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IMPROVING QUERY PROCESSING TIME OF OLAP CUBE USING OLAP OPERATIONS

Neha[1], Dr. Kanwal Garg[2]

[1] *Research Scholar, M.Tech. (CSE), Department of Computer Science & Applications, Kurukshetra University Kurukshetra, India.*
[2] *Assistant Professor, Department of Computer Science & Applications, Kurukshetra University Kurukshetra, India.*

ABSTRACT *: The popularity of OLAP cube has been growing due to the huge volume of data and need for ad-hoc analytical queries. As OLAP cube provides multidimensional view of data the analysis of data become faster and improve response time over relational databases. The performance here is measured on the basis of throughput of the queries that is the time taken by a query in fetching the appropriate and efficient result. The processing time of query processing is observed to be better in case of OLAP cube as compared with the OLTP but still there is some hope of more improvement. In this regard applying OLAP operations on a cube found to be more appropriate approach to improve query processing time of OLAP cube. In this paper a comparative analysis is done to compare the query processing time of the OLAP cube and the OLAP operations.*

Keyword: OLAP, OLTP, MDX, SSMS, BIDS.

1. INTRODUCTION

Multidimensional model consisting of fact and dimension table are structured as data warehouse (DW) schema. Further these tables can be viewed as OLAP cube (Data cube). The fact tables consist primary information in data warehouse and dimension tables consist detailed information of attributes in fact tables. Dimension tables joined to the fact tables with the help of primary key and foreign key relationship. OLAP data can be analyzed in multiple dimensions. OLAP cube provides appropriate knowledge for any organization. Analyst can apply roll-up, drill-down, slice and dice the data cube to examine for relevant knowledge [1]. Roll-up operation also known as drill-up operation summarize the data by rising up hierarchy or by reduce dimensions. Drill-down operation is opposite of roll-up and which performed by stepping down hierarchy or by adding new dimension. Slice operation selects one particular dimension and provides the results according to selecting dimension. Dice operation is reverse of slice as it selects two or more dimensions instead of one particular dimension [2].

2. PROBLEM IDENTIFICATION

OLAP allow users to view data from different perspective which improves the analyst capability to perform better analysis. OLAP helps in reducing execution time, reduce efforts and collect filter knowledge/information from raw data. The OLAP cube can also improve the query response time over relational database by summarizing the dimensions [3]. Although, OLAP provides better execution time but still there is hope for the improvement in this execution time by using OLAP operations [3]. The research methodology for the following problem is discussed in next section.

3. RESEARCH METHODOLGY

In this paper, researcher shows how to improve query processing/execution time of cube using OLAP operations. To implement this initially user needs to create OLAP cube [3]. Now, write an MDX (multidimensional expression) query in query window for a cube and note down its execution time. After that apply OLAP operations on cube by writing the MDX query for all operations and note down the execution time of operations individually. On the basis of this execution time perform comparative analysis between OLAP cube and its operations. After reviewing the literature, it was observed that Microsoft SQL server management studio (SSMS) and Microsoft business intelligence development studio (BIDS) are more appropriate tools for management of database and for creating a cube [3]. The implementation results of this research work are shown in upcoming section.

4. IMPLEMENTATIONAL RESULTS

To get the specific information from the cube there is some OLAP operations which user can apply on the cube and get specific information from the cube in less

than time taken by a cube. The Sales_DW database has been used for implementation and analysis purposes [4]. In earlier research it was observed that MDX query written for the cube took 26 seconds to retrieve the knowledge from raw data.

