ORACLE

Oracle Converged Database

Simplifying Development and Deployment of Modern Business Apps

Maria Colgan

Distinguished Product Manager
Mission Critical Database Technologies
@SQLMaria

The Future is Data Driven

Creating **value from data** will increasingly determine **competitiveness**

The Future is Data Driven

Creating **value from data** will increasingly determine **competitiveness**

To become Data Driven, Enterprises need

Data Driven Apps and Paradigms

Data Driven Apps Create Value from Data in New Ways

Machine Learning

Real-Time Analytics

IoT

Graph Analysis

Documents

Text Search

Spatial Processing

Blockchain

Data Driven Apps Create Value from Data in New Ways

- These new algorithms add tremendous value

Data Driven Apps Create Value from Data in New Ways

- These new algorithms add tremendous value
- However, come with complex new products and databases to implement them

Data Driven Apps Create Value from Data in New Ways

- These new algorithms add tremendous value
- However, come with complex new products and databases to implement them
- Fragment data into silos

Data Driven Apps are Built Using New Dev Paradigms

Microservices

Events

SaaS

Distributed Data

CI/CD

API Driven Development

Defense in Depth

Low Code

Data Driven Apps are Built Using New Dev Paradigms

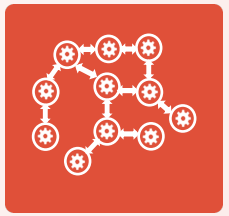
- New development paradigms simplify dev

Data Driven Apps are Built Using New Dev Paradigms

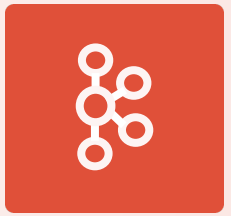
- New development paradigms simplify dev
- However, they complicate data architecture

Data Driven Apps are Built Using New Dev Paradigms

- New development paradigms simplify dev
- However, they complicate data architecture
- Create more data increasing data management complexity



Microservices

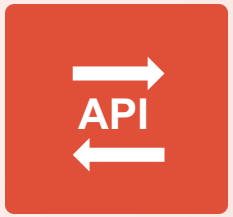


Events

SaaS

Distributed Data

CI/CD



API Driven Development

Defense in Depth

Low Code

Data Driven Apps Can be Made Simple By

- Simplifying new development paradigms with synergistic data paradigms

Data Driven Apps Can be Made Simple By

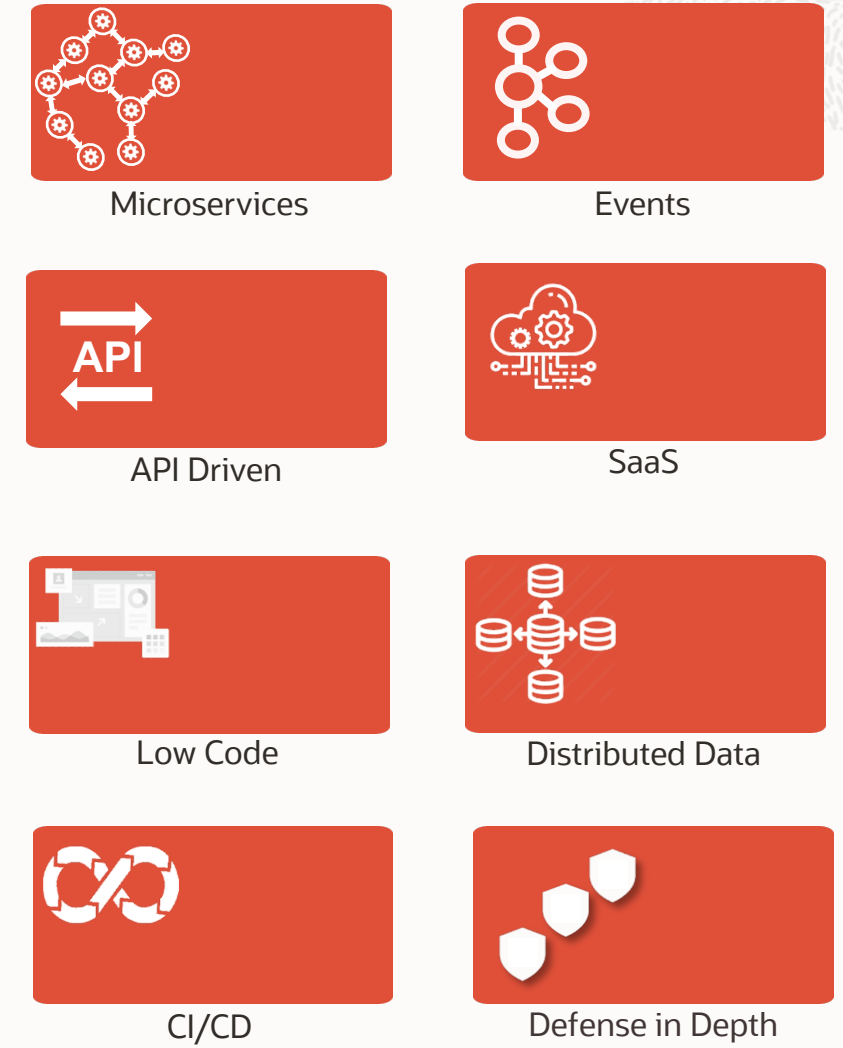
- Simplifying new development paradigms with synergistic data paradigms
- Providing easy to use declarative implementations of the new data uses and types in the core database

