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ORACLE

# Oracle Cloud Databases



Base DB



Exadata



Autonomous

# Oracle Database Services in Oracle Cloud

Flexible offerings to meet diverse business requirements



Enterprise Database Service  
Standard Database Service



ExaDB on Dedicated  
Infrastructure



ExaDB on  
Cloud@Customer



ADB on Serverless  
Exadata Infrastructure



ADB on Dedicated  
Exadata Infrastructure



ADB on Exadata  
Cloud@Customer

## Base Database Service

## Exadata Database Service

## Autonomous Database



Automation



Oracle-managed infrastructure with customer-managed databases

Fully-managed by Oracle

Oracle Cloud Infrastructure

Customer Data  
Center

Oracle Cloud Infrastructure

Customer Data  
Center



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# Oracle Base Database Service



# License-included Oracle Database Consumption Options

Functionality tiers to meet application-specific requirements

## Standard Database Service

Standard Edition 2 Database features plus

- Tablespace Encryption
- Machine Learning
- Spatial and Graph
- Up to 3 PDBs

## Enterprise Database Service

Enterprise Edition Database features plus

- Data Guard
- Real Application Testing
- Data Masking and Subsetting Pack
- Tuning Pack and Diagnostic Packs

## Enterprise Database Service high performance

Enterprise Database Service features plus

- Partitioning
- Advanced Compression
- Advanced and Label Security, DB Vault
- Multitenant

## Enterprise Database Service extreme performance

High performance features plus

- Active Data Guard
- Real Application Clusters
- Database In-Memory
- Application Continuity

# Virtual Machine Database System Options

Choice of Flexible AMD, Intel, or Ampere Shapes



## Oracle single-instance DB on Virtual Machines

- Up to 64 OCPUs
- Up to 1 TB memory
- Up to 80 TB of usable block-volume data storage

## Oracle RAC on Virtual Machines

- Up to 128 OCPUs
- Up to 2 TB memory
- Up to 80 TB of usable block-volume data storage
- Extreme Performance Edition

Note: The maximum OCPU count for Standard Edition is 8. Standard Edition and Oracle RAC is not supported with Ampere shapes.

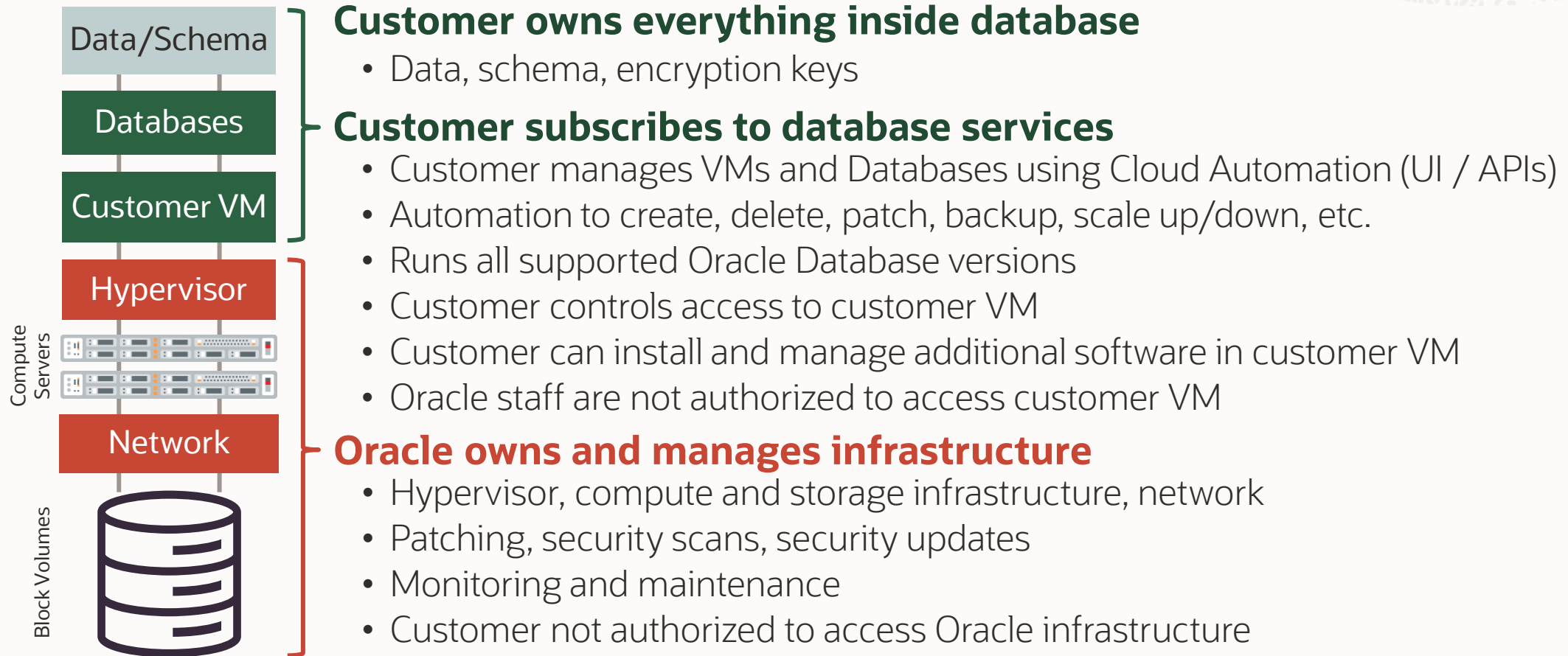
# Flexible AMD E5, Intel X9, and Ampere A1 Shapes Summary



	AMD Standard E5 Flex	Intel X9 Standard 3 Flex	Ampere A1 Standard Flex
Type	Virtual Machine	Virtual Machine	Virtual Machine
OCPU	Flexible, increments of 1, Max 64	Flexible, increments of 1, Max 32	Flexible, increments of 1, Max 57
Memory	16 GB per OCPU, Max 1 TB	16 GB per OCPU, Max 512 GB	8 GB per OCPU, Max 456 GB
Network Bandwidth	1 Gbps per OCPU, Max 40	1 Gbps per OCPU, Max 32	1 Gbps per OCPU, Max 40
Max Data Storage	ASM: 80 TB LVM: 40 TB	ASM: 80 TB LVM: 40 TB	LVM: 40 TB
Block Volume Performance	Balanced or Higher Performance	Balanced or Higher Performance	Balanced or Higher Performance
Availability	RAC and Data Guard Support	RAC and Data Guard Support	Data Guard Support



# Simple Cloud Management Model in Public Cloud



# Cloud Automation for Life Cycle Management

## Oracle Cloud Web-based UI, REST APIs, SDK, CLI, Terraform

- Scale OCPUs
- Scale up storage
- Enable Data Guard
- Update DB System and Database
- Backup and recovery

### Create Backup

Help

Name

If you previously used RMAN or dbcli to configure backups and then you switch to using the Console or the API for backups, a new backup configuration is created and associated with your database. This means that you can no longer rely on your previously configured unmanaged backups to work.

