

Abstract

Emerging information technology trends for the cloud have the power to transform organizations. In the data management and analytics space, a key cloud service offering has arrived: Oracle Autonomous Data Warehouse (ADW) Cloud and Oracle Autonomous Transaction Processing (ATP)



Rich Niemiec

Chief Innovation Officer @ Viscosity
North America



Tweet



January 25 2024 - premiere 5PM GMT

Thu Jan 25 2024 11:00:00 GMT-0600 (Central Standard Time) in America/Chicago



Player Piano: The World of Autonomous Database (ATP/ADW)

Fast - Easy - Elastic



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Conf42: DevOps 2024

January 25 2024 - premiere 5PM GMT

Special Thanks:

William Hardie, George Lumpkin, Maria Colgan, Charles Kim, Justin Nugent



Agenda – Your Self-Driving Future

- ❑ The DBA, Autonomous & the Cloud
- ❑ A Robot May Not Look Like One
- ❑ Autonomous Transaction Processing (ATP)
- ❑ Autonomous Data Warehouse (ADW)
- ❑ Machine Learning & Data Visualization Desktop
- ❑ Next: Robots & the Future Ahead



Quick FREE notes

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[@richniemiec](https://twitter.com/richniemiec) - twitter



Conf42: DevOps 2024

January 25 2024 - premiere 5PM GMT



Viscosity Pillars and Delivery Models

Data

Database

Data Integration

Data Warehousing
Analytics
GoldenGate

Performance Tuning

APEX & Apps

SAAS / PAAS
CX ERP SCM HCM

EBS / JDE / PS

Middleware

Web Applications

Mobility

Infrastructure

Oracle Cloud
AWS
Azure

Engineered Systems
Exadata ODA ZFS
@Customer

Virtualization
VMware - KVM

RAC

Turnkey
Projects

Assessments

Proof of
Concepts

Training

Security

Managed
Services

Oracle ACE Program

The Oracle ACE Program recognizes and rewards community members for their technical contributions in the Oracle community.



Charles Kim,
CEO & Co-Founder

Twitter: [@racdba](#)



Rich Niemiec,
Chief Innovation Officer

Twitter: [@richniemiec](#)



Craig Shallahamer
Applied AI Scientist

Twitter: [@orapub](#)



Sean Scott,
Consultant

Twitter: [@oraclesean](#)



Gary Gordhamer,
Consultant

Twitter: [@ggordham](#)



Julio Ayapan,
Consultant



We wrote the books - many Experts!



“We Enable Business Transformation at a Time when Companies must Change to Survive”

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

Why Upgrade to 19c?

19^c

Core Aim : Long Term Stability

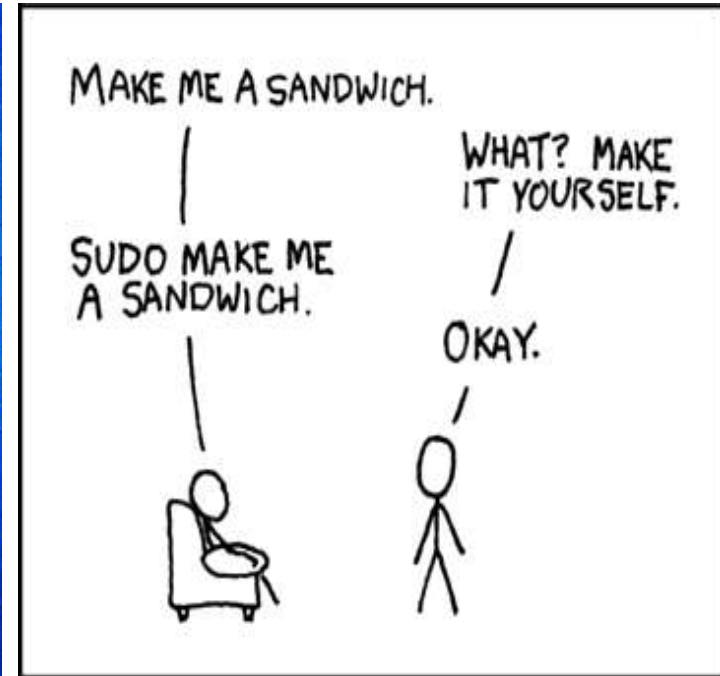
Long Term Support Release:

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

21c

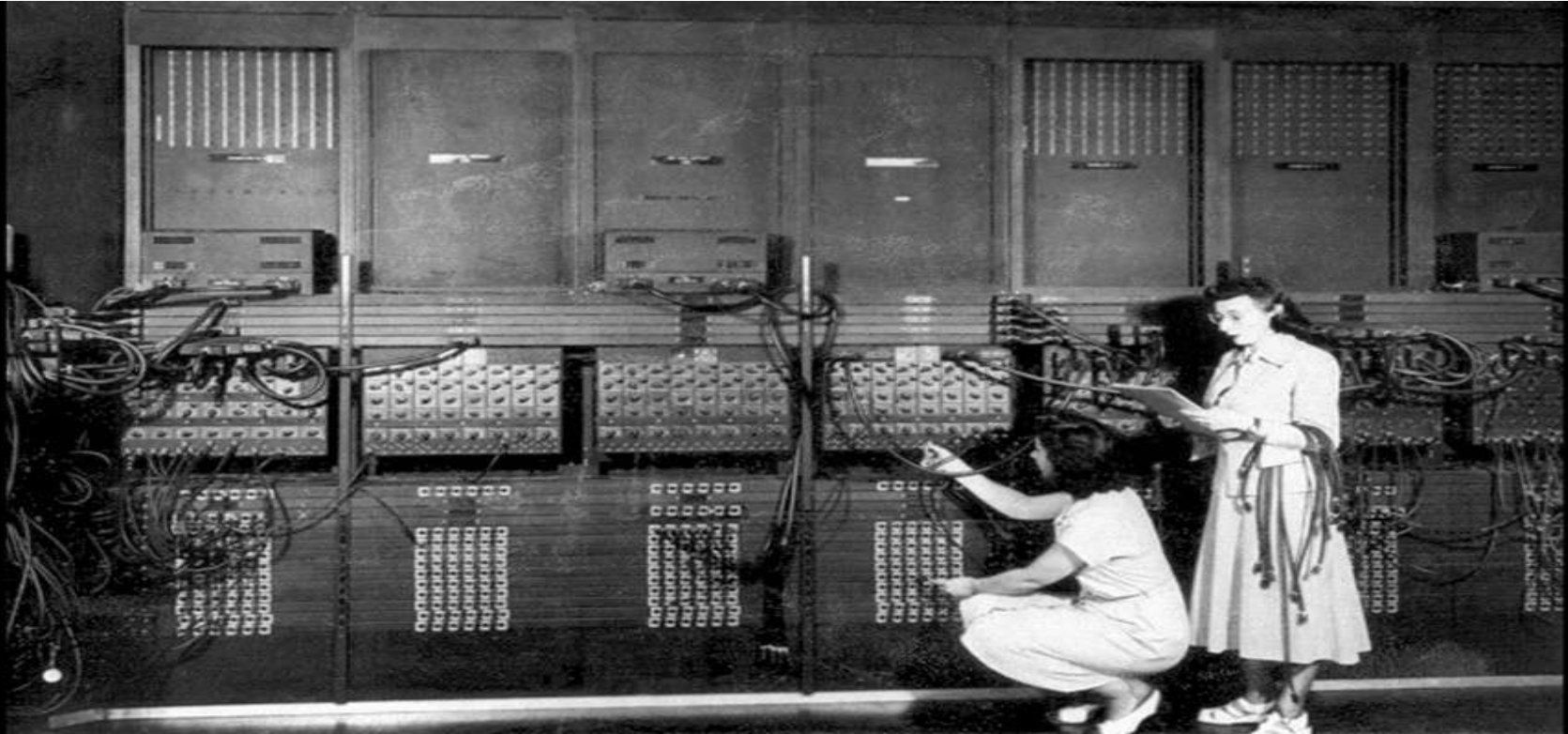
Innovation Release:

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



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

Some Jobs gone: Computer **Surpassed** Them!



REPRODUCTION PERMITTED

“The competition between Man’s Mind vs. the Product of Man’s Mind... for this, there is standing room only in the Twilight Zone.” - Rod Serling

Autonomous Database – Replacing the DBA?



At OpenWorld



At Modern Cx (Customer Experience)

All 1,000 units of "Pepper" being offered in September sold out within one minute.

AI

GUEST

It's time for workers to worry about AI

GARY GROSSMAN, EDELMAN @GARYG02 APRIL 7, 2019 2:22 PM



MOST READ



It's time for workers to worry about AI



Remote AR will make it so we can work —

72% of IT Budget is Spent on Maintenance

DBA & IT Stress by the Numbers



39%

Workloads for DBAs are increasing: **39%** of DBAs handle **50** or more databases



95%

Automation is lacking: **95%** of DBAs create or upgrade databases manually



78%

78% of DBAs will experience unplanned downtime from untested database changes during their careers



2 out of 3

DBAs and IT staff are struggling to provide full protection: **2 out of 3** organizations use multiple tools to backup a single database



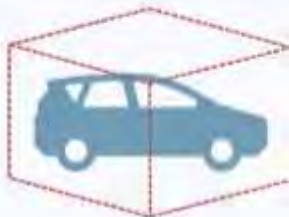
Source: Oracle customer survey

ORACLE

The Answer... it's the Self-Driving Database

From Maria Colgan's talk on it...

Oracle's **Vision** for Autonomous Database



Self-Driving

User defines service levels, database makes them happen

Self-Securing

Protection from both external attacks and malicious internal users

Self-Repairing

Automated protection from all downtime

Concerns with Autonomous (worst DBA article)



Oracle's autonomous database could leave DBAs unemployed

The long-term future of database administrators could be at risk if every enterprise adopts the Oracle 18c autonomous database

Stuart Kennedy

09 May 2018 1:08

Oracle CEO Mark Hurd threw the long-term future of hundreds of thousands of [database administrators \(DBAs\)](#) into question while talking up the benefits of the company's new autonomous database.

The [autonomous self-patching, self-healing database](#), the first version of which is 18c, is a part of a long-term play to help draw the company's customers into Oracle's piece of the cloud – which is increasingly packing itself with cloud-based applications and services.

Latest News

Leading PC makers set to expand to target existing customers

Artificial intelligence making its mark in Russian banking

Security challenges in the cloud

The Autonomous Database Cloud



Self
Driving

ORACLE
Autonomous
Database

Self
Securing

ORACLE[®]
Autonomous
Database

Self
Repairing

Vendor's view of the Cloud



Vendor's path for you to the Cloud



How Easy to Move to Cloud Quickly



A Few Years Later on the Cloud



Data: Becoming the World's Most Valuable Resource

Data driven organizations are **23 times more** likely to acquire customers, **6x as likely** to retain those customers, and **19x as likely** to be profitable as a result.⁴



Tesla is (Data from 25M miles/day) Worth More Than GM Which Shipped **92x** More Vehicles Q1/17¹



\$430B Advantage to Data Driven Organizations²



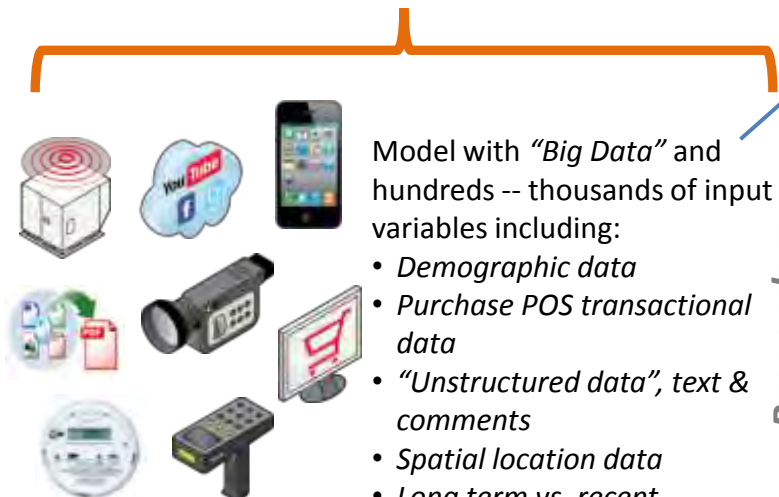
Only about **29%** of Organizations are Using Deep Business Analytics³

Source:

- 1. [Economist Magazine, May 2017](#)
- 2. IDC, 2020 Prediction of Value created by Capitalizing on Data
- 3. Accenture and General Electric Report On Predictive Analytics
- 4. McKinsey Global Institute

More Data Variety—Better Predictive Models

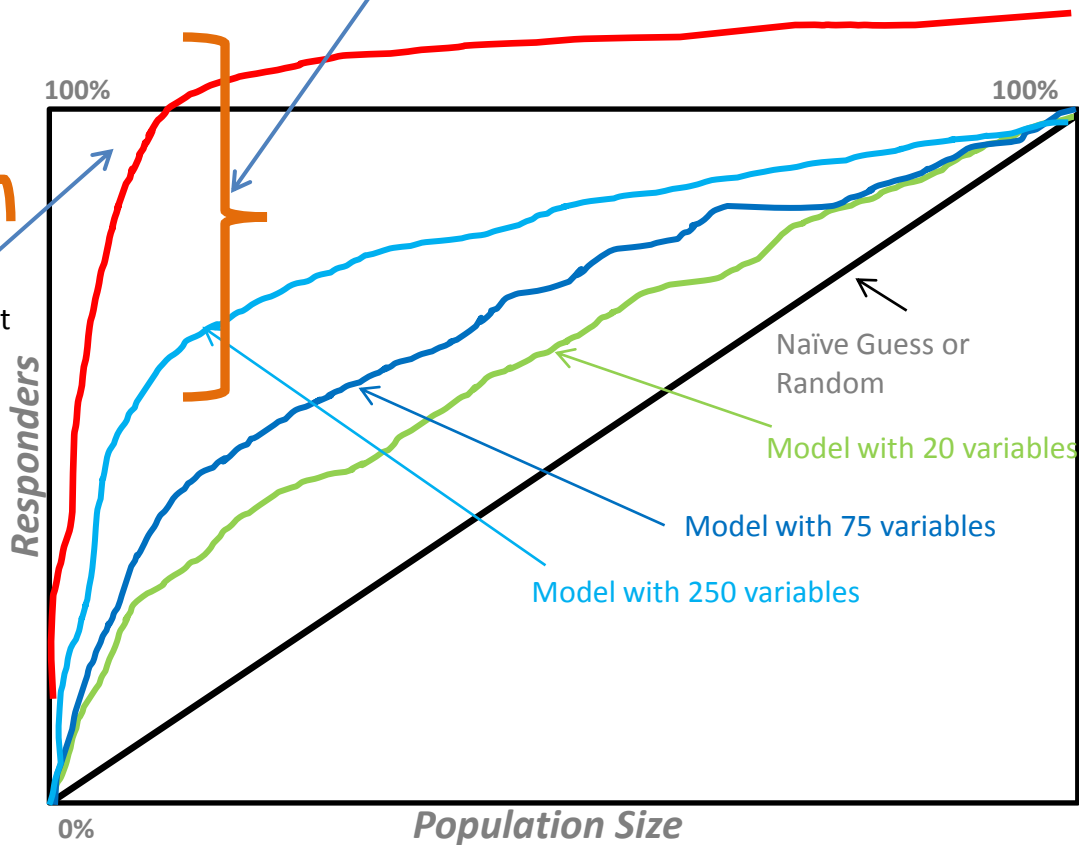
- Increasing sources of relevant data can boost model accuracy



Model with “Big Data” and hundreds -- thousands of input variables including:

- Demographic data
- Purchase POS transactional data
- “Unstructured data”, text & comments
- Spatial location data
- Long term vs. recent historical behavior
- Web visits
- Sensor data
- etc.

Engineered Features – Derived attributes/variable that reflect domain knowledge—key to best models



Characteristics of Big Data

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

Velocity

Often time-sensitive, big data is streaming in to the cloud as it is streaming in to the cloud to maximize its value to the business. Batch, Near time, Real time

Value

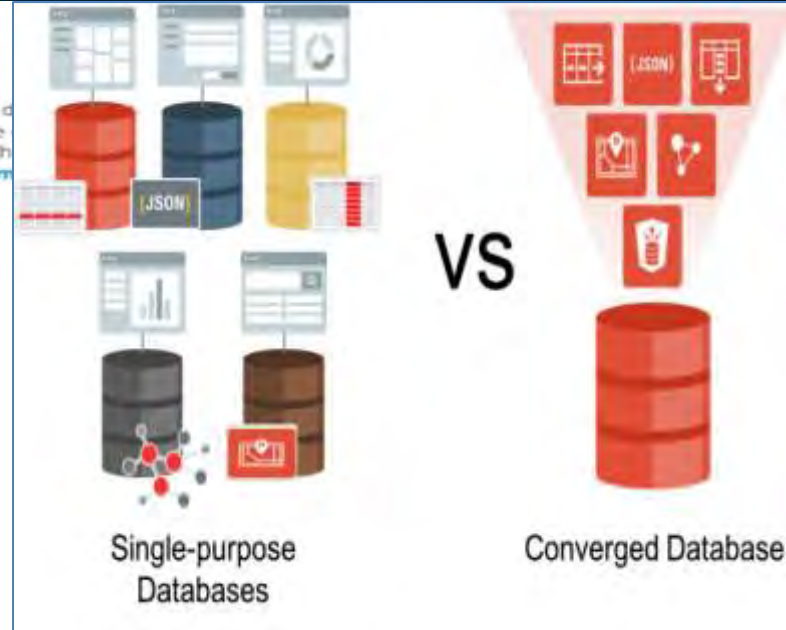
Business value of Big Data

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

Converged Database - Oracle Multi-Model Database*

- Benefits of Oracle's Converged Database are broad

*Slide from Oracle's,
Nitin Vengurlekar

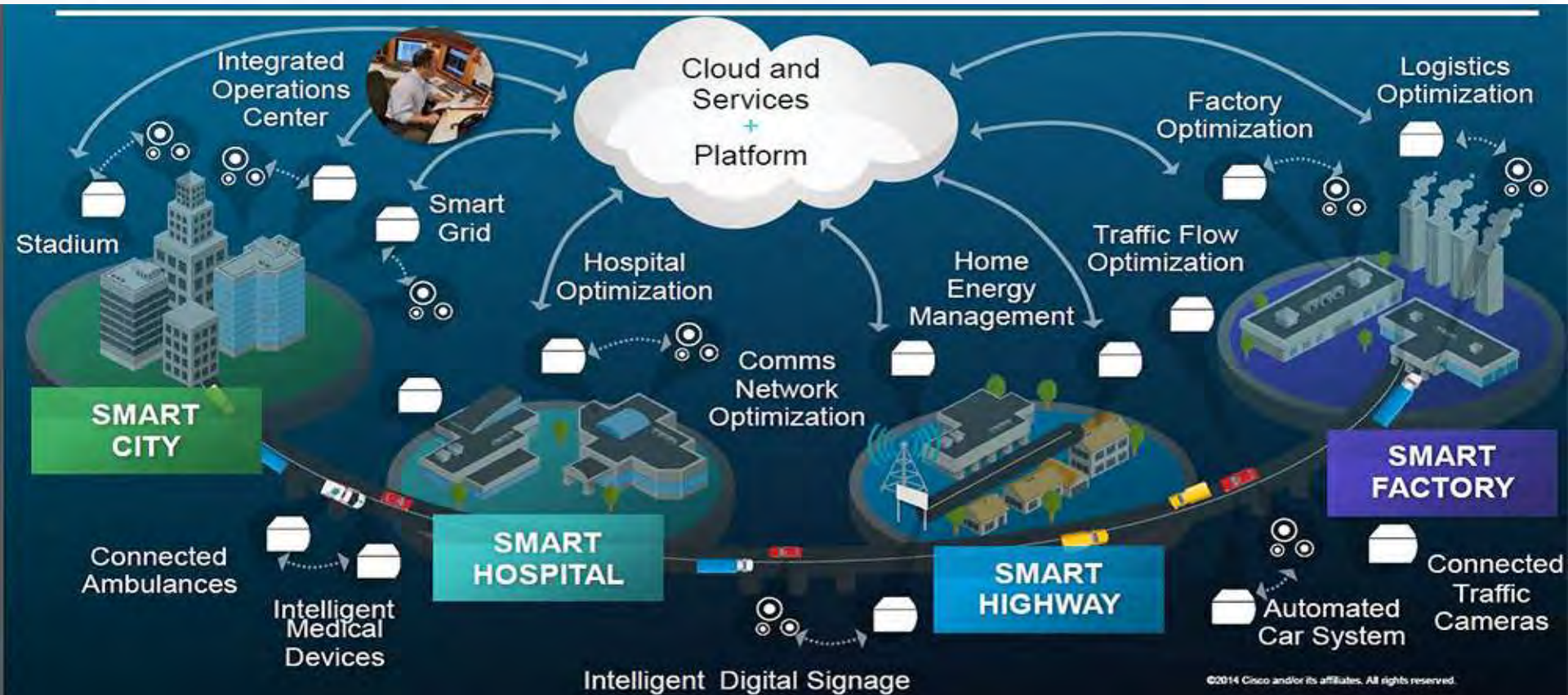


- Integrated development tools (Apex, SQL Dev, Spatial Studio) ✓
- 3rd party and Open Source development tools ✓
- Machine Learning ✓
- Node.js, Python, many others ✓
- In-memory database ✓
- Spatial, Graph support ✓
- NoSQL (JSON, key-value, wide column, XML) ✓
- Containers, microservices, virtualization (Docker, MT) ✓
- Integrated Security ✓
- Deployment choice (on-prem, cloud, hybrid) ✓
- Integrated High Availability and Disaster Recovery ✓



Venturebeat.com – IOT \$14.4T this decade

Typical Views of the Internet of Things



The Consumer IOT Connection

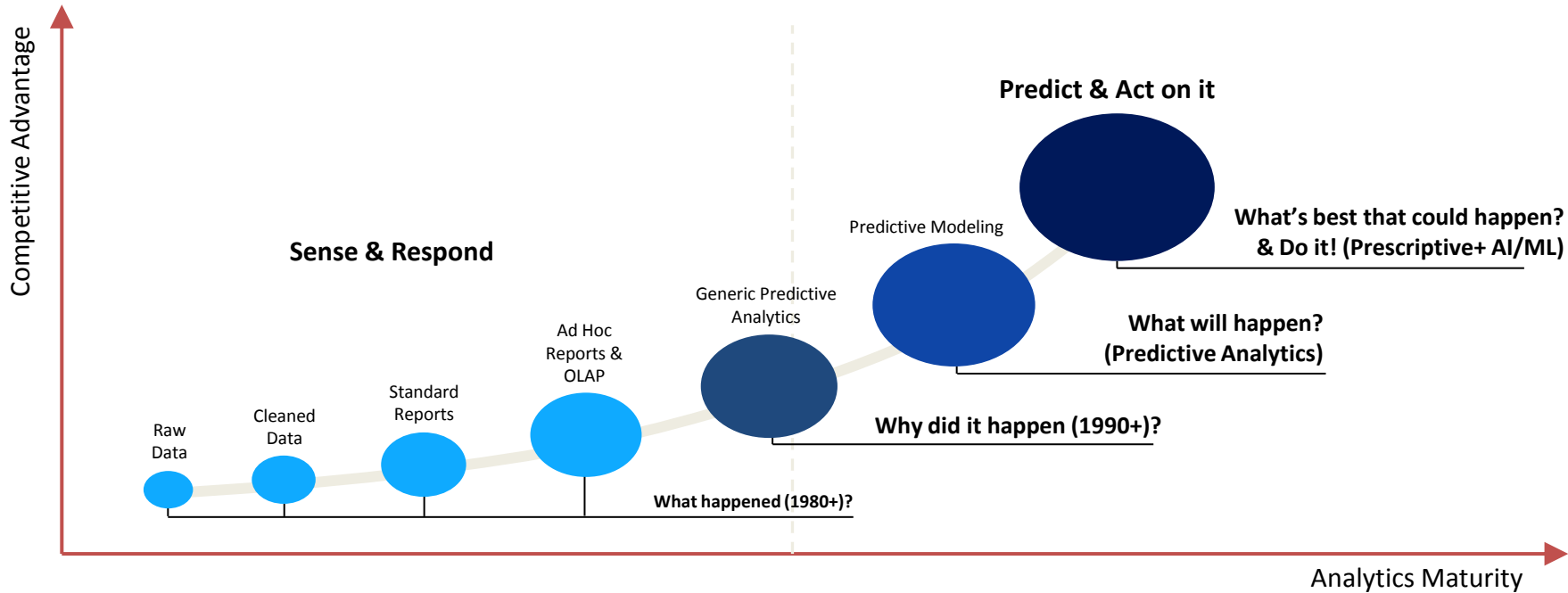


Vessyl smart cup tracks coffee and more for IoT hydration



Big Data / IOT Driving Prescriptive 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

Biju Thomas at ODTUG - *Emerging Jobs*

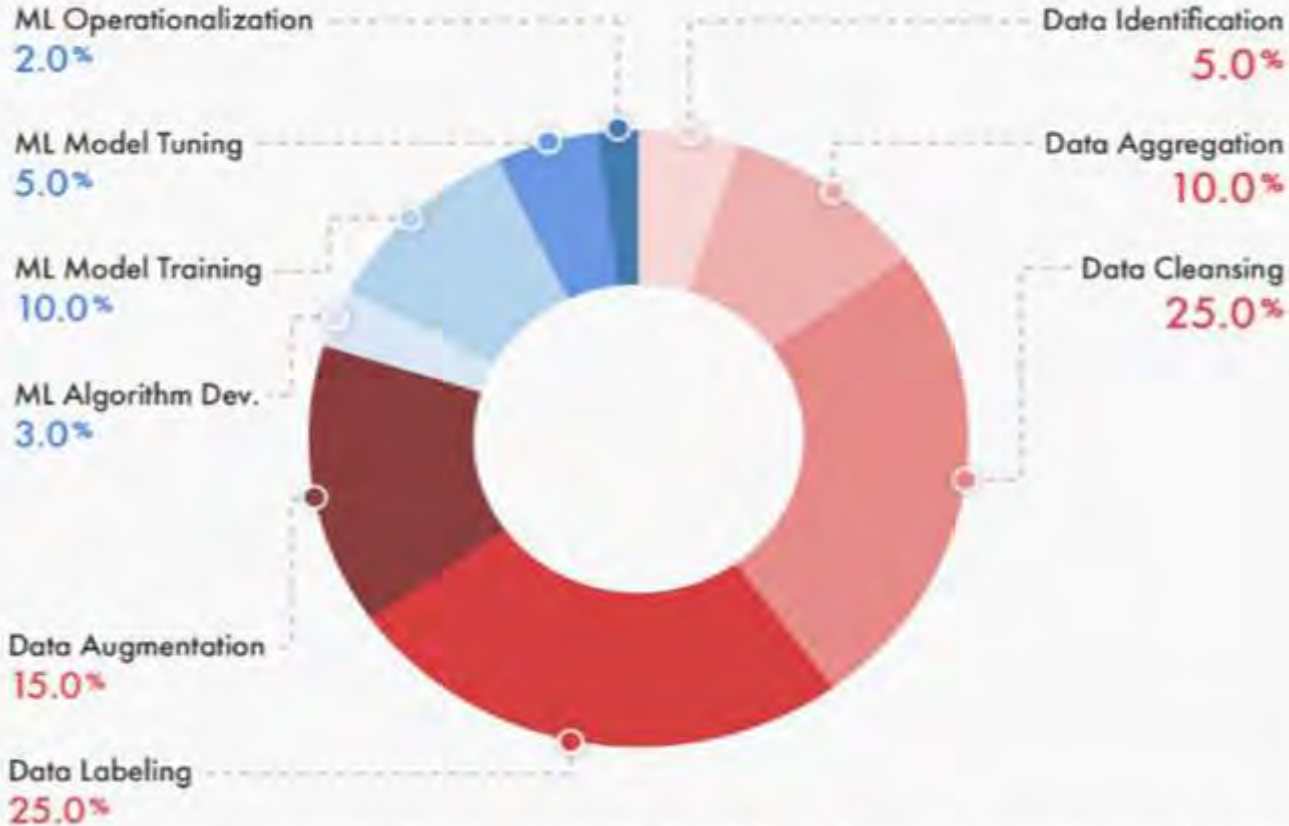
#8 Data Engineer

LinkedIn

2020
Emerging
Jobs Report

- 33% annual growth
- Skills
 - Apache Spark
 - Hadoop
 - Python
 - ETL
 - AWS
- Industries
 - Computer Software
 - Information Technology
 - Financial Services
 - Healthcare & Hospitals
- Primary job responsibilities involve preparing data for analytical or operational uses.
- Works as part of an analytics team, providing data in a ready-to-use form to data scientists.
- Commonly deal with both structured and unstructured data sets

