

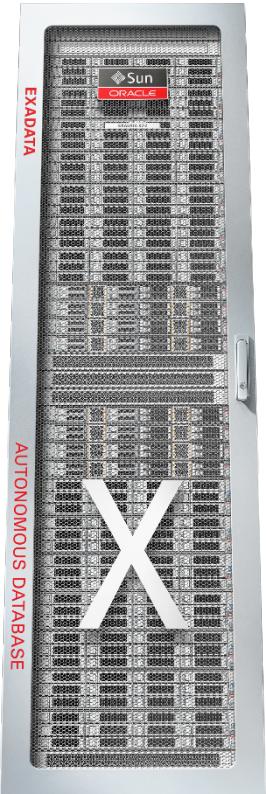
# Oracle Database Exadata Cloud Service

Brian Spendolini  
Database Cloud Services Product Manager



# Exadata Vision

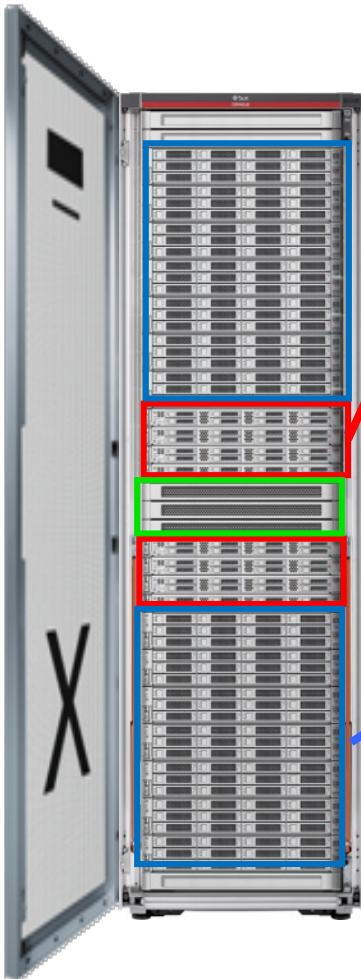
Dramatically Better Platform for All Database Workloads



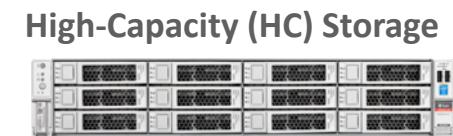
- **Ideal Database Hardware** - Scale-out, database optimized compute, networking, and storage for fastest performance and lowest costs
- **Smart System Software** – specialized algorithms vastly improve all aspects of database processing: **OLTP, Analytics, Consolidation**
- **Automated Management** – Automation and optimization of configuration, updates, performance, and management culminating in **Fully Autonomous Database and Infrastructure**

**Identical On-Premises and in Cloud**

# Exadata Adopts Latest State of the Art Hardware Every Year



- Scale-Out 2-Socket or 8-Socket Database Servers
  - Latest 24 core Intel Xeon
  - Latest **25 GigE** client connectivity
- Ultra-Fast **Unified InfiniBand** Internal Fabric
- Scale-Out Intelligent Storage Servers
  - Latest Intel 10 core CPUs offload database processing
  - Latest disk technology - 10TB **Helium** Disk Drives
  - Latest **NVMe PCIe Flash** - 6.4 TB Hot Swappable



# The Challenge with Querying Data from a Large Database

You need to find a small amount of data to answer the question you asked

**Give me the total of all orders that have an order number between 10 and 20.**

```
select sum(amount) from orders where order_number between 10 and 20;
```

Order Number	Customer	Product	Amount
5	Johnny	Brooms	\$10
36	Billy	Shoes	\$5
15	Mary	Lambs	\$20
19	Bob	Sponges	\$10
3	Frank	Pasta	\$3
42	Jeff	Jelly	\$5

# The Challenge with Querying Data from a Large Database

We know the rows we need

Order Number	Customer	Product	Amount
5	Johnny	Brooms	\$10
36	Billy	Shoes	\$5
15	Mary	Lambs	\$20
19	Bob	Sponges	\$10
3	Frank	Pasta	\$3
42	Jeff	Jelly	\$5

