

ORACLE

Oracle Database 19c

New Features

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October 2019

Safe harbor statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. 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 for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

Direct Upgrade to Oracle Database 19c



Production on
Exadata, Linux,
Solaris, Windows,
ZLinux, AIX and
HP-UX

19c

Long Term Support Release of the 12.2 Family

12^c
RELEASE 2

12.2.0.1

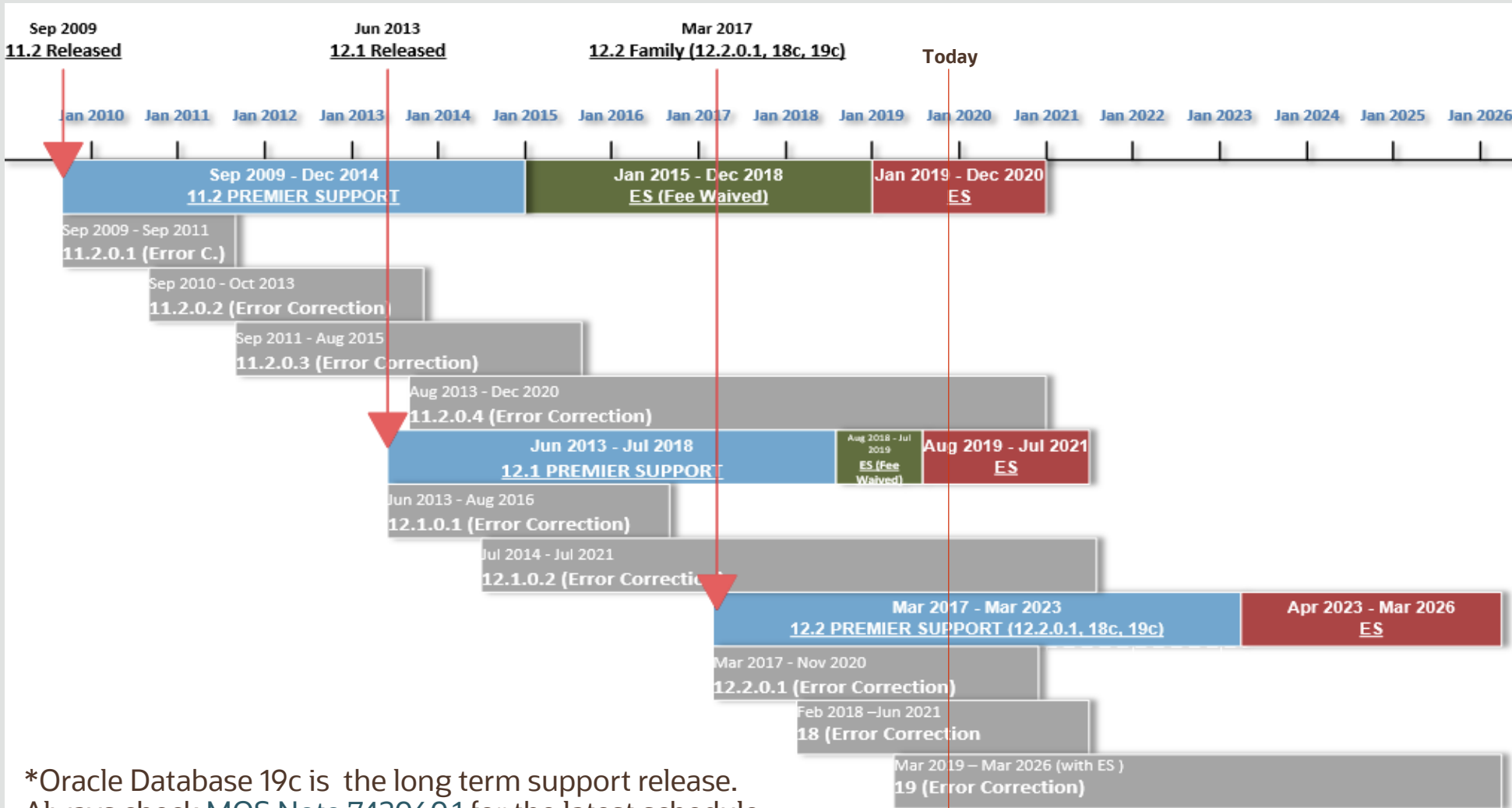
18^c

12.2.0.2

19^c

12.2.0.3

Database Release and Support Timelines



*Oracle Database 19c is the long term support release. Always check [MOS Note 742060.1](https://www.oracle.com/technetwork/database/enterprise-articles/mos-note-742060-1.html) for the latest schedule.



