IBM's IMS Database Solution Pack for z/OS
Significantly Reduces IMS's Total Cost of Ownership

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Cedric Chen
Eric Radzinski
Joe Sacco

Information Management Tools
IBM Information Management Software
Silicon Valley Laboratory, California

About this White paper

This white paper demonstrates the business value that is associated with IBM's IMS Database Solution Pack for z/OS. Specifically, this paper demonstrates how the IMS Database Solution Pack can contribute to reducing the overall total cost of ownership (TCO) of IMS and, in turn, improve the return on investment (ROI) for IMS customers.

IMS Database Solution Pack builds upon the functionality that was formerly provided by IMS Parallel Reorganization for z/OS. This functionality, along with the ability to conditionally reorganize your IMS databases, is now provided by IMS Database Reorganization Expert for z/OS, which is the key component of IMS Database Solution Pack.

Note that the examples that are used in this white paper were developed by IBM's Silicon Valley Laboratory IMS Tools software group for use by the IBM marketing and sales teams, as well as by IMS customers to help them better understand the value that can be gained by using IBM IMS database reorganization solutions. These examples have been derived from laboratory tests and are not intended to apply to all IMS environments. Each IMS environment is unique in terms of industry, line of business, staffing, applications, system configuration, policies, procedures, and other variables; therefore, the validity of these examples depends on the unique aspects of each IMS environment. Your IBM Technical Sales representative can help you customize your IMS environment so that these examples can be applied and validated on your own system.

IMS Tools Solution Packs

IMS Tools Solution Packs are related products that are packaged together to provide end-to-end IMS database management solutions. Each solution pack provides a complete set of resources that facilitate best practices and offer outstanding return-on-investment benefits. The packs are specifically designed to provide DBAs with smart solutions to database operation and maintenance tasks.
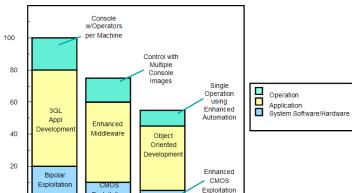
IMS, IMS Tools, and Total Cost of Ownership

IMS is IBM's premier transaction and hierarchical database management system. It is the product-of-choice for critical online operational applications and data in which support for high availability, performance, capacity, integrity, and low cost are key requirements. Today, IMS manages the world's most mission-critical data and has been a key reason for the resurgence of mainframe usage.

Over the last three years, significant changes in the mainframe's total cost of ownership (TCO), in conjunction with changes in the typical computer workload, have led to mainframe TCO advantages of between 5 and 60 percent over typical Linux, UNIX, and Windows (LUW) alternatives.

IMS has significantly contributed to reducing the cost of the mainframe and computing as a whole. As shown in the following figure, IMS operational and other systems management improvements have continued to bring down the costs of operations. In addition, enhanced IMS solutions and Object Oriented Programming have helped reduce application costs. Finally, by exploiting the CMOS technology and other advances in technology in the hardware and operating systems, IMS has helped lower the system's software and hardware costs.

Cost of Computing Evolution

It should be noted, however, that the total cost of ownership of any database management system (DBMS) is comprised of more than software and hardware costs. To determine the total cost, you must factor in scalability, reliability, systems management, the cost of database professionals to program, support, and administer the DBMS, and the cost of the computing resources that are required to operate the DBMS.
For example, in terms of energy expense, the majority of mainframe servers use less energy than racks of equivalent LUW servers.

IMS Tools from IBM further lower IMS's TCO by enabling personnel who have less IMS and mainframe experience to perform common tasks, while freeing up more experienced personnel to focus on complex or strategic tasks. All these benefits can be realized by implementing IBM's IMS Database Solution Pack.

IBM's IMS Database Solution Pack

Keeping IMS databases reorganized helps ensure that your IMS applications perform at their optimal levels. IBM's IMS Database Solution Pack for z/OS can help reduce the time that is required to keep databases in top condition, while enhancing your ability to manage IMS databases.

The normal process for reorganizing an IMS database consists of the following steps:

1. Unloading the database and indexes (depending on the number of indexes and related databases that are involved, this step might require several job steps.)
2. Reloading the databases and indexes
3. Copying all databases (image copy)
4. Checking all DB pointers (pointer check)

These steps are scheduled in a serial fashion – each step depends on the completion of the prior step before the next step can begin – which can make the normal reorganization process a complicated and time-consuming endeavor. For example, a database with two indexes might require as many as fifteen job steps to complete the reorganization. IBM's IMS Database Solution Pack condenses all these manual steps into only one job step for parallel operation that can reduce not only the amount of time that is required to reorganize a database, but also the resources that are required.

