

ORACLE

CloudWorld

Converged Database & the Modern Data Platform

October 17–20, 2022

Caesars Forum and The Venetian
Las Vegas, NV





Converged Database & the Modern Data Platform is Oracle's Best Kept Secret

(Oracle CloudWorld 2022 - Las Vegas, Nevada)

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Our Panel's Agenda

- Quick Intro by our 3 Panel Members
- Converged Database - 2022 and Beyond: Nitin
- Converging Trends for Converged Database: Rich
- Perspectives From the Trenches: Jim
- 15+ minutes of Q&A (start submitting your questions now!)



It's 2022. Just How Digitally Driven Have You Become?



C-Level Executives are thinking:
How **successful** is our digital transformation, and can
I now answer **my most pressing questions**?



CIOs are thinking:
What future trends will dictate how I reshuffle my team?



Meanwhile, **DBAs & developers** are thinking:
So, are they gonna reshuffle me outta of my job, or what?

Converged Database: The CEO's Perspective





DATA IS KING!

- Gartner: “Information has replaced technology as the central and most critical asset to be managed by organizations.”
- As a result, business leaders must shift to using the value of information as basis for new planning and funding models.”



What Makes Data Management So Difficult Today

Data Generated Everywhere in Every Format



Legacy or Closed
Systems



Transactional
Databases



Devices or Machine
Generated



Structured and
Unstructured

Different Vendors Emphasize Different Parts of the Approach to Analyze that Data



Data
Warehouse



Data Lake



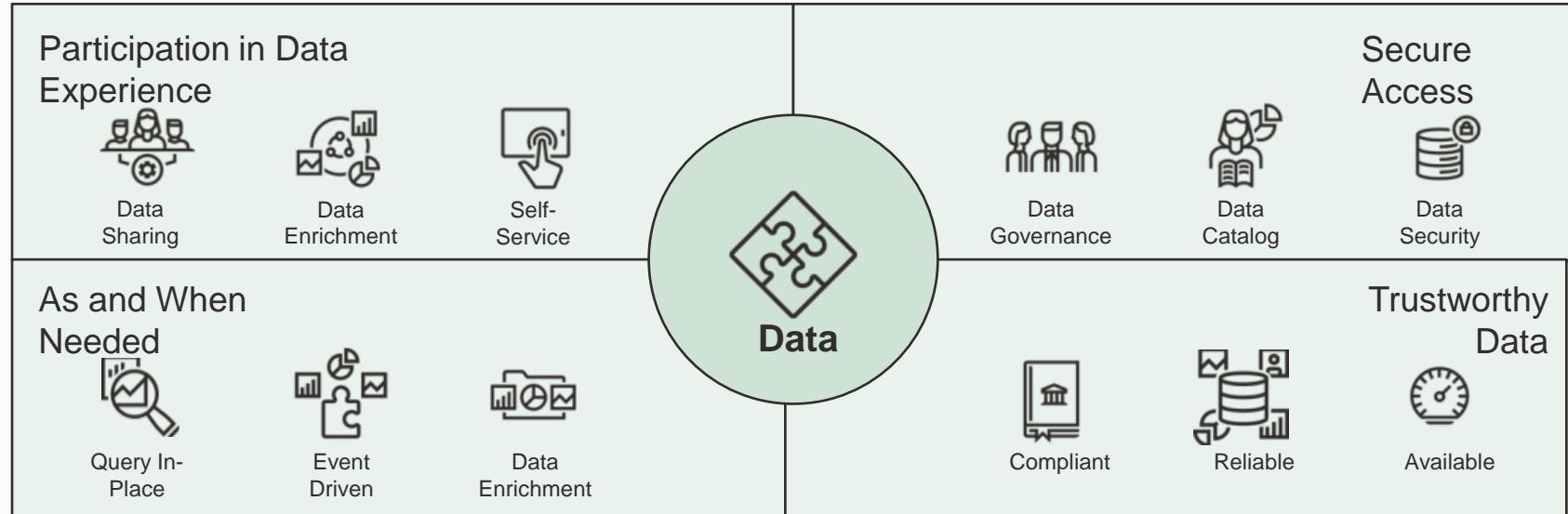
Data
Lakehouse



Data
Mesh

Oracle Modern Data Platform: All Data to All Users Quickly and Securely

Secure Access to Trustworthy Data, As and When Needed, Enabling Participation in Data Experience



Brief History Lesson – How We Got To Now

Emergence of Domain Specific Languages (DSLs)

Benefits - Best in Breed

- Go[lang]
- Kotlin
- Ruby
- Rust
- Python
- C++
- .Net
- JavaScript

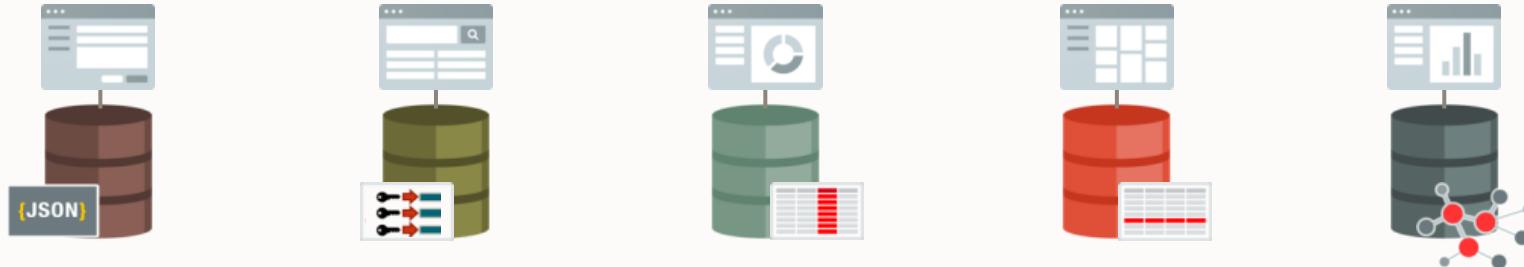
Use of multiple data tier storage technologies

- Chosen based upon the way data is used by individual applications or components of a single application
- Benefits - Different kinds of data are best dealt with different data stores
 - MongoDB
 - Casandra
 - SQL databases
 - Cloud Databases

Developer's Delight and Data Architect's Dilemma

Silo'ed , Single-Purpose Database = Data Issues

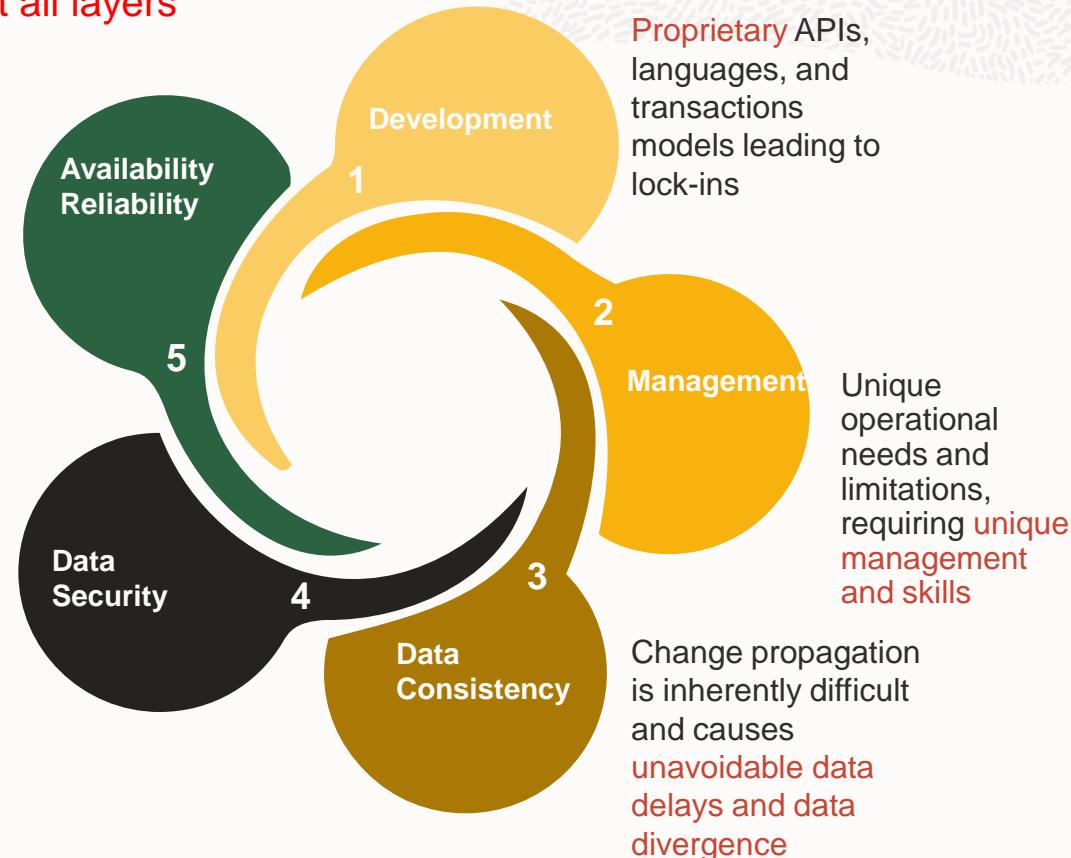
- Each Developer created service independence using best-of-breed databases for each workload or data type
 - Document
 - Key-value
 - Analytic
 - Relational
 - Graph and spatial
- This led to separate database per application service



Developer's Delight and Data Architect's Dilemma

Leads to fragmentation at all layers

Data is **inconsistent** across different failover sites - database replication rates vary



Developer's Delight

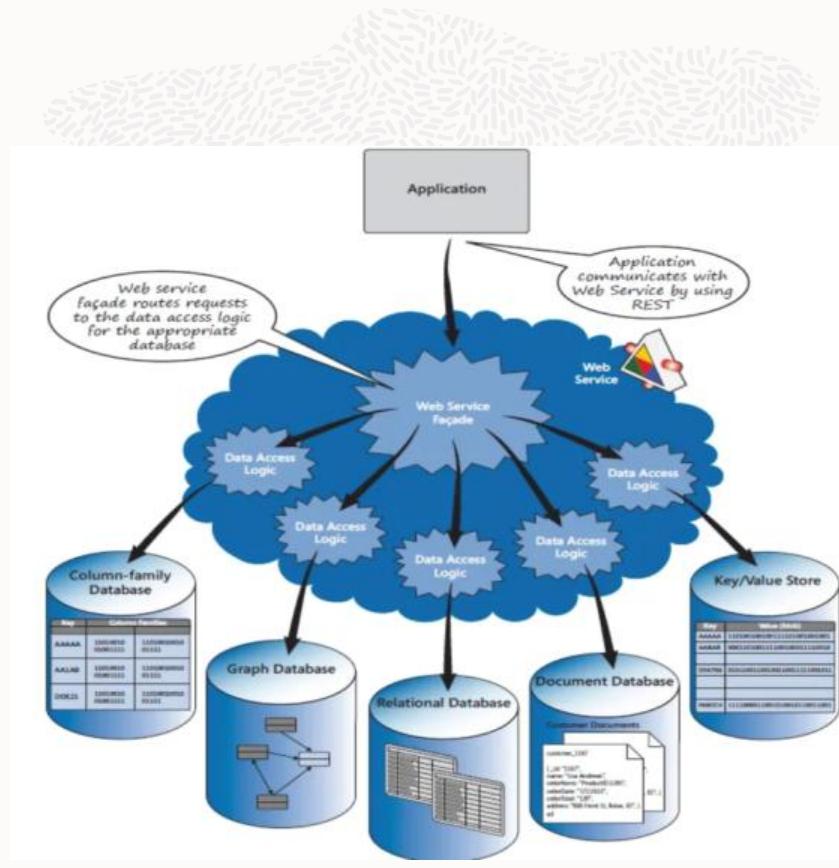
Web Services to Overcome Polygot Persistence

Web services can be created to send the data request to the appropriate database.

