

Cloud DBA

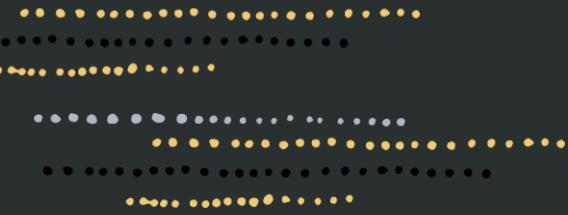
Learn how to stay relevant in the DBaaS era

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LAD Partner Enablement

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About Our Live Sessions

DB-Systems

MySQL

NoSQL

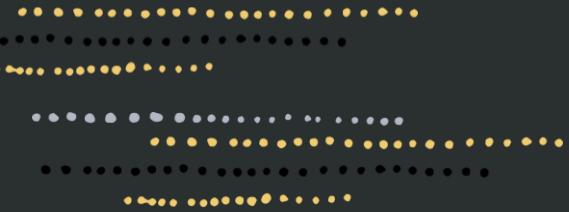
Autonomous DB

Data Safe

IaC

Architecture Center





Oracle DB-Systems

OCI Database Service

Mission critical cloud database service

- Exadata, RAC, Bare Metal, VM

Complete Lifecycle Automation

- Provisioning, Patching, Backup & Restore

High Availability and Scalability

- RAC & Data Guard
- Dynamic CPU and Storage scaling

Security

- Infrastructure (IAM, Security Lists, Audit logs)
- Database (TDE, Encrypted RMAN backup / Block volume encryption)

OCI Platform integration

- Tagging, Limits and Usage integration



Virtual Machine (VM) Database (DB) Systems

2 DB systems types on VM:

“1-node” One VM DB and “2-node” Two VMs clustered with RAC

When a 2-node RAC VM DB system is provisioned, by default each node is assigned to a different fault domain.

VM DB systems have only a single database home, which in turn can have only a single database.

If you are launching a DB system with a virtual machine shape, you have option of selecting an RDBMS version.

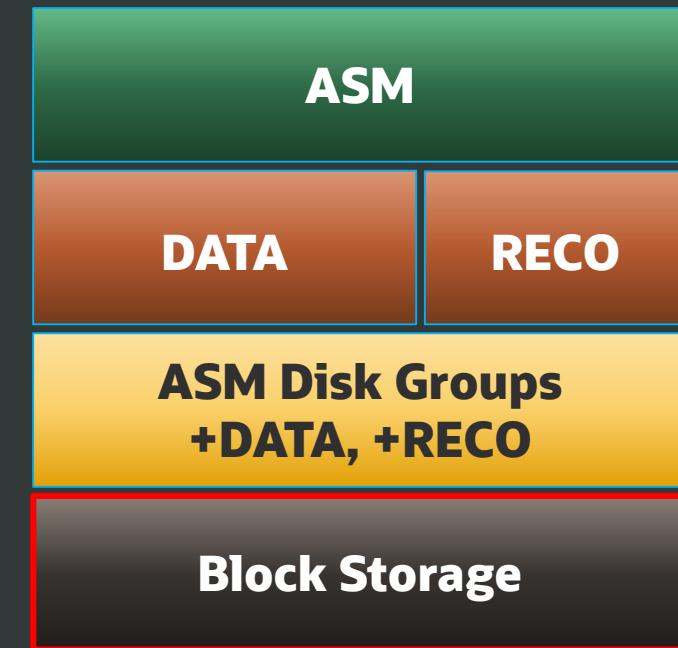
Amount of memory allocation for the VM DB system depends on the VM shape selected during the provisioning

Size of storage is specified when you launch a VM DB system and you scale up the storage as needed

Data Guard within/across ADs is available for VM DB systems (requires DB Enterprise Edition).

VM DB Systems Storage Architecture

- ASM relies on OCI Block Volume (based on NVMe) for mirroring data
- Block volumes are mounted using iSCSI
- ASM uses external redundancy relying on the triple mirroring of the Block Storage
- Different Block Storage volumes are used for DATA and RECO
- Monitors the disks for hard and soft failures
- These actions ensure highest level availability and performance at all times
- This storage architecture is required for VM RAC DB systems



VM DB Systems Storage Architecture – Fast Provisioning Option

- Linux Logical Volume Manager manages the filesystems used by the database for storing database files, redo logs, etc.
- Block volumes are mounted using iSCSI
- The available storage value you specify during provisioning determines the maximum total storage available through scaling**
- VM RAC DB Systems cannot be deployed using this option
- Currently supports Oracle Database 18c, 19c, 21c releases

**Please refer to

<https://docs.cloud.oracle.com/iaas/Content/Database/References/fastprovisioningstorage.htm> for more information

ext4 File Systems–
/u01 - BITS, /u02 – DATA and /u03 - RECO

Logical Volumes

Volume Groups on VM

Physical Volumes on VM

Block Storage

Bare Metal DB Systems

Bare Metal DB Systems rely on Bare Metal servers running Oracle Linux

One-node database system:

Single Bare Metal server

Locally attached 51 TB NVMe storage (raw)

Start with 2 cores and scale up/down OCPUs based on requirement

Data Guard within and across ADs (requires DB Enterprise Edition)

If single node fails, launch another system and restore the databases from current backups

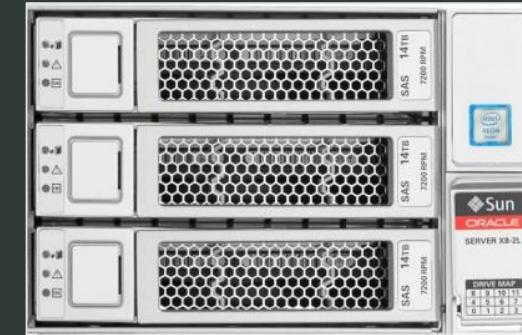
Bare Metal Server X8-2

Oracle Database

ASM for 19c+, ACFS for 11g

DB Management Agent

Oracle Linux



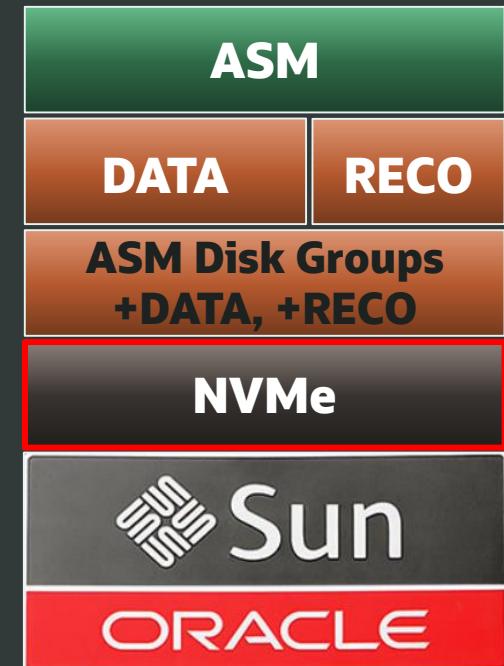
52 CPU cores

768 GB RAM

51 TB NVMe raw

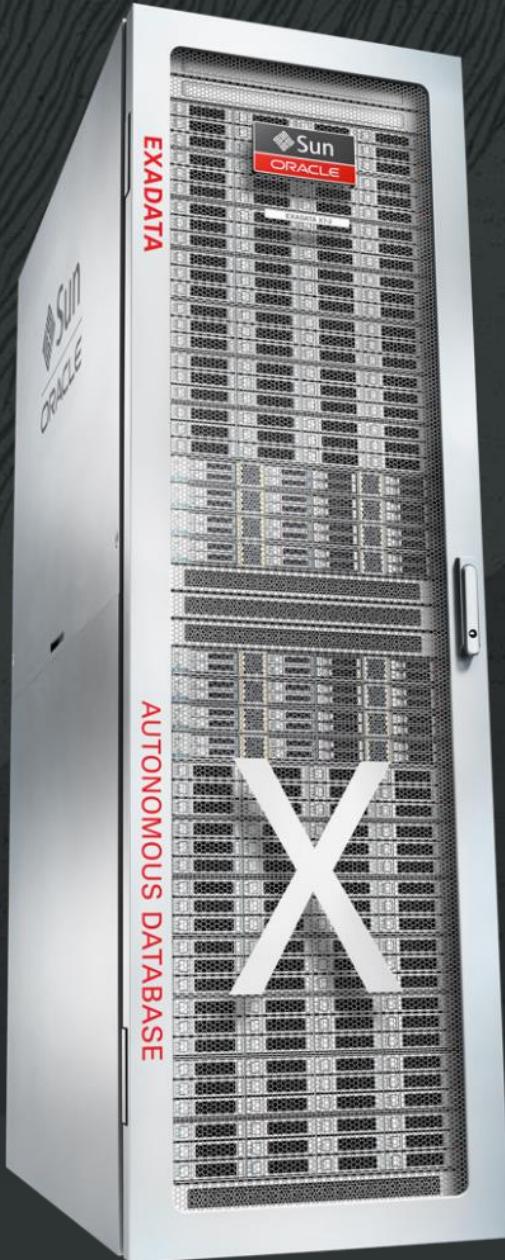
Bare Metal DB Systems Storage Architecture

- ASM manages mirroring of NVMe disks
- Disks are partitioned – one for DATA and one for RECO
- Monitors the disks for hard and soft failures
- Proactively offlines disks that failed, predicted to fail, or are performing poorly & performs corrective actions, if possible
- On disk failure, the DB system automatically creates an internal ticket and notifies internal team to contact the customer
- These actions ensure highest level availability and performance at all times



Exadata Cloud Service

- Full Oracle Database with all advanced options
- On fastest and most available database cloud platform
 - Scale-Out Compute, Scale-Out Storage, Infiniband, PCIe flash
 - Complete Isolation of tenants with no overprovisioning
- All Benefits of Public Cloud
 - Fast, Elastic, Web Driven Provisioning
 - Oracle Experts Deploy and Manage Infrastructure

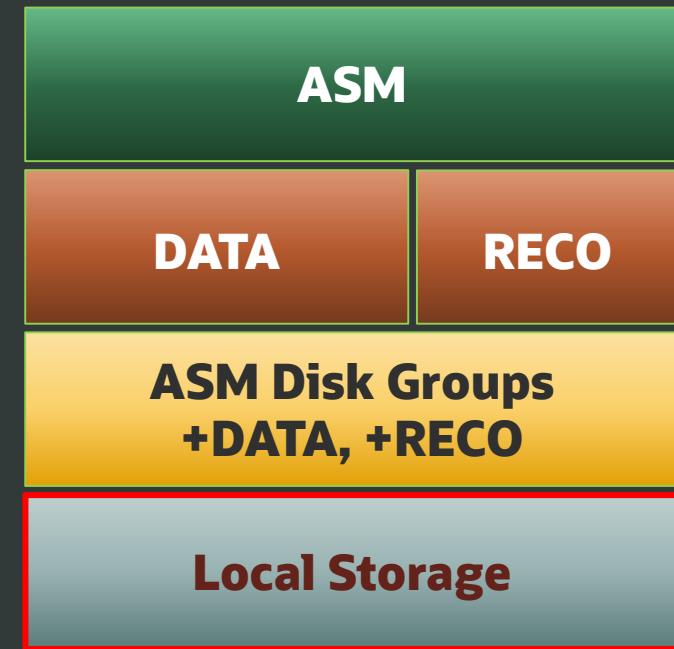
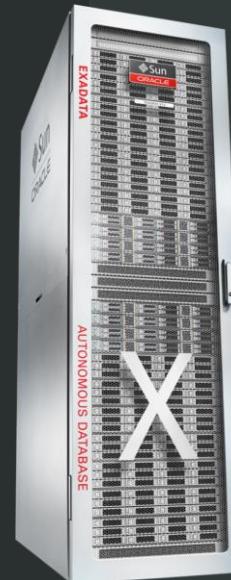


Exadata DB Systems

- Oracle manages Exadata infrastructure - servers, storage, networking, firmware, hypervisor, etc.
- You are billed for the Exadata infrastructure for the first month, and then by the hour after that. Each OCPU you add to the system is billed by the hour from the time you add it
- Scaling from $\frac{1}{4}$ to a $\frac{1}{2}$ rack, or from $\frac{1}{2}$ to a full rack requires that the data associated with database deployment is backed up and restored on a different Exadata DB system

Exadata DB Systems Storage Architecture

- Backups provisioned on Exadata storage: ~ 40% of the available storage space allocated to DATA disk group and ~ 60% allocated to the RECO disk group
- Backups not provisioned on Exadata storage: ~ 80% of the available storage space allocated to DATA disk group and ~ 20% allocated to the RECO disk group
- After the storage is configured, the only way to adjust the allocation without reconfiguring the whole environment is by submitting a service request to Oracle



Database Editions and Options

Standard Edition

- Full database instance
- Includes Transparent Data Encryption

Enterprise Edition

Adds...

