases are registered to DBRC, IMS Cloning Tool updates the target IMS RECONS

Step 8 – Start target databases

Step 9 - The refreshed IMS databases are now available for application or offload work.

For step 7 -Don't need to say this but here is the information

LIST.DB – extract information (on both source and target)

DELETE.DB - to remove recovery history (on target) to prevent invalid recovery processes

INIT.DB, INIT.DBDS, INIT.PART, and INIT.AREA to redefine target databases and data sets

CHANGE.DB to: a. sets IC RECOMMENDED flag on for target databases and indexes / b. HALDB (copy and shadow) make sure target is on same sets

30

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,ssidt)  -
   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, Keystrng
Segment	Length, Key start and length, Uniqueness, Pointers, Edit Routine
Index	CIsize, record length, DDATA, source and target segment codes, Sparse routine
Partitioned Index	Number of Partitions, Keystrng

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

33

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**

- Prevents environmental issues not found in the original testing

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

Production
Database

IMS → IMS Clone

IMS Cloning Tool
Cloning
Automation

Source Database Volumes

Clone Database Volumes

Now we'll get into IMS Cloning Tool subsystem cloning. IMS Cloning Tool takes an existing IMS system and its databases and creates a new, or cloned, IMS system from it without having to repeat the entire installation and system generation processes

——

It leverages volume-based fast replication facilities to copy the data quickly, speed up the cloning process, and save host CPU and I/O resources

————————————————————————————

After the volumes have been copied, IMS Cloning Tool performs volume reconditioning on the copied volumes so they can be brought on-line to the same or different z/OS LPAR solving the challenges discussed in the previous slides. Data set names are changed on the copied volumes so they can be accessed from the cloned IMS system without z/OS ICF catalog conflicts. The volume reconditioning and data set renaming processes are performed fast and efficiently to reduce overall IMS system cloning time.

————————————————————————————

After the volumes are copied, reconditioned, and data sets renamed, then the cloned IMS meta-data must be adjusted to accommodate the copied data. The IMS RECONS, IMS PROCLIB and JOBS libraries, MDA, members, etc. must be updated to reflect the new data set names in the cloned IMS system. So lets get into the details.

IMS System Cloning Steps
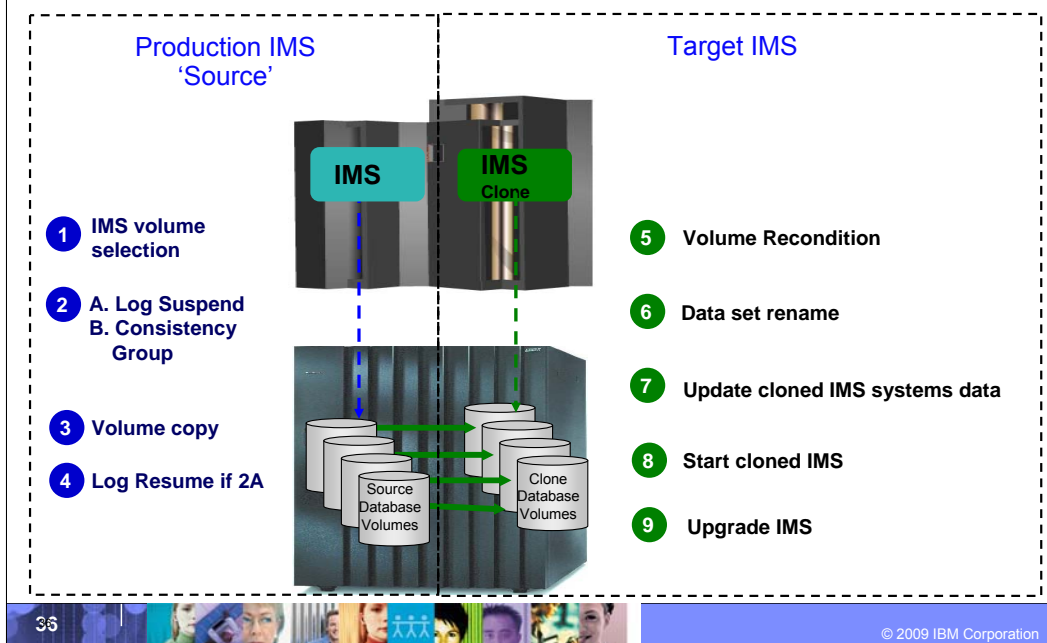
Production IMS 'Source'

Target IMS

IMS

IMS Clone

1 **IMS volume selection**

2 **A. Log Suspend**
  B. Consistency Group

3 **Volume copy**

4 **Log Resume if 2A**

5 **Volume Recondition**

6 **Data set rename**

7 **Update cloned IMS systems data**

8 **Start cloned IMS**

9 **Upgrade IMS**

Source Database Volumes

Clone Database Volumes

The left side of the slide represents the source IMS, in this case, a Production IMS system. The right side of the slide represents the target or cloned IMS system.

On the source,

Step 1 --- The disk volumes that make up the production IMS system are identified by using specific VOLSER IDs, VOLSER mask, or SMS storage group.

