



Leveraging NEON Technology to Maximize IMS Database Availability

Lucy Breitenbach,
Senior Systems Consultant, *NEON Enterprise Software, Inc.*

white paper

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Introduction

Continuous application availability is a strategic goal for any organization competing under today's business conditions. Customers expect to be able to look up and update their data at any time of the day or night. Market globalization places even more emphasis on continuous availability because customers can update their data from any time zone.

Applications provide the customers with interfaces into their data. When the data is not available, the application is not available and customer expectations are not met. Database outages cause major business disruptions. This paper will examine planned outages and demonstrate how NEON Enterprise Software, Inc. can reduce or eliminate IMS database outages.

Planned IMS Database Outages

The leading causes of planned, deliberate IMS database outages are to:

1. Back up the database
2. Verify the integrity of the database
3. Create recovery points or synchronization points
4. Reorganize the database
5. Apply system maintenance

Database Backup

IMS database backups, also known as image copies, are safety nets. Databases with large amounts of update activity are backed up frequently. This reduces the time and resources needed to recover the database from a system failure, a reorganization failure, or a disaster. It is simply a prudent business practice to back up a database.

Image copy utilities will not only back up the database but also interface directly with DBRC to register the image copy. Thus, in a recovery situation, DBRC can identify the most current image copy.

Another method of backing up a database is by copying the entire volume. The major disadvantages of this method are that there is no interface with DBRC and that only the portion of the database residing on the particular volume is backed up. Databases that are allocated across more than one volume may not be fully backed up with this method. Users of these methods must intervene directly with DBRC to register the copies.

Image copy processing falls into one of three categories.

- The consistent or batch image copy contains only committed updates. This requires a database outage to actually create transactional consistency within the database. It is run against the actual database while the database is unavailable for update processing. The database is not available to the application.
- The concurrent or fuzzy image copy does contain uncommitted updates. When used for database recovery, the active system logs and/or change accumulation files are required in the recovery process. Because the concurrent image copy is run against the actual database while the database is being actively updated, there is no impact to database availability.
- The incremental image copy is another form of a fuzzy image copy because it also may contain uncommitted updates. This image copy is created not by accessing the database but rather by old master/new master processing. The last image copy is updated with changes from the system logs and change accumulation files, if available, to create a new image copy. This not only has no impact on database availability but also avoids contention with application update activity.

In terms of maintaining application availability, a concurrent or an incremental image copy process should be used to avoid a database outage. If the organization also wants to avoid any possible database contention, the incremental image copy process should be used.

The NEON Eclipse Backup & Recovery Utilities provide all of these forms of image copy for both full function and fast path databases with significant savings in elapsed time and CPU usage when compared to other vendors' solutions. Within the solution set, Eclipse iCopy will create database image copies directly from the database itself. Incremental image copies are created by Eclipse iRecover.

In spite of availability requirements, many organizations continue to use consistent image copies rather than concurrent or incremental. These organizations believe that this is the only way to provide an opportunity to verify the integrity of the database. As we will see, this concern is obsolete.

Verify the Integrity of the Database

Data is stored in hierarchically related segments in an IMS database. IMS segments are chained together with pointers that provide the addresses of related segments. These pointers not only delineate the relationship of segments but also form the basis for index information within the IMS database. If these pointers should become corrupted or broken, IMS cannot retrieve the segments and the segment data is effectively lost. Although broken pointers are a rare occurrence, the sooner broken pointers are found, the easier it is to fix them.

Pointer verification is normally performed in several different ways. Each requires that the database incur an outage:

- A pointer checker utility may be run directly against the actual database while the database is unavailable for update processing.
- A hash, or arithmetic, pointer check may be run as a sub-function of a consistent image copy. However, the database is unavailable for update processing as a requirement of the consistent image copy.
- A hash pointer check may be run against a consistent image copy dataset. However, producing the consistent image copy dataset means that the database is unavailable for update processing.

