30 technical tips and tricks to speed query, report, and dashboard performance

Dr. Bjarne Berg

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What We’ll Cover …

• **Introduction**

• **Performance Issues & Tips**
  - MultiProviders and Partitioning
  - Aggregates
  - Query Design & Caching
  - Hardware & Servers

• **Designing for Performance**
  - InfoCubes and DSOs

• **BW- Accelerator**
  - Why BWA
  - Management and Costs

• **EarlyWatch Reports**

• **BW 7.2 - Better Performance**

• **Wrap-up**
In this session.

- In this session we will cover the top 30 must-do technical performance tricks to help you optimize SAP NetWeaver BI reporting for your end users.

- We will look at performance modeling of InfoCubes, how to improve memory utilization by caching and how to use diagnostics to analyze performance issues.

- We will also explore best practices on how to develop and manage aggregates and MultiProviders, and see what the BW- Accelerator (BWA) can do for your organization.

- Finally, we will look at how to analyze EarlyWatch reports from Solution Manager 4.0 so they become actionable.
Performance Is the Top Concern for the BI Professional

A survey of 534 top BI professionals, reported that the top concern was the ability to deliver faster query and data exploration capabilities.

- Fast data exploration, query, and analysis capabilities: 69%
- Ease of implementation: 66%
- Ease of use for a broad range of workers: 63%
- Users can share and collaborate on information: 62%
- Output to a broad range of formats (e.g., CSV, Excel, HTML, Flash, PDF): 59%
- Integration with enterprise applications such as ERP and CRM: 57%
- Can collect and analyze operational data in real time: 54%
- Integration with desktop applications: 51%
- Seamless data, application, business process integration: 50%
- Broad array of data visualizations: 43%
- Can respond to events and provide near-real-time data updates: 38%
- Can predict customer behavior, risk, or business outcomes: 33%
- Breadth of product offering and potential to consolidate on fewer vendors: 29%

Source: Business Intelligence Survey, InformationWeek, 2009
High-volume SAP BI require more design then other systems

SAP BI has typically more data and high-volume reads and therefore need more, not less, design considerations than other systems.

695 people were asked at Sapphire 2009, what SAP system had the most performance issues. SAP-BI ranked number one.

This is not due to the product, but due to the frequent lack of attention to performance during design and build.

Source: 2009 Precise, Dimensional Research report.
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• Wrap-up
Problem: To reduce data volume in each InfoCube, data is partitioned by Time period.

A query now have to search in all InfoProviders to find the data (i.e. billing docs from 2007). This is very slow.

Solution: We can add “hints” to guide the query execution. In the RRKMULTIPROVHINT table, you can specify one or several characteristics for each MultiProvider which are then used to partition the MultiProvider into BasicCubes.

If a query has restrictions on this characteristic, the OLAP processor is already checked to see which part cubes can return data for the query. The data manager can then completely ignore the remaining cubes.

An entry in RRKMULTIPROVHINT only makes sense if a few attributes of this characteristic (that is, only a few data slices) are affected in the majority of, or the most important, queries (SAP Notes: 911939. See also: 954889 and 1156681).
Tip 2: The Secret about MultiProviders & Parallel Processing

- To avoid an overflow of the memory, parallel processing is cancelled as soon as the collected result contains 30,000 rows or more and there is at least one incomplete sub process
  - The MultiProvider query is then restarted automatically and processed sequentially
  - What appears to be parallel processing, is actually sequential processing plus the startup phase of parallel processing.

- Generally, it’s recommended that you keep the number of InfoProviders of a MultiProvider to no more than 10
  - However, even at 4-5 large InfoProviders you may experience performance degradation
Tip-2: MultiProviders and Parallel Processing (cont.)

Consider deactivating parallel processing for those queries that are MultiProvider queries and have large result sets (and “hints” cannot be used)

- With SAP BW 3.0B SP14 (SAP BW 3.1 SP8 and later versions), you can change the default value of 30,000 rows - Refer to SAP Note 629541, SAP Note 622841, SAP Note 607164, and SAP Note 630500

A larger number of base InfoProviders is likely to result in a scenario where there are many more base InfoProviders than available dialog processes, which results in limited parallel processing and many pipelined sub-queries

You can also change the number of dialogs (increase the use of parallel processing) in RSADMIN by changing the settings for QUERY_MAX_WP_DIAG.
TIP 3: SPO in SAP BW 7.2 can reduce data volumes

• In BW 7.2 a new feature called "Semantic partitioned object" (SPO) is introduced to help partition InfoCubes for query performance, and DSOs for load performance.

