



# Oracle Database

Vision for Simplifying Data-Driven Apps and Analytics

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**Alexandre Fagundes**

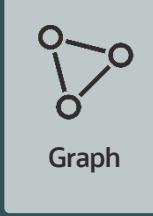
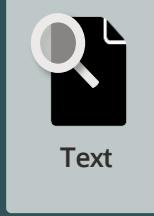
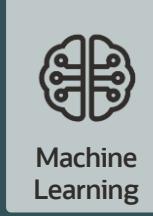
LAD Partner Enablement

October, 2022

# The Increasing Complexity of Modern Apps



Modern data-driven apps create powerful experiences for users and more value for enterprises using a wide variety of data technologies:

Many Types of Data	Many Types of Analytics	Many Types of Workload									
 Documents	 Graph	 Text	 Spatial	 Machine Learning	 Social Graph	 Location	 Lake House	 Micro Services	 Data Mesh	 IoT	 Blockchain

The breadth and depth of data technologies used by modern apps makes app dev increasingly **complex**

- Making the complete solution **manageable, available, and secure** adds even more complexity

What is the best way to build modern data-driven apps?

# Specialized Databases



One approach to building modern apps is to use a **specialized database** for each application need

Each specialized database excels at one aspect of the app's requirements

New Types of Data	New Types of Analytics	New Workload Types									
 MongoDB Documents	 Neo4j Graph	 Elastic Search	 Spatial	 Machine Learning	 Social Graph	 Location	 Snowflake Lake House	 Micro Services	 Geo- Distributed	 DynamoDB IoT	 AWS QLDB Blockchain

# The Problems With Using Specialized Databases



However, this approach inherently creates an application architecture that is **heterogeneous** and **distributed**

- Built from many moving parts that must be learned, synchronized, secured, maintained, and governed
- Fragments the data and app, which makes app dev more complex, and compromises security and QoS

New Types of Data	New Types of Analytics	New Workload Types									
 MongoDB Documents	 Neo4j Graph	 Elastic Search	 Spatial	 Machine Learning	 Social Graph	 Location	 Snowflake Lake House	 Micro Services	 Geo-Distributed	 DynamoDB IoT	 AWS QLDB Blockchain

Specialized databases also provide limited **ACID consistency** and **data security** further complicating dev

Because specialized databases are **incomplete**, developers must focus on **integration** instead of **innovation**

Oracle Database vision:

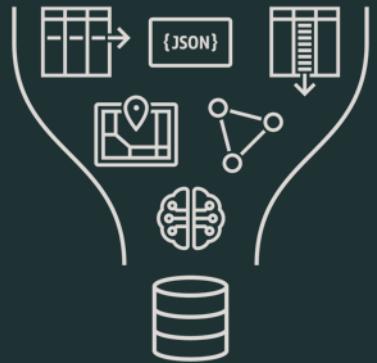
**Make it simple to  
develop and run  
modern operational and  
analytic apps, everywhere**



# Delivering the Vision

**Complete** and **Simple** database for developing and running modern apps and analytics

## Complete



### CONVERGED DATABASE APPROACH

- Complete support for all modern data types, workloads, development styles
- Complete consistency, scalability, availability, and security

## Simple



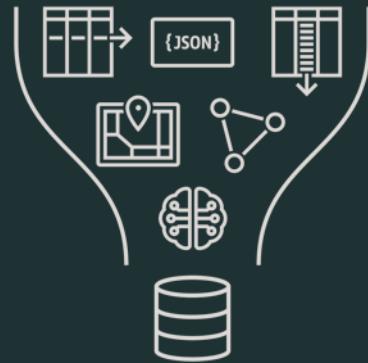
### AUTONOMOUS DATABASE

- Simplest cloud database for developers and analysts
- Simplest cloud database for running any app at any scale or criticality

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# Oracle Converged Database Engine

Move Compute to the Data; Dramatically Simplifies Application Development

## In-Database Machine Learning

Create and use models in SQL, PL/SQL, R and Python

## Relational

Data stored as rows

## Native JSON

SQL/JSON and NoSQL like API  
and API for MongoDB

## Spatial

Data stored as geometry(GeoJSON compatible)

## Stored Procedures

Eliminate client/server network latency,  
plus consistently enforce business logic

## Text Data

Binary data: PDF, DOCX, PPTX...

## XML

Data stored as XML

## Blockchain tables

Tamper resistant rows

## In-Memory analytics

Data as columns in RAM and rows on disk  
(in columns on Exadata infrastructure)

