

Instant Snapshot:
Reducing Copy and Recovery Time

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Overview

Within DB2® and IMS environments, there is a need to increase data availability and decrease downtime. To address this need, Instant Snapshot by BMC Software is the newest method to enable immediate, fast copies and restores of DB2 and IMS data. This solution also leverages intelligent storage devices to extend your copy and restore options.

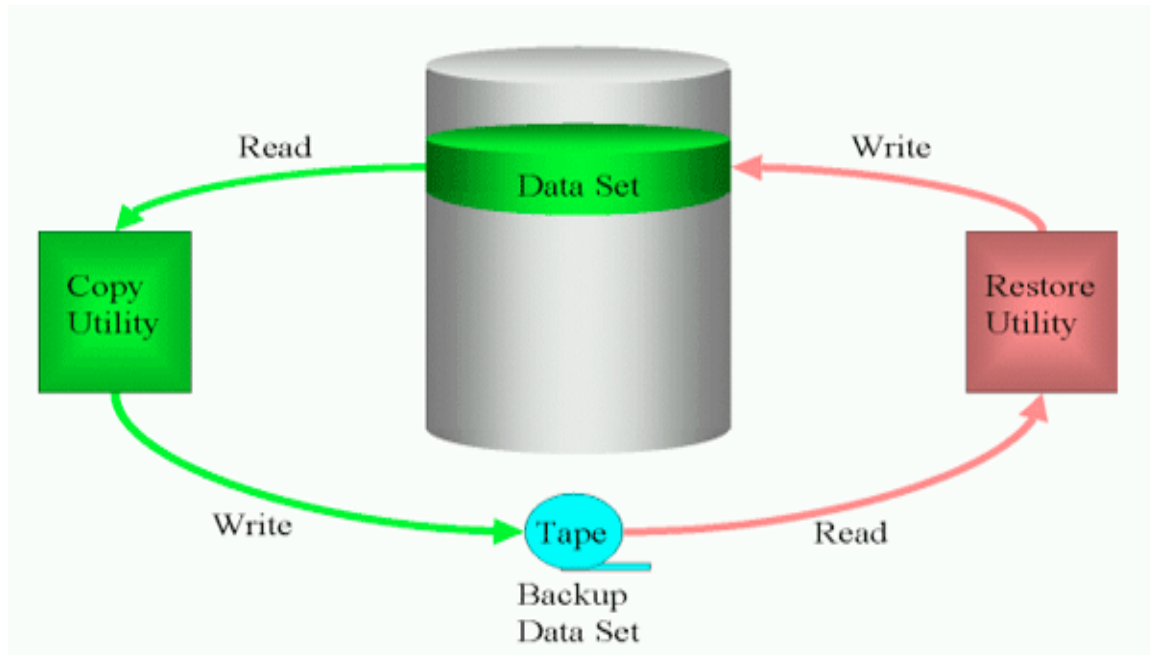
Background

While backup windows are shrinking or becoming non-existent, businesses must manage the availability of critical data and still provide consistent backup of that data. To achieve maximum data availability, many companies are deploying advanced intelligent storage solutions from various hardware vendors. It can be difficult however to exploit these devices to their fullest potential, due to a lack of automation and seamless integration to backup utilities. As a result, companies are now looking for solutions like Instant Snapshot to help leverage current investments in advanced storage solutions *and* provide high availability and recoverability required by e-commerce applications.

The traditional copy-restore process

The traditional copy and restore process requires physical movement of data. The copy process reads the input data set from a disk and writes that data to an output medium (e.g., tape). During the restore process, the data set is read from the backup medium (e.g., tape) and written back to disk. **See Figure 1.**

Figure 1: Traditional Copy and Restore Process



With the traditional copy-restore process, data sets are copied to tape, or another backup medium, then they are restored from that medium. This process consumes valuable time that can be reduced through snapshot technology.

The copy process with Instant Snapshot

Instant Snapshot is a bi-directional implementation of the BMC Software snapshot technology. It uses data-set “*snap*” capabilities of intelligent storage devices. The copy and/or restore process at the data-set level is faster and is less expensive in disk consumption.

With Instant Snapshot, data sets are copied to the same or another storage device via the snap process. The copied data sets are catalogued with unique names and remain on disk. These data sets are immediately ready and available for recovery or other activities.

The value of Instant Snapshot is that it does *not* require data to be physically duplicated onto tape or other media. In fact, it can create external copies of the data sets for offsite storage or for other purposes.