- All standard EE features
- Data Masking and Subsetting
- Diagnostics and Tuning
- Real Application Testing

EE High Performance

Adds...



Multitenant



Partitioning



Advanced Compression



Advanced Security,
Label Security,
Database Vault



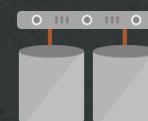
OLAP, Advanced
Analytics, Spatial
and Graph



Management
Packs

EE Extreme Performance

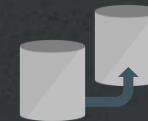
Adds...



Real Application Clusters (RAC)



In-Memory



Active Data Guard

Note that all editions include Oracle Database Transparent Data Encryption (TDE)

Managing DB Systems

You can use the console to perform the following tasks:

- **Launch a DB System:** You can create a database system
 - Status check: You can view the status of your database creation and after that, you can view the runtime status of the database
- **Start, stop, or reboot DB Systems**
 - Billing continues in stop state for BM DB Systems (but not for VM DB)
- **Scale CPU cores:** scale up the number of enabled CPU cores in the system (BM DB systems only)
- **Scale up Storage:** increase the amount of Block Storage with no impact (VM DB systems only)
- **Terminate:** terminating a DB System permanently deletes it and any databases running on it

Patching DB Systems

- **Automated Applicable Patch Discovery:** Automatic patch discovery and pre-flight checks/tests
- **On demand patching:** N-1 patching (previous patch is available if it hasn't been applied), pre-check and patching at the click of a button
- **Availability during patching:** For Exadata and RAC shapes, patches are rolling. For single node systems if Active Data Guard is configured this can be leveraged by the patch service.
- **2 step process** – patching is a 2 step process, one for DB System and one for the database. DB System needs to be patched first before the database is patched
- **Identity and Access Controls:** Granular Permissions – its possible to control who can list patches, apply them, etc.

The screenshot shows the Oracle Cloud interface for managing database systems. The top navigation bar includes 'ORACLE Cloud', 'Applications >', and a search bar. The main content area displays a database named 'PRF' with a green 'AVAILABLE' status indicator. On the left, a sidebar lists 'Resources' such as Metrics, Backups (8), Updates (2) (which is selected), Update History (0), Data Guard Associations (0), Pluggable Databases (1), and Workload (0). The central panel shows 'General Information' for the database, including Lifecycle State: Available, OCID: ...lscdmq, Created: Thu, Dec 30, 2021, 18:55:41 UTC, Database Unique Name: PRF_gru1vp, Database Workload: OLTP, Database Architecture: Container Database, Database Version: 21.1.0.0.0, Database Software Image: None, Character Set: AL32UTF8, and National Character Set: AL16UTF16. To the right, there are sections for 'Backup', 'Automatic Backup', 'Last Backup Time', 'Backup Retention', 'Backup Schedule', 'Data Guard', 'Status: Not enabled', 'Associated', and 'Database Manager'. Below the general info, there's a 'Updates' section with a note about one-off patches and a link to 'Apply a one-off patch'. A table lists available patches:

Patch description	Type	State	Version
Oct 2021 21c Database patch	Patch	Available	21.4.0.0.0
Jul 2021 21c Database patch	Patch	Available	21.3.0.0.0

Backup / Restore

Backups stored in Object or Local storage
(recommended: Object storage for high durability)

DB System in private subnets can leverage Service Gateway

Backup options

- Automatic incremental – runs once/day, repeats the cycle every week; retained for 30 days
- On-demand, standalone/ full backups

Restore a DB

Managed backup and restore feature for VM/BM DB Systems;
Exadata backup process requires creating a backup config file

The screenshot shows the Oracle Cloud interface for managing database backups. The main page displays a database named 'PRF' with a green 'AVAILABLE' status. A modal dialog titled 'Restore Database' is open on the right, containing three restore options:

- Restore to latest: The database is restored and recovered with zero, or least possible, data loss.
- Restore to a timestamp: The database is restored and recovered to the specified timestamp. (This option is selected.)
- Restore to SCN: The database is restored and recovered to the specified Oracle Database System Change Number.

Below the options are buttons for 'Restore Database' and 'Cancel'. The background of the main page shows 'General Information' for the database, including its Lifecycle State (Available), OCID, creation date (Thu, Dec 30, 2021, 18:55:10 UTC), unique name (PRF_gre...), workload (OLTP), architecture (Container Database), version (21.1.0.0.0), software image (None), character set (AL32UTF8), and national character set (AL16UTF16). At the bottom, sections for 'Resources' (Metrics, Backups, Updates, History, Data Guard Associations, Pluggable Databases) and 'Backups' (Create Backup button, table with three rows of backup details) are visible.

Automatic Backups

- By default, automatic backups are written to Oracle owned object storage (customers will not be able to view the object store backups)
- You can optionally specify a 2-hour scheduling window for your database during which the automatic backup process will begin
- These are the preset retention periods for automatic backups
- Backup jobs are designed to be automatically re-tried
- Oracle automatically gets notified if a backup job is stuck
- All backups to cloud Object Storage are encrypted
- Link to troubleshooting backup issues <https://docs.us-phoenix-1.oraclecloud.com/Content/Database/Troubleshooting/Backup/backupfail.htm>

OCI Security Features Overview for Database Service

Security capability	Features
Network security and access control	VCN, Security Lists, VCN Public and Private subnets, Route Table, Service Gateway
Secure and Highly-available Connectivity	VPN DRGs, VPN and FastConnect
User authentication & authorization	IAM Tenancy, Compartments and security policies, console password, API signing key, SSH keys
Data encryption	TDE, RMAN encrypted back-ups, Local storage and Object storage encryption at rest
End-to-end TLS	LBaaS with TLS1.2, Customer-provided certificates
Auditing	OCI API audit logs



High Availability - Using DataGuard

Data Guard & Active DataGuard on VMDB, BMDB



DataGuard on Database Cloud Service- VM/BM

- Data Guard and Active Data Guard provide disaster recovery (DR) for databases with recovery time objectives (RTO) that cannot be met by restoring from backup.
 - Active Data Guard extends Data Guard capabilities by providing advanced features for data protection and availability as well as offloading read-only workload and fast incremental backups from a production database. Active Data Guard is included in the Extreme Performance Edition and Exadata Service.
- Once Data Guard is instantiated, it maintains synchronization between the primary database and the standby database.
- To configure a Data Guard system across regions or between on-premises and Oracle Cloud Infrastructure DB systems, you must access the database host directly and use the DGMGR utility.
 - Oracle recommends that the DB system of the standby database be in a different availability domain.
 - The standby databases in Oracle Cloud Infrastructure Database are physical standbys.

Data Guard Networking Requirement

- **Properly configure the security list ingress and egress rules** for the subnets of both DB systems in the Data Guard association to allow TCP traffic to flow between the applicable ports. **Ensure that the rules you create are stateful (the default).** For example, if the subnet of the primary DB System uses the source CIDR 10.0.0.0/24 and the subnet of the standby DB system uses the source CIDR 10.0.1.0/24, create rules as shown in the following example.
- The egress rules in the example show how to enable TCP traffic only for port 1521, which is a minimum requirement for Data Guard to work. If TCP traffic is already enabled on all of your outgoing ports (0.0.0.0/0), then you need not explicitly add these specific egress rules. Service Gateway can provide NW connectivity.

Rules(Prod)	Stateless	Source	IP Protocol	Source Port	Dest Port	Security List for Primary DB System's Subnet
Ingress	No	10.0.01.0/24	TCP	All	1521	
Egress	No	10.0.1.0/24	TCP	All	1521	
Rules(Sby)	Stateless	Source	IP Protocol	Source Port	Dest Port	
Ingress	No	10.0.0.0/24	TCP	All	1521	
Egress	No	10.0.0.0/24	TCP	All	1521	

Data Guard Configuration supported from Console

The Console allows you to enable a Data Guard association between databases, change the role of a database in a Data Guard association using either a *switchover* or a *failover* operation, and *reinstate* a failed database.

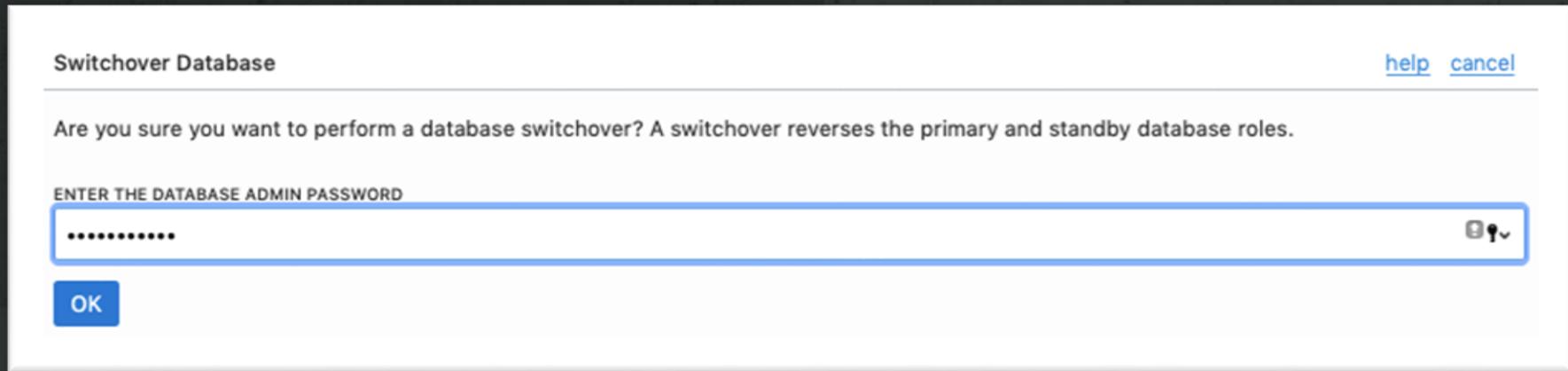
When you enable Data Guard, a separate Data Guard association is created for the primary and the standby database.

