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Database Backup and Recovery for IMS

Manage IMS backup, recovery, and disaster recovery using a system level backup methodology to minimize IMS down time. Provide instant backup, parallel recovery, and disaster restart while using less CPU and I/O resources.

Database Backup and Recovery for IMS (DBR for IMS) is an IMS backup and recovery solution that simplifies and speeds up IMS backup, recover and disaster recover operations. DBR for IMS is a "storage-aware" backup and recovery manager that is tightly integrated with storage processors to speed up IMS backup and recovery processing and save CPU and I/O resources by using storage-based fast-replication facilities. DBR for IMS automates storage management functions for DBAs so they can leverage storage-based fast-replication without having to create or use storage specific commands, scripts, or JCL. An overview of DBR for IMS and its storage-aware facilities is shown in figure 1.

DBR for IMS provides a fast and easy-to-use implementation of an IMS system level backup methodology where backups can be used for system, application, database, or disaster recovery purposes. It reduces backup windows by leveraging storage-based fast-replication such that backups of multi-terabyte databases can be performed in seconds or less. It simplifies backup and recovery methodologies by allowing full-system, application, and database level recoveries to be performed from a common system level backup.

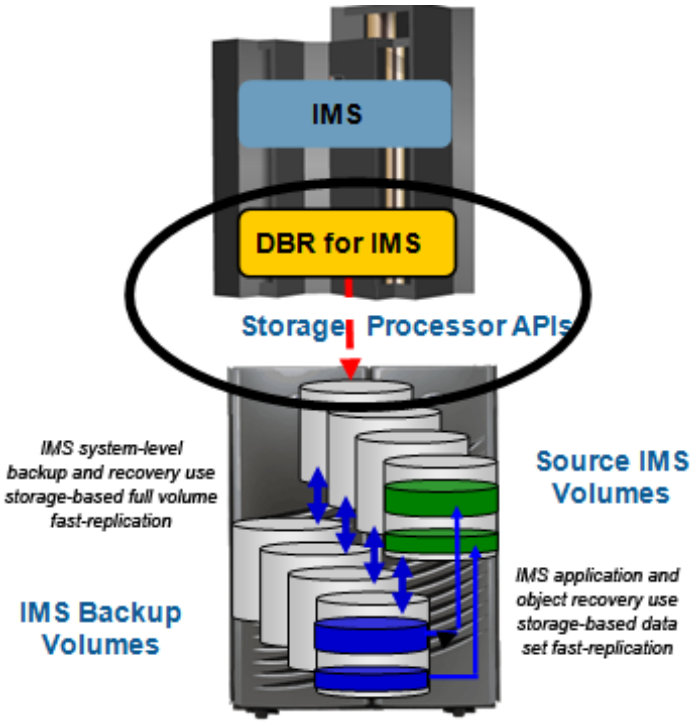

Figure 1 DBR for IMS is storage-aware and uses storage processor APIs to create IMS system-level backups.

DBR for IMS uses an intuitive and sophisticated ISPF interface to navigate through its features and use. DBR for IMS main ISPF menu is shown in figure 2.

Figure 2 DBR for IMS ISPF main menu.

- User Settings - Establishes configuration and usage defaults.
- Systems Backup Profiles - Defines system backup profile characteristics including; number of online backups, backup type, consistency method, fast replication usage, etc.
- System Restore and Offload - Provides facilities to select a system backup for recovery and specify recovery type and scope. Defines backup archival characteristics including data mover specifications, tape naming schemes, number of maintained offline backups, etc.
- Application Profiles - Specifies database groupings and recovery options for database and application recovery coordination.
- Disaster Recovery Profiles - Specifies source and recovery site structures that are used to automate remote recovery processes, reduce recovery time objectives (RTO), and minimize recovery point objectives or data loss (RPO).
- IMS System Analysis and Configuration - Discovers IMS systems and identifies database layout issues to support a system level backup methodology that accommodates recovery requirements. DBR for IMS analysis provides comprehensive backup and recovery reporting capabilities and has robust database and storage validity checking to ensure successful creation and usage of IMS system level backups.

