

Ten Tips for Reducing the Cost of Your Daily DB2 Maintenance By Using RealTime DBAExpert

Transforming and Integrating a Classic Job Generator for Daily DB2 Database Maintenance into Execution and Control Management (On Demand)

Summary

Learn how to save I/O and CPU resources and create less work through easy implementation and operation of RealTime DBAExpert.

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Tip 1: Implement RealTime DBAExpert

The RealTime DBAExpert solution has improved ease-of-use for installation, integration, and configuration. When implementing the RealTime DBAExpert solution, you save time and resources compared to other solutions as follows:

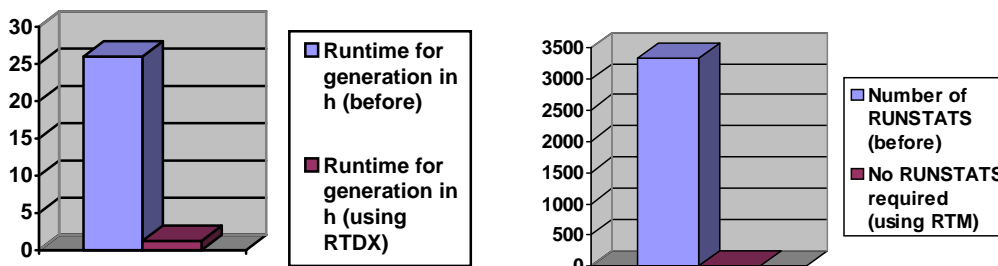
- All settings and variables have default values—the product is ready to run immediately after guided installation. All thresholds, required for utility generation, are based on IBM/SAP recommendations. In most cases you do not need any further definition or adjustment. All individual settings (such as job names or data set names) have been set so that, in most cases, you can install the solution without complications.
- A simulation mode is available for evaluation and integration tests. This mode drastically reduces the effort for product evaluation. Migration from a previous version of the ISDM product group, as well as most third party solutions, includes migration of all customized settings.

Tip 2: Use Real-Time Statistics Instead of RUNSTATS to Analyze Objects

Previously, classic maintenance procedures dictated that you run extensive analysis (e.g. RUNSTATS) on all objects to determine object characteristics for threshold checking. Because RealTime DBAExpert integrates real-time data, this analysis step is no longer necessary. Integrating real-time data does not incur any extra cost. With DB2 version 7.1 and later, the database itself provides the data, and gathering this information is an internal process.

RealTime DBAExpert uses a wide range of verifications and cross-checks to secure the integration of the real-time data. The solution includes all tools that RTS maintenance requires, which assures compatibility with previous processes for gathering statistics. RealTime DBA Expert's integration of real-time data saves you 100% of the expensive RUNSTATS that you normally need for database maintenance and reduces analysis runtime by 50% to 95%.

Savings for determining statistics for database maintenance per week (customer example)



Savings are calculated from the following points:

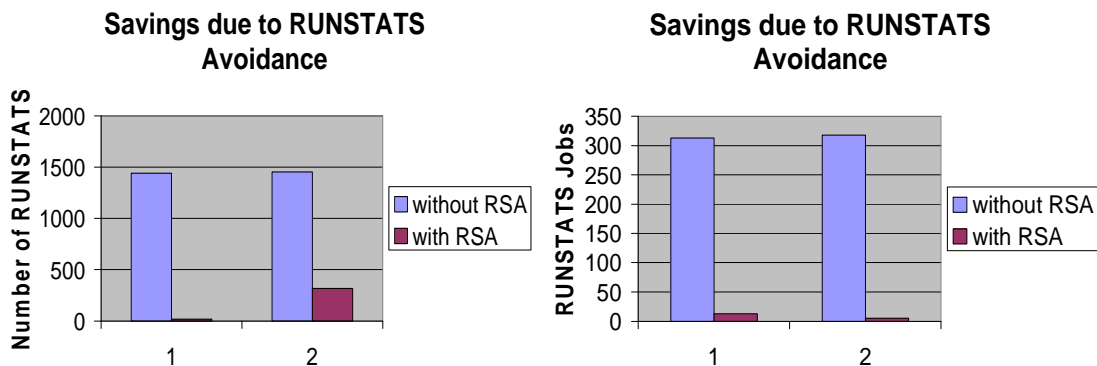
- You no longer need processes that determine objects that require a RUNSTATS to update object statistics as well as generating the appropriate RUNSTATS jobs (RUNSTATS FORECAST).
- You no longer need to execute any RUNSTATS job to analyze objects for maintenance.