You can use console to perform following operations:

- To enable Data Guard
- To perform a database switchover
- To perform a database failover
- To reinstate a database
- To terminate a Data Guard association

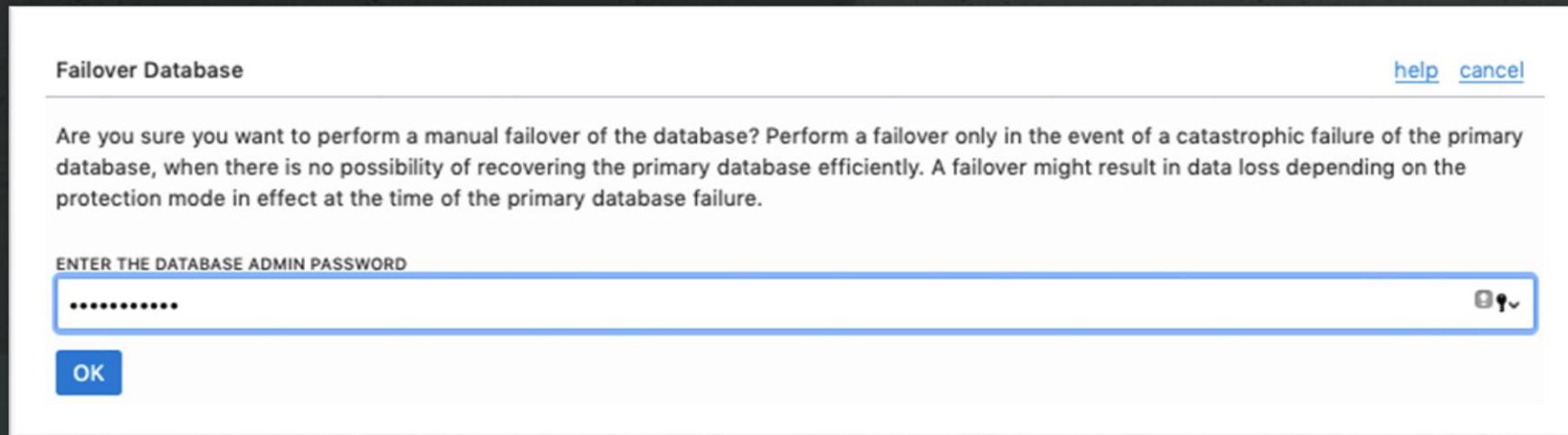
Switchover - A switchover is a role reversal between the primary database and one of its standby databases. A switchover guarantees no data loss. This is typically done for planned maintenance of the primary system. During a switchover, the primary database transitions to a standby role, and the standby database transitions to the primary role. The transition occurs without having to reenable either database.

Supported Operation for Data Guard-”SwitchOver”



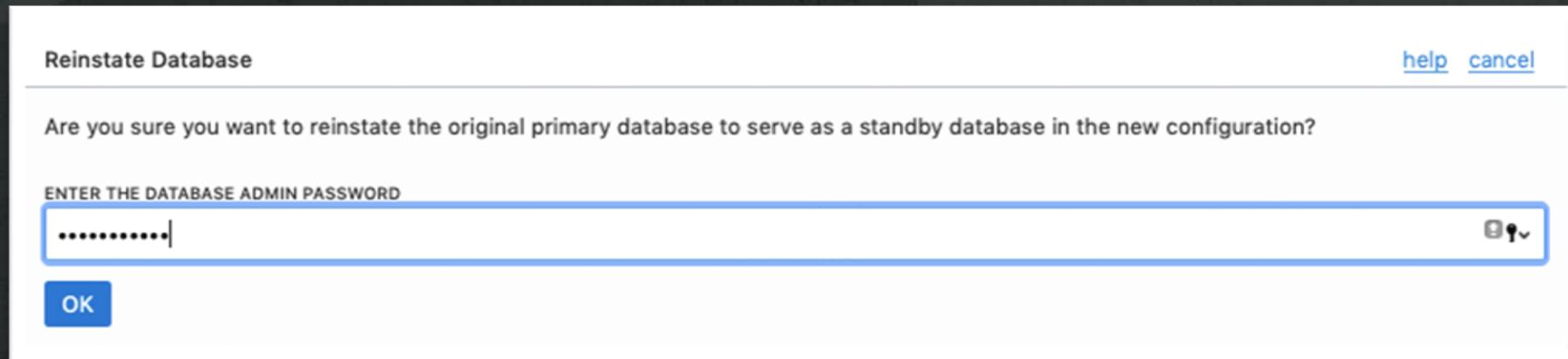
Failover - A **failover** is when the primary database (all instances of a RAC primary database) fails and one of the standby databases is transitioned to take over the primary role. Failover is performed only in the event of a catastrophic failure of the primary database, and there is no possibility of recovering the primary database in a timely manner. Failover may or may not result in data loss depending on the protection mode in effect at the time of the failover. This operation is supported from the Standby database.

Data Guard-FailOver



Data Guard- Reinstate

Reinstate – In some situations, the primary database can go into a failed state, which becomes irrecoverable. The reinstate allows customers to reinstate a failed primary database as a standby database after repair.



High Availability-Demo

Creation of Standby & Data Guard operation

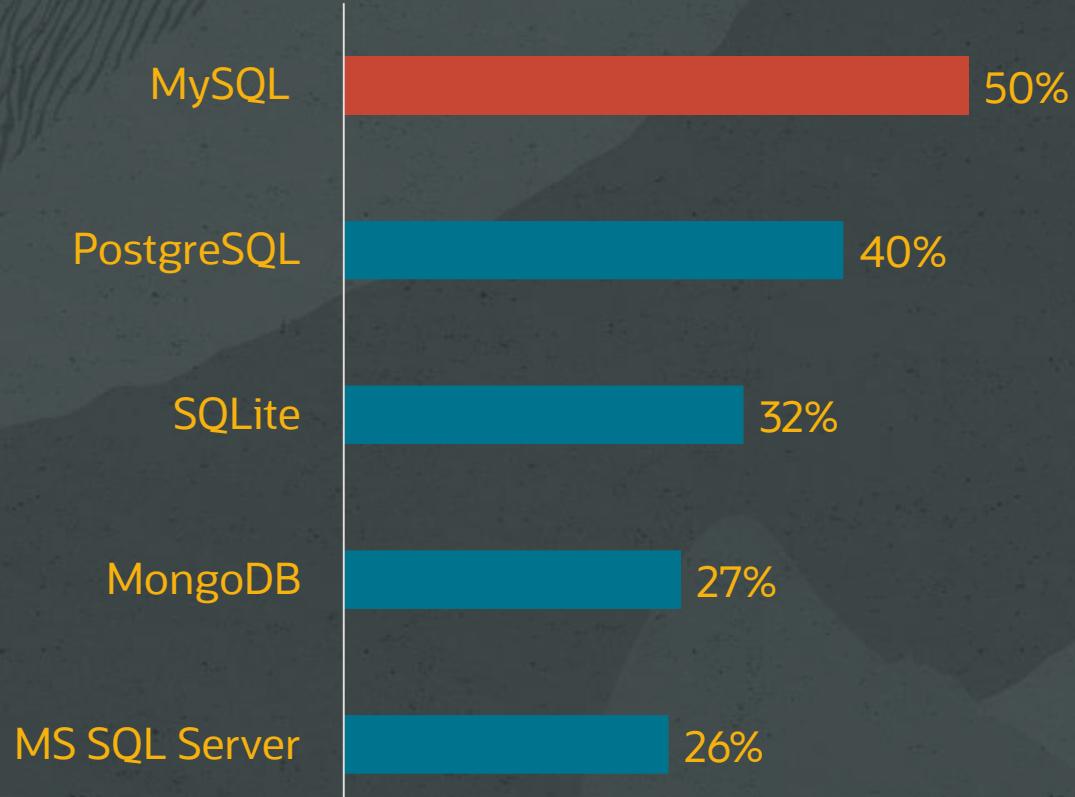


MySQL DB-Systems



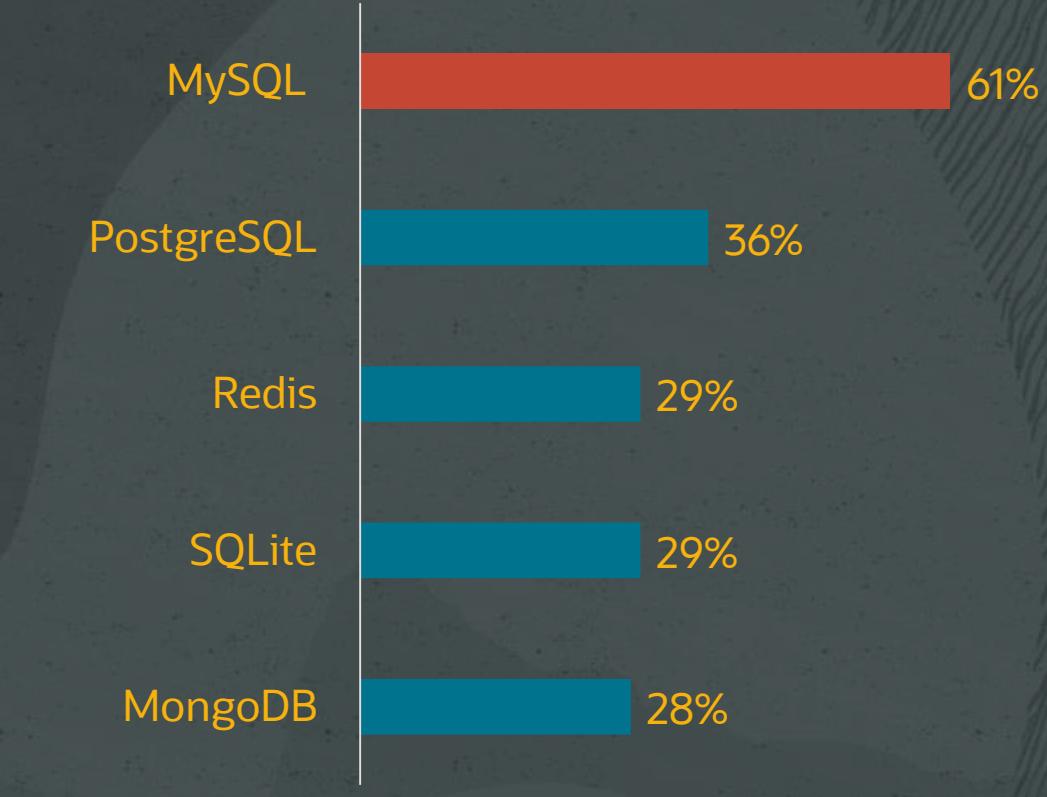
MySQL is the most popular database for developers

Most popular databases



Stackoverflow survey 2021

Which databases have you used in the last 12 months?



