Logical and Physical Storage Structures in Oracle 23c

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Logical vs Physical Storage Structures

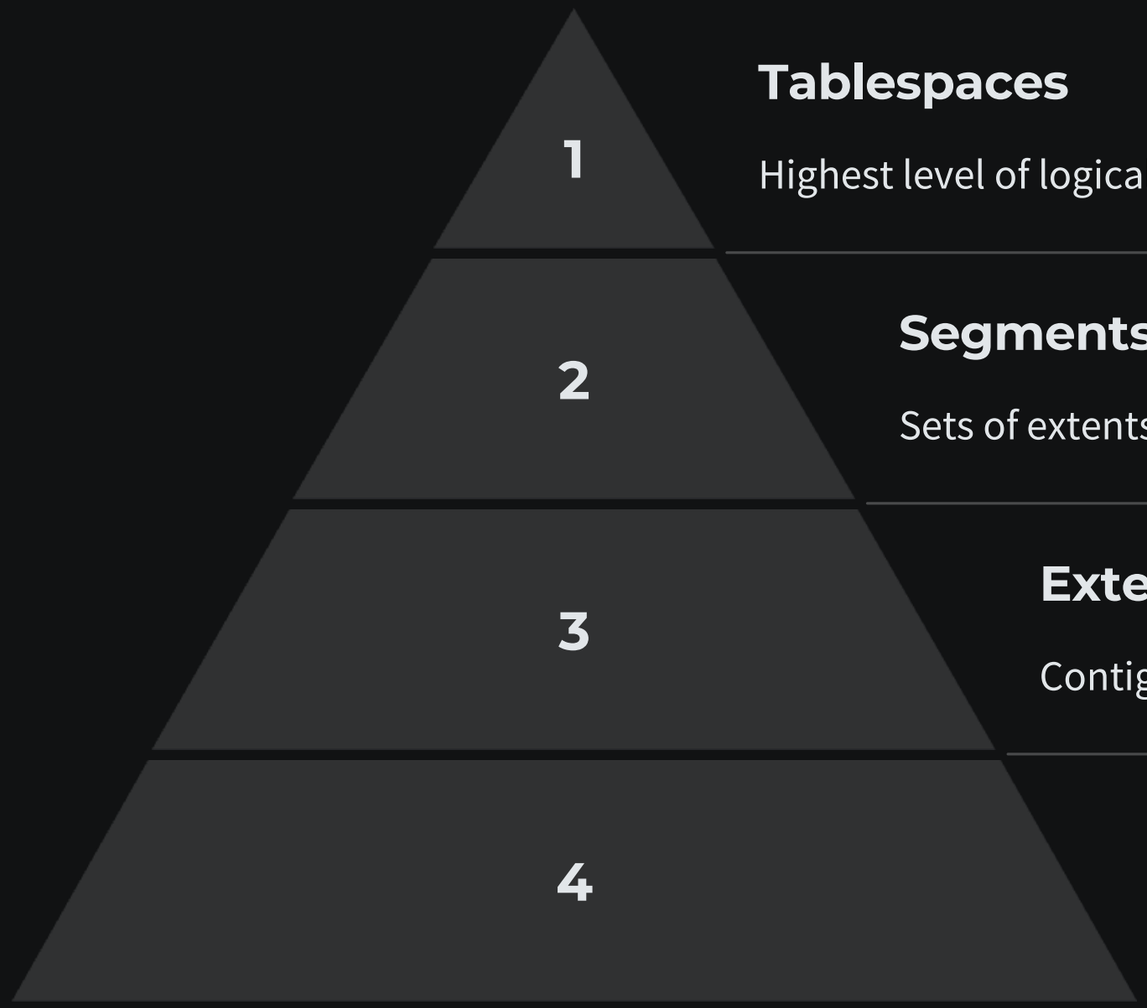
Logical Structures

Abstract representations of data organization in Oracle 23c. These structures define how data is logically arranged and accessed within the database.

Physical Structures

Actual storage of data on disk in Oracle 23c. These structures relate to how data is physically stored and managed on the storage devices.