Many ways to resolve the Distributed Data transaction - 6 Distributed Data Access Patterns:

- DB per Services
- Shared DB
- CQRS
- SAGA based
- Domain Driven Design
- Event driven design

Solved One Problem, But Still Left Huge Holes

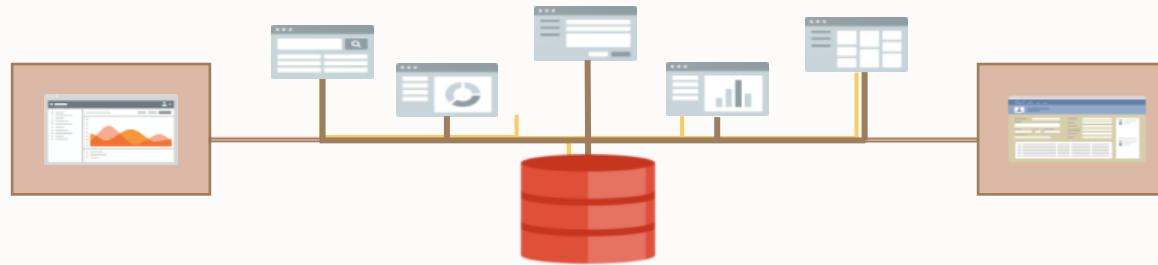


From <https://www.jamesserra.com/archive/2015/07/what-is-polygot-persistence/>

Developer's Delight and a Data Architect's Dilemma

Data Challenges , Small Problems Just Got Bigger

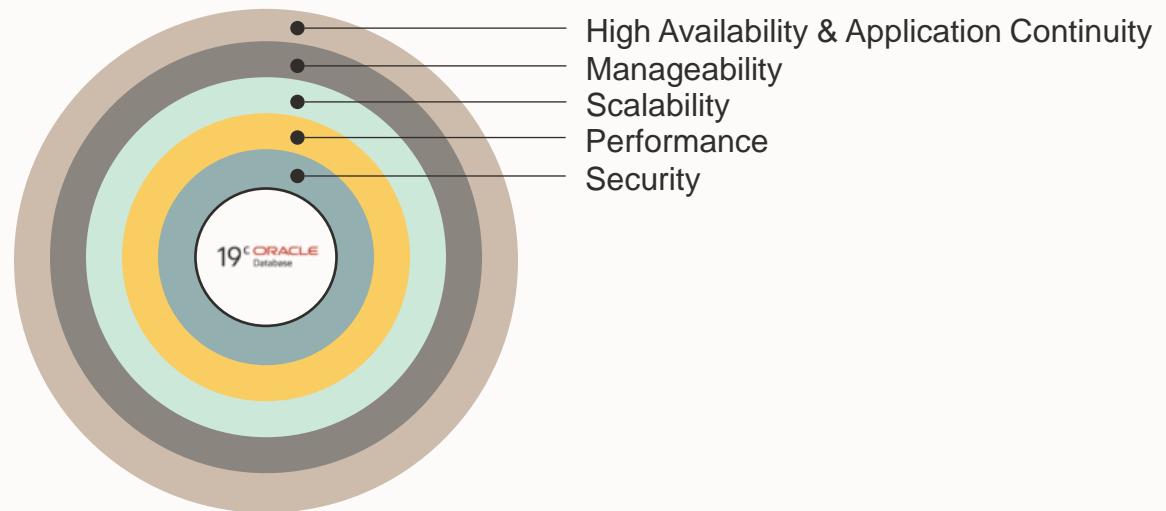
- Datasets keep growing
- How to integrate and analyze the data
- Lack of ACID capabilities across tiers
- Sagas across disparate systems
- How to secure across data platforms



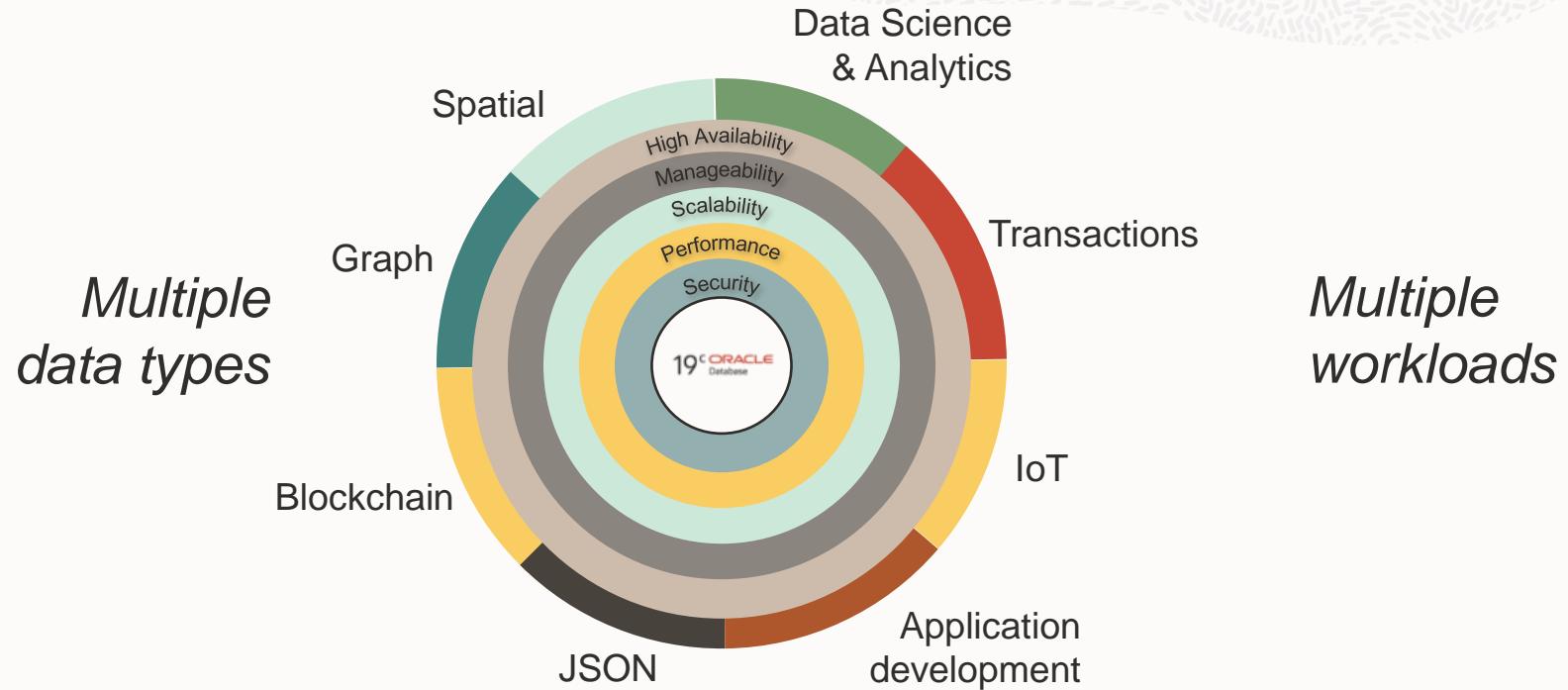
Converged Database Architecture Approach



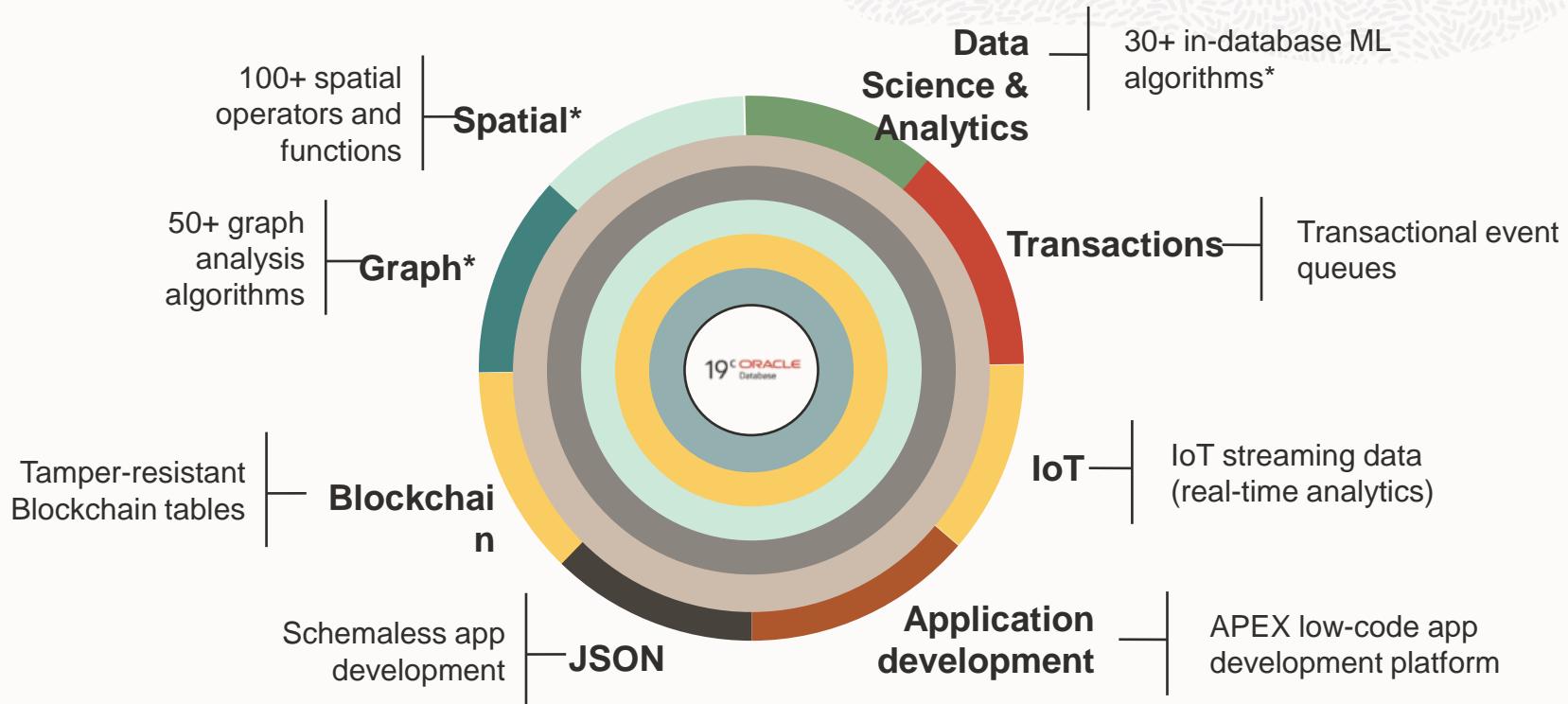
Oracle Database – core, user-driven capabilities