• BW 7.2 provides Wizards to help you partition objects by year, business units or products.

• BW also generate automatically all needed DTP such as transformation rules and filters to load the correct infoProvider.

• Maintenance is easier since any remodeling only need to change the reference structure.

SPOs can be added to MultiProviders for easy query administration and to mask complexity.
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TIP-4: Aggregates

• Aggregates are much less used by the SAP installation base than training and common sense should dictate.

• The interface to build the summary tables (aggregates) are intuitive and easy to master, but few are taking real advantage of them.

• Even among those that are using aggregates, many have poorly defined solutions & seldom monitor the usage, thereby limiting the benefits of this simple technology.

To avoid poor definition and usage, aggregates should be developed after the system has been in production for a while and real user statistics are captured.
Tip 4: Building aggregates is easy – Propose from statistics

This example shows how to build aggregates by using system statistics to generate proposals.

Note: To make this work, the BW statistics must be captured.

- Select the run time of queries to be analyzed (e.g., 20 sec)
- Select time period to be analyzed
  - Only those queries executed in this time period will be reviewed to create the proposal
Tip-5: Correct Aggregates Are Easy to Build – Propose from Query

We can also create proposals from the Query user statistics. To make this work, a representative number of queries must be executed to gather the statistics to optimize from.

Another option is to create proposals for aggregates based on individual queries that are performing poorly.
Tip 6: Reduce the number of overlapping Proposals

We reduce the overlapping proposals by optimizing them. This may reduce the proposals from 99 to less than a dozen.

High valuation and high usage is what we are looking for. This indicates high reduction of records in aggregate and high benefits to users.

When using third-party query tools and ODBC to query directly into the DSO, you are bypassing the OLAP Processor. Therefore, you cannot accurately performance tune the system using aggregates (statistics), nor will the third-party tool benefit from aggregates.
Activate the aggregate

The process of turning 'on' the aggregates is simple

1. Click on Jobs to see how the program is progressing

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Fill aggregate with summary data
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Tip 7: Use the Right Read Mode for Queries

• Select the right read mode. Three query read modes in SAP NetWeaver BW determine the amount of data to be fetched from a database:
  
  ➢ Read all data (all data is read from a database and stored in user memory space)
  ➢ Read data during navigation (data is read from a database only on demand during navigation)
  ➢ Read data during navigation and when expanding the hierarchy

• Reading data during navigation minimizes the impact on the application server resources because only data that the user requires will be retrieved
Tip 8: Query Read Mode for Large Hierarchies

- For queries involving large hierarchies, it is smart to select **Read data during navigation** and when expanding this option to avoid reading data for the hierarchy nodes that are not expanded.

- Reserve the **Read all data** mode for special queries—i.e. when a majority of the users need a given query to slice and dice against all dimensions, or data mining
  - This places heavy demand on database and memory resources and may impact other BW processes
  - A query read mode can be defined on an individual query or as a default for new queries (transaction RSRT)

- **SAP's recommendations for OLAP Universes & Webi**
  - Use of hierarchy variable is recommended
  - Hierarchy support in SAP Web Intelligence for SAP BW is limited
  - The Use Query Drill option in SAP Web Intelligences significantly improves drilldown performance

Source: Catherine Roze, MyITgroup
Tip 9: Minimize conditions-and-exceptions reporting

- Conditions and exceptions are usually processed by the SAP application server
  - This generates additional data transfer between database & application servers

- If conditions and exceptions have to be used, the amount of data to be processed should be minimized with filters
  - When multiple drilldowns are required, separate the drilldown steps by using free characteristics rather than rows and columns

- This strategy results in a smaller initial result set, and therefore faster query processing and data transport as compared to a query where all characteristics are in rows

This approach separates the drill-down steps. In addition to accelerating query processing, it provides the user more manageable portions of data.

