



IMS Cloning Tool

IMS Cloning Tool – Faster, Automated, IMS Cloning and Refresh Operations

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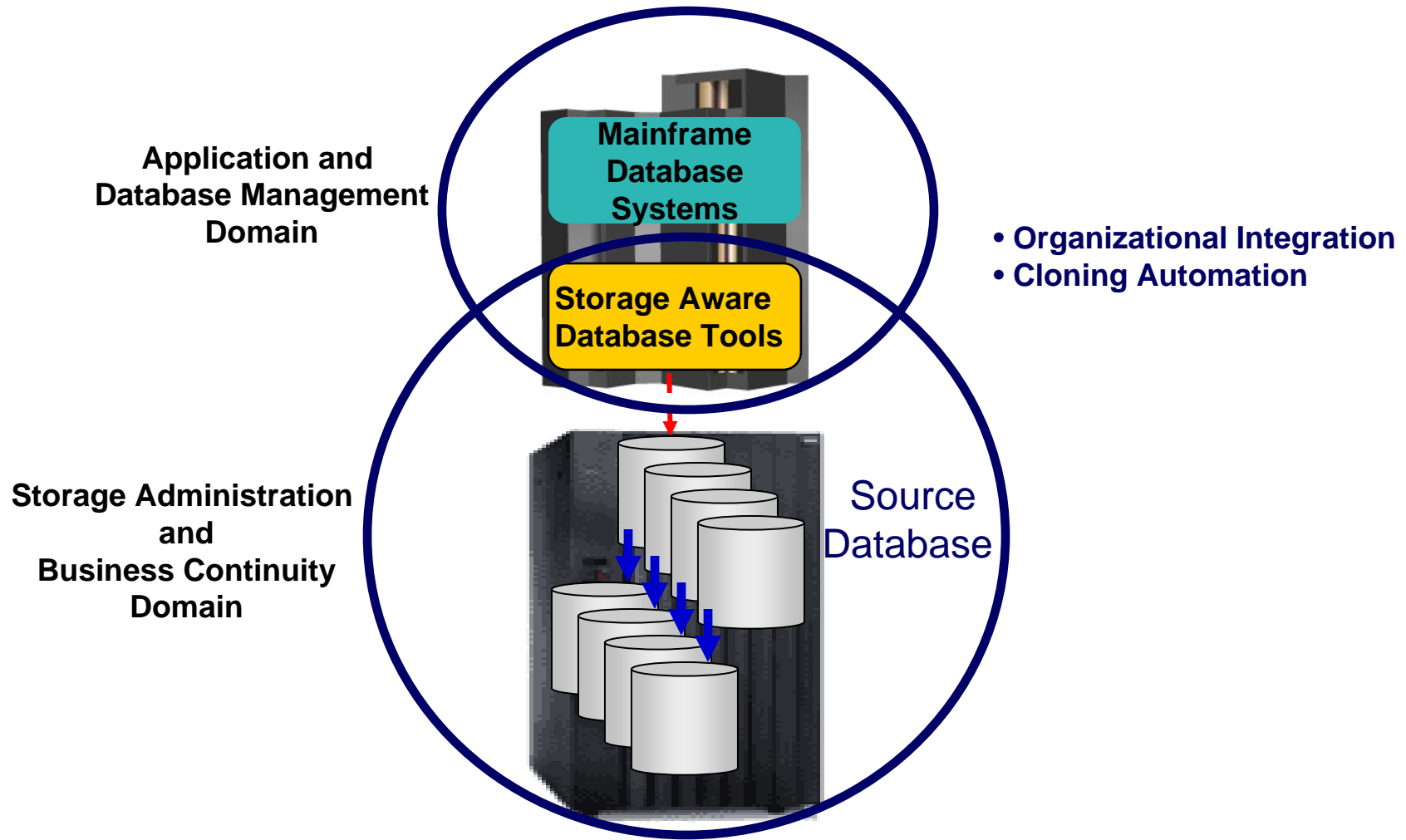
Agenda

- **Trends and Directions**
- **Data Cloning Terminology**
- **Use Cases for Cloning IMS Systems and Databases**
- **Traditional Copy/Cloning Methods**
- **Storage-based Fast Replication**
- **IMS System Cloning and Challenges to Data Access**
- **Using IMS Cloning Tool to:**
 - Clone an IMS System by Volume
 - Refresh IMS Databases by Data Set

Trends and Directions

- **IMS and DB2 systems require high availability as these systems and the web have evolved**
- **Need fast and non-intrusive cloning and backup facilities to maintain high availability**
 - Storage processors have evolved
 - All that functionality can be moved into the storage processor
 - Most cloning, backup, and recovery 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)
 - Not many tools integrate database management with storage to drive fast replication

Trends and Directions: Database and Storage Integration



Database and Storage Integration Operational Advantages

- **Reduce administration costs through automation**
 - Fast replication executed in safe and transparent manner
- **Reduce host CPU and I/O resource utilization**
 - Copy process is done in the storage processor
- **Copy data instantaneously**
 - Data cloning in minutes
- **Promotes high availability solutions**
 - Copy of production data without sacrificing data availability
 - Clone IMS systems in less than an hour

Data Cloning Terminology

- **What is a clone?**

A clone is an exact replica

- **What is IMS system and database cloning?**

The act of replicating the data, making the replica accessible, and then using the replica in lieu of the original data