Oracle Database – converged by design

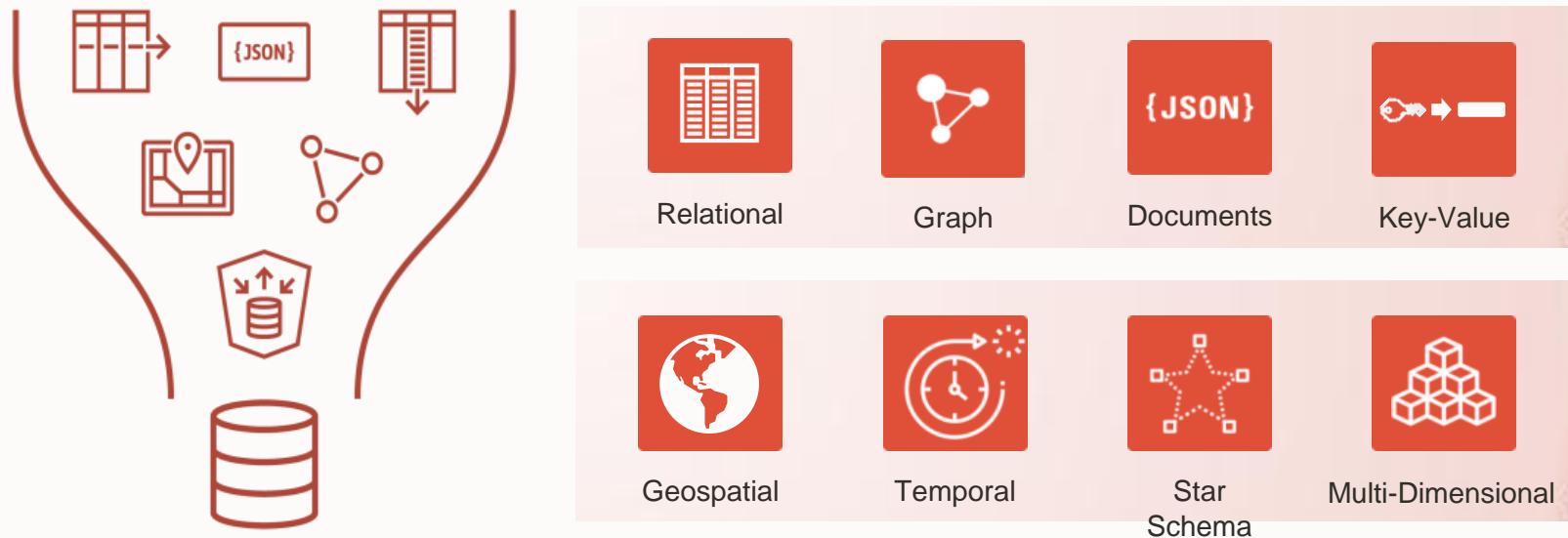


Oracle Database – all-inclusive and converged by design



* No longer an extra cost option - all other options were always free

A converged multi-model, multi-workload data platform

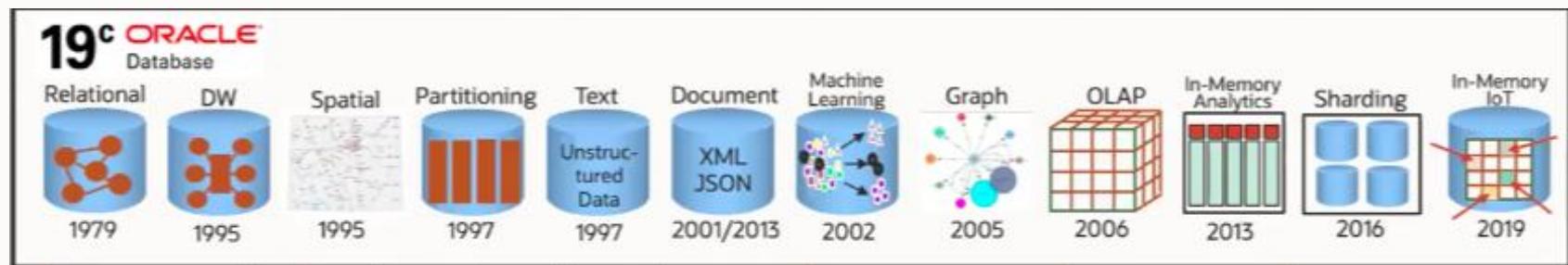


All data models can seamlessly coexist in the same schema or different schemas

Data model does not need to be specified during database creation

Oracle Database – all-inclusive and converged by design

Years of Specialization and Technology Investments



Application Development with Oracle Database

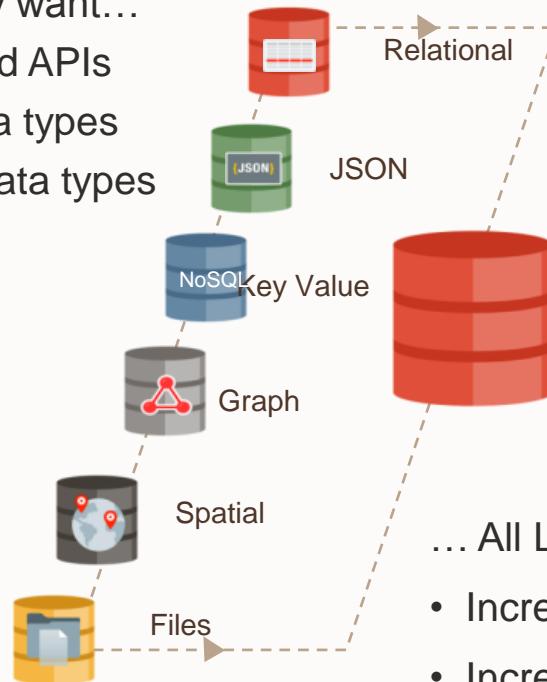
Oracle is a Converged Database

Developers get what they want...

Use popular dev tools and APIs

SQL query across all data types

Transactions across all data types



... Analysts and Ops get what they need

Consistent, queryable view of data

Powerful query and analytics

Reliability

Scalability

Security

... All Leads to Data Liquidity

- Increased data productivity
- Increased data value



“Aggregating or co-locating different data models and datasets for the sake of operational efficiencies, is huge...but its not the end goal. Leveraging and blending a variety datasets for the basis of answering complex business questions, now that’s a differentiator.”

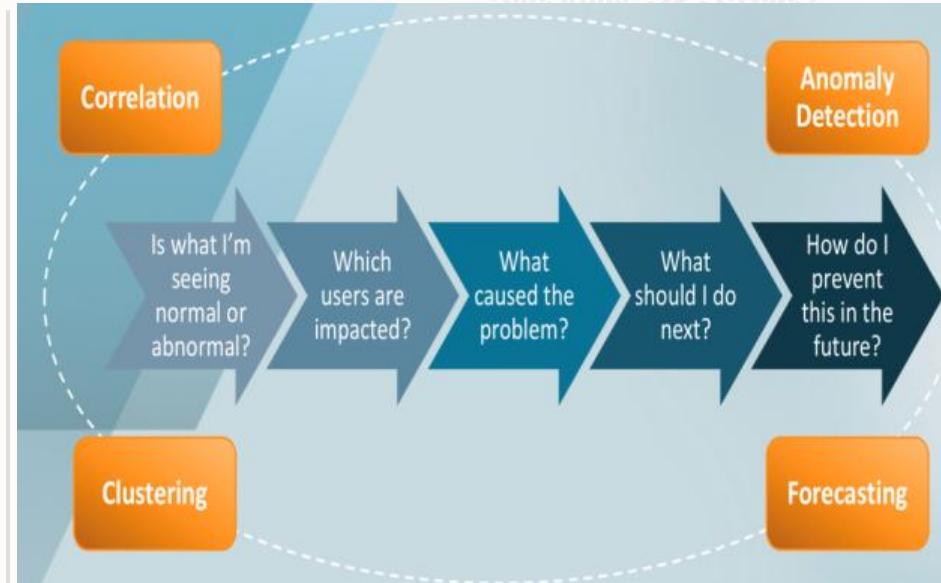
- ClubCorp CIO Corp & Nitin Vengurlekar

Converged Database – Why and Why Now

Unified Data Tier driven by need for Unified Data Access/Analytics (AI + ML)

Data Variety and Data Diversity - Streamlines Data Blending which improves better predictive modeling

Position for Adaptive Intelligence and Augmented Analytics



Oracle's converged database offers unique synergies

Detect fraud **in real time** by applying Machine Learning in OLTP

Synergies across features makes the whole better than the sum of the parts.

Build **flexible OLTP data models** by leveraging document data types

Achieve **high concurrency and security** for your Data Warehouses

Run real-time **sentiment analysis** on data streaming into your document store

Boost a spatial app with **social graphics** and **real-time updates**

Oracle's converged database - enabling the data-driven enterprise

Rationalize, Simplify, Standardize and Consolidate

Do more with less

A **unified approach** to data management means more opportunity for **data synergies**, and less maintenance overhead

Shorten time to value

Accelerate application development – with **easier data access** and support for the **latest development methodologies**

Modernize workloads

Flexible deployment options to meet your specific needs, and **ease of movement** between those deployment options

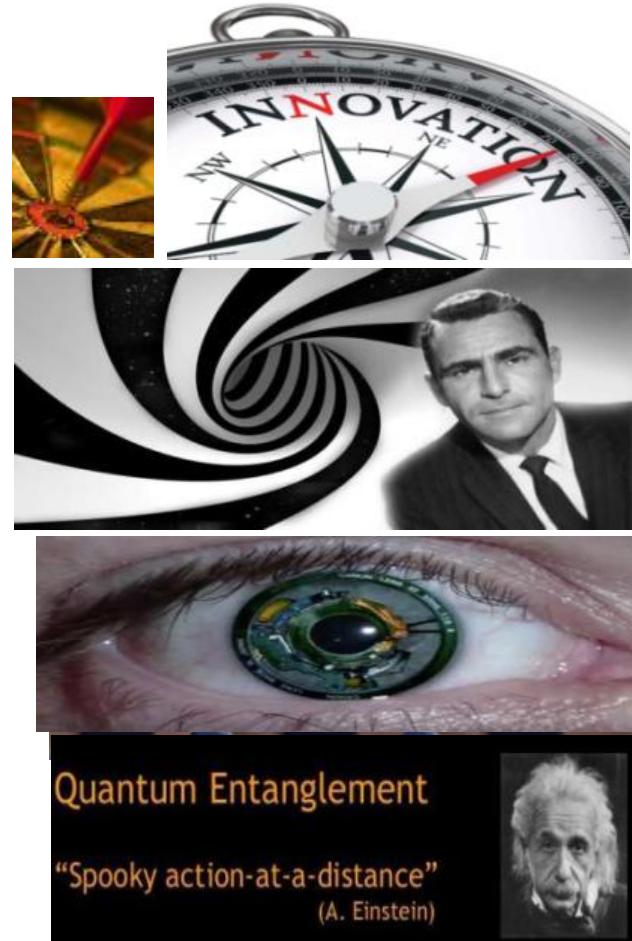


Converged Database: The CIO's Perspective



CIO Goal is to Leverage Technology

- Disruption & Innovation of Technology
- What version should I be running?
- Leverage Big Data and IOT
- ADW & ML in Oracle - Load & Go
- Leverage Oracle & Create the Future



The Disruption of Tech Coming

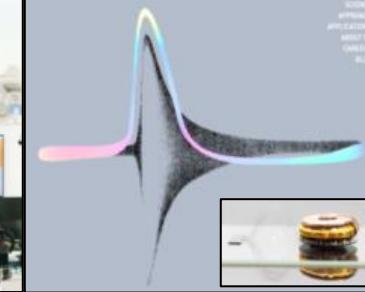
Digital Transformation 2000 to 2050

A historically significant
change in humanity...



Disconnected
The Dark Ages

Using
Digital



Gerd



Disconnected
The Dark Ages

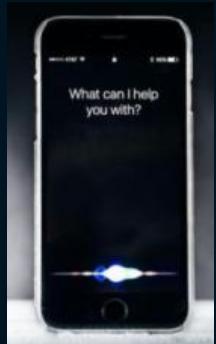
Wearing
Digital

Implanting
Digital

The Hive
Mind

ORACLE
Database Cloud

The World's First Autonomous Database



A Robot may not look one!

*Robots that Manage a Database (ADW/ATP)!

*Robots that secure a system and use ML & AI

Autonomous DB : Future DBA & Robot DB

- Self-Healing
- Self-Driving
- Self-Tuning
- Self-Recovering
- Self-Scaling Administration



Fully automated patching, upgrades, backups, & availability architecture

**Oracle Unveils World's First
Autonomous Database Cloud**

ADW - Provision Database (3 minutes)

ADW



The screenshot shows the Oracle Cloud Autonomous Database provisioning process across three stages:

- PROVISIONING...**: The first stage where the database is being created. It features a large orange "ADV" logo and a green "ADW" logo. The status is "AVAILABLE".
- AVAILABLE**: The second stage where the database is ready for use. It features a large green "ADW" logo. The status is "AVAILABLE".
- DB 2019090**: The final stage where the database is fully provisioned. It features a large green "ADW" logo. The status is "AVAILABLE".

Autonomous Database Details (DB 2019090)

Search for resources and services

US East (Ashburn) ▾

DB Connection Performance Hub Service Console Scale Up/Down More Actions ▾

Autonomous Database Information Tools Tags

General Information		Infrastructure
Database Name:	DB2019090	Dedicated Infrastructure: No
Workload Type:	Data Warehouse	Backup
Compartment:	atptesting	Last Automatic Backup: Tue, Jun 9, 2020, 11:27:45 UTC
OCID:	...mpjmoa Show Copy	Network
Created:	Thu, Sep 5, 2019	Access Type: Allow secure access from everywhere
CPU Core Count:	1	Access Control List: Disabled Edit
Storage (TB):	1	Maintenance ⓘ
License Type:	License Inclusive	Next Maintenance: Sun, Jun 14, 2020, 07:30:00 UTC - 15:30
Database Version:	18c	
Auto Scaling:	Disabled ⓘ	
Lifecycle State:	Available	

Things to Focus On! (**DA = DBA Alive**)

- Data Administration (just change your title)
- Manager / Business
- Cloud & Autonomous
- Big Data
- IOT
- Security
- Network Administration
- Chatbots
- AI: ML, NLP, Robotics



**Get the Autonomous
DBA Some of the
Work!**

Go to 19c or 21c (*get to 19c!*)?

Why Upgrade to 19c?

19^c

Core Aim : Long Term Stability

Long Term Support Release:

- 5 Years of Premier Support to 2024
- 3 Years Extended Support to 2027

21^c

Innovation Release:

- 2 Years of Premier Support to 2023
- No Extended Support

MAKE ME A SANDWICH.

