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Oracle Database 19c New Features Overview



Előadó:
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Oracle Database 19c (12.2.0.3)

- Oracle Database 18c is a new version but not a major release.
- It is a new approach to the software releases.
- Oracle Database 18c is equivalent to 12.2.0.2.

- Oracle Database 19c is the final member of the 12.2 family a.k.a 12.2.0.3, and is therefore the 'long term support' release or terminal patch set.
- long term support release: minimum 4 years premier support, 3 years extended support
- for Oracle Database 12.2. Extended Support End Data:
31-MAR-2026

Oracle Database 19c (12.2.0.3)

- As 19c is the final member of 12.2: many customers are expected to upgrade.
- Note that Extended support is without additional fees in the Oracle Cloud.
- Compared to Oracle 12R1, 12R2 or 18c, in version 19c Oracle reduced the number of new features introduced.
- In release 19c Oracle focused more on stability than new features.

Oracle Database 19c: What's New

Search for...

Home / Database / Oracle / Oracle Database / Release 19

Oracle Database 19c

What's New

Database Features App

Use the Database Features app to view feature availability across Oracle Database releases and to see what features are new in Oracle Database 19c.

New Features Guide

See the *New Features Guide* for a summary of new features and links to details about each new feature.

Interactive Architecture Diagram

Use the Interactive Architecture Diagram to take a visual tour of Oracle Database architecture and technology.

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<https://docs.oracle.com/en/database/oracle/oracle-database/19/whats-new.html>

Oracle Database 19c: What's New Database Features App

The screenshot displays the Oracle Database Features App interface. On the left, there is a search bar and filters for Focus Area and Version. The main area shows a table of features with their availability across versions 11.2, 12.1, 12.2, 18c, and 19c.

Feature	11.2	12.1	12.2	18c	19c
.NET Cloud Development and Deployment With ODP.NET, Managed and Unmanaged Drivers can be deployed easily to common hosted and third-par... 12.2 Release Windows	✗	✗	✓	✓	✓
3D Visualization Framework This release includes a set of metadata tables to describe themes, scenes, textures, viewpoints, light sources... 11.2 Release Spatial	✓	✓	✓	✓	✓
4K Sectors and Metadata Enhancements for Oracle ACFS Oracle ACFS supports I/O requests in multiples of 4096-byte logical sector sizes as well as providing contin... 12.2 Release ACFS	✗	✗	✓	✓	✓
ACFS, ADVM and Snapshots on Solaris and AIX Oracle ACFS, Oracle ASM Dynamic Volume Manager (Oracle ADVM) and Snapshots were delivered in Oracl... 11.2 Release ACFS	✓ 11.2.0.2	✓	✓	✓	✓
AL32UTF8 As the Default Database Character Set The AL32UTF8 character set is now the default for the database character set in Oracle Database installs an... 12.2 Release Globalization	✗	✗	✓	✓	✓
AQ Rules Engine Fast Evaluation of SYS_CONTEXT and Other Predicates	✓	✓	✓	✓	✓

<https://apex.oracle.com/database-features/>

Oracle Database 19c

Database Licensing Information / Permitted features

The screenshot shows the Oracle Help Center interface. At the top left is the Oracle logo and 'Help Center'. At the top right is the user 'balazs.toth@webvalto.hu' with a 'Sign Out' link. Below the navigation bar is the breadcrumb 'Home / Database / Oracle / Oracle Database / Release 19'. The main title is 'Database Licensing Information User Manual' in red. On the left is a 'Table of Contents' sidebar with a search icon and a list of sections: 'Title and Copyright Information', 'Preface', '1 Licensing Information' (selected), '2 Third-Party Notices and/or Licenses', and 'A Open Source Software License Text'. The '1 Licensing Information' section is expanded to show sub-sections: '1.1 Introduction', '1.2 Oracle Database Offerings', '1.3 Permitted Features, Options, and Management Packs by Oracle Database Offering', '1.4 Oracle Database Options and Their Permitted Features', '1.5 Oracle Management Packs and Their Permitted Features', '1.6 Checking for Feature, Option, and Management Pack Usage', '1.7 Special License Rights', and '1.8 Restricted Use Licenses'. The main content area shows the '1 Licensing Information' section with a list of topics: 'Introduction', 'Oracle Database Offerings', 'Permitted Features, Options, and Management Packs by Oracle Database Offering', 'Oracle Database Options and Their Permitted Features', 'Oracle Management Packs and Their Permitted Features', 'Checking for Feature, Option, and Management Pack Usage', 'Special License Rights', and 'Restricted Use Licenses'. Below this is the '1.1 Introduction' section, which contains a paragraph of text explaining the purpose of the document and providing links to Oracle's Software Investment Guide and License Management Services representative.