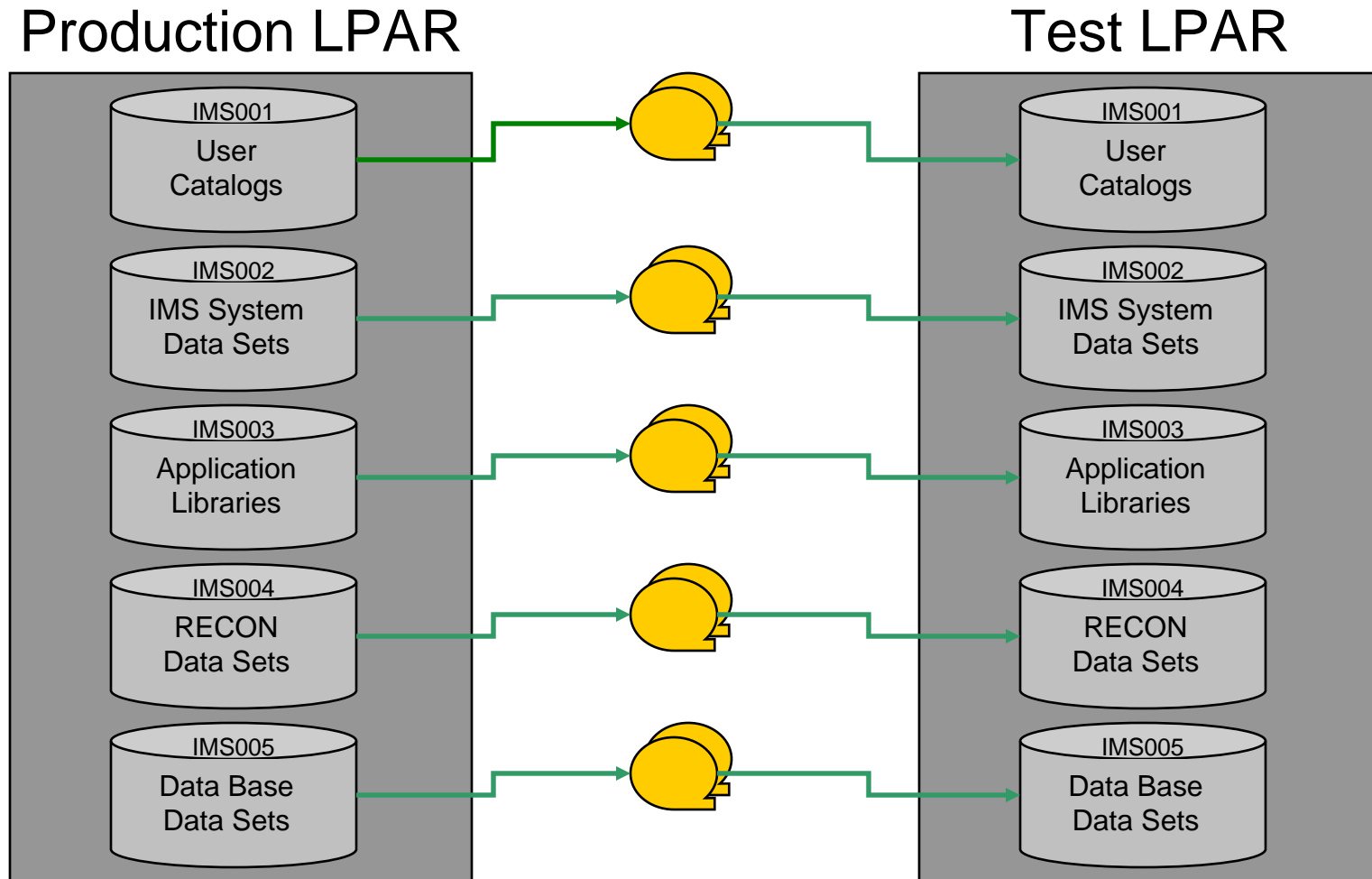
Use Cases for Cloning IMS Systems and/or Databases

- **To run 'read-only' production**
 - Offload business processes from production
 - Improve production performance
 - Run pointer checker utility from the clone
- **To create or refresh test, quality assurance, or development environments**
- **To apply maintenance and verify integrity before applying to production**
- **To stage data-warehouse loads**
- **To aid in problem determination**
- **To refresh databases into a previously cloned IMS skeleton**