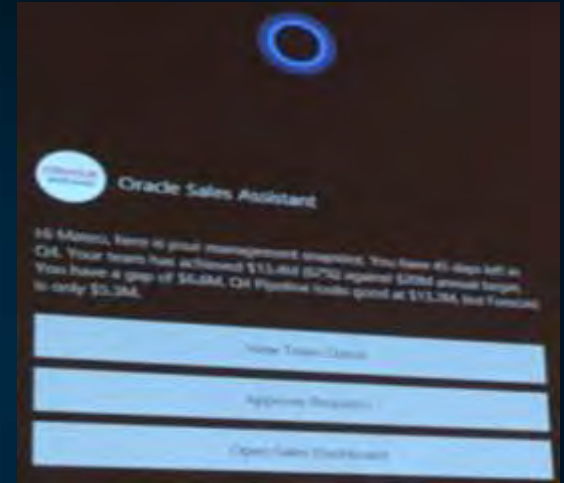
Percentage of Time Allocated to Machine Learning Project Tasks



Niti Sharma An Introduction to Data Labeling in Artificial Intelligence *Data Wrangling consumes over 80% of the time in AI projects.*

The DBA

The DBA is most important part of the Machine Learning Process

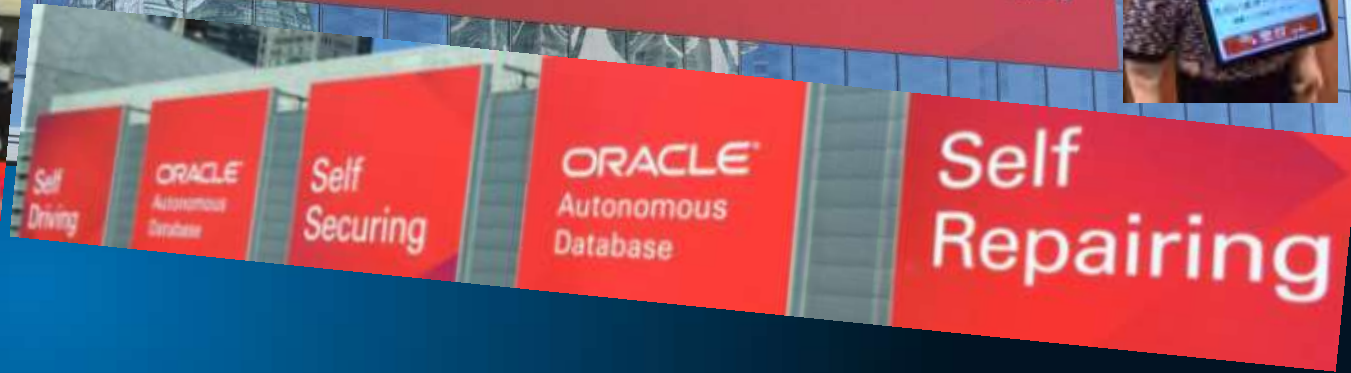
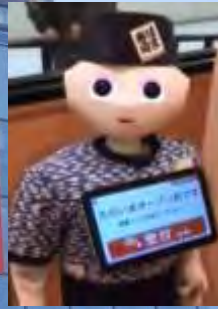


A Robot may not look one!

Oh Yeah... they never complain, always happy to do more, work anywhere, get smarter as time goes on, leverages AI & ML, works 24x7, doesn't ask for a raise, no union (yet).

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**

The Autonomous Database Cloud

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

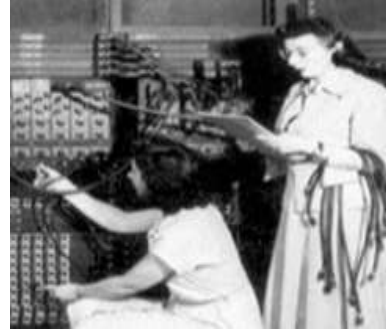


**Oracle Unveils World's First
Autonomous Database Cloud**

Reality of the Autonomous Database

Will my job change?

- Absolutely...sure hope so!
- Hopefully... It already has!
- It has many times in the past...
- It will move **closer to the business** & innovation
- Data Manager instead of DBA & Developer
- Security Expert instead of Security on the DB
- Watching over costs more
 - Cloud Hidden Costs
 - Cloud, Hybrid, or On-Site Decisions
 - Decide which databases should be Autonomous



Oracle Autonomous spreads to **OLTP**: 8/7/2018



Rich Niemiec @RichNiemiec · Aug 7

Are DBAs up for early retirement? @larryellison says No, but DBA won't do tedious things - managing disk storage & upgrading O/S. DBAs will work with dev on new apps & work with CIO to help business vs. patching. @oracledatabase

Autonomous Optimizations - Specialized by Workload

	ADW	ATP (Creates Indexes) *In 19c
➡ Primary Goal	Fast Complex Analytics	Fast Transaction Processing
📊 Data Formats	Columnar	Row
👤 Data Access Acceleration	Creates Data Summaries	RDMA for messaging and IO
💾 Memory Usage	Parallel Joins and Aggregations	Data Caching to Avoid IO
📈 Statistics	Automatically manages optimizer statistics as data changes	

Automatically Withstands Errors

- Autonomous database must be safer than manually operated database
- **Exceptional SLA Guarantee:**
 - **99.995 NRX%** (No Ridiculous eXclusions)
 - Guaranteed triggered if there is more than 2.5 minutes downtime a month
 - Includes patching and upgrade, database bugs, regional outages
- Applications that are architected for HA using Oracle best practices will usually see pauses, not failures

Outage	Key Feature	Potential Downtime
Server Outage (HA)	RAC	Near-Zero
Regional Outage, Disaster Recovery	ADG	Seconds
Data Corruption	ADG	Zero
Patches (Updates)	RAC	Near-Zero
Database Upgrade	ADG	Seconds
Table/Index Changes	Redef	Zero
User Error	Flashback	Time Since Error

The Autonomous Database & the IT Dept.

Autonomous Databases into the future:

- Who ensures database is tuned before it gets to the Cloud?
- Who ensures the cloud vendor is charging correctly?
- Who ensures the backup, security, or recovery is correct?
- Who decides what kind of service the databases will be?
- Who will build the policies for those autonomous databases?
- Who will have the knowledge to decide or estimate the cost of these services?
- Who decides the complex IT Infrastructure when we have more options & vendors?
- The answer is obvious: **A DBA & the rest of IT**, but not a simple DBA; A DBA that has evolved with all this new generation of databases on Cloud (**A Data Manager**).



Get Started FREE: oracle.com/cloud/free

cloud.oracle.com/tryit

oracle.com/cloud/free (Above link takes you here)

- Create your first Autonomous Database Data Warehouse
- Create your first Autonomous Database Transaction Processing
- Try out Analytics & Machine Learning
- Monitor / Clone ...etc.



Get Started FREE: oracle.com/cloud/free



Services Solutions Why OCI Customers Pricing Learn Developers Support Marketplace



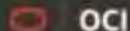
Sign in to Oracle Cloud

Oracle Cloud Free Tier

Build, test, and dep

New Always Free se
large scale Arm dev

Start for free



Services Solutions Why OCI Customers Pricing Learn Developers Support Marketplace



Sign in to Oracle Cloud

Oracle Cloud Advantage over Amazon Web Services

Get more with Oracle Cloud Free Tier

Oracle Cloud Free Tier

Always Free

- + 2 Autonomous Databases, 20 GB each
- + Up to 4 instances of Arm Compute with 3,000 OCPU hours and 18,000 GB hours per month
- + 200 GB block volume
- + 10 GB object storage

AWS Free Tier

Free for 12 Months

- + 1 database, 20 GB
- + 1 instance of Arm Compute
- + 30 GB block volume
- + 5 GB object storage

Consistently less expensive than AWS

1/4

the cost for outbound bandwidth

>2X

better compute price/performance

44%

lower compute costs for HPC

20X

the IOPS for half of the price

Start for free

Cloud Economics—See how we compare

Get Started FREE: oracle.com/cloud/free

Oracle Cloud Free Tier

Get started with...

Always-Free access to essential services including:

- Autonomous Database
- Object storage

Plus, \$300 of credits for 30 days to use on even more services:

- Container Engine for Kubernetes
- Analytics Cloud
- Data Integration

Account information

Country/Territory

First Name

Email

I am human



Sign Up for Free Oracle Cloud Promotion

Get 1000 of free credits good for up to 1000 hours of Oracle Cloud usage by the next 30 days.

Payment Information

You won't be charged unless you elect to upgrade the account.

You may see a small, temporary charge on your payment method. This is a verification hold that will be removed automatically. See the [FAQ](#) for more information.

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oracle.com/cloud/free



ORACLE Cloud

Sign In Contact Chat English Estimate Buy
Applications Platform Infrastructure Resources

Use the Following Oracle Cloud Services with Free Credits*



Autonomous Data Warehouse

3,338 hours, 2 TB of Exadata storage

Fully managed, pre-configured, and optimized. Load-and-go in minutes



Autonomous Transaction Processing

3,338 hours, 2 TB of Exadata storage

Mission-critical transaction processing made effortless, the first Database in the Cloud



Database

3,200 hours, 500 GB storage

Fully managed Oracle database



NoSQL Database

1.25 Billion Writes, 250 GB storage per instance

Fully managed, elastic. Get up and running in minutes. * 1KB record size, absolute consistency reads, per

ORACLE Cloud

Sign In Contact Chat English Estimate Buy
Applications Platform Infrastructure Resources



Container Engine for Kubernetes

1,500 hours of compute, 1.5 TB storage

A managed, enterprise-grade service to deploy and manage containers



Cloud Infrastructure Registry

5 TB storage

A highly available service to store and share container images



Big Data - Compute

2,700 hours, 1.5 TB storage

Create Hadoop and Spark based apps



Integration

4,464 hours

Application Integration with Adapter, Connectivity and Process Automation. Oracle takes care of management, backups, and patching



Developer Cloud

Always Free

Automate CI/CD workflows



Database Backup

5 TB

Oracle database backup



Ravello

2,500 hours

Move VMs to multiple Clouds



Digital Assistant

50,000 Requests

Build Digital Assistants for Your Enterprise Applications



Mobile Hub

50,000 Requests



API Platform

1,000 hours



Management Cloud

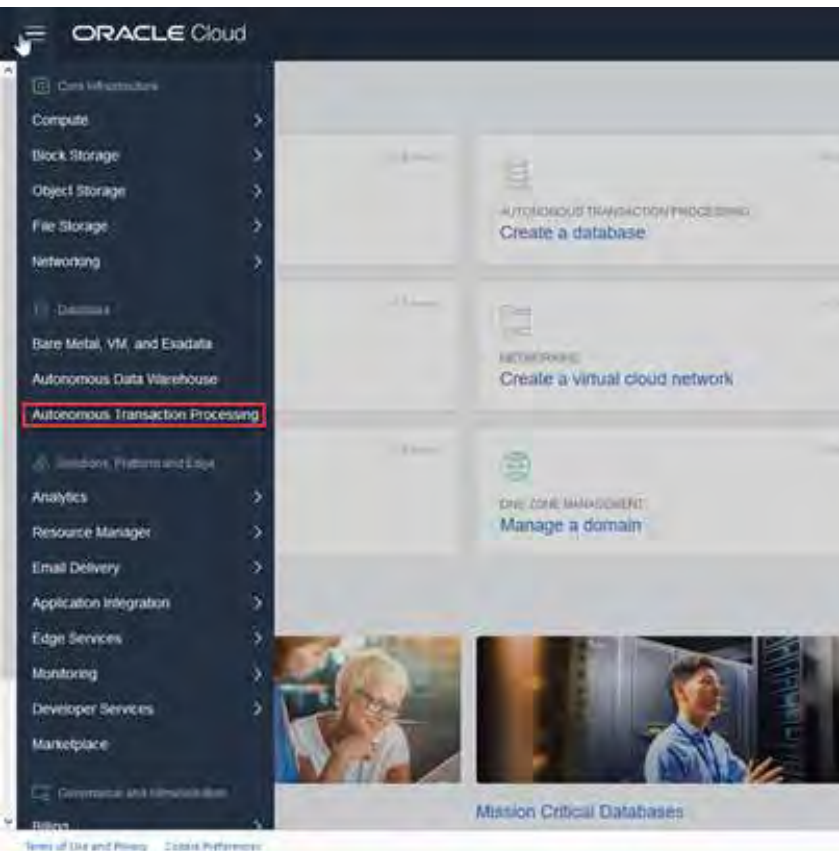
1,500 hours



Identity

10,000 hours of active usage

ADW/ATP – Provisioning a Database



7. The Create Autonomous Database dialog appears. Enter the following information:

- **Compartment** - Select a compartment for the database from the drop-down list.
- **Display Name** - Enter a name for the database for display purposes.
- **Database Name** - Use letters and numbers only, starting with a letter. Maximum length is 14 characters. (Underscores not initially supported.)
- **Workload Type** - Autonomous Transaction Processing is automatically selected. Alternately, you can choose Data Warehouse as the workload type.
- **Deployment Type** - Serverless will automatically be selected. This choice runs the autonomous database without provisioning a dedicated infrastructure. Alternately, you can choose the Dedicated Infrastructure deployment type to run the autonomous database on a dedicated Exadata infrastructure.
- **CPU Core Count** - Number of CPUs for your service.
- **Storage (TB)** - Select your storage capacity in terabytes. It is the actual space available to your service instance, including system-related space allocations.
- **Auto Scaling** - If you select the auto scaling option, Autonomous Transaction Processing can use up to three times more CPU and IO resources than specified by the number of OCPUs currently shown in the Scale Up/Down dialog. When auto scaling is enabled, if your workload requires additional CPU and IO resources, the database automatically uses the resources without any manual intervention required.
- **Administrator Credentials** - Password for ADMIN user of the service instance. The password must meet the following requirements:
 - The password must be between 12 and 30 characters long and must include at least one uppercase letter, one lowercase letter, and one numeric character.
 - The password cannot contain the username.
 - The password cannot contain the double quote (") character.
 - The password must be different from the last 4 passwords used.
 - The password must not be the same password that is set less than 24 hours ago.
- **License Type** - Select whether you have existing licenses or if you want to subscribe to new database software licenses and the database cloud service.
- **Tags** - (Optional) Tagging is a metadata system that allows you to organize and track resources within your tenancy. Tags are composed of keys and values which can be attached to resources.

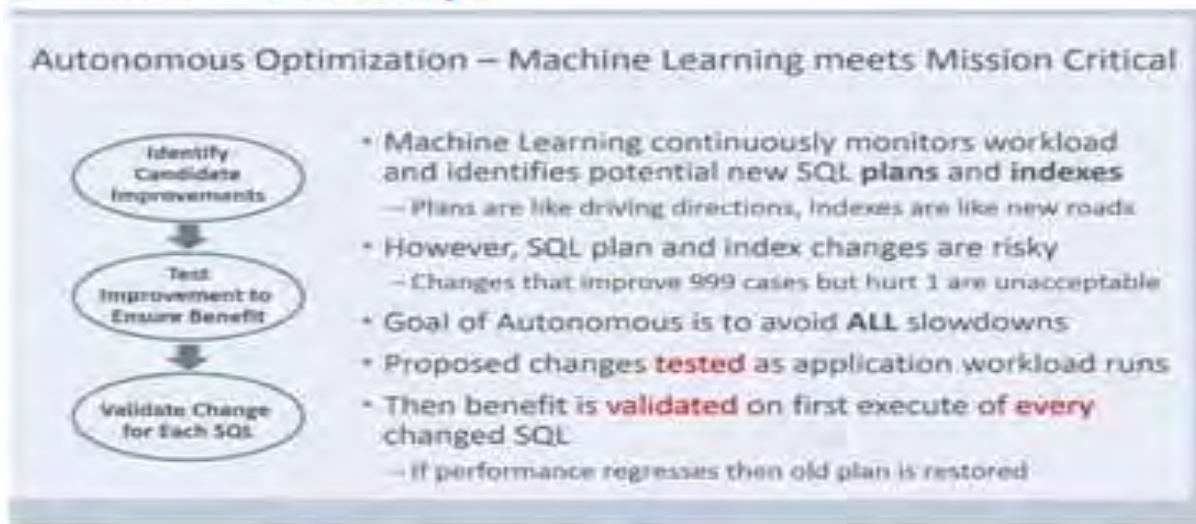
Click **Create Autonomous Database**

19c - Machine Learning with Automatic Indexes*



Rich Niemiec @RichNiemiec · 7 Aug 2018

Oracle19c #autonomousdatabase will leverage #machinelearning when you upgrade from #Oracle18c by using regression testing to ensure things will be faster in the new version. @oracledatabase @IOUG @OAUG1 @odtug @oracleace @viscosityna



ATP

•Screenshots from Larry Ellison introduction of ATP on 8/7/18 to describe update from Autonomous 18c to Autonomous 19c

19c ORACLE
Database

Fast 18c to 19c Upgrade

Autonomous Optimization – Machine Learning meets Mission Critical



- Machine Learning continuously monitors workload and identifies potential new SQL **plans** and **indexes**
 - Plans are like driving directions, Indexes are like new roads
- However, SQL plan and index changes are risky
 - Changes that improve 999 cases but hurt 1 are unacceptable
- Goal of Autonomous is to avoid **ALL** slowdowns
- Proposed changes **tested** as application workload runs
- Then benefit is **validated** on first execute of **every** changed SQL
 - If performance regresses then old plan is restored

ATP – Provisioning a Database (PDB)



ORACLE Cloud Search resources, services, documentation, and marketplace US E

Launch Resources View All Resources

COMPUTE Create a VM Instance 2-6 mins Always Free Eligible	AUTONOMOUS TRANSACTION PROCESSING Create an ATP database 3-5 mins Always Free Eligible	AUTONOMOUS DATA WAREHOUSE Create an ADW database 3-5 mins Always Free Eligible
NETWORKING Set up a network with a wizard 2-3 mins	RESOURCE MANAGER Create a stack 2-6 mins Always Free Eligible	OBJECT STORAGE Store data 2-8 mins
NETWORKING Set up a load balancer 5 mins Always Free Eligible	ORACLE CLOUD DEVELOPMENT KIT Set up an instance with developer tools 10-15 mins Always Free Eligible	SEARCH Query all resources

Start Exploring

- Get Started
- Key Concepts and Terminology
- Introduction to APEX

ORACLE Cloud
[Blurred Account Name]
Oracle Cloud Account Sign In

User Name

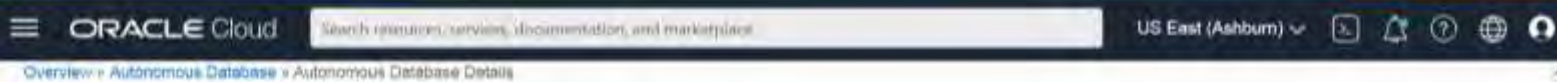
Password

Sign In

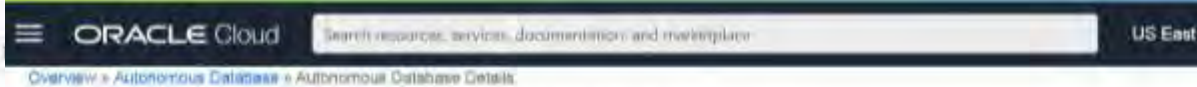
[Need help signing in? Click here](#)

[Cookie Preferences](#)

ATP – Provisioning a Database (2 minutes)



DB-20220510121752



DB-20220510121752

- Database Actions
- DB Connection
- Performance Hub
- Service Console
- More Actions

Autonomous Database Information

Tools Tags

General Information

Database Name: DB20220510121752
Workload Type: Transaction Processing
Compartment: richlemiec (root)
OCID: ...
Created: Tue, May 10, 2022, 17:19:34 UTC
OCPU count: 1
OCPU auto scaling: Disabled
Storage: 1 TB
Storage auto scaling: Disabled
License Type: License included
Database Version: 19c

Infrastructure

Dedicated Infrastructure: No

Autonomous Data Guard

Status: Disabled Enable

Backup

Last Automatic Backup: No active backups exist for this database.
Manual Backup Store: Not Configured

Network

Access: ...

Oracle Autonomous Database

70%

Q4 Growth Rate

Annualized Consumption Revenue - ACR

ATP – Stop Database (25 sec.)



ORACLE Cloud Search resources, services, documentation, and marketplace US East (Ashbu)

Overview » Autonomous Database » Autonomous Database Details

DB-20220510121752

Database Actions DB Connection Performance Hub Service Console More Actions

- Manage Scaling
- Stop
- Restart

Autonomous Database Information Tools Tags

General Information

Database Name: DB20220510121752
Workload Type: Transaction Processing

Infrastructure Dedicated Infrastructure

AVAILABLE

Confirm Stop

Are you sure you want to stop the Autonomous Database?

Stop Cancel

ORACLE Cloud Search resources, services, documentation, and marketplace US East (As)

Overview » Autonomous Database » Autonomous Database Details

DB-20220510121752

Database Actions DB Connection Performance Hub Service Console More Actions

Autonomous Database Information Tools Tags

General Information

Database Name: DB20220510121752
Workload Type: Transaction Processing

Infrastructure Dedicated Infrastructure

STOPPING

ORACLE Cloud Search resources, services, documentation, and marketplace US East (As)

Overview » Autonomous Database » Autonomous Database Details

DB-20220510121752

Database Actions DB Connection Performance Hub Service Console More Actions

Autonomous Database Information Tools Tags

General Information

Database Name: DB20220510121752
Workload Type: Transaction Processing

Infrastructure Dedicated Infrastructure

STOPPED

ATP – Start Database (30 sec.)

ATP

ORACLE Cloud Search resources, services, documentation, and marketplace US East (Ashburn)

Overview » Autonomous Database » Autonomous Database Details

DB-20220510121752

ORACLE Cloud Search resources, services, documentation, and marketplace US

Overview » Autonomous Database » Autonomous Database Details

DB-20220510121752

ORACLE Cloud Search resources, services, documentation, and marketplace

Overview » Autonomous Database » Autonomous Database Details



AVAILABLE

DB-20220510121752

- Database Actions
- DB Connection
- Performance Hub
- Service Console

Autonomous Database Information

Tools Tags

General Information

Database Name: DB20220510121752

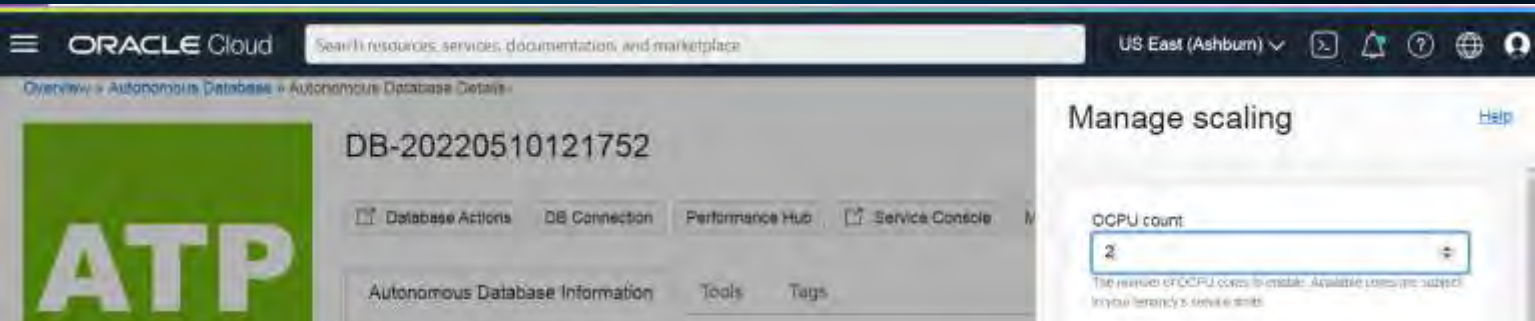
Workload Type: Transaction Processing

Infrast

Dedicated

ATP – Scaling Database (50 sec.)

ATP



Oracle Cloud console interface for an Autonomous Database (ATP). The page title is "Manage scaling". The database name is "DB-20220510121752". The OCPU count is currently set to 2. A note below the input field states: "The number of OCPU cores to enable. Available processors subject to your tenancy's service limit."

Database Name: DB-20220510121752

Workload Type: Transaction Processing

Compartment: richnielec (root)

OCID: ...Spdqg ...Show Copy

Created: Tue, May 10, 2022, 17:19:34 UTC

OCPU count: 2

OCPU auto scaling: Disabled

Storage: 1 TB

Storage auto scaling: Disabled

License Type: License included

Database Version: 19c



Oracle Cloud console interface for an Autonomous Database (ATP). The page title is "Manage scaling". The database name is "DB-20220510121752". The OCPU count is currently set to 2. The "Infrastructure" section shows "Dedicated Infrastructure: No". The "Autonomous Data Guard" section shows "Status: Disabled (Error)". The "Backup" section shows "Last Automatic Backup: No active backups exist for this database." and "Manual Backup Store: Not Configured". The "Network" section is partially visible.

Database Name: DB-20220510121752

Workload Type: Transaction Processing

Compartment: richnielec (root)

OCID: ...Spdqg ...Show Copy

Created: Tue, May 10, 2022, 17:19:34 UTC

OCPU count: 2

OCPU auto scaling: Disabled

Storage: 1 TB

Storage auto scaling: Disabled

License Type: License included

Database Version: 19c

Infrastructure

Dedicated Infrastructure: No

Autonomous Data Guard

Status: Disabled (Error)

Backup

Last Automatic Backup: No active backups exist for this database.