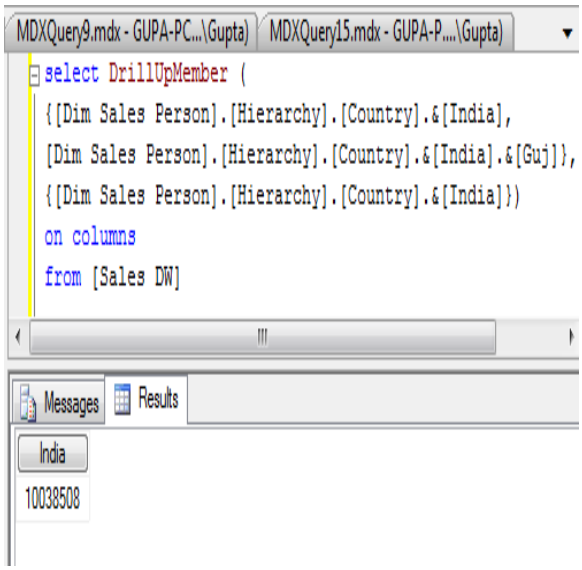

Figure1: Roll-up operation.

Figure shows the roll-up operation applied on a cube and gets more appropriate results as requested by user. Query took only 3 seconds to retrieve the required results.

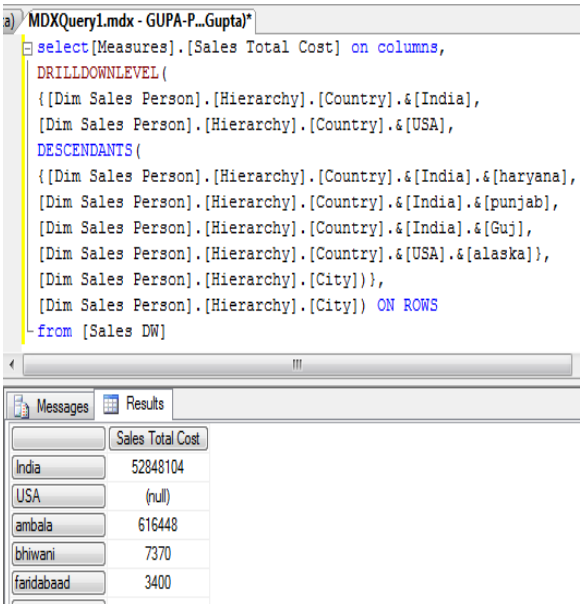

Figure2: Drill-down operation.

Figure2 explores the raw data in more detailed form by using drill-down operation. It was observed that the query took only 2 seconds to retrieve appropriate results.

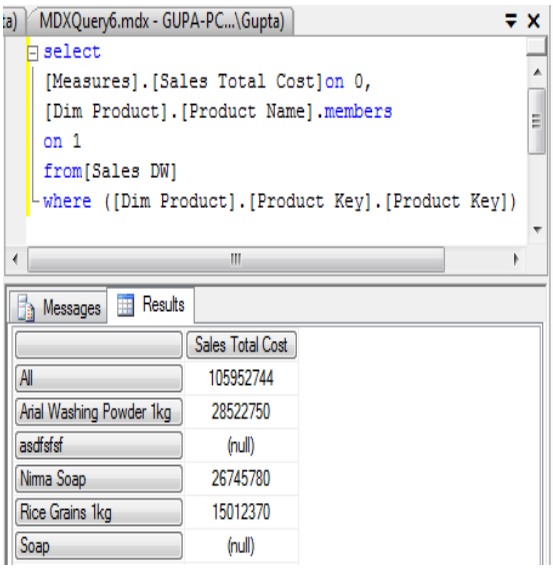

Figure3: Slice operation.

Figure3 shows the slice operation in which analyst selects only one particular dimension from the cube to provide the more specific knowledge by using where clause. The query execution time for slice operation has been observed as 5 seconds.

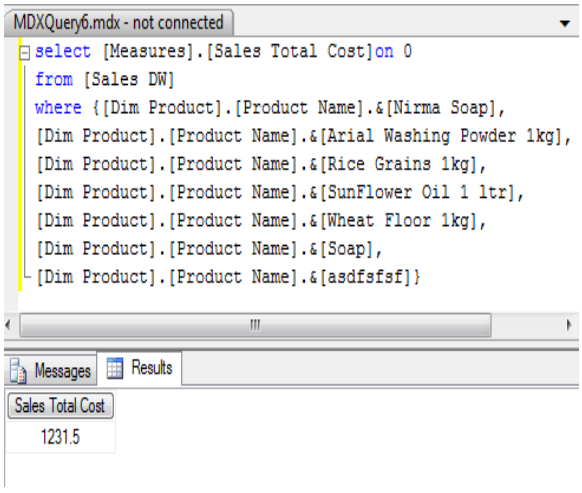

Figure4: Dice operation.