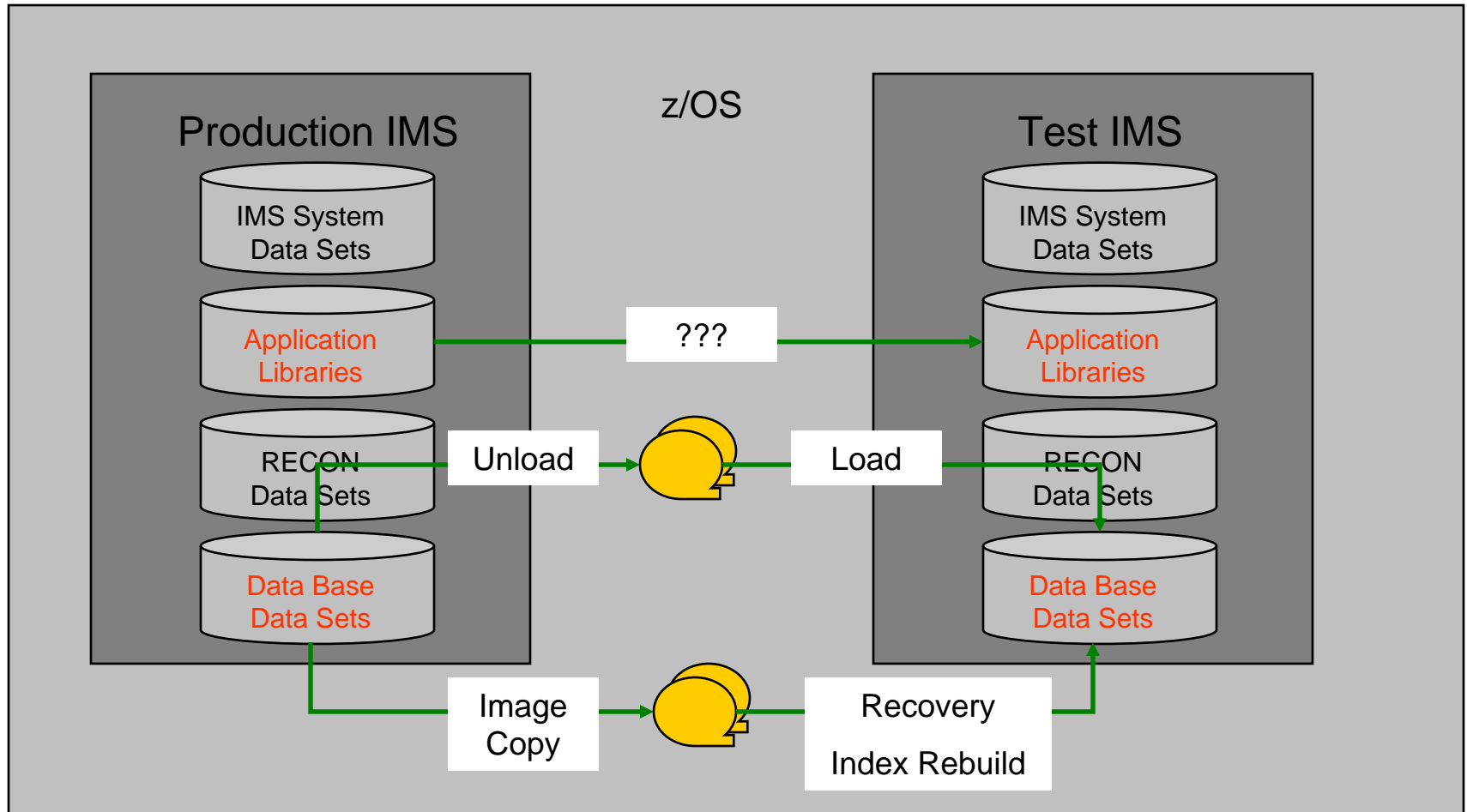
You may be cloning your IMS systems and databases today!



IMS System Cloning Today



IMS Database Cloning Today



Problems with Traditional Methods

■ **Slow**

- Can require the data to be stopped for a long time while the copy operation is performed

■ **Impacts high availability**

- Customers waiting
- Users waiting

■ **Expensive**

- Resource intensive
 - Use large amounts of host CPU and I/O

■ **For IMS system cloning**

- Requires a separate LPAR to house the copy
- Same volumes and data set names

Storage-Based Fast Replication

- **What is storage-based fast replication?**
 - The act of copying volumes or data sets using microcode facilities in the modern storage processors
- **Fast**
 - Copies data instantaneously
 - Combined with IMS Cloning Tool
 - IMS system cloning on average – < 30 minutes
 - Database refreshes - minutes
- **Provides high availability**
 - Provides a consistent copy of production
 - Allows clones to be available quicker
- **Provides huge cost savings**
 - Doesn't use host CPU or I/O resources
 - Copy process is done in the storage processor
 - > Save CPU and I/O costs
 - Save personnel time

Storage-Based Fast Replication

■ By Volume

– Snaps

- Volume FlashCopy (IBM,EMC,HDS)
- Volume SnapShot (IBM,STK)

– Onsite mirrors

- TimeFinder/Snap(EMC)
Metro Mirror (IBM)
- SRDF (EMC)
- TimeFinder/BCV (EMC)
- ShadowImage (HDS)

■ By Data set

– Snaps

- Data Set FlashCopy (IBM,EMC,HDS)
- Data set SnapShot (IBM,STK)
- Data set Snap (EMC)



Other Solutions Used to Copy Data

■ By Volume

- Software Point-in-Time Copies
 - TDMF (IBM)
 - FDRPAS (Innovation Data Processing)

■ By Data set

- Any traditional data set copy
 - Much slower



Challenges to Data Access on the Same or Shared LPAR

■ **IMS system cloning by volume**

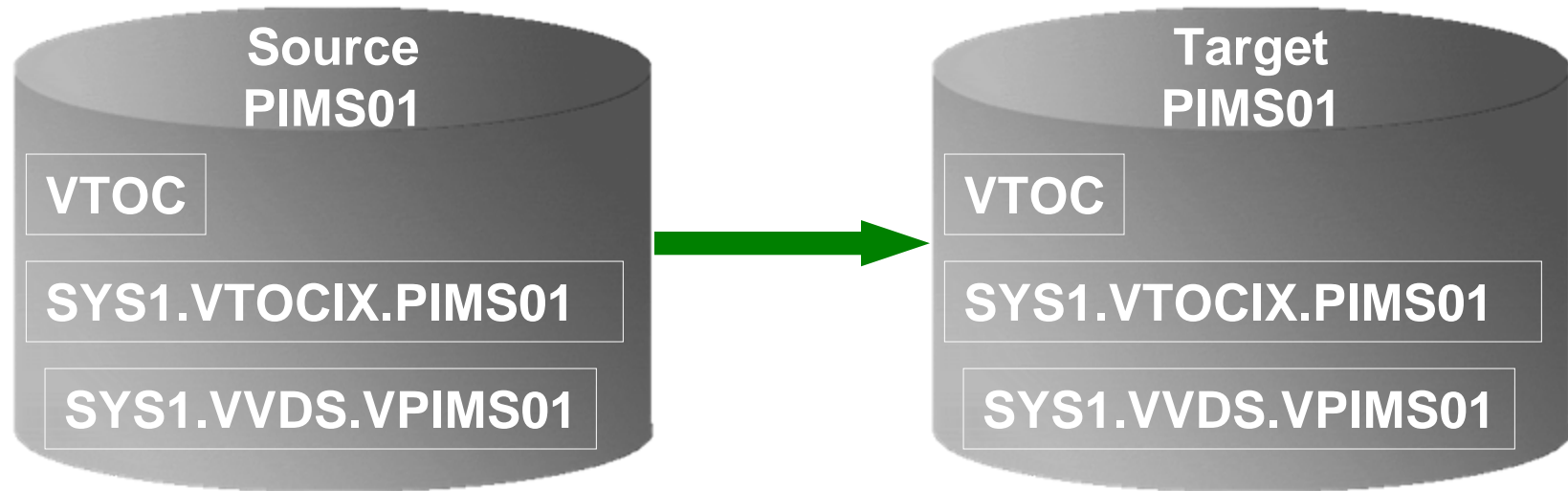
- The volumes have been cloned but how do you access the data that was just cloned?