Jetbrains survey 2021

Innovative enterprises across many industries run MySQL

Social

facebook



Linkedin



Pinterest

E-Commerce

Booking.com

NETFLIX

U B E R

airbnb

淘宝网
Taobao.com

阿里巴巴
Alibaba.com™

Tech

APPDYNAMICS
part of Cisco

GitHub

HubSpot

zendesk

intuit
mint

New Relic

Finance

Bank of America



J.P.Morgan

citi

Fidelity
INVESTMENTS

VISA

CA

Manufacturing

TESLA

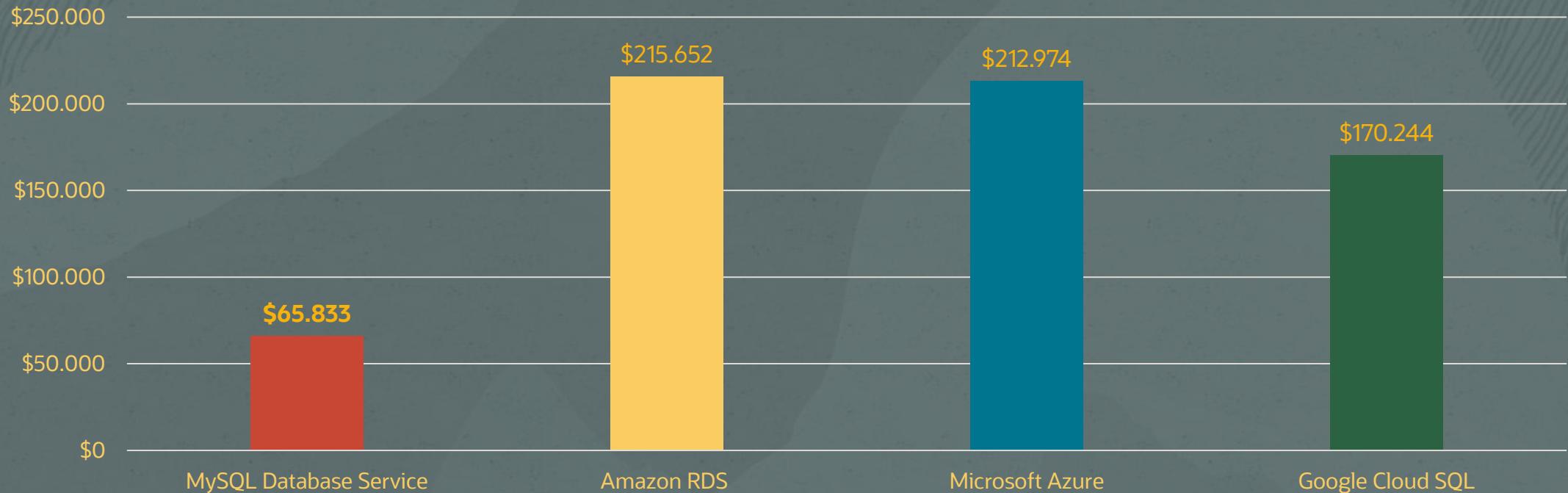


TOYOTA

CAT®

MySQL Database Service costs less

Annual cost for a 100 OCPUs, 1TB Storage configuration



MySQL Database Service: Standard E3 AMD 16GB/Core, all regions have the same price.

Amazon RDS: Intel R5 16GB/Core, [AWS US East](#).

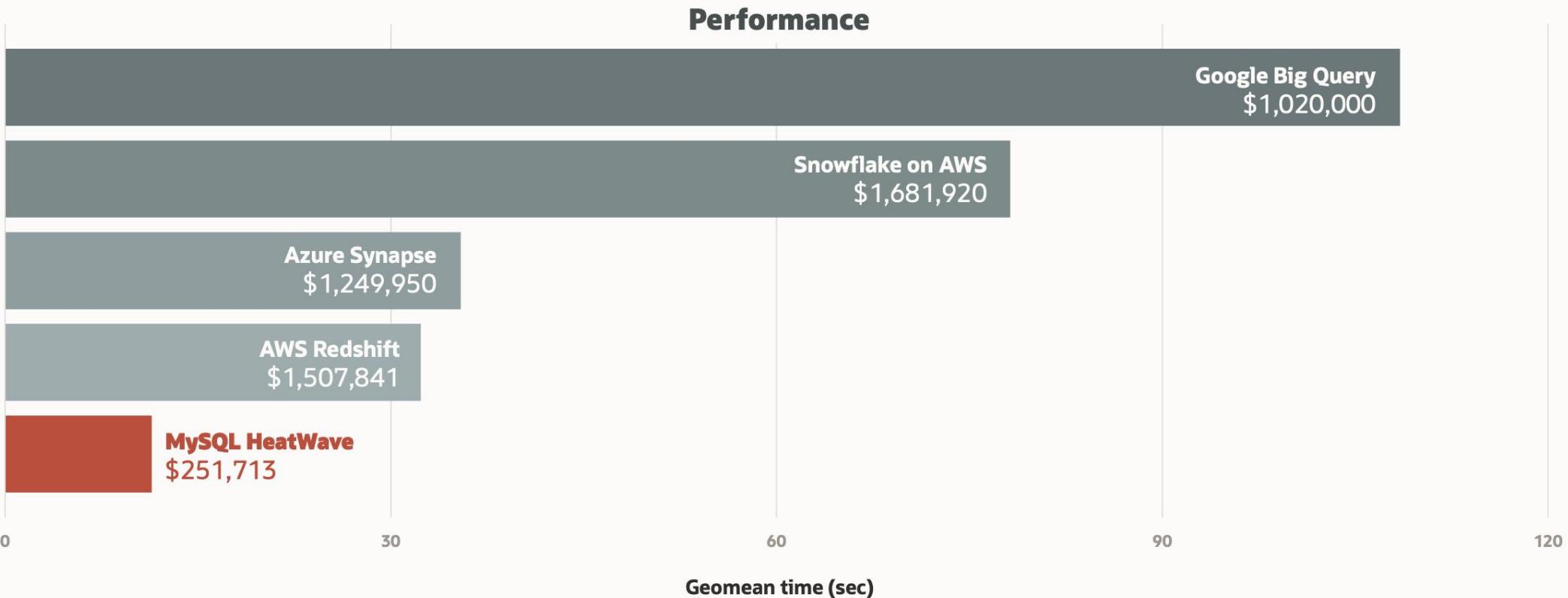
Azure: Memory Optimized Intel 20GB/Core, [MS Azure US-East](#).

Google: High Memory N1 Standard Intel 13GB/Core, [GCP Northern Virginia](#).

Configuration: 100 OCPUs, 1 TB Storage.

Performance and price comparison

30TB TPCH, HeatWave is **faster and cheaper** than all the competitive database services



3rd party numbers derived from Gigaom report of Oct 2020

Using PAYG pricing for Snowflake. Other prices are based on 1 year pricing

*Benchmark queries are derived from TPC-H benchmark, but results are not comparable to published TPC-H benchmark results since they do not comply with TPC-H specification.





Benchmarks & TCO Savings

5400x Faster than RDS

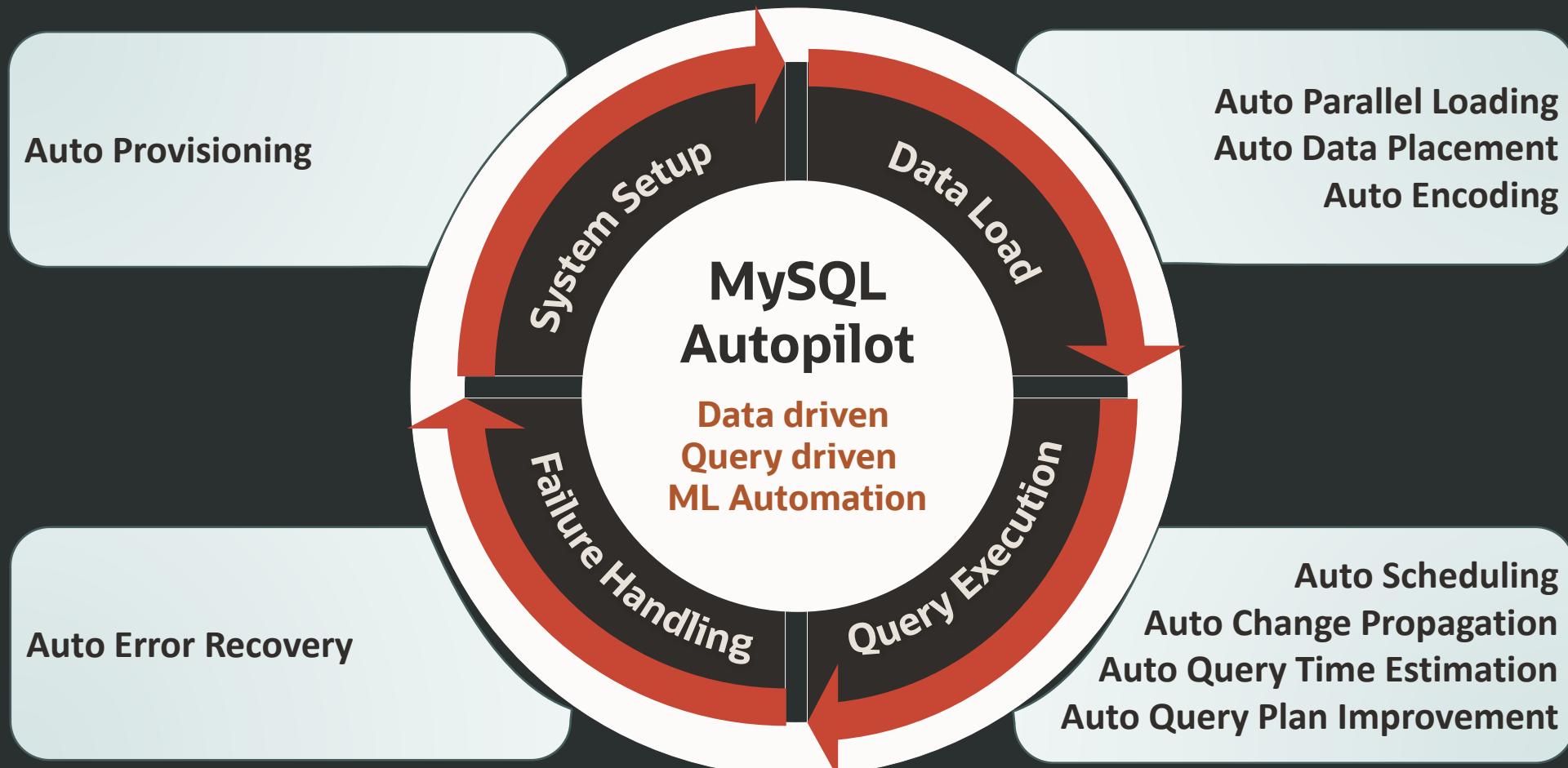
1400x Faster than Aurora

6.5x Faster than Redshift AQUA

7x Faster than Snowflake

MySQL Autopilot Features

Machine learning based automation



MySQL Database Service: High Availability

Fault-tolerant system with automatic failover and zero data loss

- Single Click High Availability
- Automatic Failover
- Increased Uptime
- Zero Data Loss

- Recover Time Objective (RTO): Minutes
- Recovery Point Objective (RPO): Zero

Create MySQL DB System

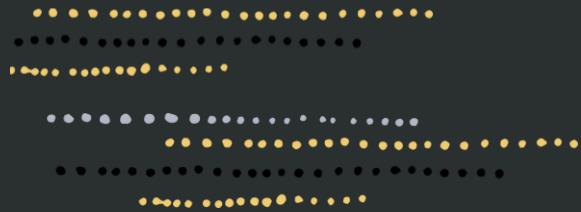
Standalone

Single-instance MySQL DB System

High Availability

Run 3-node MySQL DB System providing automatic failover and zero data loss



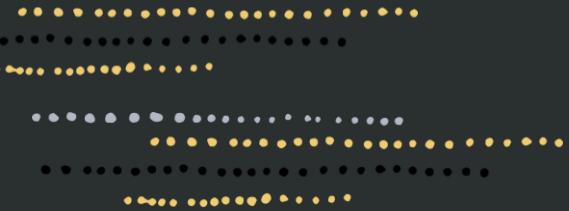


Test Drive MySQL Database Service For Free Today

Get **\$300** in **credits** and try
MySQL Database Service
free for 30 days.