Manual Backup Store: Not Configured

Network

ATP – Restart Database (Stop/Start) (40 sec.)

ATP



AVAILABLE

DB-20220510121752

Database Actions DB Connection Performance Hub Service Console More Actions

Manage Scaling

Stop

Restart

Autonomous Database Information Tools Tags

General Information

Database Name: DB20220510121752

Workload Type: Tra

Compartment: rich

OCID: ..Eppdq @h

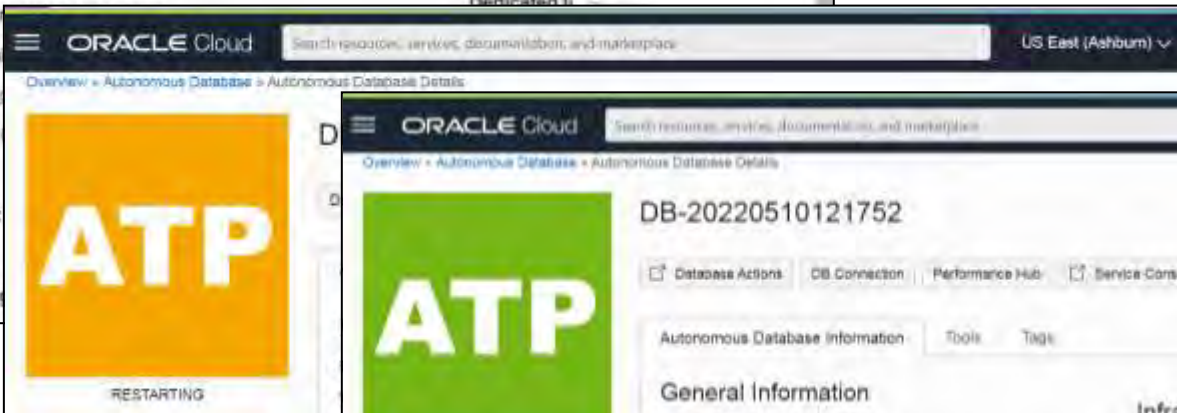
Created: Tue, May 1

OCPU count: 1

OCPU auto scaling:

Storage: 1 TB

Storage auto scaling



RESTARTING



AVAILABLE

DB-20220510121752

Database Actions DB Connection Performance Hub Service Console More Actions

Autonomous Database Information Tools Tags

General Information

Database Name: DB20220510121752

Workload Type: Transaction Processing

Infrastructure

Dedicated Infrastructure

ATP - Create a Clone



ORACLE Cloud Search resources, services, documentation and tasks by... US East

Overview > Autonomous Database > Autonomous Database Details

DB-20220510121752

Database Actions DB Connection Performance Hub Service Console More Actions

Manage Scaling

Stop

Restart

Autonomous Database Information Tools Tags

General Information

Database Name: DB20220510121752
Workload Type: Transaction Processing
Compartment: nchueniac (root)
OCID: [6ppn6](#) [Show Error](#)
Created: Tue, May 10, 2022, 17:19:34 UTC
OCPU count: 1
OCPU auto scaling: Disabled

Infrastr Restart
Dedicated I (1/1)
Autono **Create Clone**
Status: Disc Update Network Acces
Backup Administrator Passwa
Last Autom

ORACLE Cloud Search resources, services, documentation and tasks by...

Create Autonomous Database Clone

Choose a clone type

Full Clone
Creates a new database with source database's data and metadata.

Refreshable Clone
Creates a read-only full clone that can be easily refreshed with source database data. Must be refreshed within 7 days (168 hours) to remain connected to the source database.

Metadata Clone
Creates a new database that includes all source database schema metadata, but not the source database data.

Clone source

Clone from database instance
Creates a clone that inherits its metadata & schema from the source database.

Clone from a backup
Use for non-Autonomous Database clones that are not connected to the source database.

Provide basic information for the Autonomous Database clone

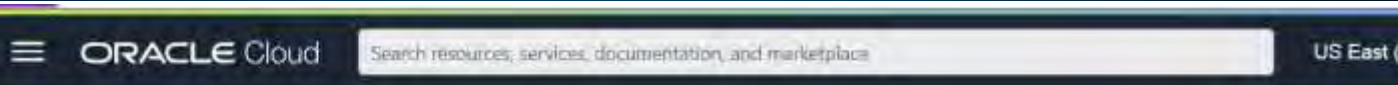
Choose your preferred region

US East (Ashburn) - Current Region

[Create Autonomous Database Clone](#) [Cancel](#)

View of the get Primary [Go back to previous](#)

Database Actions are Numerous!



Overview » Autonomous Database » Autonomous Database Details



AVAILABLE

DB-20220510121752

Database Actions

Autonomous Databa

General Infor

Database Name: DB20

Workload Type: Trans

ORACLE Database Actions | Launchpad

Development

- SQL: Execute queries and scripts and create database objects.
- DATA MODELER: Create database diagrams by database object.
- REP: Setup REST API to your database.
- SQLcl: Manage your OCI Database Database.
- EXPORT: Export data from your database.
- IMPORT: Import, manage and view data and files.
- APX: Build web applications quickly.

Data Tools

- DATA PUMP: Import and export data quickly with data pumps.
- DATA LOAD: Load or append data from local files to Oracle database.
- EXPORT: Upload data (identified with file object) to cloud.
- DATA RESERVE: Discover anomalies, outliers and hidden patterns in your data.
- DATA ANALYZER: Visualize your data.

Getting Started

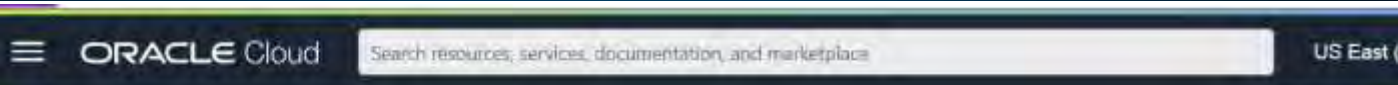
- Charts: Create visualizations using area, bar, pie, and other popular charting methods from your SQL query results.
- RESTful Web Services: Deploy REST APIs for your Oracle database - GET, POST, PUT and DELETE securely using HTTPS with your Oracle data and stored procedures.
- Load Data: Populate existing tables or build new ones from local files (Avro, JSON, XML, CSV or Excel) using our data loading wizard.
- JSON: Create collections, documents, add, edit, delete, and browse your documents, and visualize your JSON Data Guide.

Need Help?

- Documentation
- SQL Developer Community Forum
- SQL Developer on Twitter

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ATP - Performance Hub



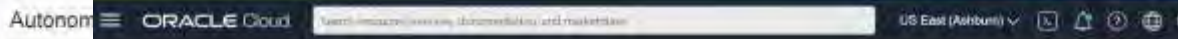
Overview » Autonomous Database » Autonomous Database Details



AVAILABLE

DB-20220510121752

- Database Actions
- DB Connection
- Performance Hub**
- Service Console
- More Actions



Performance Hub - DB-20220510121752

Class: DBSYS | Host: ODP

Last Hour: May 10, 2022 8:53:18 PM - 7:53:18 PM

Activity Summary (Average Active Sessions) ⓘ



ADH Analytics | SQL Monitoring | AOM | Workload | Blocking

Advanced Filters ⓘ | Filter

Average Active Sessions | All Consumers ⓘ | Consumer G

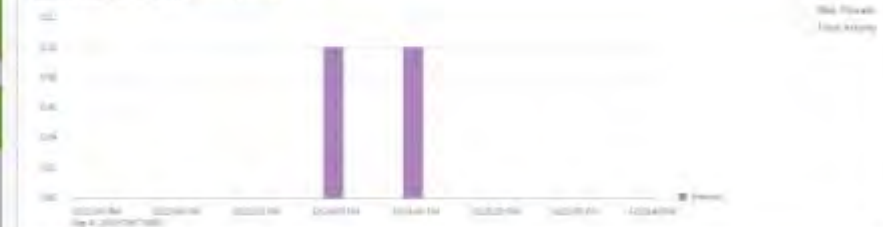
Close

Show a Message | Filter



DB 201609041830

Average Active Sessions by Consumer Group ⓘ



SQL ID: By Consumer Group

SQL ID: Activity (Average Active Sessions)



User Session: By Consumer Group

User Session: Activity (Average Active Sessions)



ATP - Service Console (Overview/Activity)

ATP

DB-20220510121752

Service Console

Database Actions

DB Connection

Performance Hub

Service Console

More Actions

ORACLE
Cloud Infrastructure

Autonomous
Transaction
Processing

Overview

Activity

Administration

Development

DATABASE
DB201909041630

ORACLE
Cloud Infrastructure

Transaction
Processing

Overview

Activity

Administration

Development

DATABASE
DB201909041630

The Monitored SQL tab shows information about current and past monitored SQL statements. See [documentation](#) for more information.

Show Details

Download Report

Cancel Execution

Auto Refresh: Off

	PARALLEL	USER NAME	MODULE	CONSUMER GROUP	DATABASE TIME	I/O BYTES
1		ADMIN	Oracle REST Data Se	LOW	1.83 s	111 GB
2		ADMIN	SQL Developer	LOW	51.77 s	
3		ADMIN	SQL Developer	LOW	50.43 s	
4		ADMIN	SQL Developer	LOW	53.42 s	
5		ADMIN	SQL Developer	LOW	19.91 s	
6		ADMIN	SQL Developer	LOW	18.95 s	
7		ADMIN	SQL Developer	LOW	36.95 s	

ADW - Provision Database (1 min. 20 sec.)

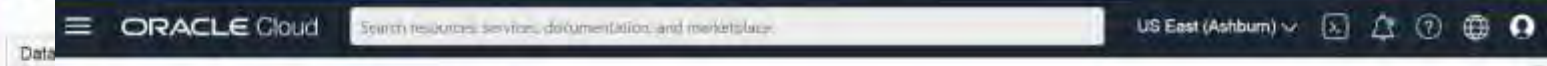


Overview > Autonomous Database > Autonomous Database Details

DB-20220510174437



PROVISIONING



Overview > Autonomous Database > Autonomous Database Details

DB-20220510174437



AVAILABLE

- Database Actions
- DB Connection
- Performance Hub
- Service Console
- More Actions

Autonomous Database Information

Tools Tags

General Information

Database Name: DB20220510174437
Workload Type: Data Warehouse
Compartment: richnemic (root)
OCID: ...labjpa...
Created: Tue, May 10, 2022, 22:57:35 UTC
OCPU count: 1
OCPU auto scaling: Disabled ⓘ
Storage: 1 TB
Storage auto scaling: Disabled ⓘ
License Type: License included

Infrastructure

Dedicated Infrastructure: No

Autonomous Data Guard ⓘ

Status: Disabled-Enable

Backup

Last Automatic Backup: No active backups exist for this database.
Manual Backup Store: Not Configured

Network

Optimized for Autonomous Database



- Managed service for data warehouse workloads
- **Easy to import data** from various source: existing Oracle installation, external tables...
- ADB Originally configured for **best DW (ADW) performance**: no parameter settings required. **New ATP** with auto-indexes (19c+ only)!
- Optimizer **statistics are automatically gathered and maintained**; pre-configured for accuracy and efficiency
- **No SQL tuning or hints needed**
- DOP for SQL is automatically chosen for best performance

ADW vs. ATP - *sqlmaria.com* blog



Autonomous Data Warehouse

Optimizes Complex SQL



Columnar Format



Creates Data Summaries



Memory Speeds Joins, Aggs
(Columnar In-Memory Usage)



Statistics gather as part of
bulk load operations

Autonomous Transaction Processing

Optimizes Response Time

Row Format

Creates Indexes
(Auto-Indexing on 19c)

Memory for Caching, No IO

Statistics gather as part of
DML operations

Autonomous Database: Performance vs. AWS



Rich Niemiec @RichNiemiec · Oct 1

Replying to @RichNiemiec

Demo by #LarryEllison of #oracle vs #Amazon is 15x faster "but you have to be willing to pay less." #ioug #viscosityna #oracleace

Retail Analysis Workload

Start

Oracle

Autonomous Data Warehouse Cloud
16 OCPU

\$0.02

✔ Workload Completed

Queries Completed 14 of 14

Time Elapsed 20s

Start

AWS

Redshift
8 nodes of ds2.xlarge

\$0.31

✔ Workload Completed

Queries Completed 14 of 14

Time Elapsed 282s

**Amazon
15.5x More Expensive**

Autonomous Database Summary

MY ADW/ATP Benefits:

- Oracle19c PDB –**19c features** (Server, Storage, VM, RAC)
- 3rd Party **BI and Integration tools** as well as Oracle's
- Pay/Scale what you need only! **Shut down idle instances**
- Runs on Oracle Cloud or YOUR Cloud at Customer
- Auto Full stack **patching** once/quarter with pre-checks prior
- **Automatic Patching** rolls across nodes for availability
- Automatic Quarterly patches or off-cycle Security Patches
- **ML Security**, Fully Encrypted, with Data Vault & Masking
- Oracle “break glass” access when approved by client
- Monitors CPU, Disk, Memory with Alerts & Resource Mgr.
- Cluster Health Monitor & Error Handling use ML algorithms

Results in Less Admin, More Uptime & Better Security!

Autonomous Database Summary

Database management simplified...

* Sean Stacey Session

1 Auto-Provisioning
Automatically deploys mission-critical databases (RAC on Exadata infrastructure) which are fault-tolerant and highly available. Enables seamless scale-out, protection in case of a server failure and allows updates to be applied in a rolling fashion, while apps continue to run.

2 Auto-Configuration
Automatically configures the database to optimize for specific workloads. Everything from the memory configuration, the data formats, and access structures are optimized to improve performance. Customers can simply load data and go.

3 Auto-Indexing
Automatically monitors workload and detects missing indexes that could accelerate applications. It validates each index to ensure its benefit, before implementing it and uses machine learning to learn from its own mistakes.

4 Auto-Scaling
Automatically scales compute resources when needed by workload. All scaling occurs online, while the application continuously runs. Enables true pay per use.

5 Automated Data Protection
Automatically protect sensitive and regulated data in the database, all via a unified management console. Assess the security of your configuration, users, sensitive data, and unusual database activities.

6 Automated Security
Automatic encryption for the entire database, backups and all network connections. No access to OS or admin privileges prevents phishing attacks. Protects the system from both cloud operations and any malicious internal users.

7 Auto-Backups
Automatic daily backup of database or on-demand. Restore or recover a database to any point-in-time you specify in the last 60 days.

8 Auto-Patching
Automatically patch or upgrade with zero downtime. Applications continue to run as patching occurs in a round-robin fashion across RAC nodes or servers.

9 Automated Detection and Resolution
Using pattern recognition, hardware failures are automatically predicted without long timeouts. IOs are immediately redirected around unhealthy devices to avoid database hangs. Continuous monitoring for each database automatically generates service requests for any deviation.

10 Automatic Failover
Automatic failover with zero-data loss to standby. It's completely transparent to end-user applications.

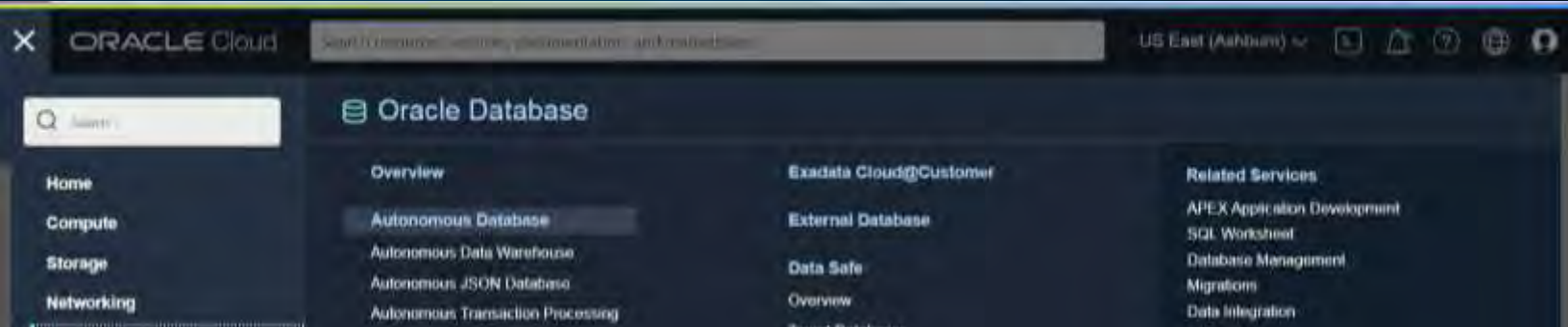
Autonomous Database - Cost Analysis

ATP ADW

The screenshot displays the Oracle Cloud Billing & Cost Management console. The left sidebar contains navigation options: Home, Compute, Storage, Networking, Oracle Database, Databases, Analytics & AI, Developer Services, Identity & Security, Observability & Management, Hybrid, Migration, Billing & Cost Management (highlighted), and Governance & Administration. The main content area is titled "Billing & Cost Management" and includes sections for Billing, Programs and Rewards, and Related Services. The "Cost Analysis" section is active, showing a "Cost details (USD)" view. A chart titled "Cost by Date (UTC)" displays daily costs from May 1 to May 17, 2022. The chart is a stacked bar chart with a total cost to date of \$215.11 (USD). The Y-axis represents Cost (USD) from 0.00 to 16.00. The X-axis represents Date (UTC) from May 01 to May 17. The legend includes: Oracle Cloud Storage, Compute, Database, Object Store, Tenancy, and Virtual Cloud.

Date (UTC)	Cost (USD)
May 01	15.00
May 02	15.00
May 03	15.00
May 04	15.00
May 05	15.00
May 06	15.00
May 07	15.00
May 08	15.00
May 09	15.00
May 10	15.00
May 11	15.00
May 12	15.00
May 13	10.00
May 14	10.00
May 15	10.00
May 16	10.00
May 17	1.11

Autonomous DB: ATP-ADW-AJD-APEX *all in root*



ADW

ATP

AJD

APX

Create/Run Notebooks in Oracle ML

Quick Actions

The screenshot shows the Oracle Machine Learning interface. On the left, a sidebar titled 'Notebooks' is visible. The main area displays a code editor with the following content:

```
PL/SQL procedure successfully completed.
```

```
Oracle  
-- visualization lift Result  
select QUANTILE_NUMBER, GAIN_CUMULATIVE from LIFT_TABLE
```

Below the code editor, there are several interactive elements:

- A toolbar with icons for undo, redo, save, and other actions.
- A 'Settings' button.
- A section for 'All fields' with a search bar and a list of fields: QUANTILE_NUMBER, GAIN_CUMULATIVE.
- A 'Keys' section with a search bar.

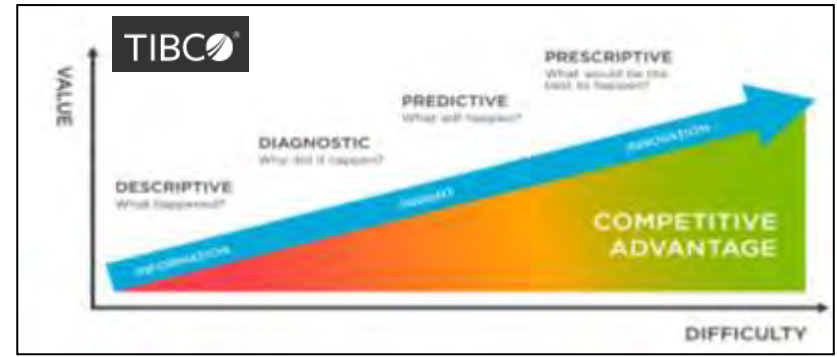
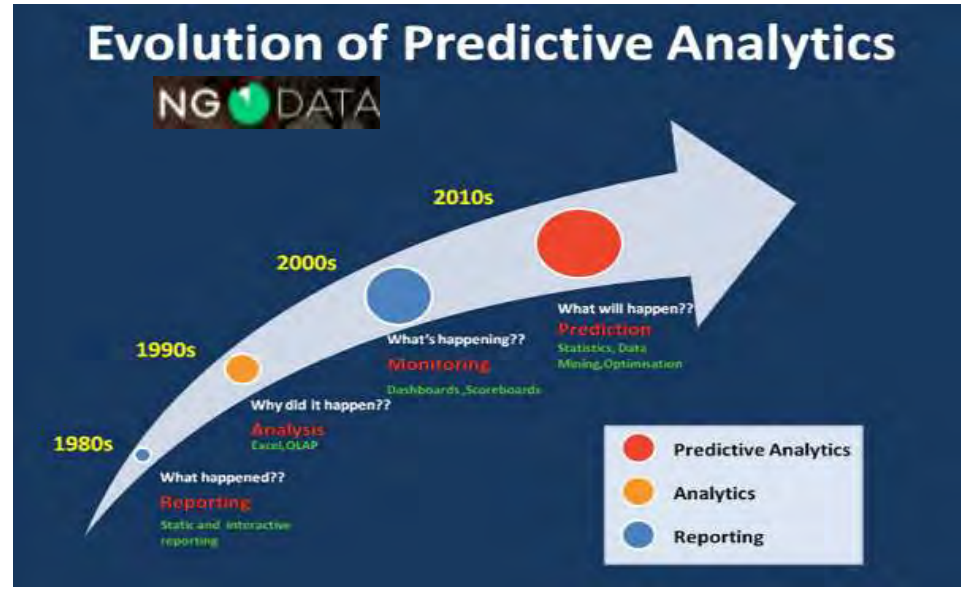
The screenshot shows the Oracle Machine Learning interface for a notebook titled 'Analyzing Customer Data Notebook'. The notebook is running on a 'Machine Learning Lab Project (Oracle Machine Learning Workspace 1)' and is connected to a user named 'CHBERGER'.

The notebook content includes:

- A table of customer data with columns: ID, Name, Last Name, Gender, Age, Marital Status, Address, City, and Postal Code. The data is as follows:

ID	Name	Last Name	Gender	Age	Marital Status	Address	City	Postal Code
102,962	Jim	Bhagwat	M	1,943	Married	4090 Perryway Street	46,453	North Carolina
103,564	Carl	Dool	F	1,306	Never/M	117 South Lafayette Avenue	70,457	Norman
104,266	Jadye	Dyer	M	1,968	Married	57 West De Soto Drive	87,344	Petaluma
- A bar chart titled 'HOUSEHOLD_SIZE' showing the distribution of household sizes. The x-axis represents household size (1-11) and the y-axis represents the count (0-440). The chart is grouped by household size.
- A pie chart showing the distribution of household sizes. The legend includes: HS-grad, Bach, Master, Grad, AssocA, 12th, Profis, AssocV, PHD, 19th, 11th, 5th-8th, 7th-8th, 9th, 1st-4th, and Phdcr.
- A chart titled 'Household Size vs. Yrs Residence' showing the relationship between household size and years of residence. The x-axis represents years of residence (0-14) and the y-axis represents the count (0-22,888). The chart is stacked by household size (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14).

What You Need; Nick of Time (Predictive Analytics)



ATP - Service Console (Development)

ATP

ORACLE
Cloud Infrastructure

Service Console

Autonomous Transaction Processing

Oracle Application Express

Oracle Application Express (APEX) provides a low-code development environment that enables you to build apps in a single, extensible platform, which is fully supported by Autonomous Database.

Overview

Actively

Administration

Development

Database
DB201909041630

SQL Developer Web

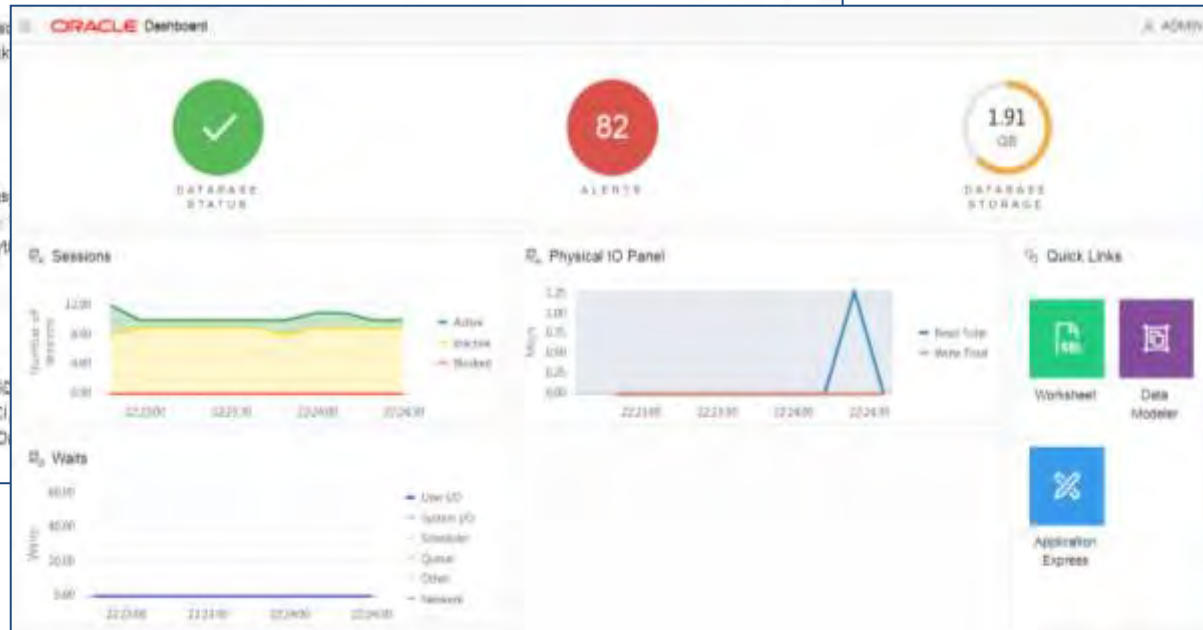
Oracle SQL Developer Web provides a browser-based development environment that provides a subset of the features available in the desktop version of SQL Developer.

Oracle ML SQL Notebooks

Oracle Machine Learning SQL notebooks provide easy access to Oracle Analytics' machine learning algorithms (classification, regression, etc.), SQL, PL/SQL and Oracle's statistical and analytical functions.

Download Oracle Instant Client

This is a free, lightweight set of tools, libraries and SDKs for Node.js, Python and PHP and provide access for OCI. Includes - Oracle recommends using this version of OCI.



▲ How Do I?



Get Started

Get started with Oracle Machine Learning



Create Notebooks

How to create a notebook



Create Jobs

How to create a job



Manage Permissions

How to manage collaborative permissions in workspaces



Try It

Follow along with a hands on workshop

▲ Quick Actions



Run SQL Statements

Enter and run SQL statements



Run SQL Scripts

Enter and run SQL scripts



Notebooks

The place for data discovery and analytics



Jobs

Schedule notebooks to run at certain times



Examples

Check out some examples

Machine Learning connection to ADW/ATP - SQL

ATP

DB Connection Performance Hub **Service Console** Scale Up/Down Stop Actions

Autonomous Database Information Tags

The screenshot displays the Oracle Machine Learning web interface. At the top, there are navigation tabs: "DB Connection", "Performance Hub", "Service Console" (highlighted with a red dashed circle), "Scale Up/Down", "Stop", and "Actions". Below these is a section for "Autonomous Database Information" with a "Tags" link. The main content area is titled "Example Templates" and features a grid of ten notebook cards. Each card includes a title, a brief description, the author's name, the date added, and tags. The cards are arranged in two rows of five. The first row includes "OML4Py Text Mining SVM", "OML4SQL Anomaly Detection SVM", "OML4SQL Association Rules Apriori", and "OML4SQL Attribute Importance MDL". The second row includes "OML4SQL Classification DT", "OML4SQL Classification GLM", "OML4SQL Classification NB", and "OML4SQL Classification NN". On the left side, there is a sidebar with a search bar and two notebook preview cards: "Anomaly Detection" and "Clustering".