<https://docs.oracle.com/en/database/oracle/oracle-database/19/dblic/Licensing-Information.html#GUID-B6113390-9586-46D7-9008-DCC9EDA45A84>

Oracle Database 19c: Availability today (HOUG 2019)

- Initially released on [LiveSQL.oracle.com](https://livesql.oracle.com) (January, 2019)
- Oracle Exadata On-Prem. / Oracle Supercluster (February, 2019)
- Linux x86-64: Q2CY19
- Oracle Solaris SPARC (64-bit): Q2CY19
- ...
- MOS: Release Schedule of Current Database Releases
(Doc ID 742060.1)

Oracle Database 19c

New Features overview

- Oracle Database 19c forms a foundation of the next phase of Autonomous Database optimization:
 - Automatic Indexing
 - Real-Time Statistics
 - High-Frequency Automatic Optimizer Statistics Collection
 - SQL Quarantine
- Key unique innovations for core Enterprise capabilities:
 - Active Data Guard DML Redirect
 - Memoptimized Rowstore – For High Speed / High volume Data Ingest
 - Hybrid partitioned tables
 - ...

Oracle Database 19c Data Guard New Features

- Data Guard 19c New Features:
 - Active Data Guard DML Redirect
 - Restore point replication
 - Physical Standby Flashback
 - ...

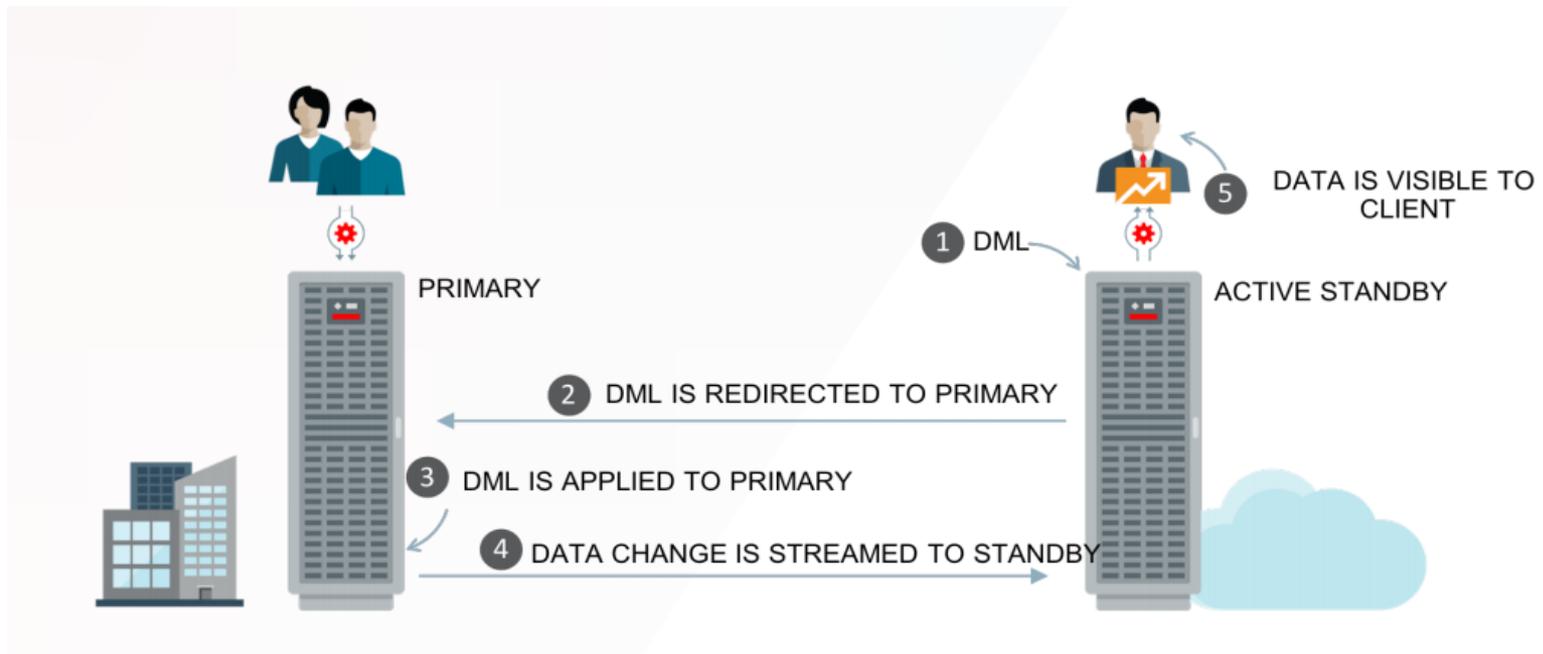
- Oracle (Active) Data Guard 19c [White Paper](https://www.oracle.com/technetwork/database/availability/dg-adg-technical-overview-wp-5347548.pdf):
<https://www.oracle.com/technetwork/database/availability/dg-adg-technical-overview-wp-5347548.pdf>

