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What's New in Oracle Database 19c

New York Oracle Users Group

Summer General Meeting
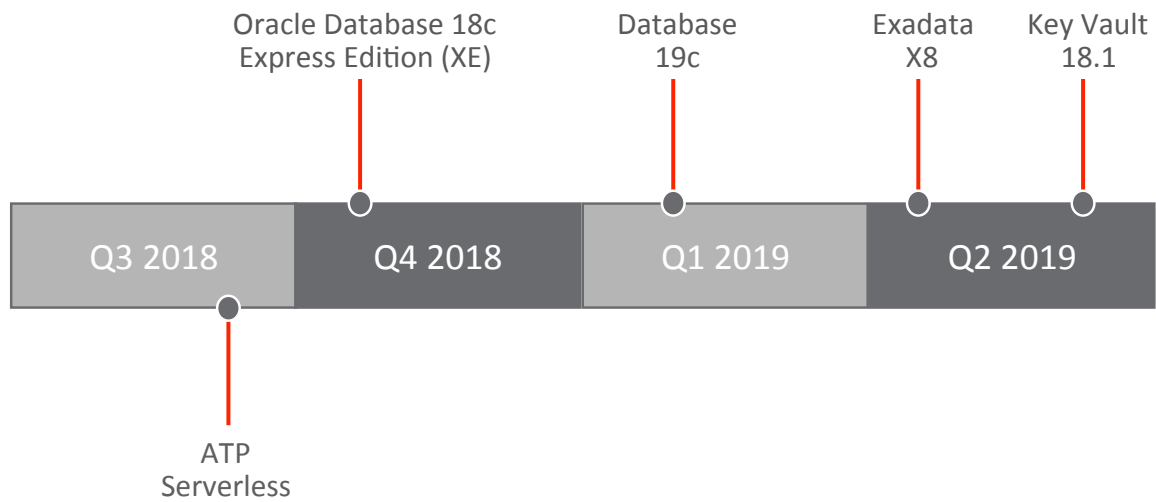June 5, 2019

Today's Topics

What's New from Oracle

Autonomous Database Update

New in Oracle Database 19c

What's Next from Oracle

What's New from Oracle

Oracle Database 18c
Express Edition (XE)

Database
19c

Exadata
X8

Key Vault
18.1

| Q3 2018 | Q4 2018 | Q1 2019 | Q2 2019 |

ATP
Serverless

Oracle Database 18c Express Edition (XE)

- Includes most enterprise features
  - no RAC, Data Guard, GoldenGate
- Resource limits increased to:
  - 2 CPUs for foreground processes
  - 2 GB memory (SGA + PGA)
  - 12 GB user data
  - 3 PDBs
- Free to use (forum support)

XE

www.oracle.com/xe

Oracle Exadata X8

Latest generation of optimized platform for all database workloads

- Scale-Out 2-Socket and 8-Socket Database Servers
  - 15% faster clock rate – latest 24 core Intel Cascade Lake
  - Spectre & Meltdown mitigated in silicon – no software overhead, more secure
- Ultra-Fast Unified InfiniBand Internal Fabric
- Scale-Out Intelligent 2-Socket Storage Servers
  - 60% more cores – latest 16 core Intel Cascade Lake
  - 40% higher capacity 14TB Helium Disk Drives
- NEW Storage Server Extended (XT)
  - Low cost storage extends Exadata benefits to infrequently accessed data

Database Server

High-Capacity (HC) Storage

OR

Extreme Flash (EF) Storage

Extended (XT) Storage

Oracle Key Vault 18.1

For storing and managing encryption keys

- Optimized for TDE master key management for 100s of databases
  - Supports popular Hardware Security Modules as root of trust

- Prevents key loss from;
  - Forgotten passwords, and
  - Accidental deletion of wallets and Java keystores

