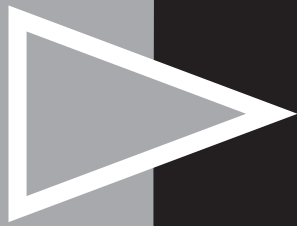




ACTIVATE BUSINESS WITH THE POWER OF I.T.™



Strategies to Expedite IMS Backup and Recovery Processes

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Executive Summary

As IMS teams support growing amounts of data (which often is not even IMS related data), the need for proven processes and technologies becomes business critical. If your business processes fail because of unexpected IMS backup or recovery needs, it directly affects availability and your business health.

Many IT organizations have evolved their own mixes of technologies to meet the increasing demands for availability and service, adding solutions where needed to meet a current demand. These homegrown solutions are often only effective when administered by the team that put them in place. When the IMS team is constrained further by IT budgets and staff reductions, it is almost impossible to use this mix of solutions effectively unless they approach the backup and recovery process with procedures and technology that automates and monitors the environment.

This white paper discusses the importance of effective backup and recovery procedures and reviews the role that the BMC® Backup and Recovery Solution for IMS product (BMC BRS) can play toward automating your IMS environment and freeing the IMS team to be proactive and work most effectively.

Backup and Recovery Challenges

Because IMS systems drive many of your business processes, accuracy and availability are business critical. The IMS team faces daily challenges that directly affect the ability to meet service level agreements, keep customers happy, and contribute to the company's overall business health. These daily challenges include:

- > **Increased availability demand** – Many enterprise applications are Web-based, enabling customers 24x7 access to their accounts. The batch processing typically relegated to nighttime is now done in a window of time that continues to shrink as customers push the limits of availability. Backups often take place while an application is running, forcing ill planned, impromptu application changes.
- > **Shrinking expertise, growing complexity** – IMS system programmers, DBAs, and other mainframe experts are maturing and leaving the workforce, putting IMS systems in the hands of less experienced staff. Yet, the complex systems that have evolved over the past 30 years must be monitored, managed, controlled, and optimized while assuring availability needs.
- > **Failures** – Hardware failures are infrequent today and disk storage is more reliable than ever, but system failures are still a reality. A simple mistake made by a programmer or operator, logic errors in programs, or applying the wrong

update at the wrong time can result in a system crash or an undetected database error that causes havoc hours or days later.

- > **Budgets and downtime** – Shrinking expertise, growing system complexity, and costs for obtaining, implementing, and operating resources continue to rise. Downtime is too expensive. Systems must remain available to make money and serve customers. You must balance your data management budget against the cost of downtime.

Recovery: Strategize Before You Back Up

Recovering data when problems occur is one of the most critical data management services your IMS team provides. Organizations worldwide spend many hours each week preparing their environments for the possibility of recovering a failed database. Such preparations include backing up data, accumulating changes, and keeping track of the respective needed resources.

Any IMS team needs more than a set of tools to ensure their backup and recovery processes are accurate, reliable, efficient, and expedited with minimal downtime. They need a backup and recovery methodology that includes evaluating procedures, ensuring that all resources are available and in usable condition, automating processes as much as possible, and ensuring the right resources are in place for the tasks at hand.

Evaluate Your Procedures

An organization's recovery strategy might have been adequate when it was designed, but may not have evolved to meet today's enterprise demands and is likely ineffective under increased availability needs. Consider for example, that an organization takes weekly image copies on the weekend and performs change accumulations at midweek. This procedure satisfied their recovery requirements for many years; if all of the resources (image copies, change accumulations, and logs) are available at recovery time, a standard recovery is guaranteed. However, if hundreds of logs must be applied, the time required for the recovery could take hours, which might be unacceptable when considering downtime costs.

Plan for RECONs

In another example, creating the recovery JCL for your IMS systems is not as simple as modifying existing JCL to change the appropriate names. In the event of a disaster, the IMS recovery control (RECON) data sets must be modified in preparation for the recovery. RECON backups are usually taken while IMS is up, which leaves the RECONs needing to be cleaned up (deleting OLDS, closing LOGS, deleting SUBSYS records, and so on) before they can be

used to perform a recovery. This clean-up process often takes hours to perform manually, with the system down, equating to lost money. Planning for RECON cleanup is an important but often overlooked step of the preparation process.

Carefully Monitor Tasks

Many organizations use combinations of batch and online image copies of various database groups and change accumulations, staggered throughout the workweek. But what if a required resource is damaged or missing? How will it be discovered? When will it be discovered? Finding out that a critical resource is missing at recovery time can be disastrous. In a complex environment, identifying these conditions is critical to ensuring a successful recovery:

- > Ensure that every database that should be backed up is being backed up
- > Ensure that image copies (either batch or online) are being taken as frequently as planned
- > Determine whether change accumulations are being taken as often as planned
- > Take action when media errors occur

Automate Recovery Tasks

Automation removes some of the human error and “think time” from the recovery process, and makes the complexity of the environment less of a concern. Automating recovery processes can enable less experienced staff to administrate them, and thus maximizes your resources and reduces risk to your business.