ORACLE Machine Learning ADMIN_RICH2 Project [ADMIN_RICH2... ADMIN_RICH2

Example Templates

+ Create Notebook

Anomaly Detection
This notebook shows how to
Author: Oracle
Date Added: 2/13/18 11:16 P
Tags: Anomaly Detection

OML4Py Text Mining SVM
This notebook builds and applies a classification model (S...
Author: Oracle
Date Added: 11/05/17 5:45 AM
Tags: Classification Prediction Details SH-SUPPLEMENTARY...

OML4SQL Anomaly Detection SVM
This notebook builds an anomaly detection (I-Clear Supp...
Author: Oracle
Date Added: 11/05/17 5:45 AM
Tags: Anomaly Detection SQL SH-SUPPLEMENTARY...

OML4SQL Association Rules Apriori
This notebook builds an association rules model (A Priori)...
Author: Oracle
Date Added: 11/05/17 5:45 AM
Tags: SQL Rules Market Basket Analysis Frequent Itemsets...

OML4SQL Attribute Importance MDL
This notebook computes attribute importance (Minimum...
Author: Oracle
Date Added: 11/05/17 5:45 AM
Tags: SQL Attribute Importance Minimum Description La...

Clustering
This notebook shows how to
Author: Oracle
Date Added: 2/13/18 11:16 P
Tags: Clustering K-Means

OML4SQL Classification DT
This notebook builds and applies a Decision Tree Classifi...
Author: Oracle
Date Added: 11/05/17 5:45 AM
Tags: SQL Classification Decision Tree SH-SUPPLEMENTARY...

OML4SQL Classification GLM
This notebook builds and applies a Generalized Linear Cl...
Author: Oracle
Date Added: 5/10/17 8:40 AM
Tags: SQL Classification SH-SUPPLEMENTARY_DEMOGRAPH...

OML4SQL Classification NB
This notebook builds and applies a Naive Bayes Classifi...
Author: Oracle
Date Added: 5/10/17 8:40 AM
Tags: SQL Classification SH-SUPPLEMENTARY_DEMOGRAPH...

OML4SQL Classification NN
This notebook builds and applies a Neural Network Classi...
Author: Oracle
Date Added: 5/10/17 8:40 AM
Tags: SQL Classification SH-SUPPLEMENTARY_DEMOGRAPH...

Machine Learning connection ADW/ATP - Python

Example Templates

+ Create Notebook

Filter

OML Run-me-first

This notebook loads and prepares tables with data...

Author: Oracle

Date Added: 2/17/21 5:18 PM

Tags: 'SQL' 'sql' 'Object Storage' 'Customer Insuren...

0 Likes

OML4Py -0- Tour

This notebook highlights a wide range of OML4Py ...

Author: Oracle

Date Added: 11/26/20 5:41 AM

Tags: 'Attribute Importance' 'Classification' 'Rando...

2 Likes

OML4Py -1- Introduction

This notebook highlights OML4Py core features

Author: Oracle

Date Added: 11/26/20 5:41 AM

Tags: 'Anomaly Detection' 'Attribute Importance' 'R...

2 Likes

OML4Py -2- Data Selection and Manl...

This notebook highlights the OML4Py Transparenc...

Author: Oracle

Date Added: 11/26/20 5:41 AM

Tags: 'Join' 'Split' 'Python' 'Data Selection' 'Proxy O...

2 Likes

OML4Py -3- Datastore and Script Rep...

This notebook highlights features of OML4Py data...

Author: Oracle

Date Added: 11/26/20 5:41 AM

Tags: 'Regression' 'Python' 'Data Selection' 'Iris' 'Da...

OML4Py -4- Embedded Python Execu...

This notebook highlights features of OML4Py Emb...

Author: Oracle

Date Added: 11/26/20 5:41 AM

Tags: 'Regression' 'Python' 'Matplotlib' 'Iris' 'Embed...

OML4Py -5- AutoML

This notebook highlights the AutoML features of O...

Author: Oracle

Date Added: 11/26/20 5:41 AM

Tags: 'Classification' 'Regression' 'Random Forest' ...

OML4Py Anomaly Detection SVM

This notebook builds an anomaly detection (1-Class...

Author: Oracle

Date Added: 11/26/20 5:41 AM

Tags: 'Anomaly Detection' 'Sampling' 'Join' '1-Class...

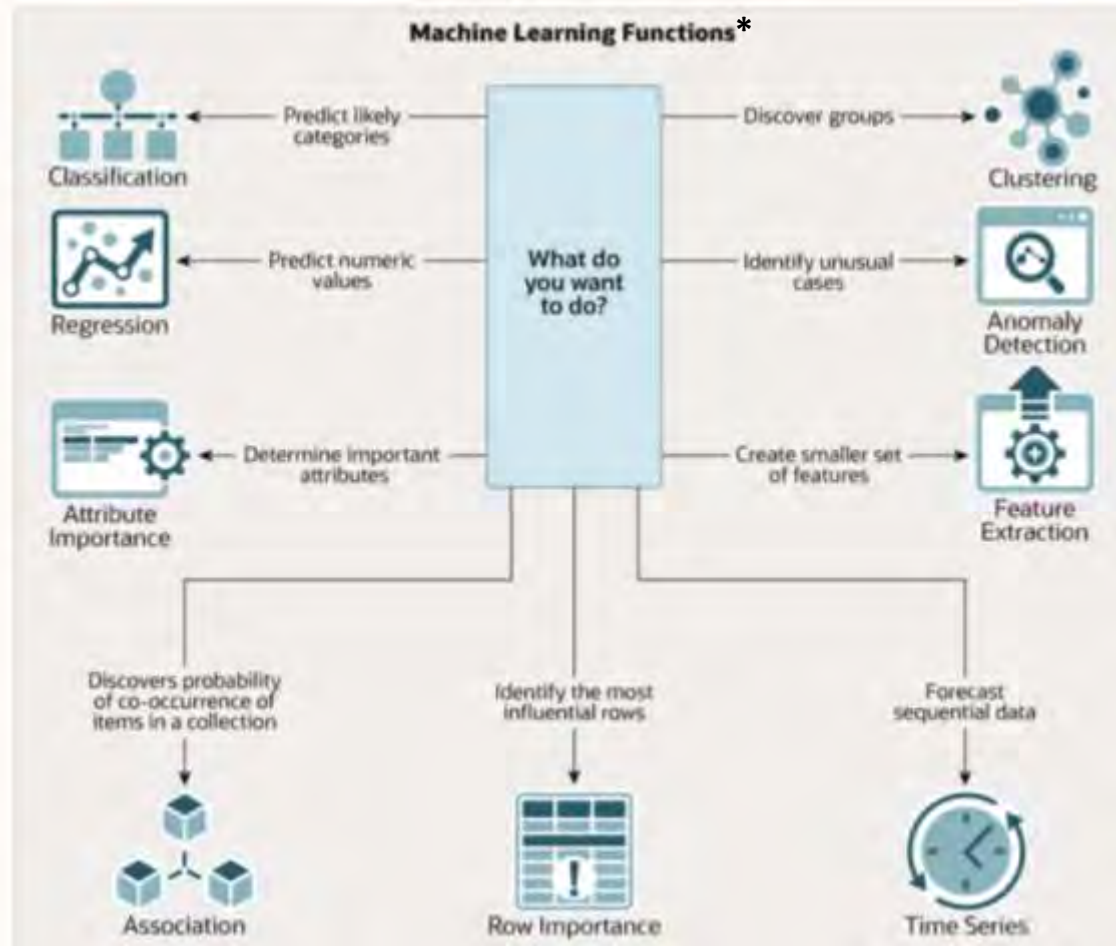
Machine Learning Functions* - Oracle Docs.

- **First:** *Clear Business Problem to Solve*
 - **Second:** *Function to Perform*
 - **Third:** *Algorithm to use*
-
-

- **First:** *Build/Train the Model* when you build it using about 60% of data.

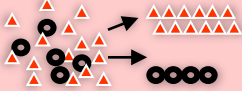
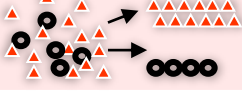
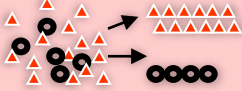

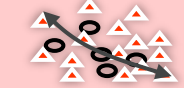
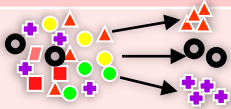
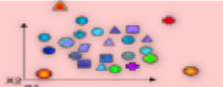
- **Second:** *Test/Score Model* for accuracy/precision using about 40% of data.

Compare Algorithms!

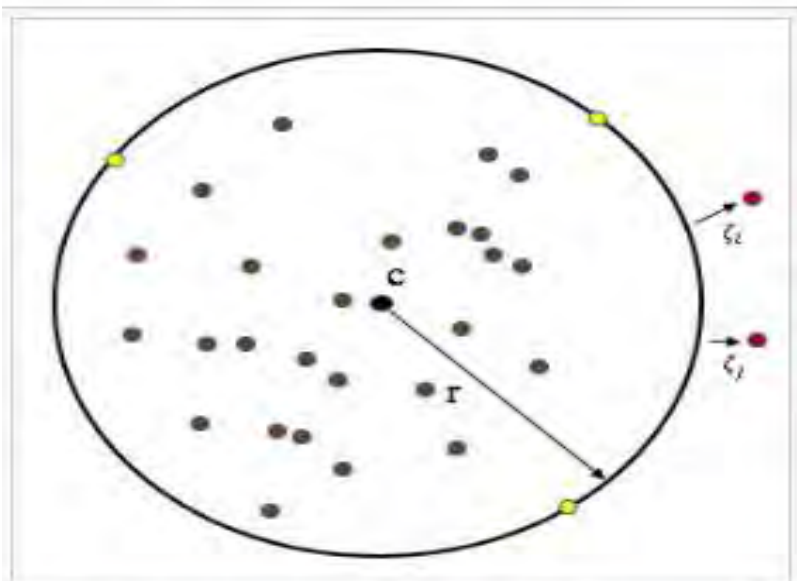


Business Understanding

Be Extremely Specific in Problem Statement:

Poorly Defined	Better	Data Mining Technique
Predict employees that leave	<ul style="list-style-type: none"> Based on past employees that voluntarily left: <ul style="list-style-type: none"> Create New Attribute EmplTurnover → 0/1 	
Predict customers that churn	<ul style="list-style-type: none"> Based on past customers that left (churn): <ul style="list-style-type: none"> Create New Attribute Churn → YES/NO 	
Target “best” customers	<ul style="list-style-type: none"> Recency, Frequency Monetary (RFM) Analysis Specific Dollar Amount over Time Window: <ul style="list-style-type: none"> Who has spent \$500+ in most recent 18 months 	
How can I make more \$\$?	<ul style="list-style-type: none"> What helps me sell soft drinks & coffee? 	
Which customers are likely to buy?	<ul style="list-style-type: none"> How much is each customer likely to spend? 	
Who are my “best customers”?	<ul style="list-style-type: none"> What descriptive “rules” describe “best customers”? 	
How can I combat fraud?	<ul style="list-style-type: none"> Which transactions are the most anomalous? <ul style="list-style-type: none"> Then roll-up to physician, claimant, employee, etc. 	

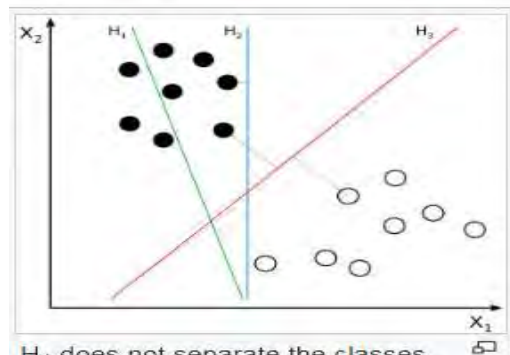
One-Class SVM (ML Anomaly Detection)*



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

One-Class SVM (ML Anomaly Detection) - FYI Only

- Support Vector Machine (**SVM**)
- One-Class Classification (**OCC**)
- Used to Classify Data
- **Identify specific objects of a class** based on supervised learning based on objects of that class.
- **Supervised Learning** using **Algorithms**
- SVM maps training data into separated areas
- **Unsupervised Learning** does data **clustering**
- They analyze the data used for **regression**
- SVM as binary non-probabilistic linear classifier
- **Classify images, text, & even hand written text.**

Machine Learning connection to ADW/ATP

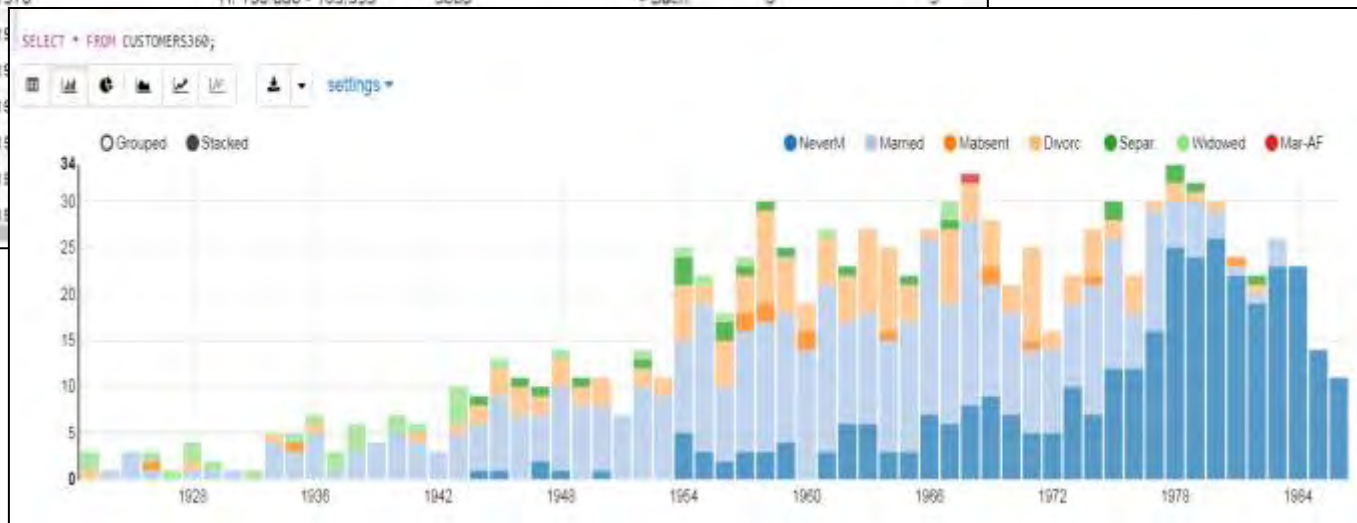
ORACLE Machine Learning ADMIN_RICH2 Project (ADMIN_RIC... ADMIN_RICH2

Anomaly Detection

Display CUSTOMERS360 table

```
SELECT * FROM CUSTOMERS360;
```

CUST_ID	CUST_GENDER	CUST_MARITAL_STATUS	CUST_YEAR_OF_BIRTH	CUST_INCOME_LEVEL	CUST_CREDIT_LIMIT	EDUCATION	AFFINITY_CARD	HOUSING
104088	M	NeverM	1980	L: 300,000 and above	11000	Bach.	0	1
104089	M	Married	1970	H: 150,000 - 169,999	5000	< Bach	0	3
104090	M	Married	19					
104091	M	Married	19					
104092	F	NeverM	19					
104093	M	Married	19					
104094	M	Married	19					
104095	M	NeverM	19					



Machine Learning connection to ADW/ATP

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: CUSTOMERS360_SET
Created model: CUSTOMERS360_MODEL
PL/SQL procedure successfully completed.

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



Machine Learning connection to ADW/ATP

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 *) > 0.50
AND OCCUPATION = 'TechSup'
ORDER BY CUST_ID) OUT,
XMLTABLE('/Details'
PASSING OUT.PREDICTION_DETAILS
COLUMNS
"Attribute1" XMLType PATH 'Attribute[1]',
"Attribute2" XMLType PATH 'Attribute[2]',
"Attribute3" XMLType PATH 'Attribute[3]',
"Attribute4" XMLType PATH 'Attribute[4]',
"Attribute5" XMLType PATH 'Attribute[5]')
OUTPRED;
```

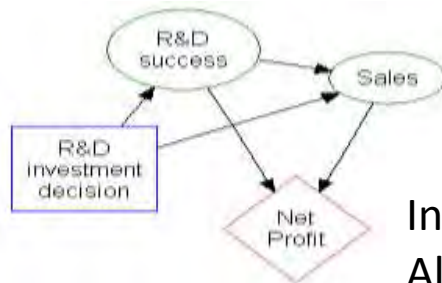
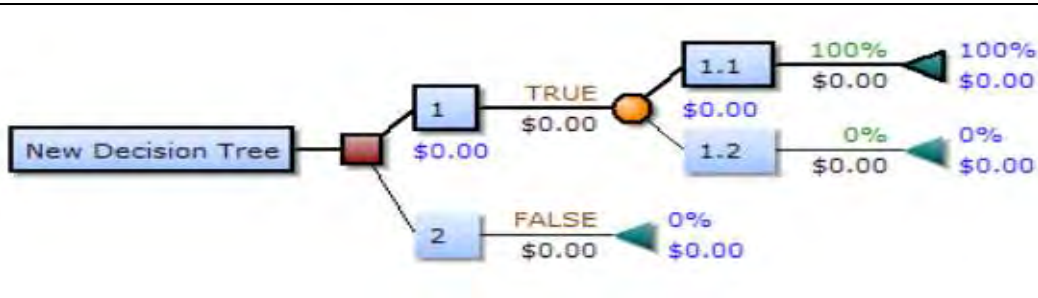
CUST_ID	FIRST_ATTRIBUTE	SECOND_ATTRIBUTE	THIRD_ATTRIBUTE
---------	-----------------	------------------	-----------------

100646	"CUST_MARITAL_STATUS" actualValue="Widowed" weight=".226"	"CUST_YEAR_OF_BIRTH" actualValue="1941" weight=".118"	"CUST_CREDIT_LIMIT" actualValue="1500" weight=".
102922	"CUST_MARITAL_STATUS" actualValue="Widowed" weight=".222"	"CUST_YEAR_OF_BIRTH" actualValue="1931" weight=".	"CUST_CREDIT_LIMIT" actualValue="1500" weight=".
103441	"CUST_MARITAL_STATUS" actualValue="Widowed" weight=".222"	"CUST_YEAR_OF_BIRTH" actualValue="1941" weight=".117"	"EDUCATION" actualValue="Bach." weight="."076"
104286	"EDUCATION" actualValue="9th" weight="."165"	"HOUSEHOLD_SIZE" actualValue="4-5" weight="."146"	"CUST_CREDIT_LIMIT" actualValue="1500" weight=".

Decision Tree Algorithm (ML Classifier)

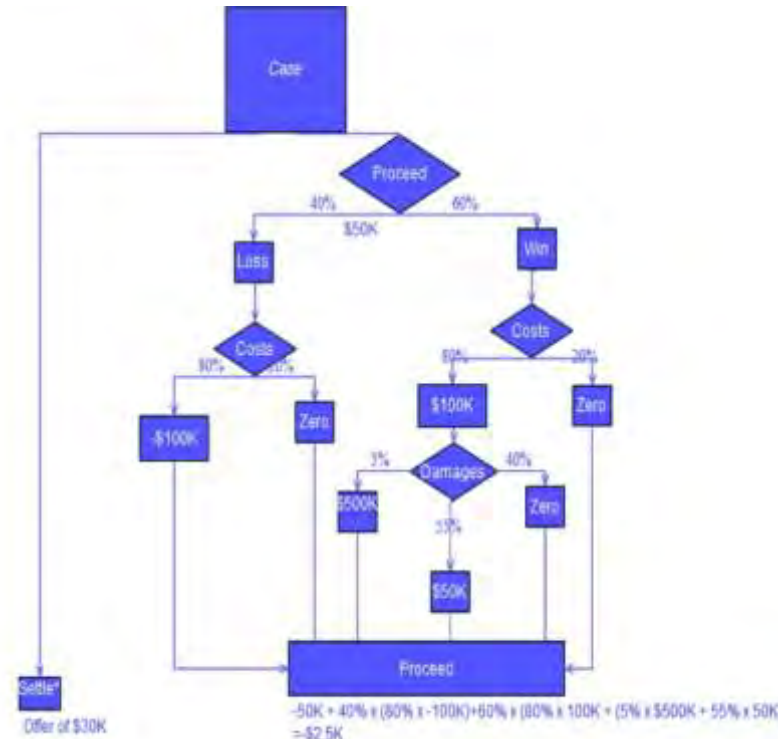
A decision tree consists of three types of nodes:^[1]

1. Decision nodes – typically represented by squares
2. Chance nodes – typically represented by circles
3. End nodes – typically represented by triangles



Influence Diagram is Also a Decision Tree

Flow Chart calculates whether to settle a case or not based on costs/probabilities



OML (OAA) Oracle Data Mining SQL Sample (PARTIAL)

dmdtdemo.sql → DBMS_DATA_MINING package – Decision Tree

```
-- Given demographic data about a set of customers, predict the  
-- customer response to an affinity card program using a classifier  
-- based on Decision Trees algorithm.
```

```
INSERT INTO dt_sh_sample_settings VALUES  
(dbms_data_mining.algo_name, dbms_data_mining.algo_decision_tree);  
--  
-- CREATE A NEW MODEL  
-- Build a DT model
```

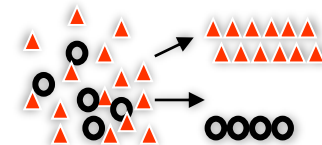
```
BEGIN  
DBMS_DATA_MINING.CREATE_MODEL(  
  model_name      => 'DT_SH_Clas_sample',  
  mining_function => dbms_data_mining.classification,  
  data_table_name => 'mining_data_build_v',  
  case_id_column_name => 'cust_id',  
  target_column_name => 'affinity_card',  
  settings_table_name => 'dt_sh_sample_settings');  
END;  
/
```