Source: Catherine Roze
Some Performance settings for Query Execution

- **Read Mode**: H Query to Read When You Navigate or Expand
- **Req. Status**: 0 All PartProviders Up to Released Status (RQ...
- **Cache Mode**: 1 Main Memory Cache Without Swapping
- **SP Grouping**: 0 No Grouping
- **Use Selection of Structure Elements**
- **Calculate w/ Packed Numbers**
- **no parallel processing**
- **Generation log**
- **Optimization Mode**: 0 Query Will Be Optimized after Generation
- **Disaggregation on Totals**: Default
- **Statistic Det.**: 2 All

In 7.0 BI: OLAP engine can read deltas into the cache. Does not invalidate existing query cache.

Turn off/on parallel processing

When will the query program be regenerated based on database statistics

Examine the request status when reading the InfoProvider

This decides how many records are read during navigation.

Displays the level of statistics collected.
Leverage filters as much as possible. Using filters contributes to reducing the number of database reads and the size of the result set, thereby significantly improving query runtimes.

Filters are especially valuable when associated with “big dimensions” where there is a large number of characteristics such as customers and document numbers.

If large reports have to be produced, leverage the BEx Broadcaster to generate batch reports and pre-deliver them each morning to their email, PDF or printer.
Tip 11: Use RSRT Transaction to examine slow queries
Look for patterns and see the performance details

In this real case, aggregates was needed for those cubes flagged...
Real Example: This system has issues with the Oracle DB

Work with the basis team to research the settings and the Oracle issues. Focus on SAP notes and the index issue.

The RSRT and RSRV codes are a gold mine for debugging and analyzing slow queries.
Look at the query details for each slow query

Notice the yellow flag for the 6 base cubes in the MultiProvider and the yellow flag for the 14 free chars.

(Note: no hints were used in this MultiProvider, which led to very poor performance).

You can also trace the front-end data transfers and OLAP performance by using RSTT in SAP 7.0 BI (RSRTRACE in BW 3.5)
Tip 12: Use the BEx Broadcaster to Pre-Fill the Cache

You can increase query speed by broadcasting the query result of commonly used queries to the cache.

Users do not need to execute the query from the database. Instead the result is already in the system memory (much faster).
Tip 13: Debugging Queries - RSRT

Here you can execute the query and see each breakpoint, thereby debugging the query and see where the execution is slow.

Worth a try: Try running slow queries in debug mode with parallel processing deactivated to see if they run faster.
For BOBJ Integration there are FixPacks (smaller fixes) and Service Packs (major fixes and previous fixes).

- FixPack 1.2 was released March 2009, a major addressed many of the performance issues of the MDX interface for the OLAP Universe.

SP 2 Was released in June 2009 and is include   FP 1.5 + new features

- In FixPack 1.6 are fixes to WebI refresh, Prompts and row level restriction, WebI publishing and single pass bursting
- In FixPack 1.7 is a critical hot fix to Qaaws to fix a timeout issue.
- In FixPack 1.8 includes updates to the WebIProcessServer settings and more.
- FixPack 2.3 was released on Dec. 16th, 2009 and requires SP2.

To install a new server, you must install 3.1, then SP2, then FP 2.3. This is required also for desktop products.

If you already have installed SP1 and FixPacks 1.6, 1.7, 1.8, 1.9 you now have to ‘retrograde’, install SP2 and then FixPack 2.3.
1. When **Restrictive Key Figures** (RKF) are included in a query, conditioning is done for each of them during query execution. This is very time consuming and a high number of RKFs can seriously hurt query performance.

**Recommendation:** Reduce RKFs in the query to as few as possible. Also, define calculated & RKFs on the Infoprovider level instead of locally within the query. Why?:

- **Good:** Formulas within an Infoprovider are returned at runtime and held in cache.
- **Bad:** Local formulas and selections are calculated with each navigation step.
SAP's recommendation for Key Figures in OLAP universes:

- A large number of Key Figures in the BEx query will incur a significant performance penalty when running queries, regardless of whether the Key Figures are included in the universe or used in the SAP BusinessObjects Web Intelligence query.

- Only include Key Figures used for reporting in the BEx query.