- Up to 16-node multi-master deployment architecture
  - For continuous key availability, and
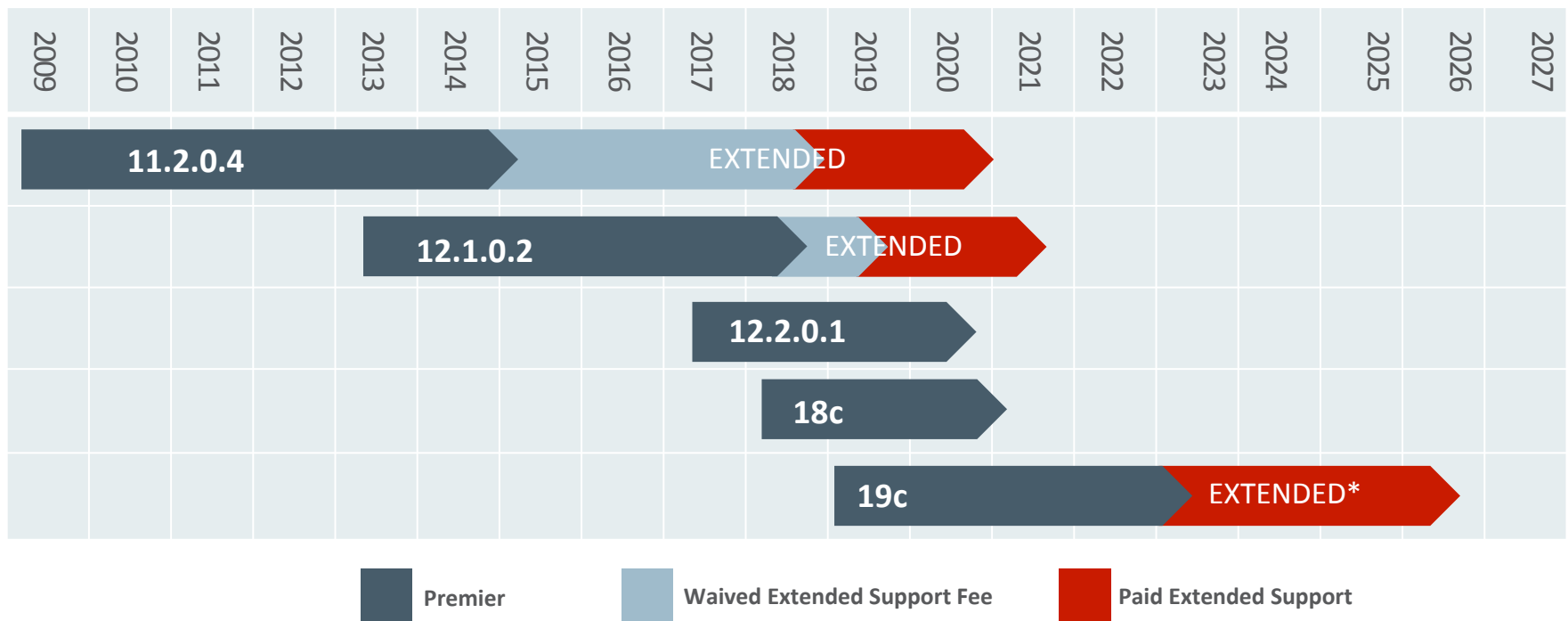 - Support for large globally distributed deployments
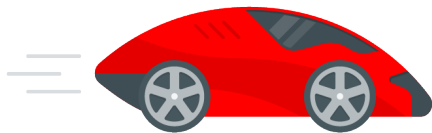
Oracle Database 19c: Goals

- Provide a stable and secure release of Oracle Database
  - Long-term support for 12c and 18c family of releases
  - Premier support to March 2023
  - Extended support to March 2026
- Deliver additional Autonomous Database capabilities
  - Automatic indexing, real time statistics, …
- Deliver functional changes to improve overall customer experience
  - IoT Ingest, updates on Active Data Guard standby, hybrid partitioned tables, …

Database Release and Support Timelines

Always check MOS Note 742060.1 for the latest schedule!

| 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |

11.2.0.4 — Premier, Waived Extended Support Fee (EXTENDED), Paid Extended Support

12.1.0.2 — Premier, Waived Extended Support Fee (EXTENDED), Paid Extended Support

12.2.0.1 — Premier

18c — Premier

19c — Premier, Paid Extended Support (EXTENDED*)

- **Premier**
- **Waived Extended Support Fee**
- **Paid Extended Support**

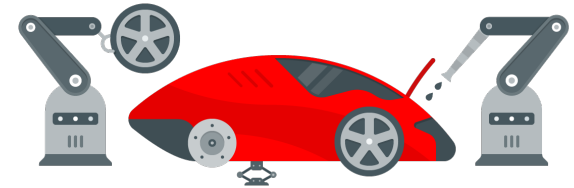# Oracle Autonomous Database Key Attributes