Tip 3: Avoid RUNSTATS

When the characteristics of a DB2 object change significantly (especially the amount of data), the statistics within DB2 internal tables of that object need to be updated. The DB2 optimizer uses these statistics for access path determination, so they are critical for database performance.

Commonly known thresholds that lead to the execution of RUNSTATS can cause a maintenance headache. To assure availability, real-time maintenance must reduce exclusive accesses to DB2s internal tables as much as possible.

RUNSTATS write claims on the catalog are often the reason for dynamic SQL timeouts. Analysis shows that the RUNSTATS cycles can be reduced by at least 99% by building object groups of special size ranges without a negative impact on the performance. In particular, the savings for NPIs are very high.



Savings are calculated based on the following formula:

Current:

RUNSTATS that are executed to update Optimizer data (thresholds e.g. RS for objects > 2000 rows and updates > 20%, unconditionally every 30 days)

Prediction:

RUNSTATS that are executed to update Optimizer data (thresholds e.g. RS for objects turning from one object group to another (20000 rows, 50000 rows, 150000 rows, 500000 rows, 1500000 rows, 4500000 rows, unconditional every 30 days)

Tip 4: Manage Space on Demand

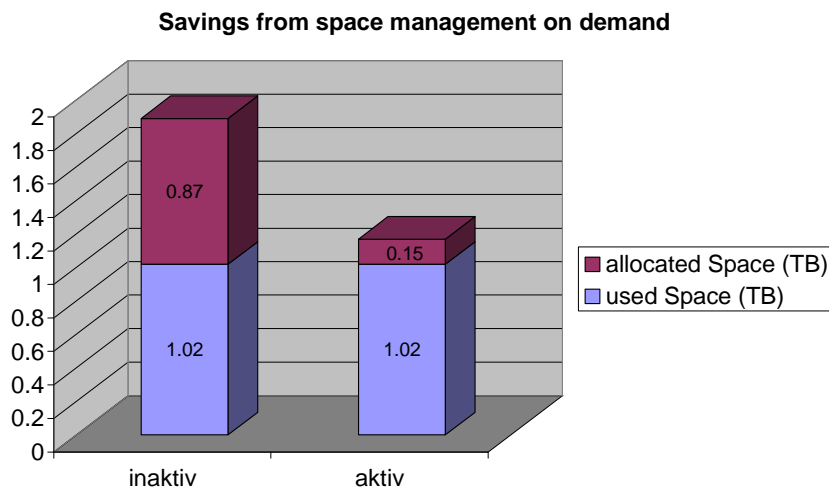
RealTime DBAExpert provides real-time space monitoring and dynamic space adjustment for DB2 objects.

Objects that contain the data of a DB2 database are not created by the database but manually or by a database application, such as SAP. At creation time, you have to allocate space for the data. Not knowing the amount of data can lead to allocating too little or too much. If you allocate too much space, the DASD space is unused and wasted. If you allocate too little space, the database can extend the object dynamically but only to a small degree.

Also, when the limit for extents is reached, the data stored within an object is available only for read access, and you cannot update or insert new data. Updating data leads to an outage of the application. To avoid such outages, space adjustments are typically and intentionally made too big.

SAP systems have two additional problems. First, it is nearly impossible to forecast the data amount for a single object. Secondly, the number of objects is very large, which leads to a huge amount of allocated, unused DASD space.