- This performance impact is due to time spent loading metadata for units, executed for all measures in the query.

FYI: After SAP BusinessObjects Enterprise XI 3.1 FP 1.1, the impact of large number of key figures was somewhat reduced by retrieving metadata information only when the unit/currency metadata info is selected in the Webi Query.
Tip 17: Line Item Dimensions are Your Friends

Line item dimensions are basically fields that are transaction oriented. Once flagged as a ‘line item dimension’, the field is actually stored in the fact table and have no table joins.

The results is significant improvements to query speeds (10%-40%)

Explore the use line item dimensions for fields that are frequently conditioned in queries. This model change can yield faster queries.
Tip 17: Reducing the Query processing time

Problem: Calculated Key Figures (CKF) are computed during run-time, and a many CKFs can slow down the query performance.

Solution: Many of the CKF can be done during data loads & physically stored in the InfoProvider. This reduces the number of computations and the query can use simple table reads instead. Do not use total rows when not required (this require additional processing on the OLAP side).

SAP's recommendation for OLAP universes:

- RKF and CKF should be built as part of the underlying BEx query to use the SAP NetWeaver BW back-end processing for better performance.
- Queries with a larger set of such Key Figures should use the “Use Selection of Structure Members” option in the Query Monitor (transaction RSRT) to leverage the OLAP engine.
Tip 18: Reduce Sorting in Queries

Problem: Sorting the data in reports with large result sets can be time consuming.

Solution: Reducing the number of sorts in the default view can improve the report execution & provide the users with data faster. User can then choose to sort the data themselves.

PS! Reducing the text in query will also speed up the processing some.
Web templates in SAP BI can become really large. Since they contain both scripts and Cascading Stylesheets (CSS), the code can become really comprehensive.

To reduce the CSS, you can try several compression tools that may help you limit the overall size of your web templates.

There are no lack of free tools available, and the quality varies. Therefore you must remember to test, test and test…. (but the benefits can also be great).

**Compression tools for CSS and Java scripts can reduce the overall web template size. If you have thousands of users, this can be a ‘life saver’**
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Tip 20: Is the Memory Cache Is Set Too Low?

Cache has a system default of 100 MB for local and 200 MB for global cache. This may be too low for a system that can be optimized via broadcaster.

Review the settings with the Basis team and look at the available hardware.

Use the transaction code RSCUSTV14 in SAP NetWeaver BI to increase the cache. Focus particularly on the global cache.

The Cache is not used when a query contains a virtual key figure or virtual characteristics, or when the query is accessing a transactional DSO, or a virtual InfoProvider.
Tip 21: Monitor and adjust Cache Size

To monitor the usage of the cache, use transaction code RSRCACHE and also periodically review the analysis of load distribution using ST03N – Expert Mode.

The size of OLAP Cache is physically limited by the amount of memory set in system parameter rsdb/esm/buffersize_kb. The settings are available in RSPFPAR and RZ11.

Source: V. Rudnytskiy,
## Tip 22: The Right OLAP Cache Persistence Settings

<table>
<thead>
<tr>
<th>Note</th>
<th>When</th>
<th>What</th>
<th>t-code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Flatfile</td>
<td>Change the logical file BW OLAP CACHE when installing the system (not valid name)</td>
<td>FILE</td>
</tr>
<tr>
<td>Optional</td>
<td>Cluster table</td>
<td>Medium and small result sets</td>
<td>RSR_CACHE_DBS_IX</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RSR_CACHE_DB_IX</td>
</tr>
<tr>
<td>Optional</td>
<td>Binary Large Objects (blob)</td>
<td>Best for large result sets</td>
<td>RSR_CACHE_DBS_BL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RSR_CACHE_DB_BL</td>
</tr>
<tr>
<td>SP 14</td>
<td>Blob/Cluster Enhanced (new in SAP 7.0 BI)</td>
<td>No central cache directory or lock concept (enqueue). The mode is not available by default.</td>
<td>Set RSR_CACHE_ACTIVATE_NEW RSADMIN VALUE=x</td>
</tr>
</tbody>
</table>

Source: SAP AG 2009.
Monitor Memory Usage – Do you need more?