Create Backup

Cancel

### Enable Data Guard

A new virtual machine DB system must be created for the standby database when the primary database belongs to a virtual machine DB system.

#### Create peer DB system

Display name ⓘ

Region

US West (Phoenix)

Primary database is in region US West (Phoenix)

Availability domain

Select an availability domain

Primary database is in availability domain AAdFPHX-AD-1

Select a shape ⓘ

Enable Data Guard

Cancel

### Scale storage up

Help

Available data storage (GB)

256

Maximum available data storage for the DB system is 2560 GB. Available data storage cannot be decreased.

Recovery area storage (GB)

256

Recovery storage is used by the system to store backup and recovery files. Recovery area storage cannot be decreased.

Total storage (GB)

712

The total storage used by the DB system. Oracle bills for total storage used.

Expected theoretical max IOPS for Data Storage: 15.36K

Update

Cancel

### Change shape

#### Shape series

A shape determines the options for resources such as node count, core count and storage. [Learn more.](#)

AMD  
Flexible OCPU count. AMD processors.

Intel  
Flexible and fixed OCPU count. Intel processors.

Ampere  
Flexible OCPU count. Arm-based processors. ✓

#### Configure OCPU

Name	OCPU	Memory	Network bandwidth	Theoretical max IOPS
<input checked="" type="checkbox"/> VM.Standard.A1.Flex	4	32 GB	4 Gbps	64K

You can customize the number of OCPUs. Other resources scale proportionately. [Learn more about flexible shapes.](#)

Number of OCPUs per node

4

1

64

1 Selected

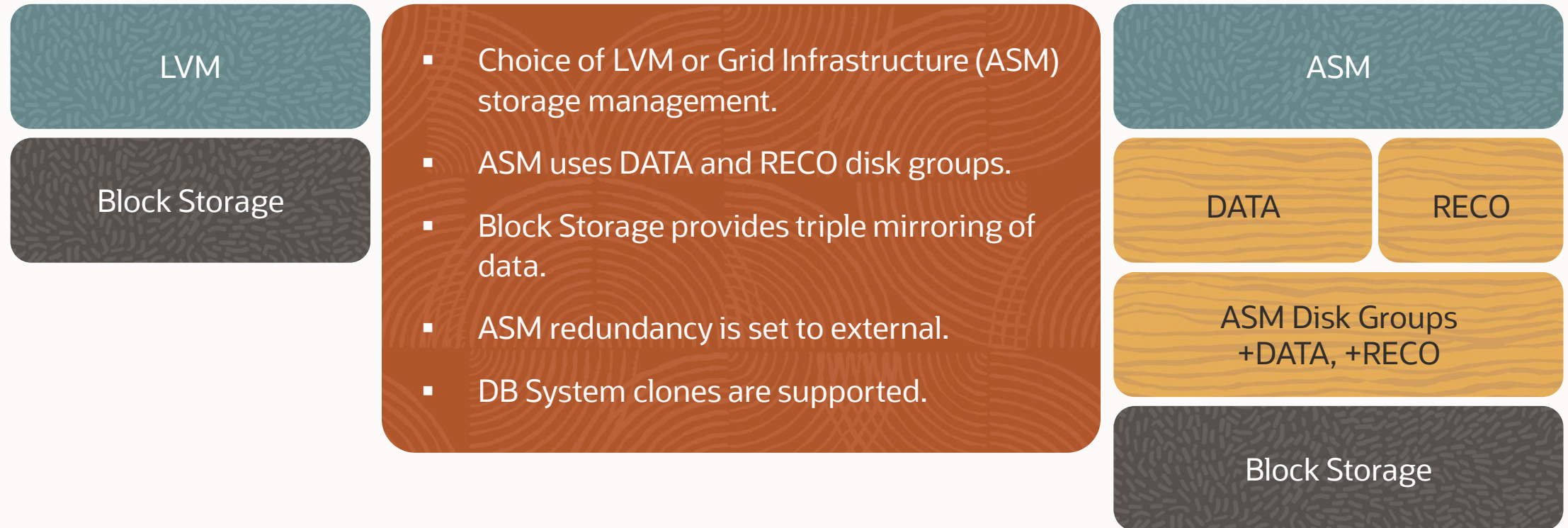
Showing 1 item

Select shape

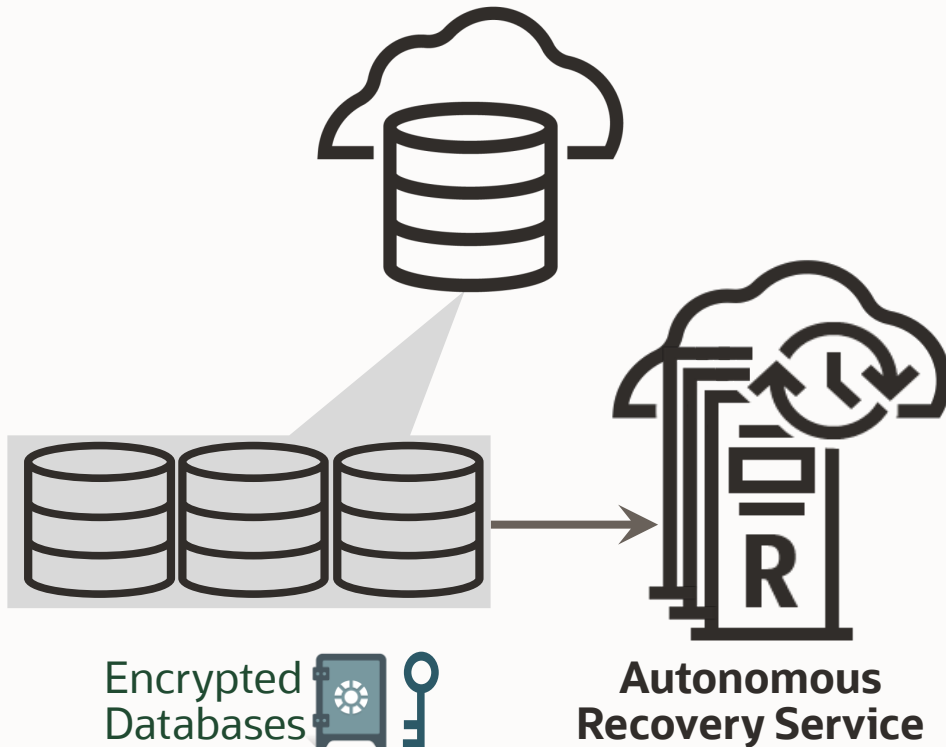
Cancel



# Virtual Machine DB Systems Storage Architecture



# Automatic Database Backups



**Configure automatic backups**

☒ Enable automatic backups ⓘ

**Important:** All [prerequisites](#) for backing up to Oracle Cloud Infrastructure must be met for automatic backups to work.