# The Challenge with Querying Data from a Large Database

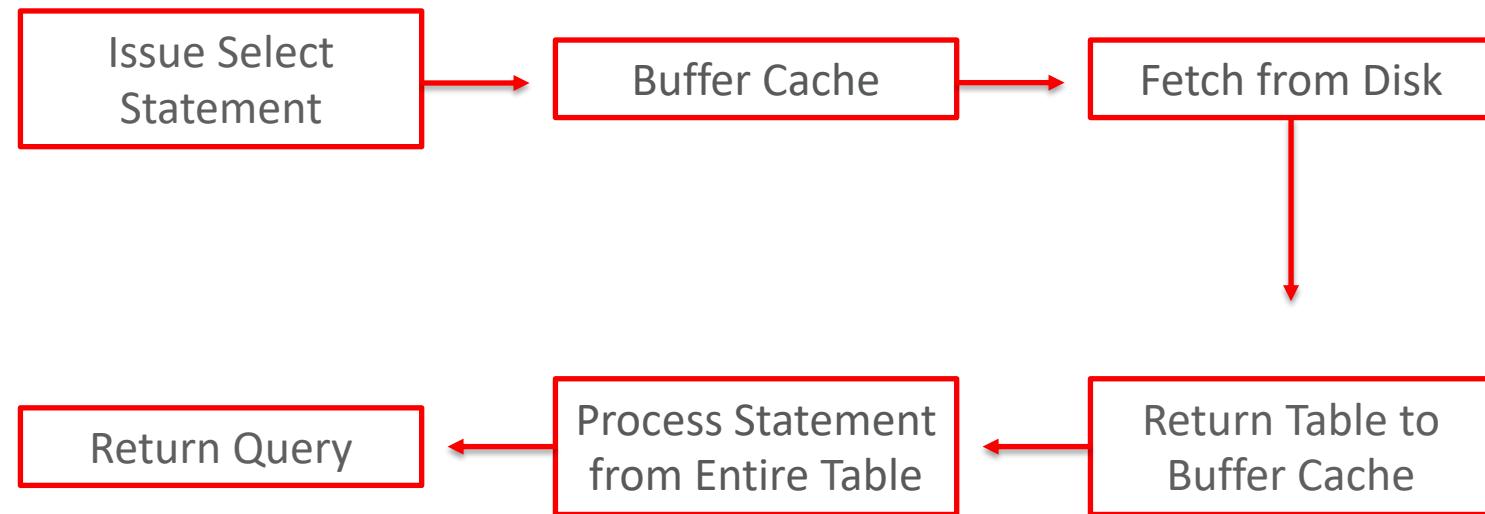
And the column for the order totals



Order Number	Customer	Product	Amount
5	Johnny	Brooms	\$10
36	Billy	Shoes	\$5
15	Mary	Lambs	\$20
19	Bob	Sponges	\$10
3	Frank	Pasta	\$3
42	Jeff	Jelly	\$5

# Traditional Database

In a traditional database, we will bring back all the rows of the table and the columns and do the filtering and analytics in the buffer cache/SGA.



# The Challenge with Querying Data from a Large Database

The entire table will be returned

Order Number	Customer	Product	Amount
5	Johnny	Brooms	\$10
36	Billy	Shoes	\$5
15	Mary	Lambs	\$20
19	Bob	Sponges	\$10
3	Frank	Pasta	\$3
42	Jeff	Jelly	\$5

# Exadata Database Machine – Smart Scans

In an Exadata, we can filter the rows and columns in the storage layer to only return the data we asked for. This is called Query Offloading.

