Improve the Health and Performance of DB2 Applications

With Offline Analysis of Your DB2 Environment

Your DB2 for z/OS Requires Ongoing Attention

Left to their own devices, DB2 for z/OS databases and applications will accumulate problems over time. Things that used to work, stop working. This can happen for various reasons including the addition of more data, a reduction in some aspect of business data, different types of data, more users, changes in busy periods, business shifts, software changes, hardware changes... you get the idea.

And there is always the possibility of remnants from the past causing issues with your DB2 environment. Some things may have been implemented sub-optimally from the start, perhaps many years ago... or perhaps more recently. Furthermore, DB2 is not a static piece of software; it changes over time with new versions, features and functionality. As new capabilities are introduced, older means of performing similar functionality become suboptimal, and in some cases, even obsolete. Identifying these artifacts can be troublesome and is not likely to be something that a DBA will do on a daily basis.

Nonetheless, the performance and availability of your DB2 environment – and therefore the business systems that rely on DB2 – can suffer if you do not pay attention to the health and welfare of your DB2 databases and applications.

Read further to hear about a novel, new method of assuring the health and viability of your mainframe DB2 databases and applications.

Mullins Consulting, Inc.

Health Checking Your DB2

DB2 Health Check Issues

- Health checks can be costly (consulting engagements)

- When a consulting company conducts a health check the analysis usually is done off-site, so your DBAs do not learn the techniques used by the consultants as they massage and analyze the data

- Health checks generally are valid for a specific point-in-time and can become obsolete quickly

The purpose of a DB2 health check is to assess the stability, performance, and availability of your DB2 environment. Health checks are conducted by analyzing your DB2-based systems and reviewing the details to determine the effectiveness of your setup. You may narrow down a health check to focus on specific aspects of your DB2 infrastructure, for example, concentrating on just availability and performance, or on other aspects such as recoverability, security, and so on.

At any rate, scheduling regular independent reviews of your DB2 environment is an important aspect of assuring the viability and robustness of your implementation. Simply migrating DB2 applications to production and then neglecting to review them until or unless there are complaints is **not** a best practice for delivering good service to your business. Just like a car requires regular maintenance, so too does your DB2 environment. Systematic analysis with an overall goal of identifying weaknesses and targeting inefficiencies can save your organization time and money, as well as reduce the daily effort involved in implementing and maintaining your DB2 applications.

DB2 health checks typically are conducted by a DB2 consulting or services firm. The engagement begins with consultants interviewing the DBAs, submitting questionnaires as needed and collecting data from DB2. After collecting the data the consulting team goes off site and analyzes the reams of collected data. After some time (usually a week or more), a report on the health of your DB2 environment, perhaps with some recommendations to implement, is delivered.

What happens next is all up to you. After reading the report you can ignore it, implement some or all of the recommendations or send it along to management for their perusal. But there is a deadline involved. After all, your systems are not static. So the health check report is only as good as the point-in-time for which it was delivered. If you wait too long, the recommendations become stale and you might not be doing the proper thing for your environment by implementing changes based on old information.

Of course, when too much time has gone by after the health check, you could always engage with the consultants again, requiring additional spending… or perhaps there is another way?

DB2 Offline Analysis

Instead of relying on outside experts to conduct your DB2 health checks you can instead rely on expert system software to provide a reliable, impartial analysis of your DB2 databases and applications. Such as solution is offered by DataKinetics' InnovizeIT Offline Analysis and Reporting for DB2 for z/OS.

How does InnovizeIT work? Well, similar to the DB2 health check process explained earlier, the product deploys a two-step process (see Figure 1) to check the health of your DB2 databases and applications:

- Collect data about your DB2 environment and ship it to your PC

- Analyze the data and identify issues and potential problems

Figure 1. Two-Step DB2 Offline Analysis

InnovizeIT is an analysis tool that identifies mainframe DB2 bottlenecks and performance degradation problems, and recommends improvements based on its analysis. DB2 performance and availability metadata is collected on the mainframe and downloaded to a Windows workstation. All of the analysis is performed offline, on the workstation, so there is no use of mainframe resources and no effect on mainframe performance.

It is important to consider the ramifications of running the analysis on a workstation instead of on the mainframe. In today's world of cost-cutting and resource management, most organizations are looking for ways to reduce their mainframe MSU consumption. As such, a product that would consume a lot of mainframe CPU to analyze your DB2 environment would likely not align with your business and IT objectives. On the other hand, though, PC resources are frequently idle during off hours, so it makes a lot of sense to run the analysis on those under-utilized resources. Doing so preserves valuable mainframe CPU resources, thereby not driving up the cost of mainframe computing… while at the same time making the most of the under-utilized resources of your workstation computing power.