Data Driven Apps Can be Made Simple By

- Simplifying new development paradigms with synergistic data paradigms
- Providing easy to use declarative implementations of the new data uses and types in the core database
- Eliminating data fragmentation with a single Converged Database for all data types and uses

DataDev Synergy

- Modern development paradigms complicate data architecture



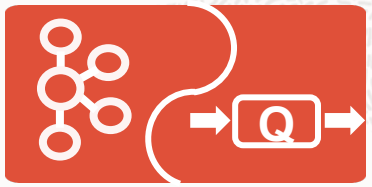
DataDev Synergy

- Modern development paradigms complicate data architecture
- This complexity can be eliminated by pairing each Development Paradigm with a Synergistic Data Paradigm

Dev Data

DataDev Synergy


Microservices - Pluggable



Events - Queues

API Driven - DaaM


SaaS - Multitenant


Low Code - APEX

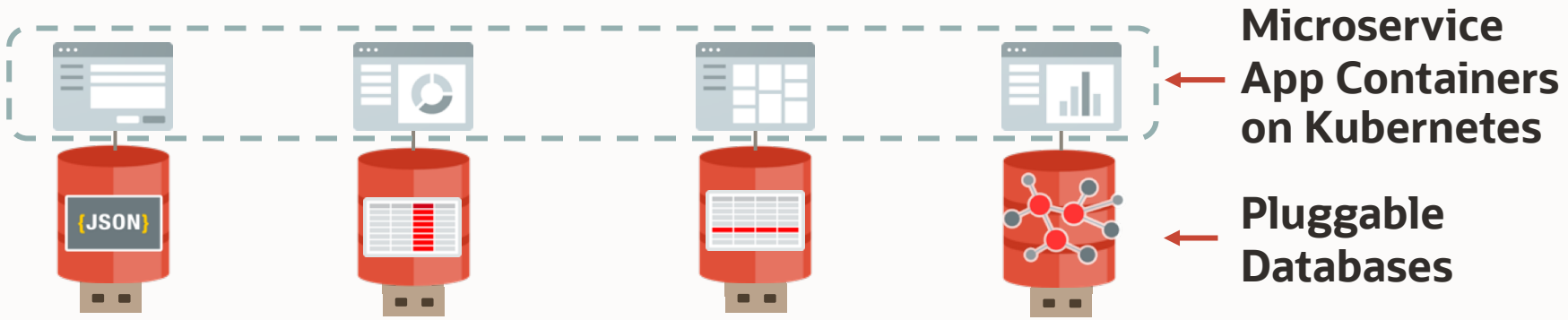

Distributed Data - Sharding


CI/CD – Online Redefine


Defense in Depth – Declarative Security

