

Experiences

Reported by



HUK-COBURG

Da bin ich mir sicher

Automated Quality Assurance and SQL Tuning
with **SQL PerformanceExpert** and **Bind ImpactExpert**

Reliable mass analysis of DB2 access modules
to assure SQL quality and performance

Includes hints to insure
a quality-driven DB2 migration

Automated Quality Assurance and SQL Tuning with SQL PerformanceExpert und Bind ImpactExpert

1 The Company

As a large German insurer for private households, HUK-COBURG owes their continuous and unprecedented success to exceptional service combined with simultaneously attractive, economical offers. More than nine million customers in Germany place their confidence in HUK-COBURG.

Founded in 1993, the HUK-COBURG holding company serves its members according to the basic principle of mutuality. It is the largest official insurer with 3,6 million members.

The HUK-COBURG group consists of five damage and accident insurers, two life insurers, two health insurers, a savings and loan bank, and a service company that provides around-the-clock support for all customers belonging to the group.

HUK24, an especially successful company founded in 2000, is a pure online-insurer whose drastic increase in customers surpassed all expectations.

Since the end of 2004, there are additionally three insurers for churches and welfare care: BRUDERHILFE Property and Casualty Insurance, FAMILIENFÜRSORGE Life Insurance, and PAX-FAMILIENFÜRSORGE Health Insurance.

The group collected more than 4,8 billion in contributions in 2008. In addition, customers paid about 170 million into their accounts at HUK-COBURG Savings and Loan. By the end of 2008, the capital investments of the group amounted to 21,5 billion Euros.

2 Motivation

One factor for the continuous success is the Information Technology (IT).

An important building block is efficient, inexpensive application programs. Important aspects of application performance are the tuning and quality control of database accesses.

Database administration, quality management, and on-going performance improvements, all of which are supported by a vast number of in-house developed tools and purchased tools, have contributed to the achievement of high-quality standards of the application programs.

In order to guarantee this, an intensive analysis and test phase was performed during 2004 and the decision was made to implement the DB2 SQL tuning and performance tools from SOFTWARE ENGINEERING GMBH.

The subject areas covered:

- Reliable mass analysis of access modules regarding performance based on defined quality criteria:

- Support of interactive analysis with the goal of performance improvement.
- Control of BIND activities based on early warning measure.
- Clean up and care for libraries containing the access modules.

A number of factors speak for the products from SOFTWARE ENGINEERING.

- In comparison to the competition, the technical requirements are covered best.
- Long practical use by other customers proves the products are well-established.
- The product combination allows the objective as a well-rounded solution to be achieved.
- During the trial, technical support immediately answered questions or resolved occasional problems.
- Through close contact with the developers, fertile discussions provided all participants with very useful findings. From there, a joint project was developed to complement the products with missing elements in order to achieve the outlined objective of continuous high-quality management.

HUG-COBURG considered another important point when choosing SOFTWARE ENGINEERING. As a long time customer of their RealTime DBAExpert and SpaceManager for DB2 products, the company has had many years of good experience with these products and with their technical support. These products are a central pillar of automated maintenance procedures and provide the necessary conditions for the integration of an automated high-quality management in the DB2 environment.

Experience

The SQL tuning and performance products have been implemented since 2005 to attain the following objectives:

- Analysis of access paths with
 - Proactive performance enhancements through access path analysis as early as the development phase,
 - Analysis and improvement of programs in production and test,
 - Support of all DB2 users in IT and IB departments.
 - Independent, active analysis of access paths by the application programmers
- A required component to manage packages and clean up those no longer needed.
- Automated BIND and REBIND Control
 - Access path control in the area of DB2 maintenance with history and documentation
 - Avoidance or timely recognition of production problems resulting from performance influences by which the quality is automatically controlled or detected.

2.1 Analysis of Access Paths

Immediately after product installation, all DB2 application programmers were trained in Workshops on how to use SQL PerformanceExpert.

Positive feedback and reactions indicated that the implementation and use of SQL PerformanceExpert is easy and successful to insure proactive performance evaluations, even a large user group. The introductory success is considerable.

2.2 Cleanup of Unnecessary Packages

Once introduced to the production environment, the component to clean up all unnecessary packages reduced the overall package inventory by 34%. Since the initial cleanup, the component of SQL PerformanceExpert runs monthly under manual control.

For security reasons no automated procedure is used. Instead:

- During the analysis phase, the unnecessary packages are determined and the required FREE statements are generated by the component.
- During a maintenance window, the generated FREE statements are exported and processed by an automated application test. If mistakes should occur, the deletion of the packages can be made again with the aid of the LINK-EDITING-statements generated in the analysis phase. The prerequisite is the available DBRMs.

This procedure was chosen in order to minimize the mistakes that might occur and to quickly intervene with corrective action.

2.3 Automated BIND/REBIND Control

2.3.1 Daily Maintenance Control

Bind ImpactExpert automatically controls REBINDs after the daily generation of RUNSTATS and REORGS. By blocking all REBINDs that degrade access path performance as well as those that are unnecessary, Bind ImpactExpert insures REBINDs are processed that will improve the access paths.

