A Compression Algorithm for Optimization of Storage Consumption of Non Oracle Database

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Abstract—Relational database are very important in satisfying today’s information needs. This paper aims at optimization of storage consumption of non oracle database with the table compression algorithm of oracle 11g. Many concepts have been developed for compressing of relational database. But no concepts ever talked about the technique of compression of non oracle database with in the oracle environment. This paper discusses the use of OLTP Table compression algorithm given by ORACLE 11g which optimizes the storage consumption. But the challenges are faced by organizations when running several different databases and utilizing the heterogeneous services of the same. Data that are stored in non oracle system cannot be compressed by OLTP table compression algorithm given by Oracle 11g which reduces its size approximately about 70% ,so instead of migrating database system and loading the content of non oracle database system like SQL SERVER in ORACLE DATABASE format which is totally a wastage of time one can use oracle transparent gateway which is based on heterogeneous services technology. Oracle Transparent Gateways provides the ability to transparently access data residing in a non-oracle system from an oracle environment. After configuring the non oracle database in oracle environment and the relational database can be compressed by the table compression algorithm of oracle 11g.

Index Terms—Oltp Table Compression Algorithm, Oracle 11g, Oracle Transparent Gateway, Sql Server.

I. INTRODUCTION

The rapidly growing internet and related technologies has offered an unprecedented accessibility and redistribution of data. Relational database can be protected in several different ways. Like Oracle uses compression algorithm which provide security and optimizes storage space for its database. Heterogeneous data access is a problem that affects a lot of companies. A lot of companies run several different database systems. Each of these systems stores data and has a set of applications that run against it. Consolidation of this data in one database system is often hard in large part because many of the applications that run against one database may not have an equivalent that runs against another. Until such time as migration to one consolidated database system is made feasible, it is necessary for the various heterogeneous database systems to interoperate.

Oracle Transparent Gateways provide the ability to transparently access data residing in a non-Oracle system from an Oracle environment. This transparency eliminates the need for application developers to customize their applications to access data from different non-Oracle systems, thus decreasing development efforts and increasing the mobility of the application. Applications can be developed using a consistent Oracle interface for both Oracle and Microsoft SQL Server.

As a database administrator with multiple databases to manage, one should have the responsibility to make information available when and where it is needed and use the services provided by ORACLE in the non oracle database system like SQL SERVER.

As organizations expand, it becomes increasingly important for them to be able to share information among multiple databases and applications. Data replication and integration enables us to access information when and where it is needed in a distributed environment. Oracle Database provides secure and standard mechanisms that enable communication between databases, applications, and users. These mechanisms include queues, data replication, messaging, and distributed access in both homogeneous and heterogeneous environments. If these organizations might prefer to centralize this data, at least in the short term, it might not be possible. These organizations must have a method of accessing these distributed data sources as if they were a single, centralized database. Using distributed SQL, applications and users can access and modify information at multiple Oracle or non-Oracle databases as if it resided in a single Oracle database. Because information does not need to
be moved or copied, using distributed SQL to federate their
distributed data sources provides organizations with the
fastest, and easiest, path to information integration. If
information is later moved, then it is not necessary to rewrite
an application. This is especially useful for organizations that
are transitioning to a consolidated approach, but need a
method for accessing the distributed data now.

For example, by using distributed SQL with the appropriate
Oracle Database Gateway, applications can access legacy
data immediately, without waiting until it can be imported
into an Oracle Database. Distributed SQL is also useful to
organizations that want to perform ad hoc queries or updates
on infrequently accessed data that is more appropriately
located elsewhere.

Information about accessing and modifying information in
multiple databases can be using Distributed SQL.

Distributed SQL enables applications and users to query or
modify information in multiple databases with a single SQL
statement. Because distributed SQL masks the physical
location of your data, you can change the location of your
data without changing our application. Distributed SQL includes the following: distributed queries (which access
data) and distributed transactions (which modify data).

In distributed transactions, the two-phase commit mechanism
guarantees the integrity of your data by ensuring that all
statements in a transaction either commit or roll back as a unit
at each database involved in the distributed transaction.

When an application or user tries to commit a distributed
transaction, the database to which the application or user is
connected is called the global coordinator. The global
coordinator completes the two-phase commit by initiating the
following phases:

Prepare Phase: The global coordinator asks the other
databases involved in the distributed transaction to confirm
that they can either commit or roll back the transaction, even
if there is a failure. If any database cannot complete the
prepare phase, then the transaction is rolled back.

Commit Phase: If all of the other databases inform the global
coordinator that they are prepared, then the global
coordinator commits the transaction and asks all of the other
databases to commit the transaction.

Oracle Database Gateway enables Oracle databases to access
and modify data in a number of non-Oracle databases,
including Sybase, DB2, Informix, Microsoft SQL Server,
Ingres, and Teradata databases. This access is completely
transparent to the end user. That is, one can issue the same
SQL statements regardless of whether we are accessing data
in an Oracle database or a non-Oracle database.