<https://www.oracle.com/mysql/free/>

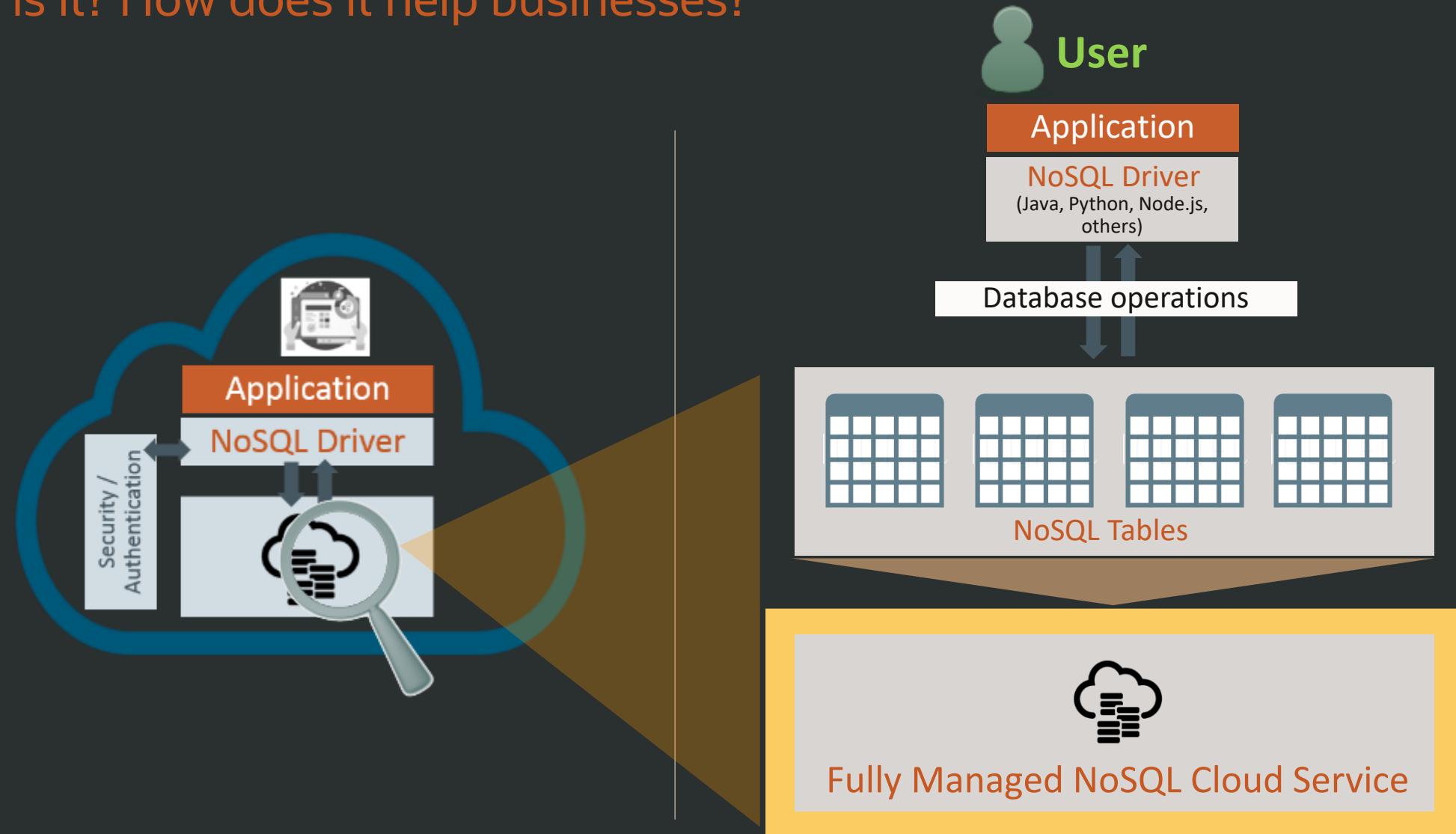




NoSQL

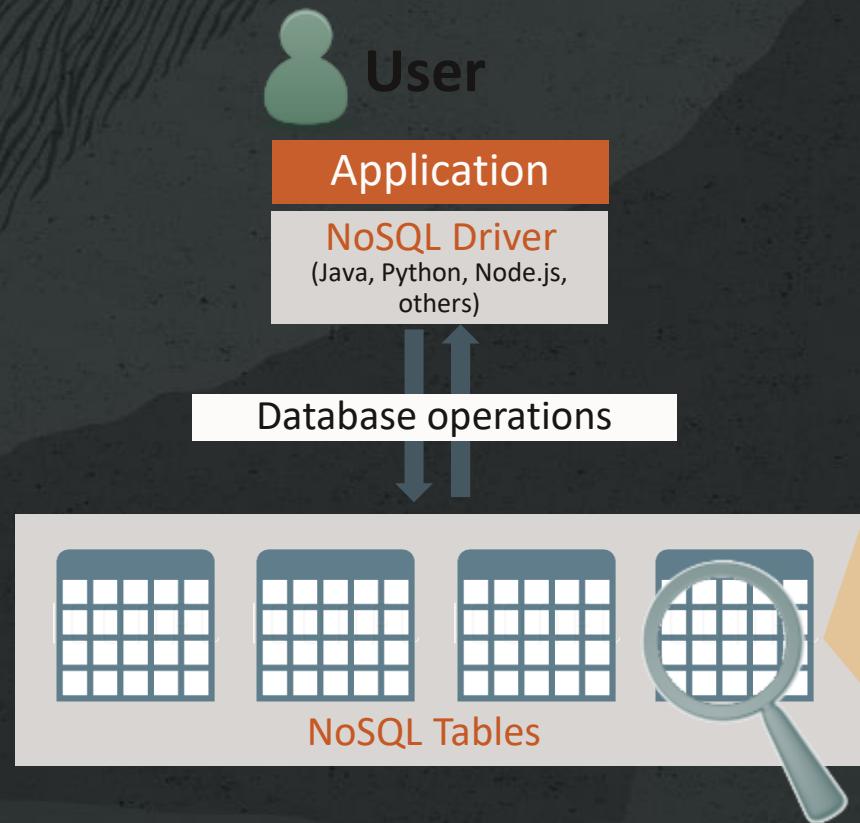
Oracle NoSQL Database Cloud Service

What is it? How does it help businesses?



Oracle NoSQL Database Cloud Service

NoSQL table



NoSQL Table

DATA

Integer (key)	String (data)	String (data)	Json (data)
num1	string1	string1	json1
num2	string2	string2	json2
num3	string3	string3	json3
num4	string4	string4	json4

CAPACITY PROVISIONED



Oracle NoSQL Database Cloud Service

Overview



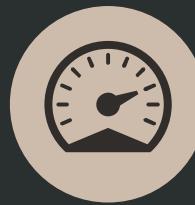
Fully Managed

Database operation, maintenance, tuning are managed by Oracle



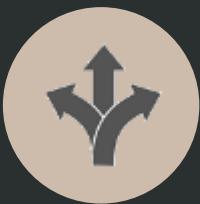
Elastic

Dynamically change throughput and storage capacities based on workloads



High Performance

Predictable low latency for all types of workloads



Data Model Flexibility

Document, columnar, key/value models supported with a single application interface



Security

Enterprise grade security with roles, privileges, encryption



Low Operating Cost

Pay only for the throughput and storage capacities provisioned



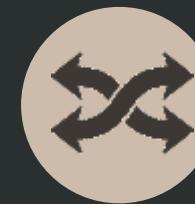
Developer Friendly

Easy-to-use APIs and integrated with different developer tools



Always Available

Built-in high availability to ensure business continuity



Hybrid Cloud

Interoperate with Oracle NoSQL on-premise solution using a single application interface

Oracle NoSQL Database Cloud Service

Fully managed

- Oracle Fully Manages
 - Servers, storage, networking, security
 - Installation of software and updates, run security inspections
 - Monitors the health of the service
 - Replication across multiple Availability Domain for HA
- Developer / User Manages
 - Application development
 - Data model design – decides on how to model the data best for the application
 - Sets roles and privileges – determines who can do what with the service



Oracle NoSQL Database Cloud Service

Security

Encryption

- Data encryption at rest
 - Data, indexes, backups encrypted with Advanced Encryption Standard (AES 256)
- Data encryption in motion
 - HTTPS protects data transfer between applications and NoSQL database cloud service
- Data encryption enabled by default

Authentication & Access Control

- User authorization
 - Manage groups, users, credentials
- Table resource access control
 - Manage tables, rows, indexes access and API operation policies
- Compartment management
 - Organize table resources within different compartments

Free Trial

**\$ 300 Credit
(30 days)**

200 write
units per
second

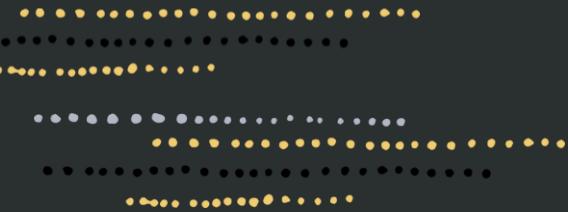
3,000 read
units per
second

500 GB
Storage per
month

(1 KB
record size)

Example

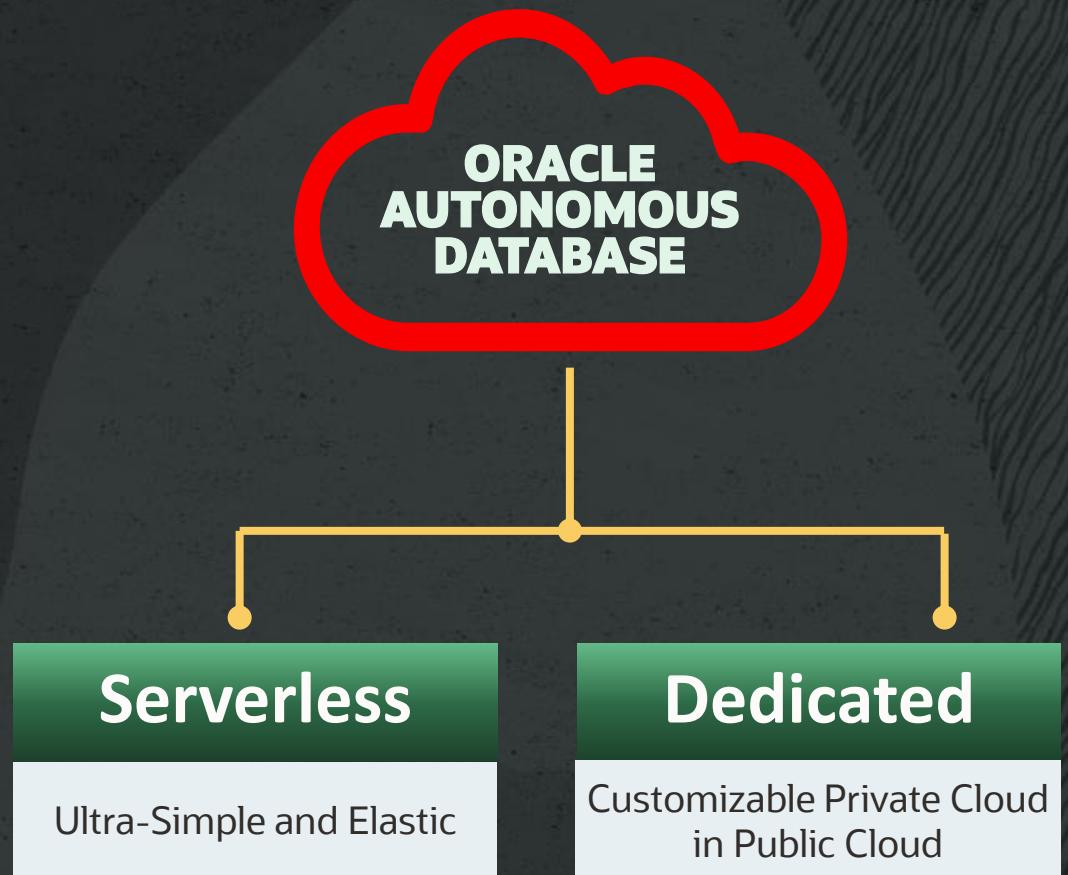
- 520 million writes per month
- 7.8 billion reads per month



Autonomous DB

2 types of Deployment

- Oracle Autonomous Database is a family of products with each member of the family optimized by workload.
- Autonomous Data Warehouse (ADW), has been optimized for analytic workloads, such as data warehouse, data marts or as part of a data lake.
- ATP is optimized for transaction processing or mixed workload environments and makes an excellent platform for new application development.