Backup destination ⓘ  
Object Storage

**Warning:** Tenancy has reached the limit for Autonomous Recovery Service. View your service limits and [request an update](#).

Backup retention period  
30 days  
You can change the backup retention period after provisioning.

Scheduled day for full backup ⓘ  
☒ Sunday ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday

Scheduled time for full backup (UTC) ⓘ  
Anytime

Scheduled time for incremental backup (UTC) ⓘ  
Anytime

☒ Take the first backup immediately ⓘ

[Save changes](#) [Cancel](#)

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**Restore Database**

☒ 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.

☐ Restore to SCN  
The database is restored and recovered to the specified Oracle Database System Change Number (SCN).

[Restore Database](#) [Cancel](#)

## Backup and restore using Autonomous Recovery Service or Object Storage

- Schedule automatic backups and retention policy
- Create on-demand backups
- Create database on new DB System from backup
- Receive notifications for successful and failed backups
- Restore databases to the latest backup, point-in-time or SCN

# Oracle Database Zero Data Loss Autonomous Recovery Service

## Ransomware Resiliency

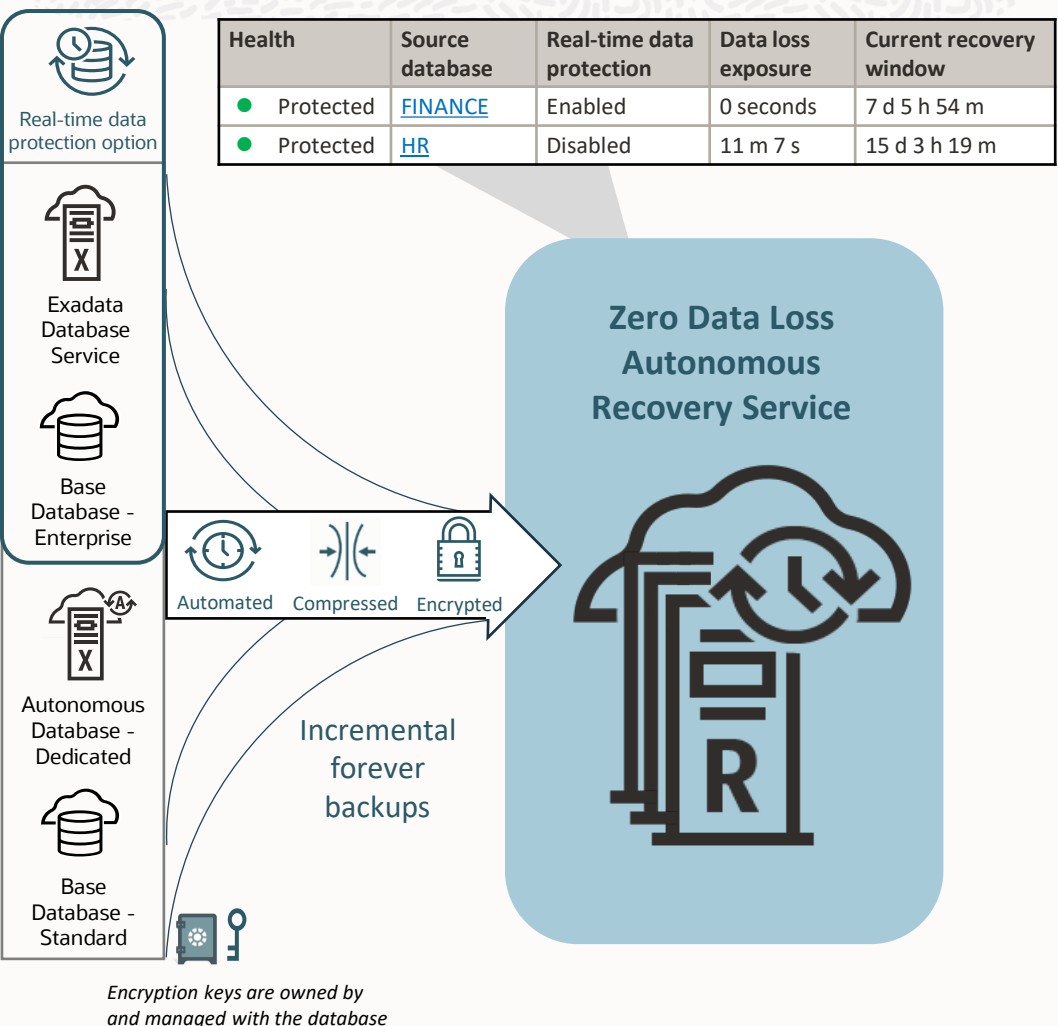
- Automated and mandatory encryption to help prevent data theft
- Safeguards backups with enforced minimum 14-day retention
- Optimizes backups in background for fast recovery with zero data loss

## Operational Efficiency

- No more weekly full backups - eliminates production database overhead
- Shorter backup windows with incremental forever strategy
- Zero-impact database recovery validation for every backup

## Cloud Simplicity

- Quickly configure database protection at scale with zero data loss
- Control costs with database-specific backup consumption metrics
- Gain deep data protection insights with granular recovery health dashboard



# Data Safe – Database Security Control Center

Delivers a unified set of essential security services for Oracle Databases

- Detect insecure configurations, monitor for configuration drift
- Identify high-risk database users
- Manage database audit settings
- Analyze audit data for reporting and alerting
- Scan databases for sensitive data
- Mask sensitive data in test/development databases

Easy to implement, requires no special security expertise



**Available for ALL your Oracle  
Databases – cloud and on-premises**



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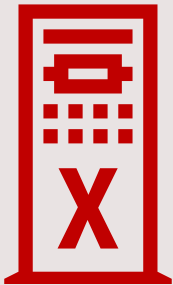
# Exadata Cloud@Customer