Database Software Innovation in 19c

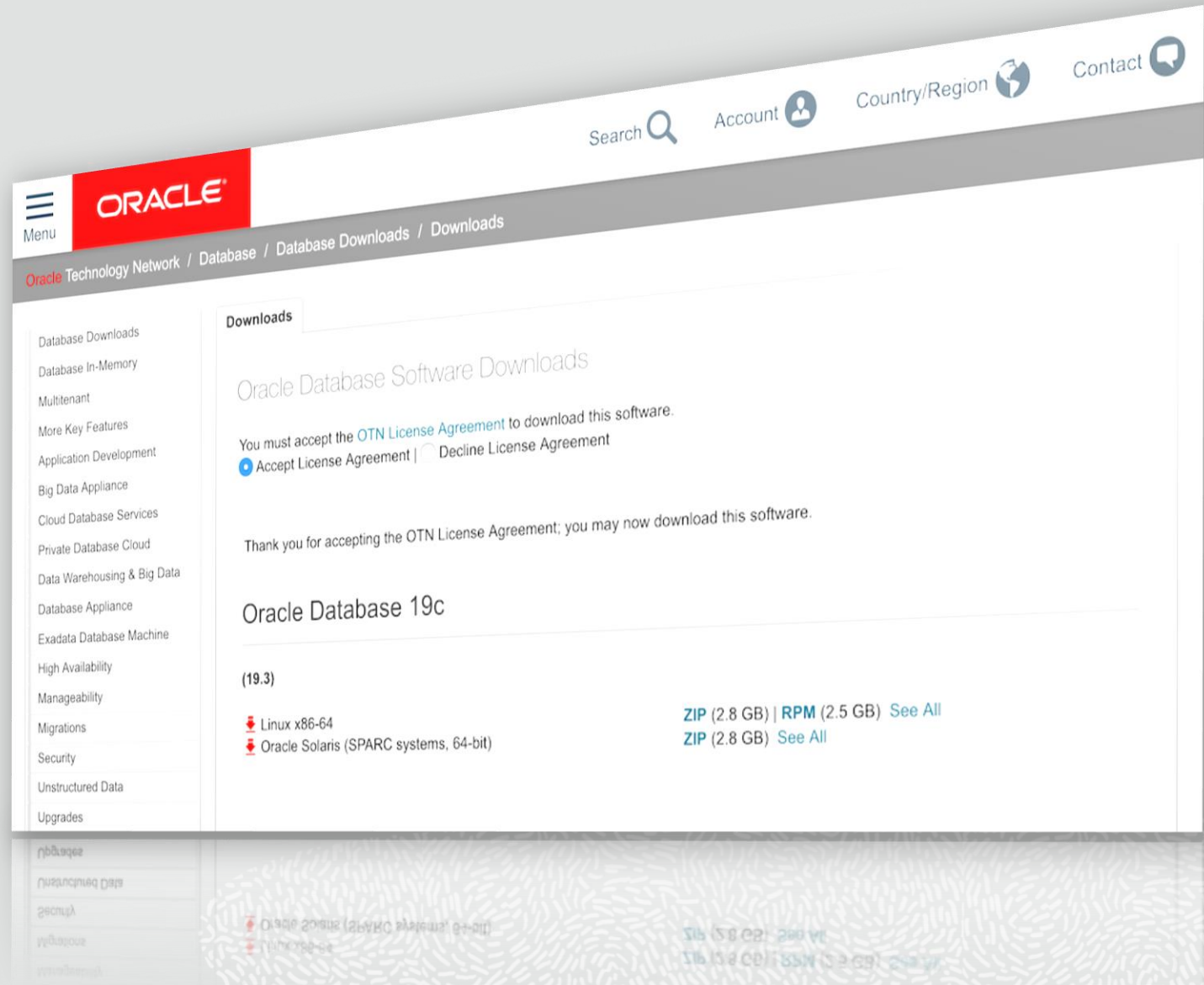
- New Install Approaches
- Automatic Indexing
- Memory Optimized Fast Ingestion
- SQL Plan Regression Auto-Resolution
- SQL Runaway query quarantine
- Optimized and Real Time Stats
- Active Data Guard DML redirection
- SQL for Object Stores
- Hybrid Partitioned tables
- Multitenant enhancements
- Schema Only account security

19c

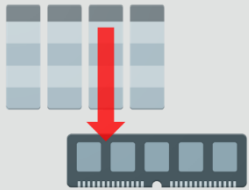
12.2.0.3

New Install Approaches

- Oracle Database 18c and 19c RPM Install
 - Yum install from OLN
- No click-through Oracle Client software install
- Oracle Read Only Homes
- Oracle Docker images