The results of the analysis are categorized and reported using an easy-to-navigate GUI (see Figure 2). You can scan and review the potentially suboptimal DB2 objects and SQL identified by the analysis all on your PC workstation. There is no need to go back and forth between the mainframe and the PC because all of the relevant information is captured to allow the DBA to review the results of the analysis.
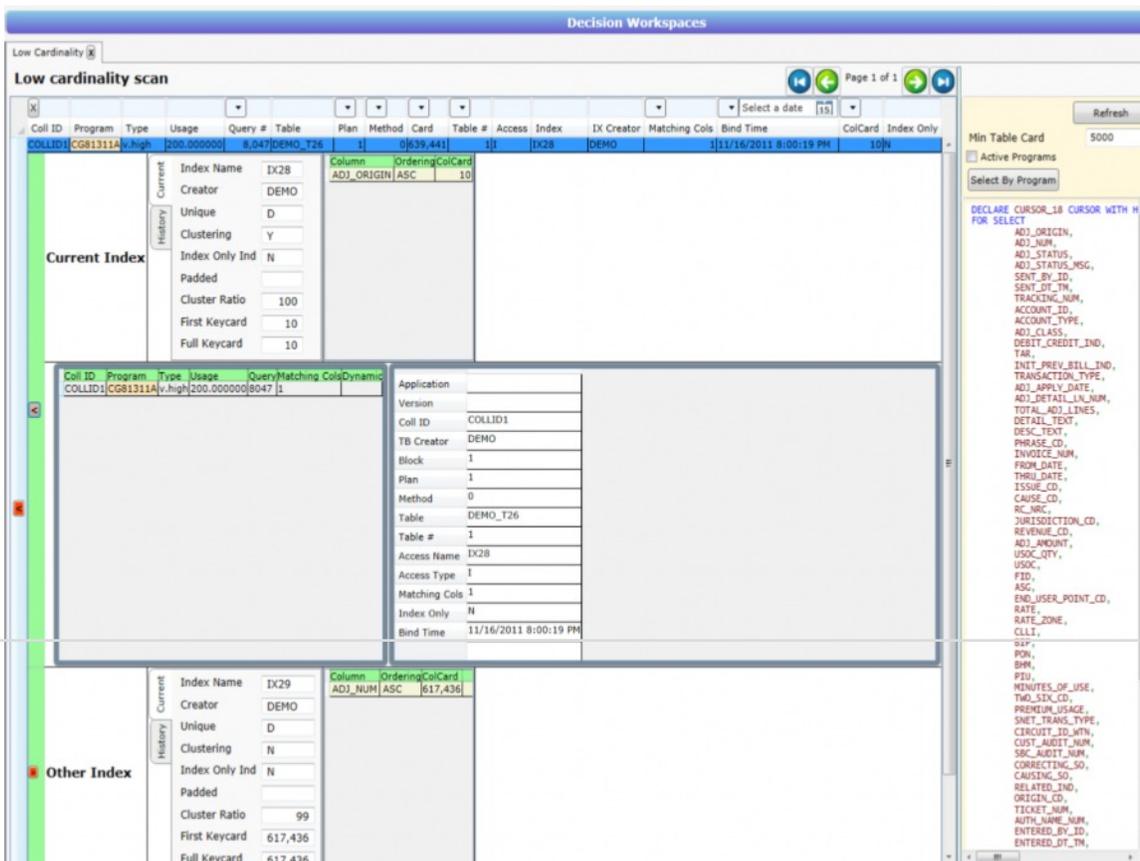

Figure 2. Sample Offline Analysis Report

As you can see in Figure 2, the analysis report provides simple drill-down, point-and-click operations. For example, when reviewing low cardinality scan issues you can quickly see the program details, access path information, DDL and SQL statement.

The information displayed is context-sensitive depending upon the issue you are investigating and the report you are viewing. For example, in Figure 3, we see another sample report. Here we are reviewing table spaces where the lock rule is not set to ANY. From here, we can dive down and take a look at the table(s) defined in the table spaces that we are examining.

TableSpaces with LockRule <> Any Page 1 of 1

DB Name	Table Space	TS Creator	BPool	Partitions	Lock Rule	Page Size	Erase Rule	Tables #	Active #	Close Rule	Segment Size
DBDEMO	TS10	DBC4TXD1	BP1	0	R		4	N	1	185,672	N	4

Table Info
Table Name	DEMO_T13
Creator	DEMO
Table Space	TS10
NPages	185546
Card	8658274

DB Name	Table Space	TS Creator	BPool	Partitions	Lock Rule	Page Size	Erase Rule	Tables #	Active #	Close Rule	Segment Size
DBDEMO	TS11	DBC4TXD1	BP1	0	R		4	N	1	727,282	N	0
DBDEMO	TS16	DBC4TXD1	BP1	0	R		4	N	1	722,105	N	0

Figure 3. Another Sample Report

Of course, we have taken a look at only a few of the capabilities and many reports that InnovizeIT can generate. Some additional capabilities of InnovizeIT worth mentioning include:

- Automated recommendations based on the collected and analyzed performance data and metrics

- History logging and tracking of improvements and recommendations

- The ability tointegrate performance data from your monitoring tools to help prioritize the remediation activities to be performed by your DBAs.