Oracle Database 19c

Active Data Guard DML Redirect

- Oracle Active Data Guard (from 11g)
 - Running reports on opened standby (redo apply is ON)
 - Automatic block repair
- Active Data Guard DML Redirect
 - Previous releases: manual solution with using database links
 - From 19c: Out of the box, Active Data Guards enables DML operations on the standby database to be redirected to the primary database.

Oracle Database 19c Active Data Guard DML Redirect



Oracle Database 19c

Active Data Guard DML Redirect

- The Active Data Guard session waits until the corresponding changes are shipped to and applied to the Active Data Guard standby.
- Read consistency is maintained during the DML operation and the standby database on which the DML is run can view its uncommitted changes. However, all the other standby database instances can view these changes only after the transaction is committed.
- Avoid running too many DML operations on Active Data Guard standby databases. Because the operations are actually performed on the primary, too many DMLs may impact the performance of the primary.

Oracle Database 19c

Active Data Guard DML Redirect

- To configure automatic redirection of DML:
 - On the standby database, enable DML redirection for the *current* session:

```
SQL> ALTER SESSION ENABLE ADG_REDIRECT_DML;
```

- *for all* standby sessions:

```
set the ADG_REDIRECT_DML initialization parameter to TRUE
```

Oracle Database 19c

Active Data Guard DML Redirect

- Running Top-level PL/SQL Operations on Active Data Guard Standby Databases:
 - PL/SQL blocks that you run on Active Data Guard standby databases can be redirected to and run on the primary database, *if they do not contain bind variables*.
 - You can configure automatic redirection for PL/SQL operations *only at the session level*.
 - Configure automatic redirection of PL/SQL using the following command on the standby database:

```
SQL> ALTER SESSION ENABLE ADG_REDIRECT_PLSQL;
```

Oracle Database 19c

Automatic Flashback of a Mounted Standby

- A standby database that is in a mounted state can automatically follow the primary database after a RESETLOGS operation on the primary. This simplifies standby management after a RESETLOGS operation on the Primary.
- PIT recovery / Flashback on Primary DB / PDB in Primary
- Standby must be in mounted state
- MRP performs the following actions:
 - detects the new incarnation
 - flashes back the standby or the PDB on the standby
 - restarts the standby recovery and moves the standby to the new branch of redo
- The flashback operation will succeed only when the standby database has sufficient flashback data.

Oracle Database 19c

Restore Point replication

- COMPATIBLE initialization parameter for both the primary database and the standby database: 19.0.0 or higher
- Primary Database is Open (restore point info replicated though the redo)
- Irrespective of whether a restore point on the primary database is a guaranteed restore point or a normal restore point, the corresponding *replicated restore point is always a normal restore point.*

Oracle Database 19c Automatic Indexing

- The automatic indexing feature automates the index management tasks in an Oracle database, automatically
 - creates,
 - rebuilds,
 - and drops indexes

in a database *based on the changes in application workload.*

- Auto indexes are local B-tree indexes.
- Auto indexes can be created for partitioned as well as non-partitioned tables.
- Auto indexes cannot be created for temporary tables.