Logical Storage Structures in Oracle 23c



Tablespaces

Highest level of logical storage

Segments

Sets of extents for database objects

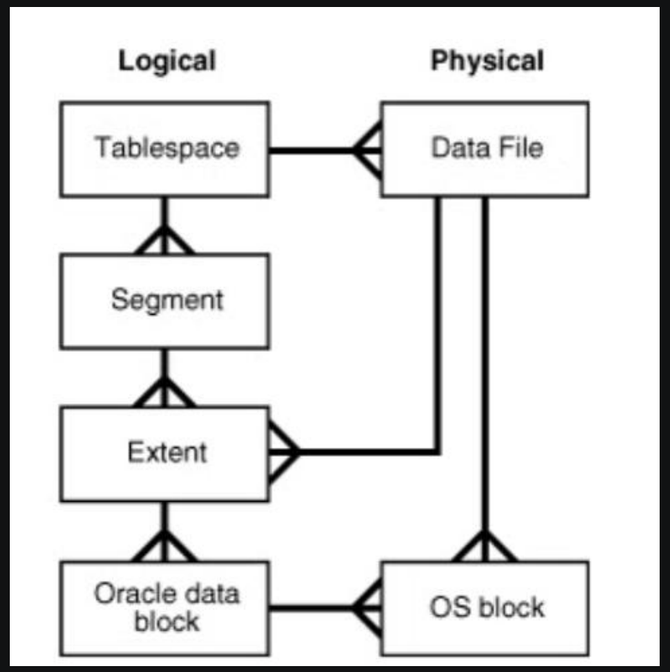
Extents

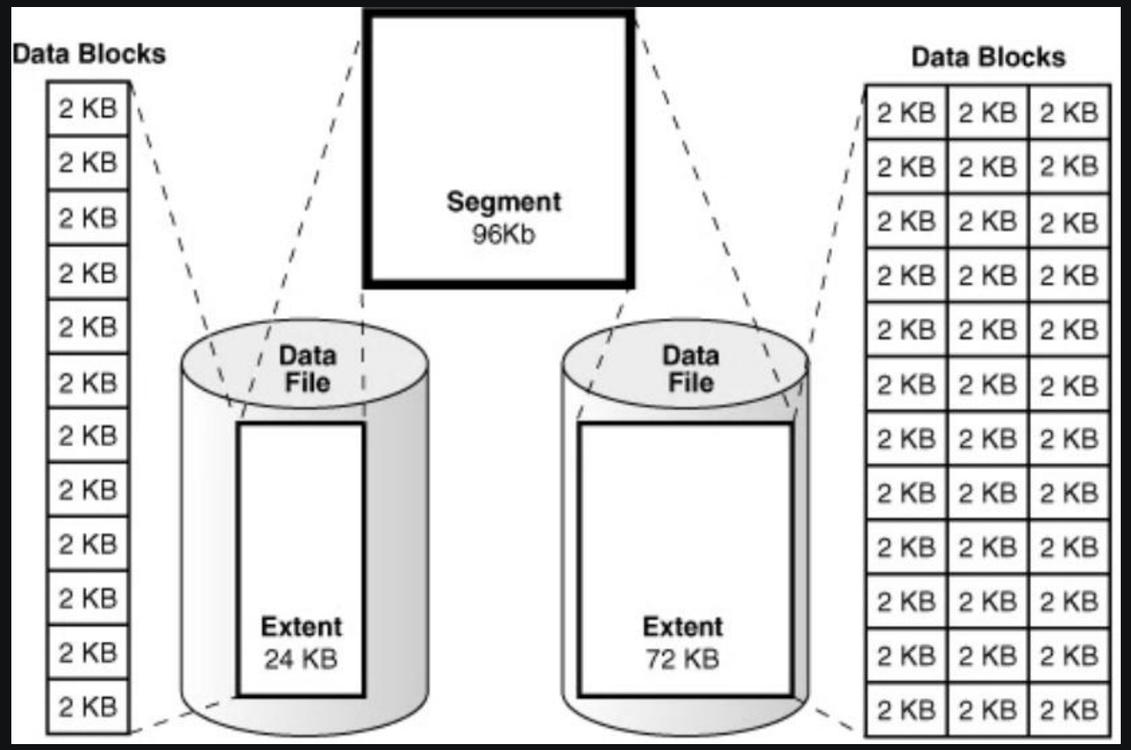
Contiguous data blocks

Data Blocks

Smallest units of data

Logical Storage Structures in Oracle 23c





Enhancements in Logical Storage Structures

1 **Data Blocks**

Improvements in block management, particularly in terms of compression and deduplication.

2 **Extents**

More flexible extent management, allowing for better space utilization.

3 **Segments**

Enhanced segment advisors that provide more accurate recommendations for segment sizing and management.

4 **Tablespaces**

New features including advanced encryption options and improved temporary tablespace handling.