## Graph

Data as property graph or RDF

## REST Data Services

Data from tables, collection, SQL queries...  
exposed as REST APIs

## Application Express

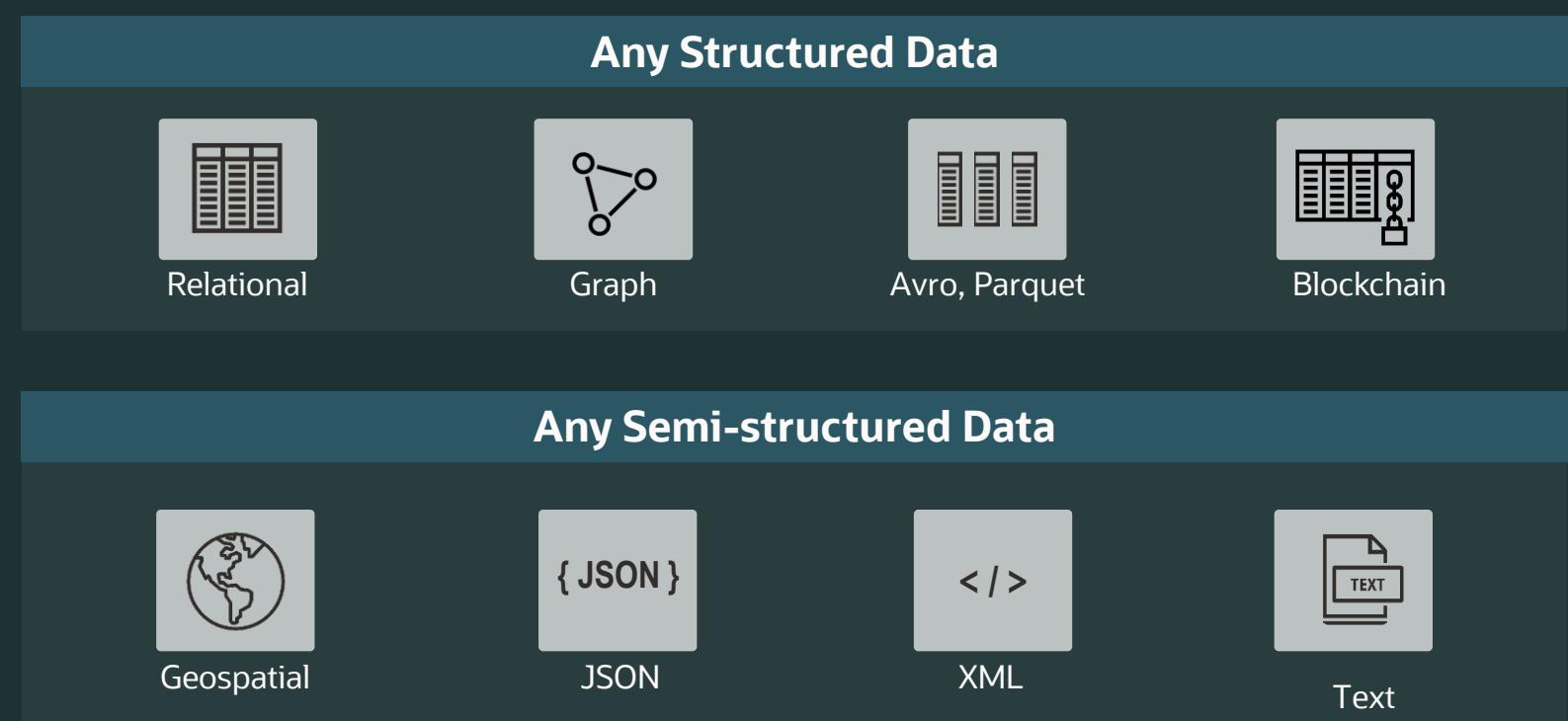
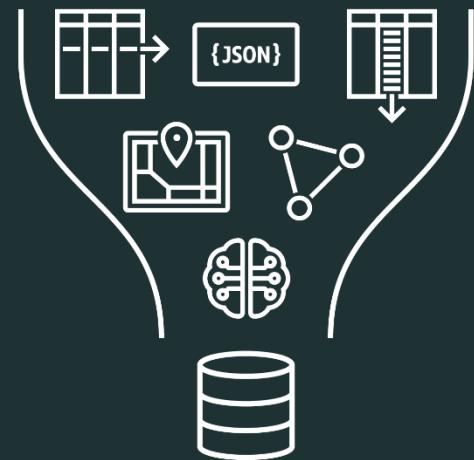
Built-in low code application development  
and deployment platform

## External Data

External data can be accessed: csv, json, avro,  
parquet, orc, hdfs, hive, S3, Azure BLOB, GCP...

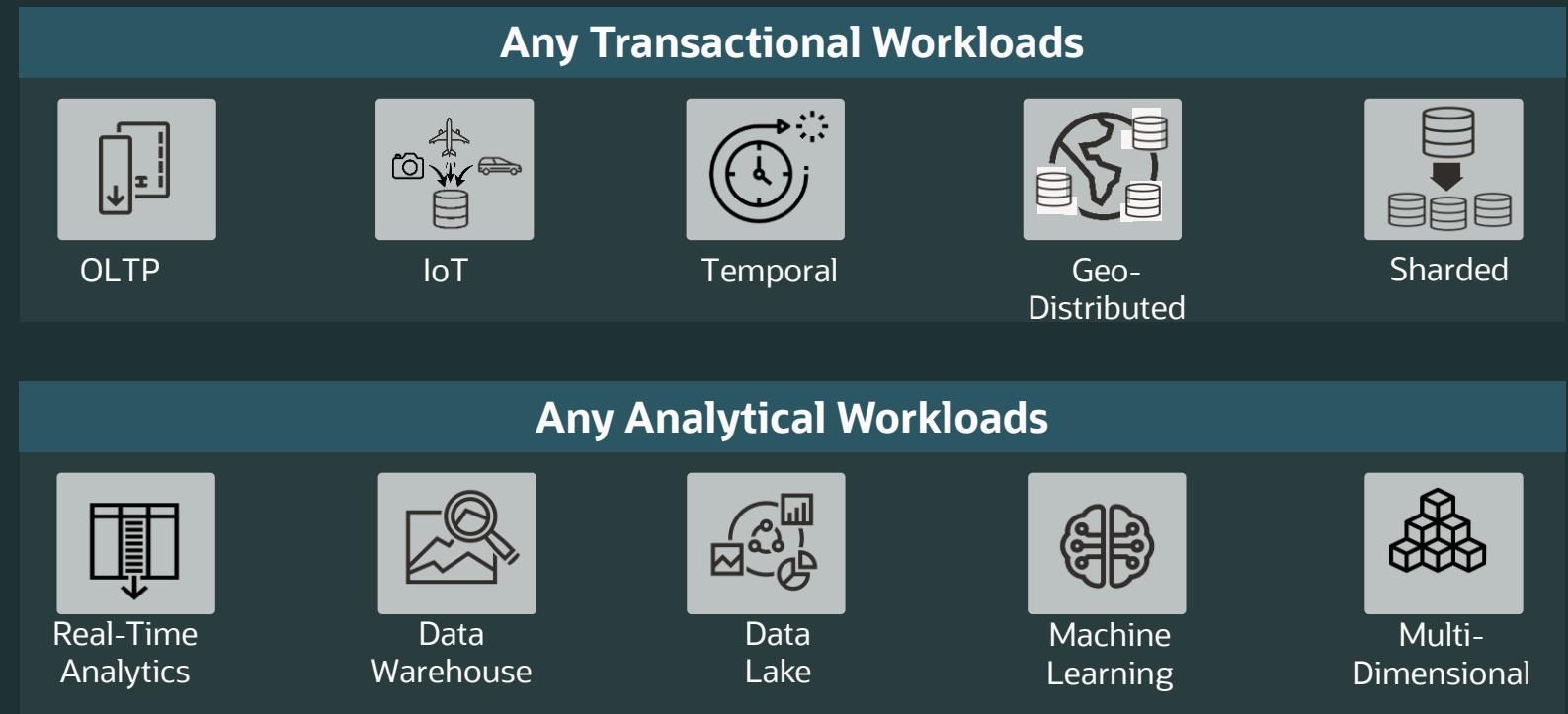
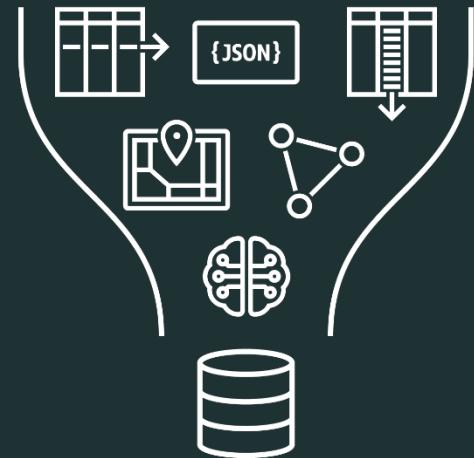
Multi-model & multi-workload

