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Automatic Data Optimization Reduces ILM Development and Administrative Time and Costs at Yapı Kredi Bank

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Purpose statement

This document provides an overview of features and enhancements included in release 23ai. It is intended solely to help you assess the business benefits of upgrading to 23ai and planning for the implementation and upgrade of the product features described.

Disclaimer

This document is for informational purposes only and is intended solely to assist you in planning for the implementation and upgrade of the product features described. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described in this document remains at the sole discretion of Oracle. Due to the nature of the product architecture, it may not be possible to safely include all features described in this document without risking significant destabilization of the code.

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"ILM is one of the top priorities for our Data Warehouse applications. We determined that the ideal ILM solution was one that is automated, relying not solely upon the collective knowledge of the organization -- for this solution we looked to Oracle's Heat Map and Automatic Data Optimization capabilities."

– **Ongun Demirler**, Senior Developer Architect, Yapı Kredi Bank

Executive Summary

Organizations are trying to store rapidly growing quantities of data online, as efficiently and cost effectively as possible, while meeting increasingly stringent regulatory and business requirements for data retention and protection. The result is an explosion in the amount of data that organizations are required to obtain, organize, manage, and store securely (and safely), while still providing easy, scalable, and high-performance access.

Information Lifecycle Management (ILM) is the practice of applying lifecycle policies for the effective management of data throughout its useful life – including both compression tiering and storage tiering. Implementing an Oracle Database ILM solution enables organizations to understand how their data is accessed over time and optimize the storage of that data accordingly.

Oracle Database can help implement an ILM solution to meet diverse data storage demands. Enabling organizations to quickly deploy compression tiering and storage tiering policies that are automated, allowing organizations to easily manage multiple data classes and tiers of storage, and assign different portions of data to different storage tiers based on desired cost, performance, and security requirements.

This Case Study discusses how Yapı Kredi benefited by using Oracle's Automatic Data Optimization (ADO) capability, included with Oracle Advanced Compression, in their data warehouse application environment. Yapı Kredi implemented automatic compression tiering -- reducing ILM development and administration time and costs for the life of their data warehouse deployment.

Read more to learn how they accomplished this.

About Yapı Kredi

Established in 1944 as Turkey's first retail focused private bank with a nationwide presence, Yapı Kredi has played a significant role in Turkey's development, setting standards in the sector through its innovative approach, commitment to social responsibility and investment in culture and arts.

Yapı Kredi, the fourth largest private bank in Turkey with TL 248.1 billion of assets, is one of the 10 most valuable brands in Turkey, Yapı Kredi is a strong franchise with inherent culture of customer-centric core banking focus, innovative banking technologies and sustainable value generation.

Yapı Kredi operates as an integrated financial services group in Turkey and abroad. In addition to its extensive domestic network, the Bank maintains an important international presence.

Yapı Kredi is headquartered in Istanbul, Turkey.

Understanding Their Data Usage

Environment

- Exadata X5-2 w/ RAC
- Oracle Linux 6.x

- Oracle Database Enterprise Edition 12*c*
- Hybrid Columnar Compression
- Advanced Compression, Data Partitioning, Data Guard and Database In-Memory

Like many organizations, Yapı Kredi saw that 90% of the data (approximately 90TB) managed by Oracle Database was data warehouse data, leaving the remainder of the data, approximately 10TB, being OLTP data which was being actively modified.

Yapı Kredi's DBA's recognized that as their data become less active, moving from highly active OLTP data to less active, query-mostly data warehouse data it was possible to use different types of Oracle compression to suit different access patterns. For example, historic/archive data could be compressed to a greater level than OLTP data, significantly reducing storage requirements at the cost of slight additional CPU overhead.

But how could their DBA's identify which tables/partitions, across the database, are best suited for compression, and which type of compression? To do so requires that DBAs could easily determine which of their tables/partitions are "hot" (the most active data) and which have "cooled" (less active historic/archive/reporting data).

Their DBA's worried that implementing compression tiering could be very complex and painful if they tried to implement it using in-house applications or manual methods. They feared that they would not get healthy information from business users to determine table usage for archiving or deleting critical data and likewise did not want to rely solely upon the collective knowledge of the organization, especially given owners of that knowledge could change positions or leave the organization.

However, implementing an ILM solution, for their existing DW applications where data was to be compressed at greater levels as that data aged, was one of the top priorities for Yapı Kredi.

Automating Data Usage Tracking

Not wanting to invest the time and cost to create a custom compression tiering solution, Yapı Kredi instead identified Oracle's Automatic Data Optimization and Heat Map features as possible solutions.

Yapı Kredi's DBAs knew that to ensure their database compression tiering was efficient as possible they had to know the current usage levels for possibly hundreds, or thousands, of tables and partitions. It was crucial that they know where each table and/or partition was in terms of its usage, was the table/partition still being actively modified, or had it cooled down and was primarily historic/archive data now?

Yapı Kredi began their compression tiering development by enabling Heat Map. Heat Map is a feature of Oracle Database that automatically tracks usage information at the row and segment levels. Data modification times are tracked at the row level and aggregated to the block level, and modification times, full table scan times and index lookup times are tracked at the segment level.

Once enabled, Heat Map automatically, and transparently, began tracking the usage of all the tables and partitions in the database, no longer having to rely upon users' estimates of usage levels, Heat Map instead provided Yapı Kredi DBA's a detailed view of how their data is being accessed, and how those access patterns are changing over time.