Physical Storage Structures in Oracle 23c

Data Files

Contain actual data of database objects

Control Files

Contain metadata about database structure

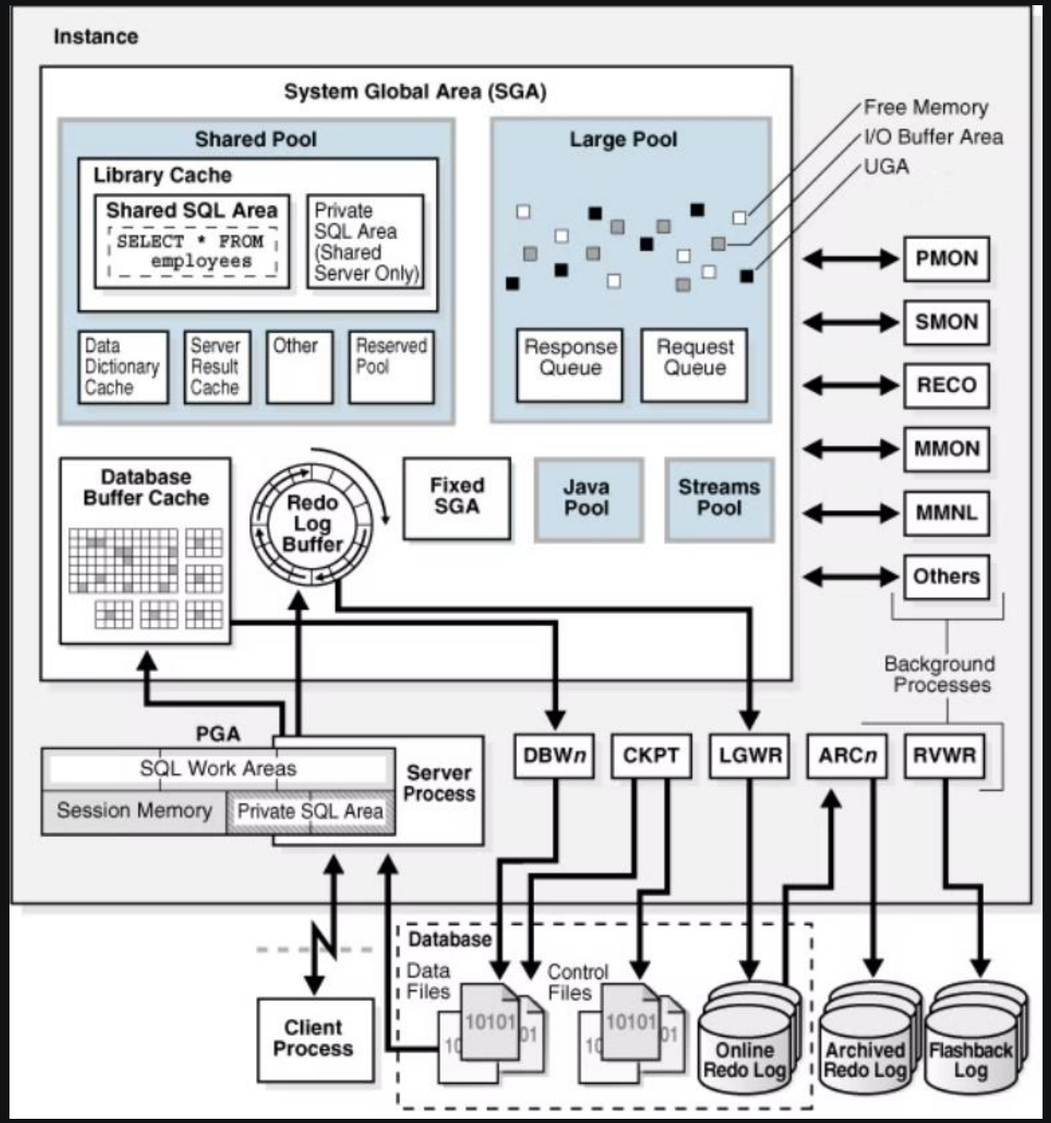
Archived Redo Log Files

Copies of online redo log files

Online Redo Log Files

Record changes made to the database

Physical Storage Structures



Enhancements in Physical Storage Structures

Data Files

Faster data file creation and more efficient space reclamation in Oracle 23c.

Control Files

Enhancements in control file redundancy and recovery mechanisms.