Performance



12.2, 12.2

18c, 19c



▪ 12.1

- In-Memory Column Store
- Engineered Systems

▪ 12.2

- In Memory JSON Queries
- In Memory Active Stand By

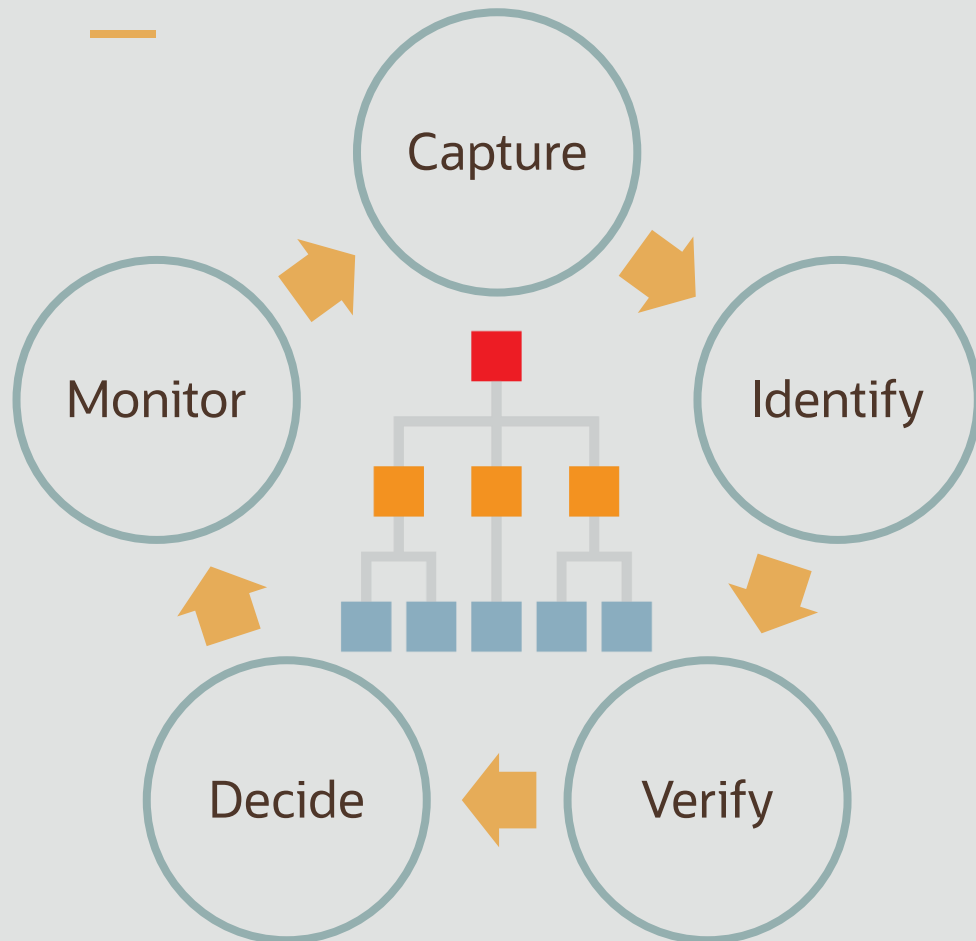
▪ 18c

- Memory Optimized Row Store

▪ 19c

- Auto Indexing
- Fast ingest support for IoT type workloads
- Stats Only Queries
- Improvements for COUNT DISTINCT and GROUP BY queries
- SQL Quarantine

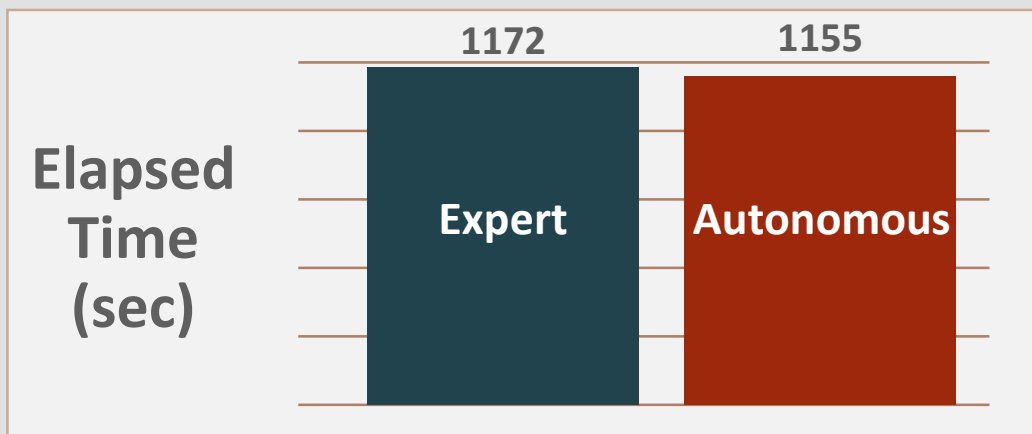
Automatic Indexing



- The Automatic Indexing methodology is based on a common approach to manual SQL tuning
- It **identifies** candidate indexes and **validates** them before **implementing**
- The entire process is fully automatic
- Transparency is equally important as sophisticated automation
All tuning activities are auditable via reporting

Automatic Indexing In Action On Netsuite Workload

Ran a complex Netsuite workload, and compared ATP to existing expert tuning
17,542 SQL statements, **1,852** tables, **8,151** indexes - years of tuning to create these indexes
 Before running on ATP, all indexes and statistics were dropped



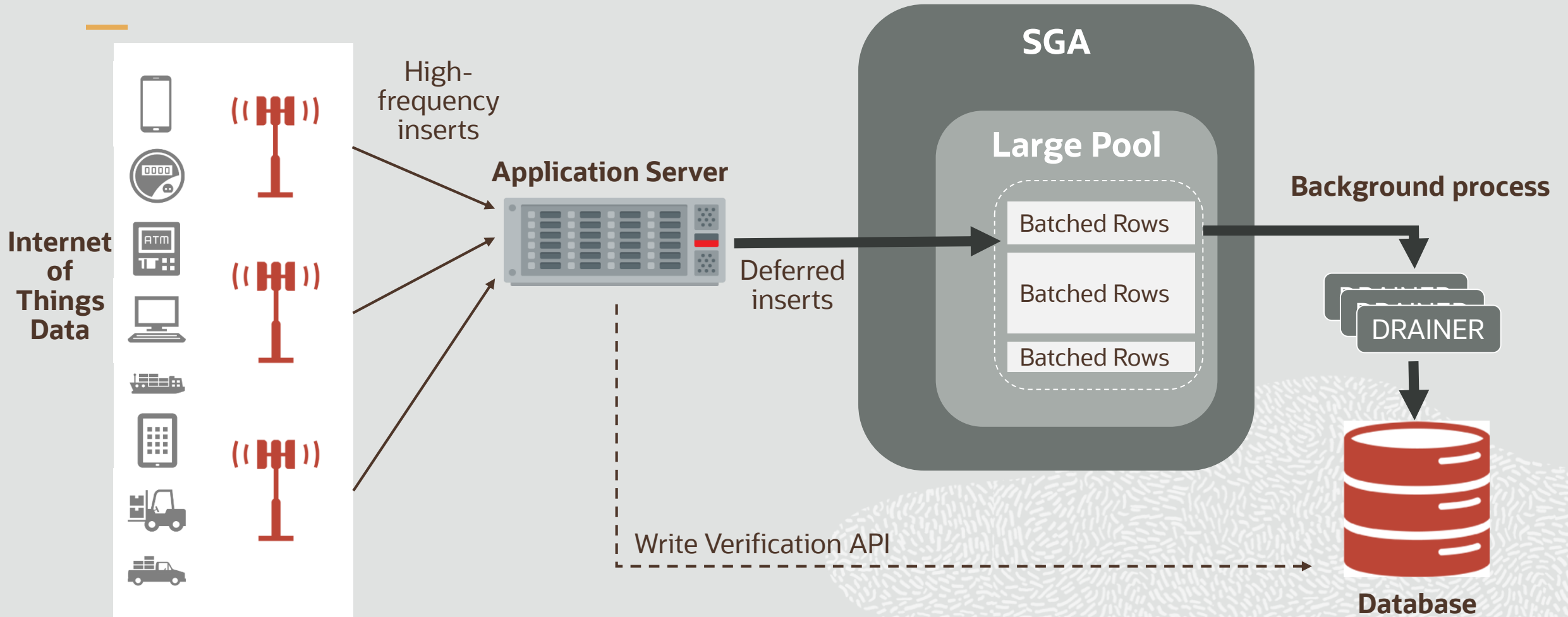
Achieved identical performance to expert manual tuning
Stays tuned as workload changes



