Improving Query Performance by Effective and Efficient Maintenance of Aggregates

Applies to:
SAP BW 3.5, BI 7.0, and BI 7.1. For more information, visit the Business Intelligence homepage.

Summary
You have created queries over a Multiprovider or Infocube but when you are executing these queries using BEx Analyzer, they are taking lot of time to show the query result and query response time is more. We'll take an example where queries are built over a Multiprovider and there are four Info Cubes as part of this Multiprovider. There are already existing aggregates built over couple of Info cubes. This article explains how to improve the query performance by making effective and efficient use of aggregates of Info Cubes of the Multiprovider.

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Created on: 20 May 2009

Author Bio
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**Table of Contents:**

Scenario..............................................................................................................................................................3

Calculation of %DB time and aggregation ratio for a Query .................................................................3

Procedure to find the aggregation ratio of each of the targets and query run time statistics ..............5

Approaches to modify the existing aggregates or maintaining new aggregates with more effective and efficient way ........................................................................................................6

Case I: .........................................................................................................................................................................6

Case II : .......................................................................................................................................................................7

Case III: .......................................................................................................................................................................7

Related Content ..................................................................................................................................................8

Disclaimer and Liability Notice ............................................................................................................................9
Scenario

There can be following performance concerns with a query in BW:

Considerations:

a. Maintaining Aggregates.
b. Infocube Partitioning.
c. Line Item Dimension.
d. Creating Indexes.
e. DSO - Infocube - Report to Report Interface.
f. Query Design - Start at summarized level, drill down for details
g. Use of OLAP Cache.
h. Compression of Data in Infocubes
i. Database Statistics - Are they complete and up-to-date?
j. Resource constraints: CPU speed, Number of CPUs, Available memory, I/O throughput, number of controllers.

From the above considerations, Maintaining and creating aggregate is one of the important and crucial consideration for optimizing the query performances in BW.

So, this article will be helpful to optimize the performance of queries by making effective and efficient use of aggregate. In this article, I will be talking about only aggregates perspective to improve the runtime of query.

When you think about maintaining aggregates over a Cube then following questions may arises in your mind:

1. Will aggregates be helpful to improve the query Performances?
2. Whether queries are hitting on Aggregates?
3. Determination of Characteristics Infoobjects list for an Aggregate?

So this article gives the answers of all the above questions. I have used the RSRT (Query monitor) and ST03N (Workload monitor) to get this analysis and information to identify the approaches for improving the performances.

Building Aggregates:

a. Primary technique for tuning reporting performance.
b. Analyze to determine if building aggregates will help.

Calculation of %DB time and aggregation ratio for a Query

1. Calculation and analysis of %DB time and aggregation ratio for each of the queries using ST03N, which are taking lot of time.

One Key Indicator: database time (%DB) for queries > 30% of total query runtime

Second Key Indicator: Aggregation ratio = Ratio records selected / records transferred > 10

So Building an Aggregate will improve the query performance only when %DB time > 30 AND Aggregation ratio > 10.

Below are the steps to get this information:

- Execute the query from RSRT with proper selection variables values and wait until it shows the result of this query.
- And then go to ST03N → BI Workload → User defined Time Selection or Week or Month wise as per you would like to see the information.
Improving Query Performance by Effective and Efficient Maintenance of Aggregates

- Go to third tab of this screen (All Data) → Double click on particular Infocube on which executed query was built, then it will show you all the information of that query as per below screen shot.
- So now, you would be able to know the total time, %DB time and Aggregation ratio for executed query from ST03N.
- As we can see from this below screen shot that for this particular query YZZAPS_MC02_Q002 the % DB time = 32.80>30 AND aggregation ratio = 30.7 >10.so building an aggregates over the Infocubes of this Multiprovider will definitely help to improve this query performance.