Self-Driving

Automates all database and infrastructure management, monitoring, tuning
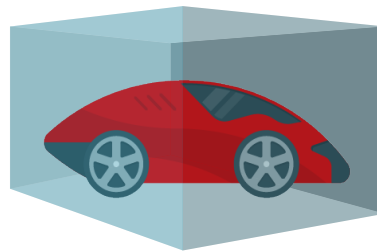
Self-Securing

Protects from both external attacks and malicious internal users

Self-Repairing

Protects from all downtime including planned maintenance

Autonomous Database Machine Learning

Diagnostics, recovery and optimizations for each layer of the deployment stack

Database Infrastructure

Detection and recovery of failed/sick server, storage or switch/link
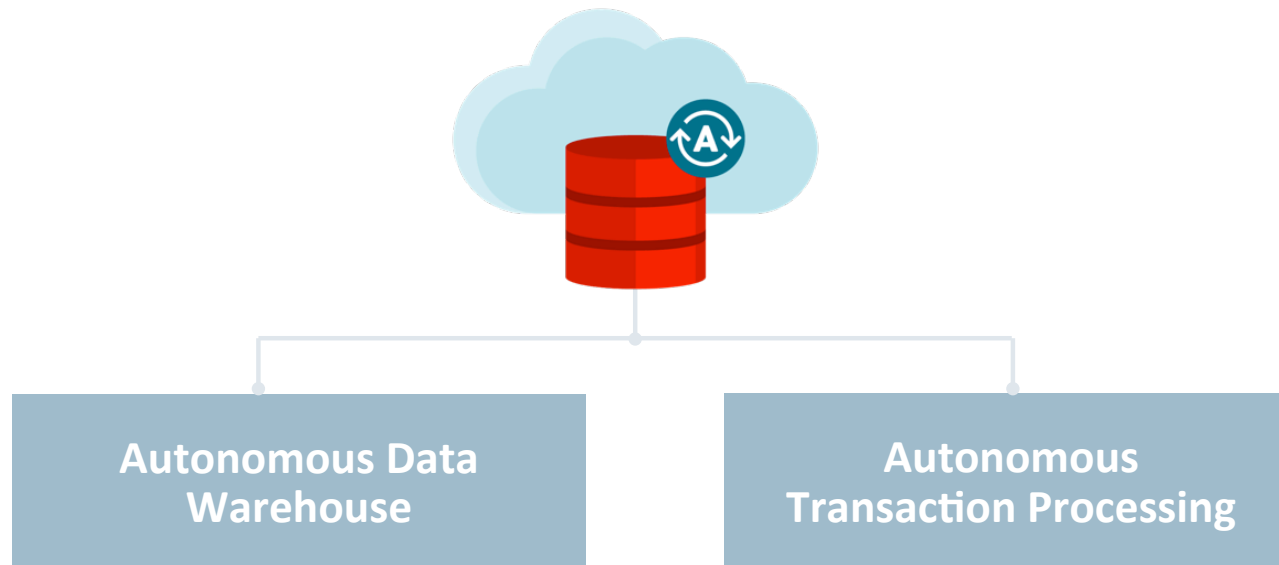
Database Operations

Hang Management
Anomaly Detection
Maintenance Slot Identification
Bug Identification and Prioritization