ADB Serverless vs Dedicated

Serverless – Primary Goals/Benefits

Simple

- Oracle automates and manages everything
 - Deployment, lifecycle, software updates, etc.
- Customer just chooses database compute, storage, and region

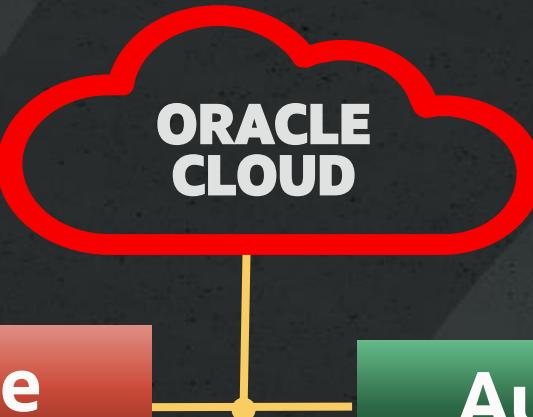
Elastic

- Low minimum size - 1 OCPU and 1 TB of storage
- Low minimum time commitment - 1 hour
- Instantly grow or shrink online, pay for what you use

Dedicated – Primary Goals/Benefits

- Provides a **Private Database Cloud running** on dedicated Exadata Infrastructure in the Public Cloud
 - Runs all your databases - any size, scale, or criticality
- Highest **Isolation**
 - Multiple levels of isolation protect from noisy or hostile neighbors
- Customizable **Operational Policies**
 - Control of provisioning, software updates, availability, density

Autonomous vs Automated



Autonomous Database

- All database operations fully automated
- User runs SQL, no access to OS or CDB
- Exadata Performance and Availability
- Customizable for DW or TP Workload

Automated DB Services

- Database lifecycle automation provided
- User operates, has DBA and OS root access
- Runs older database versions
- ALL database features (e.g. Java, etc)

Serverless

Ultra-Simple &
Elastic

Dedicated

Customizable
Private Cloud

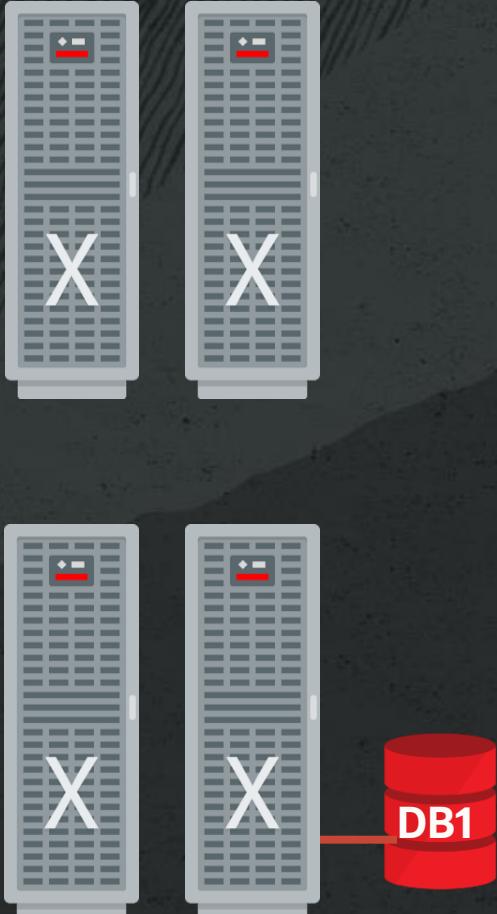
ExaCS

Scale, Performance,
Availability

DBCS

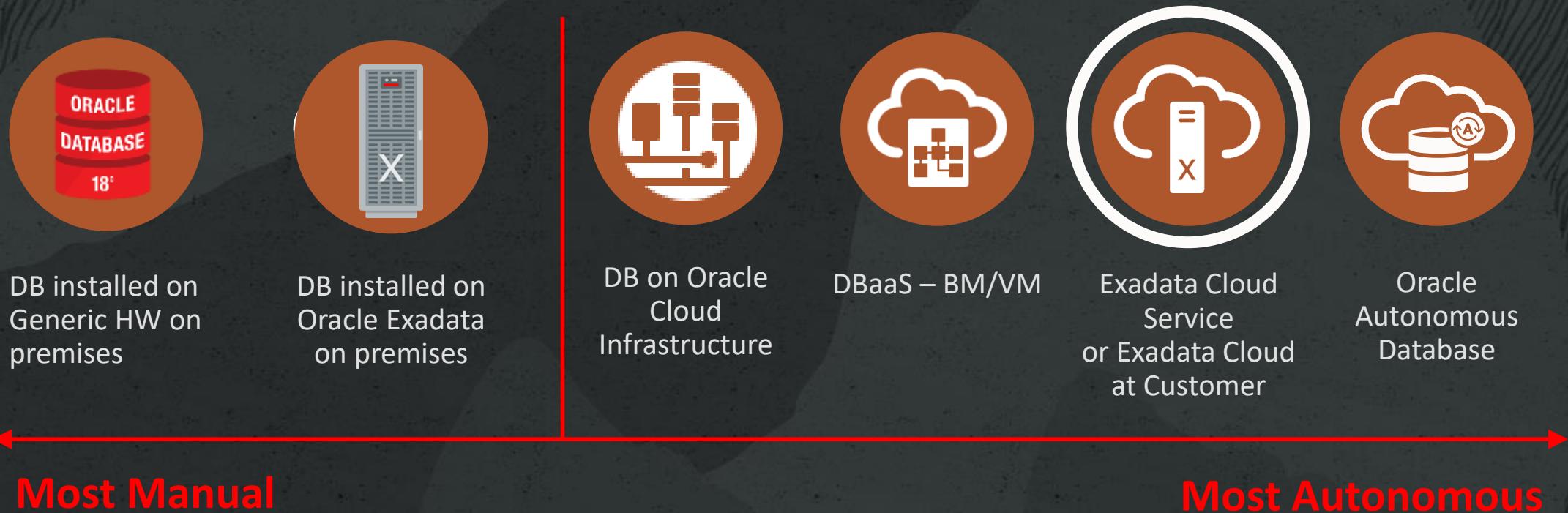
VM or bare metal,
single server or RAC

Serverless ADB



- Database is placed on Exadata Cloud Infrastructure based on Region
- Oracle completely manages and controls all placement, patching, software versions, and isolation
 - Zero customer administration required
- RAC cluster enables rolling upgrades and fast failover
- Low minimum size/cost - 1 OCPU and 1 TB of storage
- Low minimum time commitment – 1 hour
- Designed for Common compliance apps or Public cloud apps

Oracle Database – Choice of Deployment



Autonomous Database -IAM setup

Create separation of responsibility for Fleet vs Database Administration

An OCI Autonomous **RESOURCE** can be one of:

- **autonomous-exadata-infrastructures** – dedicated hardware resources
- **autonomous-container-databases** – runtime environments that meet specific SLAs
- **autonomous-databases** – application databases
- **autonomous-backups** – data archives

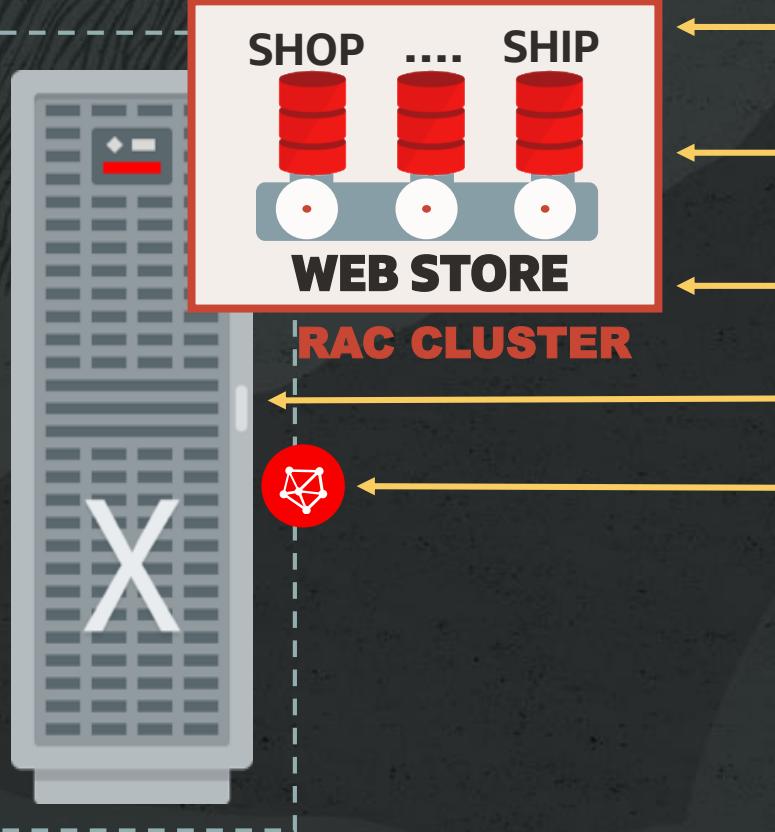
“Keep in Mind”

GROUP is a set of users with the same privileges

POLICY is used to bind privileges for a GROUP to a specific set of resources in a COMPARTMENT

COMPARTMENT is an operating context for a specific set of service resources only accessible to GROUPs who are explicitly granted access.

ADB– Dedicated Security -Isolation



Dedicated allows multiple levels of isolation

- Database (DB)
- Container database (CDB)
- Cluster of VMs
- Separate Hardware (Exadata Infrastructure)
- Hardware Enforced Private Network (VCN)

The level of security and performance isolation can be tailored to the needs of each database
Implementing isolation is normally complex but in autonomous you just specify what you want

Autonomous Database- Database Admin

- DB Admin easily creates new databases. Same as serverless, just select:
 - DB **type** - ATP or ADW
 - DB **CPU** count - really performance
 - DB **storage** size limit
 - **Container DB** that contains the DB – specific to dedicated
 - Then creates database users and schemas
- Performance resources allocated proportionally to number of CPUs chosen
 - Example – if a DB gets 15% of CPUs in Exadata servers, then it gets 15% of memory
 - Same for IOs per second, Storage CPUs, Flash Cache
 - CPU and Memory allocated to a CDB grows dynamically as PDB CPUs are added to it
 - No need to specify sessions, files, processes, buffer cache, PGA, etc. - all are automatic



DB Admin

Security in ADB



- No highly privileged access - no Root or SYSDBA that means No login allowed to OS or CDB
 - No callouts to OS allowed
 - Prevents installing or modifying any software on system
- Secure Configuration deployed at all levels – Network, OS, DB, storage, etc.
- Databases run in customer's Virtual Cloud Network where ADB can be deployed in Private subnet.
- Databases always encrypted, additionally Network encryption is available.
- Automatic protection of customer data from Oracle operations staff
 - Database Vault's new Operations Control feature
- Oracle automatically applies security updates for the entire stack
 - Quarterly, or off-cycle for high-impact security vulnerability
 - Customer can separately use Database Vault for their own user data isolation

ADB Client Connections- Credential Wallet

The screenshot shows the Oracle Cloud Autonomous Database interface. A modal dialog box titled "Database Connection" is open, providing instructions for connecting to the database using client credentials and a wallet. It includes sections for "Download Client Credentials (Wallet)" and "Connection Strings".