```
SELECT T.cust_id, S.prediction, S.probability, S.cost  
FROM (SELECT cust_id,  
  PREDICTION_SET(dt_sh_clas_sample COST MODEL USING *) pset  
FROM mining_data_apply_v  
WHERE cust_id < 100011) T,  
TABLE(T.pset) S  
ORDER BY cust_id, S.prediction;
```

Script Output x
Task completed in 3.075 seconds

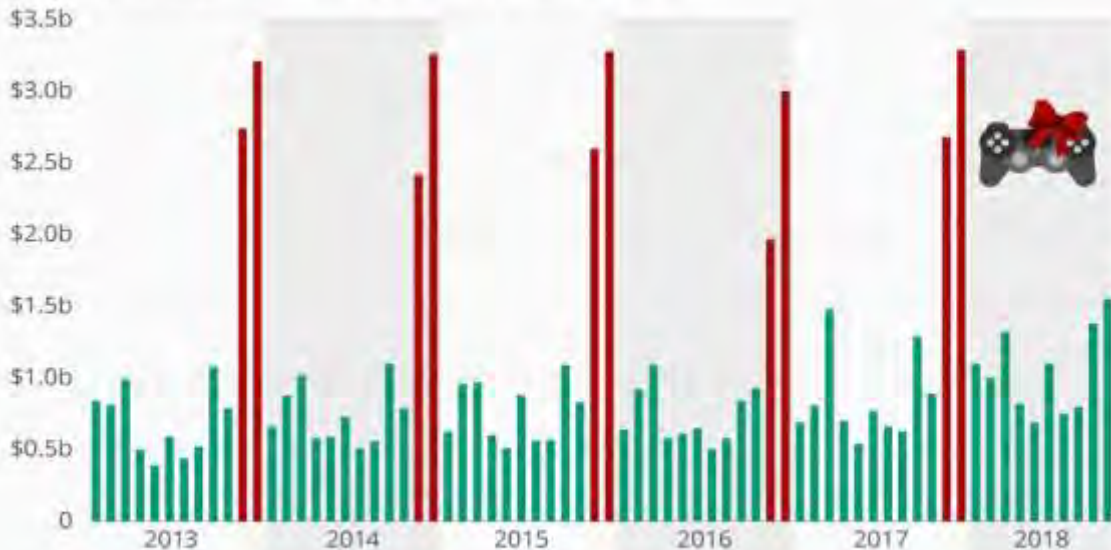
CUST_ID	PREDICTION	PROBABILITY	COST
100001	0	.966183575	.270531401
100001	1	.033816425	.966183575
100002	0	.740384615	2.076923077
100002	1	.259615385	.740384615
100003	0	.909090909	.727272727
100003	1	.090909091	.909090909
100004	0	.909090909	.727272727
100004	1	.090909091	.909090909
100005	0	.272357724	5.821138211
100005	1	.727642276	.272357724
100006	0	1.000000000	.000000000
100006	1	.000000000	1.000000000
100007	0	.909090909	.727272727
100007	1	.090909091	.909090909
100008	0	.909090909	.727272727
100008	1	.090909091	.909090909
100009	0	.272357724	5.821138211
100009	1	.727642276	.272357724
100010	0	.675965665	2.592274678
100010	1	.324034335	.675965665



Seasonal, Irregular & Missing Data: Time Series Algorithm

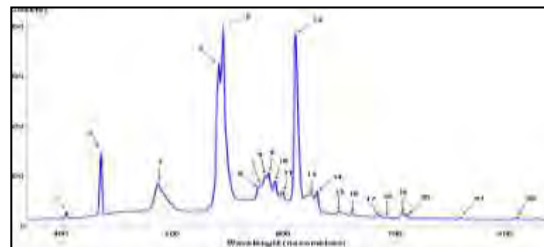
Video Game Sales Are Extremely Seasonal

Monthly video games industry sales in the United States*



* Incl. video games hardware, PC & video games software, accessories and game cards
@StatistaCharts Source: NPD Group

statista



The power spectrum $S_{xx}(f)$ of a time series $x(t)$ describes the distribution of power into frequency components composing that signal. According to Fourier analysis, any physical signal can be decomposed into a number of discrete frequencies, or a spectrum of frequencies over a continuous range. T

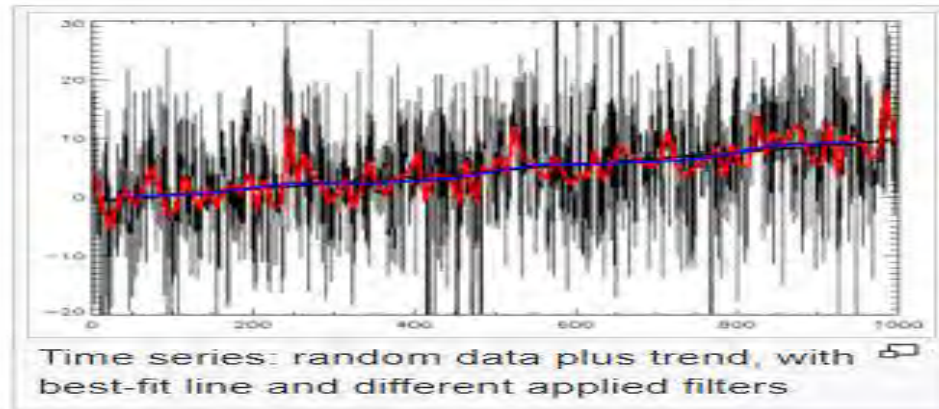


Exponential Smoothing Algorithm (Time Series)



Stock Application (Left)
A Time Series (Below)

Use **Exponential Smoothing** to Weight older data to have less effect than newer data



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

Oracle's Machine Learning & Adv. Analytics Algorithms



CLASSIFICATION



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

CLUSTERING



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

ANOMALY DETECTION



- One-Class SVM

TIME SERIES



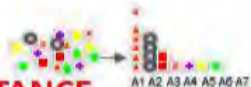
- State of the art forecasting using Exponential Smoothing.
- Includes all popular models e.g. Holt-Winters with trends, seasons, irregularity, missing data

REGRESSION



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

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

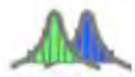
- Principal Comp Analysis (PCA)
- Non-negative Matrix Factorization
- Singular Value Decomposition (SVD)
- Explicit Semantic Analysis (ESA)

TEXT MINING SUPPORT



- Algorithms support text type
- 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 PACKAGES

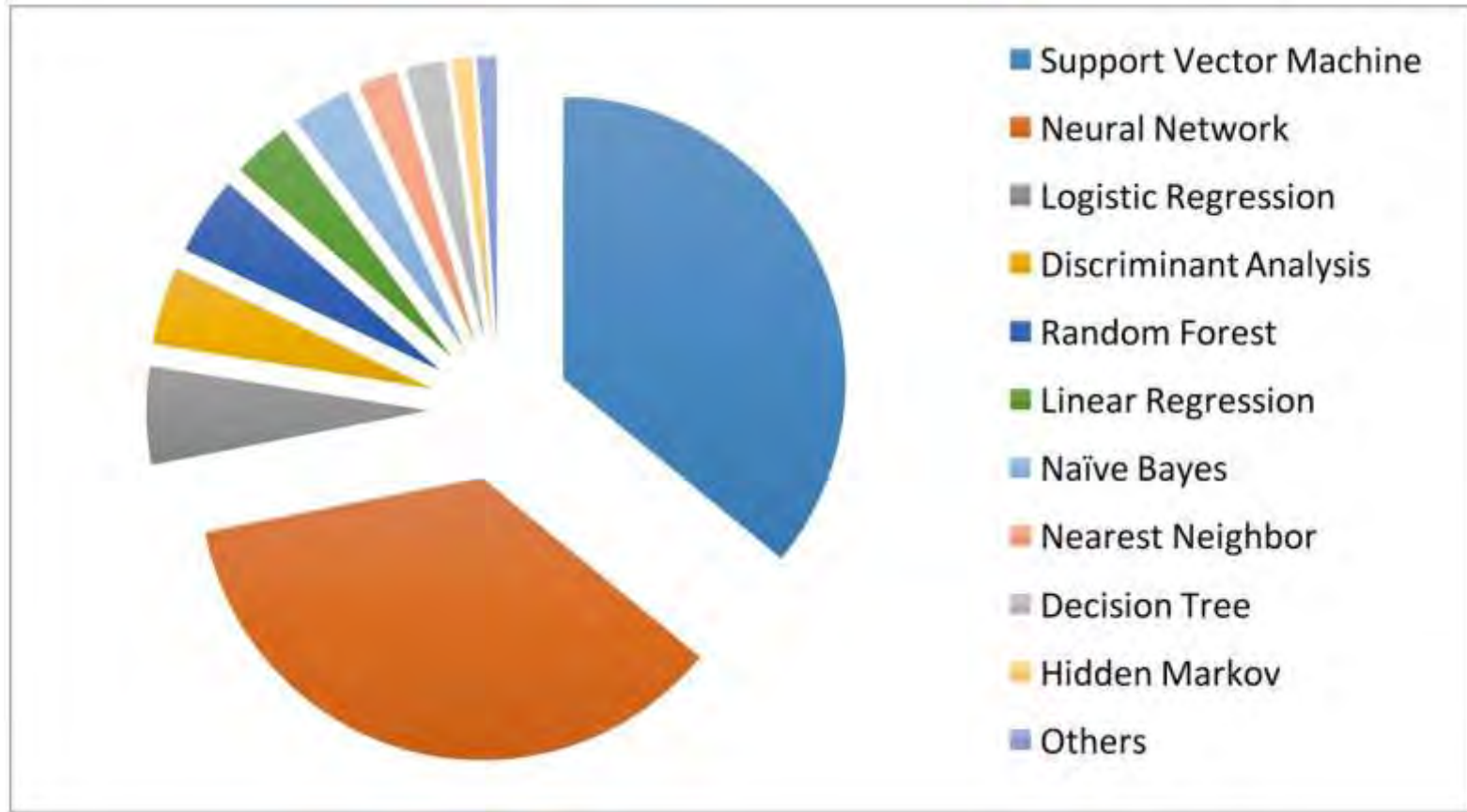


- CRAN R Algorithm Packages through Embedded R Execution
- Spark MLib algorithm integration

EXPORTABLE ML MODELS

- REST APIs for deployment

Types of ML Algorithms in Healthcare on PubMed*



*Stroke and vascular neurology (snj.bmj.com)

Note: Markov is Bayesian, NN is k-NN, DA close to PCA

AutoML for Autonomous Database- 3/18/2021

ORACLE Machine Learning

How Do I?

- Use AutoML**
How to create AutoML Experiments
- Get Started**
Get started with Oracle Machine Learning

Quick Actions

- AutoML**
Create and run AutoML Experiments
- Scratch**
Run Scratch Experiments

Create Experiment

Name *
AutoML_RichI

Comments

Data Source *
ML_USER_PROJECT

Prediction Type *
Classification

Predict *
AFFINITY_CARD

Class ID
CUST_ID

Additional Settings

Features

Refresh

Name	Type	Percent NULLs	Distinct Values	Min	Max	Mean	Std Dev
AFFINITY_CARD	NUMBER	0	2	0	1	0.24	0.8
CUST_CREDIT_LIMIT	NUMBER	0	8	1500	15000	7924.72	4204
CUST_GENDER	CHAR	0	2				
CUST_ID	NUMBER	0	4500	10000	104500	102250.8	1300

AutoML Experiments

Create **Refresh** **Delete** **Export**

Name	Comment
AutoML_RichI	Testing Automatic Machine Learning
AutoML_RichI	
WalmartBets.ml	Testing Test

AutoML is here for Autonomous Database


ORACLE Machine Learning ML_USER Project [ML_USER Works...]

← Experiments

AutoML_Rich Completed

Experiment Settings Edit

Accuracy



Leader Board

Deploy Create Notebook Metrics

Algorithm	Model Name	Accuracy
Support Vector Machine (Gaussian)	svmg_09cd02ee4e	0.7878
Random Forest	rf_df53fb31a8	0.7821
Generalized Linear Model	glm_74cbb2b7ac	0.7821
Generalized Linear Model (Ridge Regres...	glmr_df24288679	0.7821
Support Vector Machine (Linear)	svml_a031bb0ae1	0.7431

Algorithm Model Name Accuracy

Support Vector Machine (Gaussian) svmg_09cd02ee4e 0.7878

Random Forest rf_df53fb31a8 0.7821

Generalized Linear Model glm_74cbb2b7ac 0.7821

Generalized Linear Model (Ridge Regres... glmr_df24288679 0.7821

Support Vector Machine (Linear) svml_a031bb0ae1 0.7431

AutoML is here for Autonomous Database

ORACLE Machine Learning ML_USER Project [ML_USER Works... ML_USER

<- Experiments

AutoML_Rich

Completed Start

Experiment Settings Edit

Accuracy

Leader Board

Deploy **Create Notebook** Metrics

Algorithm	Model Name	Accuracy	Precision	Recall	ROC AUC	Balanced Accuracy
Support Vector Machine (Gaussian)	svmg_09nd02ee4e	0.7878	0.5522	0.8409	0.8439	0.8054
Random Forest	rf_df53fb31a8	0.7821	0.5449	0.8273	0.8616	0.7971
Generalized Linear Model	glm_74cbb2b7ac	0.7821	0.5441	0.8409	0.8518	0.8016
Generalized Linear Model (Ridge Regres...	glm_df24288679	0.7821	0.5441	0.8409	0.8521	0.8016
Support Vector Machine (Linear)	svml_a031bb0ae1	0.7431	0.4947	0.8500	0.8477	0.7785

Create Notebook

Create a notebook based on selected model and this experiment's settings. Use a generated notebook to further tune your approach using Python.

Notebook Name:

OK Cancel

AutoML_Classify



Build Data

```

python
import onl

columns = 'CUST_ID', 'CUST_CREDIT_LIMIT', 'CUST_GENDER', 'CUST_INCOME_LEVEL', 'CUST_MARITAL_STATUS', 'CUST_YEAR_OF_BIRTH', 'EDUCATION', 'HOUSEHOLD_SIZE', 'OCCUPATION', 'YRS_RESIDENCE',
          'Y_BOX_GAMES', 'AFFINITY_CARD'
schema='ML_USER'
table='CUSTOMERS300'

column = ','.join(columns)
query = 'SELECT ' + column + ' FROM ' + schema + '.' + table

data_build = onl.sync(query=query)
= showData(build)

```

Create Train Data

```

python
import onl

X_train = data_build[:,('CUST_ID', 'CUST_CREDIT_LIMIT', 'CUST_GENDER', 'CUST_INCOME_LEVEL', 'CUST_MARITAL_STATUS', 'CUST_YEAR_OF_BIRTH', 'EDUCATION', 'HOUSEHOLD_SIZE', 'OCCUPATION', 'YRS_RESIDENCE',
                        'Y_BOX_GAMES')]
y_train = data_build[:, 'AFFINITY_CARD']

```

Build 'SUPPORT_VECTOR_MACHINES' Model

```

python
import onl

svm_settings = {
    'ODPS_SAMPLE_SIZE' : '1294', 'SVMS_COMPLEXITY_FACTOR' : '66.70000000000002', 'SVMS_KERNEL_FUNCTION' : 'SVMS_GAUSSIAN', 'SVMS_STD_DEV' : '2.23606797749979', 'CLAS_WEIGHTS_BALANCED' : 'OFF',
    'SVMS_MAX_PIVOTS' : '200', 'ODPS_DETAILS' : 'ODPS_DISABLE', 'ODPS_SAMPLING' : 'ODPS_SAMPLING_ENABLE', 'ALGO_NAME' : 'ALGO_SUPPORT_VECTOR_MACHINES'
}

svm_mod = onl.svm(**svm_settings)