Workload Optimizations

Query Optimizer
Real-time statistics
Automatic Indexing

Autonomous Database | Optimized by Workload

Autonomous Data Warehouse

Autonomous Transaction Processing

Autonomous Optimizations | Specialized by Workload

	Autonomous Data Warehouse	Autonomous Transaction Processing
	Optimizes Complex SQL	Optimizes Response Time
	Columnar Format	Row Format
	Creates Data Summaries	Creates Indexes
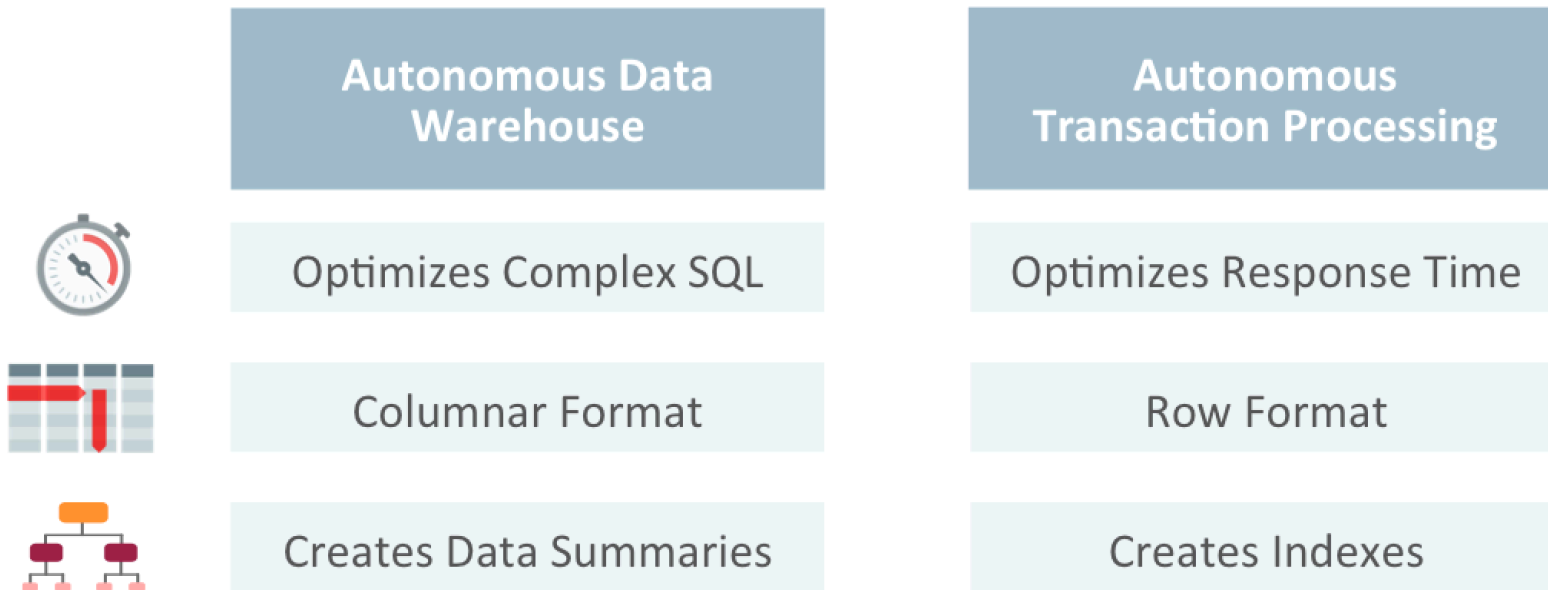
Autonomous Data Warehouse (ADW)

For data marts/warehouses, machine learning and data lakes

- Optimized for analytic workloads
  - High performance DW query with flexibility of big data platforms
- Easy to provision, load data, and execute queries
  - Or lift and shift existing databases
- Low Cost
  - Zero administration, self-tuning, instant elasticity

Autonomous Data Warehouse Customers

Determine Fans Most Likely to Renew Season Tickets

Using simple two-step Machine Learning (ML) process

1. Build ML model in ADW where we have a detailed history of all fan activities using in-Database ML algorithms

```
DBMS_DATA_MINING.CREATE_MODEL(
    model_name          => 'SEASON_TKS_MODEL',
    mining_function     => dbms_data_mining.classification,
    data_table_name     => 'FAN_DETAIL_TAB',
    case_id_column_name => 'FAN_ID',
    target_column_name  => 'BUY_SEASON_TKS',
    settings_table_name => 'GLM_SETTINGS');
```

2. Apply the ML model via a simple SQL query on ATP to predict which fan likely to buy

```
SELECT PREDICTION_PROBABILITY(SEASON_TKS_MODEL, 'Yes'
USING  3500 as BANK_FUNDS, 40 as AGE, 'Married' as MARITAL_STATUS)
FROM   dual;
```

Autonomous Transaction Processing (ATP)

For OLTP, mixed OLTP/analytical, IoT, document workloads

- High performance, reliable, and secure Exadata infrastructure

- Easy to provision new databases or lift and shift existing databases
  - Simply specify # OCPUs and amount of storage
  - System provisioned in seconds