IMS System Level Backup

DBR for IMS is a storage-aware backup and recovery solution that backs up IMS systems instantaneously with no impact to business applications. Backups can be made for an entire IMS system or for a partial IMS system. All backups are created consistently using “full” or “data only” system level backup options. DBR for IMS performs system level backup and restore operations by invoking appropriate fast-replication facilities in the storage system through appropriate storage processor APIs. Leveraging storage-based fast-replication to perform backup operations in the storage processor significantly reduces host CPU and I/O Utilization costs and allows CPU upgrades to be deferred.

Storage blades provide storage processor integration and extensibility to support heterogeneous storage platforms and fast-replication features. DBR for IMS supports IBM, EMC, and HDS storage systems and fast-replication facilities using integrated storage blades. DBR for IMS storage blades include:

- IBM FlashCopy Storage Blade - Provides IBM native FlashCopy support
- EMC TimeFinder Storage Blade - Provides TimeFinder/Mirror, TimeFinder/Clone, TimeFinder/Snap Virtual Device, and EMC Ingenuity Consistency Assist support
- HDS ShadowImage Storage Blade - Provides HDS ShadowImage support
- DFSMSdss Storage Blade - Allows backups to be performed using DFSMSdss. DFSMSdss can optionally be used to invoke FlashCopy or SnapShot fast-replication methods.

An IMS system level backup is a “restartable” copy. A restartable IMS copy is one that has a dependent-write consistent data state from an I/O perspective. This data state is identical to the data state that is created by a power failure. A restartable IMS copy is created by suspending I/O while a backup operation is performed. A restartable IMS copy can be created using a DBR for IMS Suspend function or by using storage-based consistency functions.

Meta-data Repository

DBR for IMS has a meta-data repository to record IMS source and backup volume relationships along with correlated IMS recovery information. The repository keeps track of backup volumes, backup time, and pertinent database information to aid recovery. It records data set and volume mapping to allow database recovery from a system backup. The meta-data repository is maintained by DBR for IMS and can be backed up when an IMS system level backup is performed.

Multi-purpose System Level Backup

DBR for IMS generated system level backups can be used for multiple purposes and saves storage and processing resources. An IMS system level backup can be used for IMS system recovery, application recovery, database recovery, and for disaster restart or recovery. Thus, saving the CPU, I/O and storage resources required to make multiple backups for different purposes.

IMS Discovery, Analysis, and Configuration

DBR for IMS discovers IMS systems and provides configuration advice for adjusting data set layouts to accommodate a system backup methodology. It provides guidance and assistance in isolating IMS recovery structures from IMS database structures when recovery objectives require data set isolation. Reports show IMS data set and volume mappings and highlight volumes where non-IMS data sets are collocated with IMS data sets. It provides alerts when identifying data set layout issues that may affect recovery operations.

Backup Profiles

Backup profiles make it easy to define and manage your backup processes. Backup profiles define the type of fast-replication to use, source IMS volume and backup volume relationships, the number of online backups to maintain, backup consistency mechanisms, and tape archival characteristics. Backup profiles contain information and options needed to perform a system level backup and provide validity checking to ensure backups are complete. DBR for IMS generates JCL that is used to execute the backup using the characteristics defined in the backup profile. The generated JCL can be used to perform the IMS system level backup at predetermined times.

Backup Validation

DBR for IMS automatically performs IMS discovery during the backup process to validate that backups are complete. The validation ensures the integrity of the restoration process which provides the basis for successful recovery. It validates ICF catalog information, source and target volume information, recovery structures and database data separation, and it ensures the DBR for IMS meta-data repository resides on a separate device from volumes being backed up. DBR for IMS can ensure that system backups are valid for a recovery to a specific point in time.

Managed IMS Recovery Processes

DBR for IMS leverages existing IMS recovery tools by using them in managed recovery processes. Preferred recovery tools and processes can be specified to manage the recovery functions that are needed to recover databases and indexes. When a recovery process is executed, DBR for IMS determines the state of the databases to be recovered and decides what recovery utilities need to be executed. DBR for IMS determines the data sets to be recovered and whether they should be restored from a system level backup or whether they should be restored from an image copy. If an IMS change accumulation is specified or is required to merge log updates, then DBR for IMS invokes the specified IMS change accumulation utility. DBR for IMS can also invoke index rebuild utilities and specified post recovery image copy utilities if preferred. The DBR for IMS managed recovery process is shown in figure 3.