Step 2-4 ---To gain a static copy of your data and the source ICF catalog entries, there are several options:

  a. IMS is up and the IMS log is suspended (this is proprietary code in IMS Cloning Tool and it works similar to DB2's log suspend.)

  b. IMS is up and can use either IBM FlashCopy, FlashCopy Manager, or EMC consistency group support

----With either of these techniques, IMS Cloning Tool immediately invokes a DFSMSdss Copy to issue IBM FlashCopy or SnapShot commands to copy the data instantly and backs up the ICF catalogs that point to the data sets being copied.

----When cloning IMS systems that reside on EMC or Hitachi Storage Systems, an appropriate storage-based fast-replication process is performed before the IMS Cloning Tool cloning automation is invoked and a list of copied storage volumes is passed to IMS Cloning Tool for use in later processing steps.

----Once the copy is complete which is in seconds, IMS Cloning Tool can resume the source log. At this point, we are done using the production IMS system.

The following steps will be performed on the target or cloned IMS system shown on the right side of the slide

• Step 5 - The data sets on the target volumes are renamed and cataloged to a new high level qualifier. Data sets are renamed to eliminate duplicate data set names from a z/OS ICF catalog perspective and to allow the new data set names to be integrated into the cloned IMS system. The cloned IMS data sets can then be used on the same LPAR but integrated into a different IMS system using different data set names.

• Step 6 – The next step is to update the cloned IMS system data sets with the new names and volsers. I'll show you what is updated in the cloned IMS when we get to the next slide.

• Step 7 - The cloned IMS system is then started and can be used to run offload or application work.

36

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**

39

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

40

IBM

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

41

© 2009 IBM Corporation

IMS Cloning Tool simplifies and automate database administration tasks so DBA's can concentrate on business-critical work. They integrate and coordinate the database and storage activities so fast replication can be executed in a safe and transparent manner

_____

So DBA's can provide the high availability solutions their companies require. IMS Cloning Tool clones IMS systems fast and refreshes databases quickly so that clones can be available in significantly less time.

_____

IMS Cloning Tool integrates storage-based fast replication to provide fast and non-intrusive cloning and refresh operation while saving valuable host CPU and I/O utilization costs.

Q & A

42

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**

IMS Configuration Manager
Complements DRD; retains benefits of both approaches

Dynamic resource definition (DRD)
Alternative to MODBLKS

Immediate
Simple
Flexible

MODBLKS
Batch system definition process, with online change process

Structured
Controlled
Organized

43
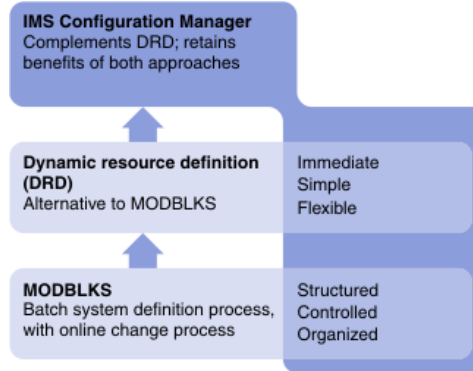
Parameter management

- **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

Select option 3 from main menu - LOAD

Data Management Tools – IMS Tools

Can enter INCLUDE/EXCLUDE parameters
(to select messages)

Load report

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    _  AVE           8 Input queue time
__ PROCESS   _  AVE           8 Processing time
__ OUTPUTQ   _  AVE           8 Output queue time
__ TOTALTM   _  AVE      ----------- Range -----------
__ TOTALTM   _  MAX      From +        To            Report
__ INPUTQ    _  RANGE    >0.1                         PERCENT   Seconds
__ TOTALTM   _  RANGE    >0.5                         PERCENT   Seconds
__ CPUTIME   _  AVE           8 CPU time
__ DBCALLS   _  AVE          10 DB call count
__ RATESEC   _               10 Transaction rate / Second
__ EOR                   ------------------ End of Report ------------------
****************************** 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:                       -----  Report Interval  ------
1   1. Report                                        YYYY/MM/DD   HH:MM:SS:TH
    2. Extract                            From  _____  _____
    3. Transit options                   To    _____  _____

Reports Required:
                           Time      Totals              Digit      Tran Report
      Type       Form +    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

SUMMO001 Data from 11.30.00 01May2011 to 11.40.00 01May2011                    Page  1

                        Avg     Avg          Avg       Max      >0.1    >0.5    Avg      Avg
             Proc  Tran InputQ Process       Total     Total    InputQ  Total   CPU      DBcall  Rate
Trancode     Vers  Count Time  Time          IMS Time  IMS Time Time    Time    Time     Count   /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】                          【2】   【3】
```

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**

Log records can be selected to display, formatted according to their mapping DSECT, or with additional information only available to IMS Problem Investigator.

Zoom to any field to get further information.

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

Save processing time by using
Transaction Index as input
to IMS PA instead of IMS log

IMS log

IMS
Performance
Analyzer

Transaction
Index

IMS
Problem
Investigator

IMS PA batch job condenses
all IMS log records for
one IMS transaction into
one Transaction Index record

Transaction Index contains performance
information (such as response time) derived
from IMS log fields, enabling more intelligent
filtering and analysis in IMS PI

Transaction index – locate a problem transaction

```
                              Conditions                      Row 1 to 2 of 2
Command ===> _____         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=FUNTRMO7
         LTerm=FUNTRMO7     Terminal=SCOTCPO7 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
```

60

61

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