Creating an automated and easy-to-use system requires the right tools and planning for the unforeseen, but is worth the investment. Proper planning and automation reduces reliance on key administrators and nearly eliminates the human-error factor.

Minimize Backup and Recovery Task Times

Planning for efficient recoveries is critical. Multithreading tasks shortens the recovery process. Recovering multiple databases with one pass through your log data certainly will save time. Taking image copies, rebuilding indexes, and validating pointers concurrently with the recovery process further reduce downtime. Any steps you can take to perform recovery and related tasks more quickly, efficiently, and effectively, allow your business to resume faster and save money.

BMC Backup and Recovery Solution for IMS

The first step toward successful IMS recovery is to adequately back up your data. The goal is to do so quickly, efficiently, and with minimal discomfort to your customers. Standard image copies are the best option if there is luxury of a large batch-processing window. Clean image copies are good recovery points and are easy to manage. If backups must be made while systems are active, you can take advantage of newer technologies that require only very brief outages to take instant copies of your data. Or, you can use intelligent storage devices that can take a snapshot of your data.

Both methods need tools that assist in resource management. The BMC Backup and Recovery Solution for IMS (BRS) product is an integrated solution with built-in intelligence to automate many routine tasks, and that brings together the functions of four cornerstone backup and recovery processes:

- > Image copy
- > Recovery
- > Recovery management
- > Change accumulation

The BMC BRS solution includes additional support from three related utilities, as well as intelligent automation that is exclusive to BRS. Unlike standalone utilities, BRS brings additional features from these related utilities and requires only one install, versus seven installations for standalone utilities. BRS reduces time and effort for disaster recovery by automating the preparation of an IMS startup and database recovery at a disaster recovery site. Eliminating manual procedures saves both time and resource costs.

BRS works with full-function IMS databases, including high-availability large databases (HALDBs), and Fast Path data-entry databases (DEDDBs). BRS automates many routine tasks using exclusive proactive technology that helps ensure recoverability and reduce technical and business exposures.

Image Copy

The BRS Image Copy component helps manage the image copy process. Image copies can be taken in various ways — including methods that allow you to take the copy without taking the database offline — and include:

- > Batch
- > Online (“fuzzy”)
- > Incremental image
- > Snapshot
- > Instant snapshot

The Image Copy component of BRS is faster and easier to use than the IMS Database Image Copy utility and has a variety of features, including:

- > Dynamic allocation of all input and output data sets
- > Stacking of output data sets
- > High-performance access methods (faster I/O)
- > Copying by volume
- > Compression of output image copies
- > Database group processing
- > Asynchronous processing while interfacing with DBRC

Pointer Checking – BRS enables you to verify the validity of database pointers as part of your image copy or recovery process, through the Concurrent Pointer Checking feature for both full-function databases and DEDBs. Using the same I/O operation to read the database records saves elapsed time and I/O. Reduced recovery time helps save resources.

Recovery

BRS includes the tools required both to perform the actual recoveries and to automate the recovery process. The BRS Recovery component, which functionally replaces the IMS Database Recovery utility for full-function (DL/I) databases and DEDBs, allows recovery of multiple databases with one pass of the log and change accumulation data sets while dynamically allocating all data sets required for recovery. And it is faster and easier to use than the native IMS utility.

BRS lets you use multiple log readers to maximize resource utilization and minimize elapsed recovery time. You can also recover multiple databases to any point in time, not just when the database is deallocated, eliminating the need for scheduled log switches and saving on the overall number of tapes that you must create, process, and manage. BRS can even determine the best choice for a point-in-time (PIT) recovery.

Creating image copies concurrently with the database recovery process, as well as concurrently checking database

pointers, saves an additional job step and the time associated with it. Full DBRC support is included and you can use DBRC-registered secondary image copies and logs as input.

Recovery Manager – The Recovery Manager component of BRS further automates several key recovery functions. For example, by creating meaningful groups of related databases and creating optimized JCL to perform the recovery of these groups, the Recovery Manager component lets you automate and synchronize recoveries across applications and databases. The IMS Command utility within this component lets you easily issue automatic IMS commands and monitor results — which provides a positive response for the IMS commands that are used to deallocate and start your databases. This utility is especially helpful in coordinating recoveries in a data-sharing environment.