Database Connection

You will need the client credentials and connection information to connect to your database. The client credentials include the wallet, which is required for all types of connections.

Download Client Credentials (Wallet)

To download your client credentials, click Download, and supply a password for the wallet.

Download

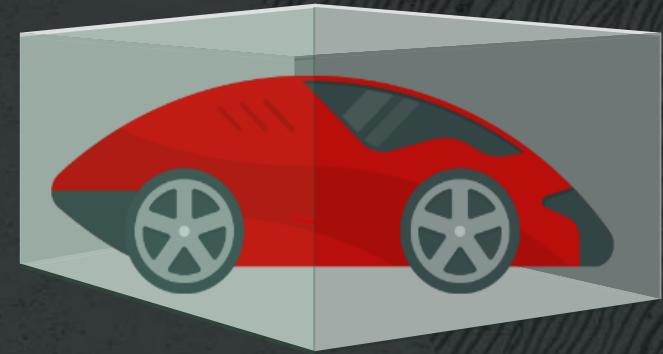
Connection Strings

Use the following connection strings or TNS names for your connections. See the [documentation](#) for details. Oracle recommends using TLS connections to connect to your Autonomous Database.

TNS Name <i>i</i>	Connection String <i>i</i>
ATPDB2_tp	...ME=ATPDB2_tp.atp.oraclecloud.com))) Show Copy
ATPDB2_medium	...TPDB2_medium.atp.oraclecloud.com))) Show Copy
ATPDB2_tpurgent	...DB2_tpurgent.atp.oraclecloud.com))) Show Copy
ATPDB2_low	...E=ATPDB2_low.atp.oraclecloud.com))) Show Copy
ATPDB2_high	...=ATPDB2_high.atp.oraclecloud.com))) Show Copy
ATPDB2_tp_tls	...ME=ATPDB2_tp.atp.oraclecloud.com))) Show Copy
ATPDB2_medium_tls	...TPDB2_medium.atp.oraclecloud.com))) Show Copy
ATPDB2_tpurgent_tls	...DB2_tpurgent.atp.oraclecloud.com))) Show Copy
ATPDB2_low_tls	F=ATPDB2_low.atp.oraclecloud.com))) Show Copy

Autonomous Database is Highly Available

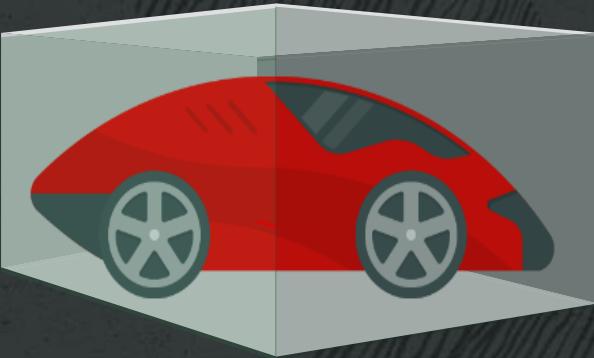
- Automatically protects from **all** types of downtime
- Features unique to Oracle
 - Failures** – Exadata, RAC
 - Site Outages** – Active Data Guard
 - Maintenance** – RAC Rolling Updates, **Transparent App Continuity**
 - Changes** – **Auto-Indexing, Edition Based Redefinition**
 - User Errors** – Flashback Database , Table , Query



No ridiculous exclusions to availability in fine print

- Other CSPs excludes planned downtime, database bugs, regional outages, etc.

Dedicated Backup Policy



Serverless

- Fully automated daily backups to OSS, on demand backups, Flashback to 24 hours, etc

Dedicated adds

- Backup of archive logs performed every hour (will be 15 minutes in v2)
- Retention time for CDB backups is configurable (7-60 days)
- Currently, on demand backup retention same as CDB -indefinite retention would be supported.
- Zero Data Loss Recovery Cloud Service will be used for backups

Autonomous Database empowers Developers

- **Fastest and simplest** creation of database
 - Just specify capacity and name
- **No database management**, no support from DBA required
 - Fully automated tuning, scaling, updating, upgrading, etc.
- **Most Flexible and Productive** development
 - Single database for Relational, JSON, Spatial, Graph, Text, etc.
 - Full set of SDKs - Java, Python, Node, Go, .NET, Ruby, C
 - Industry standard compliant; ISO SQL, JDBC, PEP249 etc.



Developer ready with APEX & ORDS

- APEX & ORDS
- SQL Dev-web
 - Developer workbench and modeling
 - Performance Hub SQL analysis
- Service SDKs
 - Java, Python, Node, Go, .NET, Ruby





AVAILABLE

ATP

DB Con

Autono

Ge

Data

Work

Cor

OCI

Cre

CPU

Sto

Dat

Life

Database Connection

[help](#) [close](#) DB CONNECTION APPLICATION CONNECTION

Use the applicable URL to access the target application from within your VCN.

Oracle Application Express

Oracle Application Express (APEX) is a rapid web application development tool for Oracle Database. Using only a web browser and limited programming experience, you can quickly develop and deploy secure, professional-looking applications. [Learn more.](#)

Access <https://host-qwiq5-scan.exadatasubnet.ocivcn.oraclevcn.com/ords/ATPDB1/apex> [Hide](#)**URL:** [Copy](#)

Oracle SQL Developer Web

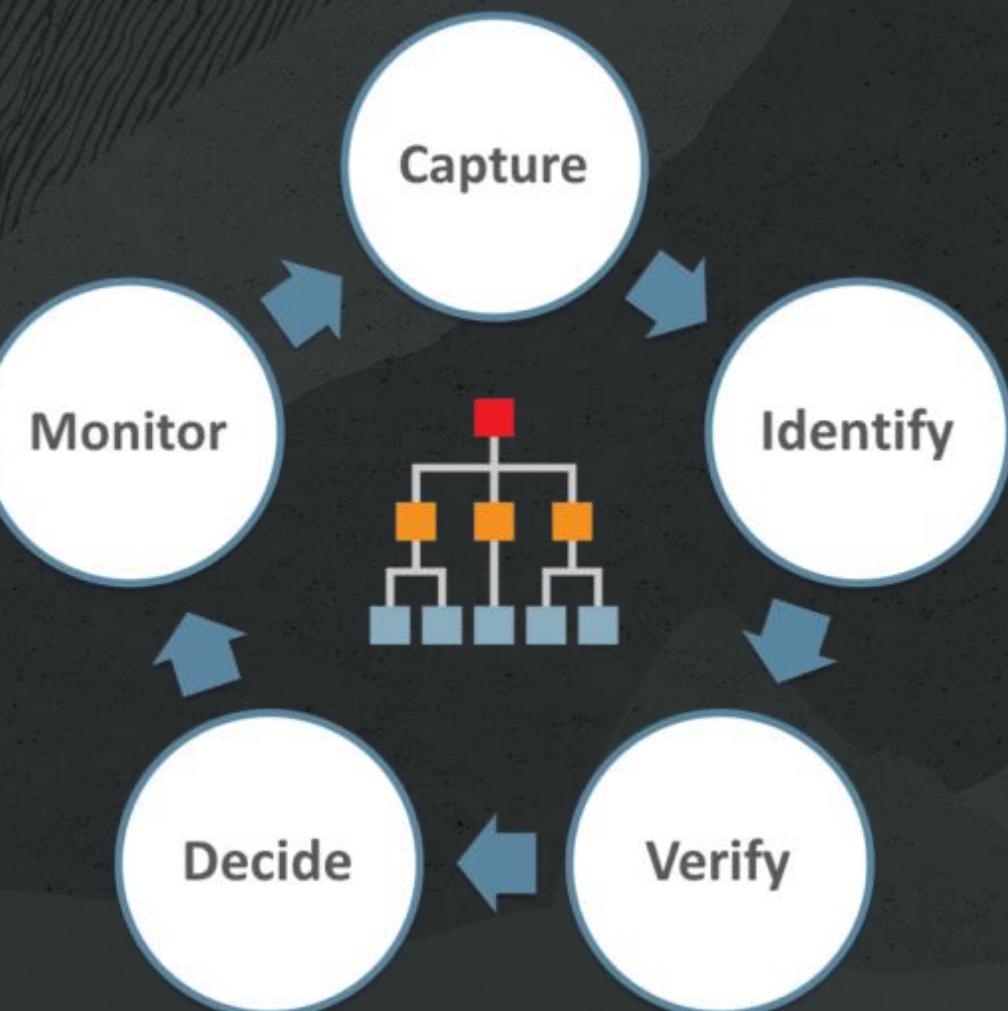
Oracle SQL Developer Web provides an integrated development environment and a database administration interface for Oracle Database in Oracle Cloud. This web interface for Oracle SQL Developer provides a subset of the features available for the desktop product and is bundled with various database services available in Oracle Cloud. [Learn more.](#)

Access https://host-qwiq5-scan.exadatasubnet.ocivcn.oraclevcn.com/ords/ATPDB1/admin/_sdw/?na**URL:** [v=worksheet](#) [Hide](#) [Copy](#)[Close](#)

e: Container DB2

Jun 2019 05:34:19 GMT

Automatic Indexing

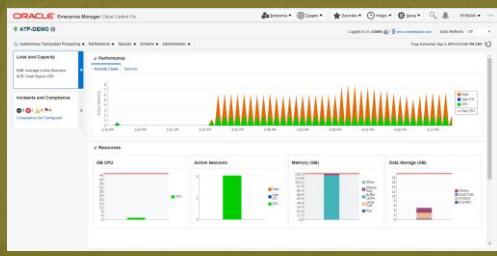


- Indexes implemented using Machine Learning
- **Reinforcement Learning** allows it to learn from its own actions as all candidate indexes are **validated** before being **implementing**
- The entire process is continuous and fully automatic
- Indexing activities are viewable, controllable, and auditable
- Real-time optimizer statistics gathering ensures plans stay current

Mgmt Choices of Tools for Various Personas

All these tools are bundled with ADB .