It should be noted that since Heat Map is tracking actual usage levels and patterns Yapı Kredi realized that patience was needed, as it took some time (typically days or weeks) initially before enough activity occurred for Heat Map to gather the information needed for their DBAs to understand the individual usage levels of their tables and partitions.

But once the usage information was gathered, Yapı Kredi's DBAs could define the optimal compression tiering policies, using Automatic Data Optimization, that the database automatically enforces to ensure that as their data warehouse data aged, the coldest data is compressed to the highest compression ratio possible.

Automating Compression Tiering

Automatic Data Optimization policies are specified at the segment or row level for tables and table partitions. Oracle Database periodically evaluates ADO policies, and uses the information collected by Heat Map to determine which policies to execute.

ADO policies specify what conditions (of data access as tracked by Heat Map) will initiate an ADO operation – conditions such as *no access*, or *no modification* or *creation time* – and when the policy will take effect – for example, after "n" days or months or years. Organizations can create custom ADO conditions based upon their specific business rules.

Yapı Kredi's ADO policy rules, for compression tiering, are determined by considering both the business need of the data and the actual usage information tracked by Heat Map. Developer and DBA teams participate to define the ADO policy rules.

Below is an example of the types of compression policies created by Yapı Kredi.

- Tables that are accessed for update/insert/delete operations within the last 90 days contain "Hot Data" and these tables are kept uncompressed
- As an exception for above rule -- Tables that are accessed for only bulk operations will be compressed for "HCC Query High"
- Tables that are not accessed in 90 days contain "Warm Data" and they will be compressed for "HCC Query High"
- Tables that are not accessed for write operations in 180 days contain "Mild Data" and they will be compressed for "HCC Archive High"
- Tables that are not accessed for read/write operations over 365 days contain "Cold Data". These tables are typically archived and removed from the data warehouse.
- Read operations that come from Sandbox users (Power Users) should not be used to determine a tables overall usage and are excluded from Heat Map.

In this example, the DBA has created their ADO compression tiering policies and Oracle Database, using Heat Map, automatically evaluated the ADO policies to determine when the table was eligible to be moved to a higher compression level and then implemented the specified compression automatically, with no additional burden placed on database administrators or storage management staff.

Although this example uses a table, data partitioning could also have been used and all the ADO policies specified could have been enforced at the partition-level.

While this example focused on Hybrid Columnar Compression, Oracle's suggested "best practice" includes compressing using both Advanced Row Compression (for OLTP data) and Hybrid Columnar Compression (for query-mostly data). While compression tiering, best practice does include the use of HCC, if an organization does not have access to HCC, then they would use only Advanced Row Compression in their ADO policies.

Database Enforced ILM Reduces Costs

While storage footprint and cost reduction are often cited as a key reason for deploying ADO-based compression tiering, for Yapı Kredi it was not their most critical concern during the time they were evaluating ADO. Their DBAs already recognized that keeping data compressed is the best way to access data fast

alongside significant storage savings, but for Yapı Kredi the other benefits of automating ILM took precedence.

ILM was identified by their organization and a key goal, but prior to ADO, when organizations wanted to implement an ILM strategy they would have typically leveraged Advanced Compression and Data Partitioning to create a manual database compression and storage tiering solution – a solution which required organizations to have a deep understanding of their data access and usage patterns, often across thousands of tables/partitions – or they created a custom solution.

What became very clear, to organizations considering implementing a manual database compression tiering and/or storage-tiering solution, was that the ideal ILM solution was one that is automated, relying not solely upon the collective knowledge of the organization, especially given that in some cases vital owners of that knowledge had long since changed positions or even left the organization.

This was the conclusion that Yapı Kredi arrived at as well. Their DBAs recognized that the data maintenance tasks associated with a manually implemented ILM solution would require serious time of DBAs, developers, and even the business users themselves. Knowing that if ADO worked as they expected they believed the organization would save development and administration time, and costs, for the life of the deployment.

Yapı Kredi choose to automate their ILM solution, using the usage information being automatically gathered and managed by Heat Map, and creating the ILM policies (enforced by ADO) to automate and transparently enforce database compression -- allowing them to better utilize the organizations existing storage, better manage their storage growth and help with database performance.

Key Takeaways

- 100 TB Data Warehouse database
- Implemented ADO to help control and govern their data based on the actual usage of that data
- Utilized Hybrid Columnar Compression to achieve the highest compression ratios with their data
- Choose database enforced ADO policies to avoid cost and time of custom ILM solution
- Developer and DBA teams participate together to define ADO policy rules

Conclusion

Information Lifecycle Management enables organizations to understand how their data is accessed over time and manage the data compression and storage tiering accordingly. However, most ILM solutions for databases lack two key capabilities – automatic classification of data and automatic data compression and movement across storage tiers.

The Heat Map and Automatic Data Optimization features of Advanced Compression with Oracle Database provide comprehensive and automated ILM capabilities that minimize costs while maximizing query performance. In combination with its comprehensive compression features and capabilities, Oracle Database provides an ideal platform for implementing Information Lifecycle Management for all your database data.

"Heat Map and Automatic Data Optimization clearly met our expectations. It enables us at Yapı Kredi to save development and administration time and costs for the life of the deployment. A win all around for us!"

– **Oktay Elmas**, Senior Database Administrator, Yapı Kredi Bank

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