As compared to the slice operation the dice operation selects two or more dimensions from the cube and provides a new sub cube. Figure 4 shows that dice operation performed on the cube by selecting more than two dimensions from the cube in where clause and its equivalent results is also shown here. The time

1 second has been observed as query response time of Dice operation.

4.1 Comparative analysis between OLAP cube and OLAP operations

A comparative analysis has been done between OLAP cube and OLAP operations as discussed above on the basis of query execution time.

Table1: Comparison chart

	Query execution time(sec)				
	OLAP Cube	Roll-up	Drill-down	Slice	Dice
OLAP cube	26				
Roll-up		3			
Drill-down			2		
Slice				5	
Dice					1

Table1 shows the Comparison chart of execution time between OLAP cube and OLAP operations. The size of the database used in this research was 379 MB. The no. of tables hold by this database is seven and each table contains lakhs of records. From the above comparison chart it has been observed that query written for OLAP operations took much less time to execute and provides requested data than query written for OLAP cube. Although, query for dice operation took very much less time among all other operations but every time business users cannot use this operation to retrieve knowledge from raw data as it works only on sub cube. So, Analysts can use roll-up and drill-down operations to retrieve specific information from the data cube.

In order to get the clear view, the results are shown in form of graph.

Graphical Representation

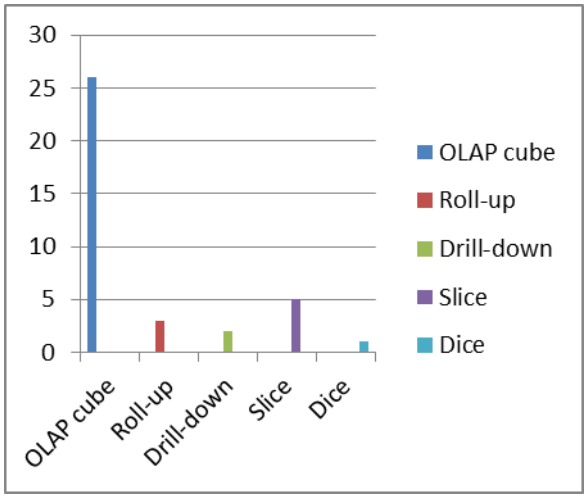

Figure5: Performance graph

Figure5 is the graphical representation of data present in table1 and from this graph it clearly has been observed that the time taken by executing the MDX query for OLAP operation is much less than the time taken by executing MDX query for OLAP cube. Hence, it can say that OLAP operations have better query execution time than OLAP cube.

5. CONCLUSION

OLAP cube is an efficient way to represent data in multidimensional view. It is also examined in earlier research that OLAP systems are good enough than OLTP. The only weakness which the researcher observed in OLAP was execution time. Therefore, an idea was implemented where the MDX queries are fired on the multidimensional data by using the OLAP operations and then a comparative analysis has been done where the query processing time of both OLAP cube and OLAP operation has been observed and it was evaluated that the query processing time taken by using the OLAP operations is much less than the time taken by using OLAP cube.

6. REFRENCES

[1] Dr. Walid Qassim Qwaider, "Apply on-line Analytical processing (OLAP) with data mining for clinical decision support", International journal of managing information technology (IJMIT), Vol.4, No.1, February 2012.

[2] Ms. Alpa R.Patel and Dr. Jayesh M.Patel, "Multidimensional model and OLAP operations", Indian

Journal of applied research, Vol.3, Issue 3, ISSN-2249-555X, March 2013.
[3] Neha and Kanwal Garg, "Efficient information retrieval using multidimensional OLAP cube", International research journal of engineering and technology (IRJET), Vol.4, Issue 7, July 2017.
[4]Web-link:
https://www.codeproject.com/Articles/658912/Create-First-OLAP-Cube-in-SQL-Server-Analysis-Serv