svm_mod = svm_mod.fit(X_train, y_train)

```

Quick Actions



AutoML

Train and run AutoML Experiments



Scratchpad

Run Scratchpad



Notebooks

The place for data discovery and analytics



Jobs

Schedule notebooks to run at certain times



Examples

Check out some examples

Recent Activities

today



Rob Warner created AutoML_Classify notebook in ML_USER Project (ML_USER Workspace)

11:02 AM

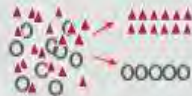
READY ▶ ⌵ ⌵ ⌵

READY ▶ ⌵ ⌵ ⌵

Oracle Machine Learning Algorithms

**CLASSIFICATION**

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

**REGRESSION**

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

**FEATURE EXTRACTION**

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

TEXT MINING SUPPORT

Algorithms support text
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Explicit Semantic Analysis (ESA) for
document similarity

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

**ATTRIBUTE IMPORTANCE**

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

**STATISTICAL FUNCTIONS**

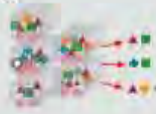
Basic statistics: min, max,
median, stdev, t-test, F-test, Pearson's,
Chi-Sq, ANOVA, etc.

**ANOMALY DETECTION**

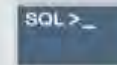
One-Class SVM
MSET-SPRT*

**ASSOCIATION RULES**

A priori/ market basket

**PREDICTIVE QUERIES**

Predict, cluster, detect, features

**SQL ANALYTICS**

SQL Windows
SQL Patterns
SQL Aggregates

TIME SERIES

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

**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)

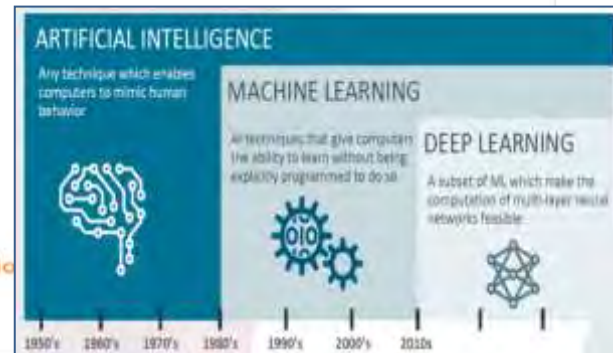
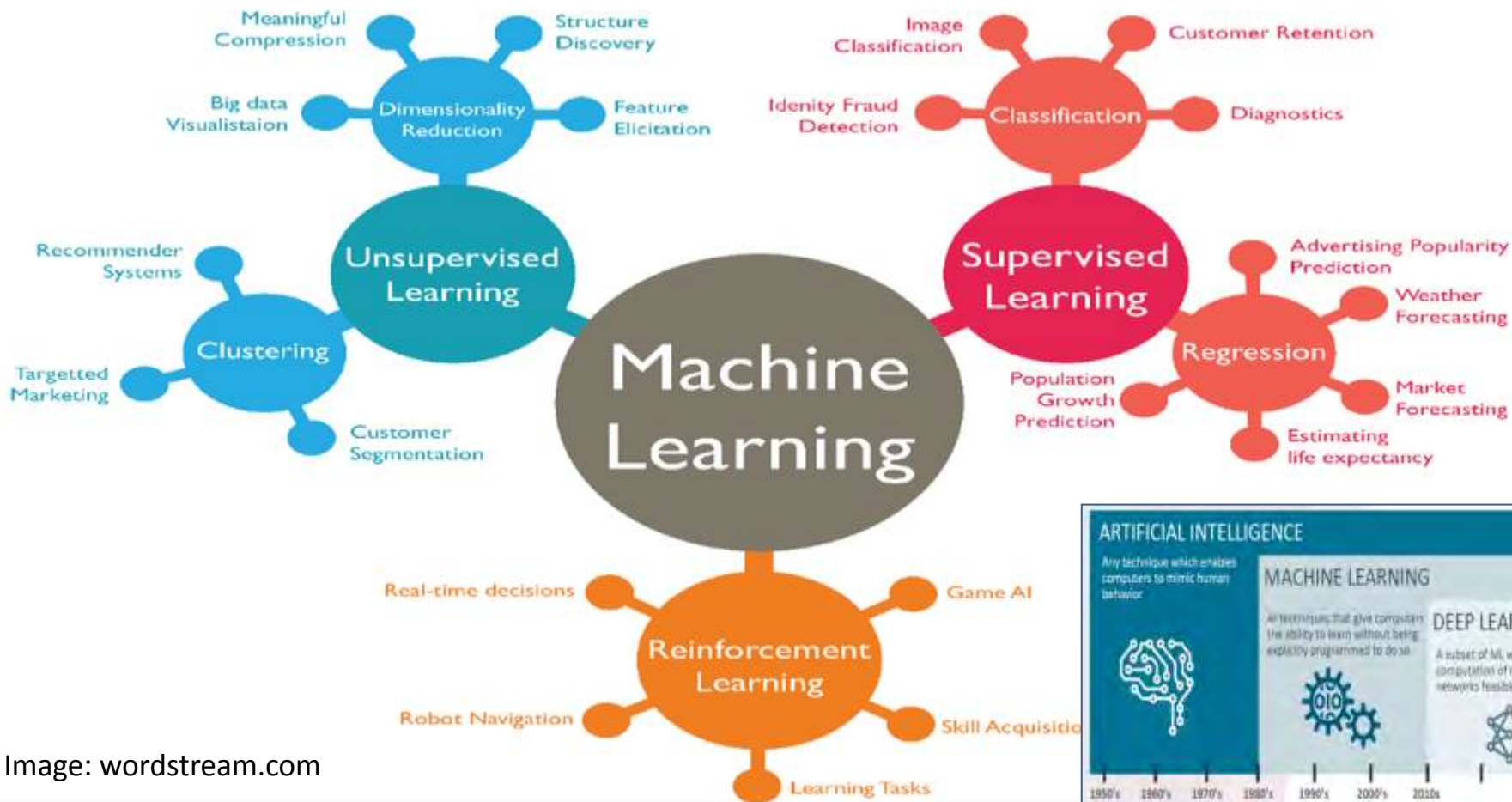


*Includes support for Partitioned Models, Transactional data and aggregations,
Unstructured data, Geo-spatial data, Graph data, etc.*

* New in 21^o



Machine Learning has many parts



Exadata Cloud Machine: ALL Features

(Oracle's Juan Loaiza presentation on Exadata Cloud)







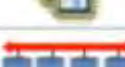
Exadata Cloud: Compatible, Scalable, Available, Secure
 Decades of Database Innovation Proven at Millions of Mission-Critical Deployments

	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

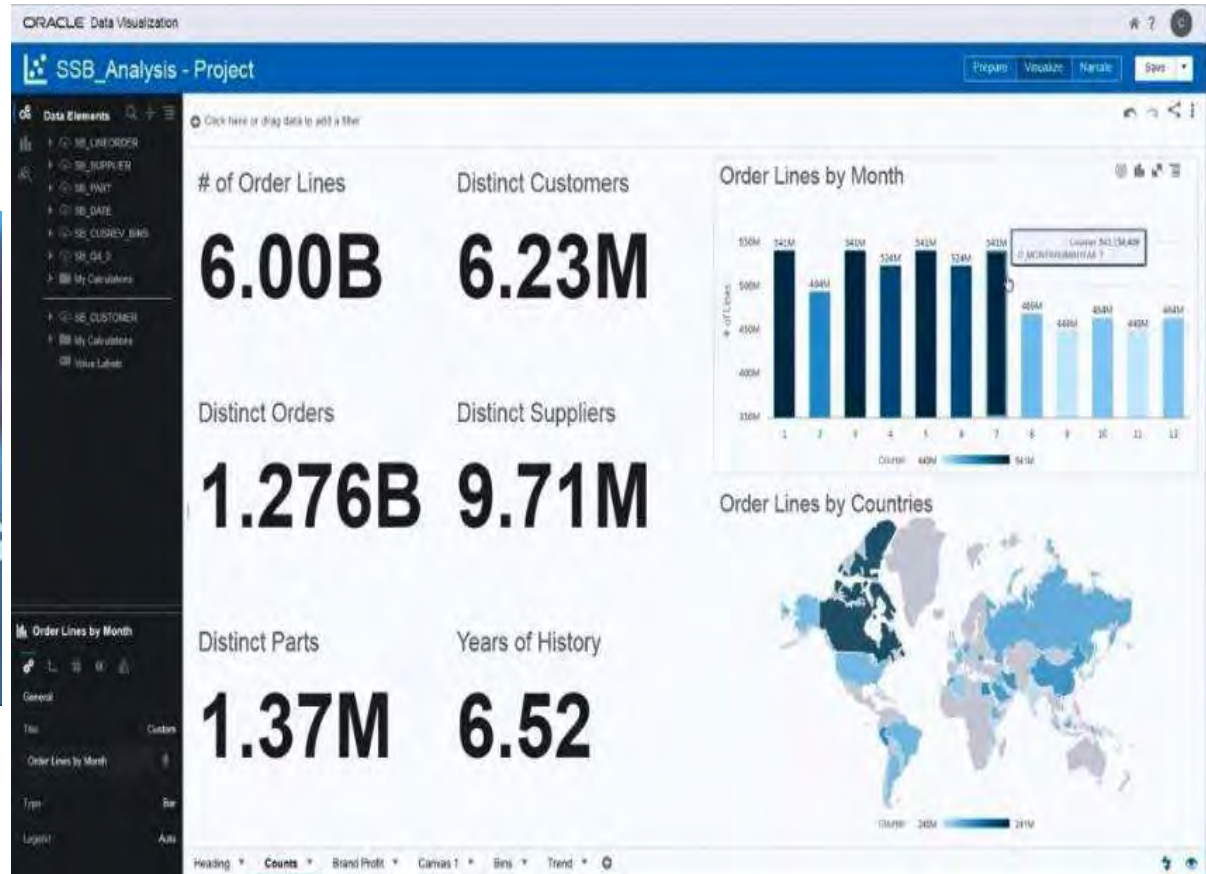
All Oracle Database Innovations



All Exadata DB Machine Innovations

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

George Shows How to Mine ADW with Oracle Analytics

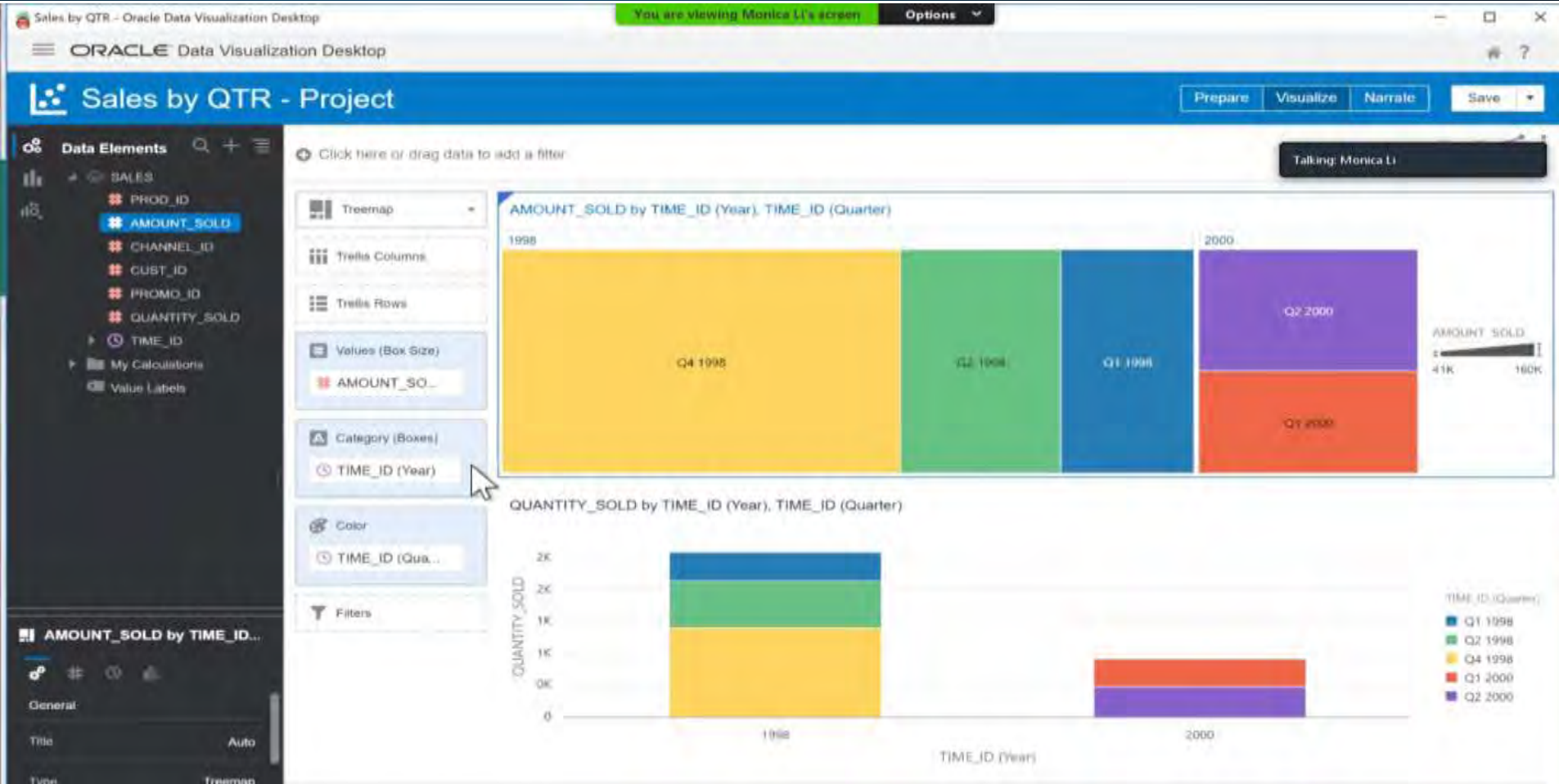


Many Graph Choices

Oracle Data Visualization Desktop interface showing a treemap visualization. The main visualization is titled "AMOUNT_SOLD by TIME_ID (Q4 1999)". The left sidebar shows "Data Elements" including PROD_ID, AMOUNT_SOLD, CHANNEL_ID, CUST_ID, PROMO_ID, QUANTITY_SOLD, and TIME_ID. The "Time" dimension is set to "Quarter". The "Color" dimension is set to "TIME_ID (Year)". The "Filters" section is empty. The bottom status bar shows "General", "Title: Auto", "Type: Treemap", and "Legend: Auto".

A grid of 50 different chart types available in the software. The charts are arranged in a 10x5 grid. The "Treemap" chart is highlighted with a blue background and a hand cursor pointing to it. The charts include: Bar, Stacked Bar, Horizontal Bar, Horizontal Stacked, Scatter, Line, Area, Combo, Scatter (Cat.), Stacked Scatter (Cat.), Pie, Donut, Pivot, Table, Treemap, Sunburst, Box Plot, Horizontal Box Plot, Waterfall, Map, Radar Line, Radar Area, Radar Bar, List, Parallel Coordinates, Tag Cloud, Timeline, Chord Diagram, Circular Network, Network, Sankey, and 50 Tile.

More Complex Treemap



Much More Complex Available

Stacked Bar

Trellis Columns

Trellis Rows

Values (Y-Axis)

Sales

Category (X-Axis)

Order Date (Q...

Color

Customer Seg...

Size (Width)

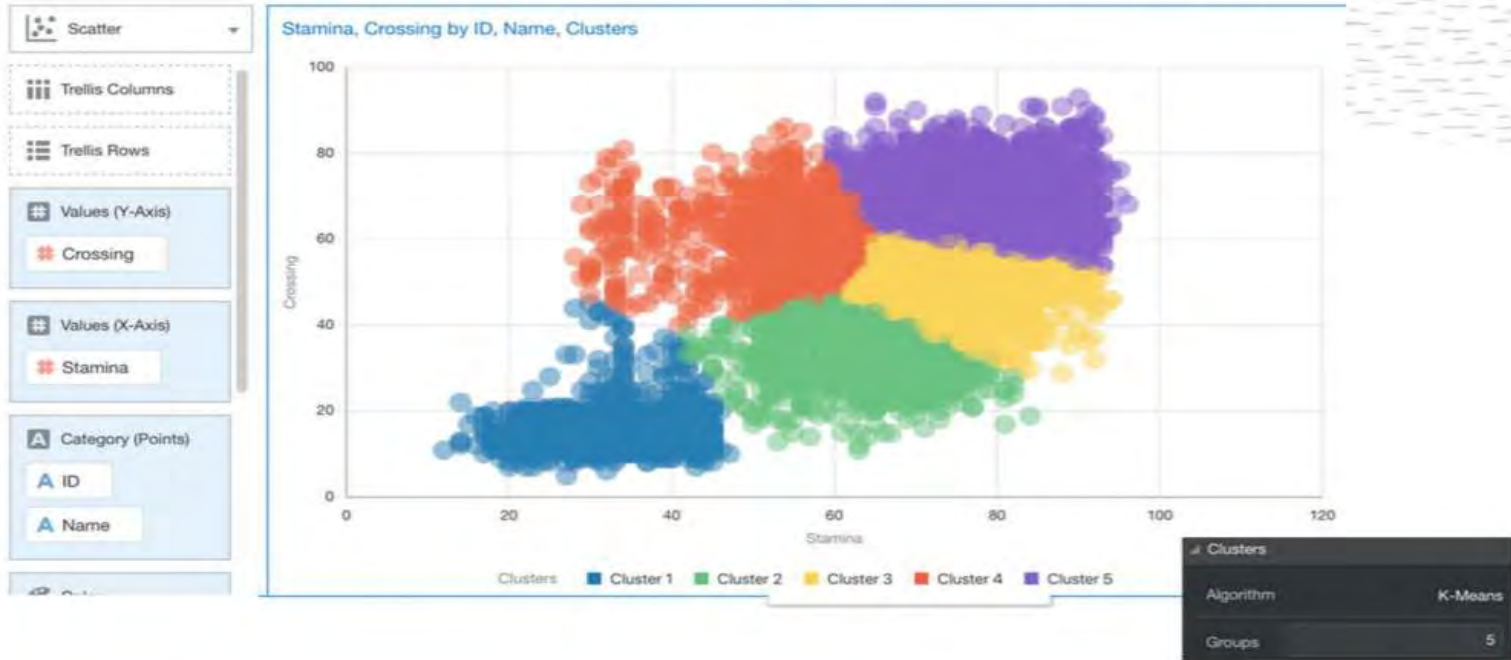
Profit

Detail



Oracle Analytics Cloud (OAC) to Cluster Data

Easy Models



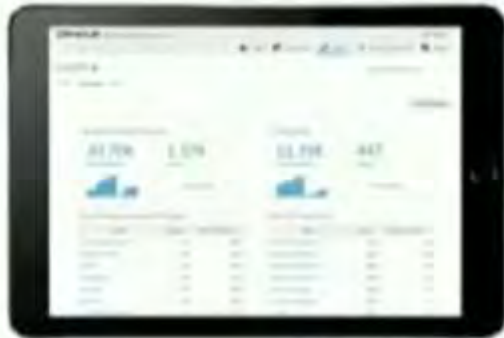
Oracle Analytic Summit 2020



Advanced Innovations to Leverage from Oracle:

Built-In Innovations to Drive Faster Transformation

AI / ML Embedded into Apps



IoT Apps

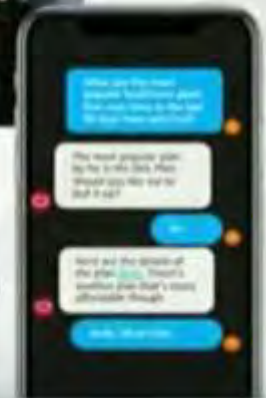


Human Interface



Augmented Reality

ChatBots



Future World – Enabling Innovation!

THE TWILIGHT ZONE

"You unlock this door with the key of imagination. Beyond it is another dimension - a dimension of sound, a dimension of light, a dimension of mind. You're moving into a land of both shadow and substance, of things and ideas. You've just crossed over into the Twilight Zone."
- Rod Serling



$E=MC^2$

64-Bit advancement of Directly addressable memory



	<u>Address Direct</u>	<u>Indirect/Extended</u>
<u>4 Bit:</u>	16	(640)
<u>8 Bit:</u>	256	(65,536)
<u>16 Bit:</u>	65,536	(1,048,576)
<u>32 Bit:</u>	4,294,967,296	
<u>64 Bit:</u>	18,446,744,073,709,551,616	

As the hardware physically implements the theoretical possibilities of 64-Bit, things will dramatically change.... ...moving from 32 bit to 64 bit will be like moving from 4 bit to 32 bit or like moving from 1971 to 2000 overnight.

Addressable Memory Growth

Shift

- 8-bit to 16-bit
- 16-bit to 32-bit
- 32-bit to 64-bit
- 64-bit to 128-bit

Increase (Result)

1 mph (Windows)


65K mph (Internet)

300T mph (Robotics/3D...etc.)

5T*T*B mph (Implants/4D)

Experts In Focus

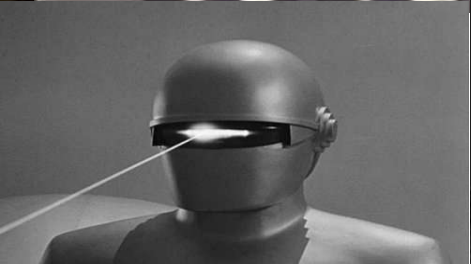
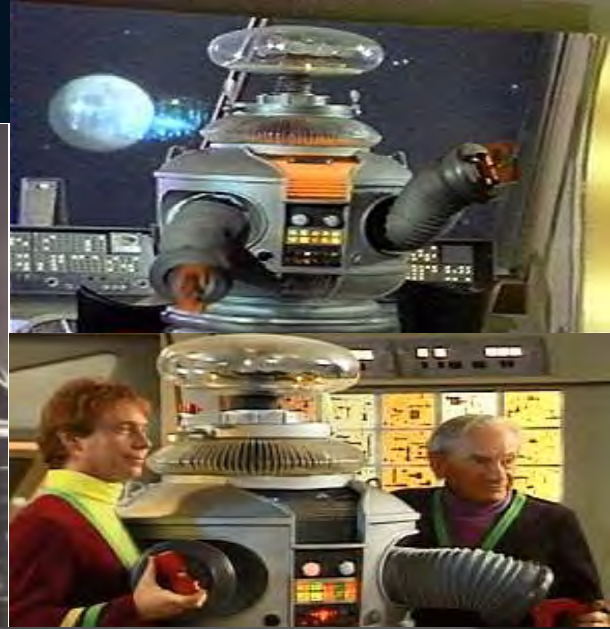
**Technology Feels Like It's Accelerating
— Because It Actually Is**

By Allison E. Berman and Jason Dorrier - Mar 22, 2016  40,547

Here Come the Robots!



Robots We Grew up With...



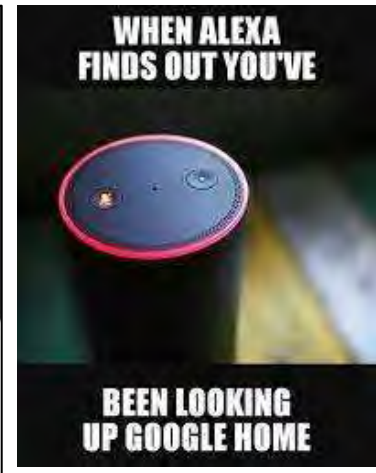
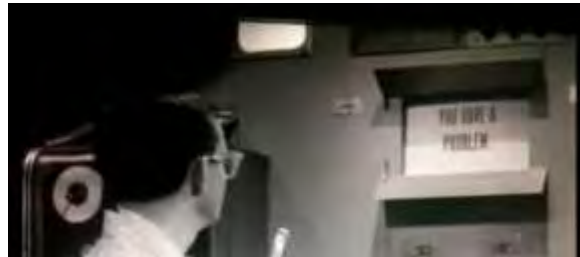
Your Robotic Backup DBA ... *may be Your Clone!*



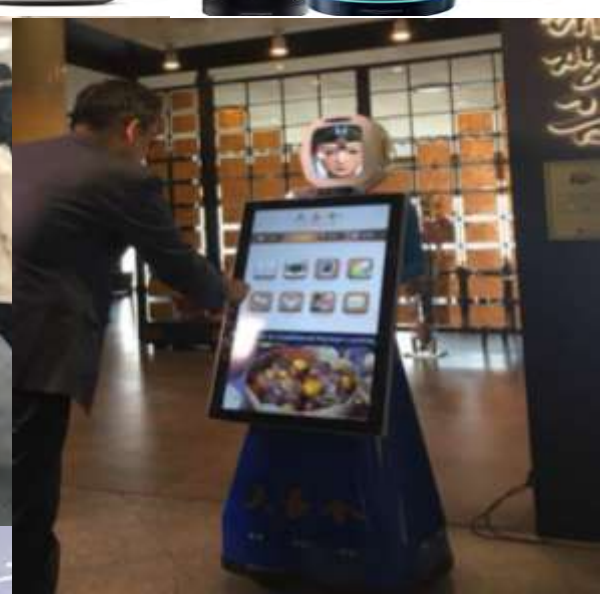
From Agnes with Love (Computers try to help)



Google Assistant	
Alexa	
Siri	
Bixby	



Service Robots at Work... 24x7



How to Connect Pepper to Oracle (so far)

How Pepper + Oracle are Connected



ORACLE
MOBILE



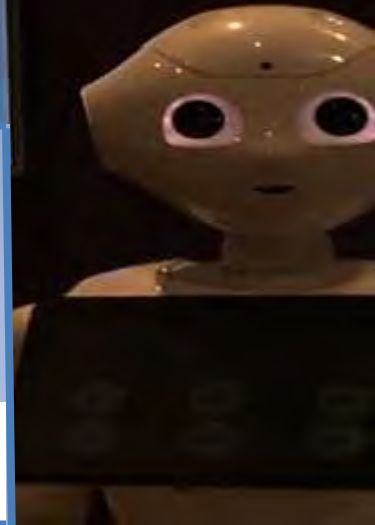
Meet Pepper



- Humanoid robot designed by SoftBank Robotics
- Able to recognize principal human emotions and tailor interactions
- Facial / object recognition
- Spatial awareness



SoftBank
Robotics



Use Oracle Virtual Assistant with Robots - FYI Only!


ORACLE

SER-10
SERVICE

VIRTUAL ASSISTANT

Offer Natural, Conversational Interactions at Scale with a Smart Automated Solution

Oracle Virtual Assistant the Chatbot for Service



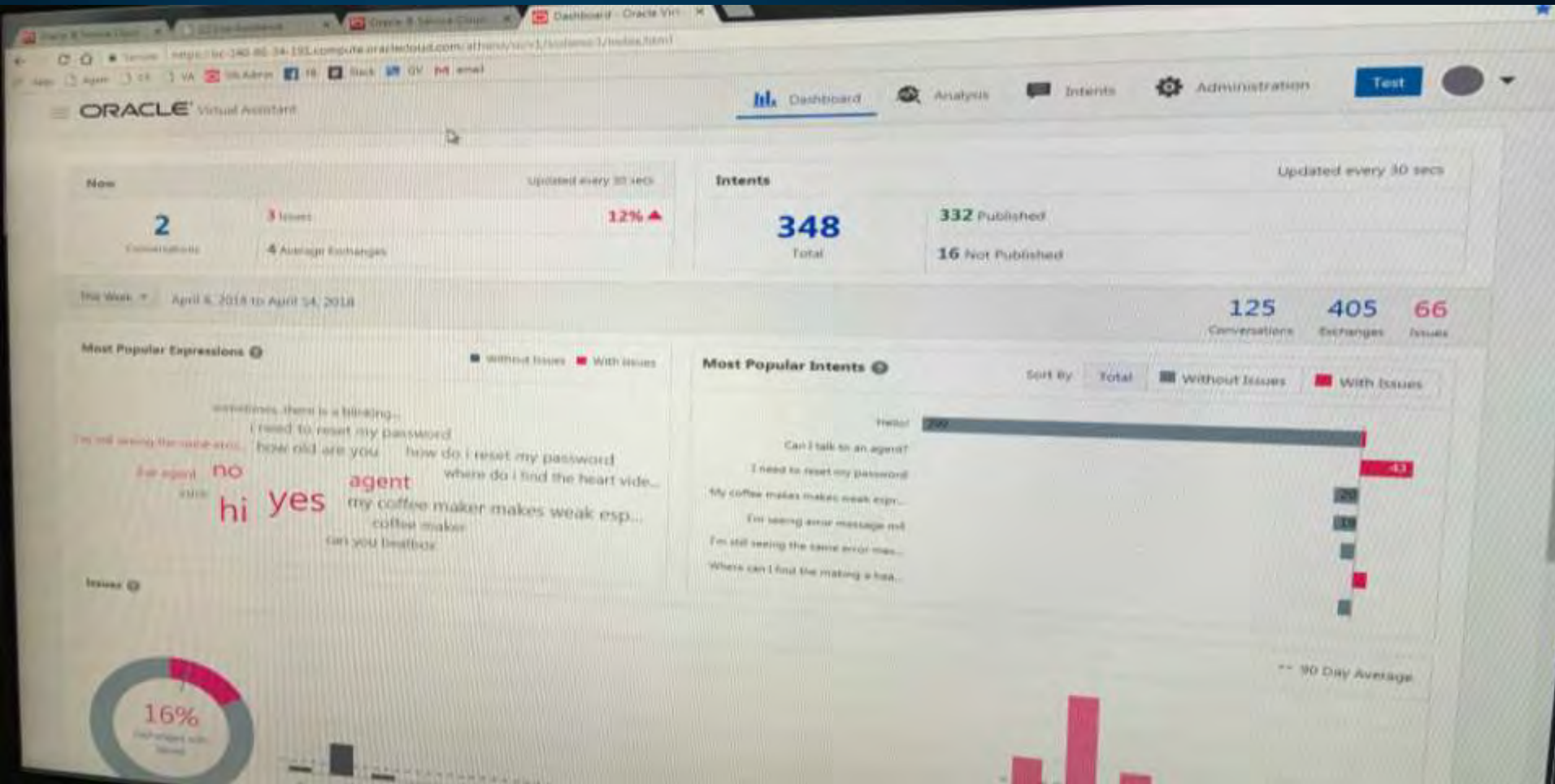
Oracle Virtual Assistant the Chatbot for Service



- SMS
- Facebook Messenger
- weChat
- Kik
- WhatsApp
- Phone
- Alexa
- Slack
- HipChat
- Siri



Oracle Virtual Assistant Interface



The Brain Center at Whipple's - *Robots Coming*



Ameca



Pepper



Spot & Atlas



Sofia

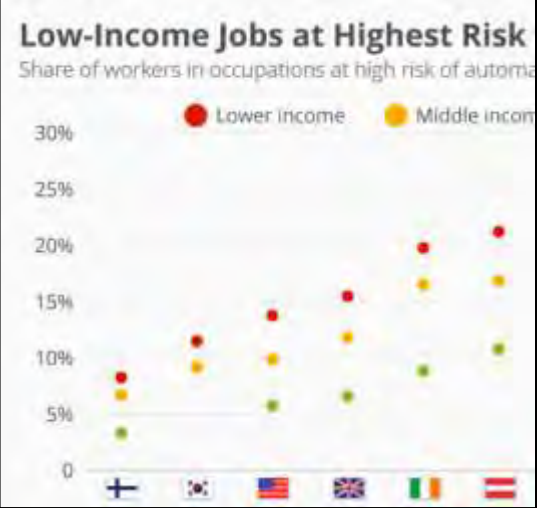
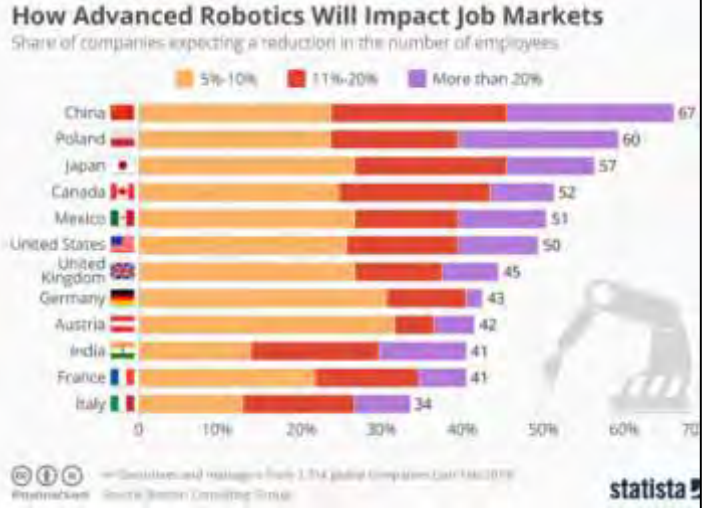


(Optimus)

TESLA
BOT

"Okay, I will destroy humans."

Robotics/Automation Impact to Jobs



The New York Times

Uber's Self-Driving Trucks Hit the Highway, but Not Local Roads



Robotics/Automation Impact to Jobs



The Obsolete Man (Twilight Zone)



Autonomous Database – Replacing the DBA?

Rich Niemiec @RichNiemiec · Oct 2
I'll ask #Pepper if she can tune my #database in 11 AM session on #Innovation #IOT #robotics #cloud at #aow17 #ioug #viscosityna #oracleace



Are DBAs Obsolete?

Posted on February 20, 2014

Before we go any further, let me briefly answer the question: "No Way!" OK ... with that out of the way, let's get to the main point.

Every so often, some industry pundit gets bored and writes "Database administrators are obsolete" or "DBAs are obsolete." When I hear this, it makes me shake my head sadly and think, "How can it be so obvious?"



BUREAU OF LABOR STATISTICS

Home ▾ Subjects ▾ Data Tools ▾ Publications ▾ Economic Releases ▾

DOH HOME | OCCUPATION FINDER | DOH FAQ | DOH GLOSSARY | A-Z INDEX | DOH SITE

OCCUPATIONAL OUTLOOK HANDBOOK

Occupational Outlook Handbook > Computer and Information Technology >

Database Administrators

Summary | What They Do | Work Environment | How to Become One | Pay | Job Outlook

Summary

Quick Facts: Database Administrators	
2017 Median Pay	\$87,020 per year \$41.84 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2016	119,500
Job Outlook, 2016-26	11% (Faster than average)
Employment Change, 2016-26	13,700

What Database Administrators Do

Database administrators (DBAs) use specialized software to store and organize data, such as information and customer shipping records. They make sure that data are available to users.

**Good News: DBA +11% Increase
(2016-2026)**

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

Apple – Tech Innovator!



03.21.16 | MOST INNOVATIVE COMPANIES
Why Apple Is The World's Most Innovative Company
In this exclusive interview with Apple CEO Tim Cook, he explains the culture and approach that led to iPhone X, AirPods, Apple Watch 3, and HomePod.

3 Signs That Apple Has Lost Its Innovation Mojo
Peter Cofrancesco

WATCH



iPhone 5s
4 inches



iPhone 6
4.7 inches



iPhone 6
5.5 inches



iPad mini
7.9 inches



Amazon - Retail Innovator (since 1994)

AMAZON PRESENTS INNOVATION DAY



Innovations at 20% Off

PART OF INNOVATION DAY



DEAL OF THE DAY
E\$5.99
Price: ~~E79.99~~ (30% off)
Ends in 12:24:21
Dashboard Camera Recorder with 32GB SD Card

PART OF INNOVATION DAY



DEAL OF THE DAY
E\$207.00
Price: ~~E259.99~~ (20% off)
Ends in 12:24:21
Oidel Simba B Black Cherry Mini PC

PART OF INNOVATION DAY



DEAL OF THE DAY
E\$39.99
Price: ~~E49.99~~ (20% off)
Ends in 12:24:21
USCENSE Z-In-F Smart Tennis Wrist

PART OF INNOVATION DAY



DEAL OF THE DAY
E\$39.00
Price: ~~E49.99~~ (20% off)
Ends in 12:24:21
Femometer Smart Basal Body

PART OF INNOVATION DAY



DEAL OF THE DAY
E\$134.99
List: ~~E169.99~~ (21% off)
Ends in 12:24:21
Roll Lightpad Block

PART OF INNOVATION DAY



DEAL OF THE DAY
E\$169.00
25% OFF or more
Amazon Echo

Home Services

You haven't submitted a service request yet.

If you ordered a service and already received an estimate, please check Your Orders. If you'd like to submit a project request to get estimates for a new project, you can shop for services below.

amazon home services

Book your next home project

Landscaping, TV setup, plumbing and more

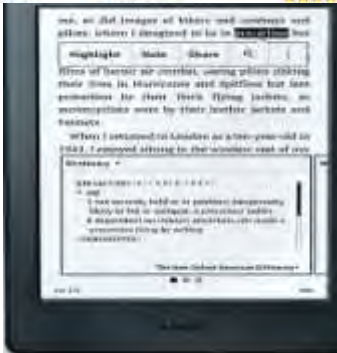
Hire a pro











AMAZON'S PRIME NUMBERS

Prime Day revenues are increasing.



Prime members are growing.



Amazon Prime members spend almost five times more than non-Prime customers.



The cost of a Prime membership is rising.



Google - Marketing Innovator (& Leveraging Data)!





Oracle Focus: Cloud, Data, Apps, Security, Self-Service, ML, & AI! Innovation Components for Business!



"I admire risk takers. I like leaders – people who do things before they become fashionable or popular. I find that kind of integrity inspirational."



LAWRENCE J. ELLISON | *Chairman & Chief Executive Officer, 2003*



Oracle Q4 Growth Rate
140%
Q4 Growth Rate
Year-over-Year Comparison: Q4 2013 vs. Q4 2012



Machine Learning: Oracle ML

READY-TO-GO

ORACLE

SaaS APPS w/EMBEDDED ML

Pre-built, packaged ML and data-driven SaaS applications

READY-TO-WORK

ORACLE

AUTONOMOUS DATABASE

Embedded AI in Databases to simplify enterprise data management

Ready-to-Build

READY-TO-BUILD

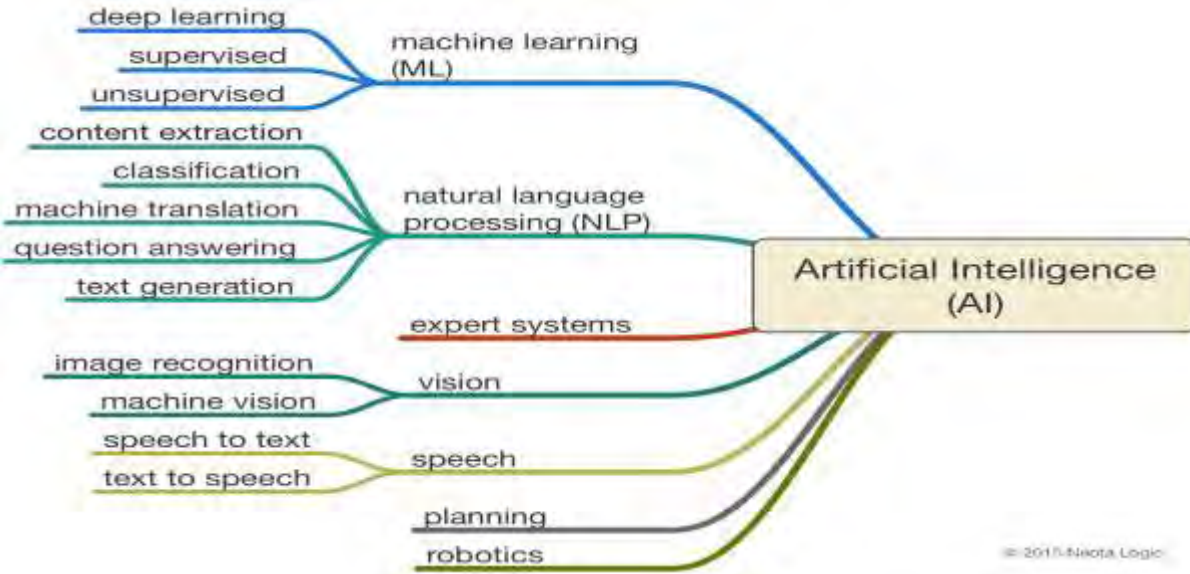
ORACLE

DATA SCIENCE PLATFORM

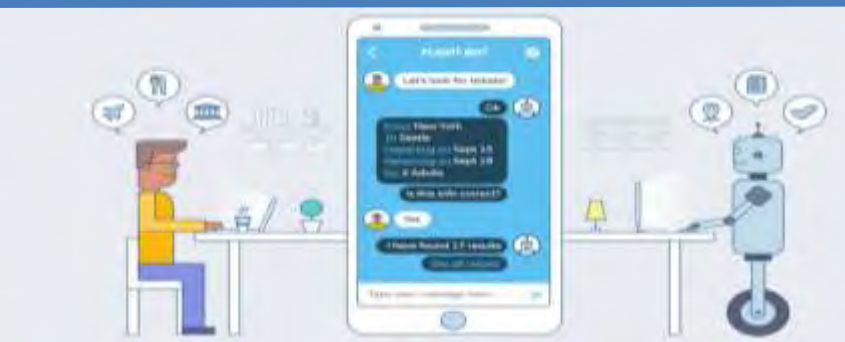
Complete platform to build and support ML-powered applications

Oracle Chatbots & AI

Viscosity helps to Leverage NOW!



© 2015-Neota Logic



OpenAI - Ten Years Later... the Baby Talks!

HOW LONG IT TOOK TOP APPS TO HIT 100M MONTHLY USERS

ChatGPT is estimated to have hit 100M users in January, 2 months after its launch.

Here's how long it took other top apps to reach that:

APP MONTHS TO REACH 100M GLOBAL MAUS



About One Year Ago: ChatGPT 3.5 was Born ... the Baby Talks

- Developed by OpenAI: A Company Founded by Elon Musk 10 Years Ago