The BMC Software products that support Instant Snapshot for IMS

- IMAGE COPY PLUS
- RECOVERY PLUS for IMS
- SNAPSHOT UPGRADE FEATURE for IMS

The BMC Software products that support Instant Snapshot for DB2

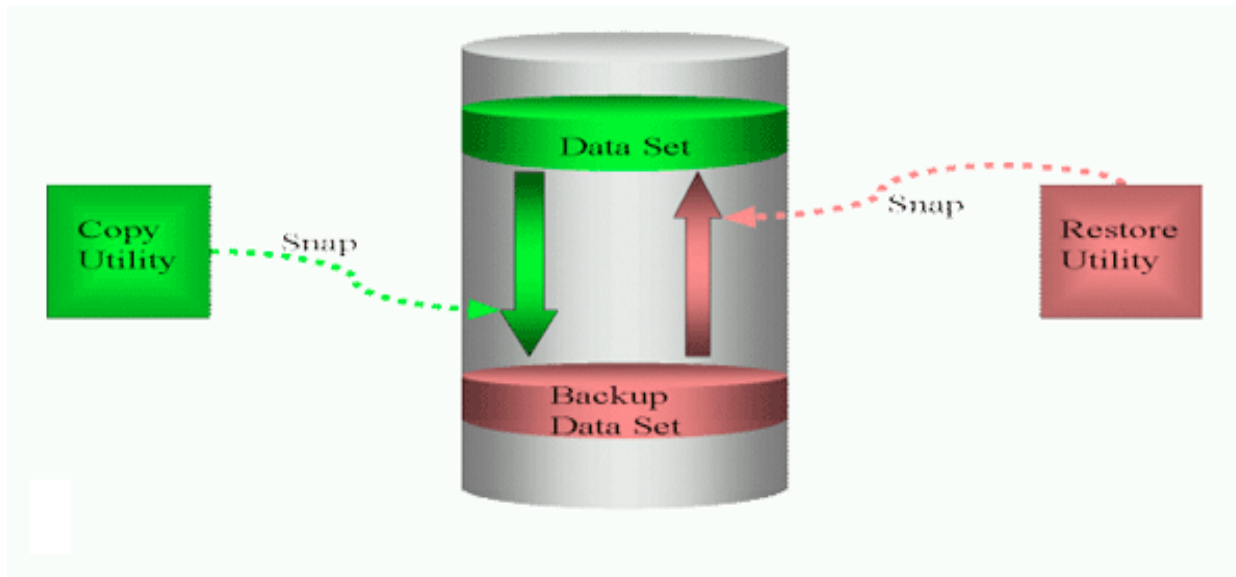
- COPY PLUS for DB2
- RECOVER PLUS for DB2
- SNAPSHOT UPGRADE FEATURE for DB2

The restore process with Instant Snapshot

Restore processing using snapped data sets employs Instant Snapshot technology. The recovery utility (e.g., RECOVER PLUS for DB2 or RECOVERY PLUS for IMS) selects the appropriate data sets based upon the desired recovery point. Instant Snapshot snaps those data sets back to disk using storage vendor technology appropriate to the device. Subsequent *log apply* or other recovery steps can begin immediately thereafter.

Speed in restore processing is the primary advantage of Instant Snapshot. Testing has shown that the snap of a data set requires effectively the same amount of time whether it is one track or two gigabytes. According to tests, restore processing of a 2 GB data set can occur in approximately 12 seconds. See **Figure 2**.

Figure 2: Instant Snapshot Copy and Restore Process



With the new Instant Snapshot process, a data set is snapped by the hardware device in an extremely fast operation. The BMC Software utilities register this snapped copy in the appropriate repository. At the time of recovery, this snapped copy is restored back to the database, again in an extremely fast operation. This process dramatically reduces the time for copy, and more importantly, reduces restore time to seconds.

Mirroring data today

To provide some background for Instant Snapshot, the following information will provide a quick review of the types of storage mirroring available today.

Disk volume mirroring

The traditional perception of disk mirroring is that a second disk is continuously updated with data written to the primary disk volume. This is essentially true for the redundant array of independent disks (RAIDs) and for user-created volume mirrors. This frequently misleads users to believe that splitting a mirrored pair means eliminating the protection offered by a RAID mirror.

Without detailing the many variations of RAID, the almost universal RAID characteristic is that it is implemented by the storage vendor engineer and cannot be changed by the user. The RAID protection architecture (e.g., RAID-1, RAID-5), selected by the user and implemented by the engineer, remains in effect until changed by the engineer.

User-controlled mirroring enables the user to establish and control a continuous duplication relationship between two or more host disks. The mirrored volume is typically an offline volume to avoid problems with duplicate volume serial numbers. The benefit of user-controlled mirroring is that the mirroring can be suspended or stopped so that the mirror volume can provide a point-in-time image of the data on the original disk volume. Access to this functionality is accomplished via a vendor-supplied application program interface (API) or certain OS/390 services.