# 100% Compatible Exadata On-Premises, Hybrid Cloud and Public Cloud

## On-Premises

**Exadata  
Database Machine**



**Customer Data Center**  
┆  
**Purchased**  
┆  
**Customer Managed**

## Hybrid Cloud

**Exadata  
Cloud@Customer**



**Customer Data Center**  
┆  
**Cloud Subscription**  
┆  
**Oracle Managed**

## Public Cloud

**Exadata  
in OCI**



**Oracle Cloud Infrastructure**  
┆  
**Cloud Subscription**  
┆  
**Oracle Managed**

**45% of Fortune Global 100 have adopted Exadata Cloud**



# Fastest OLTP

## **Unique:** Innovative, modern technologies tuned for high-volume, low-latency random I/O

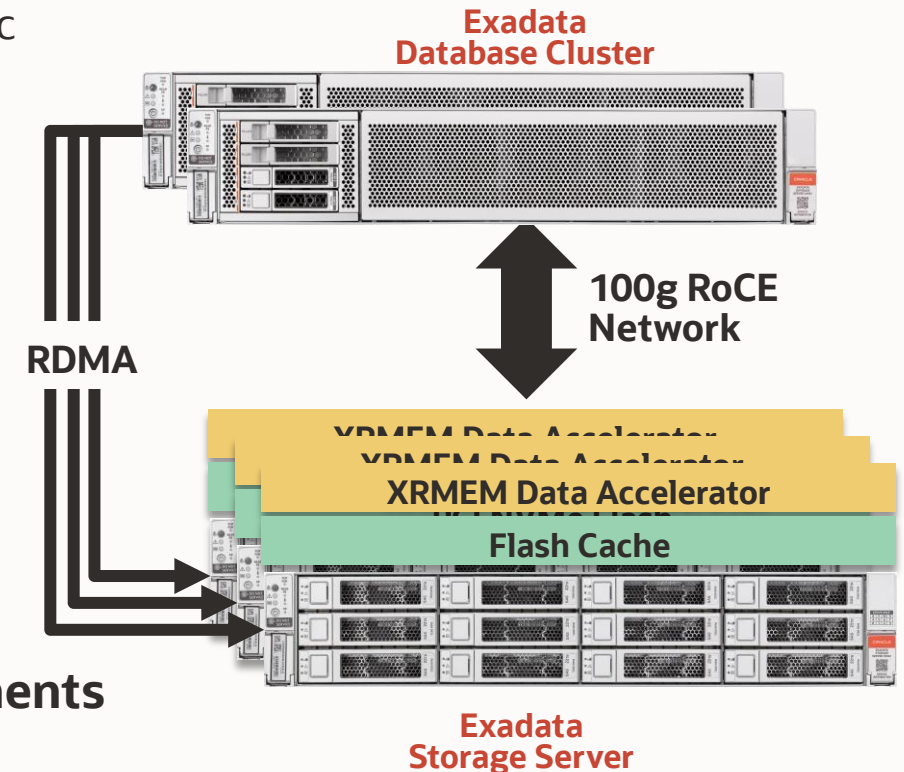
- 100 Gb/s RDMA over Converged Ethernet 100 (RoCE) network fabric
- Exadata RDMA Memory (XRMEM) Data Accelerator
- Scale-out Database & Storage servers
- Automatic data tiering between XRMEM, Flash Cache and Disk

## **Unique:** Elimination of DB cluster coordination bottlenecks

- Direct-to-Wire Protocol = 3x faster inter-node OLTP messaging
- Smart Fusion Block Transfer eliminates inter-node log write
- RDMA protocol coordinates transactions between nodes

## **Unique:** Instant detection, handling of failed/failing components

- Automatic discovery of server failures without timeout
- Sub-second redirection of I/Os around sick devices





# Fastest Cloud **Analytics**

## Smart Scan (SQL Offload)

- Data-intensive processing\* runs in massively parallel Exadata Storage, bypassing network bottlenecks and freeing up DB CPUs

## Tiered Flash Cache

- Active data is automatically cached on PCI NVMe Flash, inactive data on low cost, high-capacity disks

## Storage Indexes

- Eliminates I/O not relevant to a particular query

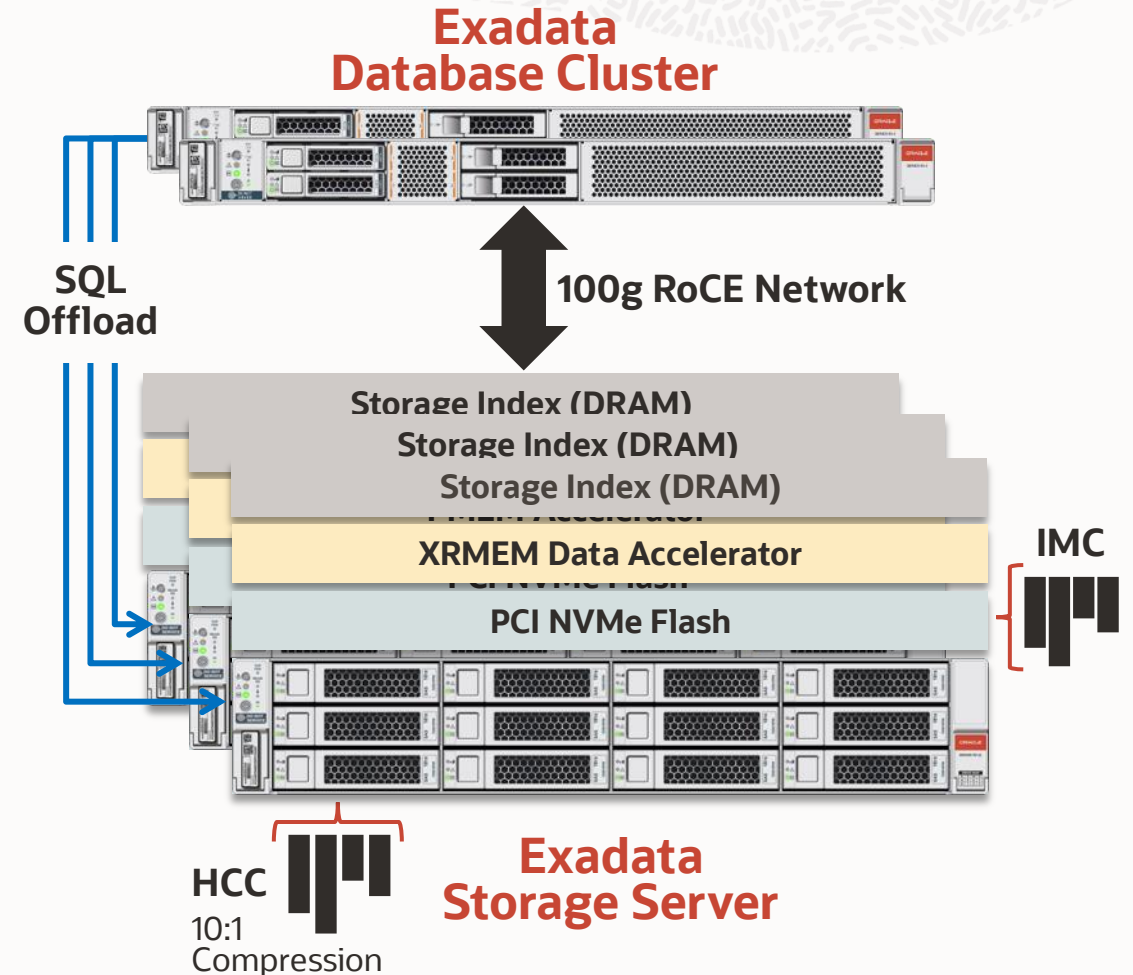
## Hybrid Columnar Compression (HCC)