The IMS Database Solution Pack combines the following products into a highly integrated end-to-end solution

- IMS Database Reorganization Expert for z/OS
- IMS HP Unload for z/OS
- IMS HP Load for z/OS
- IMS Index Builder for z/OS
- IMS HP Prefix Resolution for z/OS
- IMS HP Image Copy for z/OS
- IMS HP Pointer Checker for z/OS

- IMS Library Integrity Utilities

IMS Database Reorganization Expert for z/OS V4.1

At the center of the IMS Database Solution Pack for z/OS is IMS Database Reorganization Expert for z/OS V4.1.

With the introduction of IMS Database Reorganization Expert comes the ability to conditionally reorganize your IMS databases based on policies and conditions that you define. Gone are the days of having to run unnecessary and costly reorganization jobs simply because they are already scheduled (a habit that wastes valuable CPU cycles and cuts into an already shrinking batch window). In today's cost-conscious business climate with its high demand for information access, you simply cannot spare the time and effort to reorganize data that might not need to be reorganized. Conditional reorganization allows DBAs to set highly specialized policies to perform their database space management and maintenance tasks.

By using the high performance utilities that are included in the IMS Database Solution Pack, IMS Database Reorganization Expert provides an integrated database reorganization infrastructure for IMS full-function databases. In addition to providing all the features and functions of IMS Parallel Reorganization for z/OS V3.2, IMS Database Reorganization Expert:

- Allows you to create, customize, and centrally store user-defined policies for detecting database exceptions. This functionality is provided by the Smart Reorg utility. The Smart Reorg utility also collects statistical data about databases and determines if they need to be reorganized based on the reorganization policy selected for the database. It refreshes this data every time the conditional reorganization job is scheduled and every time that the database is reorganized based on the reorganization policy. The utility can then use this wealth of statistical information to inform you about the status of your databases by providing early notification of exception conditions. When a reorganization is deemed necessary, an automated high performance single-step reorganization job is run. In this job, the unload, the reload, and the optional tasks, including
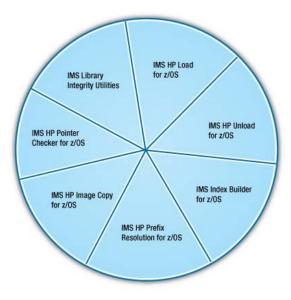
the index building, the image copy and HASH pointer checking, and the prefix resolution and update (for internal logical relationships) tasks run concurrently as subtasks, thereby reducing the elapsed time for end-to-end reorganization tasks.

After the reorganization is complete, the Smart Reorg utility provides a database diagnosis report that shows whether the condition for a reorganization was met and, if the database was reorganized, the effect of the reorganization. You can use these reports for future analysis, problem solving, and research on databases.

IMS Database Reorganization Expert for z/OS

Conditional execution allows you to reorganize your databases only when needed, saving valuable time and CPU cycles.

The power of parallelism means that when a reorganization is needed, it's performed efficiently and reduces your maintenance window.

- Provides a centralized IMS Tools Knowledge Base report repository for the tracking of database exceptions and storage of database reorganization results. This history of diagnostic reports can be analyzed to provide accurate information for future analysis, problem solving, and research. All information, including policy definitions, collected database statistics, and database diagnosis reports, is stored in repositories that are managed by the IMS Tools Knowledge Base server.

- Leverages the IBM IMS Tools Base common code components, making it a true end-to-end database reorganization solution. IMS Tools Base combines several IMS products and the entire collection of IMS Tools common infrastructure components into a single consolidated installation package. IMS Tools Base reduces errors, prevents having multiple copies of the same software, and reduces maintenance costs and disk utilization.

- Provides an ISPF-based Policy Dialog to help DBAs create, customize, and manage policies.

Performance Benefits

Your business relies on the speed of database operation to ensure that your IMS applications perform at their peak. Yet the availability of resources and expertise to manage the performance of these assets can be a constant challenge. The IMS Database Solution Pack for z/OS can help you deal effectively and efficiently with the following issues:

- Shrinking batch windows. As processing volumes increase, more work needs to get done in shorter and shorter offline periods.
- 24x7 operations. Many businesses today are moving toward 24x7 operation; to do so, key databases must be available around the clock.
- Lack of adequate IT resources and skills. Highly skilled IT resources are at a premium. Competitive businesses cannot afford to have their best people tied up with repetitive database maintenance tasks.

