ORACLE 11*g*

DATABASE

An Oracle White Paper
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Optimizing Storage for
Oracle PeopleSoft Applications

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Executive Overview

Enterprises are experiencing an explosion in the volume of data required to effectively run their businesses. Every organization today must provide fast access to vast amounts of enterprise data for their customers, partners and business users. As a result the volume of information is constantly increasing leading to the information explosion. Oracle Applications also now allow customers to store data in various formats that includes documents, images, spatial information and etc.

Exponential increases in data volumes in recent years have put enterprise IT infrastructures under severe pressure – from a cost, performance, scalability and manageability perspective. It has become imperative to employ more efficient ways of storing and managing data to meet the growing demands being placed on IT systems. In addition, application scalability and performance must continue to meet the demands of the business – even as data volumes and the complexity of data managed explode.

Increased performance and ease of data management with Oracle Partitioning

Partitioning allows a table, index or index-organized table to be subdivided into smaller pieces. Each piece of a database object is called a partition. Each partition has its own name, and may optionally have its own storage characteristics. From the perspective of a database administrator, a partitioned object has multiple pieces, which can be managed either collectively or individually. This gives the administrator considerable flexibility in managing the partitioned object. However, from the perspective of the application, a partitioned table is identical to a nonpartitioned table; no modifications to application queries are necessary when accessing a partitioned table.

Partitioning can provide tremendous benefits to a wide variety of applications by improving manageability, performance, and availability. It is not unusual for partitioning to improve the performance of certain queries or maintenance operations by an order of magnitude. Moreover, partitioning can greatly reduce the total cost of data ownership, using a "tiered archiving" approach of keeping older relevant information still online on low cost storage devices.

The Oracle Database 11g Partitioning option provides the most comprehensive set of partitioning strategies, allowing an enterprise to optimally align the data subdivision with the actual business requirements. IT administrators can implement Information Lifecycle Management (ILM) protocols by partitioning data and moving historical data to low-cost storage. Partitioning can be used to obtain

better concurrency as well as to decrease the number of rows to be processed through partition pruning and partition-wise joins.

Oracle Partitioning Option with Oracle PeopleSoft Applications

Many PeopleSoft Applications tables do not have a natural partitioning key which would apply to all customers, simply because the data distribution and access path is highly dependent on each customer's functional implementation. However, the customers are free to partition the tables in a logical manner based on their own requirements.

Advantages of Partitioning for PeopleSoft

- Partitioning improves availability and manageability of PeopleSoft Applications containing large tables such as Global Payroll application. If the table is range partitioned by Fiscal_Year and Accounting_Period, old partitions (partitions that contain data of closed fiscal year and accounting periods) can be put on Read Only tablespaces, which will reduce time and space required for backups.

- Partitioning helps reduce the number of scanned rows with combination partitioning in such applications as Global Consolidations and Accounts Payables.

- Partitioning can be used for data management when applications load data in chunks. Each chunk can be loaded into a new partition without a need to modify the whole table. Data purge can happen in a similar manner: partition(s) can be dropped without using significant database resources.

- Partitioning can be used when running PeopleSoft batch process in parallel. Isolating each job stream in its own partition on large, high-volume transaction tables reduces I/O contention.

Guidelines for Partitioning Under PeopleSoft Applications

- Determine candidate tables for partitioning by reviewing the biggest tables in the database that cause performance degradation as they grow.

- Determine the likely candidates for partitioning keys by doing the following:

  - Ask the users what processes or reports they run against those tables that are slow.

  - Check the Run Control of the above processes to determine their processing criteria.

  - Check the AWR report for bad performing SQL statements. The WHERE clause of these SQL statements can help to identify the partitioning criteria.

- Analyze job processes and chose the partitioning based on the data access pattern.

- Choose a partition key such that the data is evenly distributed across partitions. If there is a case when most of the data is located in one partition, consider composite partitioning using hash partitions.

- Always use the DBMS_STATS package to analyze partitioned tables.

- Bitmap indexes can be created on partitioned tables but they must be declared as local indexes.

- Local indexes offer better availability during maintenance operations on the partitions. They also provide better performance when running large jobs in parallel.

Supported Oracle PeopleSoft Applications Releases

Partitioning is completely transparent for Peoplesoft Applications. In versions prior to PeopleTools 8.51, a few simple changes are required to preserve partitioning during an application upgrade. Refer to the "Oracle Partitioning for PeopleSoft Applications"[1] white paper for details.

PeopleTools 8.51+ has full upgrade support for tables partitioned with Oracle Partitioning Option.

Examples of Implementations

- Commonwealth Bank of Australia[2]

Maximize resource utilization and reduce costs with the Oracle Advanced Compression Option

"Oracle technology had a big impact on how we manage our mission-critical data. Through compression, we are using one-tenth as much storage space as before."

– **Jacek Sosnia**, Atomic Data Warehouse Technical Platform Engineer, Procter & Gamble

The Oracle Database 11g Advanced Compression Option introduces a comprehensive set of compression capabilities to help customers maximize storage utilization and reduce costs. It allows IT administrators to significantly reduce their overall database storage footprint by enabling compression

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[1] http://www.oracle.com/us/products/database/peoplesoft-partitioning-bwp-068458.pdf

[2] http://www.oracle.com/pls/ebn/live_viewer.main?p_shows_id=7216841

for all types of data – relational (OLTP table compression), unstructured (SecureFiles Compression and Deduplication), network (Data Guard Redo Transport) and backup (RMAN and Data Pump) data.

Although storage cost savings are often seen as the most tangible benefit of compression, innovative technologies included in the Advanced Compression Option are designed to reduce resource requirements and technology costs for a number of components of your IT infrastructure, including memory and network bandwidth. A brief description of each Advanced Compression capability is outlined below.