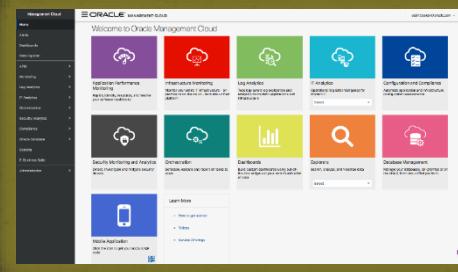
Enterprise Manager



Hybrid Cloud Administrators

Managing multiple DB instances across On-premises and heterogeneous Cloud – needs a consolidated view

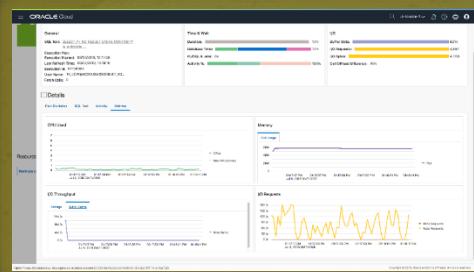
Oracle Management Cloud



Hybrid Cloud Administrators

Managing multiple DB instances across On-premises and Oracle Cloud – needs a consolidated view

SQL Developer Web



Cloud Administrators

Managing multiple departmental ADB instances – needs a quick access to performance data across their instances

OCI Console / DB Mgmt Service



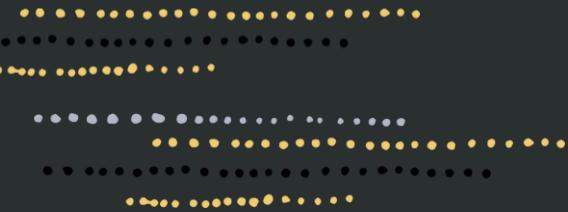
Technical Developers

Working across multiple ADB instances (dev, test, QA etc.) – needs access to SQL performance data

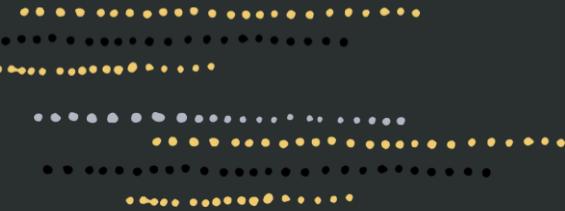
ADB Service – Management Interfaces



- Database actions are exposed through Cloud UI and REST APIs
 - Database create/terminate/backup/restore/stop/start
 - Changes to provisioned CPUs or storage
- Monitoring is available through the cloud service dashboard
 - Autonomous Database monitoring is also possible with customer's existing Enterprise Manager Cloud Control & Performance HUB
 - Developers can use SQL Developer, or any other developer tool that supports standard Oracle database connections
- Using Oracle Rest Data Services (ORDS) developers can easily build Rest APIs for data and procedures in the database



Data Safe



IaC

Infrastructure-as-Code → Terraform

➤ Terraform

- Open Source
- Cloud Agnostic Tool
- Build versioned Infra
- Declarative Configuration
- Deploy Faster
- Ideal for repetitive tasks

➤ OCI Resource Manager

➤ OCI Cloud Shell

➤ Startup Pack for OCI Resources

Example:

- Networks
- Compute instances
- Databases

Terraform Basics

init - command is used to initialize a working directory containing Terraform configuration files. This is the first command that should be run after writing a new Terraform configuration or cloning an existing one from version control. It is safe to run this command multiple times.

plan - The terraform plan command is used to create an execution plan. Terraform performs a refresh, unless explicitly disabled, and then determines what actions are necessary to achieve the desired state specified in the configuration files.

apply - The terraform apply command is used to apply the changes required to reach the desired state of the configuration, or the pre-determined set of actions generated by a terraform plan execution plan.

destroy - The terraform destroy command is used to destroy the Terraform-managed infrastructure.

<https://www.terraform.io/docs/commands/>



How can we do that?

DEMO

The screenshot shows the Oracle Cloud Identity Compartments Explorer interface. The top navigation bar includes the Oracle Cloud logo, Applications, and a search bar. The main content area is titled "Tenancy Explorer" and displays the following details for a compartment named "startup":

- Name:** startup
- Description:** startup pack demo

A message indicates that the results include only resources supported by Oracle Cloud. There are sections for "Governance" (Tenancy Explorer, Quota Policies, Limits, Quotas and Usage, Tag Namespaces, Domain Management) and "Tag Filters" (with an "add" link). A "Select Compartment" section shows a tree view of compartments under "acteamlad (root)", with "startup" selected. A "Cloud Shell" section contains a snippet of Terraform code:

```
compartment_ocid = "ocid1.compartment.oc1..aaaaaaaaabgefe2fzwxt6w6wtmh4gef2aeyzyo4jocowfus6tke2pgrc4koq"
# Copyright (c) 2019, 2021 Oracle Corporation and/or affiliates. All rights reserved.
# Licensed under the Universal Permissive License v 1.0 as shown at https://oss.oracle.com/licenses/upl
#terraform.tfvars file

variable "tenancy_ocid" {}
variable "ssh_public_key" {}
variable "compartment_ocid" {}
```



Tenancy Explorer | Oracle Cloud | +

cloud.oracle.com/identity/compartments/explorer?compartmentId=ocid1.compartment.oc1..aaaaaaaaabgef2fzwxte6w6wtmh4gef2aeyzyo4jocowfus6tke2pgrc4koq®ion=sanfrancisco

ORACLE Cloud Applications > Search for resources, services, and documentation

Governance

Tenancy Explorer

Description: startup pack demo

Name: **startup**

Don't see what you're looking for? These results include only resources supported by [Search](#). Updates made to resources might not immediately appear in your results.

Filter by resource type

View Work Requests Actions ▾

<input type="checkbox"/>	Name	Compartment
<input type="checkbox"/>	Web-Server-02 (Boot Volume)	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	Web-Server-01 (Boot Volume)	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	subnet.subnet.oraclevcn.com	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	0.10.in-addr.arpa	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	Default DHCP Options for subnet	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	subnet	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	Web-Server-02	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	Web-Server-01	acteamlad (root)/ALEXANDRE-FAGUNDES/startup
<input type="checkbox"/>	subnet_inw	acteamlad (root)/ALEXANDRE-FAGUNDES/startup

Tag Filters [add](#) [clear](#)

no tag filters applied

Select Compartment

Show resources in subcompartments

Search compartments

- acteamlad (root)
 - ALEXANDRE-FAGUNDES
 - DB-SYSTEMS
 - startup**
 - Andre-EMCC
 - AndreWorkshop
 - Breno
 - BrenoBDS

Cloud Shell

```
oci_core_instance.web-02: Still creating... [20s elapsed]
oci_core_instance.web-01: Still creating... [30s elapsed]
oci_core_instance.web-02: Still creating... [30s elapsed]
oci_core_instance.web-01: Still creating... [40s elapsed]
oci_core_instance.web-02: Still creating... [40s elapsed]
oci_core_instance.web-01: Creation complete after 46s [id=ocid1.instance.oc1.sa-saopaulo-1.antxeljrfwbklmacrdd3kjfyinvgaxmvyjk7t3xsawppvo35gjkl6lbi7ehq]
oci_core_instance.web-02: Creation complete after 46s [id=ocid1.instance.oc1.sa-saopaulo-1.antxeljrfwbklmacq6v13xaluw5qvuadx455tvrhemqihoouuhapesbtwlkxq]
```

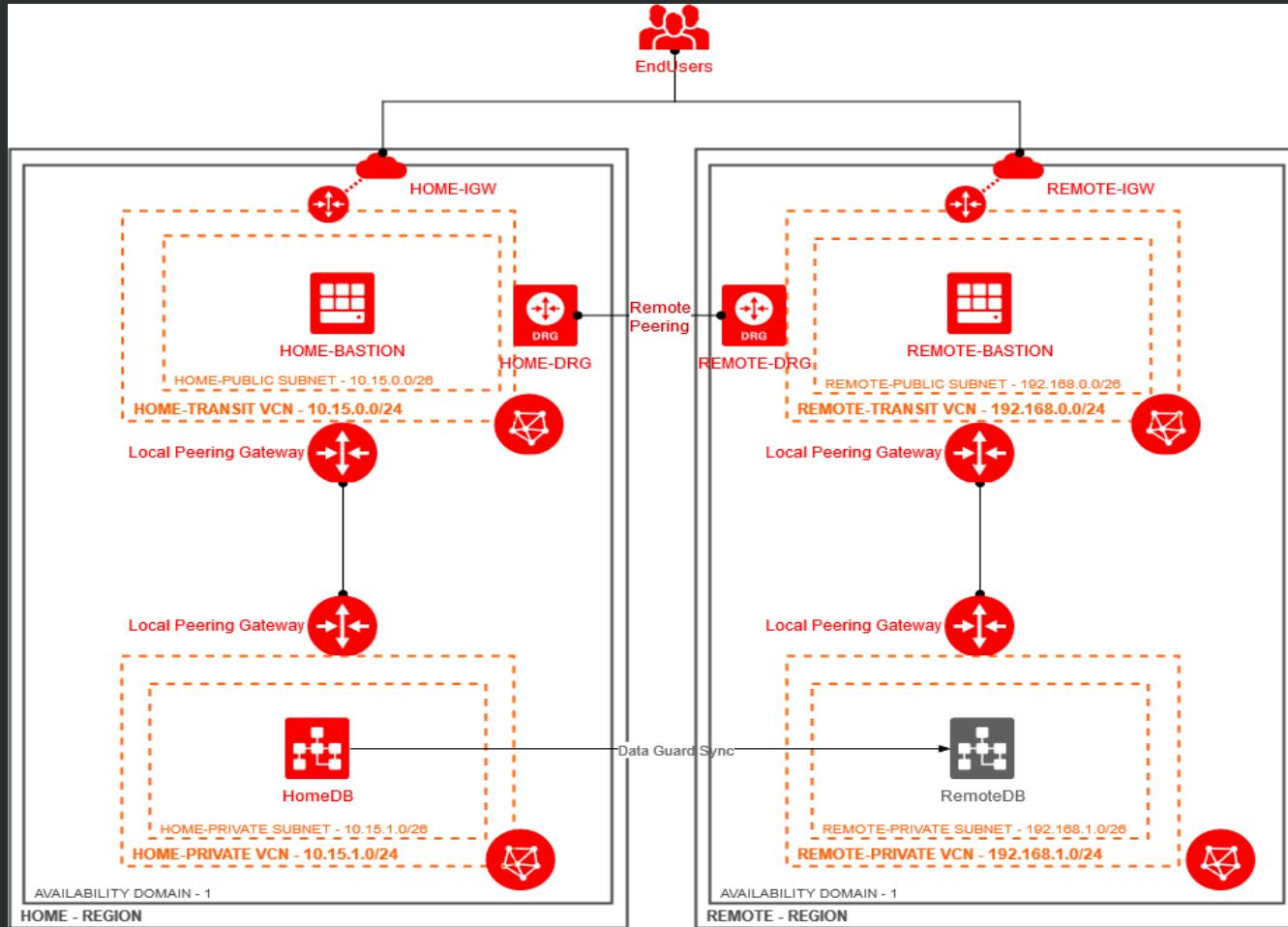
Apply complete! Resources: 7 added, 0 changed, 0 destroyed.

1st sample Deployment

VCN
 Subnet
 Security List
 Route Table
 Internet Gateway
 Boot Volumes
 vNICs
 Compute instances



DB with DG Association



2nd Deployment

- 2 VCNs
- 2 Subnets
- 2 Security Lists
- 2 Route Table
- 2 Internet Gateway
- 2 Boot Volumes
- 4 vNICs
- 2 Compute instances
- 1 Primary DB
- 1 Stand-by DB (Different Region)
- Dataguard Association

Wrap Up – Deploying Resources

Using IaC & Cloud Shell

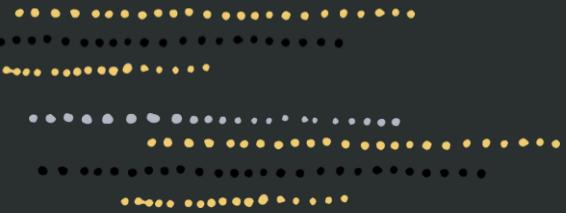
Rapidly
Easily
If necessary, repeatedly

1st deploy

<https://github.com/alefagun/code>

2nd deploy

<https://github.com/alefagun/startup>



Architecture Center