- Low Cost
  - Instant elasticity allows OCPU and storage changes online
  - Fully autonomous infrastructure and database operations
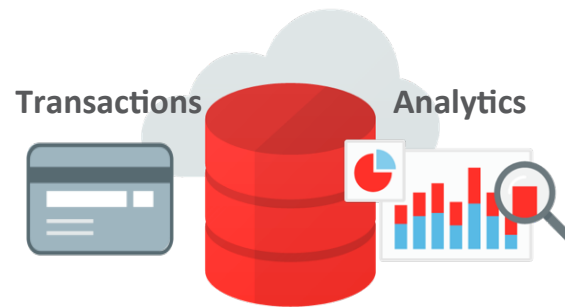 - Choice of manual tuning or self-tuning

Autonomous Transaction Processing | Key Use Cases

Departmental / Mission Critical Applications

Mixed Workloads

Application Development

Transactions

Analytics

Autonomous Database Eliminates Developer Complexity

Modern multi-model database simplifies development of modern apps

- Build applications using **one** core data management service
  - Industry standard SQL for application portability
  - Supports all popular data types and use cases
- **Fastest** time to usage
  - Rapid provisioning, online elastic scaling
- **No** DBA support required for
  - Provisioning, performance tuning, patching, upgrading, backup
- **APEX** for low-code application development

What's New | Automatic Indexing

NEW IN 19ᶜ

CAPTURE → IDENTIFY → VERIFY → DECIDE → ONLINE VALIDATION → MONITOR
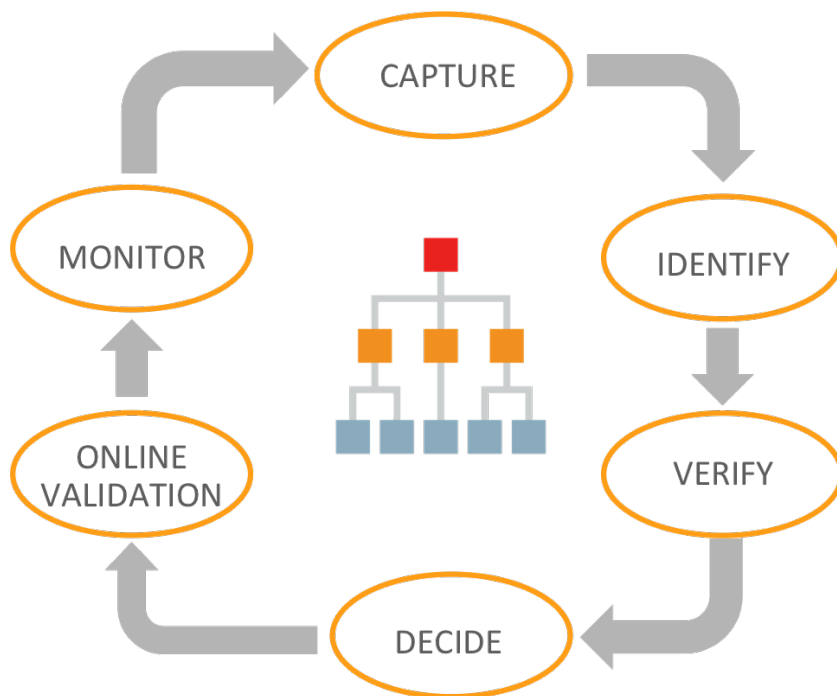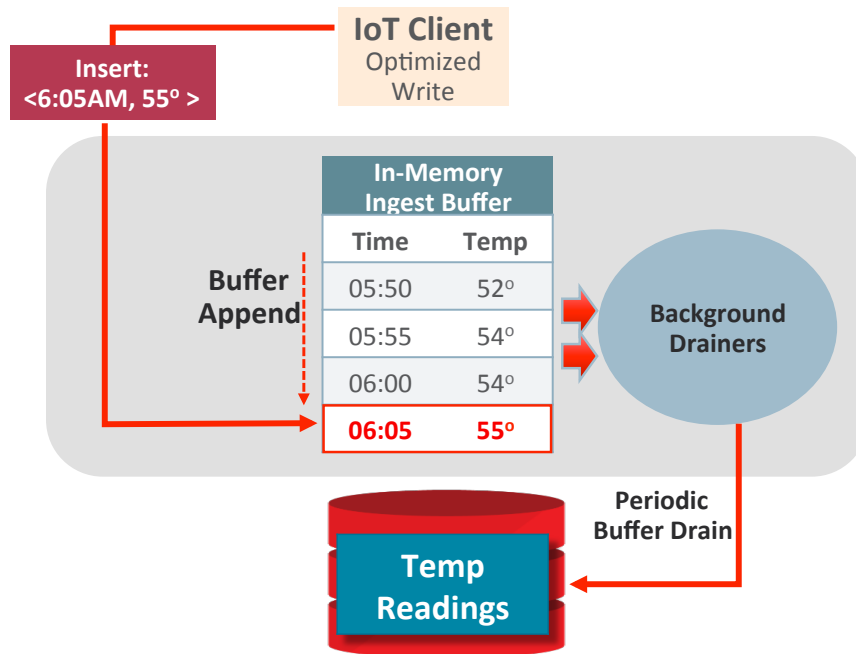
- ML meets mission critical
- Goal is to optimize performance
  - Plans are like driving directions
  - Indexes are like shortcuts
- ML continuously monitors workloads
  - Identifies new SQL plans and indexes
  - Changes tested outside of production
  - Then validated on first execution
  - If slower, then old plan is restored
- All auditable by customer