Memoptimized Rowstore – **Fast Ingest**

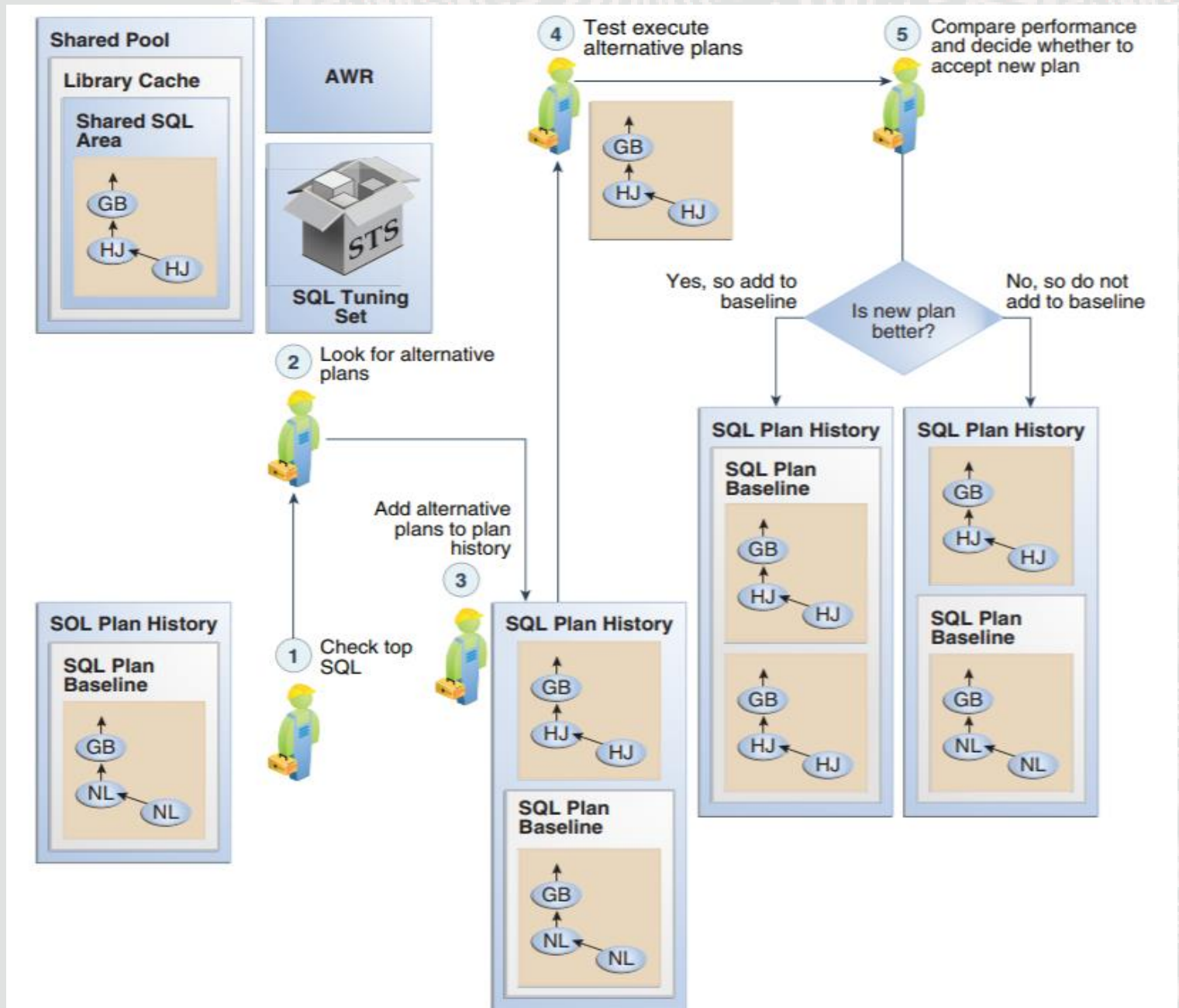
- Enable fast data inserts into Oracle Database
- Applications that generate lots of informational data – important value in the aggregate
- Doesn't necessarily require full ACID requirements
- Applications like Internet of Things (IoT) with rapid unattended workload
 - E.g. sensor data, smart meter data, traffic camera data
- Collected and written to the database in high volumes for later analysis