- Compressed, columnar format in storage, saving space, reducing I/O, speeding analytic queries

## In-Memory Columnar (IMC)

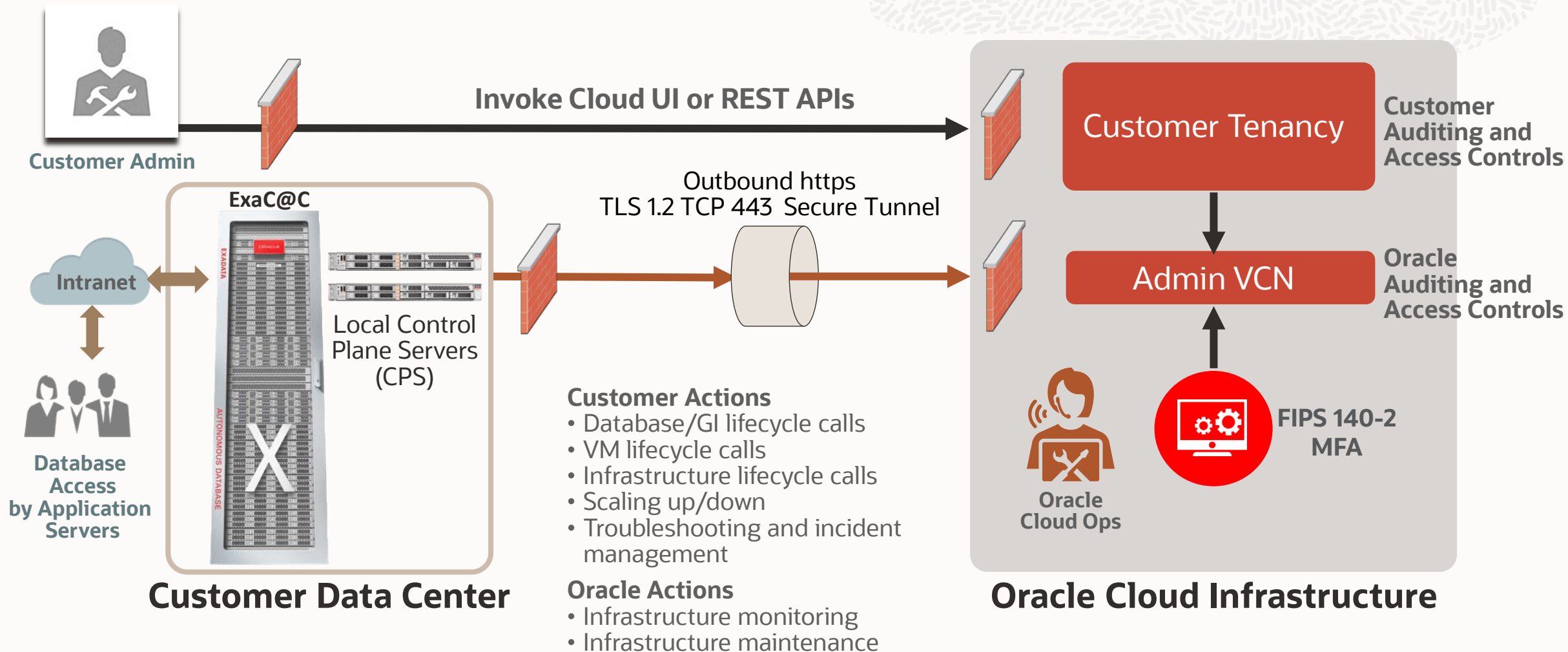
- Extends In-Memory database performance to higher capacity Flash memory in storage

\*Includes long-running SQL queries, backups, decryption, aggregation, data mining





# Exadata Cloud@Customer Architecture



# ExaC@C Infrastructure Subscription Model

## List Prices

### Infrastructure Pricing Fixed €/month

Size	€/month
Base System	7440
Quarter Rack (2x1.5TB RAM)	10044
Quarter Rack X10M –L (2x2.25TB RAM)	11383
Quarter Rack X10M –XL (2x3TB RAM)	14396
Add. DB Server	2008
Add. DB Server L	2678
Add. DB Server XL	4185
Add. Storage Server	2008

+

### OCPUs billed at actual usage

- Subscription: Universal Credits
- Commitment: Annual flex min. \$ 2,000
- Discount based on annual spend
- 1-Year Schedule
- OCPU Billing – partial hour (1 minute minimum)
- OCPU Types
  - BYOL, €0,3 /OCPU/hour => 223€/month
  - Licence Included - €1,25 €/OCPU/hour
  - => 930/month