SUDO MAKE ME
A SANDWICH.



WHAT? MAKE
IT YOURSELF.



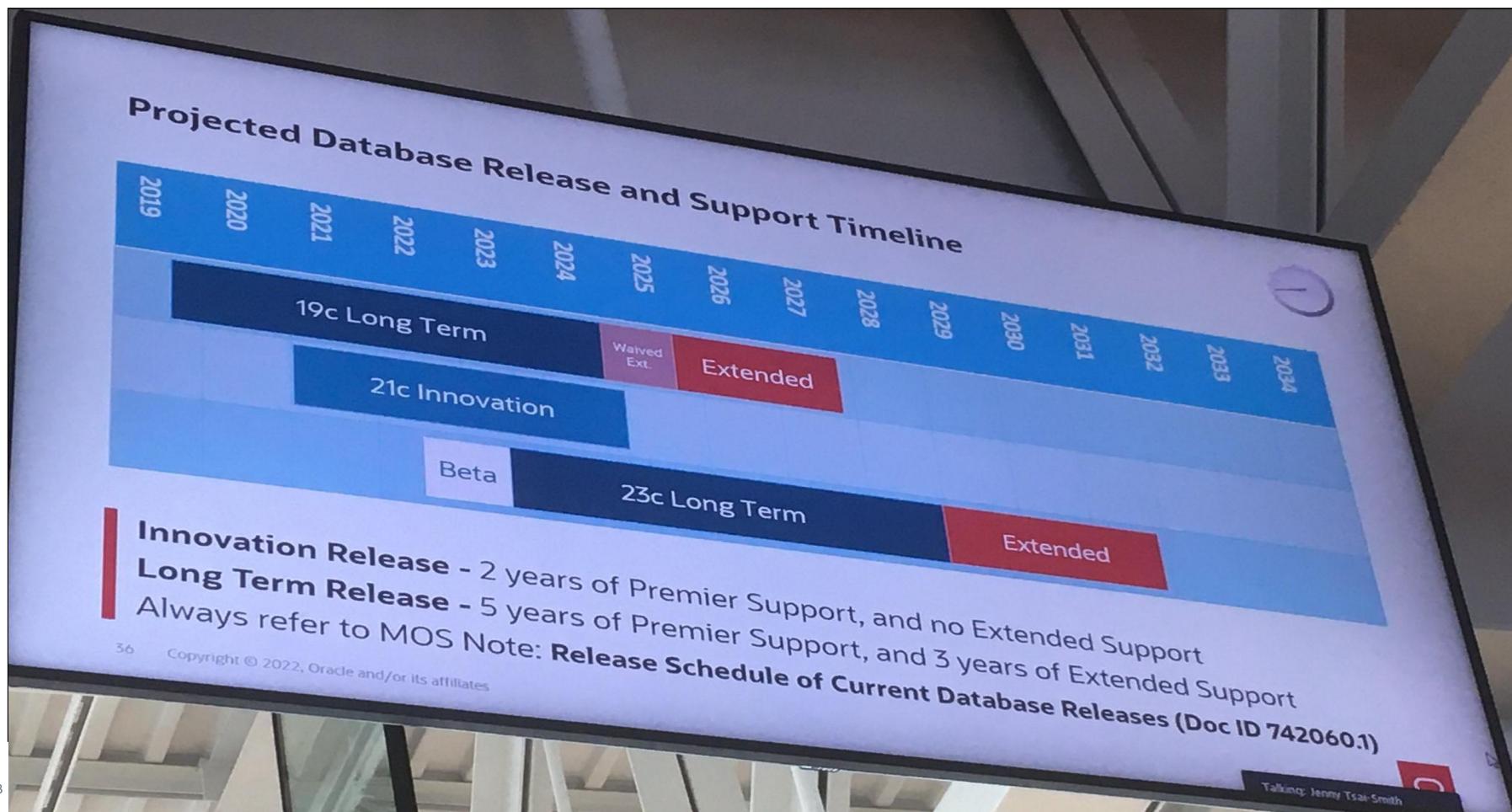
OKAY.



- Need Auto Machine Learning of 21c?
- Want to Export ADW/ATP?
- Leverage Oracle Data Safe. Security Assessment of: Database / Users / Data

Recently Updated Slightly*...

*Thanks Jenny Tsai-Smith, Oracle



Ensure you use Key Oracle 19c Features

19^c ORACLE
Database

- Use **THREE user-created PDBs** without buying multitenant!
- **Automatic Indexing (Exadata Only)**
- **JSON-Object Mapping** - Map JSON data to/from SQL Object/Collection Types
- Oracle Database supplied **Schemas have Passwords Removed**
- **SQL Quarantine (Exadata Only)** - Execution Plans & SQL using high resources
- **In-Memory support for ORACLE_HIVE & ORACLE_BIGDATA drivers**
- **In-Memory support for Parallel Query, RAC, ADG, and on-demand population**
- In-Memory **Wait on Populate function:** DBMS_INMEMORY_ADMIN.POPULATE_WAIT
- **RAT & ADDM Support for PDBs** (can tune PDBs better)
- **REST enabled SQL Support** - APEX Oracle Rest Data Services (ORDS) 17.3+
- **Sharded RAC** (not really sharding) that allows **pinning partitions to a given node.**

NEW in Oracle Database 21c

More innovations for developers & architects, analysts & data scientists, DBAs

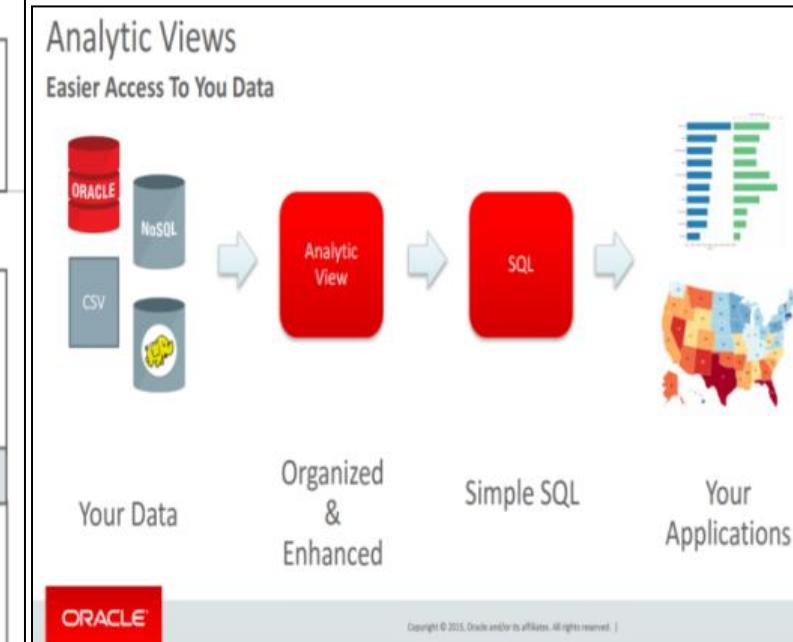
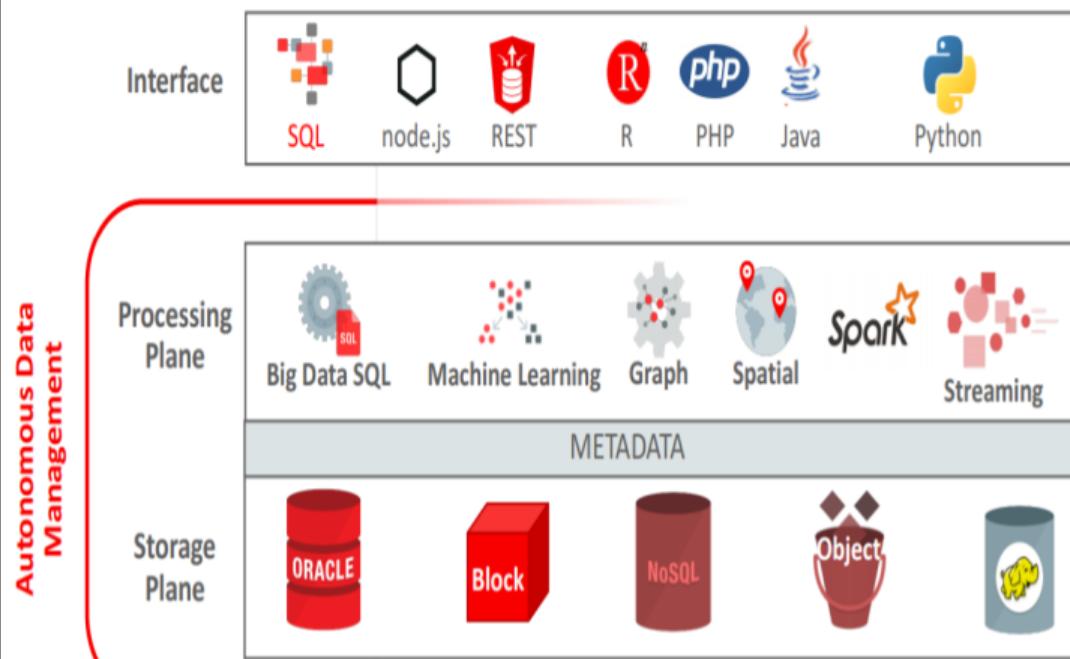
21c

Blockchain Tables	Native JSON Type
In-Database JavaScript	SQL Macros
New ML Algorithms	AutoML
In-Memory Enhancements	Better Graph Analytics
Multitenant Enhancements	Persistent Memory
Gradual Password Rollover	Easier Sharding

More details on new features at <https://bit.ly/DB21cNew>

Data is the New Oil

Data Management as a Service



Data is the New Oil...

Characteristics of Big Data & IOT

Volume

Big data comes in one size: large. Enterprises are awash with data, easily amassing terabytes and even petabytes of information.

TB, Records, Transactions, Tables, Files

Value

Business value of Big Data



Velocity

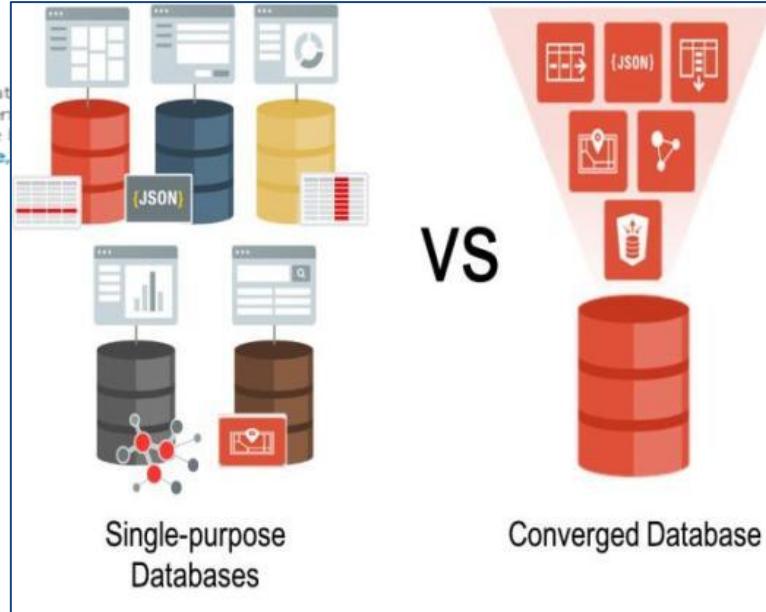
Often time-sensitive, big data is streaming in to the enterprise to maximize its value to the organization. Batch, Near time, Real time,

Variety

Big data extends beyond structured data, including semi-structured and unstructured data of all varieties: text, audio, video, click streams, log files and more.