Memoptimized Rowstore – Fast Ingest



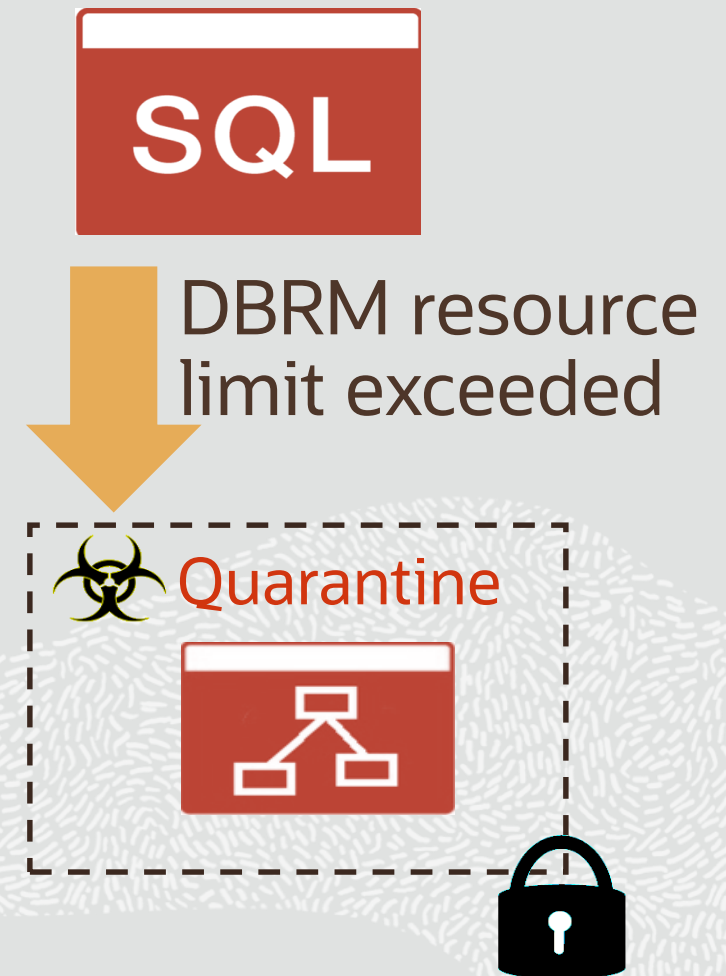
19^c

Automatic Resolution of SQL Plan Regressions



Protecting the System from Runaway SQL Statements

- Execution plans that exceed Database Resource Manager limits are automatically Quarantined
- Quarantined plans are prevented from executing
- New `QUARANTINED` column in `v$sql`

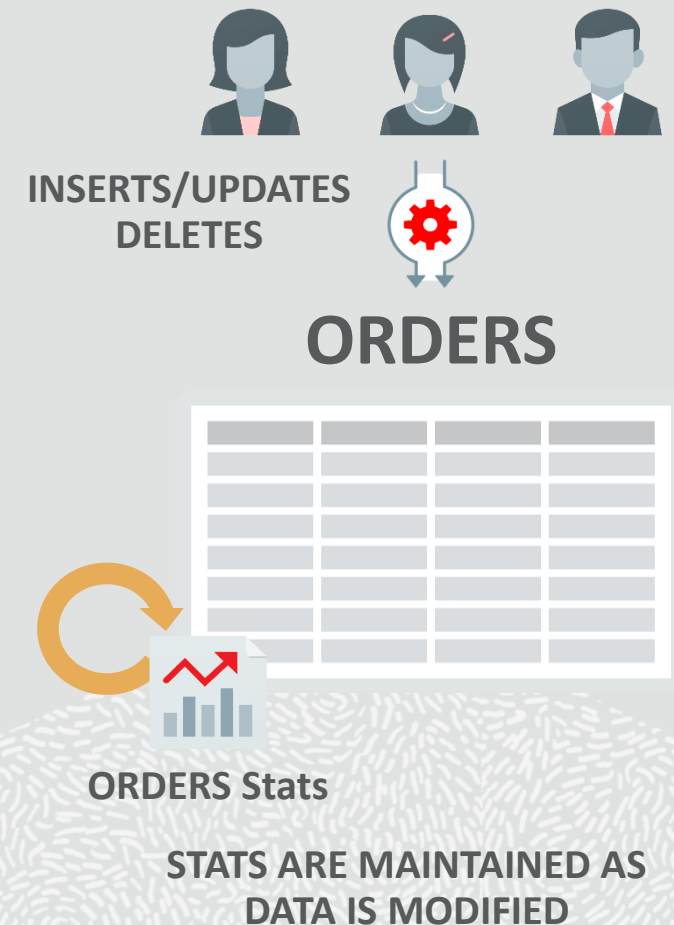


High-Frequency Automatic Optimizer Statistics Collection

- Complements the standard statistics collection job
- By default, the collection occurs every 15 minutes
- Lightweight – only gathers stale statistics
- It DOES NOT perform actions such as purging statistics for non-existent objects or invoking Optimizer Statistics Advisor
- Automatic statistics collection jobs (maintenance window) not affected by high-frequency jobs
DOESN'T start during the maintenance window

Real-Time Statistics

- Gather statistics as part of conventional DML (insert/update/merge)
- Fast, with negligible overhead
- **Only most essential stats** are gathered to avoid catastrophic SQL execution plan performance regressions (e.g. avoiding out-of-range conditions)
Min, Max, num_rows, etc.
- Gathering of remaining statistics is deferred
Automatic statistics gathering job
High frequency statistics gathering