Roll memory was never maxed out in the period

Paging memory was never maxed out in the period

Extended memory was never maxed out in the period

Only 3GB of 9 GB of Heap memory was ever used in the period

Real example
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Tip 23: Avoid Outdated Indexes and Database statistics

Database statistics are used by the optimizer to route queries. Outdated statistics leads to performance degradation. Outdated indexes can lead to very poor search performance in all queries where conditioning is used (i.e. mandatory prompts).

For high volume Infocubes, or cubes that have a high number of users, the percentage used to build the DB stats can be increased from the default 10% to 20%. This may yield more accurate query routing and better query performance (consider this especially for cubes with ‘old data’ partitioned).

<table>
<thead>
<tr>
<th>Name</th>
<th>Tech-Nm</th>
<th>Object</th>
<th>Indexes</th>
<th>DB stats</th>
<th>% used to create stats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor history closed</td>
<td>XFIAP_C10</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>AR customer</td>
<td>XFIAR_C10</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>FIAR line items</td>
<td>0FIAR_C03</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>FIAR Payment history</td>
<td>0FIAR_C05</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>FIAR: Transaction data</td>
<td>0FIAR_C02</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Multicube AR&amp;billing</td>
<td>XSDARBIL</td>
<td>Infocube</td>
<td>n/a</td>
<td>n/a</td>
<td>10%</td>
</tr>
<tr>
<td>Billing cube custom for AR trade</td>
<td>XSBILITMT</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Sales contract cube - anticipated billing</td>
<td>XSDCN_C10</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Service orders - ZSLM</td>
<td>ZCSCBZSLM</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Performance cube</td>
<td>ZCSCBPER</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Headcount and personnel actions</td>
<td>ZHRPA_C02</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Cycle count</td>
<td>XMMWWM_C10</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>MM LIO interface infocube</td>
<td>XLIO_C01</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Material aging</td>
<td>ZMMCBMAAG</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Lead time cube</td>
<td>ZMMLTCUBE</td>
<td>Infocube</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
</tbody>
</table>
Tip 24: Avoid replicating the transaction system in SAP BI

It is tempting to load cross-reference tables and do lookups inside SAP BI instead of extending extractors. This creates DSOs that cannot be queried efficiently without many table joins. In this example, ¼ of all DSOs contains less than 9 fields, & six have less than 4.

Programs that can help you monitor the system design:

1. SAP_ANALYZE_ALL_INFOCUBES
2. ANALYZE_RSZ_TABLES
3. SAP_INFOCUBE_DESIGNS

As much logic as possible should be moved to the extraction, and needed data fields should be denormalized and stored in logically organized ODSs and Infocubes.
Tip-24: InfoCube Design & Indexes

When you flag a dimension as “high cardinality” SAP BI will use a b-tree index instead of a bit-map index.

This can be substantially slower if the high cardinality does not exist in the data in general (star-joins cannot be used with b-trees).

Validate the high-cardinality of the data and reset the flag if needed – this will give a better index type and performance.
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Why SAP BW Accelerator (BWA)?

- Disk speed is growing slower than other HW components

### Technology Drivers

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2010</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>0.05</td>
<td>253.31</td>
<td>5066x</td>
</tr>
<tr>
<td>Memory</td>
<td>0.02</td>
<td>50.15</td>
<td>2502x</td>
</tr>
<tr>
<td>Addressable Memory</td>
<td>$2^{16}$</td>
<td>$2^{64}$</td>
<td>$2^{48}$x</td>
</tr>
<tr>
<td>Network Speed</td>
<td>100</td>
<td>100</td>
<td>1000 x</td>
</tr>
</tbody>
</table>

### Architectural Drivers

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk-based data storage</td>
<td>In-memory data stores</td>
<td></td>
</tr>
<tr>
<td>Simple consumption of apps (fat client UI, EDI)</td>
<td>Multi-channel UI, high event volume, cross industry value chains</td>
<td></td>
</tr>
<tr>
<td>General-purpose, application-agnostic database</td>
<td>Application-aware and intelligent data management</td>
<td></td>
</tr>
</tbody>
</table>

Physical hard drive speeds only grew by 120 times since 1990. All other hardware components grew faster.