The Bind ImpactExpert filtering results in less than 10% of the REBINDS that would otherwise be processed after RUNSTATS and REORG. On average, only 300-400 REBINDS are now processed.

Importantly, this provides reliable protection from undesirable surprises in the daily, automated maintenance. Because all activity is collected and saved for later analysis, there is always the possibility to create trend analysis in order to conduct proactive actions.

2.3.2 Change Management Control

A second area of implementation is the evaluation of REBINDS that must be exported due to Change Management. Here a proactive approach was implemented.

Each month, all packages relevant to the operations of HUK-COBURG are analyzed and the results are made available to the application programmers. This supports early warning about whether a REBIND of a package might cause a critical performance situation in case it becomes the subject of Change Management.

Criteria for the definition of "relevant packages" are prerequisites. Selected are:

- The number of packages used for the OLTP is considered. These are currently about 5100.
- From this amount, all are selected that have more than 10,000 calls within 15 minutes during the daily morning accounting analysis.

As a result, an amount of about 200 packages remain that, when related to the call frequency, covers almost 98%. The amount of these so-called TOP100 packages is small enough to do regular detailed evaluations with minimal effort.

2.3.3 Precheck a New DB2 Version

Since the installation of Bind ImpactExpert and SQL PerformanceExpert, two big updates of DB2 have been implemented, which in fact resulted in four versions of change:

- From DB2 V7 to DB2 V8 CM
- From DB2 V8 CM to DB2 V8 NFM
- From DB2 V8 NFM to DB2 V9 CM
- From DB2 V9 CM to DB2 V9 NFM

In these situations, Bind ImpactExpert offers an easy-to-manage help tool that provides an impression about the changes of the access paths resulting from the new DB2 version. This supports timely measures to identify and correct performance degradation before migrating to the new version.

An important prerequisite for a Precheck is a test environment on which the new version is installed. In this test environment, all relevant production database objects are available for which access paths should be evaluated. The size of the table spaces and index spaces can be limited to the minimum since the structures and data are not needed.

The further preparation steps are supported by Bind ImpactExpert:

- Copying the production statistics into the test environment using the Production-Simulator for DB2 component. This process considers conversion rules for different naming conventions.
- Importing the package information and access paths from production into the test environment.

Once these preparations are done, the Bind ImpactExpert Precheck performs evaluations of all access paths resulting from the new DB2 version, including possible conversion rules for different naming conventions.

In order to process the evaluation with deep details, the TOP100 approach reduces the total number of all production packages (over 15,000) down to a manageable number of relevant packages.

This is necessary for a well-founded analysis because the results of the prechecks with the categories "Worsened", "Equal", "Changed" and "Improved" only provide tips about tendencies to be expected. All SQL must be considered and the effect of the changes under a new DB2 version must be measured in detail.

The limitation to the "relevant" accesses is, in this case, the key for a balanced proportion between usability and effort.

Bind ImpactExpert is an indispensable aid that predicts the direction and the type of changes within the access paths. Other features, like the evaluation of the accounting traces and performance measurements, support the interpretation of the results.

With the Precheck of DB2 V9 CM, we concretely detected in advance that the DB2 Optimizer uses other indexes as previously in some cases. This appeared among packages that were presented in the "changed" category, which appeared to be a change from an index scan with 4 matched columns to an index scan with only 2 or 3 matched columns. Using close theoretic

cal consideration, this change did not appear to make sense because no sensible explanation could be deduced since the index sizes were not that much different from each other.

These cases appeared in the top of the TOP100 group.

Further activities and investigations were concentrated on a few cases. After the actual introduction into production, the accounting evaluations determined up to a 30% increase of CPU consumption. After IBM was consulted, they made the determination that a mistake in the DB2 Optimizer was the cause. The mistake was repaired, and a renewed Precheck confirmed this.

The experiences with the Precheck showed that one does not have to examine the group rated "EQUAL" and those with service units that grew within a tolerated frame.

3 Summary

The products SQL PerformanceExpert and Bind ImpactExpert from Software Engineering have proven themselves to be a comfortable aid in the daily practice in order to automate large amounts of quality analysis and control, while essentially reducing critical points to a minimum.

But this is valid for all automated methods: One's own permanent judgement and questioning cannot be replaced! This can only be supported through such tools. The pre-filtering, consolidation, and clearly presented information allow one to localize and resolve problems faster.

With SQL PerformanceExpert, application programmers are effectively supported in attaining high quality. The tool is so simple and straightforward, and the training expenditure requires so little effort as practice has shown. It is accepted by the developers as welcomed support.

In fully automated processes, the other components BindImpactExpert insure that quality standards are held and maintained. Changes can be seen early and are clearly understandable. BindImpactExpert makes proactive reaction to degradations possible and the history data provides the basis for estimations and trends of the future state.

All components complement themselves for a complete solution and can be integrated without problems into automated maintenance procedures. The combination of these components with RealTime DBAExpert is especially simple, which is already in use by HUK-COBURG for many years for successful daily database maintenance.

The products are complemented by excellent, competent support and reaction without bureaucracy. Direct contacts with the development engineers are characterized by rapid resolution of customer problems.