Structured, Unstructured, Semistructured

Veracity



Big Data Themes

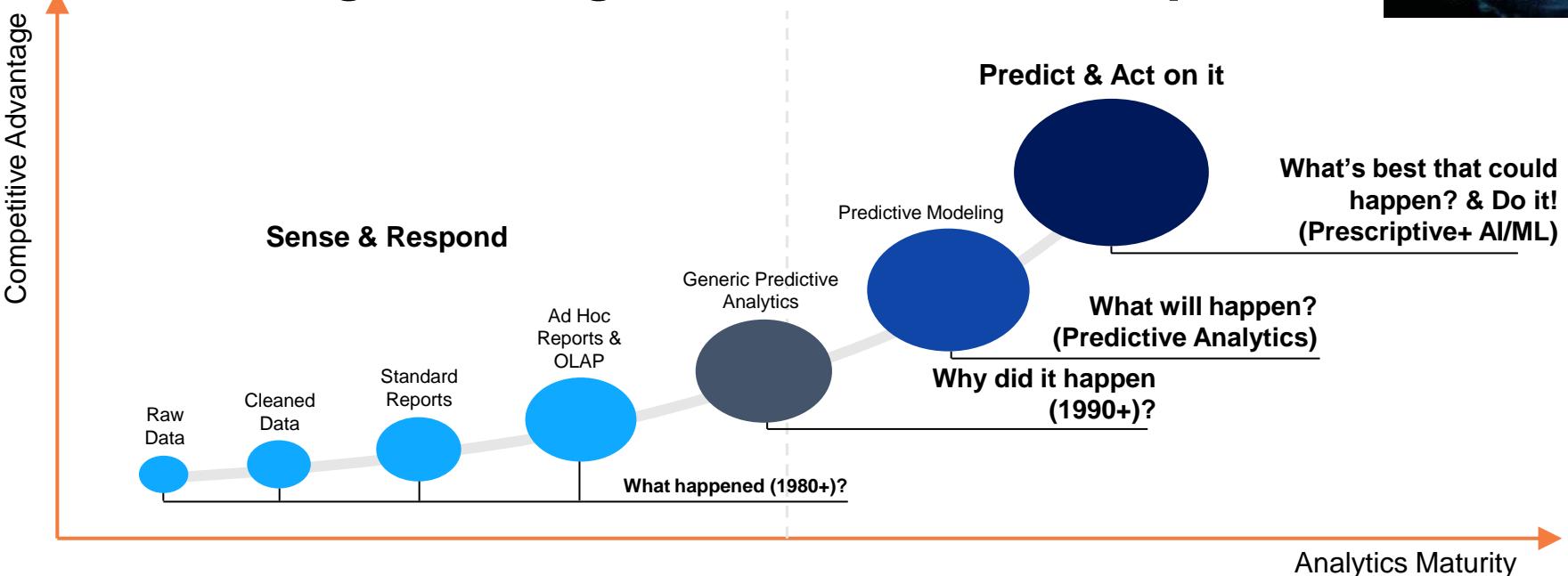
- HW & SW technologies for large data volumes
- Focus on Web 2.0 technologies
- Database Scale-out
- Relational & Distributed Data Analytics
- Real Time Analytics

Big Data Domains

- Digital Marketing Optimization
- Data Exploration & Discovery
- Fraud Detection & Prevention
- Social Network & Relationship Analysis
- Machine-generated Data Analytics



Automating the DB gives more time to Impact Business



The key is unlocking data to move decision making from sense & respond to predict & act

Exadata Cloud Machine: ALL Features Needed to Succeed!

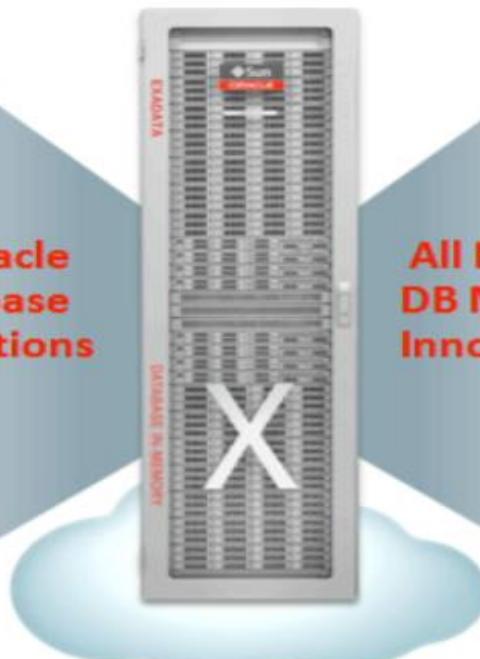
(Oracle's Juan Loaiza presentation on Exadata Cloud)

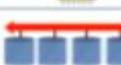
Exadata Cloud: Compatible, Scalable, Available, Secure

Decades of Database Innovation Proven at Millions of Mission-Critical Deployments

	Multitenant
	In-Memory DB
	Real Application Clusters
	Active Data Guard
	Partitioning
	Advanced Compression
	Advanced Security, Label Security, DB Vault
	Real Application Testing
	Advanced Analytics, Spatial and Graph
	Management Packs for Oracle Database

All Oracle Database Innovations



	Offload SQL to Storage
	InfiniBand Fabric
	Smart Flash Cache, Log
	Storage Indexes
	Columnar Flash Cache
	Hybrid Columnar Compression
	I/O Resource Management
	Network Resource Management
	In-Memory Fault Tolerance
	Exafusion Direct-to-Wire Protocol

Machine Learning has many parts

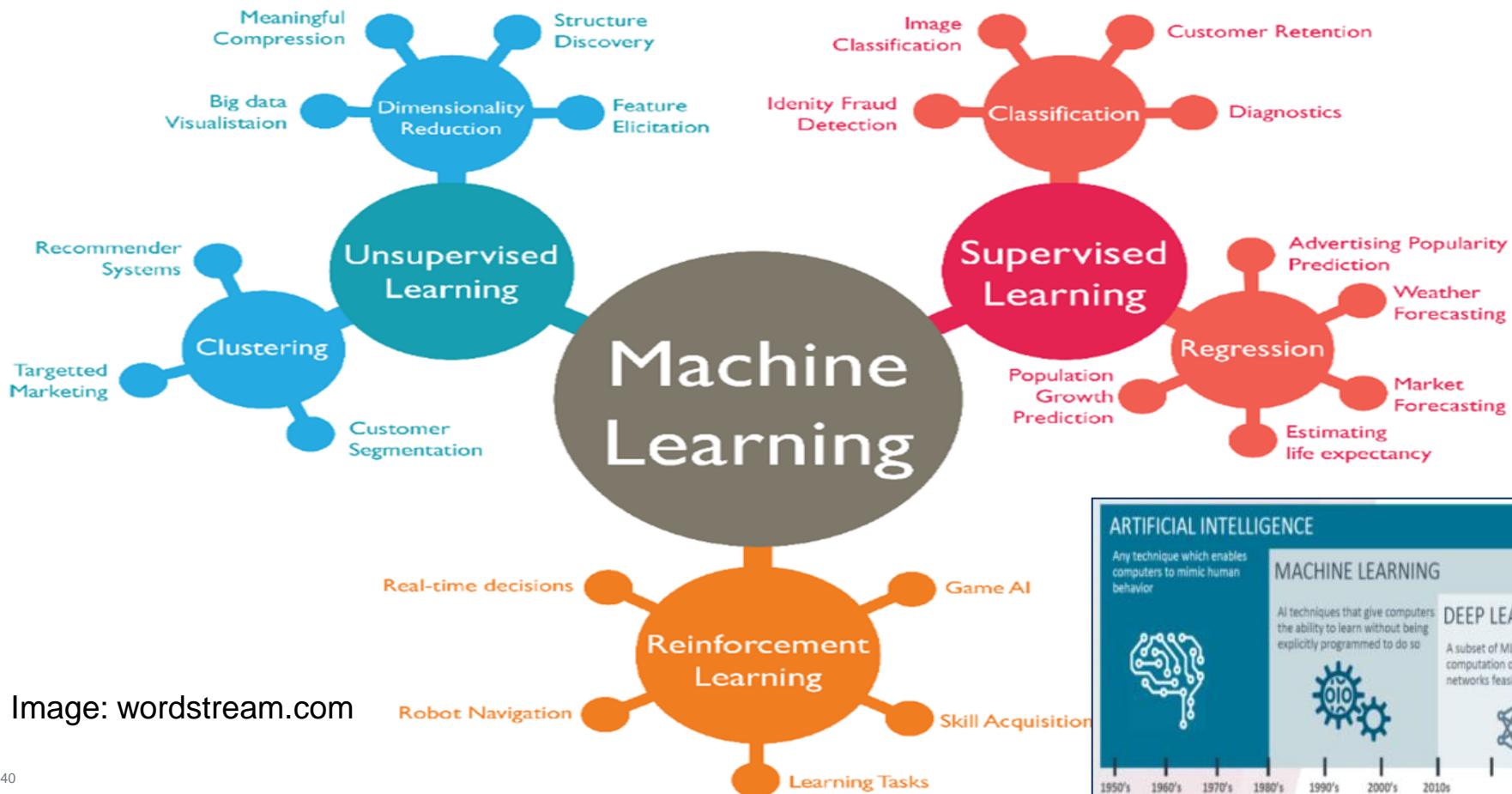
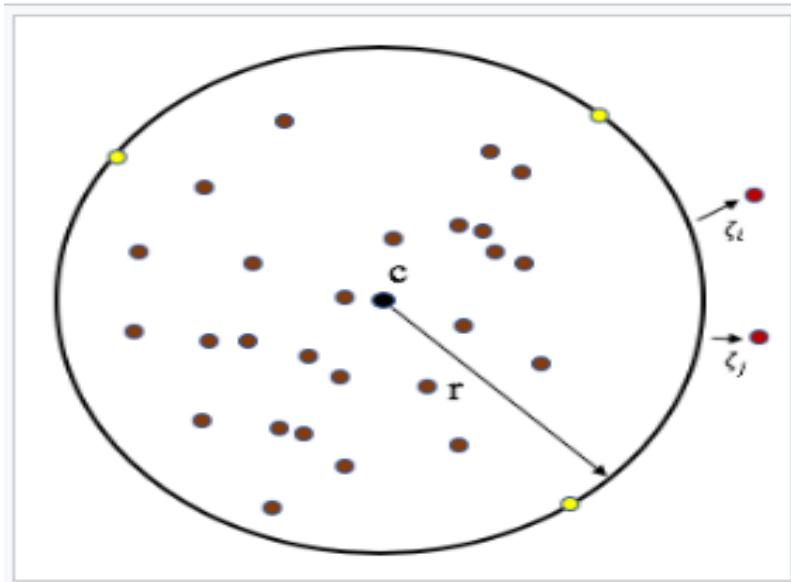


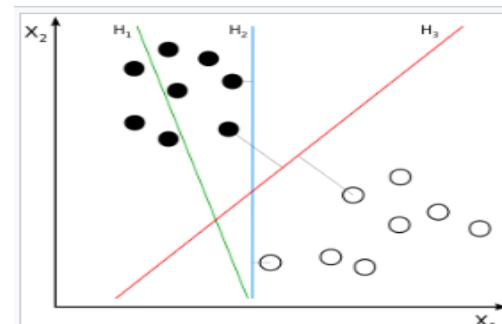
Image: wordstream.com

One-Class SVM (ML Anomaly Detection)*



The hypersphere containing the target data having center a and radius R . Objects on the boundary are support vectors, and two objects lie outside the boundary having slack greater than 0.

Support Vector Data Description (SVDD):
Find the smallest hypersphere containing all data points (use supervised training to get it)



H_1 does not separate the classes.
 H_2 does, but only with a small margin.
 H_3 separates them with the maximal margin.