What's New | Memory Optimized Access

Example: Write Temperature Reading

Insert:
<6:05AM, 55° >

IoT Client
Optimized
Write

Buffer
Append

In-Memory Ingest Buffer	
Time	**Temp**
05:50	52°
05:55	54°
06:00	54°
06:05	**55°**

Background
Drainers

Periodic
Buffer Drain

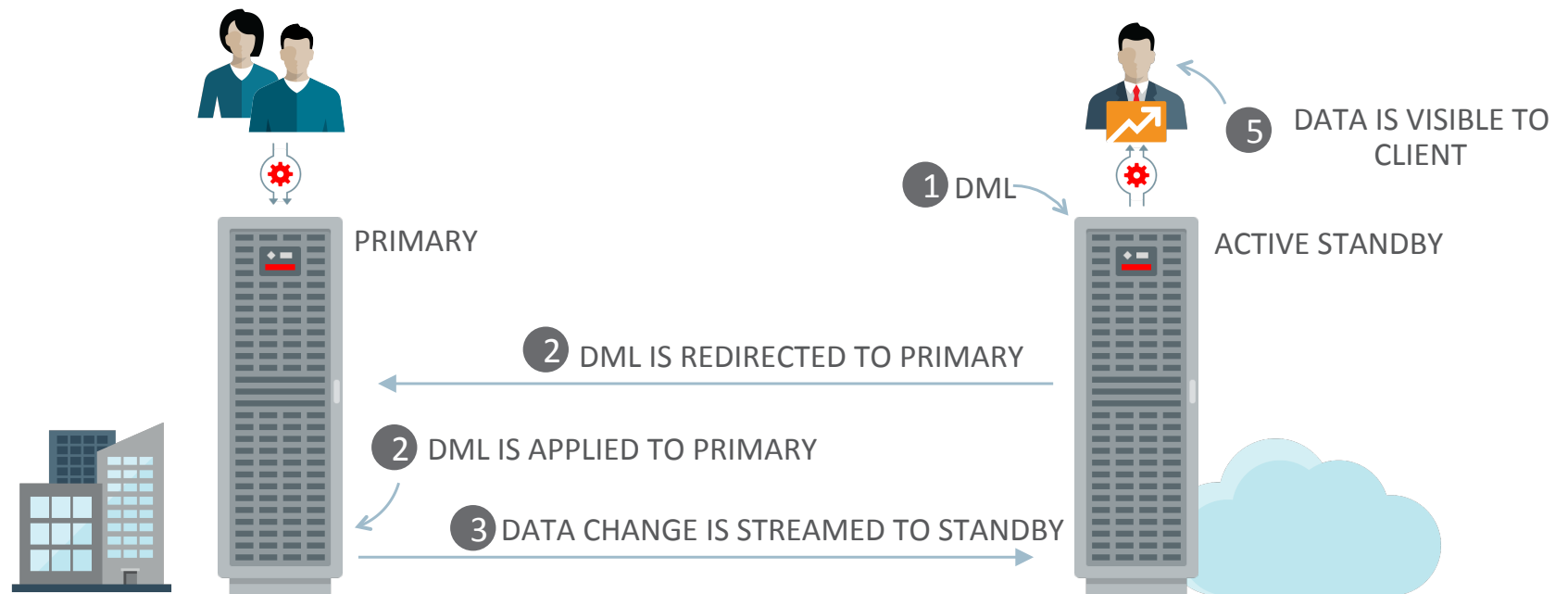**Temp**
Readings

- Oracle Database 18c introduced:
  - Declare table MEMOPTIMIZE FOR READ
  - In-memory rowstore for fast lookups
- Oracle Database 19c adds:
  - Declare table MEMOPTIMIZE FOR WRITE
  - Clients performs low-latency write into in-memory buffer
  - Buffered writes drained in background