■ **Problems:**

- VOLSERs can have the same volume names as the source
- Data has the same data set names as the source
- If you don't want to access the data from a different, non-sharing system, how do you access the data?



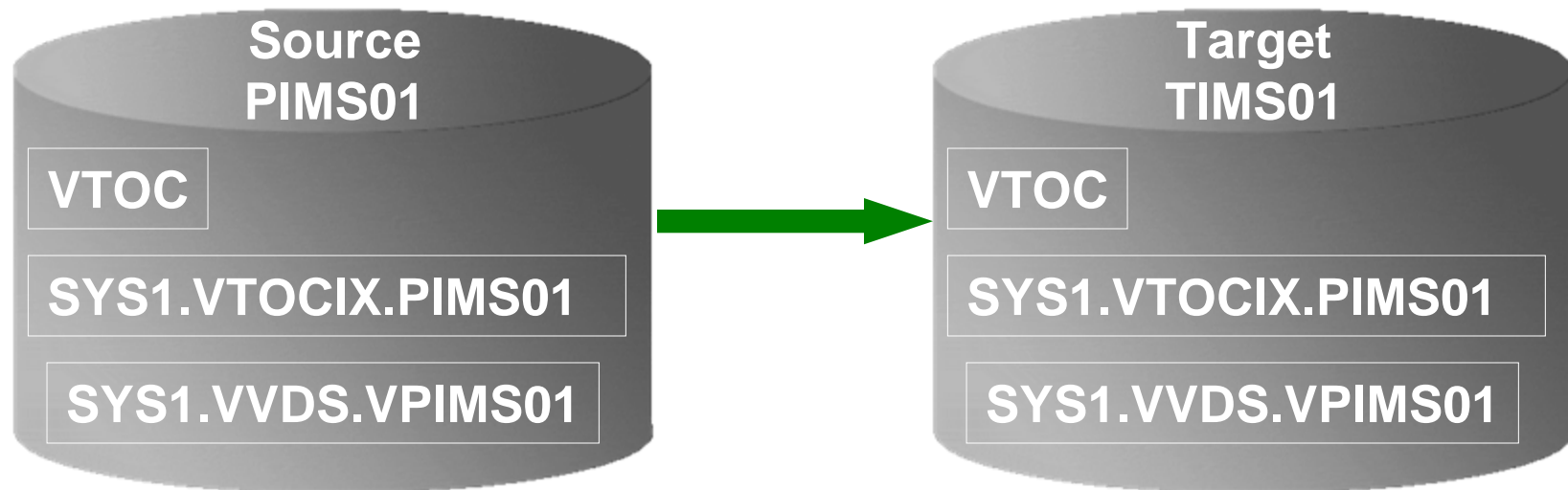
Cloned Volume Data Access Challenges: Volume ID Issues



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.

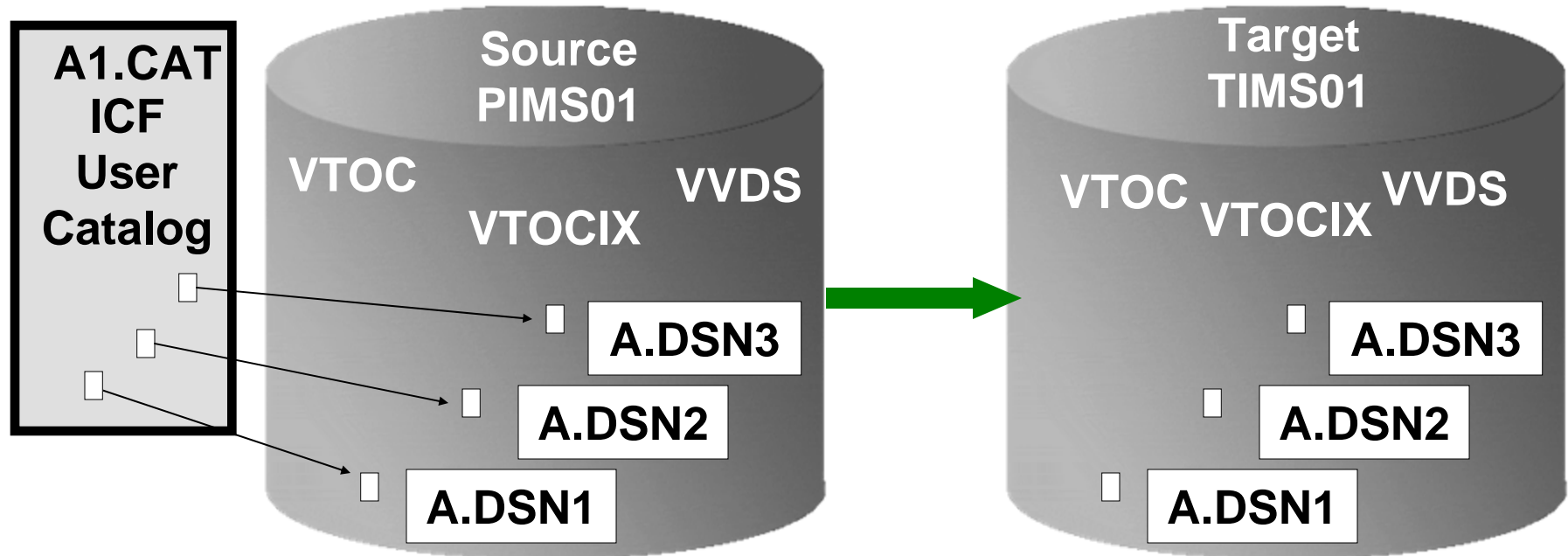
Cloned Volume Data Access Challenges: Volume ID Issues (2)