# Complete for Any Data



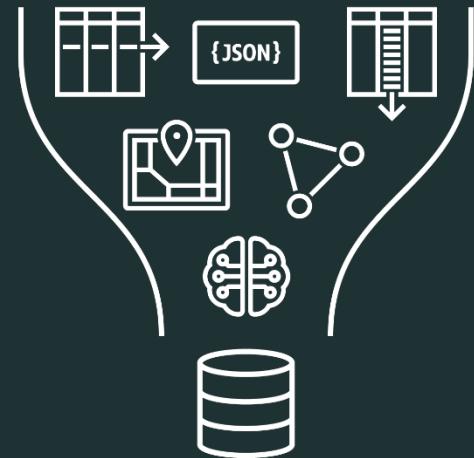
- **Converged** support for all modern data simplifies app dev and eliminates data and app fragmentation
- Best-of-breed for all – for example, better JSON than MongoDB, faster graph than Neo4j [bit.ly/OraclevsMongodb](https://bit.ly/OraclevsMongodb) [bit.ly/OraclevsNeo4j](https://bit.ly/OraclevsNeo4j)
- **Unique transactions and queries that span any data make it easy to create value across all data types**

# Complete for Any Workload

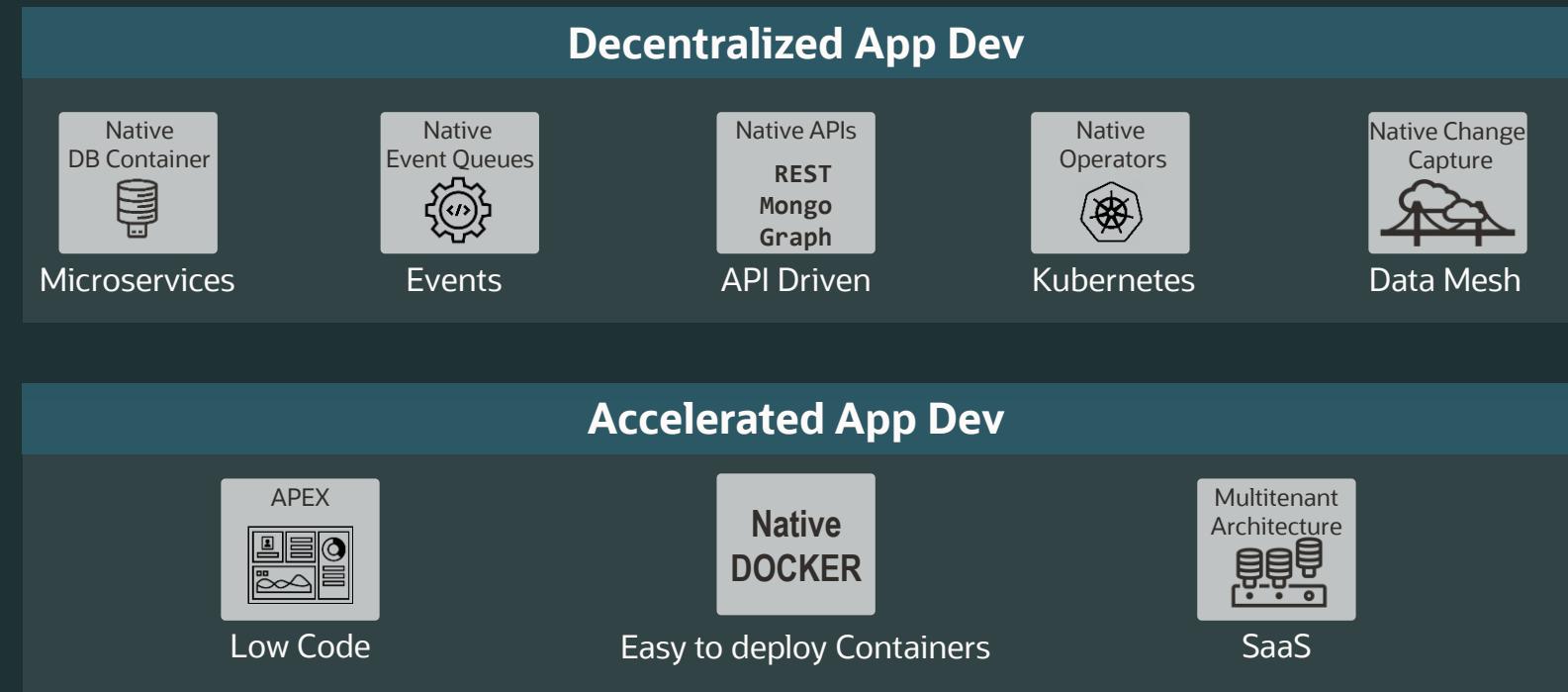


- **Converged** support for any modern transactional and analytical workloads simplifies app dev
- Best-of-breed for all – for example, better Analytics than Snowflake [bit.ly/OraclevsSnowflake](https://bit.ly/OraclevsSnowflake)
- **Unique ability to run any combination of workloads on any combination of data**

# Complete for Any Development Style

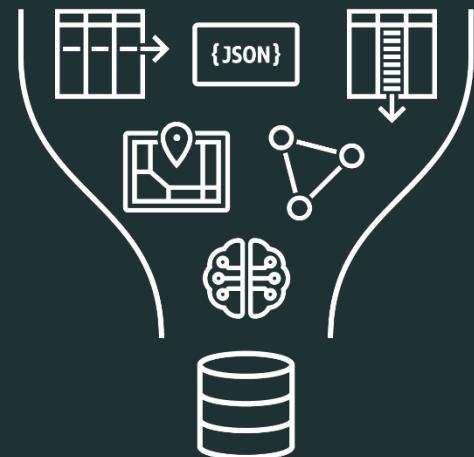


**Converged  
Database**



- **Converged** support for all modern development styles simplifies app dev
- **Unique architectural support for containers, events, REST, low-code, SaaS, etc.**