## **Column Projection**

Only return relevant columns

## **Predicate Filtering**

Filter data before it gets to the database

## **Storage Indexes**

Use in-memory summary to prune IO

# Column Projection

Only return relevant columns



Order Number	Customer	Product	Amount
5	Johnny	Brooms	\$10
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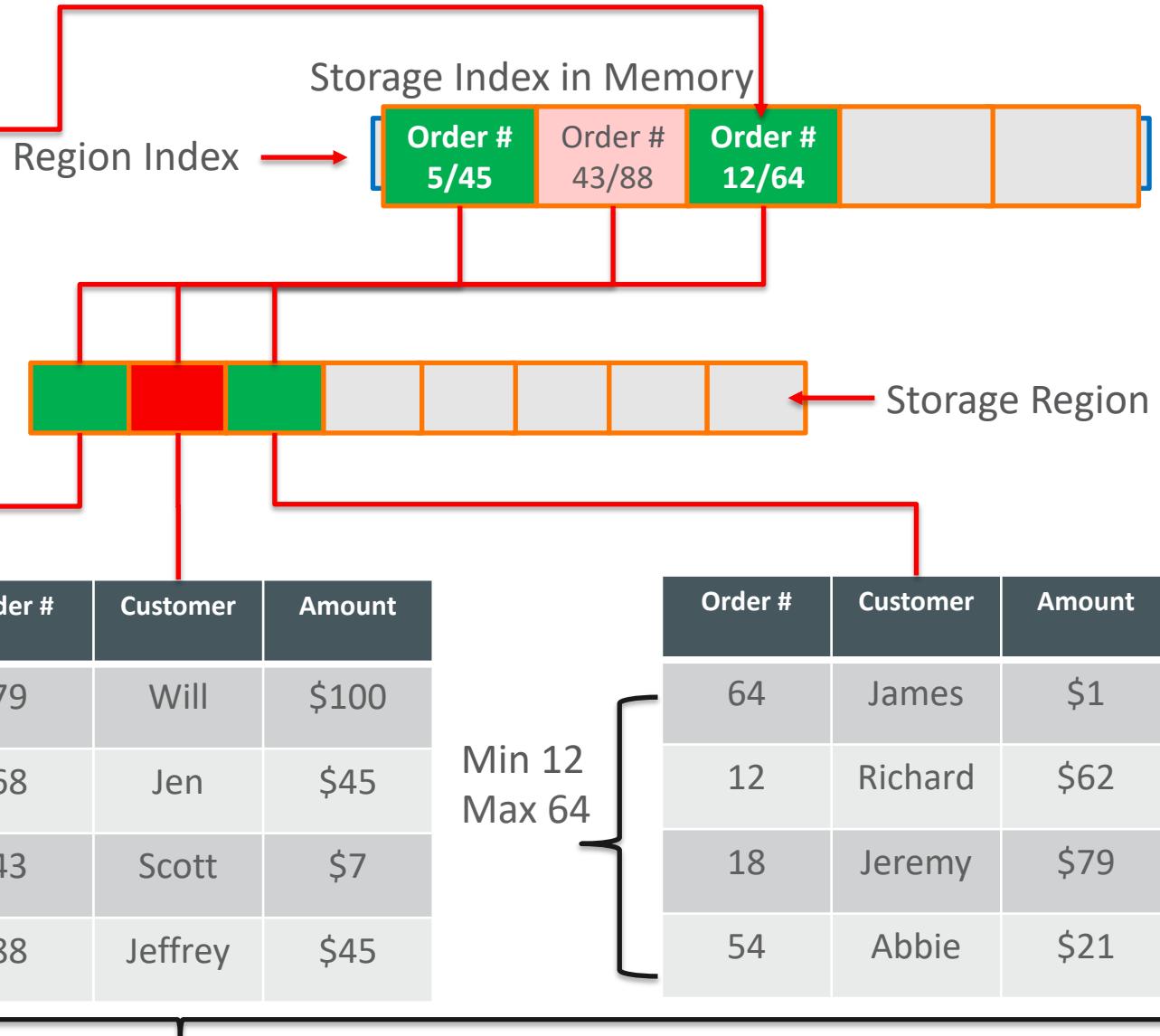
# Predicate Filtering