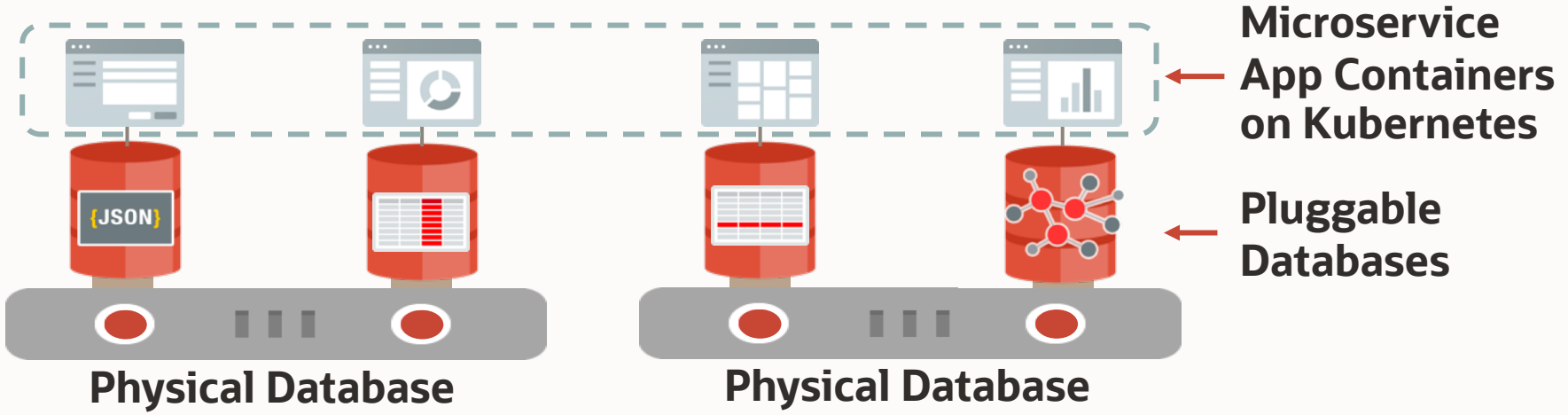
Pluggable Databases Simplify Microservice Architectures

- Oracle makes it simple for each Microservice to store its data in a logically separate Data Container called a Pluggable Database



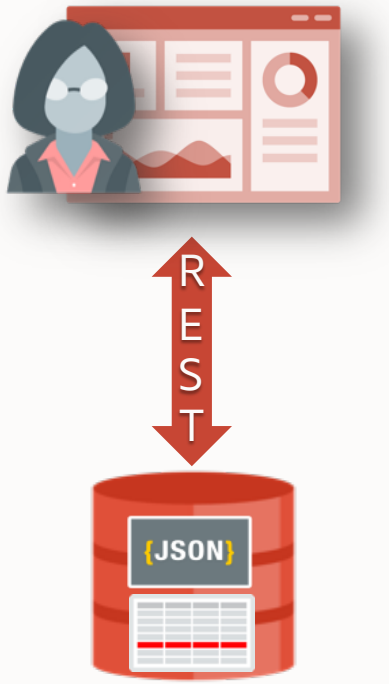
Pluggable Databases Simplify Microservice Architectures

- Oracle makes it simple for each Microservice to store its data in a logically separate Data Container called a Pluggable Database
- Pluggable Databases can easily be physically combined to simplify deployment, or separated to improve isolation and scalability



Oracle Makes Microservices Simple

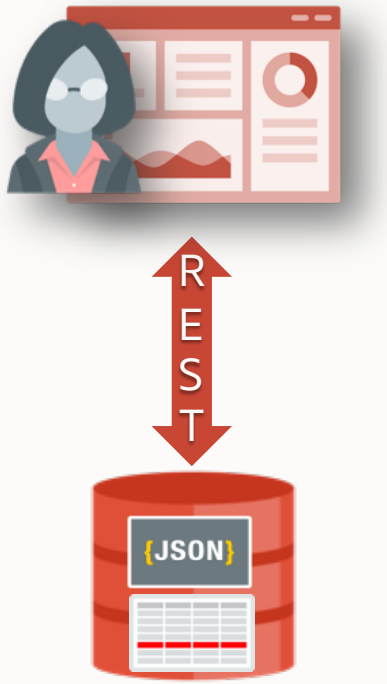
Data as a Microservice Simplifies API Driven Architecture



Data as a Service

- Oracle makes it simple to access Data as a Service
- Oracle automatically generates a REST API on top of SQL or stored procedures