# Complete Mission Critical Capabilities



## Complete Scaling in Every Dimension



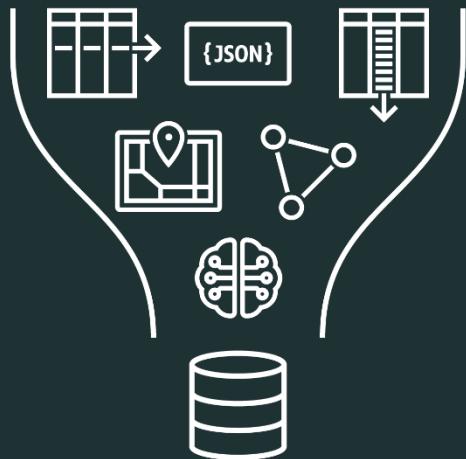
## Complete Protection from All Types of Downtime and Risk



- **Converged** support for the **complete** scaling and risk reduction needs of modern apps simplifies app dev
- **Unique transparent scalability, availability, and security without sacrificing functionality or ACID consistency**

# Oracle Database – The World's Only Converged Database that is Complete

Oracle Converged Database makes it dramatically easier to develop and run modern apps



- Just call SQL for any data type, workload, or analytics
- No need to fragment data across databases to support new app requirements
- Scaling and availability are transparent, without sacrificing data consistency
- No compromise – Oracle technologies are rated industry leading
- Enables you to focus on your app and business in each area

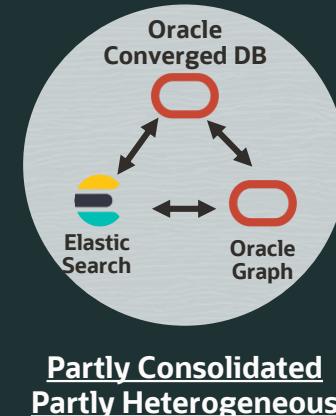
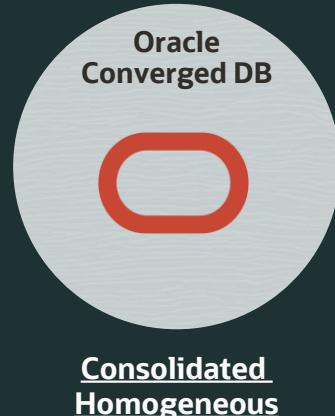
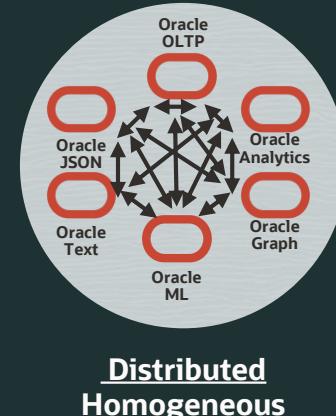
A fully complete database is the result of Oracle's decades of innovation

# Converged Database enables choice of architecture

Converged database enables you to **choose your data architecture design for each application**

- You are not forced into a distributed or heterogeneous design by product limits

You  
Choose



**You choose** whether to **distribute** or **consolidate** data for each application

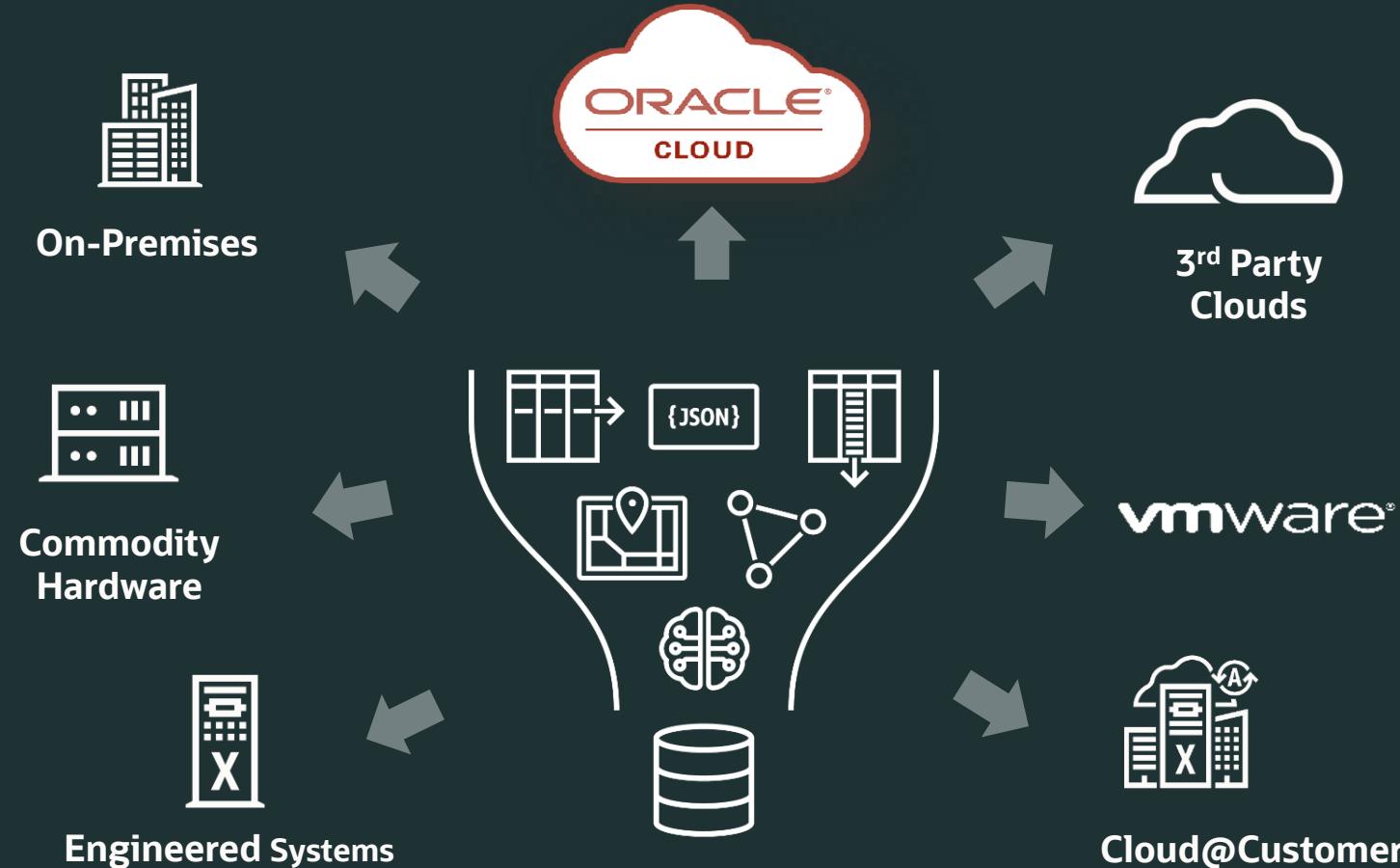
- Oracle has unique features that simplify distributed data architectures – world's best database for Microservices