Filter data before it gets to the database

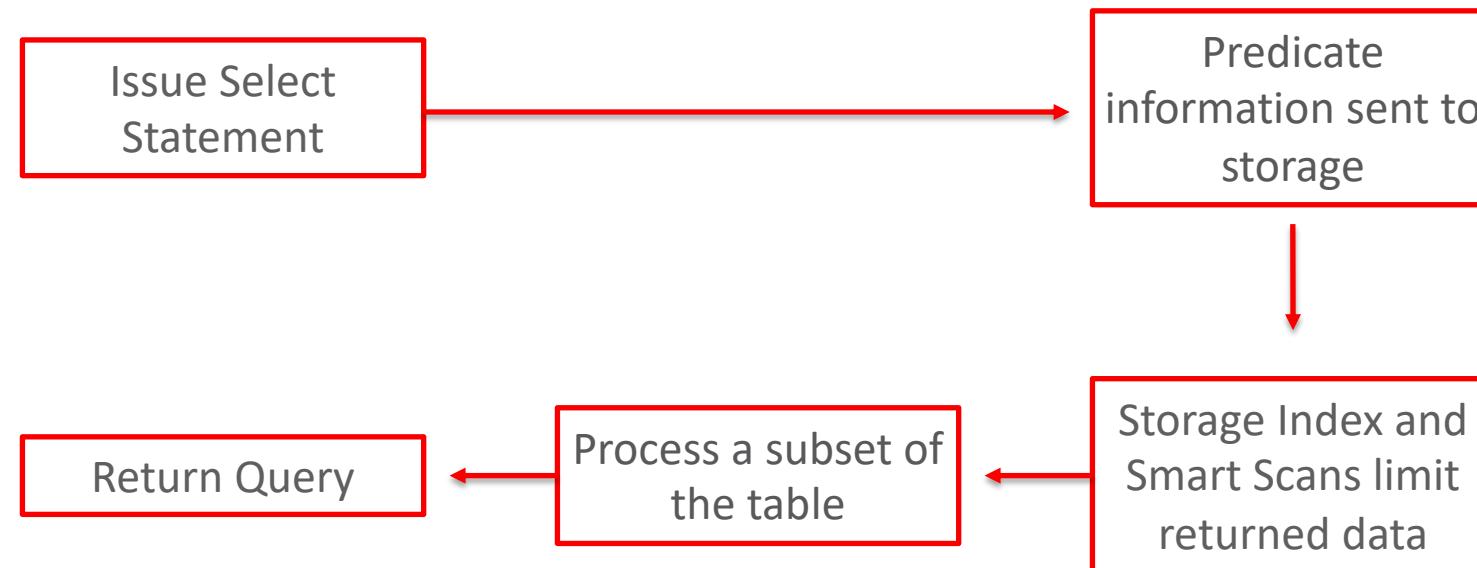
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# Storage Indexes

```
select sum(amount) from  
orders where order_number  
between 10 and 20;
```



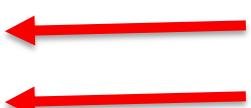
# Exadata Database Machine



# The Challenge with Querying Data from a Large Database

Only what we want from the table is returned

Order Number	Customer	Product	Amount
5	Johnny	Brooms	\$10
36	Billy	Shoes	\$5
15	Mary	Lambs	\$20
19	Bob	Sponges	\$10
3	Frank	Pasta	\$3
42	Jeff	Jelly	\$5



# Do more with less.

Traditional  
Database  
Architecture

Order Number	Customer	Product	Amount
5	Johnny	Brooms	\$10
36	Billy	Shoes	\$5
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Exadata  
Database  
Machine

# Best Database Cloud Service - Exadata Cloud Service

- Full Oracle Database with All Advanced Options or Bring Your Own License
  - 100% compatible with existing applications that use Oracle Database
- On Fastest, Most Available DB Cloud Platform - Exadata
- All the Benefits of Public Cloud
  - Fast, elastic, web and API-driven provisioning, updates, backup, etc.
  - Oracle experts deploy and manage infrastructure
  - Pay per Use subscription
  - **Best elasticity** - Online compute bursting, pay for only enabled CPUs



# How do we make it a Exadata Cloud Service?

Full Oracle Database  
with **all advanced  
options**

- Oracle Cloud **exclusive** options like RAC and Active Data Guard
- Oracle Database **11.2.0.4 , 12.1.0.2, 12.2.0.1, and 18c**

On **fastest** and **most  
available** database  
cloud platform

- **Highly available** and redundant hardware for maximum uptime
- **Complete isolation** of tenants with no overprovisioning

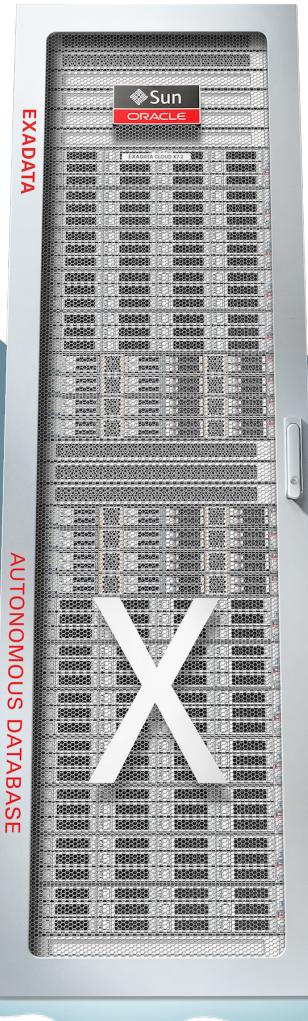
All the benefits of a  
**Public Cloud**