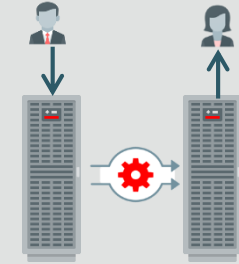


High Availability



12.2, 12.2

18c, 19c



12.1

- Comprehensive HA and disaster recovery functionality
- Oracle Golden Gate for heterogeneous replication

12.2

- Sharding
- Autonomous Health Framework

18c

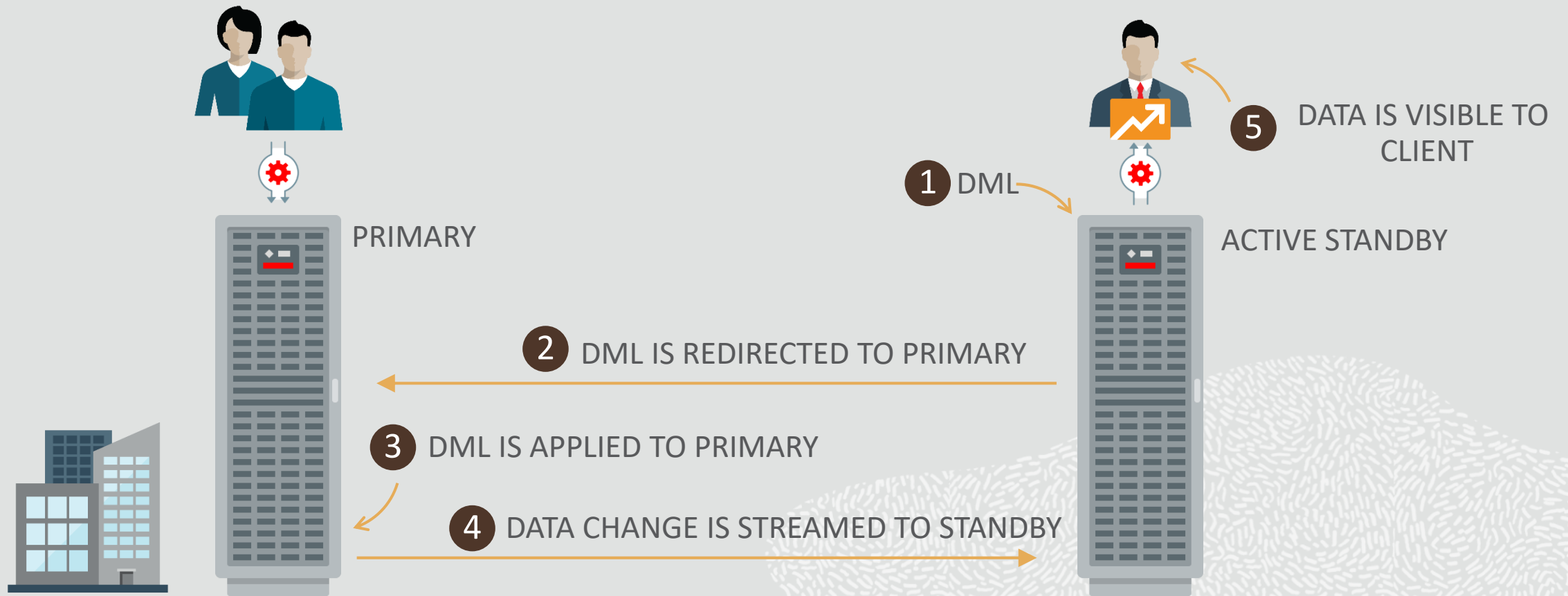
- Sharded RAC
- User-defined Sharding Methods

19c

- Data Guard DML Redirect
- Sharding:
 - Supports multiple PDB shards in a CDB
 - Unique sequence number generation per shard
- Zero Downtime Grid Infrastructure Patching
- PDB Recovery Catalog

Active Data Guard : DML Redirection

Read Mostly Standby



Application Development



12.2, 12.2

18c, 19c



▪ 12.1

- Application Express 5.1
- Comprehensive Language support
 - PL/SQL, SQL , Python, Node.js, PHP, Java, C, .NET, REST
 - JSON

▪ 12.2

- Long Identifiers
- Case Insensitive Databases

▪ 18c

- Improved JSON Support
- C, Python, JavaScript JSON SODA API
- Private Temporary Tables

▪ 19c

- SQL JSON Enhancements
- Materialized View for JSON_TABLE
- Partial JSON Update support
- Realtime SQL Monitoring for Developers

Data Warehousing and Big Data



12.2, 12.2

18c, 19c



▪ 12.1

- Partitioning, Compression, SQL, Analytical Views, Analytical SQL, Data Mining
- Easily analyze data held in Hadoop with Big Data SQL
- Big Data Appliance