**You choose** when to use a **heterogeneous database** and its proprietary APIs as part of an application

- Converged functionality is always easiest – add a heterogeneous database if converged doesn't address a need
- Oracle provides the industry's best cross-database interoperability and data replication across heterogenous envs

# Converged Database enables choice of deployment

Develop and Deploy Oracle Anywhere – Extreme Portability

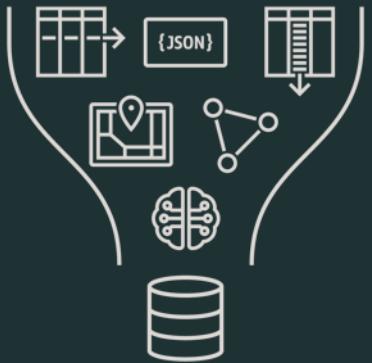


**Same database,  
same skills**

# Delivering the Vision

**Complete** and **Simple** database for developing and running modern apps and analytics

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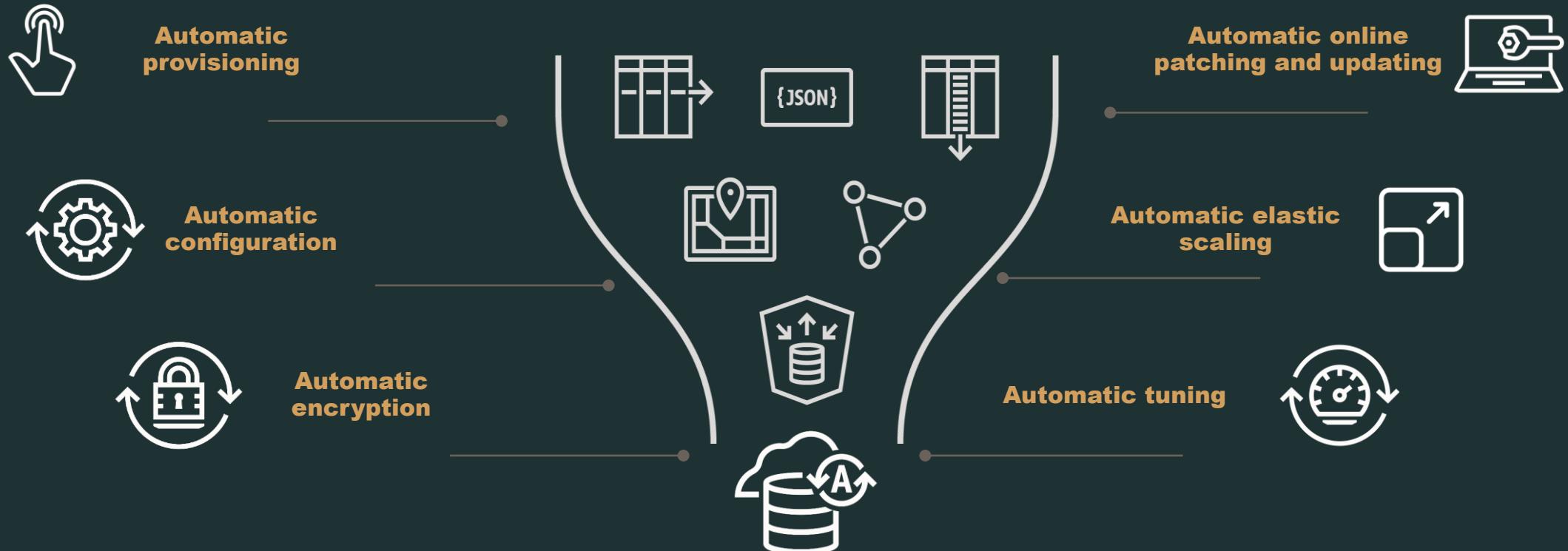


### AUTONOMOUS DATABASE

- Simplest cloud database for developers and analysts
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# Autonomous Database: a fully-managed cloud service

Delivers the complete and mission critical technology of Oracle's converged database



With automation across all components driven by AI and predictive analytics



Eliminates human labor



Eliminates human error



Eliminates downtime



Eliminates scaling complexity



Eliminates performance tuning complexity

# Oracle Autonomous Database is Complete AND Simple



## Autonomous Database

Mission critical databases have historically been complicated to use and expensive to run

**Autonomous Database** delivers the complete and mission critical technology of Oracle's converged database as the world's **simplest, most productive, and most cost-effective database cloud service**

### Simplest for Developers

- Enables applications to be simple, accelerating innovation
- Provides integrated cloud-native development for full dev lifecycle

### Simplest for Operations

- World's most advanced scaling, availability, tuning, maintenance and security capabilities are now ultra simple

### Most Cost-Effective for All Use Cases at Any Scale

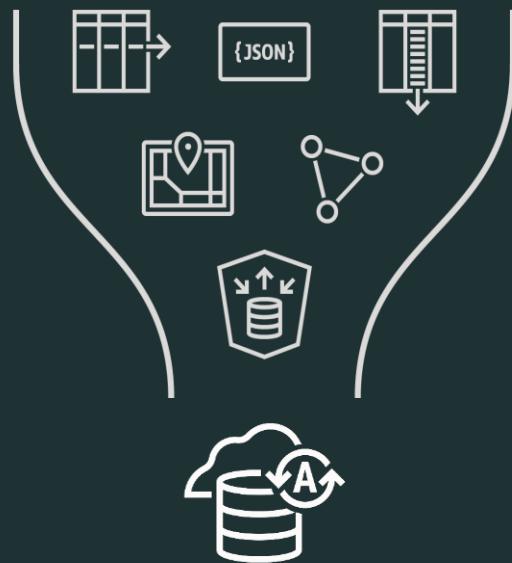
- Best price, best performance

# A Truly Simple Cloud Database Must First Enable a Simple App Architecture

“Simple” databases that fragment the App architecture create endless Dev and Ops Challenges