Oracle Database 19c

Automatic Indexing

- Automatic Indexing process runs every 15 minutes:
 - Identifies auto index candidates
 - Creates invisible auto indexes for the auto index candidates
 - Verifies invisible auto indexes against SQL statements
 - Invisible >> visible
 - Invisible >> unused, SQL statement blacklisted
 - Deletes the unused auto indexes
- DBMS_AUTO_INDEX: on/off, schema level, index tablespace, retention period, ...
- DBA_AUTO_INDEX_CONFIG, DBA_INDEXES(AUTO)

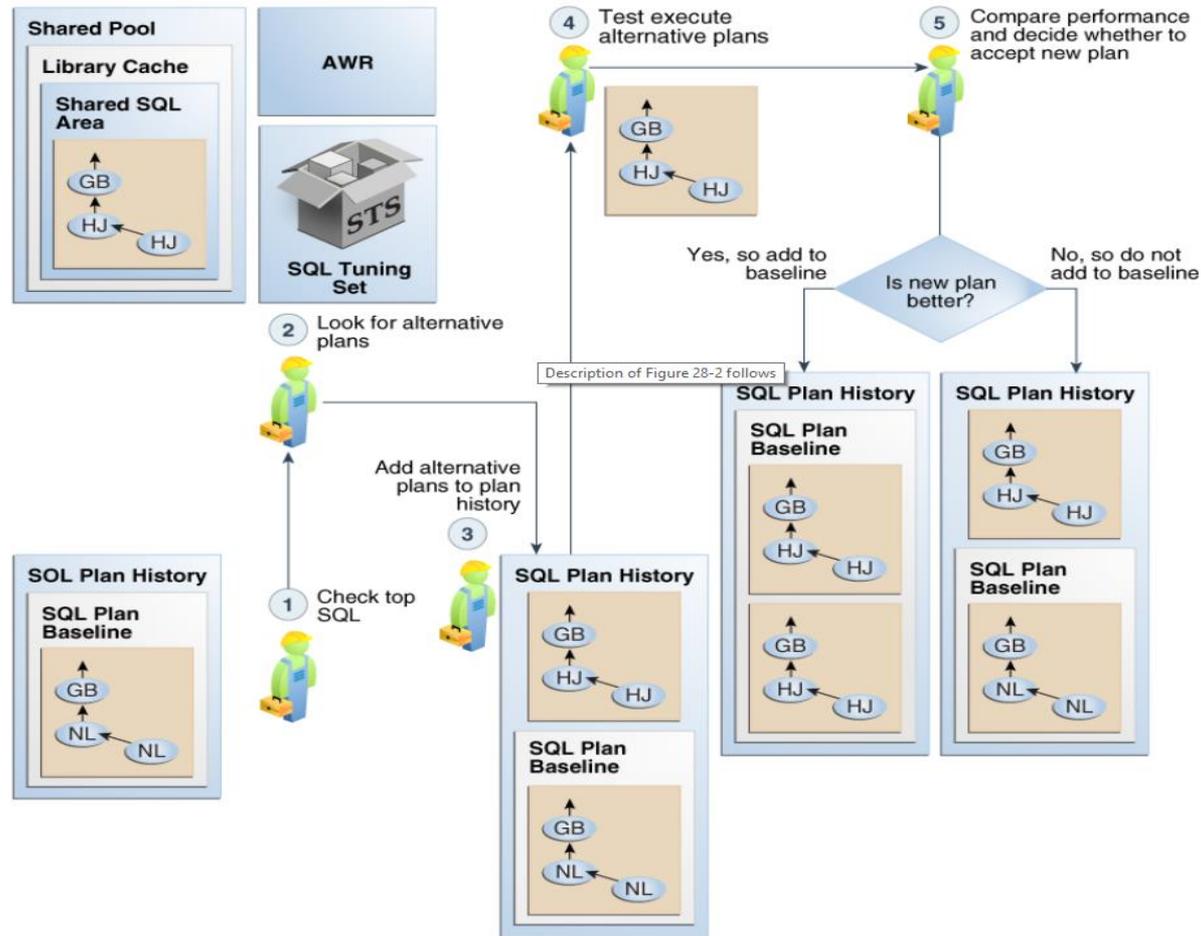
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Automatic Resolution of SQL Plan Regressions

- SPM Evolve Advisor Task / SYS_AUTO_SPM_EVOLVE_TASK
- By default runs daily in the scheduled maintenance window
- SQL plan management searches for SQL statements in the Automatic Workload Repository (AWR).
- Prioritizing by highest load, it looks for alternative plans in all available sources, adding better-performing plans to the SQL plan baseline.
- DBMS_SPM.SET_EVOLVE_TASK_PARAMETER

Oracle Database 19c

Automatic Resolution of SQL Plan Regressions



Oracle Database 19c Real-Time Statistics

- Oracle Database 12c introduced online statistics gathering:
 - for CREATE TABLE AS SELECT
 - for direct-path inserts
- Oracle Database 19c introduces real-time statistics, which extends online support to:
 - conventional DML statements
- When a DML operation is currently modifying a table, Oracle Database dynamically computes values for the most essential statistics.
- Partition-level statistics are not supported, so the only table-level views show real-time statistics.