By leveraging parallel processing and the ability to automate reorganization activities with the full suite of IMS High Performance Tools that are available from IBM, IMS Database Reorganization Expert can improve database performance and high availability, reduce resource usage, simplify processes, and improve the productivity of your IMS IT specialists.

In addition, when reorganization is required, IMS Database Reorganization Expert provides a faster, more effective way to do the job by running the various reorganization and backup utilities in parallel. The normal database reorganization requires an Unload, Load, Image Copy, and

Pointer Check, and each of these steps is executed in a serial fashion. IMS Database Reorganization Expert performs the Unload, Load, Index Build, Image Copy, and Pointer Check as a parallel operation, which is more CPU efficient and significantly faster than using standard IMS utilities. In practical terms, the parallel approach to reorganization means that customer batch window requirements can be significantly reduced and the databases can be made available sooner to support 24x7 businesses. This high degree of integration means fewer IT resources will be required to keep IMS databases in top operating condition.

Tests prove that IMS Database Reorganization Expert is significantly faster and more efficient than standard IMS utilities. When tested on root-only databases with 11 million occurrences, 110 cylinders (0.8 GB) of HIDAM and VSAM structure, and no secondary indexes, IMS Database Reorganization Expert was 6.6 times faster and consumed 5.2 times less CPU than standard IMS utilities.
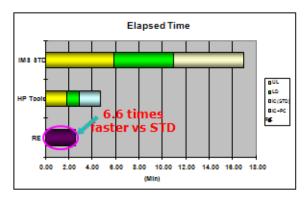

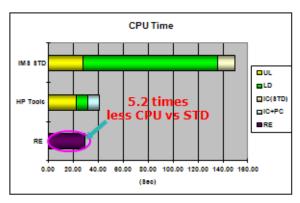Figure 1. IMS Database Reorganization Expert Elapsed Time (HIDAM/VSAM root only)

Figure 2. IMS Database Reorganization Expert CPU Time (HIDAM/VSAM root only)

When tested on 20 segment types databases with 49 million occurrences, 1700 cylinders (1.3 GB) of HIDAM and OSAM structure, and two secondary indexes, IMS Database Reorganization Expert was 7.5 times faster and consumed 4.6 times less CPU than standard IMS utilities.
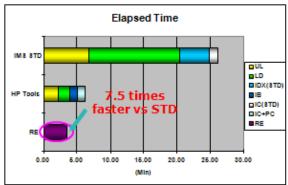

Figure 3. IMS Database Reorganization Expert Elapsed Time (HIDAM/OSAM 20 segment types)
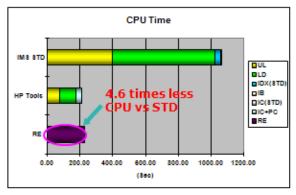

Figure 4. IMS Database Reorganization Expert CPU Time (HIDAM/OSAM 20 segment types)

These tests were conducted using the IMS High Performance Tools including HP Unload, HP Load, Index Builder, HP Image Copy, and HP Pointer Checker. The results were compared against standard IMS utilities that included HD Unload, HD Load, and Image Copy with no pointer checking.

Conclusion

Doing business in today's world requires a high rate of availability and responsiveness. IMS Tools from IBM help you to maximize your investment in IMS and meet your customers' demands more effectively and efficiently.

Whether your databases require 24x7 operation, IMS Database Solution Pack for z/OS from IBM can save you time and money by working with other High Performance IMS Tools in a true end-to-end solution. IMS Database Reorganization Expert has repeatedly outperformed standard IMS utilities in terms of elapsed time and CPU usage, in turn reducing IMS's total cost of ownership now and into the future.

In summary, IMS Database Reorganization Expert, as part of the new IMS Database Solution Pack, simplifies complex decision-making tasks for managing your IMS databases. It provides practical database reorganization criteria through out-of-the-box policy templates, which you can use to automate and implement conditional execution of your reorganization jobs. It provides a simple customization and maintenance approach for these policies through a user-friendly ISPF interface. Lastly, it saves time and expensive resources by simplifying JCL specification and by using high performance tools to get the job done quickly and accurately.

Resources

Visit the IMS Database Solution Pack on the Web:

IMS Database Solution Pack
http://www.ibm.com/software/data/db2imstools/imstools/ims-database-solution-pack/

IMS Database Solution Pack documentation
http://www.ibm.com/software/data/db2imstools/imstools-library.html#dbsol-pak

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