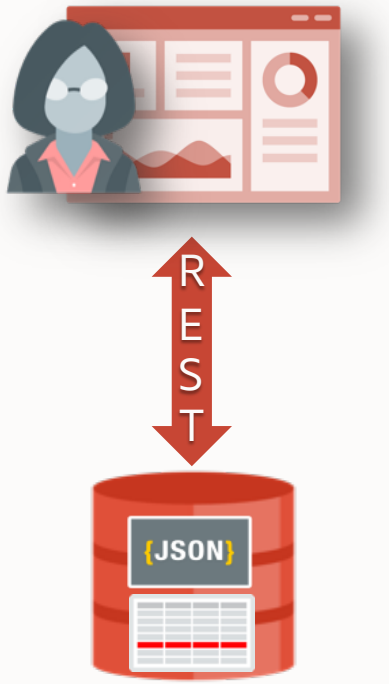
Data as a Microservice Simplifies API Driven Architecture



Data as a Service

- Oracle makes it simple to access Data as a Service
- Oracle automatically generates a REST API on top of SQL or stored procedures
- Applications access data like any other service – with REST
  - Simplifies and standardizes APIs to access data

Data as a Microservice Simplifies API Driven Architecture



Data as a Service

- Oracle makes it simple to access Data as a Service
- Oracle automatically generates a REST API on top of SQL or stored procedures
- Applications access data like any other service – with REST
  - Simplifies and standardizes APIs to access data
  - Java or PL/SQL stored procedures extend microservices with in-DB functions (lambdas), avoiding slow network round trips
    - Like JavaScript in the browser avoids network round trips

Oracle Makes API Driven Data Architectures Simple

APEX Simplifies Low-Code App Creation

- Oracle makes it simple to create Low-Code Apps
- Oracle APEX Low-Code IDE automatically creates an App starting from a spreadsheet or a table – data driven dev

APEX Simplifies Low-Code App Creation

- Oracle makes it simple to create Low-Code Apps
- Oracle APEX Low-Code IDE automatically creates an App starting from a spreadsheet or a table – data driven dev
- Deep integration with database eliminates the complexity of
  - Middle-tiers, connection management, state management, mapping database types to app types, scaling, and HA

APEX Simplifies Low-Code App Creation

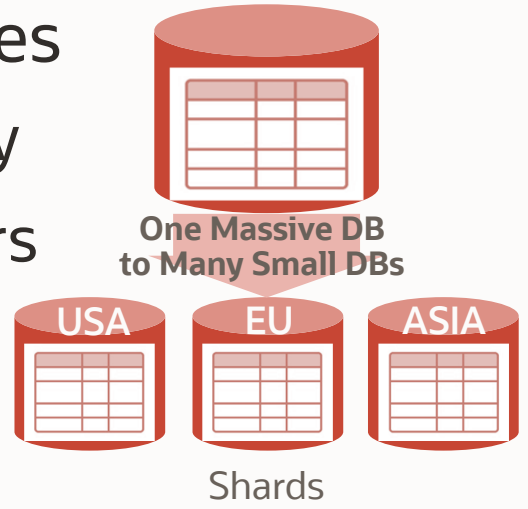
- Oracle makes it simple to create Low-Code Apps
- Oracle APEX Low-Code IDE automatically creates an App starting from a spreadsheet or a table – data driven dev
- Deep integration with database eliminates the complexity of
  - Middle-tiers, connection management, state management, mapping database types to app types, scaling, and HA
- Create an enterprise App in hours – fastest time-to-value
- Easily iterate the App to match evolving needs of business

Native Sharding Simplifies Distributed Data Architecture

- Oracle makes it simple for Apps to deliver Data Sovereignty or Massive-Scale using native Sharding

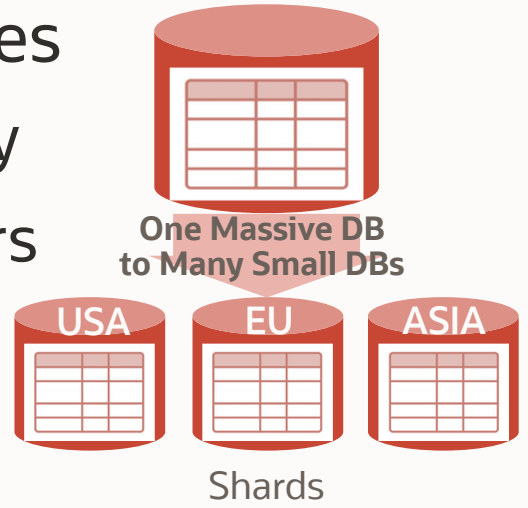
Native Sharding Simplifies Distributed Data Architecture