Result:

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

Cloned Volume Data Access Challenges: Data Set Name and Cataloging Issues



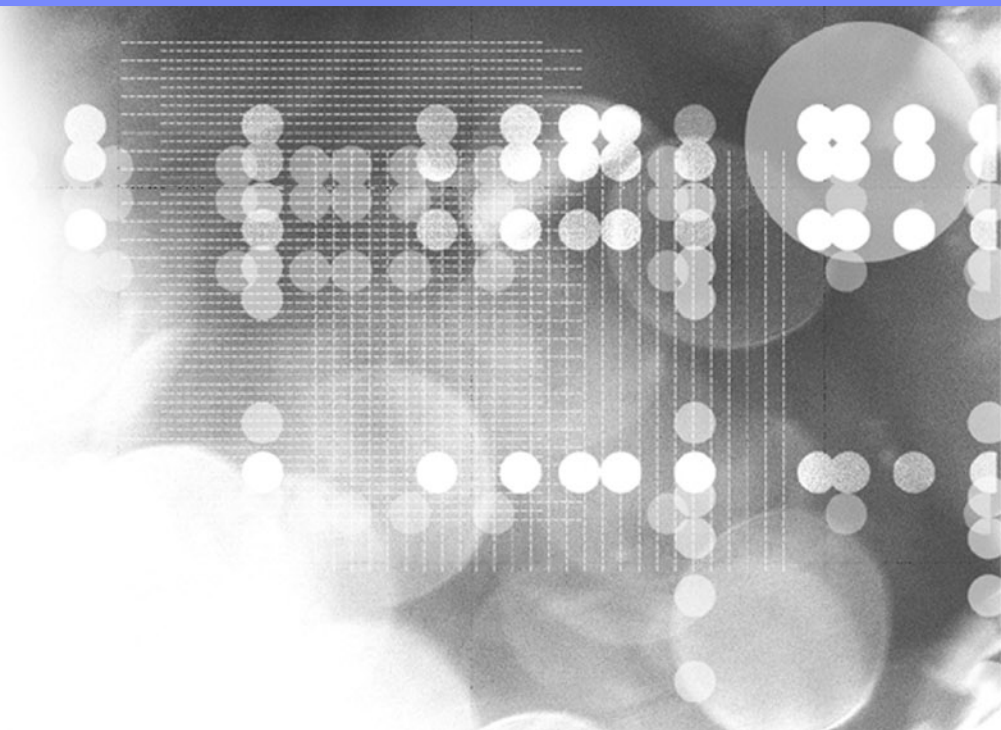
Result:

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

IMS Cloning Tool



IMS Cloning Tool Overview

- **Clones IMS systems (includes all databases)**
 - Uses volume-based fast replication, including:
 - FlashCopy (IBM,EMC,HDS), TimeFinder/Snap(EMC), SnapShot (IBM,STK), Onsite Mirrors, Software Point-in-Time
 - Performs the necessary operations so that the data can be used by the cloned IMS system
 - IMS Cloning Tool 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

IMS Cloning Tool Overview

■ Refreshes IMS databases

- Uses data set based fast replication, including:
 - FlashCopy (IBM,EMC,HDS), TimeFinder/Snap(EMC), SnapShot (IBM,STK)
- Performs the necessary operations to enable the cloned databases to be used on the same or another IMS system



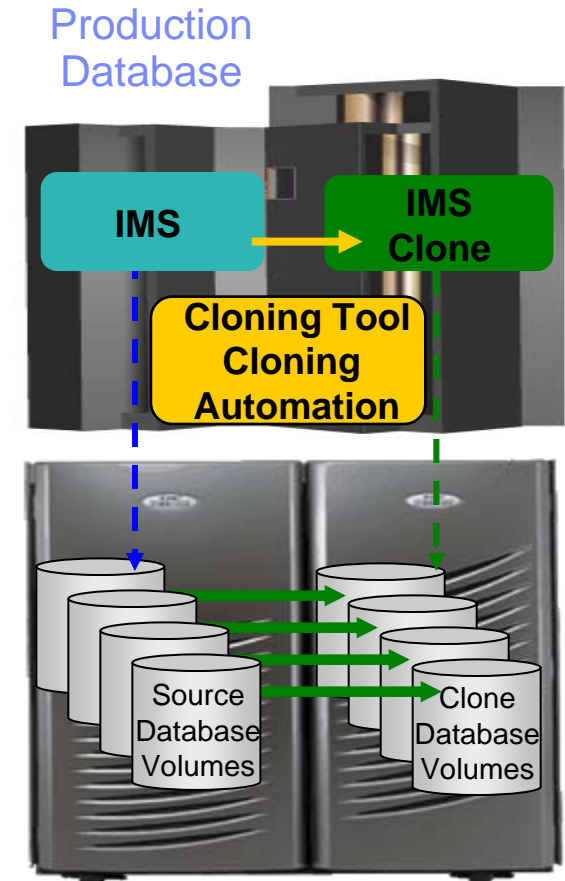
IMS Cloning Tool

Using IMS Cloning Tool to Clone IMS Systems by Volume



Cloning IMS Systems Using IMS Cloning Tool

- **Performs IMS system cloning automation**
 - Simplifies IMS cloning processes
 - Reduces cloning time and administration costs
- **Leverages fast replication facilities to clone data**
 - Data can be cloned while on-line or off-line
- **Performs rapid volume reconditioning and dataset renaming on cloned database volumes**
 - Critical component of the database system cloning process
- **Adjusts target IMS to accommodate and accept the cloned data**
 - IMS RECONS, PROCLIB, JOBS, JCL, MDA members