The solution is real-time space monitoring for each DB2 object including dynamic space adjustment. With dynamic space adjustment, each object can be created using minimal space allocation which extends dynamically if the data grows.



Savings are calculated based on the following calculation:

Potential savings = Allocated space of all DB2 objects – used space of all DB2 objects

Tip 5: Balance the Workload

Optimally, the workload usage of a mainframe should be nearly 100% (although this is not entirely true for a single system like DB2, which is maintained by the workload manager).

When you define the capacity of a mainframe, you generally assume a high overall usage. The usage is very inefficient when the workload is significantly lower, especially over long periods of time. However, subsystems like DB2 need some resource reserves to handle workload peaks. To guarantee coverage of peak usage, the workload manager readjusts resources depending on priority.

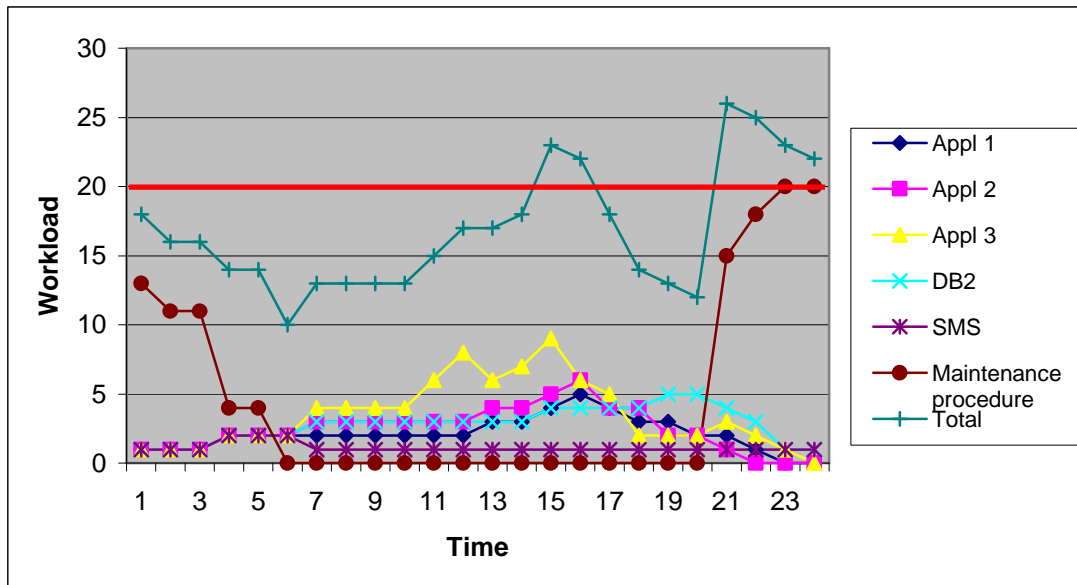
Additionally IBM provides workload on demand, which means that you can temporarily increase the capacity of the machine. If unplanned peaks occur, the capacity raises dynamically. IBM grants this to their customers on a small scale, and afterwards you have to pay for the additional capacity—because of this, it is preferable to avoid having peaks.

Current DB2 database maintenance solutions are built to run in predefined batch slots. Some maintenance can result in very high resource requirements. Additionally, the resource requirement of the database can rise disproportionately if you cannot maintain the database in a timely fashion. For example, if a maintenance requirement to run a REORG for an object arises over the day but it is not executed until the night or even the weekend, DB2 will need significantly more resources when accessing the data. The worst case scenario is when you cannot rely on the response time of an application at all.