OLTP Table Compression

Oracle's OLTP Table Compression uses a unique compression algorithm specifically designed to work with OLTP applications. The algorithm works by eliminating duplicate values within a database block, even across multiple columns. The compression ratio achieved in a given environment depends on the nature of the data being compressed, specifically the cardinality of the data. In general, PeopleSoft customers can expect to reduce their storage space consumption by a factor of 2x to 4x by using OLTP Table Compression. That is, the amount of space consumed by compressed data will be two to four times smaller than that of the uncompressed data.

The benefits of OLTP Table Compression go beyond just on-disk storage savings. One significant advantage is Oracle's ability to read data in compressed blocks directly without having to first uncompress the block. Therefore, there is no measurable performance degradation for accessing compressed data. In fact, in many cases performance will improve due to the reduction in I/O since Oracle will have to access fewer blocks. Furthermore, the buffer cache will become more efficient by storing more data without having to add memory.

SecureFiles Compression and Deduplication

SecureFiles, a feature introduced in Oracle Database 11g Release 1, offers a 'best-of-both-worlds' architecture for storing semi-structured and unstructured content, such as documents, spreadsheets and XML files. SecureFiles is specifically engineered to deliver high performance for file data comparable to that of traditional file systems, while retaining the advantages of the Oracle database. SecureFiles is designed as a superset of the ANSI standard LOB data type and offers easy migration from existing BasicFiles LOBs, the precursor to SecureFiles.

The Advanced Compression Option has two storage optimization features that can be leveraged with SecureFiles. The first feature, SecureFiles Deduplication, is an intelligent technology that eliminates duplicate copies of SecureFiles data. Oracle stores one copy of the SecureFiles LOB and replaces the duplicate copies with references to the first copy. Consider an application where 10 users store an identical 1MB document in the system. Without SecureFiles Deduplication, the system would store one copy of the file for each of the 10 users – requiring 10MB of storage. If the application uses

SecureFiles with Deduplication, it will store the 1MB attachment just once. That's a 90% savings in storage requirements.

The second feature, SecureFiles Compression, utilizes industry standard compression algorithms to further minimize the storage requirements of SecureFiles data. With SecureFiles compression, typical files such as documents or XML files experience a reduction of 2x to 3x in size. Using built-in intelligence, SecureFiles Compression automatically avoids compressing data that would not benefit from compression – for instance a document that was compressed via a 3rd party tool before being inserted into the database as a SecureFiles file. With three levels of compression available - LOW, MEDIUM and HIGH - users can determine the optimal storage savings and compression CPU overhead for their environment. SecureFiles compression can result in huge storage savings for applications storing unstructured data inside the database.

Additional compression features in the Advanced Compression Option include:

- Backup Data Compression – the Advanced Compression Option includes RMAN compression technology that can dramatically reduce the storage requirements for backup data. Due to RMAN's tight integration with Oracle Database, backup data is compressed before it is written to disk or tape and doesn't need to be uncompressed before recovery – providing an enormous reduction in storage costs. Similarly, the data and metadata generated by Data Pump exports can be compressed with Advanced Compression

- Network Traffic Compression – the Advanced Compression Option offers the capability to compress Oracle Data Guard (standby databases) redo data as it is sent over the network -- reducing network bandwidth consumption and in some cases reducing the transmission time of redo data.

To see how Oracle Advanced Compression can save your organization storage resources, download the Oracle Advanced Compression Advisor. A free download[3] is available from OTN.

The Oracle Advanced Compression Advisor provides an estimate of potential storage savings that can be realized through the use of the OLTP Table Compression feature. This estimate is based on analysis of a sample of data and provides a good estimate of the actual results you may obtain once you implement OLTP Table compression in your environment.

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[3] http://www.oracle.com/technetwork/database/options/compression/compression-advisor-095705.html

Oracle Advanced Compression with Oracle PeopleSoft Applications

Time Inc. has run an internal benchmark to test Oracle Advanced Compression for their PeopleSoft setup. In their current system, all PAYROLL tables were split into current data (current year + 2 years history) (uncompressed) and History tables containing older data (compressed) dating back to 1994.

Views were created to join tables for reporting. Some queries and reports were customized to use the views.

The following are results from Time Inc. testing of Oracle Advanced Compression as presented at Oracle Open World:

Table Name	Uncompressed Size(MB)	Compressed Size(MB)	Compress Ratio
PS_PAY_CHECK	296	224	1.3
PS_PAY_EARNINGS	232	128	1.8
PS_TAX_BALANCE	264	141	1.87
PS_PAY_DEDUCTION	326	160	2.0
PS_JOB	456	224	2.0
PS_PAY_TAX	573	288	1.99

Time Inc. has achieved about 2x-times compression, on average, without compromising query performance. That is, the amount of space consumed by compressed data (on average) is two times smaller than that of the uncompressed data and in fact many queries have improved in terms of performance.

Advanced Compression is completely transparent to PeopleSoft Applications. Starting with PeopleTools 8.51, PeopleSoft provides an upgrade path that preserves compression across application upgrades.

For more information about Advanced Compression:

Advanced Compression with Oracle Database 11g Release 2 <u>white paper</u>[4]

Conclusion

By partitioning databases based on the lifecycle of the information and compressing historical data, IT departments can reduce their dependency on high end storage, reduce their incremental storage costs, keep more data online for longer periods of time and improve the performance of applications that access large databases.

The Oracle Advanced Compression and Oracle Partitioning Options, together, provide IT departments, running Oracle Applications, cost-effective information management by better optimizing storage infrastructures while also maintaining the performance and scalability that businesses require.

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[4] http://www.oracle.com/technetwork/database/features/storage/advanced-compression-whitepaper-130502.pdf?ssSourceSiteId=ocomen

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