Source: 1990 numbers SAP AG 2010 numbers, Dr. Berg
In this example, the average query execution took 58.8 seconds; after SAP BW Accelerator the average query took 17.9 seconds (295% faster overall).

BI Accelerator (BWA) has been renamed to SAP BW Accelerator.
With BW 7.2, you can have data in BWA, InfoCube are not required.

Once you exceed a few hundred critical users and/or 3-4 Tb of data you should seriously consider BWA

BWA is no longer exotic.

- Many large SAP-BI customers have already implemented BWA & projects are under way in Europe, Asia and the Americas.
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Tip 26: SAP Solutions Manager - EarlyWatch Reports Are Great!

1 Service Summary

The EarlyWatch Alert Service has detected severe problems that may cause you to lose business. We recommend that you take corrective action immediately.

This EarlyWatch Alert session has been rated RED due to critical problems. The overall session is rated RED if one of the following general areas is rated RED.

- **DB Performance**
- **Database Administration**:
  - DB growth
  - Missing indexes
  - Critical database problems

EarlyWatch reports provide a simple way to confirm how your system is running and to catch problems.

- A “goldmine” for system recommendations

This is a real EarlyWatch report from a large company that has been running SAP BW for the last 6 years.

System issues can be hard to pin-down without access to EarlyWatch reports. Monitoring reports allows you to tune the system before the user complaints arise.

<table>
<thead>
<tr>
<th>Section Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>⚠️</td>
</tr>
<tr>
<td>✗</td>
</tr>
<tr>
<td>✔️</td>
</tr>
<tr>
<td>⚠️</td>
</tr>
<tr>
<td>⚠️</td>
</tr>
<tr>
<td>✗</td>
</tr>
<tr>
<td>⚠️</td>
</tr>
<tr>
<td>⚠️</td>
</tr>
</tbody>
</table>

**Alert Message Overview**

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
<th>New Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Performance problems exist or are expected.</td>
<td>New</td>
</tr>
<tr>
<td>Medium</td>
<td>There are security issues in your system.</td>
<td>New</td>
</tr>
<tr>
<td>Medium</td>
<td>Your database is growing very rapidly.</td>
<td>New</td>
</tr>
</tbody>
</table>
EarlyWatch Performance Info

2 Performance Indicators

The following table shows the relevant performance indicators in various system areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>Indicators</th>
<th>Value</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Performance</td>
<td>Active Users</td>
<td>358</td>
<td>up</td>
</tr>
<tr>
<td></td>
<td>Avg. Availability per Week</td>
<td>100 %</td>
<td>steady</td>
</tr>
<tr>
<td>Hardware Capacity</td>
<td>Max. CPU Utilization on DB Server</td>
<td>92 %</td>
<td>up</td>
</tr>
<tr>
<td></td>
<td>Max. CPU Utilization on Appl. Server</td>
<td>100 %</td>
<td>up</td>
</tr>
<tr>
<td>Database Space Management</td>
<td>DB Size</td>
<td>5811.62 GB</td>
<td>up</td>
</tr>
<tr>
<td></td>
<td>Last Month DB Growth</td>
<td>414.32 GB</td>
<td>steady</td>
</tr>
<tr>
<td>Query Performance</td>
<td>Avg. Total Runtime of the BW Queries</td>
<td>43.6 s</td>
<td>up</td>
</tr>
<tr>
<td></td>
<td>Avg. Database Runtime of the BW Queries</td>
<td>33.5 s</td>
<td>up</td>
</tr>
</tbody>
</table>

2.1 Query Performance

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Queries</td>
<td>1912</td>
<td>23</td>
<td>43.60</td>
<td>0.17</td>
<td>3.66</td>
<td>33.49</td>
</tr>
<tr>
<td>Cache Queries</td>
<td>729</td>
<td>2</td>
<td>10.42</td>
<td>0.17</td>
<td>1.56</td>
<td>0.00</td>
</tr>
<tr>
<td>DB Queries</td>
<td>835</td>
<td>42</td>
<td>64.85</td>
<td>0.22</td>
<td>7.01</td>
<td>50.81</td>
</tr>
<tr>
<td>RSDRI Queries</td>
<td>348</td>
<td>21</td>
<td>62.10</td>
<td>0.01</td>
<td>0.00</td>
<td>62.09</td>
</tr>
</tbody>
</table>

2.2 Current Workload

The following table lists the number of current users (measured from our workload analysis) in your system.