Pointer verification should not be performed against a concurrent image copy. The presence of uncommitted updates will cause false results in the pointer verification process.

While the NEON Eclipse Backup & Recovery Utilities provide these standard methods of pointer verification, they also provide an exclusive method of validating pointers without incurring a database outage by optionally creating a transactionally consistent incremental image copy. This image copy dataset may be used directly for hash pointer verification or restored as an actual database and used for full pointer verification. The ability to transform a fuzzy image copy into a transactionally consistent image copy is a feature exclusively available from NEON Enterprise Software, Inc. This feature eliminates database verification as a cause of database outage.

Also, within the NEON Eclipse Reorganization Utilities, Eclipse iCheck includes advanced pointer verification features. In addition to the traditional pointer checks, Eclipse iCheck's exclusive technology will detect pointer loops and orphan segments and verify free space element pointers and overflow pointers.

Create Recovery or Synchronization Points

A common operational practice in many organizations is to quiesce IMS databases periodically throughout daily processing. This practice will suspend data sharing activities among those IMS regions that update the IMS databases. If the application interfaces with other database systems, such as DB2, those systems also incur an outage. This practice creates specific time stamp records within the DBRC RECON dataset that show no update activity against the IMS databases.

These quiesce points are used for a variety of operational reasons relating to database recovery including creating recovery time stamps, synchronizing with another type of database, usually DB2, and creating change accumulation datasets.

The NEON Eclipse Backup & Recovery Utilities eliminate the need for these outages. Eclipse iRecover can recover any IMS database to any point in time regardless of whether the database was being updated or whether any active PSTs were being processed. If a DB2 database fails, the associated IMS database can be recovered to the DB2 timestamp (LRSN). Eclipse iChange can create a change accumulation dataset at any point in time

without requiring a database outage. Eclipse iChange will create a backup of the DBRC RECON file that is coordinated with the point-in-time change accumulation dataset. These exclusive NEON features not only eliminate the need to quiesce IMS databases but also speed database recovery by reducing manual intervention.

Database Reorganization

IMS database reorganizations, as implemented in most organizations, require database outages. Organizations have implemented a database reorganization strategy based on two factors: the difficulty of identifying the databases that will benefit from reorganization and the fear that delaying a reorganization may make the database so disorganized that the reorganization will not fit into its planned outage time slot. As a result of this strategy, IMS databases are reorganized on a regular time schedule that unnecessarily increases the number and duration of outages.

IMS databases should be reorganized for technical reasons, such as improving database performance, or for business reasons that cause a change in the database structure. Unfortunately, identifying those databases that truly need reorganization is a tedious and time-consuming job. Today's DBA is responsible for hundreds or even thousands of IMS databases over multiple IMS regions or sysplexes. The same DBA may also be responsible for database management systems other than IMS. The DBA rarely has time to identify the specific IMS databases that would benefit from reorganization.

For years, the DBA community has been reorganizing databases as often as possible because their toolsets perform poorly against disorganized databases. The more disorganized the database, the more slowly these tools perform. Because there is no method of calculating the specific amount of performance decay of these tools against the degree of database disorganization, the DBA is unable to estimate the amount of outage time needed to reorganize a disorganized database. To be assured of meeting availability requirements, databases are scheduled for reorganization even if there is no technical reason for doing so. Organizations that continue to use these particular tools allow their business practices to be dictated by the limitations of their tools rather than by the needs of their business.

NEON Enterprise Software, Inc. provides an easy two-phase approach to minimizing outages caused by database reorganization. The first step is to identify the work that is required. The second step is to perform that work as fast as possible.

Mission Control will easily identify reorganization candidates. This tool provides data gathering and analysis in real-time and sends alerts when a database's performance is beginning to be impacted. This advance warning empowers the DBA to be proactive in managing the databases. Mission Control can identify in real-time those databases that need reorganization and alert the DBA when action needs to be taken. The predictive capabilities in NEON solutions allow the DBA to target work that actually delivers a benefit no matter how many databases are involved. Rather than taking a shotgun approach to database reorganization, the business organization will never again need to waste processing time or CPU cycles reorganizing databases that don't need and will not benefit from reorganization.