An example of user-controlled mirroring is the hardware snapshot capability provided by BMC Software's EXTENDED BUFFER MANAGER (XBM) and XBM Enterprise Snapshot™. These snapshot solutions are employed by BMC Software utilities CHECK PLUS for DB2, COPY PLUS for DB2, IMAGE COPY PLUS, RECOVER PLUS for DB2, RECOVERY PLUS for IMS and REORG PLUS for DB2. Using hardware snapshot technology, these utilities are able to operate from point-in-time copies of the data *while* the database continues to be updated.

Snap instead of mirror

Variations of disk mirroring technology have evolved in other ways that are useful to DB2 and IMS environments. Some storage vendors provide the ability to immediately duplicate an entire volume or just a data set. When continuous disk mirroring is not required, Instant Snapshot provides the ability to just snap the volume or data set to produce a point-in-time copy.

Snap technologies differ depending upon the storage manufacturer. Some initiate background copies of the data within the storage control unit, while others just retain the old data when updates occur. A vendor-supplied API or OS/390 service provides access to different snap technologies.

Snapping a disk volume

Snapping a disk volume requires a dedicated target volume. Following the snap, the target volume contains all of the data of the source volume, at the point the operation was requested. As with mirrored volumes, data sets remain uncatalogued, and the snapped volume may need to remain offline to avoid duplicate volume serial numbers.

Snapping a data set

Snapping a data set does not require a dedicated target volume. The output is allocated to one or more volumes within the storage control unit under a new data set name. It may be cataloged and immediately accessible for processing in the same manner as any other data set.

Solving “what-ifs” with Instant Snapshot

As with any technology, there are always “what-if” scenarios. Among other things, hardware-based technologies, at times, require that the data reside on these storage technologies, that it remains on them, and that the storage-vendor support for snap or mirroring be enabled. Some of these what-ifs regarding data migration, offsite recovery, or the like, require action by the storage administrator or DBA, but some of these issues are handled by BMC Software snapshot utilities.

- *What if only part of the data is on snap-capable storage devices?*

Instant Snapshot can only snap data sets that are on snap-capable storage devices.

BMC Software snapshot utilities such as COPY PLUS for DB2 and IMAGE COPY PLUS will automatically use other snapshot services, such as a hardware snapshot using volume mirrors or the traditional cache-based snapshot, for the remaining data sets. The BMC Software recovery application will select the appropriate restore methodology for each data set as needed.

- *What if I want to ensure that the data sets stay on this type of storage device?*

Although this depends upon your site, the most direct method is to ensure that unique SMS classes are defined based upon the storage device capabilities. Instant Snapshot requires that a data-set snap support be available. Hardware snapshot can use storage devices with data-set or volume-mirroring capabilities.

- *What if the data was migrated to tape and restored to other devices?*

If data sets are on snap-capable devices, recovery will snap the data sets from them during the restore phase. If they are not on such devices, or have been restored to devices where it is not possible to snap the data set back, recovery will fail and the utility will need to restore from an earlier copy.

- *What if I need a copy for offsite or disaster recovery?*

Although frequent Instant Snapshots leave the last backup available on disk for instant restore, it is always a good idea to have a recent copy available on tape or other media. A non-Instant Snapshot (e.g., hardware or traditional cache-based snapshot) can be taken periodically, or the latest Instant Snapshot output can be used to create a copy when time permits.

- *What if I want to control the kinds of hardware functionality used?*

There are several ways to control the type of snapshot. First, the control card input to the utilities (e.g., COPY PLUS for DB2, IMAGE COPY PLUS) specifies the snapshot preference. Second, through the ISPF interface to XBM and XBM Enterprise Snapshot, options may be set to enable or disable hardware snapshots or limit it to a data set, hardware mirroring, or several other combinations.

What hardware is supported?

Most major storage hardware vendors provide some version of a data set or volume mirroring. As they are made available, XBM and XBM Enterprise Snapshot support is added. At this time, the following vendor device support is available for instant and hardware snapshots.

Instant Snapshot

- EMC Symmetrix
- IBM® RVA
- StorageTek SVA

Hardware Snapshot

- EMC Symmetrix
- IBM RVA and Shark (PPRC)
- StorageTek SVA
- Hitachi 7700E/9900
- Any PPRC-capable 3390 device

Summary

Instant Snapshot solves a very specific need in the DB2 and IMS environments. It enables frequent backup copies that are available for immediate restore. Tape copies of these backups for offsite storage or other uses can be scheduled when convenient. The quantity of copies to keep on disk and immediately available can be determined by the site requirements.

Instant Snapshot is not a panacea. It requires that data sets be allocated and maintained on snap-capable storage. When a data set does not meet this requirement, this intelligent utility will resort to other types of snapshot (e.g., hardware or traditional cache-based) to make a copy.

Ultimately, whether Instant Snapshot is appropriate for a particular environment depends upon the frequency of backup copies, the service-level requirements of the site, the availability of the required storage devices, and the necessity for rapid restore when a recovery is required.

Helping you maintain advantage

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