- Oracle makes it simple for Apps to deliver Data Sovereignty or Massive-Scale using native Sharding
- Shard monolith databases into a farm of smaller databases
  - Shards can be placed in-country to satisfy data sovereignty
  - Shards are fully isolated - linear scalability of data and users
  - Routes SQL based on shard key, or runs cross shard SQL
  - Online addition and reorganization of shards



Native Sharding Simplifies Distributed Data Architecture

- Oracle makes it simple for Apps to deliver Data Sovereignty or Massive-Scale using native Sharding
- Shard monolith databases into a farm of smaller databases
  - Shards can be placed in-country to satisfy data sovereignty
  - Shards are fully isolated - linear scalability of data and users
  - Routes SQL based on shard key, or runs cross shard SQL
  - Online addition and reorganization of shards

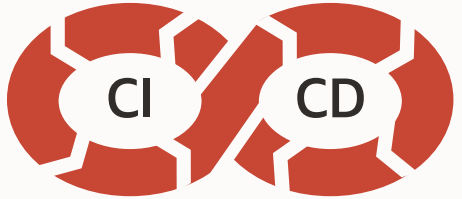


- Benefits of sharding with all the benefits of a mature SQL Database

Oracle Makes a Distributed Data Architecture Simple

Online Data Evolution Simplifies Continuous Delivery

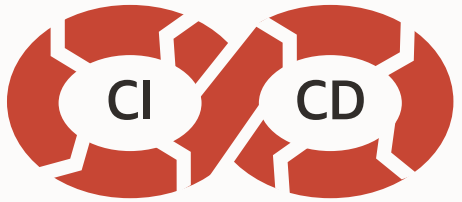
- Oracle makes it simple to perform Continuous Delivery (CI/CD) of application enhancements



- No need to batch app changes into infrequent downtime windows

Online Data Evolution Simplifies Continuous Delivery

- Oracle makes it simple to perform Continuous Delivery (CI/CD) of application enhancements



- No need to batch app changes into infrequent downtime windows
- Support for fully online schema and data evolution
  - Edition Based Redefinition, Online Table Redefinition, native JSON and XML
  - Extensively used by Salesforce, E-biz, and Fusion Applications

Oracle Makes CI/CD Simple

Data Driven Apps Create Value Using Machine Learning

- Oracle makes it simple for Apps to make Data-Driven Predictions
  - Use declarative SQL to run Machine Learning directly on business data

Data Driven Apps Create Value Using Machine Learning

- Oracle makes it simple for Apps to make Data-Driven Predictions
  - Use declarative SQL to run Machine Learning directly on business data
- Over 30 in-database parallel ML algorithms including deep-learning
  - Real-time recommendations, fraud-detection, sentiment analysis, etc.
  - Can augment SQL with Python or R algorithms

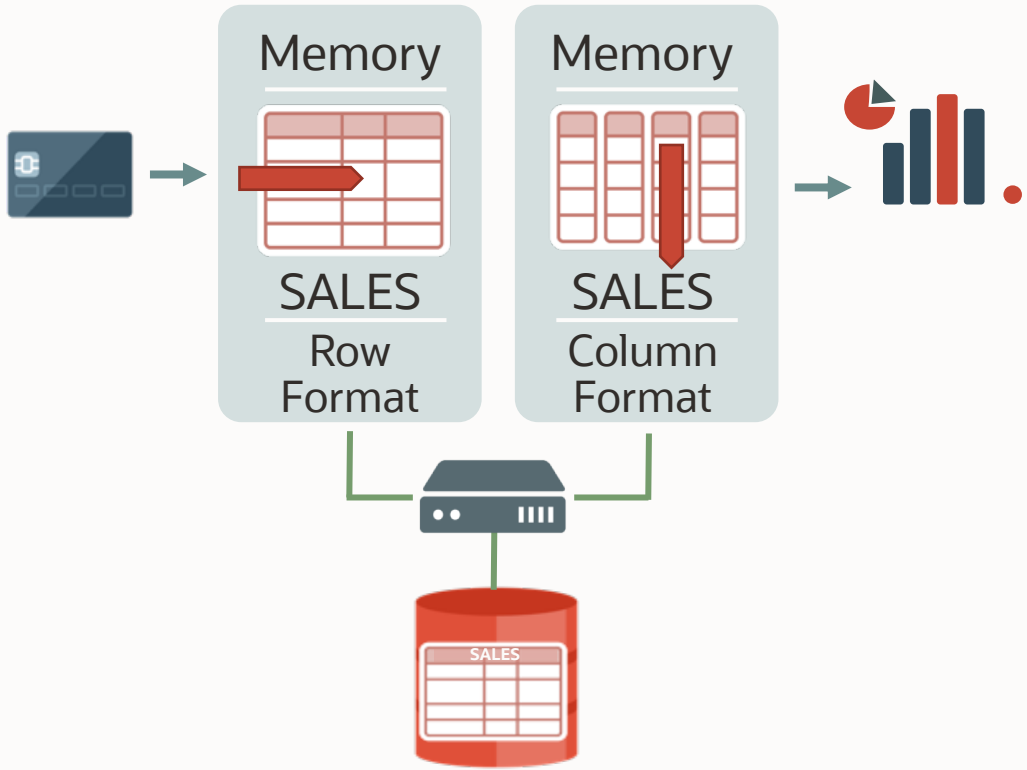
Data Driven Apps Create Value Using Machine Learning