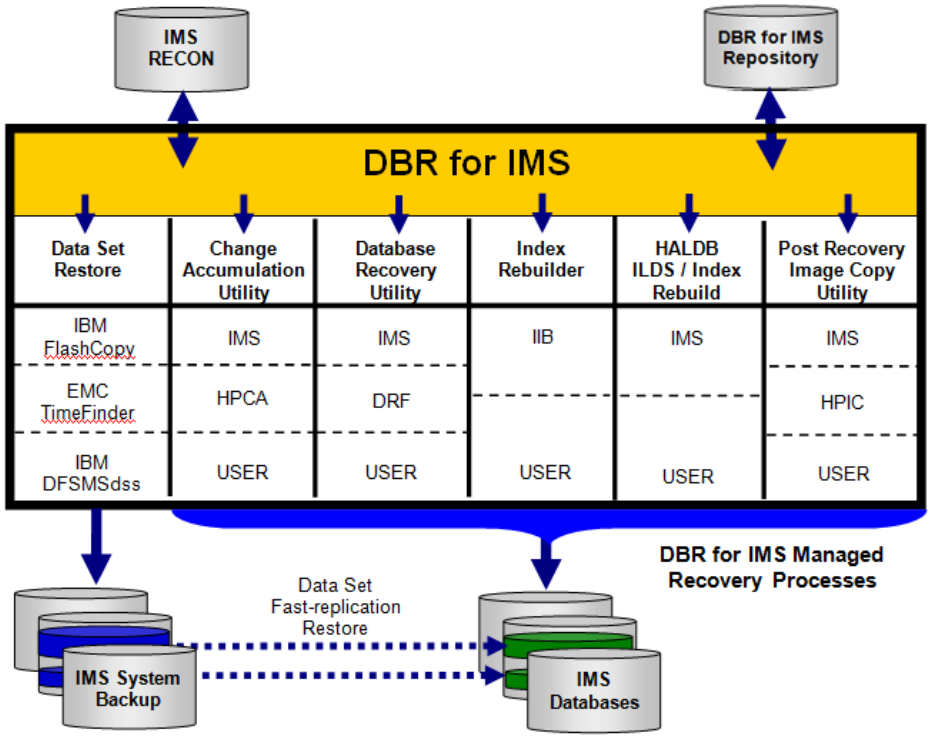

Figure 3 DBR for IMS recovery management process.

Partial IMS System Backup

DBR for IMS can perform partial system backups to minimize storage resource utilization and accommodate backup methodologies where application databases are backed up more or less frequently. A partial system backup is one where select volumes that support specific application databases are backed up using volume based fast-replication. DBR for IMS partial system backups are faster than using image copy processes, all related databases are backed up at the same time, and backups are performed without using host

CPU and I/O resources. Partial IMS system level backups cannot be used for IMS system recovery but can be used for application or database level recovery. Partial IMS system level backups reduce application and database recovery time as backups are restored using data set fast-replication and IMS log apply processing is minimized.

Backup Archiving and Tape Offload

DBR for IMS manages the archival of disk based backups by offloading them to tape or copying them to disk. DBR for IMS supports DFSMSdss and Innovation Data Processing's FDR for performing the tape, disk, or remote disk offload process. Archive tuning options allow specification of the number of subtasks and the number of disk volume backups to stack on single output tape. Data encryption offload options support DFSMSdss and FDR encryption mechanisms.

IMS Recovery Performed Efficiently

DBR for IMS reduces recovery time by parallelizing restore and recover operations. DBR for IMS uses storage-based fast-replication facilities to restore backups quickly while invoking IMS recovery processes in parallel to reduce overall recovery time and minimize IMS and application down time. IMS systems are restored using volume-based fast-replication and IMS applications and databases are restored using data set-based fast-replication facilities.