## Oracle Autonomous Database

Apps simply call SQL for any data type or workload



## Other Cloud Vendors

Apps must use many single-purpose proprietary databases, one for each data type and workload



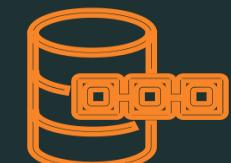
**Aurora**  
OLTP



**DynamoDB**  
Key-value



**OpenSearch**  
Elastic Search



**QLDB**  
Ledger



**Redshift**  
Data Warehouse



**Neptune**  
Graph



**Timestream**  
Time Series



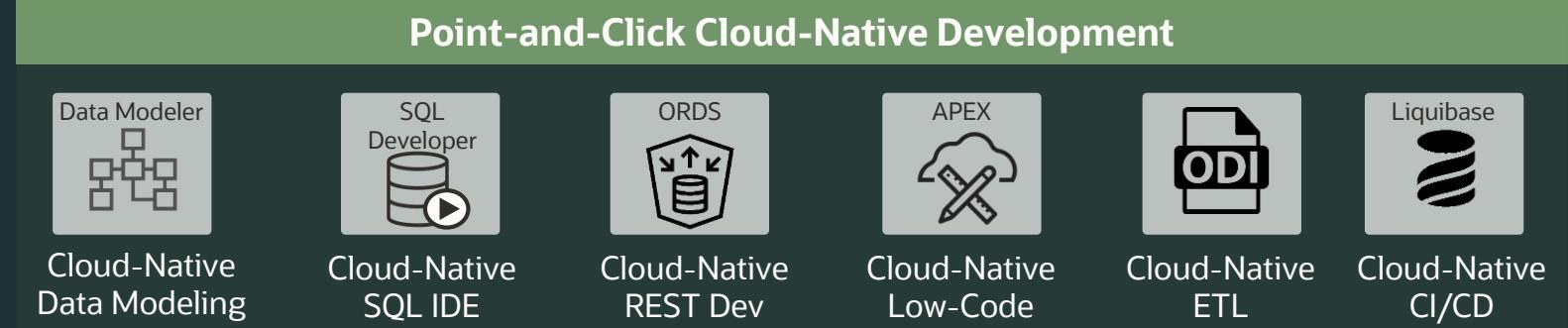
**DocumentDB**  
Document

Allows Developers to Focus on Innovation

Requires Developers to Focus on Integration

# Simplest Cloud Native Development

**Autonomous Database** simplifies the complete dev lifecycle



**Autonomous  
Database**

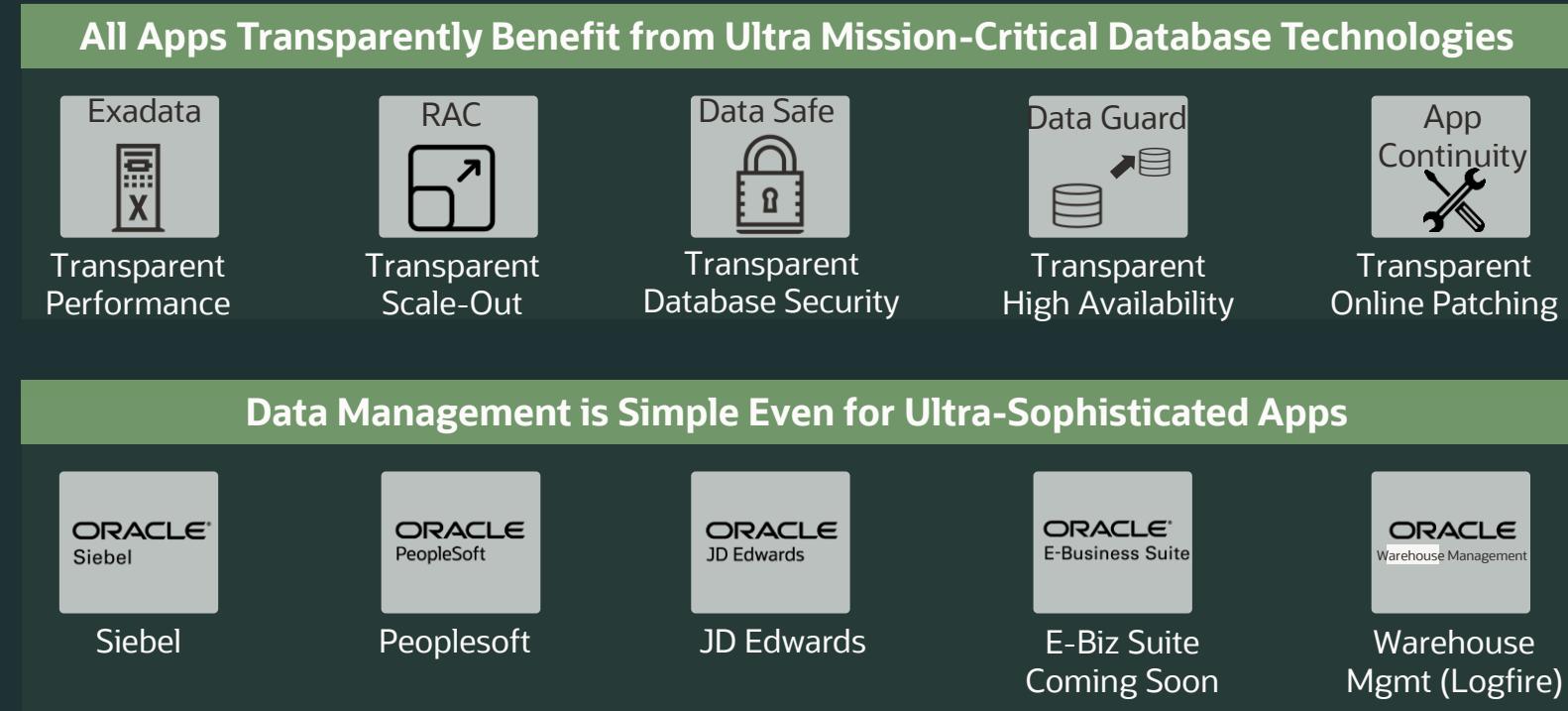
**Unique** cloud-native support for **developing** apps that use any data or workload, with any dev style

# Simplest For Running ALL Apps

**Autonomous Database** makes it **simple** to run **all** apps regardless of complexity, scale, criticality, or sensitivity