### OCPUs via Universal Credits

- Licence Included
- BYOL

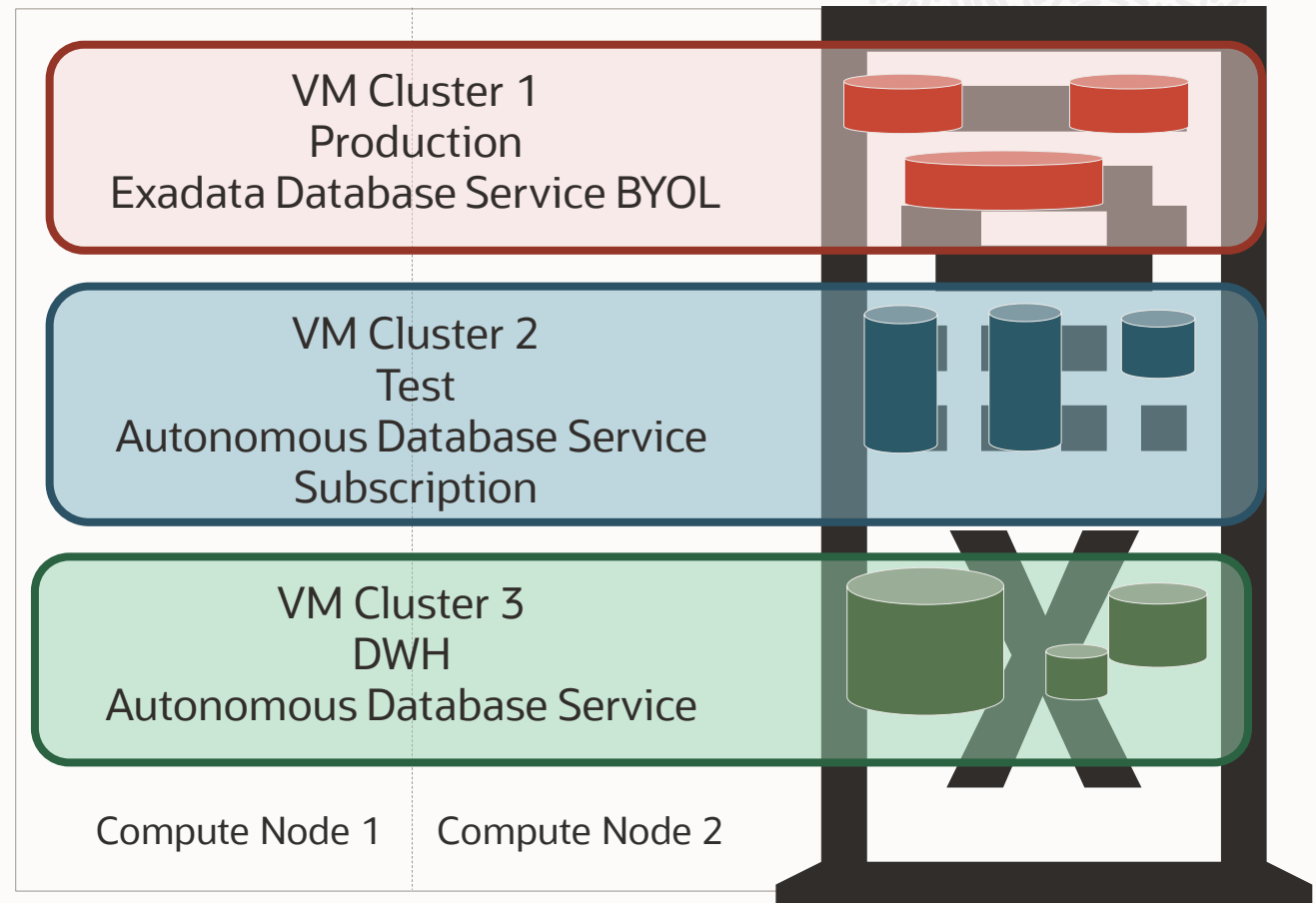
### Exadata Infrastructure NO OCPUs

Subscription: Monthly  
Term: 48 Months



# ExaCC - VM Clusters on same ExaCC

1. 8 VM clusters can be created on Exadata Cloud@Customer Infrastructure,
2. Separated VLAN, CPUs, RAM, Storage space
3. Each VM cluster can be used for either Autonomous or Exadata Database Service
4. Exadata Database Service can be:
  - BYOL (Oracle Database Licence under support)
  - Subscription (Licence included)
5. Autonomous Database Service
  - BYOL (Oracle Database Licence under support)
  - Subscription (Licence included)

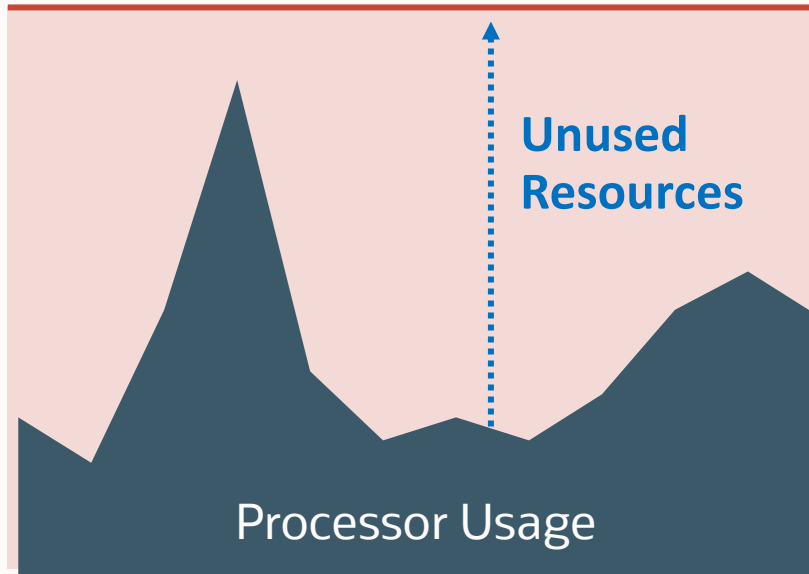


Available on Exadata Cloud@Customer Infrastructure X7 through X9M

# Online, Elastic Scaling with Exadata Cloud@Customer

Pay Only for What You Use

## Total Processor Resources

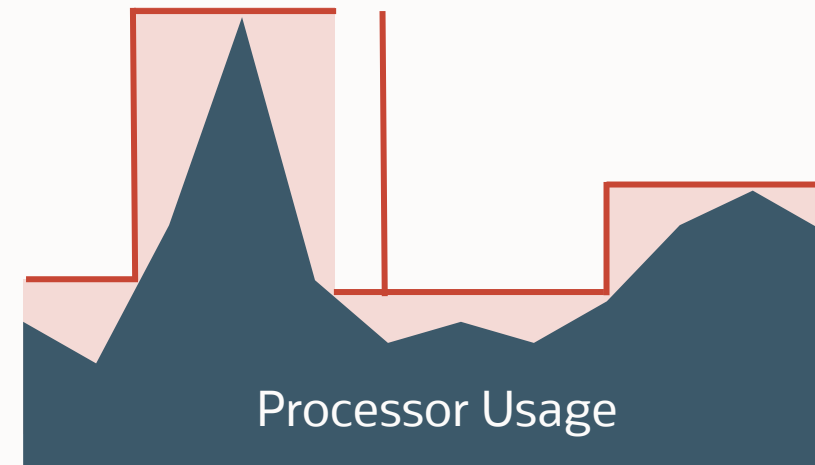


## On-Premises – Static

Purchase server processors and software licenses for **highest projected peak load**