Next, we will examine the various categories and types of performance and availability details that are collected, evaluated, and reported upon during the offline analysis process.

Issues InnovizeIT for DB2 Can Uncover

InnovizeIT can examine your DB2 for z/OS environment for a large variety of potential problems in your database objects and SQL statements. A sampling of the types of issues that InnovizeIT can uncover are documented in Table 1 (below).

Category	Issue	Description
Query Access	Table space scan	Looks at the scan chosen by the optimizer and recommends new indexes to optimize scan
	Non-matching index scan	Reviews scan chosen by optimizer and recommends changes to indexes or queries
	Low cardinality scan	Identifies indexes with low cardinality that could be modified to improve scan
	Queries with sort	Identifies SORTs in queries. Can often be eliminated via adoption of an index or modification of SQL
Indexes	Missing columns for index only	identifies where the addition of columns to an index will allow queries to complete by only reading the index
	Indexes with identical column	Reducing the number of columns, and therefore the size of the index can improve performance
	Unused indexes	Identifies indexes you are not using. Removing unused indexes will improve the performance of INSERTs, UPDATEs, and DELETEs
	Low cluster ratio indexes	Identifies where a different cluster index could improve performance
Structure	Table spaces with more than 1 table	Restricting each table space to one table can improve manageability
	Tables with no primary key	The lack of a unique index or PK can result in diminished usability and performance issues
	Tables with no clustering index	If no clustering index is chosen DB2 will choose the earliest created index to cluster, which can cause performance issues
	Table spaces with LockRule<>Any:	A scenario that generally should be minimized
SQL issues	SQL conditions that require investigation including…	- EXEC SQL LOCK - Use of UNION and not of UNION ALL - DISTINCT not in cursor - IN sub-select - Date/Time/Timestamp calculations
Statistics	Tables and Indexes with no statistics	RUNSTATS should be run on all DB2 objects to ensure that the DB2 optimizer has the needed information to create optimal access paths for SQL
	Tables and indexes with old statistics	Outdated statistics can cause performance degradation as SQL may be running with outdated access paths

Synopsis

All of these issues can degrade performance, impact usability and cause your DB2 databases and applications to be less manageable. By using InnovizeIT for DB2 to systematically and regularly health check your DB2 systems, you can eliminate hard-to-spot problems from your environment and improve the viability and effectiveness of your DB2 applications.

DB2 health checking should be a standard component of your DB2 database administration. Regularly examining your DB2 environment for problematic issues makes good business sense because it can improve performance and reduce costs. And InnovizeIT for DB2 for z/OS is a useful and cost-effective mechanism for conducting regular health checks.

DB2 performance issues causing application slowdowns, and even outages, can be uncovered by DataKinetics' InnovizeIT solution. Save time and money by automating and simplifying your performance management for DB2 for z/OS using InnovizeIT.

About DataKinetics

DataKinetics, headquartered in Ottawa, Ontario, Canada, has been providing data access optimization solutions for large enterprise customers since 1977. DataKinetics boasts many of the largest financial and insurance companies as customers.

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The InnovizeIT for DB2 for z/OS product is resold by DataKinetics in North America. The product is written and developed by InnovizeIT, an Israeli company. More information available at www.innovizeit.biz

About Mullins Consulting, Inc.

Mullins Consulting, Inc. Is a consulting and research firm that offers data management services and solutions that meet the demanding requirements of all size organizations. Let us help you with database and data warehouse design, performance audits and reviews, application performance tuning, SQL optimization, security and governance audits, and DB2 version migrations. Mullins Consulting provides a wide variety of IT services and help clients reduce IT costs through performance tuning engagements.

Craig S. Mullins is president & principal consultant of Mullins Consulting, Inc. He is also the publisher and editor of The Database Site (thedatabasesite.com)

Craig is the author of two best-selling books on database management. He has written numerous technical articles for many IT publications, including popular journals such as Database Trends & Applications, The Data Administration Newsletter, Enterprise Tech Journal, DM Review, and many others.

Craig is a frequent speaker at IT conferences, having spoken about database issues to thousands of folks at conferences such as SHARE, IBM Information on Demand, IDUG, DAMA Symposium and Oracle World. He has spoken at events in North America, Europe, Asia, and Australia.