The data that is stored in SQL SERVER database cannot be
compressed by OLTP table compression algorithm of Oracle
11g but by using ORACLE TRANSPARENT GATEWAY it
is possible to facilitate the feature oracle database to non
oracle database like SQL SERVER.

II. Literature Survey

Lossless Semantic Compression for Relational Databases by
Haiming Huang [5] Renmin University of China, Beijing, P.R.China, 1998 proposed a semantic compression technique
that exploits frequent dependency patterns embedded in the
relational table. One advantage of this approach is that
compression/decompression is performed at the tuple-level,
which is desirable for integrating the compression technique
into database systems. They showed that it is hard to compute
an optimal compression solution. Therefore, an iterative
greedy compression framework is offered to solve this
problem. This work primarily focuses on the underneath
component of the compression framework, that is to
efficiently find dependency patterns in relational data to
optimize the compression ratio. The experimental results on
several real-life datasets demonstrate the effectiveness of
their approach, as well as the efficiency and scalability.

M. Attalla and S. Lonardi [4] proposed a system, in which a
simple variation on the classic LZ-77 algorithm that allows
one to hide, within the compressed document, enough
information to warrant its authenticity and integrity. The
design is based on the unpredictability of a certain class of
pseudo-random number generators, in such a way that the
hidden data cannot be retrieved in a reasonable amount of
time by an attacker (unless the secret bit-string key is known
(2003).

Automatic relational database compression scheme design
based on swarm evolution by Tian-lei Hu, Gang Chen,
Xiao-yan Li and Jin-xiang Dong[3] presented a model with
novel techniques to integrate a rapidly convergent
agent-based evolution framework, i.e. the SWAF (Swarm
Algorithm Framework), into adaptive attribute compression
for relational database. The model evolutionally consults
statistics of CPU load and IO bandwidth to select
compression schemas considering both aspects of the
trade-off. They have implemented a prototype model on
Oscar RDBMS with experiments highlighting the correctness
and efficiency of our techniques.

High Performance SQL Queries on Compressed Relational
Database by Tian-lei Hu, Gang Chen, Xiao-yan Li and
Jin-xiang Dong, [2]. They have developed a disk-based
compression architecture, called DHIBASE, to support large
database and at the same time, perform high performance
SQL queries on single or multiple tables in compressed form.
They have compared their system with widely used
Microsoft SQL Server. Their system performs significantly
better than SQL Server in terms of storage requirement and
query response time. DHIBASE requires 10 to 15 times less
space and for some operation it is 18 to 22 times faster. As the
system is column oriented, schema evolution is easy.

But the above proposed method does not provide as much
space consumption as that of oracle 11g table compression
algorithm. So our paper uses the particular algorithm which
provides more than 50 % of storage savings.

III. OUR APPROACH

In our approach we have used oracle transparent gateway to
make non oracle database like SQL server database
compatible with oracle and hence reduce the size of it by
using OLTP table compression algorithm of Oracle 11g.
The following steps are involved in our approach:

a. Compatibility of non oracle database system to oracle environment
b. Compression: The OLTP table compression algorithm given by Oracle 11g is for compressing the relational database table of sql server.

A. Algorithm

1. Create a relational table in the non oracle database like SQL server.
2. Make it compatible with oracle through Oracle Transparent Gateway;
   2.1 Configure the listener.
   2.2 Check the status of listener; if it’s successful then go for the next step else diagnose the problem
   2.3 Start the listener.
   2.4 If the listener is started successfully then create a link between non oracle database and oracle.
   2.5 Bring the non oracle database to oracle
3. Compress the non oracle database with the table compression algorithm of oracle 11g.

B. Compression

![Fig 2. Steps Involved in OLTP Table Compression Process [1]](image)

C. The advantages of OLTP Table Compression Algorithm are:

- Structured/Relational data compression.
- Unstructured data compression
- Compression for backup data
- Network transport compression
- Reduces resource requirements and costs.
- Storage System
- Network Bandwidth
- Memory Usage

![Fig 3. OLTP Table Compression Technique[1]](image)
Fig 4. Free Space available after applying OLTP Table Compression Algorithm [1]

Fig 5. Compression for Tables having 3 columns

Fig 6. Compression for Tables having 4 columns

Fig 7. Compression for Tables having 5 columns

The following three graphs show the percentage of compression for different number of rows with tables having column 3, 4 and, 5. The figure shows the percentage of compression increases with the increase in the rows of table more effectively as compared to the number of columns.

IV. CONCLUSION

The compression technique used in our approach compresses relational database of non oracle database like SQL Server through the OLTP Table compression algorithm of Oracle 11g using Oracle Transparent Gateway. Since, we are using Table compression algorithm given by oracle 11g but the data is in SQL Server we have to make it compatible with the oracle system which is done through oracle transparent gateway then we can use the compression algorithm of oracle.

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