- **Fast, elastic, web driven** provisioning
- **Deploy** across the world
- **No capex** monthly subscription
- **Start** with what you need, **scale** anytime

# Exadata Cloud Enterprise Edition Extreme Performance Most Powerful Database + Platform

	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
	Storage Indexes
	Columnar Flash Cache
	Hybrid Columnar Compression
	I/O Resource Management
	Network Resource Management
	In-Memory Fault Tolerance
	Exafusion Direct-to-Wire Protocol

# Oracle Database Exadata Cloud Service Shapes

Same Shapes as On-Premises

	X7 Quarter Rack	X7 Half Rack	X7 Full Rack
Number of DB Compute Nodes	2	4	8
Maximum Number of OCPUs	92	184	368
Total Memory	1440 GB	2880 GB	5760 GB
Total Flash Capacity	76.8 TB	153.6 TB	307.2 TB
Max DB Size (No Local Backup)	85.5 TB	171.1 TB	342.1 TB

# Exadata Cloud Service Architecture Overview

Same Architecture as On-Premises

## Exadata Compute Nodes (X7)

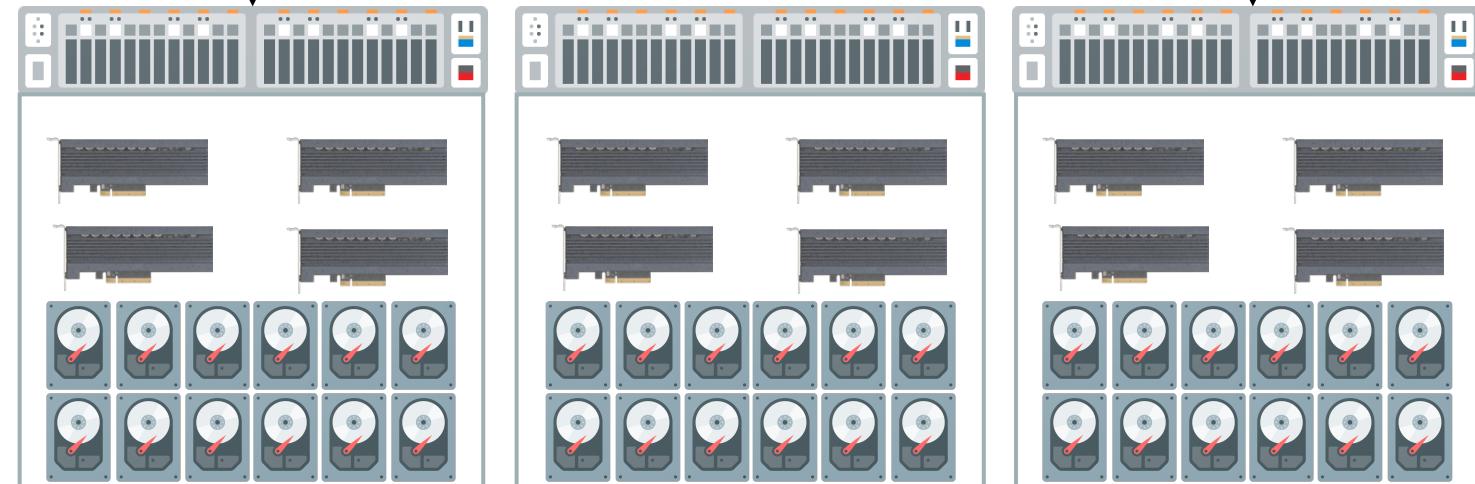
- 2x 24-Core Xeon 8160
- 720 GB of Memory



iDB Protocol

## Exadata Storage Cells HC (X7)

- 2x 10-Core Xeon 4114
- 192 GB of Memory
- 12x 10 TB 7,200 RPM Disks
- 4x 6.4 TB NVMe PCIe 3.0 flash Cards