**Autonomous  
Database**



**Uniquely** provides stock-exchange level performance, availability, and security transparently to ALL apps

# Simply Cost-Effective

**Autonomous Database** provides the best **price-performance**



**Autonomous  
Database**

Best Price													
	Auto-Scale		Tiered Storage PMEM FLASH Disk		Native Compression		All Data All Workloads All DB Options		BYOL	Least Storage	Most Included Functionality	Best License and Support Fee Migration	
Best Performance													
	Exadata Smart Scan		Persistent Memory		Exadata RDMA		Result Cache Materialized Views Analytic Views		All Workload Parallel SQL	Fastest Analytics	Best Analytics Optimizations	Auto Indexing, Auto Partitioning	
												Best Scaling	Best Auto-Tuning

**Uniquely** provides Persistent Memory, Flash Drives, RDMA, and Smart Storage for every database

## Autonomous Database - Automated Cloud Operations

Pro-active incident detection & resolution detects over 85% of incidents before customer

Continuous monitoring of each database: 8,000+ metrics and 1,500+ alarms

- Much broader than any on-premises customers
- Consolidated monitoring of entire stack: infrastructure, load-balancer, connection manager, database, ORDS, APEX, OML

Service Requests (SRs) automatically generated for each deviation

- Immediate investigation by cloud ops
- Root-cause analysis for every issue
- Zero customer actions required

**Customers report only 30% as many Sev1 SRs as with customer-managed databases**

# Oracle Autonomous Database (ADB) supports wide range of pre-configured transactional and analytics workloads



## Autonomous Data Warehouse

Analytical and machine learning workloads

**63% lower**  
total cost of operations



## Autonomous Transaction Processing

pre-configured for row format, indexes, and data caching to accelerate transaction processing and mixed workloads

**50X better storage latency**  
than Amazon Aurora



## Oracle Autonomous JSON Database

ADB exclusively for transactions and analytics on JSON, and includes MongoDB API

**30% cheaper**  
than MongoDB Atlas

Support multiple data models without sacrificing security and governance controls



## Gartner Critical Capabilities for Cloud DBMS for Operational Use Cases

Published December 2021

Oracle Autonomous Database **ranked highest** out of 16 vendors in **all four use cases** in 2021 Gartner® Critical Capabilities for Cloud Database Management Systems for Operational Use Cases

Source: Gartner Critical Capabilities for Cloud DBMS for Operational Use Cases, Merv Adrian, Rick Greenwald, Adam Ronthal, Henry Cook, Philip Russom, December 2021

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## Gartner Critical Capabilities for Cloud DBMS for Analytic Use Cases

Published December 2021

The 2021 Gartner® Critical Capabilities for **Cloud Database Management Systems for Analytic Use Cases** ranks Oracle Autonomous Database in the top 2 out of 18 vendors for the **Data Warehouse** and **Data Lake** use cases

Source:

Gartner Critical Capabilities for Cloud DBMS for Analytic Use Cases, Merv Adrian, Rick Greenwald, Adam Ronthal, Henry Cook, Philip Russom, December 2021

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# Autonomous Database – Runs Anywhere

Same autonomous database service available in the cloud and on-premises



Oracle Public Cloud



Exadata  
Cloud@Customer



Dedicated Region  
Cloud@Customer



Hybrid Cloud  
Configurations

# Autonomous Database with OCI's Global Footprint

August 2022: 39 Regions, 5 planned; 11 Azure Interconnect Regions



# Multicloud via OCI Azure Interconnect

## OCI FastConnect and Azure ExpressRoute

- No intermediate service provider required for setup
- No bandwidth charges in either direction

## Collaborative support model

- Seamless issue resolution
- Customers can contact either Microsoft or Oracle when encountering an issue

## Performance and Security

- Lowest multicloud latency  
(Average latency across interconnect is 1.2ms to ~2.1ms)
- High bandwidth with a private connection
- Unified identity and access management

## Simplified implementation

- Terraform scripts to automate provisioning and deployment



# Easing the Path to Oracle Autonomous Database

Accelerating customer success on Oracle Cloud Infrastructure (OCI)



## Bring Your Own License (BYOL) to OCI

- Repurpose existing database licenses for a 75% discount
- Customers who have Oracle Technology Foundation for JD Edwards EnterpriseOne can bring those licenses to Autonomous Database BYOL at a 76% discount



## Cloud Lift Service

Free Cloud service to help customers migrate to OCI

- Access to Oracle cloud engineers and premier technical services



## Support Rewards Program

The more you use OCI, the more you save

- Earn \$0.25 to \$0.33 in rewards for every \$1 spent on OCI
- Then apply rewards to reduce your tech software license support bill

# Growing Momentum on Autonomous Database



# Summary

1

Oracle makes it simple to build data-driven apps by providing **synergistic data technologies** for modern development methodologies

Try **always free**  
Oracle  
Autonomous  
Database

2

Converged database approach for all data types and model engineered so they all work together enables **increased productivity and faster innovation**

[www.oracle.com  
/cloud/free](http://www.oracle.com/cloud/free)

3

**Oracle Autonomous Database** is the easiest way to take advantage of the Oracle converged database engine, reducing operational costs and enabling faster innovation



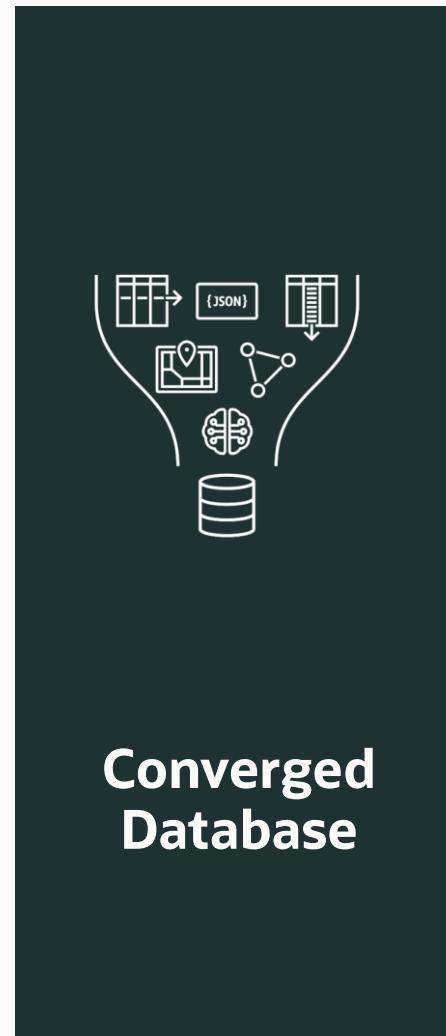
**ORACLE**



## APPENDIX – Customer Examples

# Complete for Any Data

## Example Customers Benefiting from Converged Data



**Paysafe:**



retraced

neustar™

Paysafe's fraud detection happens **in minutes** instead of hours with [Oracle Database Graph Technologies](#)