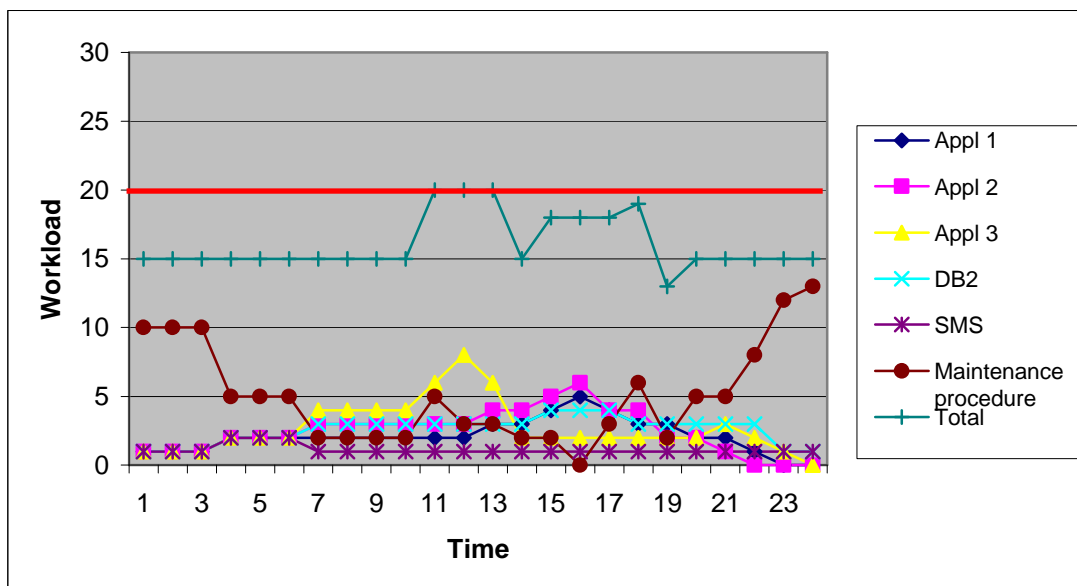
An analysis of the resource requirements of typical systems shows that the workload of a mainframe varies over the day. Dynamic real-time maintenance can efficiently make use of this fluctuation. As soon as a maintenance requirement occurs, RealTime DBAExpert checks the current workload to verify if immediate execution is possible. If possible, the unused resources are used for maintenance. Otherwise, the utility defers to the production systems. If the workload rises because the database consumes more resources as a result of a maintenance requirement of an object, than the execution is immediately forced to reduce the over-all workload again.

In practice, workload balancing results in a more evenly usage, better peak performance and efficient usage of unused resources.

System workload with current maintenance



System workload with real-time maintenance



Tip 6: Dynamically Integrate with Job Schedulers

In addition to the effort of installing and configuring a typical database maintenance solution, you typically spend a lot of time integrating the solution. A major part of integration is defining a maintenance procedure for automation within the job scheduler. Every time the quantity structure or the process flow changes, you have to adjust to this definition.

You can avoid this extra effort by using the RealTime DBAExpert dynamic interface with job schedulers. RealTime DBAExpert automatically passes any maintenance jobs that incur and their definitions to a job scheduler.

Automatic integration with all job schedulers makes dummy jobs unnecessary. Typical maintenance solutions generate dummy jobs to meet the specific requirements of the different job schedulers. RealTime DBAExpert eliminates the overhead of dummy jobs.

Tip 7: Integrate Flexibly with Additional Systems

When you add more databases, you have to update the database maintenance solution. For example, you might need to implement new applications or a service provider might want to integrate the systems of another customer. Additional databases require you to define new daily maintenance.

Because of the easier solution implementation (Tip 1) and dynamic integration with job schedulers (Tip 6), you can integrate additional systems easily.