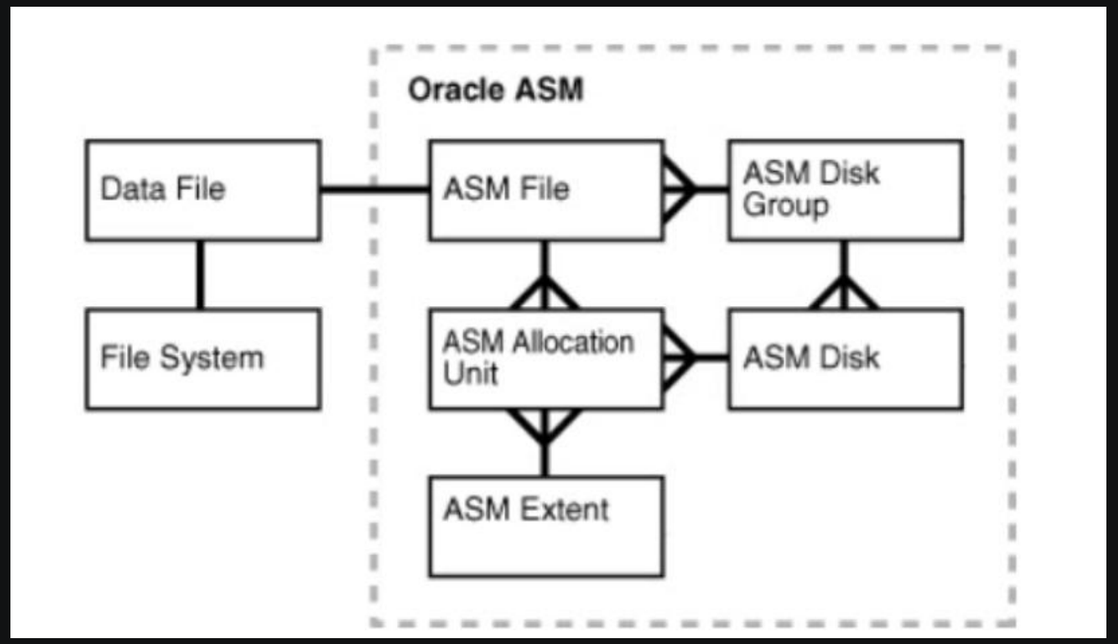
Online Redo Log Files

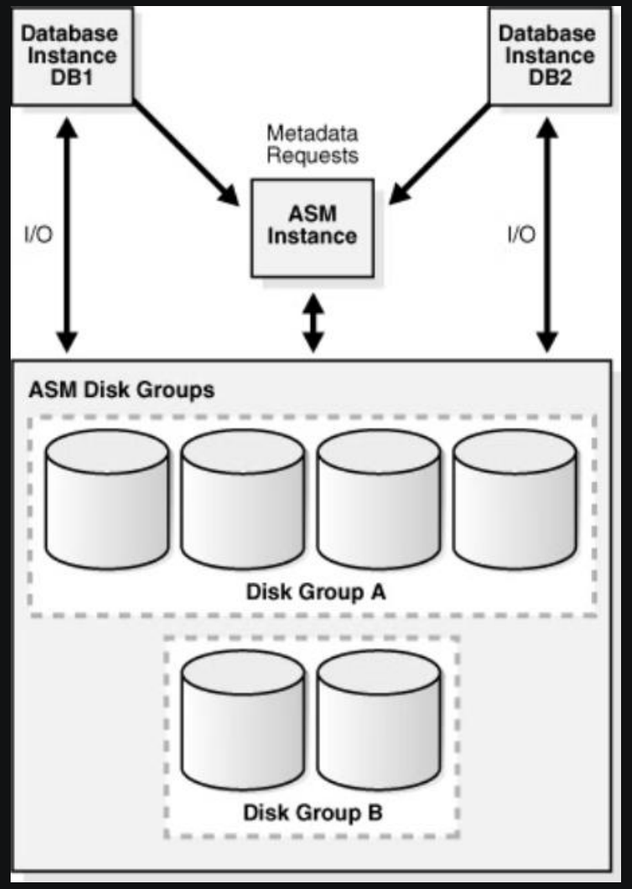
Optimizations to redo log management, improving performance during high-write workloads.

Archived Redo Log Files

New features for managing archived logs, including improved compression and faster archiving processes.

Automatic Storage Management (ASM)





Automatic Storage Management (ASM) Enhancements

1

Advanced Volume Management

ASM now provides more sophisticated volume management capabilities.

2

Enhanced File System Features

Improved file system capabilities for better data organization and access.

3

Simplified Administration

Streamlined storage administration tasks for easier management.

Intelligent Storage Tiering

1

Data Access Analysis

Continuous monitoring of data access patterns.

2

Automated Data Movement

Automatic relocation of data between storage tiers based on access frequency.

3

Performance Optimization

Frequently accessed data moved to faster storage for improved performance.

4

Cost Efficiency

Less frequently accessed data moved to cheaper storage for cost savings.

Big Data and Unstructured Data Management

Enhanced Oracle Big Data SQL

Improved integration for seamless querying across different data stores.

Relational Data

Traditional structured data in Oracle tables.

Object Storage

Support for storing and querying object-based data.

Hadoop Integration

Seamless access to data stored in Hadoop clusters.

New Storage-Related Features in Oracle 23c

Advanced Compression

New compression algorithms provide better compression ratios without sacrificing performance.

Enhanced Hybrid Columnar Compression

Further improvements for better compression in data warehousing and analytics workloads.

In-Memory Enhancements

The In-Memory Column Store now supports more sophisticated partitioning strategies for finer-grained control over in-memory data.

Interaction Between Logical and Physical Structures

Improved Coordination

Better coordination between tablespace management and physical storage allocation

Simplified Management

Easier administration of both logical and physical structures

Efficient Space Utilization

Results in more efficient use of storage space

Enhanced Performance

Leads to improved overall database performance

Real-World Benefits of Storage Enhancements

Improved Performance

Enhanced performance for both OLTP and analytical workloads, leading to faster data processing and query responses.

Better Storage Efficiency

Improved storage utilization and compression lead to reduced costs and more efficient use of resources.

Enhanced Data Protection

Advanced encryption and compression features provide better security and data integrity.

Simplified Management

Streamlined storage management reduces administrative overhead and simplifies database operations.

Conclusion: A Leap Forward in Database Storage Technology

1

Advanced Features

Oracle 23c introduces significant advancements in both logical and physical storage structures.

2

Improved Efficiency

New features lead to better performance, efficiency, and manageability in database deployments.

3

Future-Ready

These enhancements prepare organizations for future data management challenges.