Also we can see from the above screen that the aggregation ratio for the Multiprovider. Now, we are interested to know the aggregation ratio for each of the Infocubes of Multiprovider, as it would be easy to decide the Infocubes on which creating new aggregates and modifying existing aggregates will help to improve the query performance.
Improving Query Performance by Effective and Efficient Maintenance of Aggregates

Procedure to find the aggregation ratio of each of the targets and query run time statistics

Follow the below procedure to know the aggregation ratio of each of the targets:
   a. Run the Query using RSRT → Debug option: Select “Display Aggregate Found”
   b. Select Display Statistics Data.
   c. Give the selection screen fields values.
   d. Now go to Aggregation layer tab and calculate the aggregation ratio of each of the InfoCube manually as below:
   e. Aggregation ratio = Records Selected / Records Transported

I.e. from the below example:

ZSD_E01 (A.R.) = 278946/139914 = 1.99<10 (It is already less than 10, so modifying existing aggregates or creating new aggregates won’t help in improving the performance of query.)

ZSD_BC01 (A.R) = 4093654/217827 = 18.7>10
ZSD_BC10 (A.R) = 422515/20651 = 20.45>10

ZSD_BC01 & ZSD_BC10: Creating new aggregates or modifying existing aggregates will help to improve the performance as their A.R. > 10.
Improving Query Performance by Effective and Efficient Maintenance of Aggregates

Approaches to modify the existing aggregates or maintaining new aggregates with more effective and efficient way

Now, there might be three cases which are causing aggregation ratio to be more than 10 for the Infocubes:

1. There are already aggregates exists on the Cubes, but queries are not hitting on the existing aggregates?
2. If no aggregates are built over the Cubes?
3. Query is hitting on existing aggregates, but still there aggregation ration is more than 10?

Case I: Following is the procedure to identify whether a query is hitting on existing aggregates or hitting on Infocube. Second, determine the minimal list of Infoobjects which are required to be present in an aggregate to hit by a particular query.

a. RSRT→Debug option: Select “Display Aggregate Found”

If the Query is hitting an aggregate, it will show the name of hitting aggregate as below.

I.e. Query has been built over Multiprovider and ZSD_E01 is part of this Multiprovider.

100043 is aggregate of Infocube ZSD_E01.

Statistics Data for Query Runtime

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Compare Requested/Found Aggregates

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ZSD_BC01 is also part of the same Multiprovider. Otherwise it will show the name of info cube ZSD_BC01 as can be seen from below screen shot.

### Compare Requested/Found Aggregates

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But there are aggregates exist for this Cube ZSD_BC01. Even though aggregates are present on this Cube ZSD_BC01, but they are not used by this query and query is not hitting the aggregates of Cube ZSD_BC01. So determine the missing Infoobjects from an aggregate by comparing the Infoobjects of an aggregate with list of minimum InfoObjects in above screen (Compare Requested/Found Aggregates screen). Then add these missing Infoobjects in existing aggregate.

**Cautious:** When adding the new Infoobjects to an aggregate, Valuation and Record summarized (Mean Value) parameters of an aggregate should not be very much negatively impacted at the same time.

**Case II:** When there is not any existing aggregate built over the Cube, then maintain new aggregate using the below steps:

1. Determine the list of Infoobjects for an aggregate using RSRT → Debug option and select “Display Aggregate Found”.
2. Create an aggregate having all these above Infoobjects (from step 1) in their respective dimensions as per the Infocube.
3. And confirm whether the queries are hitting on this new aggregates or not as per explained above in Case I procedure. If it is not hitting the aggregate, add the missing Infoobjects to this aggregate.

**Case III:** Query is hitting on existing aggregates, but still their aggregation ratio is more than 10 and query performance is poor. It means, there are still Infoobjects that are missed in aggregates while comparing the Infoobjects list of RSRT with the list of Infoobjects in an aggregate.

So Aggregates can be modified to include the missing Infoobjects. As a result, it will reduce the aggregation ratio and will improve the query performance.
Related Content

http://help.sap.com/saphelp_nw70/helpdata/EN/10/244538780fc80de10000009b38f842/frameset.htm
http://help.sap.com/saphelp_nw70/helpdata/EN/26/4bc0417951d117e10000000a155106/frameset.htm

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