IMS System Recovery

IMS system level backups are "restartable" copies that have a dependent-write consistent data state preserved during the backup process. The backup data state is identical to that created by a power failure. IMS system recovery is accomplished by restoring a system level backup and IMS recovery is performed implicitly using IMS emergency restart procedures. IMS emergency restart performs recovery functions that transform the dependent-write consistent data state to a transactionally consistent data state. Recovery can be performed to the point-in-time of the backup or to any point-in-time after the backup, such as system checkpoint or log archive times, to control the recovery scope. Recovering IMS systems to a point after the backup is performed by restoring a system level backup and then determining and invoking the recovery processes needed to apply log updates for all databases in the IMS system.

DBR for IMS generated system level backups can be restored from disk or tape. Tape restart options are available to reduce the impact of job failures while restoring an IMS system level backup from tape. DBR for IMS keeps track of volumes in the meta-data repository as they are restored and the DBR for IMS system restore operation can restart from the failure point when the RESTART parameter is used. This parameter allows DBR for IMS to bypass restoring volumes from tape that were successfully restored in the previous job.

IMS Application Profiles

Application and database recovery is performed by creating application profiles that predefine groups of databases that are recovered together. Database groupings can be related to an application. When the need to recover arises, the ISPF interface is used to select the appropriate application profile. DBR for IMS executes the profile by analyzing the recovery resources available and automatically generates recovery JCL for all databases and indexes in the profile. The JCL generated is used to restore databases and indexes in the most effective manner using a system level backup or image copies and then invoking any necessary recovery or index rebuild utilities.

Database Recovery

IMS applications and databases can be recovered using a system level backup. Recovery is performed quickly using storage-based data set fast-replication facilities to restore IMS database data sets while invoking IMS recovery processes in parallel to reduce overall recovery time and minimize application down time. Application and database recovery is done by creating application recovery profiles

that predefine groups of databases that are recovered together. In addition, all related indexes and logically related databases can automatically be included in the application profile. DBR for IMS supports recovering databases to current or to a specific timestamp.

IMS Disaster Recovery and Restart

IMS system level backups simplify IMS disaster recovery operations by transforming disaster recovery procedures into an IMS disaster restart process that reduce IMS recovery time objectives. An IMS system level backup can be used to restart the IMS system at a point in time when the backup was performed. IMS databases can also be automatically rolled forward using other IMS recovery assets like offsite image copies, change accumulation files, and archive logs created since the system level backup.

DBR for IMS performs disaster restart operations by restoring the IMS system from the last offsite system level backup. IMS emergency restart procedures perform recovery functions that transform the dependent-write consistent data state created during a system level backup operation to a transactionally consistent data state. Disaster recovery operations become as simple as restarting the IMS system from a power failure.

When recovery point objectives require IMS to be recovered to a more recent time than the last system backup, then other recovery assets such as image copies, change accumulation files, and archive logs can be used to roll forward. DBR for IMS can invoke the IMS recovery utilities using the offsite recovery assets prior to restarting IMS. When the databases have been recovered to the desired point-in-time, then IMS can be cold started to complete the disaster recovery process. DBR for IMS manages these types of disaster recovery processes by creating updated RECON data sets and all associated JCL required for managing the disaster recovery processes. The updated RECON and associated JCL is created periodically at the source site and sent to the recovery site prior to the disaster.

Offloading storage-based IMS system level backups to tape and then transporting the tapes to a disaster recovery site provides an effective tape-based disaster restart solution. A tape-based disaster restart solution transforms tedious IMS disaster recovery procedures into an efficient tape based disaster restart process. Tape-based disaster restart solutions provide similar business continuity solution advantages as those that are based on remote storage replication like IBM PPRC and EMC SRDF.

Integration with Other Database Management Tools

IMS systems can be cloned using a DBR for IMS generated system level backup as input. Cloning IMS systems allows production data to be used for testing, reporting, data warehouse loading, database utility processing, or other production offload tasks. Offloading these types of activities to a cloned IMS copy reduces production I/O contention and allows processing activities on a static copy of the data. Mainstar: Clone and Rename for IMS (ICR) can use a DBR for IMS generated system-level backup as input to create an IMS clone at the point in time the system-level backup was created.

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