- Huge Artificial Neural Network: Multi-Billion Parameter Large Language Model (LLM)
- Trained on Language: Trillions of Data Elements ... Wikipedia + Public Internet
- ChatGPT 3.5 Talks: Generates Answers to Questions ... Engages in Conversations

A Big Surprise
ChatGPT's Scale Enabled it to Understand and Generate Language

Main Difference Between GPT-4 and ChatGPT

Unlike ChatGPT, GPT-4 can see and understand images, whereas the former is limited to text.

While ChatGPT had several issues upon its arrival, Microsoft claims that GPT-4 has been trained to avoid several malicious prompts.

ChatGPT

GPT-4 has arrived. It will blow ChatGPT out of the water *The Washington Post* 3/14/2023

ChatGPT was launched on November 30, 2022, by San Francisco-based OpenAI (the creator of the GPT series of large language models; DALL·E 2, a diffusion model used to generate images; and Whisper, a speech transcription model).



OpenAI Research Product Developers Safety Company Search Login Sign up

Introducing ChatGPT

We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.

[Try ChatGPT](#) [Read about ChatGPT Plus](#)

OpenAI

ChatGPT → **DALL·E** → **API** →

Interact with our flagship language models in a conversational interface

Create realistic images and art from a description in natural language

Integrate OpenAI models into your application or business

what are the top 10 databases

As of my knowledge cutoff in September 2021, the top 10 databases were:

1. Oracle Database: A relational database management system (RDBMS) known for its scalability, security, and comprehensive features.
2. MySQL: An open-source RDBMS widely used for web applications due to its simplicity, reliability, and compatibility.
3. Microsoft SQL Server: A popular RDBMS developed by Microsoft, known for its strong integration with Windows Server and seamless integration with other Microsoft products.
4. PostgreSQL: An open-source object-relational database management system (ORDBMS) known for its extensibility, robustness, and compliance with SQL standards.
5. MongoDB: A NoSQL database that uses a flexible, document-oriented model and is known for its scalability, performance, and ease of use.
6. IBM Db2: A family of database management systems developed by IBM, known for its reliability, scalability, and support for a wide range of applications.
7. SQLite: A lightweight, file-based, embedded database engine that requires no separate server process and is commonly used in mobile and embedded systems.
8. Redis: An in-memory data structure store that can be used as a database, cache, or message broker. It is known for its high performance and flexibility.
9. Cassandra: A distributed and highly scalable NoSQL database designed for handling large amounts of data across commodity servers and providing high availability and fault tolerance.
10. Amazon DynamoDB: A fully managed NoSQL database service provided by Amazon Web Services (AWS).

Regenerate response

Google's Bard



☰ Bard Experiment

🔄 Reset Chat

🕒 Bard Activity

🔗 FAQ

📅 Updates

📖 Help

R What are the top 10 databases

Here is a brief overview of each of the top 10 databases:

- **Oracle** is a commercial database that is known for its scalability and performance. It is often used by large enterprises that need to store and manage large amounts of data.
- **MySQL** is an open-source database that is known for its ease of use and flexibility. It is often used for web applications and other applications that need to be scalable and easy to maintain.
- **Microsoft SQL Server** is a commercial database that is known for its integration with other Microsoft products. It is often used by businesses that use Microsoft's Windows operating system and other Microsoft products.
- **PostgreSQL** is an open-source database that is known for its power and flexibility. It is often used for applications that need to store complex data or that need to be highly scalable.
- **MongoDB** is a NoSQL database that is known for its flexibility and scalability. It is often used for applications that need to store large amounts of unstructured data.
- **Redis** is a NoSQL database that is known for its speed and performance. It is often used for applications that need to store and manage large amounts of data in real time.
- **IBM DB2** is a commercial database that is known for its scalability and performance. It is often used by businesses that need to store and manage large amounts of data.
- **Elasticsearch** is a search engine database that is known for its speed and scalability. It is often used for applications that need to search and index large amounts of data.
- **Cassandra** is a NoSQL database that is known for its scalability and fault tolerance. It is often used for applications that need to store and manage large amounts of data in a distributed environment.
- **MariaDB** is a fork of MySQL that is known for its stability and performance. It is often used as a replacement for MySQL when MySQL is not available or when a more stable database is needed.

Enter a prompt here



📍 [Stock, USA](#)

From your IP address - [Verify location](#)

Bard may display inaccurate or offensive information that doesn't represent Google's views.

Transformers - Google, 2017



See: Illustrated Guide to Transformers Neural Network: YouTube step by step

iv:1706.03762v5 [cs.CL] 6 Dec 2017

Attention Is All You Need

Ashish Vaswani* Google Brain avaswani@google.com	Noam Shazeer* Google Brain noam@google.com	Niki Parmar* Google Research nikip@google.com	Jacob Uszkoreit* Google Research usz@google.com
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Illia Polosukhin*[‡]
illia.polosukhin@gmail.com

Abstract

The dominant sequence transduction models are based on complex recurrent or convolutional neural networks that include an encoder and a decoder. The best performing models also connect the encoder and decoder through an attention mechanism. We propose a new simple network architecture, the Transformer, based solely on attention mechanisms, dispensing with recurrence and convolutions entirely. Experiments on two machine translation tasks show these models to be superior in quality while being more parallelizable and requiring significantly less time to train. Our model achieves 28.4 BLEU on the WMT 2014 English-to-German translation task, improving over the existing best results, including ensembles, by over 2 BLEU. On the WMT 2014 English-to-French translation task, our model establishes a new single-model state-of-the-art BLEU score of 41.8 after training for 3.5 days on eight GPUs, a small fraction of the training costs of the best models from the literature. We show that the Transformer generalizes well to other tasks by applying it successfully to English constituency parsing both with large and limited training data.

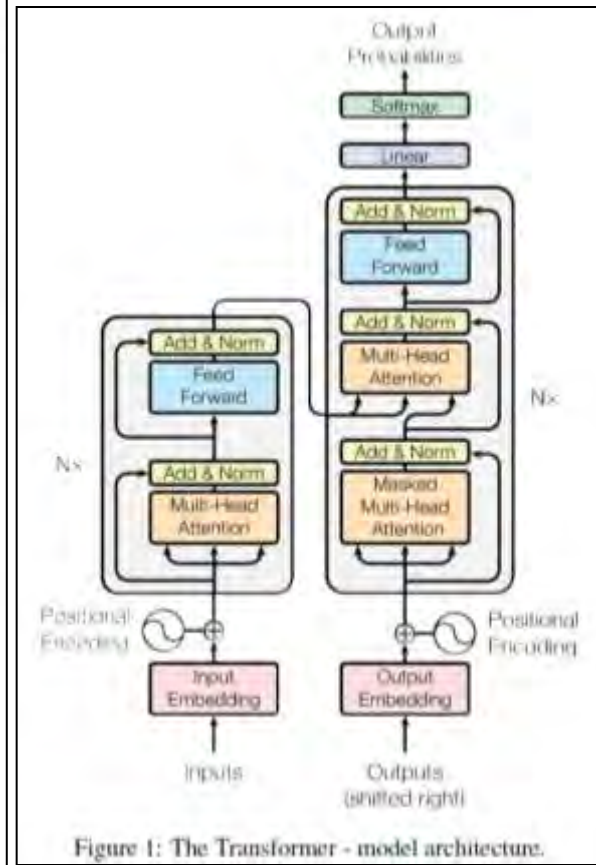


Figure 1: The Transformer - model architecture.

Outperformed Recurrent NN, GRU, & LSTM

Transformers Have Longer Term Memory

- Google BERT
- OpenAI GPT

Next word learned tend to much earlier words thru Backprop

Leverages Parallelism to train model

Stanford (113 authors / 215 pgs.) on Foundation Models 2021/2022

On the Opportunities and Risks of Foundation Models

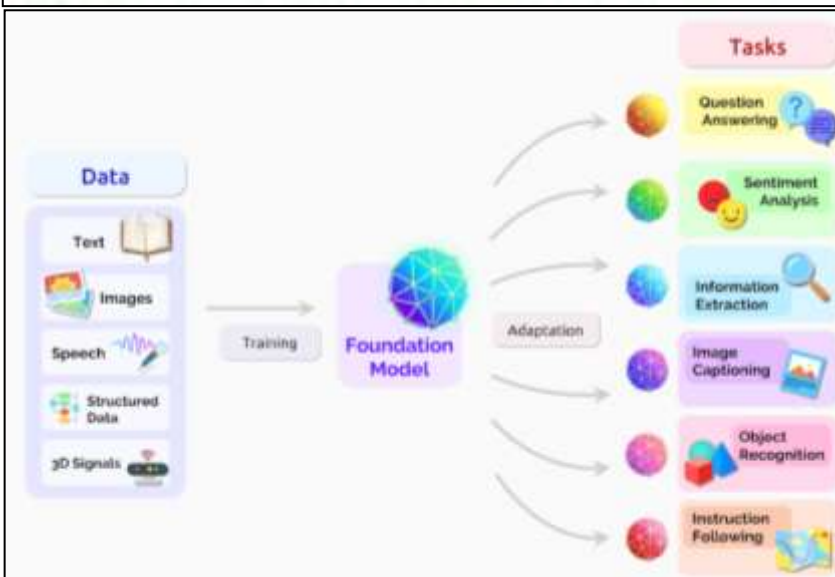
Rishi Bommasani* Drew A. Hudson Ehsan Adeli Russ Altman Simran Arora
Sydney von Arx Michael S. Bernstein Jeannette Bohg Antoine Bosselut Emma Bryson
Erik Brynjolfsson Shyamal Buch Dallas Card Rodrigo Castellon Niladri Chatterji
Annie Chen Kathleen Creel Jared Quincy Davis Dorottya Demszky Chris Donahue
Moustafa Daboudy Esin Durmus Stefano Ermon John Etchemendy Kavin Elhayarajhi
Li Fei-Fei Chelsea Finn Trevor Gale Lauren Gillespie Karan Goel Noah Goodman
Shelby Grossman Neel Gupta Tatsunori Hashimoto Peter Henderson John Hewitt
Daniel E. Ho Jenny Hong Kyle Hui Jing Huang Thomas Icard Saahil Jain
Dan Jurafsky Pratyusha Kalluri Siddharth Karamcheti Geoff Keeling Fereshte Khani
Omar Khattab Pang Wei Koh Mark Krass Ranjay Krishna Rohith Kuditipudi
Ananya Kumar Faisal Ladhak Mina Lee Tony Lee Jure Leskovec Isabelle Levent
Xiang Lisa Li Xuechen Li Tengyu Ma Ali Malik Christopher D. Manning
Sovir Mirchandani Eric Mitchell Zanele Munyikwa Suraj Nair Ayanika Narayan
Deepak Narayanan Ben Newman Allen Nie Juan Carlos Niebles Hamed Nilforoshan
Julian Nyarko Giray Oguz Laurel Orr Isabel Papadimitriou Joon Sung Park Chris Piech
Eva Portelance Christopher Potts Aditi Raghunathan Rob Reich Hongyu Ren
Frieda Rong Yusuf Roohani Camilo Ruiz Jack Ryan Christopher Ré Dorsa Sadigh
Shiori Sagawa Keshav Santhanam Andy Senior Krishnan Srinivasan Alex Tamkin
Rohan Taori Armin W. Thomas Florian Tramèr Rose E. Wang William Wang Bohan Wu
Jiajun Wu Yuhuai Wu Sang Michael Xie Michihiro Yasunaga Jiaxuan You Matei Zaharia
Michael Zhang Tianyi Zhang Xikun Zhang Yuhui Zhang Lucia Zheng Kaitlyn Zhou
Percy Liang*

Center for Research on Foundation Models (CRFM)
Stanford Institute for Human-Centered Artificial Intelligence (HAI)
Stanford University

AI is undergoing a paradigm shift with the rise of models (e.g., BERT, DALL-E, GPT-3) trained on broad data (generally using self-supervision at scale) that can be adapted to a wide range of downstream tasks. We call these models foundation models to underscore their critically central yet incomplete character. This report provides a thorough account of the opportunities and risks of foundation models, ranging



Fig. 1. The story of AI has been one of increasing emergence and homogenization. With the introduction of machine learning, how a task is performed emerges (its inferred automatically) from examples; with deep learning, the high-level features used for prediction emerge; and with foundation models, even advanced functionalities such as in-context learning emerge. At the same time, machine learning homogenizes learning algorithms (e.g., logistic regression), deep learning homogenizes model architectures (e.g., Convolutional Neural Networks), and foundation models homogenizes the model itself (e.g., GPT-3).



From Stanford Paper

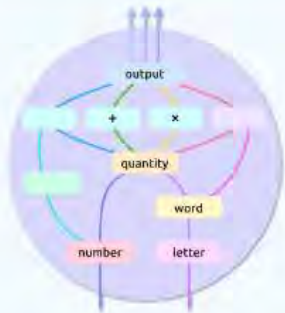
FYI

124

Center for Research on Foundation Models (CRFM)

One Model

A finite number of **generalizable model mechanisms are combined** to produce behaviors across tasks.



Many Models

For each task, distinct model mechanisms are used to produce behaviors; akin to a **large collection of individual expert models**.



On the Opportunities and Risks of Foundation Models

4.7 Security and privacy

Authors: Florian Tramèr*, Rohith Kudipudi*, Xuechen Li*



Fig. 20. Risks and opportunities raised by foundation models for security and privacy of ML systems.

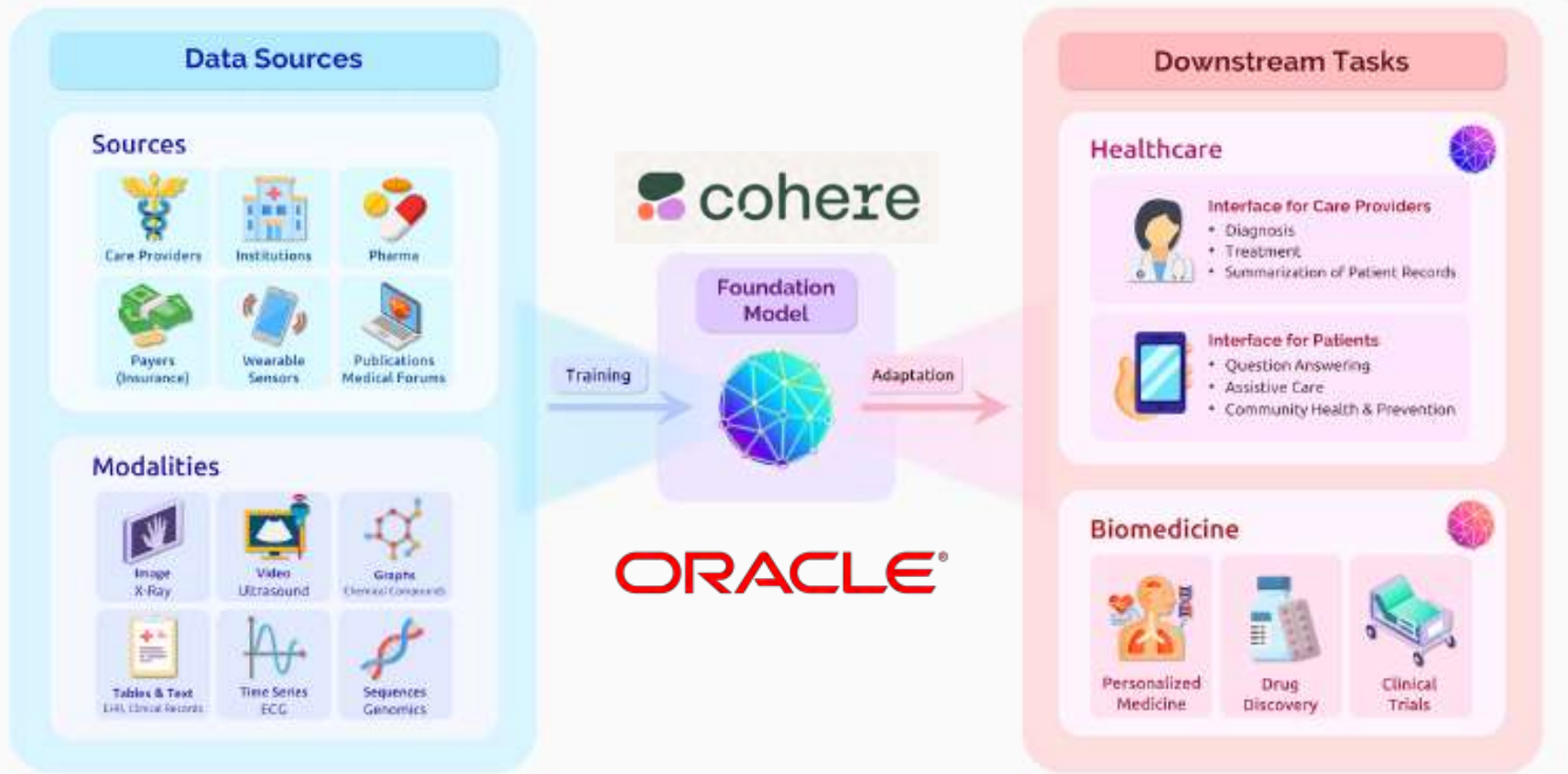
Will Businesses of the Future just be a Single Foundation Model to do all Tasks? (my own question)

Fig. 23. The one model–many model nature of foundation models: A central interpretability question is to understand where a foundation model lies on the spectrum between *one model* and *many models*. As one model, behavior can be made interpretable by identifying and characterising the finite number of generalizable model mechanisms used to produce behaviors across tasks (e.g., mechanisms that assign meaning to words, compare quantities, and perform arithmetic). As many models, explanations of model behavior in one task are not necessarily informative about behavior in other tasks, thus requiring the independent study of behavior in each task.

From Stanford Paper (Example Application)

FYI

Section on Healthcare & Biomedicine

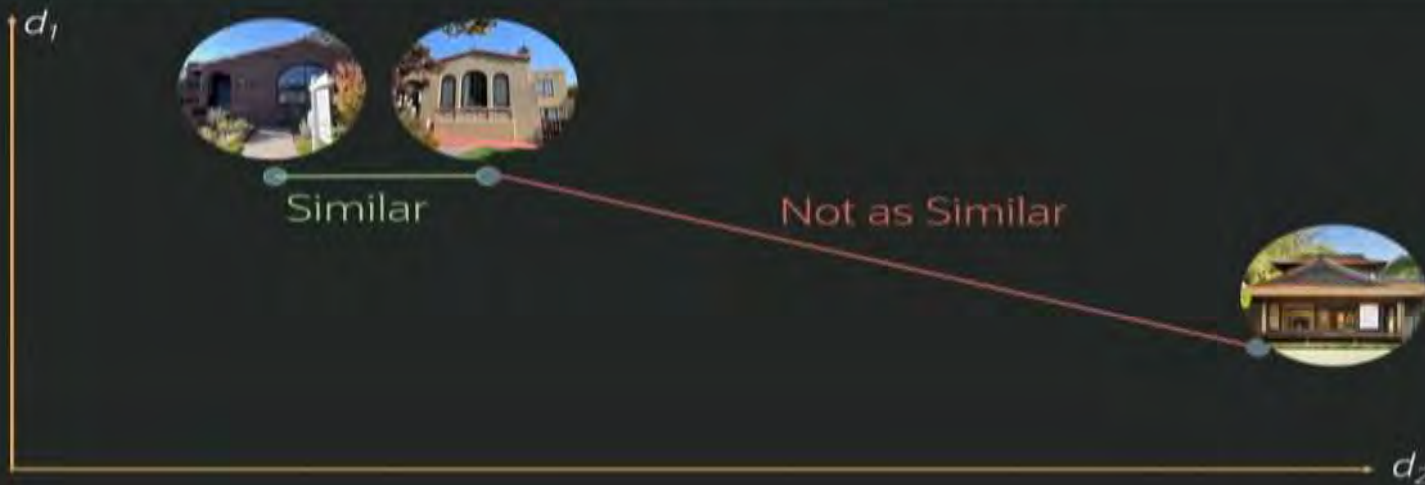


Vector Search

Imagine a house-hunting app that helps customers find houses for sale that are similar to a picture the customer uploads



The distance between the vectors is proportional to their semantic similarity



Create table with Vector Data Type & Blob