Oracle Database 19c

Real-Time Statistics

- DBMS_STATS subprograms include real-time statistics.
- DBA_TAB_COL_STATISTICS, DBA_TAB_STATISTICS
- NO_GATHER_OPTIMIZER_STATISTICS hint prevents the collection of real-time statistics

Oracle Database 19c

High-Frequency Automatic Optimizer Statistics Collection

- AutoTask schedules tasks to run automatically in maintenance windows. Automatic optimizer statistics collection (DBMS_STATS) runs in predefined maintenance windows.
- Statistics can go stale between two consecutive statistics collection tasks.
- High-frequency (by default every 15 mins.) automatic optimizer statistics collection complements the standard statistics collection job.

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High-Frequency Automatic Optimizer Statistics Collection

- `DBMS_STATS.SET_GLOBAL_PREFS`:
 - Enable/disable
 - Execution interval
 - Maximum run time
- “Lightweight”: Only gathers stale statistics.
- Only one statistics task runs at a time: Automatic statistics collection jobs are not affected by the high-frequency jobs.
- `DBA_AUTO_STAT_EXECUTIONS`

Oracle Database 19c

Hybrid Partitioned Tables

- Hybrid partitioned tables enable you to easily integrate internal partitions and external partitions (those residing on sources outside the database) into a single partition table.
- Partitions of hybrid partitioned tables can reside on both Oracle tablespaces and external sources.
- These datastores can reside on premises or in the cloud. So customer's site could effectively be stretched to the cloud.
- Supported external table types for external partitions:
ORACLE_DATAPUMP, ORACLE_LOADER, ORACLE_HDFS,
ORACLE_HIVE.



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Oracle Database 19c

Hybrid Partitioned Tables

- Only constraints in the RELY DISABLE mode are supported on hybrid partitioned tables.
- To activate optimizations based on these constraints, set the session parameter QUERY_REWRITE_INTEGRITY to TRUSTED or STALE_TOLERATED.
- Partition pruning optimizations can be used on Hybrid partitioned tables across internal and external partitions.
- Supported operations / restrictions: only single level range and list partition method, ...

Oracle Database 19c SQL Quarantine

- Starting with Oracle Database 19c, you can use the SQL Quarantine infrastructure (SQL Quarantine) to quarantine execution plans for SQL statements that are terminated by the Resource Manager.
- An individual SQL statement may have multiple execution plans, and if it attempts to use the *execution plan* that is quarantined, then that SQL statement is not allowed to run, thus preventing database performance degradation.

Oracle Database 19c

SQL Quarantine

- Using the Resource Manager, you can configure limits for SQL statements for consuming system resources (*Resource Manager thresholds*).
- SQL Quarantine:
 - Automatically quarantine execution plans of SQL statements terminated by the Resource Manager
 - Additionally, you can create *quarantine configurations* using the DBMS_SQLQ package.
- An execution plan is quarantined specific to a SQL statement
- If there is no quarantine configuration created for an execution plan for a SQL statement, or if no quarantine thresholds are specified in its quarantine configuration, the execution plan for a SQL statement still gets automatically quarantined, if the Resource Manager terminates it for exceeding any of the Resource Manager thresholds.



Oracle Database 19c SQL Quarantine

- You can specify quarantine thresholds for the following resources in a quarantine configuration using the `DBMS_SQLQ.ALTER_QUARANTINE` procedure:
 - CPU time
 - Elapsed time
 - I/O in megabytes
 - Number of physical I/O requests
 - Number of logical I/O requests

- `DBA_SQL_QUARANTINE`, `V$SQL`

Oracle Database 19c Memoptimized Rowstore

- The Memoptimized Rowstore enables high performance data streaming for applications, such as Internet of Things (IoT) applications, which typically stream **small** amounts of data in single-row **inserts** from **a large number of clients** simultaneously and also **query** data for clients **at a very high frequency**.
 - Fast ingest (from 19c)
 - Fast lookup (from 18c)

Oracle Database 19c

Memoptimized Rowstore / Fast Ingest

- Optimizes the processing of high-frequency, single-row data inserts.
- Fast ingest uses the MEMOPTIMIZE_WRITE hint to insert data into tables specified as MEMOPTIMIZE FOR WRITE.
- Steps for using fast ingest:
 - MEMOPTIMIZE FOR WRITE clause in the CREATE TABLE or ALTER TABLE statement.
 - MEMOPTIMIZE_WRITE hint.
- The database temporarily buffers these inserts in the large pool and automatically commits the changes at the time of writing these buffered inserts to disk. The changes cannot be rolled back.