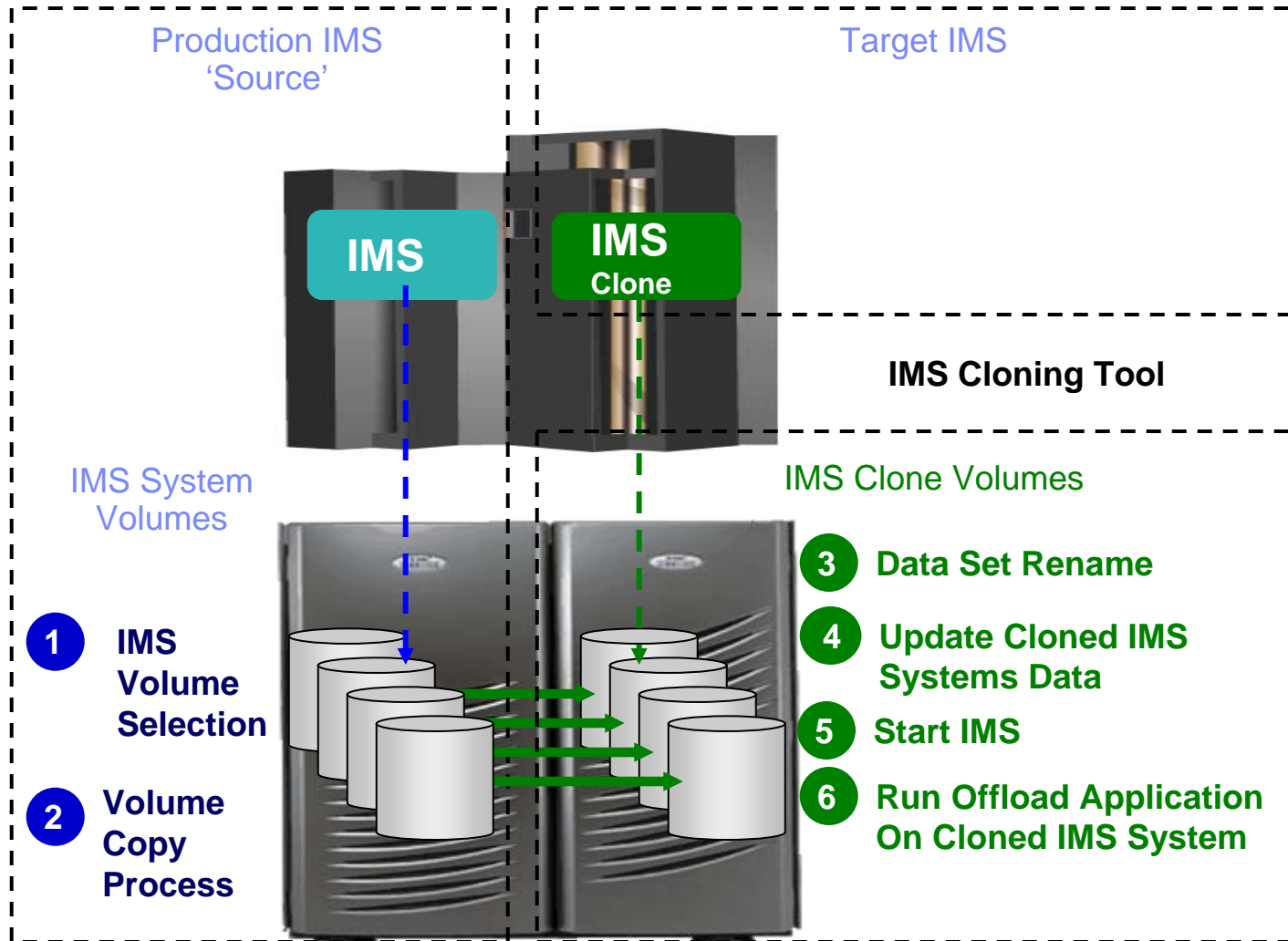


One Time Set Up - Target IMS System

- **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 Subsystem Cloning Steps



Cloned IMS System Updates

■ Update IMS cloned system

– 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

- **Update IMS cloned system**
 - 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 offline
- IMS data sharing
- IMS data sharing with many to less members
- IMS data sharing to non-IMS data sharing