Linear SVM

*Wikipedia

Machine Learning connection to ADW/ATP

The screenshot shows the Oracle Machine Learning interface. At the top, there's a navigation bar with buttons for 'Database Actions', 'DB Connection', 'Performance Hub', 'Service Console', and 'More Actions'. A red dashed circle highlights the 'Database Actions' button. Below the navigation bar, there's a large green sidebar on the left with various icons and labels like 'ATP', 'Develop', 'SQL', 'Execute query', 'LIQUID', 'Track schema', 'SCHED', 'Schedule, m...', and 'APEX'. The main content area is titled 'ORACLE Machine Learning' and displays a grid of 'Example Templates'. Each template card includes a title, a brief description, author information ('Author: Oracle'), date added, tags, and interaction metrics ('Likes', 'Comments', 'Shares'). The templates listed are:

- OML4Py Classification SVM**: This notebook builds and applies a Support Vector...
Author: Oracle
Date Added: 9/30/21, 8:40 AM
Tags: 'Create View' 'SH.SUPPLEMENTARY_DEMOGR...' 0 Likes 16 Comments 1 Share
- OML4Py Clustering EM**: This notebook builds and applies a clustering mod...
Author: Oracle
Date Added: 9/30/21, 8:40 AM
Tags: 'Clustering' 'Expectation Maximization' 'SH.S... 0 Likes 11 Comments 1 Share
- OML4Py Clustering KM**: This notebook builds and applies a clustering mod...
Author: Oracle
Date Added: 11/26/20, 5:41 AM
Tags: 'Clustering' 'K-Means' 'SH.SUPPLEMENTARY_... 0 Likes 107 Comments 5 Shares
- OML4Py Data Cleaning Duplicates Re...**: This notebook illustrates removing duplicate rows ...
Author: Oracle
Date Added: 2/17/21, 5:18 PM
Tags: 'Python' 'Data Cleaning' 'Duplicates Removal'... 0 Likes 76 Comments 2 Shares
- OML4SQL Classification DT**: This notebook builds and applies a Decision Tree Classifica...
Author: Oracle
Date Added: 11/26/20 5:40 AM
Tags: 'SQL' 'Classification' 'Decision Tree' 'sql' 'Create View' ... 0 Likes 175 Comments 27 Shares
- OML4SQL Classification GLM**: This notebook builds and applies a Generalized Linear Clas...
Author: Oracle
Date Added: 9/30/21 8:40 AM
Tags: 'sql' 'Create View' 'SH.SUPPLEMENTARY_DEMOGR... 0 Likes 13 Comments 1 Share
- OML4SQL Classification NB**: This notebook builds and applies a Naive Bayes Classificati...
Author: Oracle
Date Added: 9/30/21 8:40 AM
Tags: 'sql' 'Create View' 'SH.SUPPLEMENTARY_DEMOGR... 0 Likes 4 Comments 1 Share
- OML4SQL Classification NN**: This notebook builds and applies a Neural Network Classifi...
Author: Oracle
Date Added: 9/30/21 8:40 AM
Tags: 'sql' 'Create View' 'SH.SUPPLEMENTARY_DEMOGR... 0 Likes 28 Comments 2 Shares

Machine Learning connection to ADW/ATP

ORACLE Machine Learning ADMIN_RICH2 Project [ADMIN_RIC...] ADMIN_RICH2

Build Anomaly Detection model (1-Class Support Vector Machine)

```
%script
--Build Anomaly Detection Model (1-Class SVM) on CUSTOMERS360 data

DECLARE
v_sql varchar2(100);

BEGIN

--Create a Build Setting table for Model Build

EXECUTE IMMEDIATE 'CREATE TABLE CUSTOMERS360_SET (setting_name VARCHAR2(30),setting_value VARCHAR2(4000))';
EXECUTE IMMEDIATE 'INSERT INTO CUSTOMERS360_SET (setting_name, setting_value) VALUES (''ALGO_NAME'', ''ALGO_SUPPORT_VECTOR_MACHINES'')';
EXECUTE IMMEDIATE 'INSERT INTO CUSTOMERS360_SET (setting_name, setting_value) VALUES (''PREP_AUTO'', ''ON'')';
DBMS_OUTPUT.PUT_LINE ('Created model build settings table: CUSTOMERS360_SET ');

--Build the 1-Class SVM model.

EXECUTE IMMEDIATE 'CALL DBMS_DATA_MINING.CREATE_MODEL(''CUSTOMERS360MODEL'', ''CLASSIFICATION'', ''CUSTOMERS360'', ''CUST_ID'', null, ''CUSTOMERS360_SET'')';
DBMS_OUTPUT.PUT_LINE ('Created model: CUSTOMERS360_MODEL');

END;

Created model build settings table: CUS
Created model: CUSTOMERS360_MODEL
PL/SQL procedure successfully completed
```

Graph all Customers's PROBABILITY_ANOMALOUS vs. YRS_RESIDENCE grouped by CUST_MARITAL_STATUS

FINISHED X 08

-- Click on the bar chart icon and expand settings. Drag PROBABILITY_ANOMALOUS
-- HINT: Select items in the legend to focus on certain categories.

```
SELECT *
FROM (SELECT CUST_ID, round(probability_anomalous,2) probability_anomalous, HOUSEHOLD_SIZE, YRS_RESIDENCE, CUST_GENDER, CUST_MARITAL_STATUS,
rank() over (ORDER BY probability_anomalous DESC) rnk
  FROM (SELECT CUST_ID, HOUSEHOLD_SIZE, YRS_RESIDENCE, CUST_GENDER, CUST_MARITAL_STATUS, prediction_probability(CUSTOMERS360MODEL, '0' using *) probability_anomalous
        FROM CUSTOMERS360))
 ORDER BY probability_anomalous DESC;
```

settings

YRS_RESIDENCE	Widowed	Divorc.	Mabsent	Separ.	Married	Mar-AF	NeverM
1	0.45	0.42	0.38	0.48	0.35	0.25	0.22
2	0.52	0.28	0.35	0.28	0.25	0.22	0.22
3	0.48	0.32	0.30	0.28	0.25	0.22	0.22
4	0.38	0.28	0.35	0.32	0.25	0.22	0.22
5	0.35	0.28	0.30	0.32	0.25	0.22	0.22
6	0.38	0.28	0.35	0.32	0.25	0.22	0.22
7	0.38	0.28	0.22	0.40	0.25	0.22	0.38
8	0.32	0.28	0.35	0.38	0.25	0.22	0.40
9	0.35	0.28	0.38	0.32	0.25	0.22	0.35

Machine Learning connection to ADW/ATP

FINISHED

Display the top 15 most anomalous customers

```
%sql  
--Display the Top 15 Most Anomalous Customers  
  
SELECT *  
FROM (SELECT CUST_ID, round(probability_anomalous,2) probability_anomalous, HOUSEHOLD_SIZE, YRS_RESIDENCE,  
CUST_GENDER, CUST_MARITAL_STATUS, rank() over (ORDER BY probability_anomalous DESC) rnk  
FROM (SELECT CUST_ID, HOUSEHOLD_SIZE, YRS_RESIDENCE, CUST_GENDER,  
CUST_MARITAL_STATUS, prediction_probability(CUSTOMERS360MODEL, '0' using *) probability_anomalous  
FROM CUSTOMERS360))  
WHERE rnk <= 15  
ORDER BY probability_anomalous DESC;
```

FINISHED

View Prediction_Details that explain why the record was selected as anomalous

```
%sql  
-- Select customers with OCCUPATION of 'TechSup' and more than 55% probability of being anomalous  
  
SELECT CUST_ID,  
RTRIM(TRIM(SUBSTR(OUTPRED."Attribute1",17,100),'rank="1"/>')) FIRST_ATTRIBUTE,  
RTRIM(TRIM(SUBSTR(OUTPRED."Attribute2",17,100),'rank="2"/>')) SECOND_ATTRIBUTE,  
RTRIM(TRIM(SUBSTR(OUTPRED."Attribute3",17,100),'rank="3"/>')) THIRD_ATTRIBUTE,  
RTRIM(TRIM(SUBSTR(OUTPRED."Attribute4",17,100),'rank="4"/>')) FOURTH_ATTRIBUTE,  
RTRIM(TRIM(SUBSTR(OUTPRED."Attribute5",17,100),'rank="5"/>')) FIFTH_ATTRIBUTE  
FROM (SELECT CUST_ID, PREDICTION_DETAILS(CUSTOMERS360MODEL, '0' USING *) PREDICTION_DETAILS FROM CUSTOMERS360  
WHERE PREDICTION_PROBABILITY(CUSTOMERS360MODEL, '0' USING *) > .58  
AND OCCUPATION = 'TechSup')  
ORDER BY CUST_ID) OUT,
```

FINISHED

CUST_ID

FIRST_ATTRIBUTE

SECOND_ATTRIBUTE

THIRD_ATTRIBUTE

100646 "CUST_MARITAL_STATUS" actualValue="Widowed"
weight=".226""CUST_YEAR_OF_BIRTH" actualValue="1941" weight=".118" "CUST_CREDIT_LIMIT" actualValue="1500" weight=".118"
"CUST_YEAR_OF_BIRTH" actualValue="1931" weight=".169" "CUST_CREDIT_LIMIT" actualValue="1500" weight=".169"102922 "CUST_MARITAL_STATUS" actualValue="Widowed"
weight=".222""CUST_YEAR_OF_BIRTH" actualValue="1941" weight=".117" "EDUCATION" actualValue="Bach." weight=".076"
"CUST_YEAR_OF_BIRTH" actualValue="1931" weight=".169" "CUST_CREDIT_LIMIT" actualValue="1500" weight=".169"103441 "CUST_MARITAL_STATUS" actualValue="Widowed"
weight=".222""CUST_YEAR_OF_BIRTH" actualValue="1941" weight=".117" "EDUCATION" actualValue="Bach." weight=".076"
"HOUSEHOLD_SIZE" actualValue="4-5" weight=".146" "CUST_CREDIT_LIMIT" actualValue="1500" weight=".146"

104286 "EDUCATION" actualValue="9th" weight=".165"

Machine Learning & AI - Oracle's Built-In Algorithms

Oracle Machine Learning Algorithms



CLASSIFICATION

Naïve Bayes
Logistic Regression (GLM)
Decision Tree
Random Forest
Neural Network
Support Vector Machine
Explicit Semantic Analysis
XGBoost*



CLUSTERING

Hierarchical K-Means
Hierarchical O-Cluster
Expectation Maximization (EM)



ANOMALY DETECTION

One-Class SVM
MSET-SPRT*



TIME SERIES

Forecasting - Exponential Smoothing
Includes popular models
e.g. Holt-Winters with trends,
seasonality, irregularity, missing data

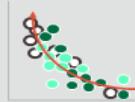


*Includes support for Partitioned Models, Transactional data and aggregations,
Unstructured data, Geo-spatial data, Graph data. etc,*

- ORAAH is Oracle R Advanced Analytics for Hadoop

REGRESSION

Linear Model
Generalized Linear Model
Support Vector Machine (SVM)
Stepwise Linear regression
Neural Network
XGBoost*



ATTRIBUTE IMPORTANCE

Minimum Description Length
Principal Comp Analysis (PCA)
Unsupervised Pair-wise KL Div
CUR decomposition for row & AI



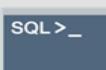
ASSOCIATION RULES

A priori/ market basket



PREDICTIVE QUERIES

Predict, cluster, detect, features



SQL ANALYTICS

SQL Windows
SQL Patterns
SQL Aggregates

FEATURE EXTRACTION

Principal Comp Analysis (PCA)
Non-negative Matrix Factorization
Singular Value Decomposition (SVD)
Explicit Semantic Analysis (ESA)

TEXT MINING SUPPORT

Algorithms support text
Tokenization and theme extraction
Explicit Semantic Analysis (ESA) for
document similarity



STATISTICAL FUNCTIONS

Basic statistics: min, max,
median, stdev, t-test, F-test, Pearson's,
Chi-Sq, ANOVA, etc.



R & PYTHON * Coming soon

Third-party R & Python Packages
through Embedded Execution
Spark MLlib algorithm integration