## Manually or automatically scaled vCPUs

- Available for Exadata DB Service
- Available for Autonomous DB Service



## Exadata Cloud – Elastic

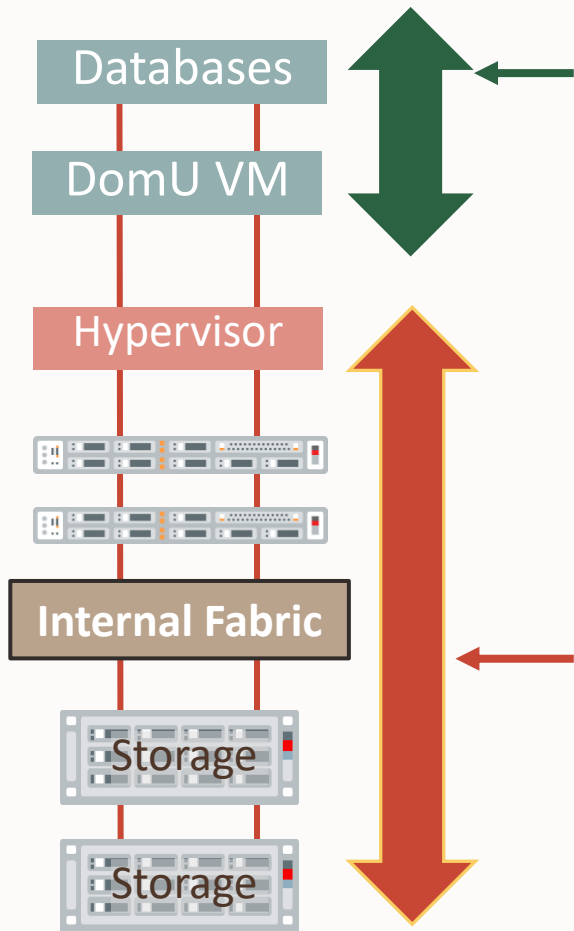
Adjust enabled vCPUs to match **actual workload** via APIs and web UI - vCPUs are charged per second

# Exadata Database Service on Cloud@Customer

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# Exadata Database Service

## Cloud Management Model in Your Data Center



- **Co-Managed** - Customer invokes Oracle Automation for DB and VM lifecycle operations
  - Automated: create, delete, patch, backup, scale up/down, etc.
  - Runs all supported Oracle Database versions 11.2.0.4 to 19c
  - Only Customer has DomU and DB administrator credentials
  - Customer can install and manage additional software in DomU
- **Oracle** manages, and controls hypervisor, DB servers, storage servers, InfiniBand network, etc.
  - No customer access



# Exadata Database Service BYOL

## What's Required and What's Included

### Oracle Database

- Only Database Enterprise Edition is required for Bring Your Own License to ExaC@C
  - **Strongly recommended to bring RAC licenses**
  - Customers may bring additional Database Options to ExaC@C

Customer continues to pay on-premises support for the Database and the Database Options the customer brings.

### Pricing:

- Subscription (Licence Included), €1,25 €/OCPU/hour => 930/month
- BYOL, €0,3 /OCPU/hour => 223€/month, 1 CPU EE -> 2 OCPUs
- OCPUs must be added in increments of **1 OCPU per VM (min 1 VM per node, min 2 OCPUs per VM)**

**What's Included:** When a customer brings a license entitlement (BYOL) to Oracle ExaC@C, customers are also granted the rights to use:

- **Oracle Transparent Data Encryption (TDE)**
- **Diagnostic Pack**
- **Tuning Pack**
- Data Masking and Subsetting Pack
- **Real Application Testing**
- Exadata Storage Software

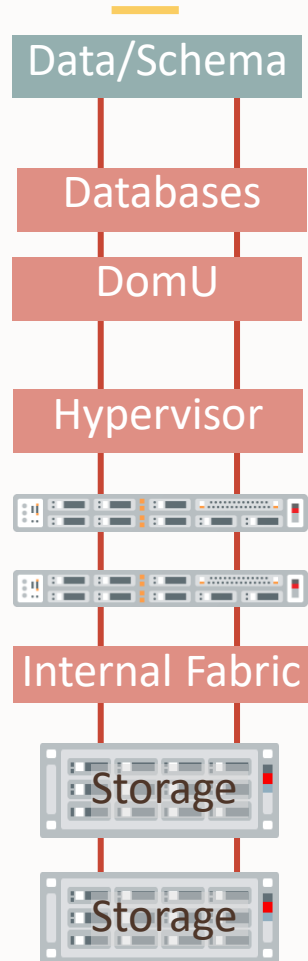


# Autonomous Database on Exadata Cloud@Customer

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# Autonomous Management Model in Your Data Center



- ← • **Customer Controls DB Users, Schemas, Encryption Keys**
  - Oracle Database 19c or later only
- ← • **Oracle** manages, and controls
  - Hypervisor, DB servers, storage servers, InfiniBand network, etc.
  - DomU, Container Databases
  - No customer access
  - Oracle Owns all issues

## Autonomous cloud operations: The foundation of Autonomous Database DevOps

Latest metrics showing Benefits of automated cloud operations:

- **Detects 88% of issues** automatically without customer service request
- **Resolves service requests 4x+ faster** than on-prem

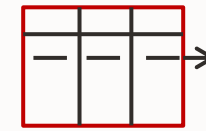
The key is **Automation**

- Automated monitoring and issue detection
- Automated bug-filing and diagnostics
- Automated patching and continuous integration
- Automated upgrades