Oracle Database 19c

Memoptimized Rowstore / Fast Ingest

- Considerations for fast ingest:
 - Because fast ingest buffers data in the large pool, *there is a possibility of data loss* in the event of a system failure!
 - Queries do not read data from the large pool, hence data inserted using fast ingest cannot be queried until it is written to disk.
 - Parent-child transactions must be synchronized to avoid errors.
 - For fast ingest, database performs index operations while writing data to disk, and not while writing data into the large pool
- V\$MEMOPTIMIZE_WRITE_AREA, DBMS_MEMOPTIMIZE, DBMS_MEMOPTIMIZE_ADMIN

Oracle Database 19c

Memoptimized Rowstore / Fast Lookup (18c)

- Fast lookup enables fast data retrieval from database tables for applications, such as Internet of Things (IoT) applications.
- Fast lookup uses a hash index that is stored in the SGA buffer area called *memoptimize pool* to provide fast access to blocks of tables permanently pinned in the memoptimize pool.
- Tables enabled for fast lookup must have a primary key constraint enabled.
- A table can be configured for using both fast ingest and fast lookup.

Oracle Database 19c

Memoptimized Rowstore / Fast Lookup (18c)

- The memoptimize pool resides in the SGA, and stores the data and hash index for the tables that are enabled for fast lookup.
- Steps for using fast lookup:
 - Set the MEMOPTIMIZE_POOL_SIZE init. param.
 - Specify the MEMOPTIMIZE FOR READ clause in the CREATE TABLE or ALTER TABLE statement.
- DBMS_MEMOPTIMIZE

Oracle Database 19c

Database In-Memory

- One of the In-Memory related new features:
 - `DBMS_INMEMORY_ADMIN.POPULATE_WAIT` function waits until objects at the specified priority have been populated to the specified percentage.
- Quiz 😊
 - Buffer cache?
 - Keep cache?
 - Database Smart Flash Cache?
 - Oracle Database In-Memory?
 - Memoptimized rowstore?

Oracle Database 19c Licensing Information

Permitted Features, Options by Oracle Database Offering

Table 1-8 Performance

Feature / Option / Pack	SE2	EE	EE-ES	DBCS SE	DBCS EE	DBCS EE-		ExaCS	Notes
						HP	DBCS EE-EP		
Automatic Indexing	N	N	Y	Y	Y	Y	Y	Y	EE-ES: Available on Exadata. Not available on Oracle Database Appliance.
SQL Quarantine	N	N	Y	Y	Y	Y	Y <small>Performance</small>	Y	EE-ES: Available on Exadata. Not available on Oracle Database Appliance.
Real-Time Statistics	N	N	Y	Y	Y	Y	Y	Y	EE-ES: Available on Exadata. Not available on Oracle Database Appliance.
High-Frequency Automatic Optimizer Statistics Collection	N	N	Y	Y	Y	Y	Y	Y	EE-ES: Available on Exadata. Not available on Oracle Database Appliance.
Client Side Query Cache	N	Y	Y	N	Y	Y	Y	Y	
Query Results Cache	N	Y	Y	N	Y	Y	Y	Y	
PL/SQL Function Result Cache	N	Y	Y	N	Y	Y	Y	Y	
Oracle TimesTen Application-Tier Database Cache	N	Y	Y	N	N	N	N	N	EE and EE-ES: Extra cost option
Database Smart Flash Cache	N	Y	Y	N/A	N/A	N/A	N/A	N/A	EE: Solaris and Oracle Linux only EE-ES: Available on Oracle Database Appliance. Not available on Exadata

Oracle Database 19c

Change in Privilege Analysis Option availability

- Privilege Analysis was introduced in release 12.1.
- This feature was part of the Audit Vault extra cost option.
- From Oracle Database 19c Privilege Analysis Available in Oracle Database Enterprise Edition.

Thank You!



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