MODEL DEPLOYMENT & MONITORING

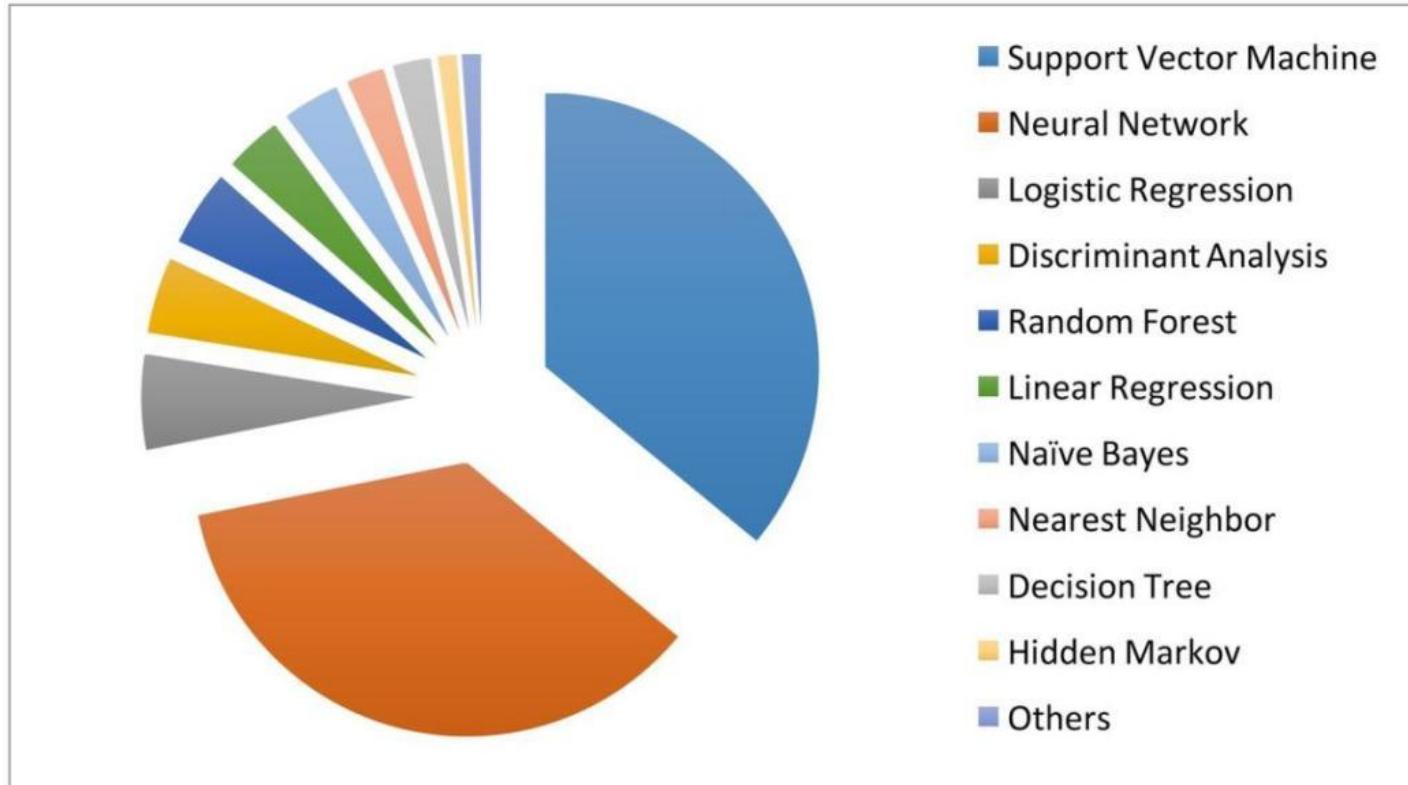
SQL—1st Class Objects
Oracle RESTful API (ORDS)
OML Web Services (for Apps)



* New in 21c



Types of ML Algorithms in Healthcare on PubMed*

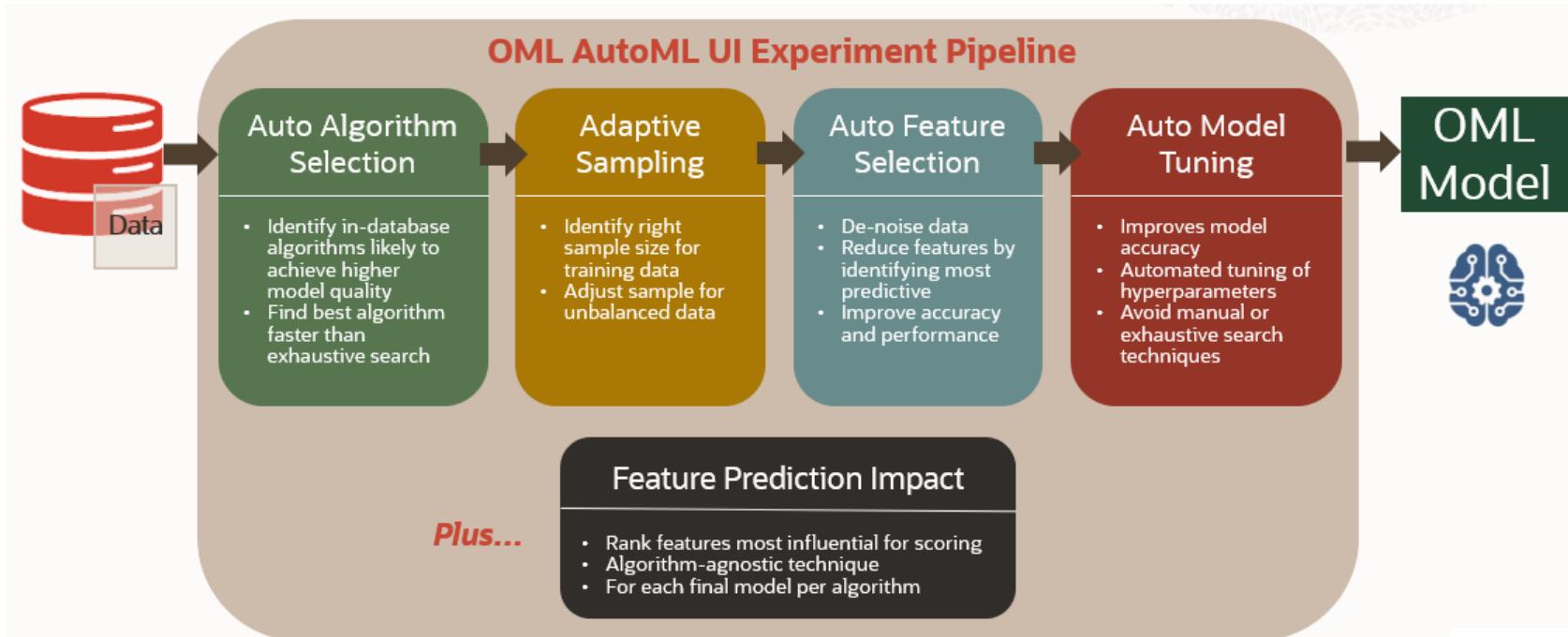


*Stroke and vascular neurology (snj.bmjjournals.com) Note: Markov is Bayesian, NN is k-NN, DA close to PCA

AutoML (Machine Learning)

21^c

Faster & Easier Machine Learning for Citizen Data Scientists, Data Scientists & Developers



ENABLES NON-EXPERT USERS TO LEVERAGE MACHINE LEARNING

Leveraging – DB, AI & Virtual Reality!



Virtual Reality



- > Immersion in virtual worlds
- > Total interaction with virtual
- > E.g. Oculus Rift



Mixed Reality



- > Virtual World integrated to reality
- > Interaction between reality and virtual
- > E.g. Microsoft HoloLens

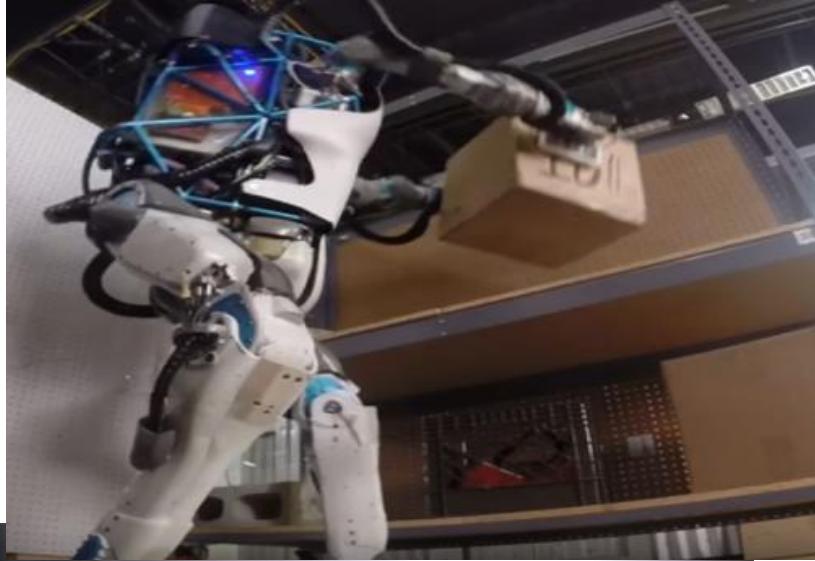


Augmented Reality



- > Virtual on top of reality
- > Limited interaction with the virtual
- > E.g. Smartphones & tablets

Leveraging – DB, GPS & Robotics!



Oracle Converged Database

Key Innovations that continue to address business needs

21c



Converged Database: Perspectives From the Trenches

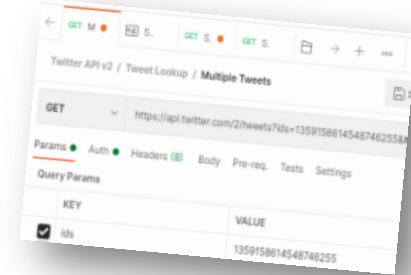


APIs, Microservices, and JavaScript: The Modern Developer's World

Application Programming Interfaces (**APIs**) and the methods they provide are ubiquitous, especially **REST APIs** for accessing and maintaining data within databases regardless of underlying technologies



Microservices provide resources to handle **specific** subsets of business needs – for example, *managing customer payments* for a coffee shop



JavaScript – whether organically written, or built and maintained through auto-coding tools – has become the *de facto* language of choice for application development



Converged Database: Why This, and Why Now?

Single-Purpose database silos
for each workload or data type

... versus an **enterprise solution** that encompasses all the needs of those specific solutions

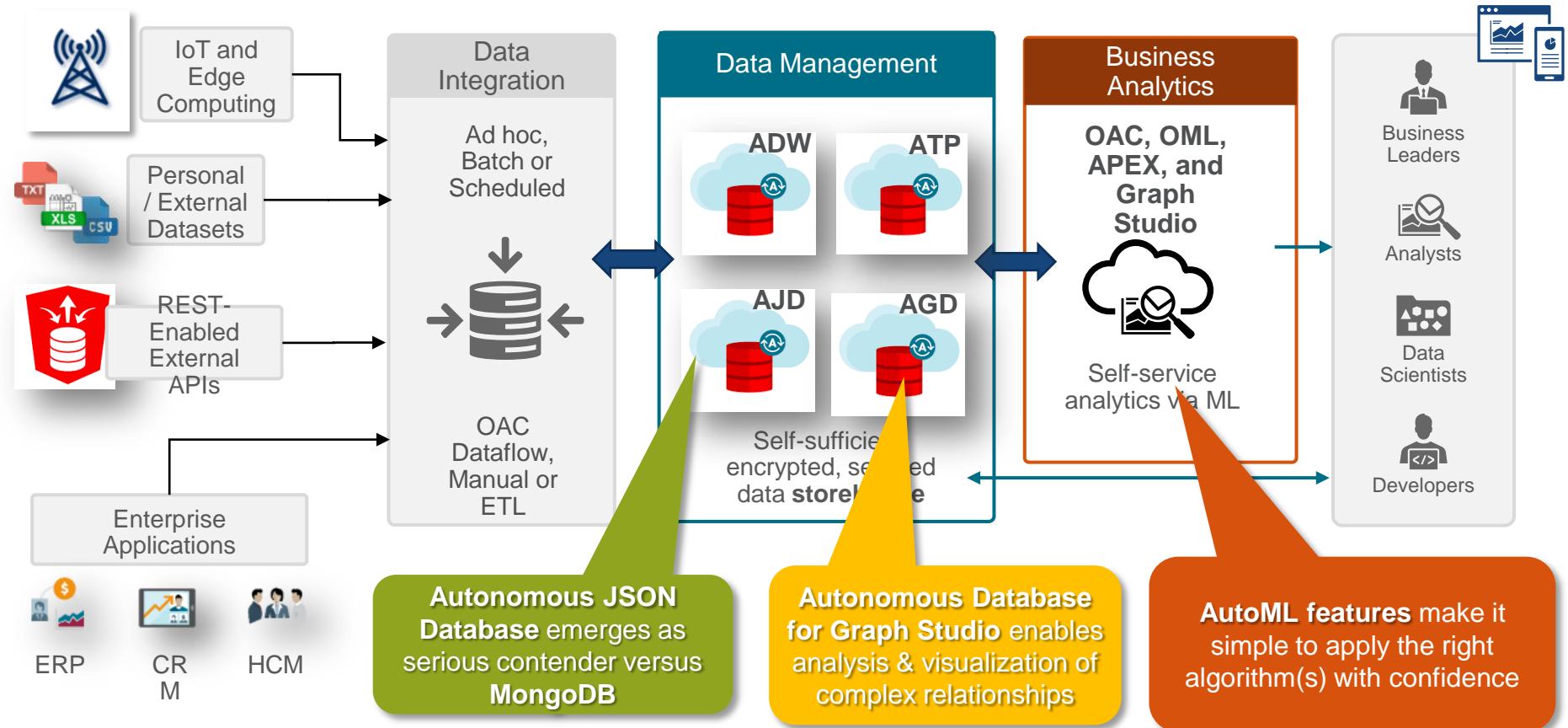


Converged database that supports multiple data types and workloads



Oracle Database 19c

Converged Database: A Vision for the Future, 21c and Beyond



Mollifying Data Scientists. Because *Somebody* Has To.