  - Ideal for for IoT Workloads

What's New | Active Data Guard DML Redirection

Enables Read Mostly Standby

NEW IN 19c

PRIMARY

ACTIVE STANDBY

1 DML

5 DATA IS VISIBLE TO CLIENT

2 DML IS REDIRECTED TO PRIMARY

2 DML IS APPLIED TO PRIMARY

3 DATA CHANGE IS STREAMED TO STANDBY

What's New | Hybrid Partitioned Tables

NEW IN 19ᶜ

COLD DATA

SQL

HOT DATA

ORDERS

Q4_2016   Q1_2017   Q2_2017   Q3_2017   Q4_2017   Q1_2018   Q2_2018   Q3_2018   Q4_2018

UPDATES

TABLE PARTITIONED BY QUARTER

OBJECT STORAGE

NEW IN 19c
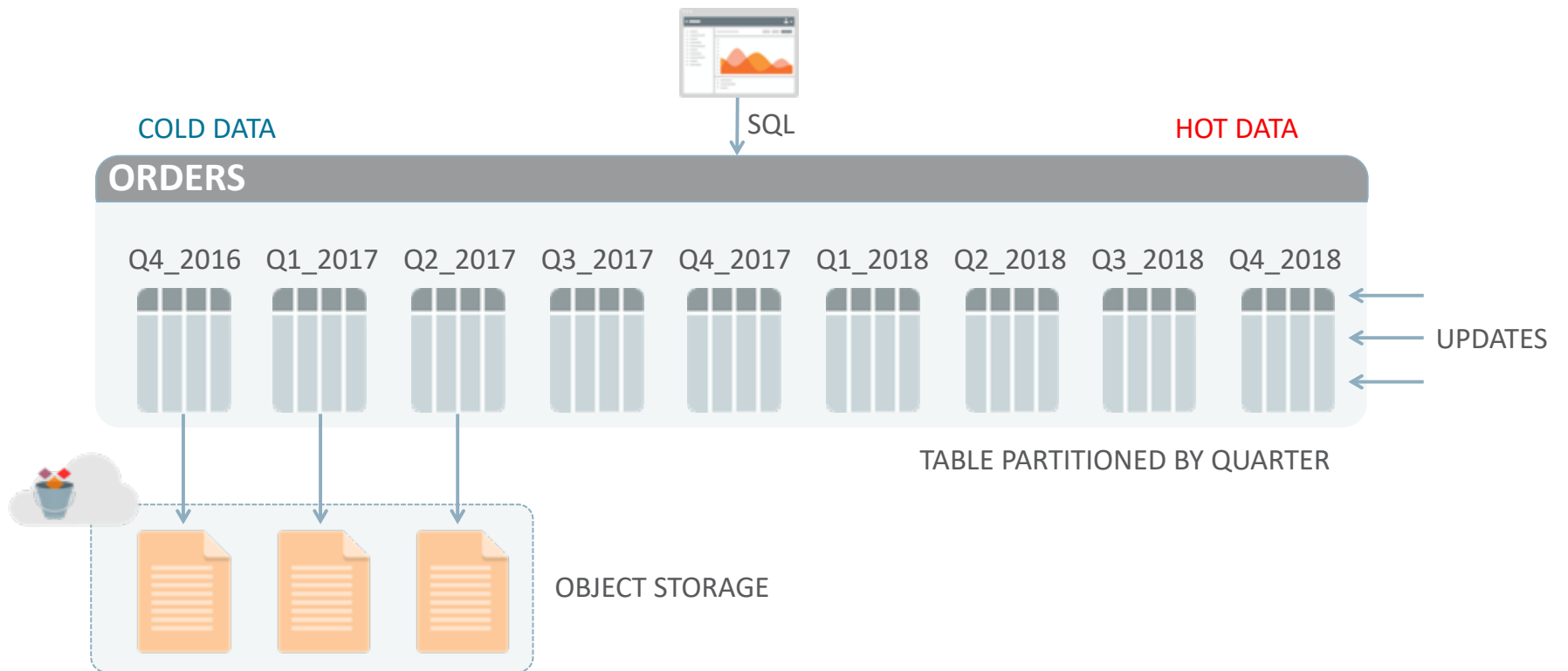
What's New | Some Other Features of Note