- Oracle makes it simple for Apps to make Data-Driven Predictions
  - Use declarative SQL to run Machine Learning directly on business data
- Over 30 in-database parallel ML algorithms including deep-learning
  - Real-time recommendations, fraud-detection, sentiment analysis, etc.
  - Can augment SQL with Python or R algorithms
- AutoML enables ML for non-experts
  - Automatically finds predictive features and builds high quality models

- Previously a priced option, now **FREE** in all Oracle Database Editions

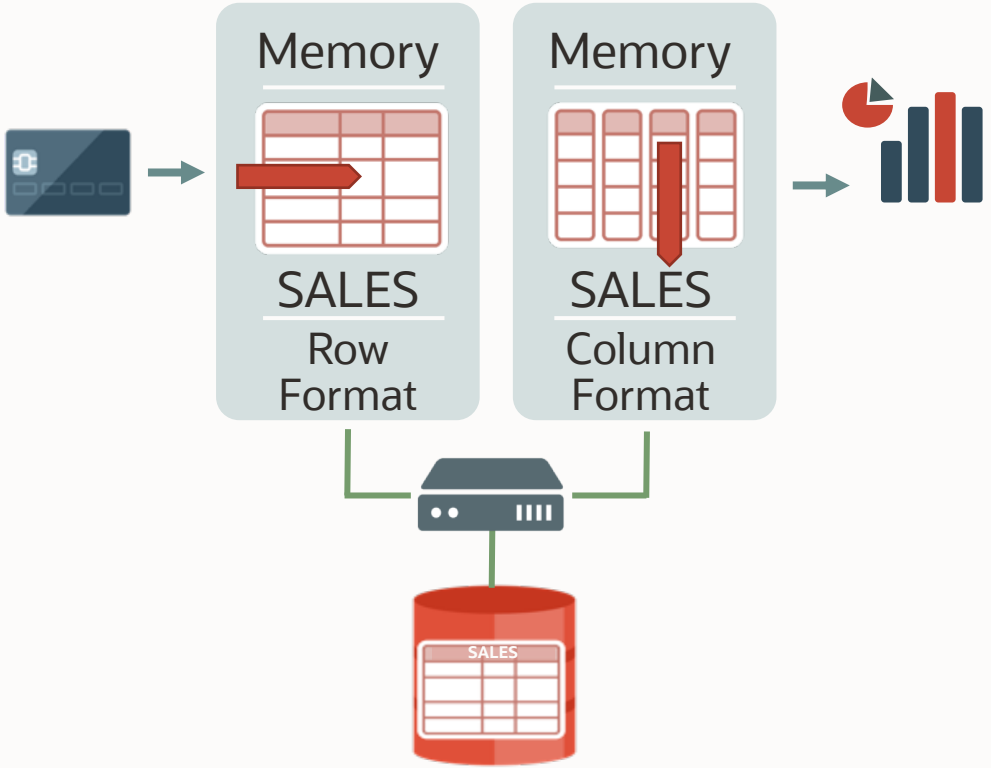
Oracle Makes Machine Learning Simple

Data Driven Apps Create Value Using Real-Time Analytics



- Oracle makes it simple for Apps to provide instant data insights
- In-memory columnar formats and automatic parallel processing enable Analytics to transparently run 100x faster