Data science teams are moving towards deeper explorations of **relationships** rather than just **patterns**

Strategy: Attack the problem with Oracle's extremely powerful **Machine Learning** (ML) algorithms and **Analytic functions** ...

... and for the less-experienced “citizen scientists” on the team, why not let the database **decide for itself** which features to analyze?

Check out the [newest and latest features](#) of Autonomous Database, including AutoML, OML4Py, OML4SQL, Property Graph support, and Graph Studio UI

AutoML: Let the Database Decide!

This makes it easier
for “citizen data
scientists” to apply
the power of **ML &**
Analytics ...

... the new **AutoML**
interface makes
selection of the proper
algorithms a snap ...

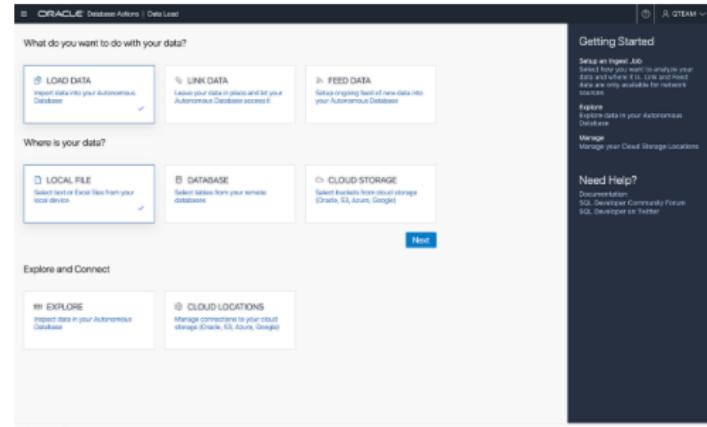
... and many more
new features, including
Graph Studio

New Innovations in Oracle Autonomous Data Warehouse

The latest release includes many new innovations, not only a broad set of capabilities that make it easier for analysts, citizen data scientists, and line-of-business developers to take advantage of the industry's first and only self-driving cloud data warehouse, but also features that deliver deeper analytics and tighter data lake integration. Key capabilities include:

- **Built-in Data Tools:** Business analysts now have a simple, self-service environment for loading data and making it available to their extended team for collaboration. They can load and transform data from their laptop or the cloud by simply dragging and dropping. They can then automatically generate business models; quickly discover anomalies, outliers and hidden patterns in their data; and understand data dependencies and the impact of changes.

- **Oracle Machine Learning AutoML UI:** By automating time-intensive steps in the creation of machine learning models, the AutoML UI provides a no-code user interface for automated machine learning to increase data scientist productivity, improve model quality and enable even non-experts to leverage machine learning.



Oracle Data Load

Check out the [summary](#) of all the latest AutoML enhancements!

So, Your Data Is In MongoDB. And Your Point Is?

```
$ mongosh --tls --tlsAllowInvalidCertificates 'mongodb://  
TESTUSER:<PASSWORD>@<database URL>.  
<OCI region>.oraclecloudapps.com:27016/admin?  
authMechanism=PLAIN&authSource=$external&ssl=true&loadBalanced=false'  
Current Mongosh Log ID: 614c9e2a01e3575c8c0b2ec7  
Connecting to: mongodb://<credentials>@<database  
URL>.<OCI region>.oraclecloudapps.com:27016/admin?  
authMechanism=PLAIN&authSource=$external&tls=true&loadBalanced=false  
Using MongoDB: 3.6.2  
Using Mongosh: 1.0.7  
For mongosh info see: https://docs.mongodb.com/mongodb-shell/admin  
> show dbs  
testuser 0 B testuser> db.createCollection( 'fruit' )  
{ ok: 1 }  
testuser> show collections  
fruit  
testuser> db.fruit.insertOne( {name:"orange"} )  
{  
  acknowledged: true,  
  insertedId: ObjectId("614ca31fdab254f63e4c6b47")  
}  
testuser> db.fruit.insertOne( {name:"apple", "color": "red"} )  
{  
  acknowledged: true,  
  insertedId: ObjectId("614ca340dab254f63e4c6b48")  
}  
testuser> db.fruit.insertOne( {name:"pear", count:5} )  
{  
  acknowledged: true,  
  insertedId: ObjectId("614ca351dab254f63e4c6b49")  
}
```

2

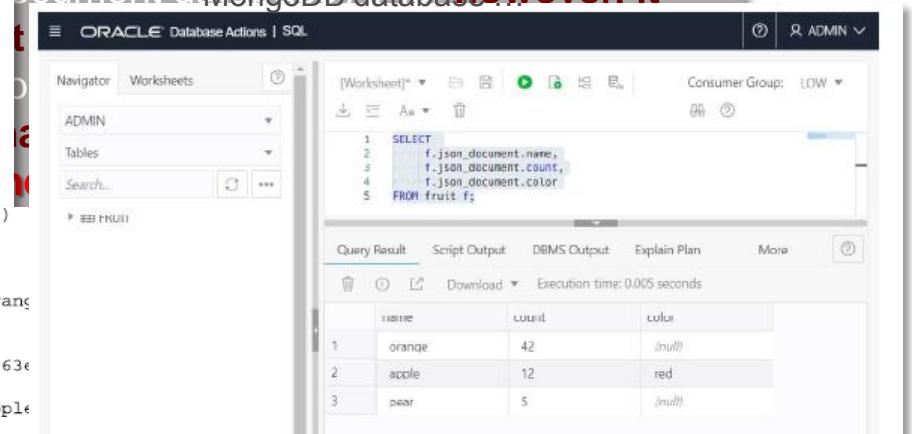
... create
collections and
data within
MongoDB ...

1

Establish security
permissions to access
data within your
document database API; however, it

3

... and start accessing
your MongoDB data
directly from Oracle!



The screenshot shows the Oracle Database Actions interface. A SQL query is run against a MongoDB collection named 'fruit'. The query selects the 'name', 'count', and 'color' fields from the 'fruit' collection. The results are displayed in a table:

	name	count	color
1	orange	42	[null]
2	apple	12	red
3	pear	5	[null]



Final Thoughts... Catch your Ride!



“Things may come to those who wait, but only the things left by those who hustle.”

— Abraham Lincoln



Oracle is never caught from behind: Oracle's 45th Anniversary in 2022

- Great Sales/Marketing
- Great Database
- Applications Leader
- BI Leader
- In the lead except Cloud
- GAME OVER
- Hardware/Software Engineering!
- Have Everything to Win in Cloud + AI!



Helpful Links

NITIN VENGURLEKAR ON *DATA FOR THE PEOPLE*:

<https://www.togglemag.com/case-studies/nitin-vengurlekar-oracle-public-sector/>

JIM CZUPRYNSKI'S ARTICLES ON ADB, ANALYTICS, & MACHINE LEARNING:

<https://www.odtug.com/p/bl/et/blogaid=940>

<https://www.odtug.com/p/bl/et/blogaid=958>

<https://www.odtug.com/p/bl/et/blogaid=966>

<https://www.odtug.com/p/bl/et/blogaid=981>

Rich Niemiec latest Blog on Autonomous Database:

bit.ly/3LLXWII



Rich's Overview @richniemiec

- Chief Innovation Officer, Viscosity North America
- Board Member – TEC, Entrigna, Ask DB Experts
- Former President of TUSC
 - Inc. 500 Company (Fastest Growing 500 Private Companies)
 - 10 Offices in the United States (U.S.); Based in Chicago
 - Oracle Advantage Partner in Tech & Applications
- Former President Rolta TUSC & President Rolta EICT International
- Author (5 Oracle Best Sellers – #1 Oracle Tuning Book for over a Decade):
 - Oracle Performing Tips & Techniques (Covers Oracle7 & 8i)
 - Oracle9i Performance Tips & Techniques
 - Oracle Database 10g Performance Tips & Techniques
 - Oracle Database 11g Performance Tips & Techniques
 - Quick Start Guide to Oracle Query Tuning (2015)
 - Oracle Database 12c Performance Tips & Techniques
- Former President of the International Oracle Users Group
- IOUG Top Speaker in 1991, 1994, 1997, 2001, 2006, 2007
- MOUG Current President & Top Speaker Twelve Times
- National Trio Achiever award - 2006
- Oracle Certified Master & Oracle Ace Director
- Purdue Outstanding Electrical & Computer and Engineer – 2007
- Honorary Senior Technical Advisor to Oracle China - 2014
- Chris Wooldridge Award – 1998, 2012
- Chicago Entrepreneur Hall of Fame - 1998
- E&Y Entrepreneur of Year & National Hall of Fame - 2001



Oracle Database 12c Release 2 Performance Tuning Tips and Techniques
Best Practices for Optimizing Database Performance

Richard Niemiec
Oracle Certified Master, Oracle ACE Director



Oracle Database 11g Release 2 Performance Tuning Tips & Techniques

Oracle Database 11g R2 性能调整与优化
Best Practices for Maximizing Database Efficiency

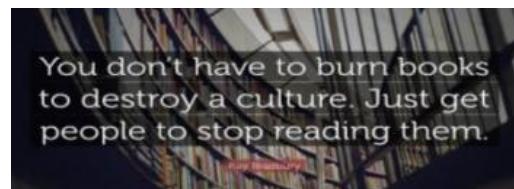


Oracle Database 11g Performance Tuning Tips and Techniques
Best Practices for Maximizing Database Efficiency

Richard Niemiec

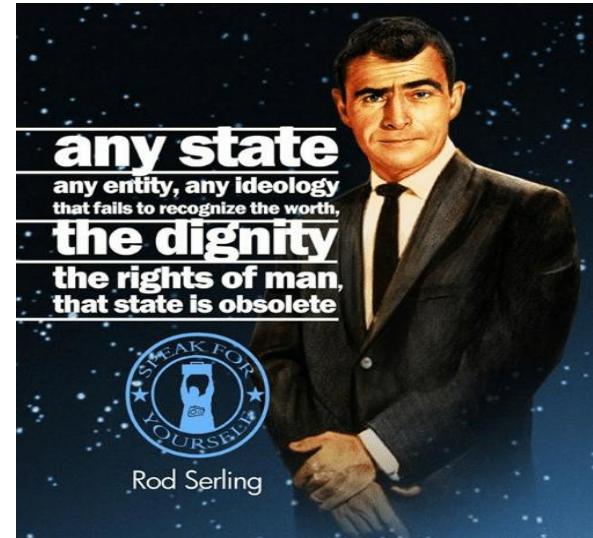
References

- The Emerging Technology Roadmap, Scott Klososky
- Futurist Gerd Leonhard The Futures Agency, Technology vs. Humanity, Gerd Leonhard, oracle.com & Juan Loaiza / Doug Hood presentations, amazon.com, smartcitiescouncil.com, youtube.com, business coach, libelium.com, monetate, en.wikipedia.org, Netflix, Black Mirror, hometoys.com, FPOV, huffingtonpost.com, thegardian.com, nationalgeographic.com, newscientist.com, enswmu.blogspot.com, dailymail.co.uk, FutureRobot, theguardian.com, thinkhealthwireless.blogspot.com, ge.com, cmswire.com, runningsupplement.co.uk, quickmeme.com, nike.com, thisiswhyimbroke.com, businessinsider.com, slideshare.com, forrester.com, spiceworks.com, mwaintel.com, humancapitalist.com, wired.com and Wired Magazine, shodanhq.com, developer.nokia.com, extremetech.com, Getty Images, Dr. Quantum, Leo Kouwenhoven, Telecom Tech News, portal.engineersaustralia.org.au, Actimage & any other company products are the property of their respective companies.



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- References include Rich Niemiec's Exadata Presentation & Oracle 12cR2 Database Performance Tuning Tips & Techniques book, www.oracle.com, en.wikipedia.org, slashgear.com, gifsoup.com, www.amazon.com, Tech Crunch, www.rolta.com, The Twilight Zone, Information Week, Gartner, Computerworld, Quest, Data and Technology Today, Forbes, Quest, Orbit, Computer Weekly, Redmond, Database Trends & Applications, dsp, Dataversity, zdnet, DBVisit, Steve Jones, Kerry Osborne, Julian Dontcheff, Accenture, Quora, Brent Ozar, & Oracle OpenWorld



**THERE IS A FIFTH DIMENSION
BEYOND THAT WHICH IS KNOWN TO
MAN. IT IS A DIMENSION AS VAST
AS SPACE AND AS TIMELESS AS INFINITY.**



Send email to (for slides): richniemiec@gmail.com





Thank you

[Send email to \(for slides\):](#)
richniemiec@gmail.com