▪ 12.2

- Partitioned External Tables
- Analytical Views

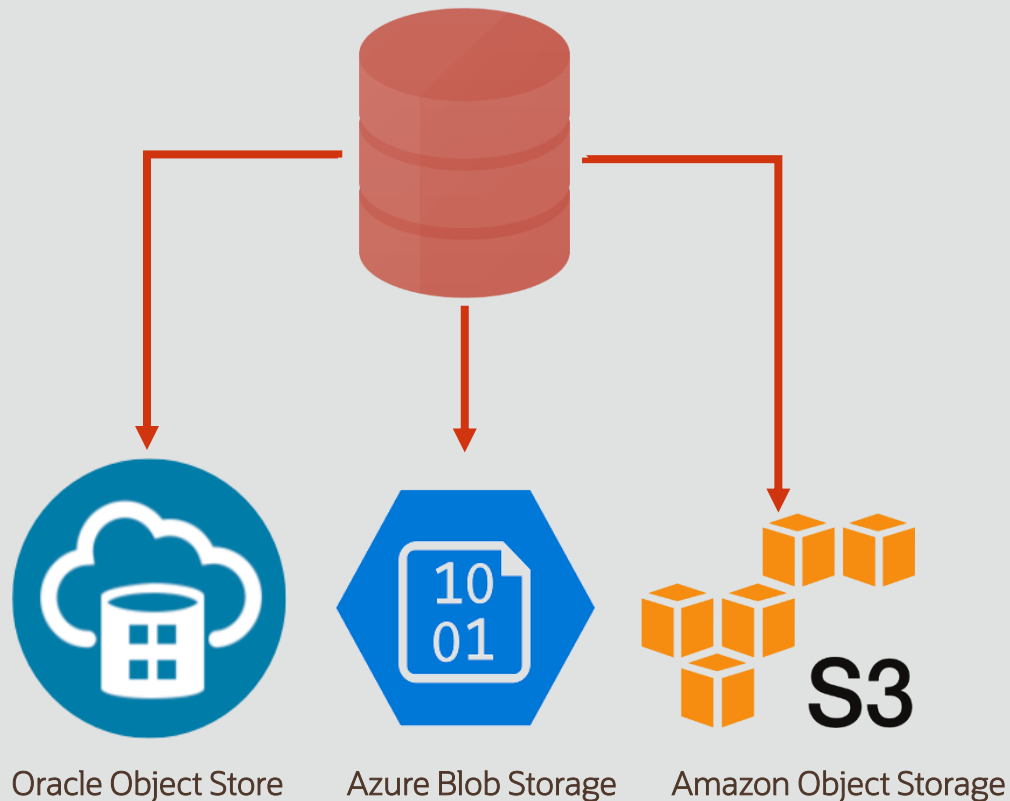
▪ 18c

- In-Memory for external tables
- Automatic propagation of nologged data to standby
- Machine Learning :
 - Random Forrest, Neural Network

▪ 19c

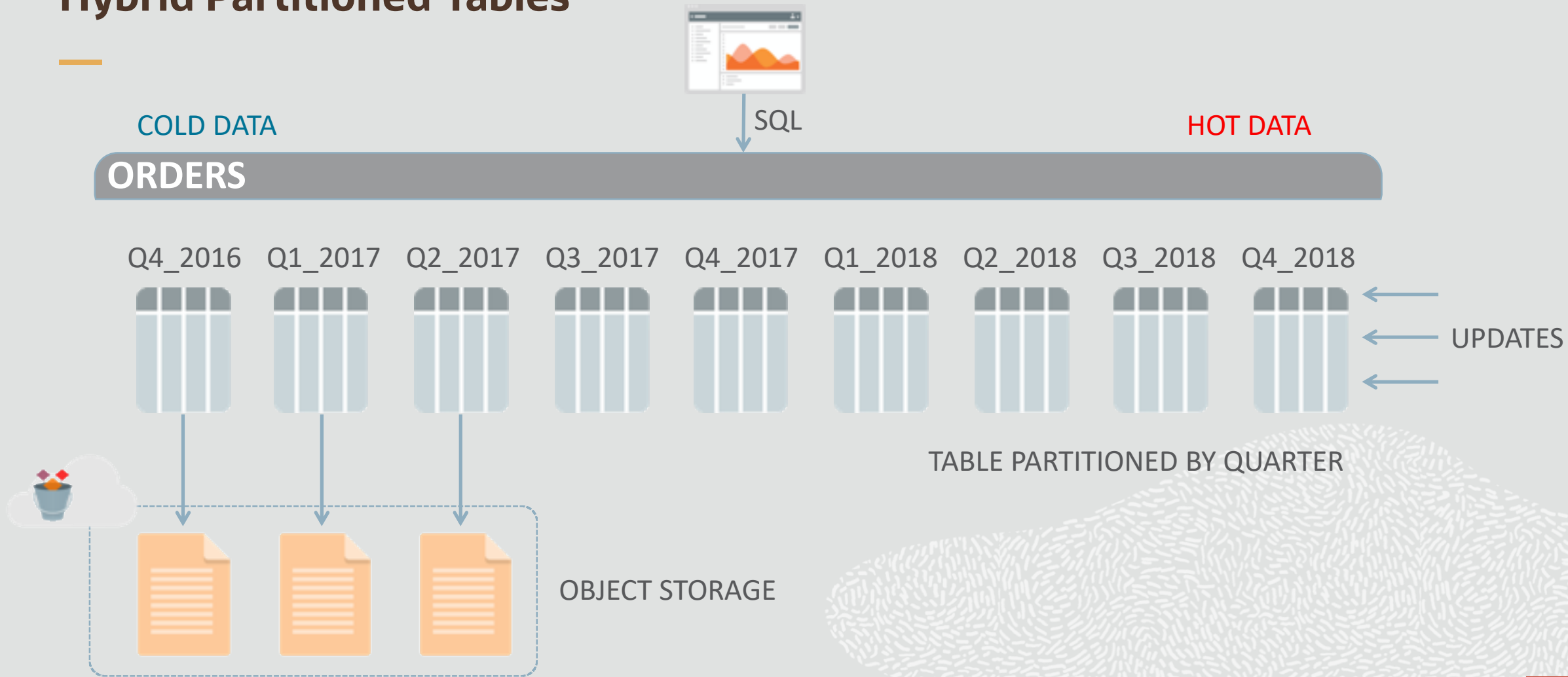
- Hybrid Partitioned Tables
- Stats only Queries