# Oracle Autonomous Database

## Under the hood – A converged database

- **Transactional** for OLTP Applications
- **Columnar** for DWH
- **Vector Store** for Vector Embeddings
- **AutoML** for simple integrated Machine Learning
- **OLAP Analytics** for analytical applications
- **Native JSON** for Document Data
- **Spatial** for Geo-coded and Spatial data
- **Persistent Memory Store** for Lowest Latency IOT
- **Graph** Property Graph, RDF
- **Cloud SQL** for integrating Object Store Data Lake
- **Licence**
  - Subscription (Licence Included), €1,25 €/OCPU/hour => 930/month
  - BYOL, €0,3 /OCPU/hour => 223€/month
    - DB EE -> 2 OCPUs (<16 OCPUs; RAC otherwise)
      - DB EE -> Active DataGuard BYOL for Autonomous Dataguard
    - DB SE2 -> 1 SE2 CPU -> 4 OCPUs (max 8 OCPUs, i.e 2 DB SE2 CPU licences)
      - 10 NUP SE2 -> 1 OCPU (max 8 OCPUs, i.e. 80 SE2 NUP licences)



Transactional



Columnar



Vector



Machine Learning



OLAP Analytics



JSON



Spatial



In-Memory IoT



Property Graph



Cloud Integration

# Exadata Database Service on Exascale Infrastructure

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# Run mission-critical workloads with confidence where ever you choose

Exadata runs practically everywhere



**Exadata Database Machine**  
(on-premises)



**Exadata Cloud@Customer**  
(hybrid cloud)



**Exascale Infrastructure**  
(Oracle public cloud)



**Exadata Cloud Infrastructure**  
(Oracle public cloud or Dedicated Region)



**Multicloud environments**  
Microsoft Azure  
Google Cloud  
AWS

Same Exadata technology | 100% compatible | Zero downtime migration



# Overview of Exadata Database Service on Exascale Infrastructure

Exadata Database Service in the public cloud is now even simpler

- No dedicated hardware
- Provision compute resources, Exascale storage, network, SSH keys
- Instantly create efficient database clones and snapshots

Start small and grow CPU and storage resources online

- **Begin with a cluster of 2 VMs, each with 8 ECPUs and 22 GB of memory**
- **Start out with 300 GB of Exadata database storage**
- Grow VMs in increments of 4 ECPUs each, add more VMs, and scale Exascale storage with Gigabytes or Terabytes of additional capacity

Powerful cloud automation

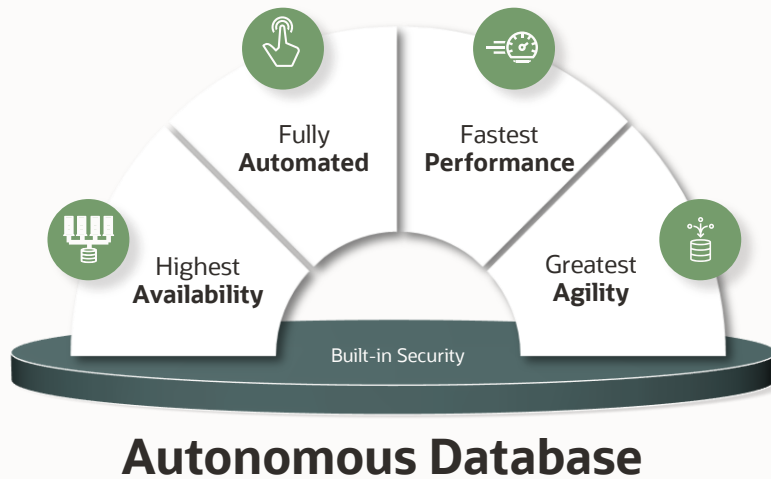
- Web and API-driven provisioning, updates, backups, and DR lifecycle operations



Affordable

All customers, any scale  
Co-managed with Oracle  
Full administrative control  
Dev/test agility

# Autonomous Database: A fully automated and managed Oracle Database



- Built on **Oracle Database**, the primary custodian of the world's business data
- Available in **OCI**, customer data centers, **Azure**, **Google Cloud**, and coming soon in **AWS**
- Provides the **highest performance, availability, security, and scalability** via **Real Application Clusters on Exadata Cloud Infrastructure**
- Securely supports **any workloads** from the simplest to the most mission critical
- **Elastically scales CPUs** from as small as two ECPU to handle the most demanding applications



# Reduce development costs with low-cost AppDev options

## Leverage the full breadth of Autonomous Database capabilities

Cost-effectively develop apps ‘your way’ and deploy to production:

- Develop online and seamlessly upgrade to production with **Autonomous Database for Developers** on OCI
- Coming soon: Develop locally and clone on OCI using **Autonomous Database for Developers – Container Image**
- Both options offer fixed-shape instance (4 ECPU and 20 GB storage) and per instance, flat hourly-rate billing

[See pricing](#)

Test out new innovations in Oracle Database 23ai for free:

- Check out online via **Always Free Autonomous Database** on Oracle Cloud Infrastructure
- Check out locally using an **Autonomous Database Free Container Image**

[Access Autonomous Database free options](#)



# Database Deployment Options on OCI

Option	On-premise, Database on OCI Compute IaaS	DBCS VM	Dedicated Exadata Exadata Cloud@Customer Exadata Database Service	Shared Exadata Exascale Exadata Database Service	Autonomous Database (Exadata)
<b>CPUs</b>	Intel, AMD	Intel,AMD	AMD	AMD	AMD
<b>CPU Range</b>	1 - 24	1 - 64	1 - 100's	1 - 100's	1 - 128
<b>IOPS</b>	15K/CPU	15K,30K,60K,90K,120K	>500K	>500K	>500K
<b>OS / SYSDBA Access</b>	Yes	Yes	Yes	Yes	No
<b>RAC</b>	No	Yes	Yes	Yes	Yes
<b>Analytics Smartscan</b>	No	No	Yes	Yes	Yes
<b>Encryption</b>	Block Storage	TDE	TDE	TDE	TDE
<b>Versions</b>	11g, 12.1, 12.2, 18c, 19c	19c, 21c, 23ai	19c, 21c, 23ai	23ai	19c, 23ai
<b>Management</b>	Customer	Customer,Oracle	Customer,Oracle	Customer,Oracle	Oracle
<b>Backups</b>	Manual	Automatic	Automatic	Automatic	Automatic
<b>DataGuard</b>	Manual	Automatic	Automatic	Automatic	Automatic
<b>Patching</b>	Manual	Automatic, customer initiated	Automatic, customer initiated	Automatic, customer initiated	Automatic
<b>Performance Tuning</b>	Manual	Manual	Manual	Manual	Automatic
<b>Licence</b>	Approved Cloud Env.	BYOL,Subscription	BYOL,Subscription	BYOL,Subscription	BYOL,Subscription
<b>Licence Flexibility</b>	Fixed	Subscription, Offline	Subscription, Online	Subscription, Online	Elastic, Subscription, Online



Our mission is to help people see  
data in new ways, discover insights,  
unlock endless possibilities.