IMS Cloning Tool

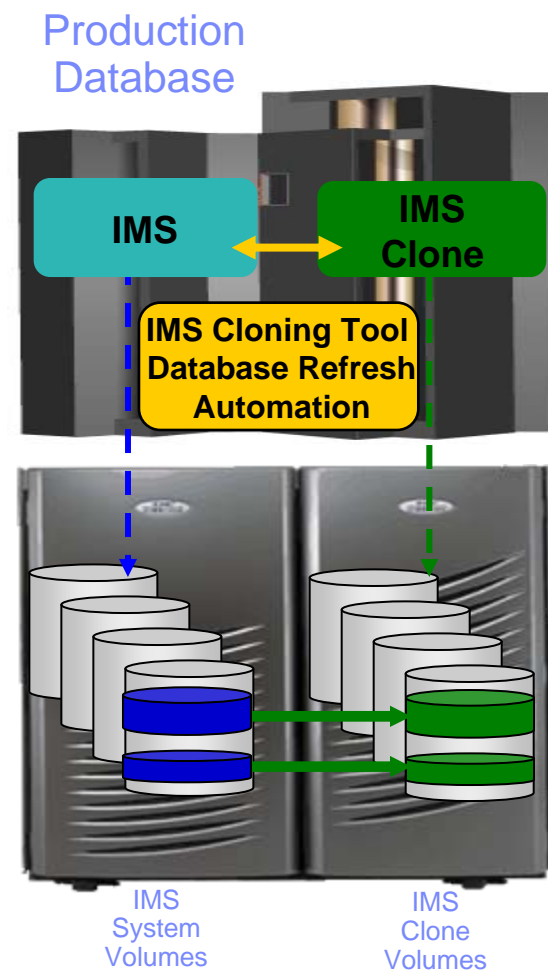
Using IMS Cloning Tool to Refresh IMS Databases by Data Set

IMS Database Refresh Overview

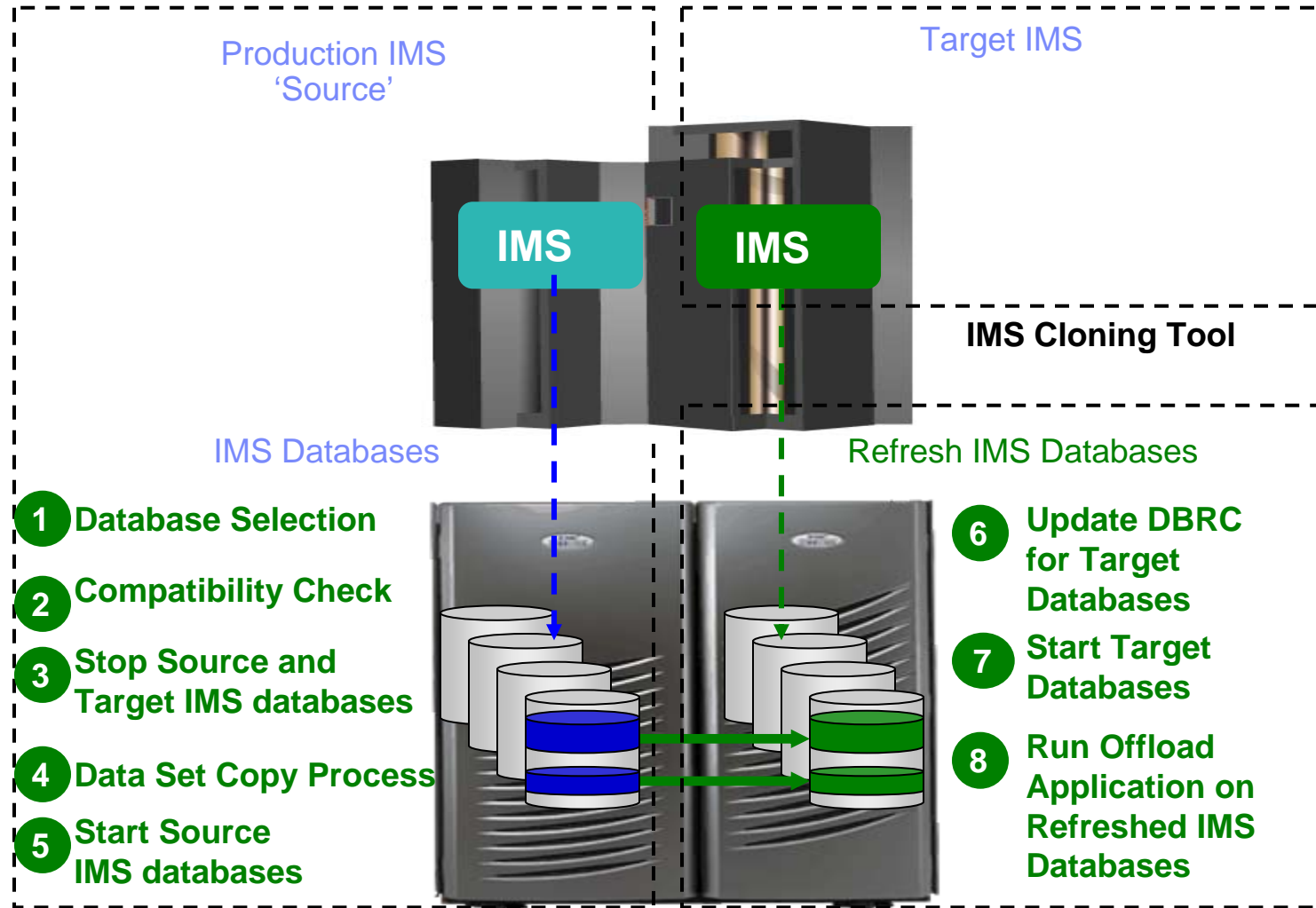
- **Uses data set fast replication**
 - Does not use volume copy
 - Any fast replication data set copy mechanism can be used, including
 - FlashCopy (IBM,EMC,HDS), TimeFinder/Snap(EMC)
 - SnapShot (IBM,STK), DFSMSdss or FDR
- **Traditional copies can also be used but are much slower**
- **Refreshes IMS databases within the same IMS system or to another IMS system**
 - Lowest level that can be copied is a data set
- **Updates DBRC information for target databases**