- Performance
  - Quarantine runaway queries
- Availability
  - Rolling RAC infrastructure patching
- Sharding
  - Multiple PDB shards in a CDB
- Multitenant
  - RAT and ADDM at PDB level

- Database Security Assessment Tool
  - Report on overall security status
  - Find the users, entitlements, and risks
  - Discover sensitive data
  - For multiple database releases
- Application Development
  - DISTINCT option for LISTAGG aggregate
  - More JSON enhancements
  - SQL Developer monitoring

ORACLE **Database Features**

Search

Search Features

Focus Area

All Focus Areas

Version

☐ 11.2   ☐ 12.1

☐ 12.2   ☐ 18c

☐ 19c

☐ New features only

🔍

↩ Reset

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 t... `12.2 Release` `Windows`	✕	✕	✓	✓	✓
3D Visualization Framework This release includes a set of metadata tables to describe themes, scenes, textures, viewpoints, lig... `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 provid... `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 ... `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 i...	✕	✕	✓	✓	✓

ORACLE Live SQL   ⑦ Help →] Sign In

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▶ SQL Worksheet

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🗄 Schema

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Learn and share SQL

Now running on Oracle Database 19c

🔍 Search scripts and tutorials

Start Coding Now   View Scripts and Tutorials

Featured Scripts and Tutorials

Introduction to SQL TUTORIAL	**Simple Explain Plan** SCRIPT
This tutorial provides an introduction to the Structured Query Language (SQL), learn how to create tables with primary keys, columns, constraints, ind...	This script explains the plan for a query of the sh.sales and sh.products tables.
19C LISTAGG DISTINCT SCRIPT	**19c JSON_OBJECT** SCRIPT
The LISTAGG aggregate function now supports duplicate elimination by using the new DISTINCT keyword. The LISTAGG aggregate function orders the rows...	Syntax simplifications are offered for SQL/JSON path expressions, SQL/JSON generation with function json_object, and field projection with SQL/JSON ne...

246,407 scripts, **1,855** likes, **894** public scripts, **3,320** new scripts created in the last **7** days.

What's Next | Dedicated Exadata Cloud Infrastructure

For secure database consolidation and workload isolation

- Deploy on **dedicated** Exadata Cloud infrastructure
  - With **guaranteed** 99.995% SLA

- Complete stack is fully **isolated** from other tenants:
  - Compute, Storage, Cluster Interconnect
  - Virtual Cloud Network is hardware enforced

- Unique **fully isolated cloud** in Public Cloud
  - Allows control over consolidation, updates

What's Next | Autonomous Database at Customer
Autonomous Database in customer's data center

- Autonomous Database is Cloud Only since it automates the entire stack:
  - Servers, storage, network, interconnect, software

- Some customers cannot move to public cloud
  - Regulations, corporate policies, network latency

- Managed by OCI public cloud control plane
  - Same Exadata hardware, software, interfaces
  - Same pay-per-use subscription model

In Summary

- Significant product releases over past 12 months
  - Autonomous Transaction Processing (ATP) Service
  - Oracle Database 19c, Oracle Exadata X8, Key Vault 18.1, …
- Enhanced/unique features for on-prem and in-cloud deployments
  - Automatic indexing, fast IoT ingest, SQL quarantines, …
- Autonomous Database gaining traction with new/existing customers
- Next round of Autonomous Database enhancements coming soon
  - Further differentiate Oracle Database in the Cloud and on-prem

Integrated Cloud
Applications & Platform Services