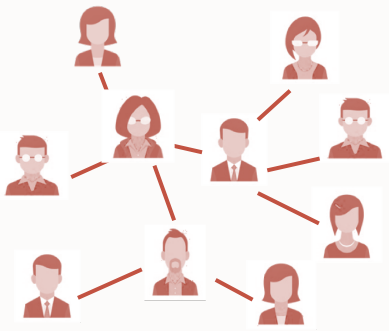
Data Driven Apps Create Value Using Real-Time Analytics



- Oracle makes it simple for Apps to provide instant data insights
- In-memory columnar formats and automatic parallel processing enable Analytics to transparently run 100x faster
- No app changes needed - easy to deploy in Data Warehouse or OLTP database

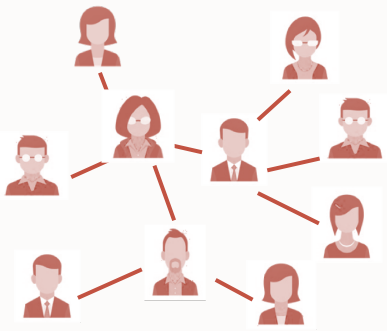
Oracle Makes Real-Time Analytics Simple

Data Driven Apps Create Value Using Graph Analytics



- **Oracle makes it simple** for Apps to discover:
  - Influencers, dependencies, communities, ranking, customer 360, etc.

Data Driven Apps Create Value Using Graph Analytics



- **Oracle makes it simple** for Apps to discover:
  - Influencers, dependencies, communities, ranking, customer 360, etc.
- Declarative SQL-like queries make development easy
- Over 50 in-memory parallel analytic graph functions
- Previously a priced option, now **FREE** in all Database Editions

Oracle Makes Graph Analytics Simple

Data Driven Apps Create Value Using Document Data

- Oracle makes it simple for Apps to use JSON and XML documents
- Development simplified by using same JSON data format in App and Database

Data Driven Apps Create Value Using Document Data

- Oracle makes it simple for Apps to use JSON and XML documents
- Development simplified by using same JSON data format in App and Database
- Freely mix or join JSON and relational data
- Index any JSON element for fast OLTP
- ACID and Declarative Parallel SQL analytics across all formats

Oracle Makes Document Data Simple

Data Driven Apps Create Value using Spatial Data

- Oracle makes it simple for Apps to use and analyze locations and networks using declarative SQL
  - Compute distance between places, assets, people
  - Analyze transportation, telecom, utilities networks; sales territories
  - Plan land management, public safety, defense

Data Driven Apps Create Value using Spatial Data

- Oracle makes it simple for Apps to use and analyze locations and networks using declarative SQL
  - Compute distance between places, assets, people
  - Analyze transportation, telecom, utilities networks; sales territories
  - Plan land management, public safety, defense
- 100s of in-database spatial operators and functions

- Previously a priced option, now **FREE** in all Oracle Database Editions

Oracle Makes Spatial Simple

Data Driven Apps Create Value Using Blockchain Data

- Oracle makes it simple for Apps to use Blockchain to help identify and prevent fraud

Data Driven Apps Create Value Using Blockchain Data

```
CREATE Blockchain Table
       Trade_Ledger;
```

TRADE LEDGER

ID	User	Value	Created	CryptoDigest
1	Tom	500	1-Feb	ADSJS
2	Carol	176	8-Mar	%10S
3	Wang	500	3-Aug	SH31
4	Eve	25	14-Oct	LRO$

- Oracle makes it simple for Apps to use Blockchain to help identify and prevent fraud
- Blockchain Table
  - Inserted rows are cryptographically chained
  - Chain can be verified and signed by participants

Data Driven Apps Create Value Using Blockchain Data

```
CREATE Blockchain Table
       Trade_Ledger;
```

TRADE LEDGER

ID	User	Value	Created	CryptoDigest
1	Tom	500	1-Feb	ADSJS
2	Carol	176	8-Mar	%10S
3	Wang	500	3-Aug	SH31
4	~~Eve~~	~~25~~	~~14-Oct~~	LRO$

- Oracle makes it simple for Apps to use Blockchain to help identify and prevent fraud
- Blockchain Table
  - Inserted rows are cryptographically chained
  - Chain can be verified and signed by participants
- Blockchain Tables are simple to integrate into apps
  - Look like standard tables with declarative SQL
  - Full analytics and transactions on blockchain data