The Recovery Manager component fully automates cleaning of the RECON data sets for restart following a disaster recovery. This component captures allocation information about your IMS database data sets and builds IDCAMS delete/define control statements. The Recovery Manager component also allows you to test your recovery strategy. You can ensure that the assets that are necessary for a recovery exist; analyze logs; practice recoveries by creating sample recovery JCL; and create alternate databases for testing purposes. The Recovery Manager component also notifies when media errors have jeopardized recovery resources. All of these functions help predict the impact that your recovery strategy may have on your databases, applications, users, and ultimately, your business.

Index Rebuild – If indexes are ever damaged or lost, the Index Rebuild function lets you rebuild rather than recover them. You no longer need to maintain image copies of primary and secondary indexes, which again saves time and resources.

Recovery Advisor – The Recovery Advisor component enables you to monitor the frequency of your image copies and change accumulations. The component helps determine whether all of your databases are being backed up. Finding out there is a problem with your recovery resources — *at the time you need to use those resources to solve a critical problem* — is counterproductive. By identifying potential problems early, you can take steps to correct harmful situations before the recovery process. You can even program the Recovery Advisor component to take the necessary corrective action.

Change Accumulation

The BRS Change Accumulation component takes advantage of the multiple engines, large virtual storage resources, and high-speed channels and controllers that are available in many environments. Use of multiple task control block (TCB) structures enables overlapping of as much processing as possible, reducing both elapsed and CPU time. State-of-the-art techniques reduce sort overhead and I/O, all while providing full DBRC support. Dynamic allocation capability makes the product easy to use.

A Concluding Example

Consider, for example, that XYZ company is an IMS shop headquartered in Houston, Texas when a severe tropical storm floods the city. XYZ, with its state-of-the-art data center located in the heart of the city, is flooded and its UPS system, network switches, and a portion of direct access storage devices (DASDs) are wiped out.

Being an experienced BRS user and through conscientious maintenance processes, XYZ is in great condition to recover. IT administrators take weekly image copies, creating dual copies concurrently so that the second copy can be stored offsite. Change accumulations run nightly, to consolidate updates. Secondary change accumulations are sent offsite each morning at 6 a.m. Copies of logs are dispatched to the DR service provider for offsite storage at 6 p.m. Recovery Advisor jobs are scheduled, to make sure that image copies and change accumulations are performed at the specified intervals. Administrators run the Check Assets function regularly to ensure that required assets are cataloged. Regular disaster recovery drills keep everyone in practice, so the IT team knows what to do in such emergency conditions.

When disaster strikes, the XYZ IT team is well prepared. They first contact their local DR service provider, arrange for shipment of backup tapes, and rush them to the hot site. They IPL their system and bring up the Recovery Manager interface. They use the RECON Cleanup utility to prepare the IMS RECONS for restart. They build the appropriate groups for their lost databases, and build appropriate recovery JCL. The Recovery utility runs, calling in the appropriate image copy, change accumulation, and log data. XYZ data is restored without errors and its business resumes quickly — all with minimal expense and elapsed time.

This example illustrates several key points:

- > Disasters do happen. You must be prepared.
- > Have a plan in place. First, take periodic image copies and send them offsite. Performing change accumulations reduces the number of logs required as input to the recovery, which saves time at the recovery site. However, performing this step consumes resources at the home site. You should evaluate your environment to decide how to handle the change accumulation question.
- > Make sure your plan is workable for all parties involved and can actually be implemented. Verifying that all assets are ready should be part of your plan.
- > When you build your recovery JCL, it must be absolutely accurate. Data integrity and your business rely on this task.
- > Clean your RECON data sets. If done manually, this process is error-prone and can take hours. The RECON Cleanup component of BRS, however, performs this task in minutes.
- > Test your plan. Make sure the plan works before you find yourself otherwise encumbered by emergency circumstances.

Summary

Today's environment is complex and intolerant of unavailability. System complexities, dwindling IMS expert resources, and demanding service level agreements further complicate managing your IMS environment. A well-planned backup and recovery strategy combined with comprehensive management tools, such as the BMC Backup and Recovery Solution for IMS, help automate your systems and enable you to manage proactively and ensure 24x7 business availability.



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About BMC Software

BMC Software helps IT organizations drive greater business value through better management of technology. Our industry-leading Business Service Management solutions ensure that everything IT does is prioritized according to business impact, so IT can proactively address business requirements to lower costs, drive revenue, and mitigate risk. BMC solutions share BMC Atrium™ technologies to enable IT to manage across the complexity of diverse systems and processes — from mainframe to distributed, databases to applications, service to security. Founded in 1980, BMC Software has offices worldwide and fiscal 2005 revenues of more than \$1.46 billion. BMC Software. Activate your business with the power of IT. For more information, visit www.bmc.com.