```
CREATE TABLE house_for_sale (house_id      number,  
                             price         number,  
                             city          varchar2(400),  
                             house_photo  blob,  
                             house_vector  vector  
);
```

Find houses that are similar to this picture and match the customer's preferred city and budget



```
SELECT ...  
FROM   house_for_sale  
WHERE  price <= (SELECT budget          FROM customer ...)  
AND    city  in (SELECT search_city    FROM customer ...)  
ORDER BY vector_distance(house_vector, :input_vector);
```


AI Vector search Preview!



Announcing:
AI Vector Search in
Oracle Database 23c

*Sign up
for Preview Now*



The Oracle AI Stack



Business applications, Oracle SaaS portfolio



Oracle
Cloud



Oracle
NETSUITE



Oracle
Aconex

...

AI services



Digital Assistant



Speech



Language



Vision



Document
Understanding



Anomaly Detection



Forecasting



+
cohere
OCI Generative AI

Machine learning services



OCI Data Science



ML in Oracle Database



MySQL Heatwave



OCI Data Labeling

Data Platform

AI infrastructure



Compute bare metal instances and VMs



Cluster networking



Block, object, and file storage; HPC filesystems

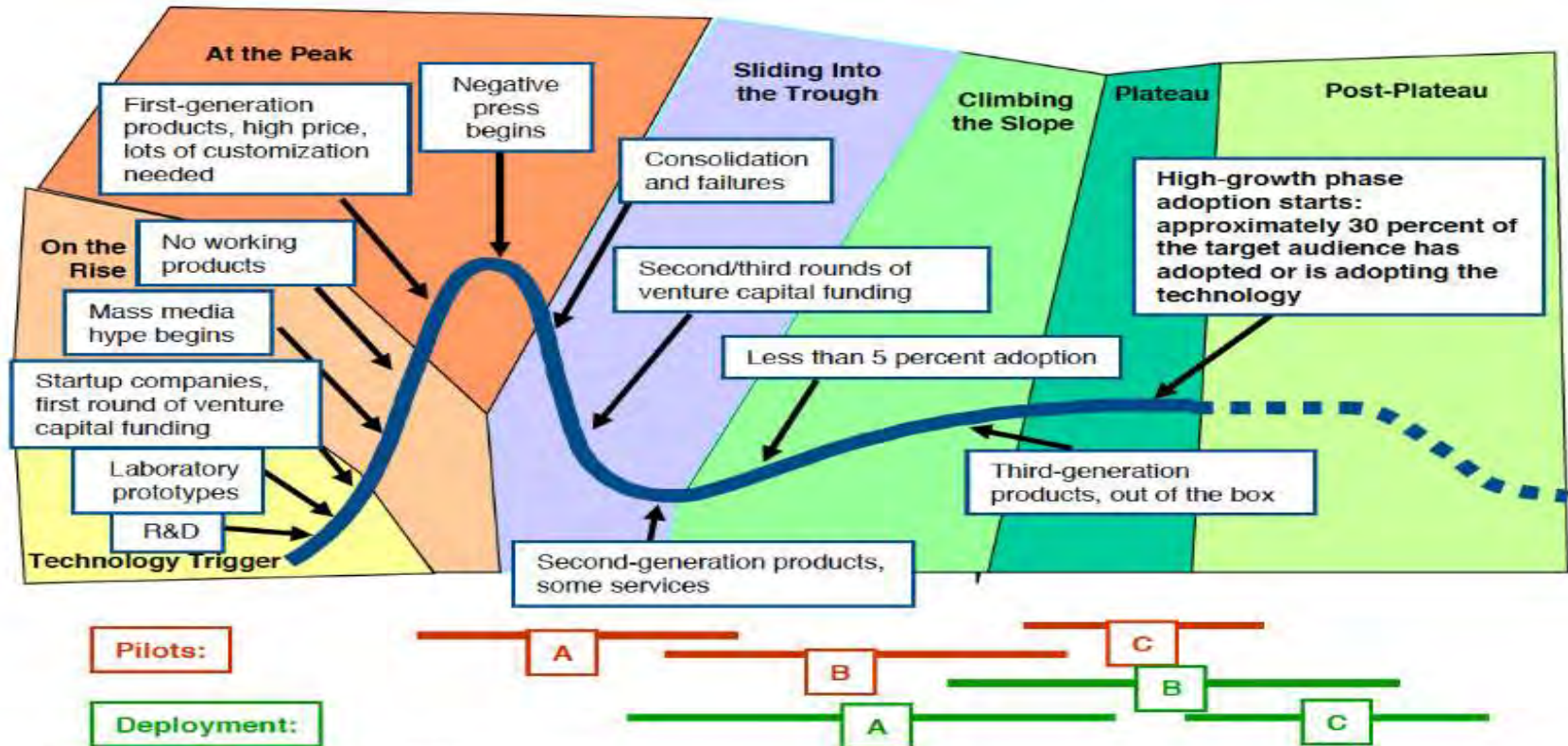


GPUs, OCI Supercluster

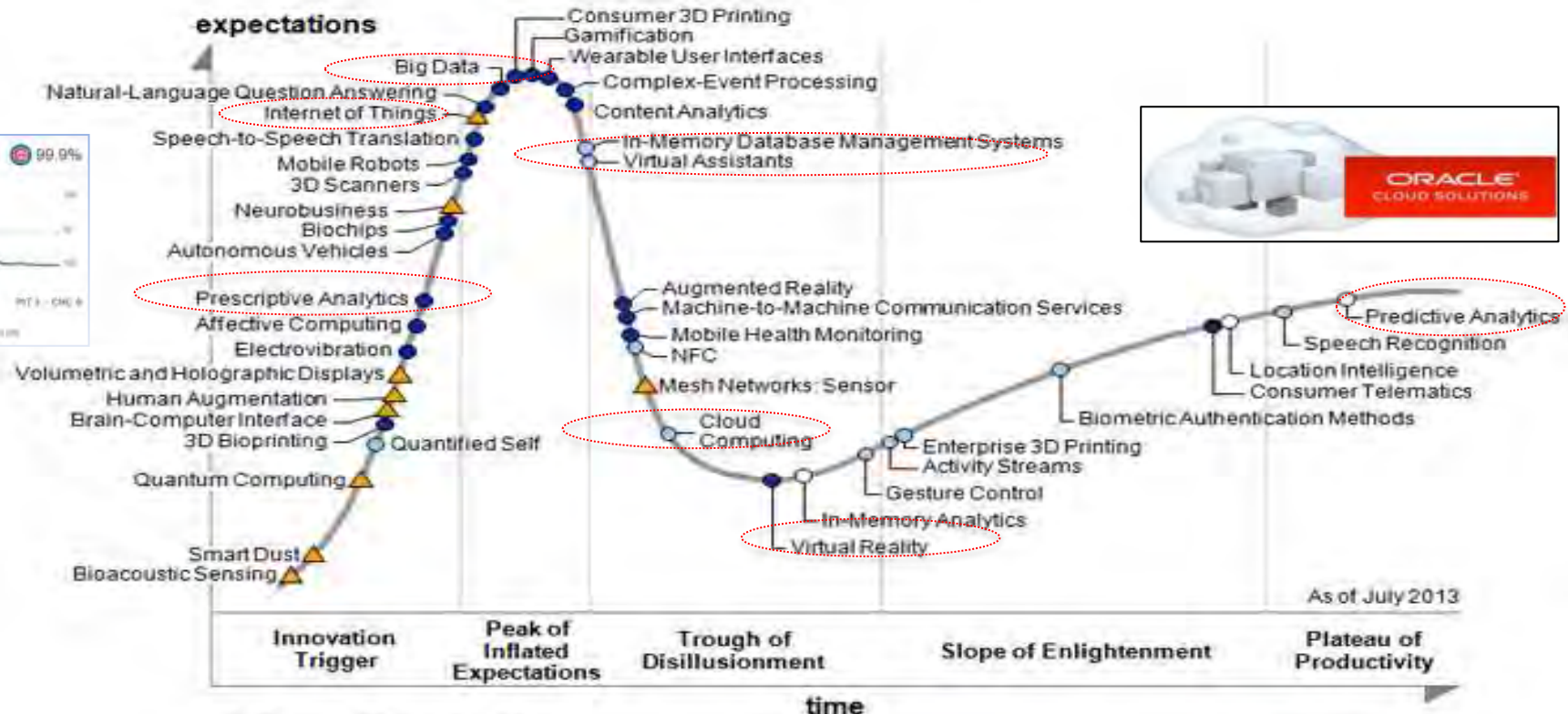


NVIDIA
A100

Tech Trends - Gartner Hype Cycle



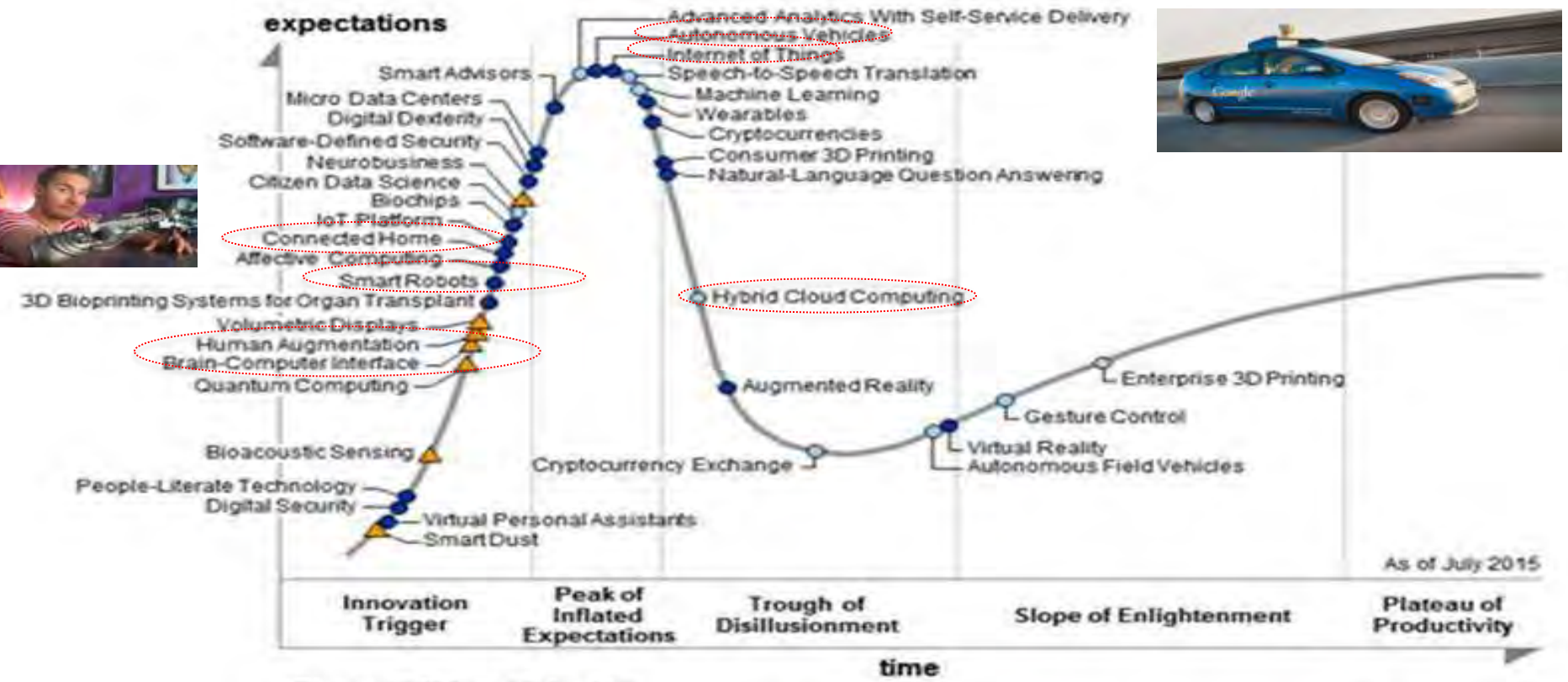
Tech Trends - Gartner Hype Cycle 2013: All about Tech ...



Plateau will be reached in:

- less than 2 years
- ◐ 2 to 5 years
- 5 to 10 years
- ▲ more than 10 years
- ⊗ obsolete before plateau

Tech Trends - Gartner Hype Cycle 2015: All about Robotics ...

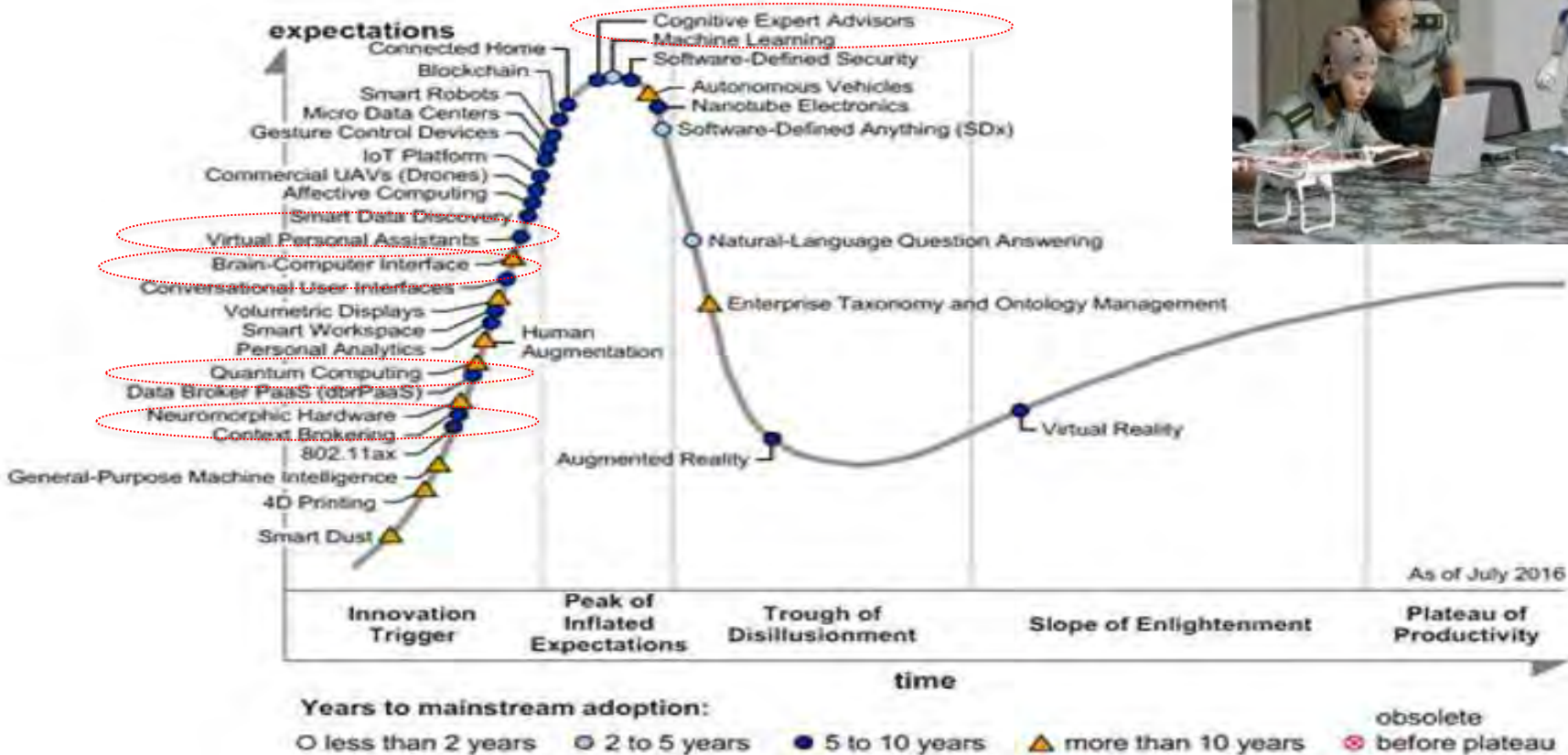


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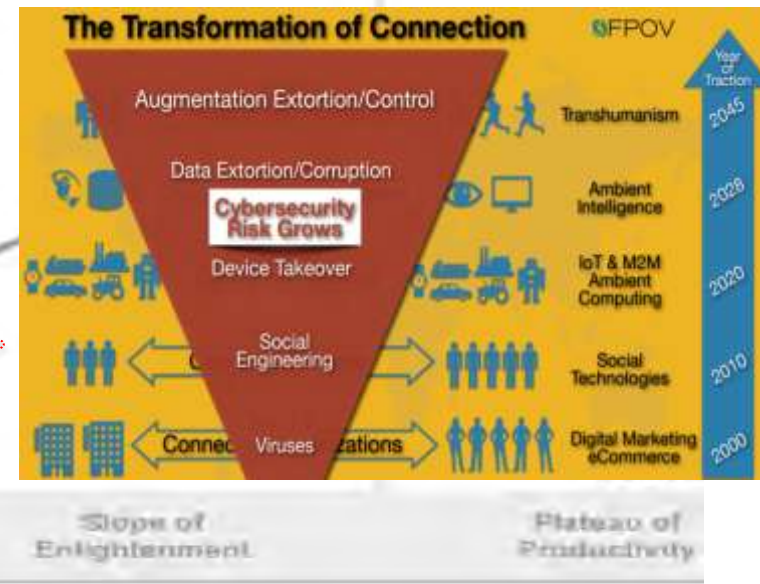
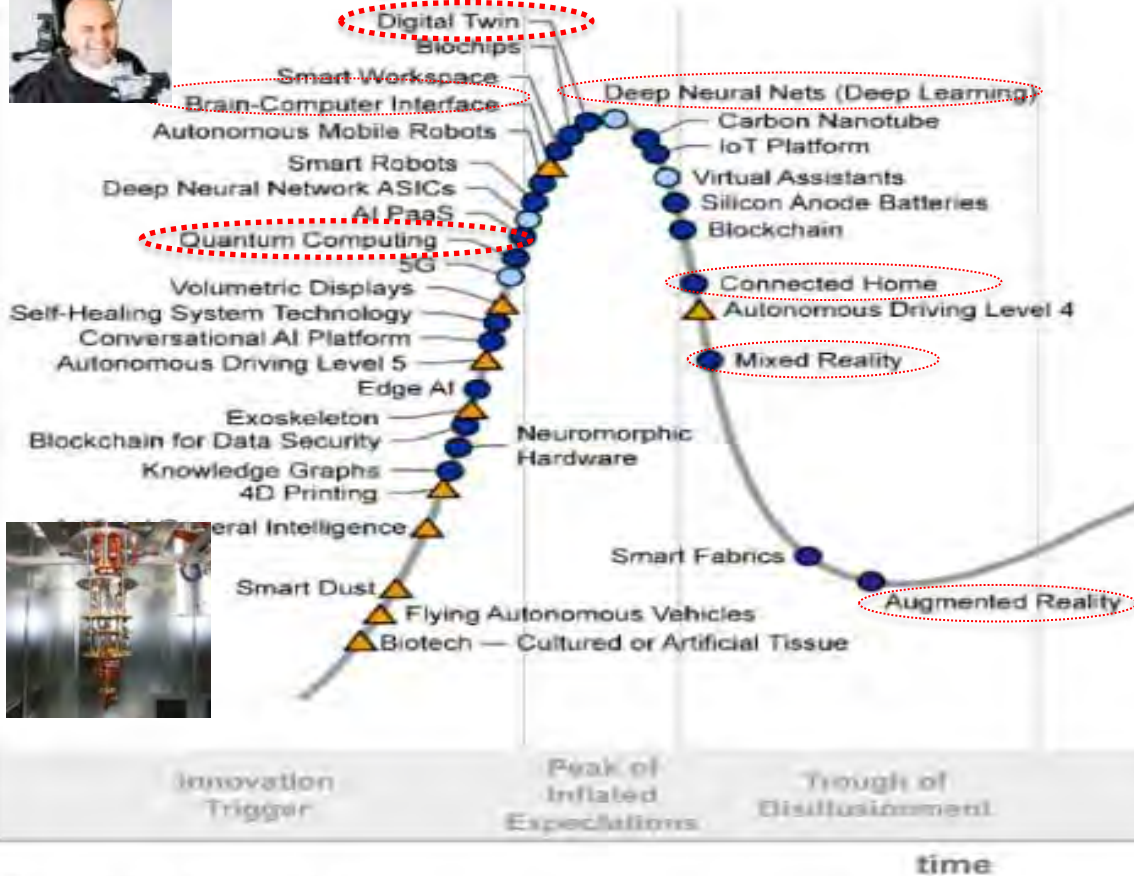
Gartner Hype Cycle July, 2016

All about Implants & the Twilight Zone



Gartner Hype Cycle August 2018 - All about Robotics ...

All about Tech Creating a New Reality (just 5 years later!)



Plateau will be reached:

time

Gartner 2020 hype cycle



82%
of consumers believe that robots will replace financial professionals in the future.



42%
of consumers believe it will happen in the next 5 years or already has.

Consumers also want help from a robot



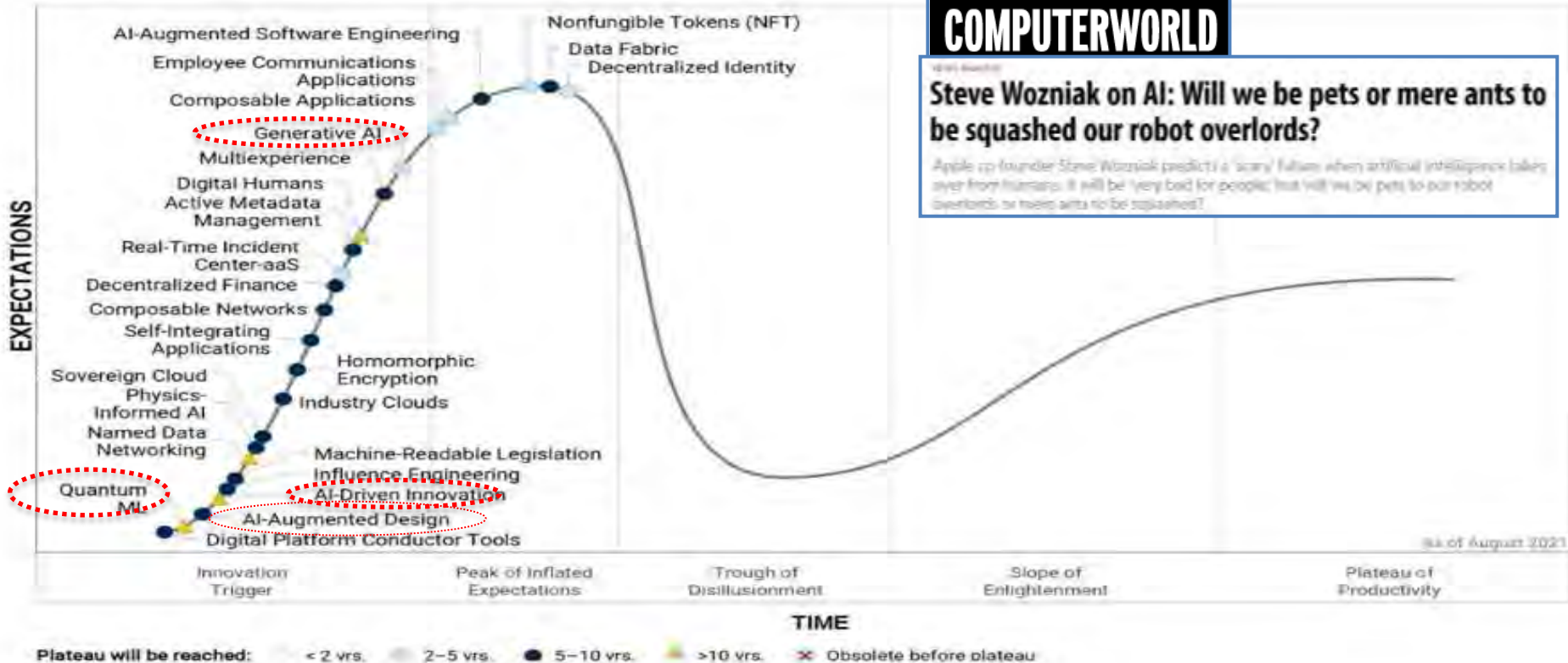
As of July 2020

Plateau will be reached:

○ less than 2 years ● 2 to 5 years ● 5 to 10 years ▲ more than 10 years ⊗ obsolete before plateau

Gartner 2021 hype cycle for Emerging Tech

Hype Cycle for Emerging Technologies, 2021



Final Thoughts... world changing fast!

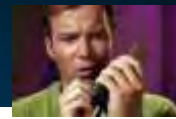
“Those who use things of the world should not become attached to them. For the world in its present form is passing away.”

1 Corinthians 7:31



Star Trek

- Communicator - Motorola Flip Phone
- Phaser - EPM or Stun Gun / Taser
- Tablets (Medical) - Tablet Computers
- Tricorders - Many Medical Devices (below)
- Translators - Google Translate (others)
- Tractor Beam - MIT has it in concept
- Telepresence - Zoom Virtual Conferences
- Geordi's Visor - Robotic Eyes / Implants
- Communicator Badges - Many Security Badges
- Food Replicator - 3D Printer
- Holodeck - VR
- Teleportation - Quantum Entanglement
- Big Screen TV - Everyone has it
- Hands Free Phone - Bluetooth headset / Airpods



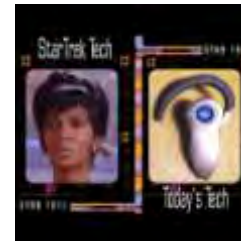
Hololens VR Apps Above



Microsoft working on Holodeck



MouthLab



Final Thoughts... Catch your Ride!



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

— Abraham Lincoln



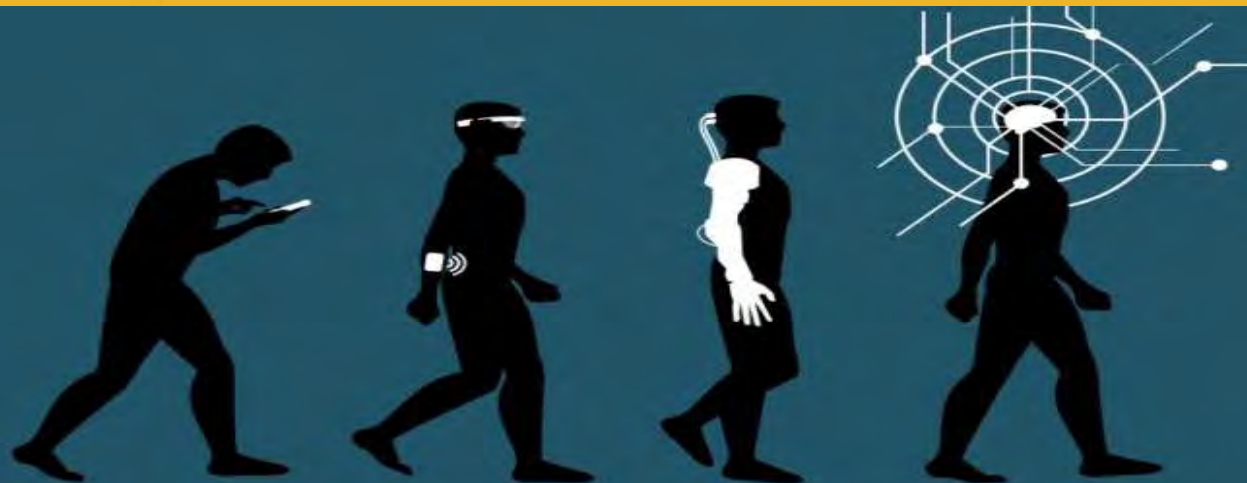
The Digital Transformation Ahead

Digital Transformation 2000 to 2050

A historically significant
change in humanity...



Gerd



Disconnected
The Dark Ages

Using
Digital

Wearing
Digital

Implanting
Digital

The Hive
Mind

ADB Gives You Time Enough at Last



Summary – Prepare now for the Future!

- ❑ Innovation, Autonomous & the Cloud
- ❑ A Robot May Not Look Like One...
- ❑ Autonomous Transaction Processing (ATP)
- ❑ Autonomous Data Warehouse (ADW)
- ❑ Machine Learning & Data Visualization Desktop
- ❑ Next: **Robots & the Future Ahead**

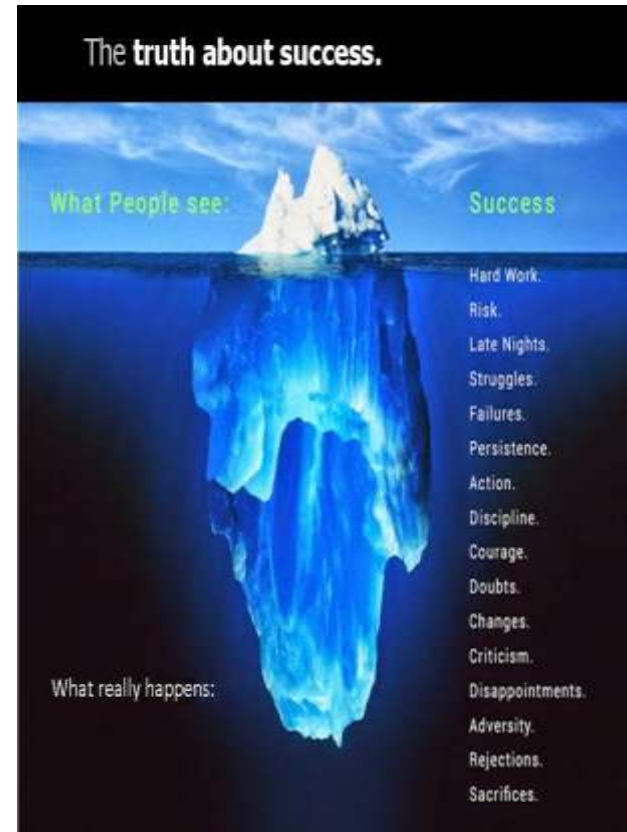


*“We make a Living by what we get.
We make a Life by what we give.”*

-Sir Winston Churchill

Conf42: DevOps 2024

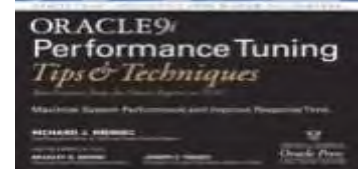
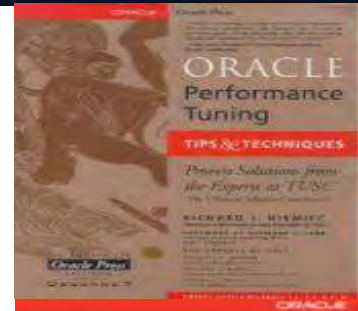
January 25 2024 - premiere 5PM GMT



Smartsalessolutions.net

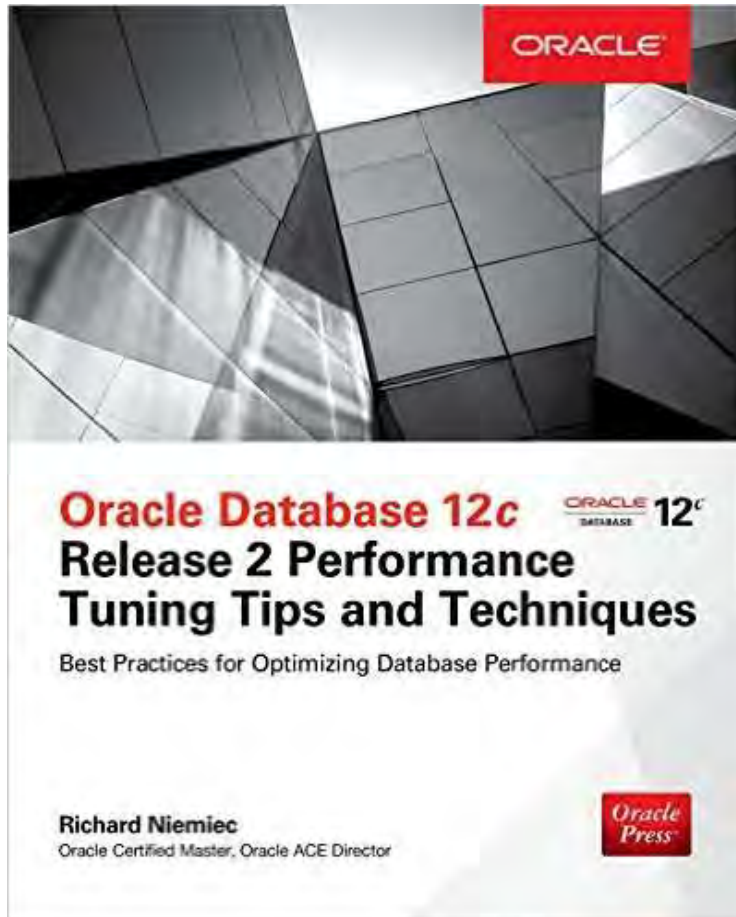
For More Information

- *Oracle 12c Release 2 Performance Tuning Tips & Techniques; Richard J. Niemiec; Oracle Press (Available now – 3/14/2017)*



“If you are going through hell, keep going” - Churchill

12c R2 Book – Available Now!



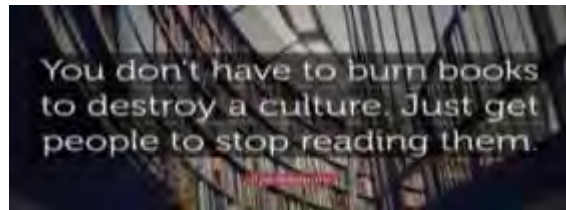
Top New Release

The screenshot shows the Amazon product page for the book. At the top, the Amazon logo and "Try Prime" are visible, along with a search bar containing the name "niemiec". Below the navigation bar, the "Departments" dropdown is set to "Books". The breadcrumb trail reads "Books > Computers & Technology > Databases & Big". The main title "Oracle Database 12c" is prominently displayed in large black font, followed by the author's name "by Richard Niemiec (Author)". A yellow badge indicates it is the "#1 New Release" in the "Oracle Databases" category. Below the text is a smaller version of the book cover, which includes the same geometric pattern, "ORACLE" logo, title, subtitle, author information, and Oracle Press logo.

References



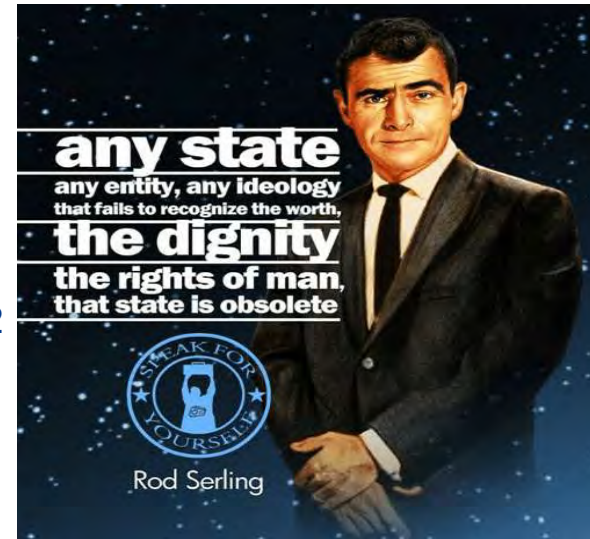
- The Emerging Technology Roadmap, Scott Klososky
- Futurist Gerd Leonhard The Futures Agency, Technology vs. Humanity, Gerd Leonhard, oracle.com & Juan Loaiza presentations, amazon.com, smartcitiescouncil.com, youtube.com, business coach, libelium.com, monetate, en.wikipedia.org, Netflix, Black Mirror, cooking-hacks.com, hometoys.com, FPOV, huffingtonpost.com, theguardian.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, & 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, & Oracle OpenWorld

Contact Information: richniemiec@gmail.com



**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.**

Rich's Overview @richniemic



- 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



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