Oracle Makes Blockchain Simple

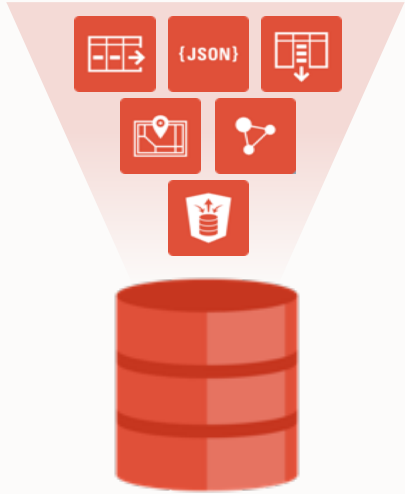
Contrasting Database Architecture Strategies

Amazon and Niche DB Vendors

Run Single-Purpose Proprietary database for each data type and workload

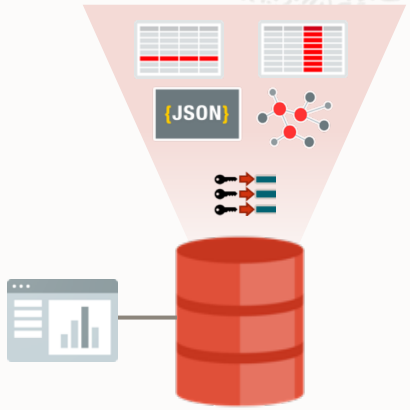
Oracle Strategy

Run Converged, Open, Oracle database for multiple data types and workloads



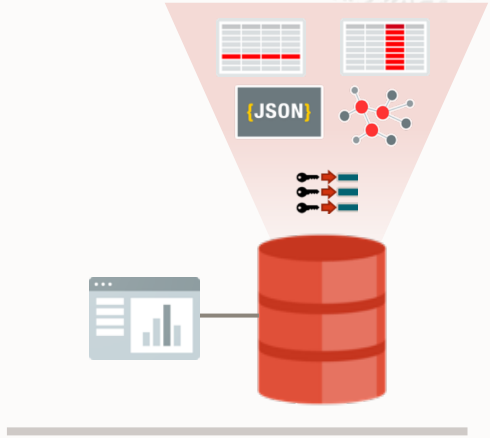
Contrasting Development Strategies

It is dramatically simpler for developers to invoke declarative SQL to run ML, graph, IoT, spatial, blockchain, etc. in one converged DB

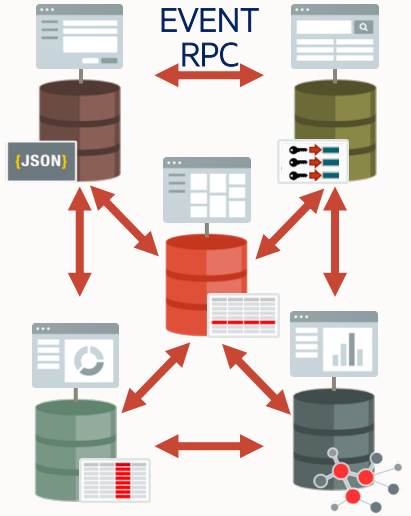


Contrasting Development Strategies

It is dramatically simpler for developers to invoke declarative SQL to run ML, graph, IoT, spatial, blockchain, etc. in one converged DB



Instead of implementing multiple fragmented databases and using distributed execution and data movement across them



Contrasting Operations Strategies

It is dramatically simpler to operate one converged Oracle database

Instead of individually making each single-purpose database highly Available, Secure, and Scalable using product specific mechanisms

Key Take-Aways

- Oracle makes it simple to build Data Driven Apps
  - Synergistic Data Paradigm for each modern Dev paradigm
  - Native declarative SQL support for all key data types

Key Take-Aways

- Oracle makes it simple to build Data Driven Apps
  - Synergistic Data Paradigm for each modern Dev paradigm
  - Native declarative SQL support for all key data types
- One Converged Database for all data
  - Converging data enables Cross Data Synergy
  - Greatly simplifies Dev and Ops

Helpful Links

Oracle Developer Resource Center
https://developer.oracle.com/

Hands on Labs for Developers
https://go.oracle.com/hols

Oracle Always Free Tier
https://www.oracle.com/cloud/free/

Autonomous Hands on Labs for Developers
https://go.oracle.com/autonomous_hol