Tip 8: FLASHCOPY II Integration

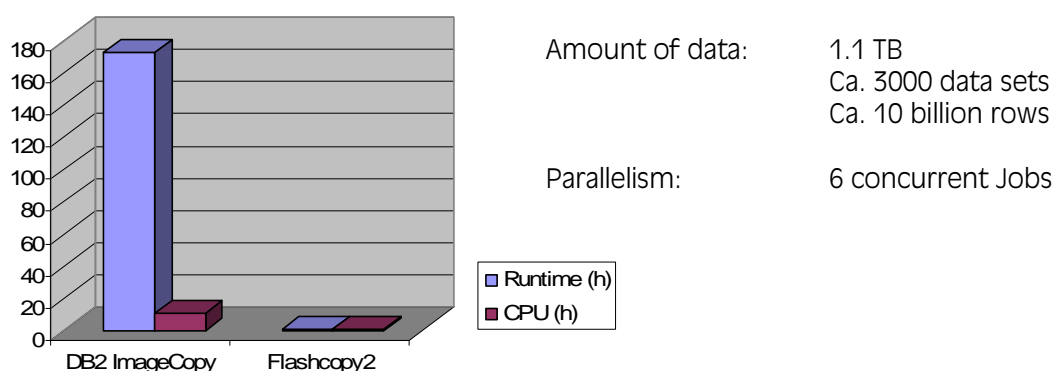
Daily DB2 database maintenance consists of two major parts: performance tasks and security tasks. Most site-specific requirements dictate that more than a half of all maintenance jobs are backups of production data.

Minimally, a backup job backs up all changed and newly created data. The largest backup job also includes old, unchanged data that has already been backed up. Typically, the back up process incurs massive resource requirements for I/O and CPU cycles within DB2 as well as within the hardware (such as channel throughput and so on).

Implementing FLASHCOPY technology creates potentially huge savings. First, you are no longer physically moving the data but managing it by using the FLASHCOPY features of the storage subsystem. Additionally the operating system or the database barely consumes any I/O or CPU because the logical backups are done by the storage subsystem only.

Now, you can drastically reduce the workload of daily backups by exploiting this new technology for database maintenance. The storage system can even take a physical backup which is done at a lower priority than regular I/O requests by using new, efficient, microcode-based destaging algorithms.

Savings occur even when restoring backups during a recovery. Quicker restores significantly reduce the duration of outages.



Tip 9: Embed KPI Determination

Tasks such as changing maintenance processes or determining a forecast for the trend of a specific production system require detailed analysis and tests. Additionally, it is vitally important to monitor system data or key performance indicators (KPI) to avoid outages— for example, outages that are caused by unforeseen data growth.

RealTime DBAExpert efficiently gathers extensive data and a data history while monitoring the database for maintenance needs. RealTime DBAExpert monitors critical factors (such as storage, object growth, run time, how the database gathers real-time data, and so on) and provides a variety of data for accounting and planning.

Tip 10: Enable Autonomic Capabilities

When running production systems, intervention sometimes is required even if you have an automated maintenance solution. Problems such as poor performance or abends due to concurrent online batch queries can require manual attention.

RealTime DBAExpert is an on-demand solution that monitors the database and reacts to situations 24x7—manual intervention is almost entirely unnecessary. If maintenance jobs are interrupted due to other processes, the interrupted jobs are executed as soon as possible. RealTime DBAExpert immediately identifies maintenance that can cause performance bottlenecks and automatically solves the problem while considering runtime and current, parallel production workload.

RealTime DBAExpert ensures that the number of maintenance jobs rises marginally and that the jobs are better scheduled. This management of jobs improves response time especially within windows that are not for maintenance—mostly during the day. Performance and data security significantly improve. RealTime DBAExpert reduces the duration of potential outages by timely backups by 30% to 40%.

Bonus Tip: Protect Investments

The component products in the RealTime DBAExpert solution use shared interfaces. The RealTime DBAExpert engine gathers real-time data and monitors information and shares the data and information with the other component products.

By sharing information, the component product processes are significantly optimized and economically integrated into the whole solution, which secures your investment in the solution and raises your cost-benefit ratio. For example, some maintenance jobs are not real-time relevant and should be processed the classic way.

Another fundamental advantage of the solution is the continuation and extension of the component link for automatic supervision, correction, and restart of batch utility jobs and application programs. . This link automatically safeguards even on-demand maintenance jobs by using commonly known and reliable governing utility capsulation.