Refreshing IMS Databases Using IMS Cloning Tool

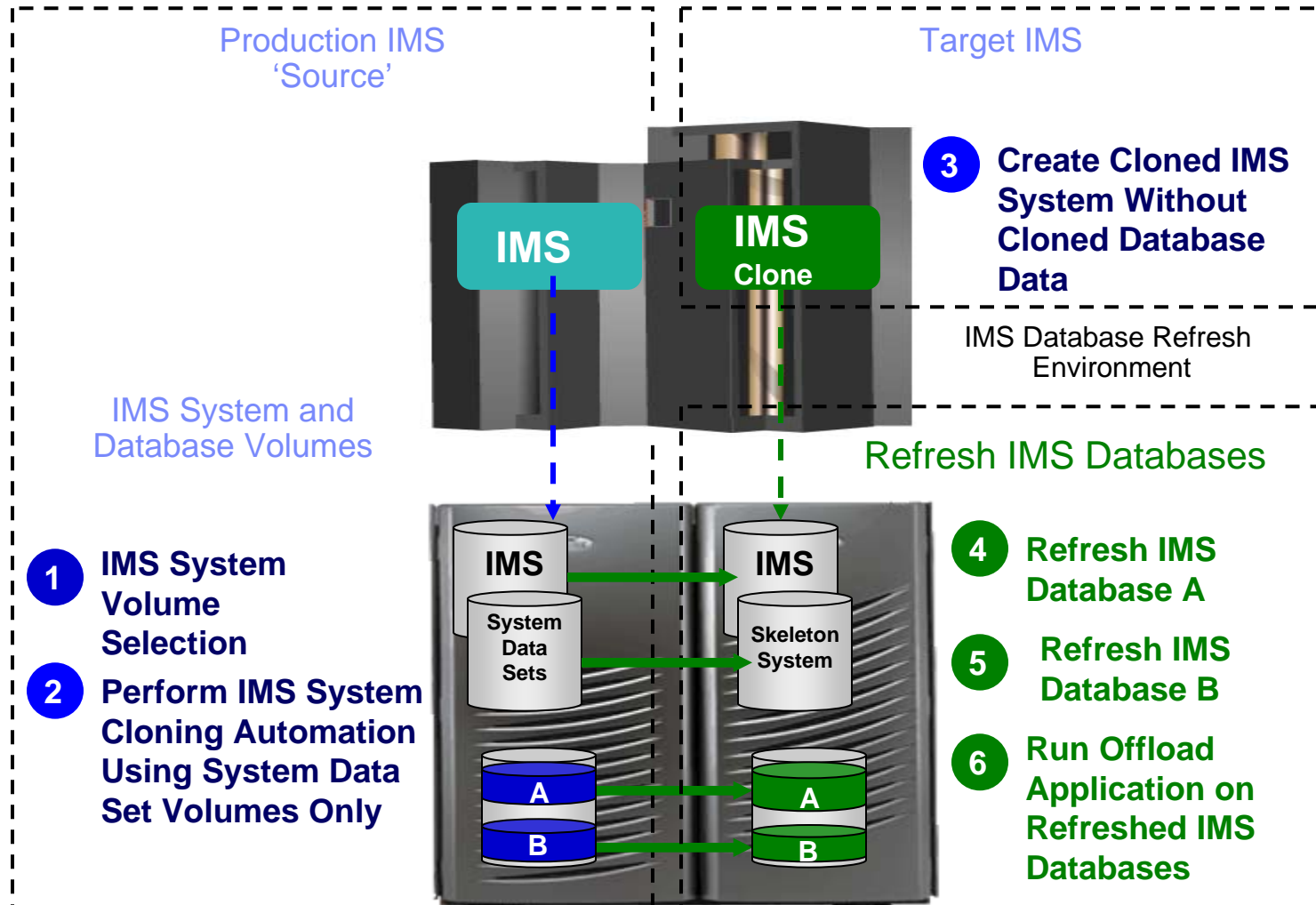
- **Performs automated IMS database refresh operations**
 - Fast refresh of IMS databases
 - IMS DB support (FF, HALDB, DEDB)
- **Verifies source and target database compatibility**
- **IMS data copied using storage-based dataset fast-replication**
 - Target takes up the same amount of space as the source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



Refreshing IMS Databases Using IMS Cloning Tool



IMS Database Refresh to a Cloned IMS Database Skeleton



Copy Job (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
```

Copy Job (Verify 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	CIsze, record length, DDATA, source and target segment codes, Sparse routine
Partitioned Index	Number of Partitions, Keystng

Use Cases

- **To create a test or development environment**
- **To refresh databases in a test or development environment**
 - Addresses HALDB copy challenges
- **To run ‘read-only’ production**
 - Offload business processes from production
 - Improve production performance
 - Run pointer checker utility from the clone
- **To apply maintenance and verify integrity before applying to production**
- **To stage data-warehouse loads**
- **To aid in problem determination**
- **And more**

Run Pointer Checker Utility on the Clone

- **DBA's have to balance the value IMS pointer checker utility analysis provides with the adverse affect it can have on running production applications**
- **The questions that database administrators must ask are:**
 - What IMS pointer checker utility functions need to run?
 - How often do they need to be run?
 - How much impact will the utility functions have to production data?
 - How can the impact to production data be reduced?
- **Running pointer checker on the clone preserves the availability and performance of running IMS applications**

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

Benefits

- **Promotes high availability solutions by leveraging fast replication and automation**
- **Copies production data instantaneously: system clones in less than an hour, database refreshes in minutes**
- **Significantly reduces costs by using less CPU and I/O**
- **Removes production contention by offloading work to the clone**
- **Reduces administration costs through automation**
- **Executes fast replication in a safe and transparent manner**
- **Reduces downtime through fast replication and automation**
- **Example savings: Total savings over 3 years for a site with 1264 MSU's and 4290 GB of IMS data is approximately \$ 8,396,301.57**

Q & A