<table>
<thead>
<tr>
<th>Users</th>
<th>Low Activity</th>
<th>Medium Activity</th>
<th>High Activity</th>
<th>Total Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured in System</td>
<td>587</td>
<td>294</td>
<td>55</td>
<td>955</td>
</tr>
</tbody>
</table>
In this real example, we can the EarlyWatch report identified that the system was several Oracle notes are behind that needed to be applied to optimize DB performance.

Before this was done, this system took 24 to 26 minutes to execute some queries.

<table>
<thead>
<tr>
<th>SAP Note number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>841728</td>
<td>Oracle 10.2.0: Composite note for problems and workarounds</td>
</tr>
<tr>
<td>871096</td>
<td>Oracle Database 10g: Patch sets/Patches for 10.2.0</td>
</tr>
<tr>
<td>871735</td>
<td>Current Patchset for Oracle 10.2.0</td>
</tr>
<tr>
<td>850306</td>
<td>Oracle Critical Patch Update Program</td>
</tr>
<tr>
<td>1021454</td>
<td>Oracle Segment Shrinking may cause LOB corruption.</td>
</tr>
<tr>
<td>952388</td>
<td>Kernel &lt;= 6.40:UNIX error due to 9i Client software</td>
</tr>
</tbody>
</table>
In this real example, the EarlyWatch report identified an increase of about 40 more casual & 5 more active users in the last 2 months.
What We’ll Cover …

• Introduction
• Performance Issues & Tips
  ➢ MultiProviders and Partitioning
  ➢ Aggregates
  ➢ Query Design & Caching
  ➢ Hardware & Servers
• Designing for Performance
  ➢ InfoCubes and DSOs
• BW- Accelerator
  ➢ Why BWA
  ➢ BWA Performance Benchmarks
  ➢ EarlyWatch Reports
• BW 7.2 - Better Performance
• Wrap-up
Controlled shipments of BW version 7.2 started on February 15\textsuperscript{th} 2010. The new version has significant performance benefits.

1. Semantic Partitioned Objects (SPO) as we already covered.

2. Improved data activation due to new package fetch of active table instead of single lookups. The new 7.2 runtime option “new, unique data records only” prevents all lookups during activation. According to SAP this means and average of 20\% – 40\% improvement in load performance.

3. A new monitor in BW Administration Cockpit so that database usage can be tracked.
With BW 7.01 we can disable delta consistency check for write-optimized DataStore objects. This protects delta requests that have been already propagated per delta mode from deletion.

This can be switched on/off – e.g. for write-optimized DataStore objects as initial staging layer. When doing so, significant load performance benefits can be achieved (10-30%).

Higher benefits are obtained from very large InfoProviders with thousands of requests.
7 Key Points to Take Home

• Use best practices for query design before you start massive hardware performance tuning efforts.

• Plan for growth – what is the plan when you have 200,500, 1000+ users?

• Start with aggregates (poor man’s BWA), thereafter go with caching.

• Monitor the system usage - do you need more app servers, memory, HW?

• Check database statistics and indexes and keep them up to date.

• If you are building an Enterprise Data Warehouse, plan and budget for a BWA installation.

• EarlyWatch reports are a tool to live (and ‘die’) by. Use the report before you have performance issues.
Resources

Performance tuning presentations, tutorials & articles
www.ComeritInc.Com

SAP COMMUNITY NETWORK

SAP SDN Community web page for Business Intelligence Performance Tuning
https://www.sdn.sap.com/irj/sdn/bi-performance-tuning

SAP DEVELOPER NETWORK

ASUG407 - SAP BW Query Performance Tuning with Aggregates by Ron Silberstein (requires SDN or Marketplace log-on). 54 min movie.
https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/media/uuid/d9fd84ad-0701-0010-d9a5-ba726caa585d

Large scale testing of SAP BI Accelerator on a NetWeaver Platform
https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/library/uuid/b0e7bb5-3add-2a10-3890-e8582df5c70f
Your Turn!

Questions?

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