Quinaryo XRing provides tamper-proof records that can **easily integrate** with other apps without requiring a complex new infrastructure with [Oracle Blockchain Tables](#)

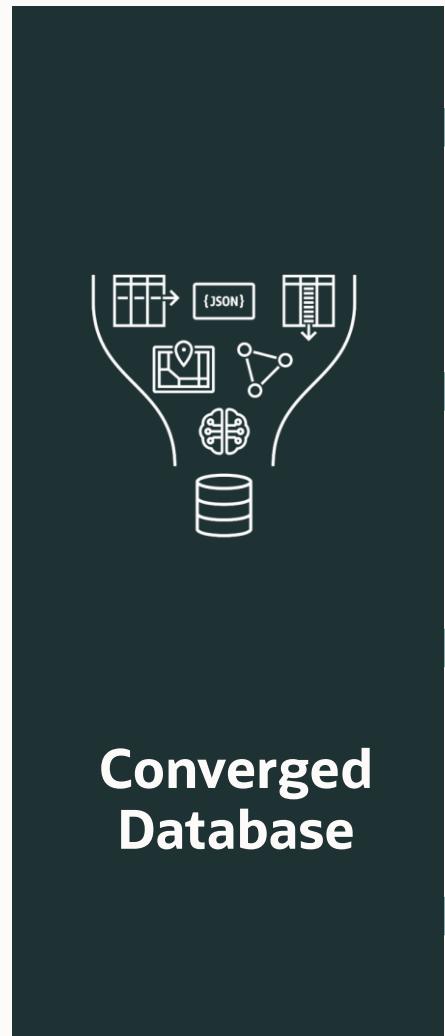
Retraced uses Oracle Database as a document store because it **supports SQL analytics** over [JSON](#) and [Blockchain](#)

Neustar archives a **4-300x** performance improvement on [spatial processing](#)



# Complete for Any Workload

## Example Customers Benefiting from Converge Workloads



STEF achieved a **10-100X** performance improvement for real-time analytics with [Oracle Database In-Memory](#)

Experian achieved superior performance and up to **60%** cost reduction with [lakehouse](#) on OCI compared to other clouds

UK National Health Service identified up to **US\$156 million** in potential savings from benefit fraud with Oracle Database Machine Learning

China Telecom instantly scales to support their **215 million** subscribers on WeChat IoT App with [Oracle Database Sharding](#)

# Autonomous Database Gaining Customer Momentum



# Exadata: thousands of critical deployments since 2008

**88%**

of Fortune Global  
100 Run Exadata

**39%**

Run Exadata Cloud

Superior Architecture for  
**ALL Workloads**

- Petabyte Warehouses
- Super Critical OLTP
  - Financial Trading
  - Manufacturing
  - E-commerce
- Complex Applications
  - SAP, Fusion Apps, E-Business Suite, NetSuite, Siebel, PeopleSoft, ...
- Database Consolidation





**“Data is fundamental to how we manage our operations, anticipate the needs of our customers and design new products and services. Our collaboration with Oracle to modernize our databases will play an important role in our overall technology transformation. Our applications supported by Oracle Exadata Cloud@Customer will benefit from a platform with the flexibility to adapt and scale critical services at speed, as well as derive better data insights.”**

**Bernd Leukert**

Chief Technology, Data and Innovation Officer  
Deutsche Bank



## NHS Business Services Authority identifies £1 billion in potential savings

“The overall solution is very fast, and our investment very quickly provided value. We can now do so much more with our data, resulting in significant savings for the NHS as a whole.”

**Nina Monckton**

Head of Information Services, NHS Business Services Authority

### Business Challenge:

UK Department of Health asked the NHSBSA to identify opportunities to reduce costs and eliminate waste in primary care dental and pharmacy contractors.

### Results:

**ORACLE** The most underused data was the prescription data (relational and JSON) which contains great amount of information about fraudulent behavior

**ORACLE** NHSBSA chose an end-to-end Oracle solution including Oracle Database Machine Learning to do Anomaly Detection that identified up to US\$156 million in potential savings from benefit fraud and error reduction

### Products Used:

In-database Machine Learning

In-database JSON

Oracle Exadata Database Machine

Oracle's Database



## Prosperdtx personalizes healthcare plans using Oracle

“Because of the time and effort that we've saved by using Oracle, that's translated into a 25% cost savings.”

**Bob Goldberg**

Cofounder and CEO, Prosperdtx

### Business Challenge:

Prosperdtx is a leader in providing digital healthcare therapeutics for patients with cancer in the United States.

### Results:

**ORACLE** Oracle Database ingests massive amounts of patient data fast with enhanced security to ensure HIPPA compliance

**ORACLE** Data Scientists utilize built Machine Learning capabilities to build machine learning models to predict patients' risk factors for hospitalization

**ORACLE** 25% costs savings and reduced time to market from months to weeks for better patient outcomes

### Products Used:

In-database Machine Learning  
Oracle Advanced Security  
Oracle Database

## Neustar delivers faster marketing intelligence with Oracle

“Only Oracle Database...could provide us with the high performance, availability, and spatial analytics we need to get detailed marketing insights into the hands of our customers quickly, so they can focus on operational improvements and customer service.”

**Nick Salem**

Distinguished Engineer, Neustar, Inc.



### Business Challenge:

Neustar delivers robust cloud-based geo-marketing platform. It provides cloud-based platform for retail and demographic analysis, for 100s of customers in media, finance, technology.

### Results:

**ORACLE** Combines demographic datasets with customer data to provide clients with better market insights

**ORACLE** Very large data set (2+ TB) requiring high precision, performance

**ORACLE** Uses Oracle's sophisticated spatial database analytics (raster, networks) and map visualization features

**ORACLE** Database powers highly scalable, secure, available platform for customer-facing cloud environment

**ORACLE** Achieved massive performance improvements on spatial processing (4-300x) with Oracle's spatial vector acceleration

### Products Used:

Oracle Database

Oracle JSON

Oracle Spatial