The NEON Eclipse Reorganization Utilities eliminate the issue of frequent reorganizations. This is an IMS database reorganization toolset whose performance does not degrade with database disorganization. The amount of wall clock time and system resources used remain constant no matter how disorganized the database. Reorganizing databases only when they absolutely need maintenance can reduce the frequency of reorganizations. The NEON Eclipse Reorganization Utilities are the only solution available whose performance does not slow down when the database is disorganized. Because the length of the reorganization job does not vary, NEON Eclipse Reorganization Utilities allow an accurate forecast of the amount of time needed to run reorganizations.

Using Mission Control and the NEON Eclipse Reorganization Utilities eliminates unnecessary database outages and significantly increases application availability. NEON can identify when there is a valid technical reason to reorganize databases and can provide the fastest, most cost-effective reorganization solution.

System Maintenance

No matter how hard the application strives to eliminate planned outages, at some point in time the operating environment itself will be taken down for maintenance. If the OS/390 or z/OS operating system itself is unavailable, the application must simply wait until it comes back. However, if other components of the operating environment are unavailable, such as the network or the IMS regions, the application can leverage that outage time by using it for database reorganization. We have already discussed how NEON IMS solutions can reduce the reorganization workload by targeting reorganization candidates and minimizing the duration of the reorganization tasks. System maintenance outages typically last over two hours. If one NEON customer can reorganize over 800 databases in 90 minutes, why not schedule your database reorganizations within the planned system maintenance window?

Summary: Planned IMS Database Outages

Leveraging NEON IMS solutions within an organization will maximize Full Function and Fast Path database availability. This table summarizes the specific NEON solution versus the specific planned outage situation.

Planned Outage	NEON Solution	Impact on Planned Outage
Database Backup	NEON Eclipse Backup & Recovery Utilities	Eliminated
Verify Integrity	NEON Eclipse Backup & Recovery Utilities	Eliminated
Create Recovery Points	NEON Eclipse Backup & Recovery Utilities	Eliminated
Create Change Accumulation files and RECON Backups	NEON Eclipse Backup & Recovery Utilities	Eliminated
Synchronize with Other Databases	NEON backup and recovery solution	Eliminated
Reorganize Database	Mission Control and NEON Eclipse Reorganization Utilities	Minimized
Apply System Maintenance	Mission Control and NEON Eclipse Reorganization Utilities	Exploited

About NEON Enterprise Software

NEON Enterprise Software develops intelligent IMS and CICS products that allow companies to easily and efficiently manage their enterprise data. The NEON Eclipse Autonomic products fully automate the tasks associated with managing IMS enterprise data, enforcing associated computing policies and service-level agreements, and ensuring data integrity.

NEON Enterprise Software's products consistently outperform those of the competition through rapid installation, high performance, and reduced CPU cycles. Headquartered in Sugar Land (Houston), Texas, NEON Enterprise Software has sales, support, and distribution offices around the world. For more information about NEON Enterprise Software and its solutions, visit www.neonesoft.com.

About the Author

Lucy Breitenbach, an IMS Senior Systems Consultant with NEON Enterprise Software, has worked in the Information Systems Industry since the late 1960s. Lucy began her career as a systems analyst designing human interfaces with automated systems before moving into application programming. Her experience with IMS began with implementing IMS/360 at a large telecommunications company and has covered each release of IMS to the present day. After several years as an applications programmer and teaching seminars on IMS online and batch programming, Lucy moved into systems programming. Prior to joining NEON Enterprise Software, Lucy spent 10 years as an IMS systems programmer installing, maintaining, and troubleshooting each version of IMS as well as vendor software.

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