SQL Query of Object Stores

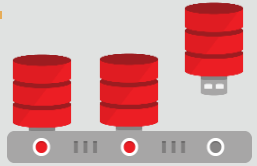


- Enables high-performance SQL over
 - Oracle Object Store,
 - AWS S3,
 - Azure Blob Storage
- Scalable scans and joins can span Oracle and data lakes
 - Loading of data into data warehouse
 - Queries on data lake data in object stores
- Supports all popular file formats
 - Including CSV, JSON, Parquet and Avro

Hybrid Partitioned Tables



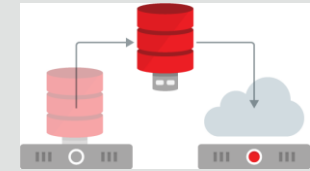
Multitenant



12.2, 12.2

- **12.1**
 - Container managed database virtualization
 - Manage Many as one
 - Patching, Backup, Security, Online Cloning, Online Relocation
- **12.2**
 - Online cloning & relocation
 - Incremental refresh of test/dev master
 - Application containers

18c, 19c



- **18c**
 - Transportable backups
 - Snapshot carousel
 - Refreshable PDB switchover
- **19c**
 - DBCA Silent mode operations for PDB
 - RAT and ADDM at PDB level
 - Automated PDB Relocation

Multitenant – Licensing Changes

- For all offerings using Oracle Database 19c, if you are not licensed for Oracle Multitenant, then you may have up to 3 PDBs in a given container database at any time
- EE: Extra cost option – if you are licensed for Oracle Multitenant, then you can create up to 252 PDBs.
- Exadata and ODA: Extra cost option – if you are licensed for Oracle Multitenant, then you can create up to 4096 PDBs
- DBCS EE-HP, DBCS EE-EP, and ExaCS: Included option – you can create up to 4096 PDBs

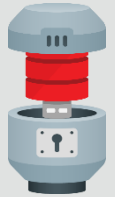
Multitenant – New Features

- **Ability to Create a PDB by Cloning a Remote PDB Using DBCA in Silent Mode**
 - You can now create a PDB by cloning a remote PDB using the `createFromRemotePDB` parameter of the `createPluggableDatabase` command of DBCA in silent mode
- **Ability to Relocate a PDB to Another CDB Using DBCA in Silent Mode**
 - You can now relocate a PDB to another CDB by using the `relocatePDB` command of DBCA in silent mode
- **Automated PDB Relocation**
 - In Oracle Grid Infrastructure, you can use Fleet Patching and Provisioning to automate relocation of a PDB from one CDB to another

Multitenant – New Features

- Automatic Database Diagnostic Monitor (ADDM) Support for Pluggable Databases
 - You can now use ADDM analysis for PDBs in a multitenant environment
- Oracle Real Application Testing (RAT) Workload Capture and Replay in a PDB
 - You can capture and replay the workload from within an individual pluggable database
- Oracle Data Pump Support for Resource Usage Limitations
 - Two new parameters, `MAX_DATAPUMP_JOBS_PER_PDB` and `MAX_DATAPUMP_PARALLEL_PER_JOB` are introduced to give DBAs more control over the number of jobs that can be started in a multitenant container database environment, and over the number of parallel workers that can be used for an individual Data Pump job, respectively

Security



12.2, 12.2

- **12.1**

- Security In-Depth
 - Access Controls, Encryption, Redaction, Masking, Auditing, SQL Firewalls
- Key Vault
- Audit Vault Database Firewall
- Security Assessment Tool

- **12.2**

- Online encryption

18c, 19c



Active Directory

- **18c**

- Integration with Active Directory
- Password-less schema creation

- **19c**

- Data Dictionary Encryption
- Password-less Schema-only Oracle accounts
- Database Vault Operations Control
- Privilege Analysis available in EE

Schema Only Accounts

Problem

- Database user accounts came with password authentication whether or not it was used as a login account
- Some accounts will never be used for login, but passwords still need to be maintained

Solution

- Remove passwords (and all authentication) from these accounts

```
CREATE USER auxapp NO AUTHENTICATION;
```

- Use `ALTER USER` to add/remove authentication

19c Update

- On fresh 19c Database installations, Oracle Database accounts will be installed without passwords (*Only SYS will have a password provided during installation)

Always Free – What's Included



Autonomous Database

*2 x Databases
20 GB each*



Compute

*2 x VMs
1 GB Memory each*



Storage

*100 GB Block
10 GB Object
10 GB Archive*



Networking/ Load Balancing

*10 Mbps LB
10 TB Outbound
Data Transfer*



Monitoring / Notifications

*500M Metrics Ingestion
1B Metrics Retrieval
1M Notifications
1K Emails*

Available to All New and Existing Cloud Accounts

Always Free Oracle Autonomous Database



Always Free: Two Databases per Cloud Tenancy

- Each Database gets 1 OCPU and 20 GB storage

Free Tools for Application Development

- APEX for low-code, web-based app development
- SQL Developer Web for database development
- SQL Notebooks for Machine Learning
- Automatic REST for easy access and publishing of DB data
- Drivers for all popular programming languages

Thank you

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A graphic consisting of a light green speech bubble with a white shadow, containing the text 'Q&A' in a white, bold, sans-serif font. The background of the slide is a vibrant, abstract pattern of overlapping shapes in shades of purple, red, and orange, with intricate geometric patterns in some areas.



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