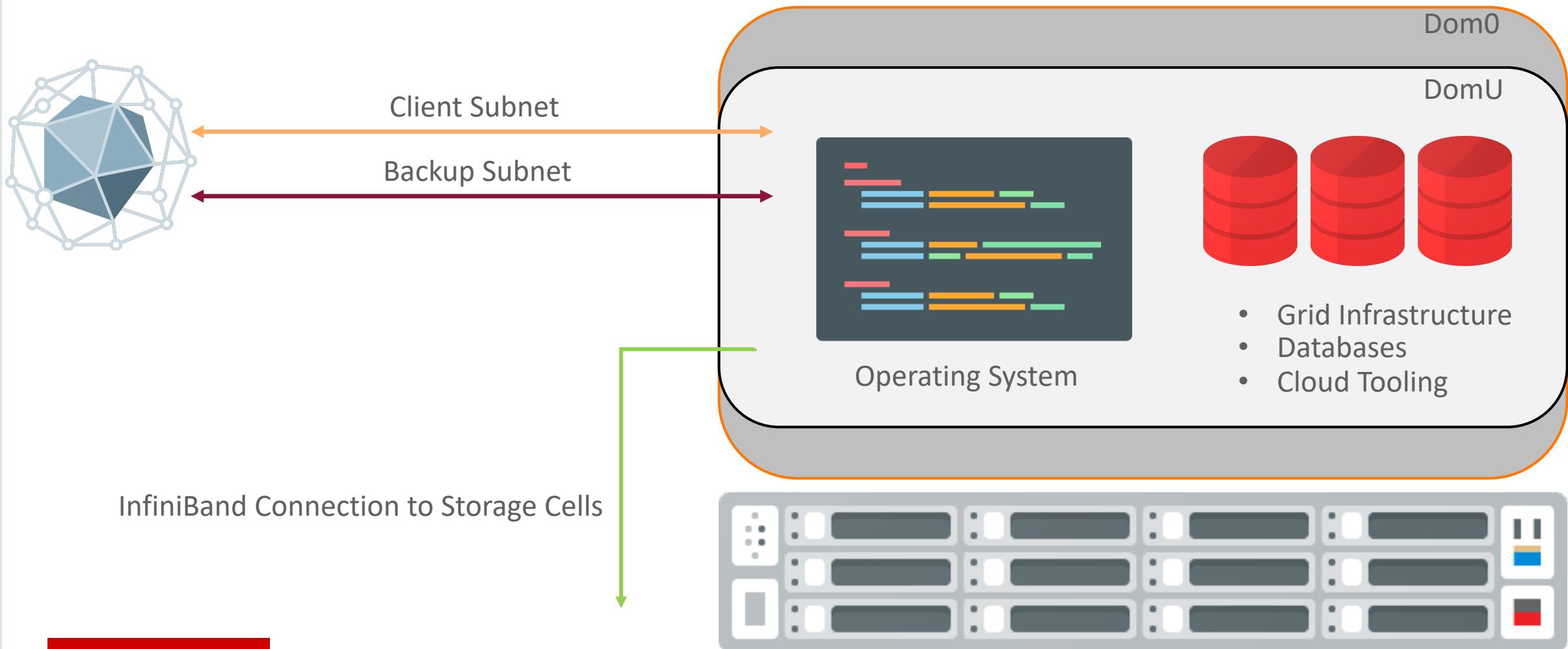


InfiniBand Network

iDB Protocol

# Exadata Cloud Service Architecture Overview

Same Architecture as On-Premises



# Exadata Cloud Service Creation

- Start by naming your service and placing it into an Availability Domain
- Choose a Shape and OCPUs
- License Included or BYOL
- Add a Public Key
- Decide how your Storage will be used
- Select a VCN and subnets
- Name your Database and Choose a Version
- Create the Service

The screenshot shows the configuration steps for creating an Exadata Cloud Service. It includes sections for SSH keys, network settings, and database information.

**SSH KEY**  
PASTE SSH KEYS  
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAQDLuJKBG5+rM0aOXBRiQTtFZICKUYwy7G  
Add SSH Key

**DATA STORAGE PERCENTAGE**  
80%

**Network Information**

VIRTUAL CLOUD NETWORK: ExaCS\_Network

CLIENT SUBNET: Client\_Subnet

BACKUP SUBNET: Backup\_Subnet

HOSTNAME PREFIX: exacs|

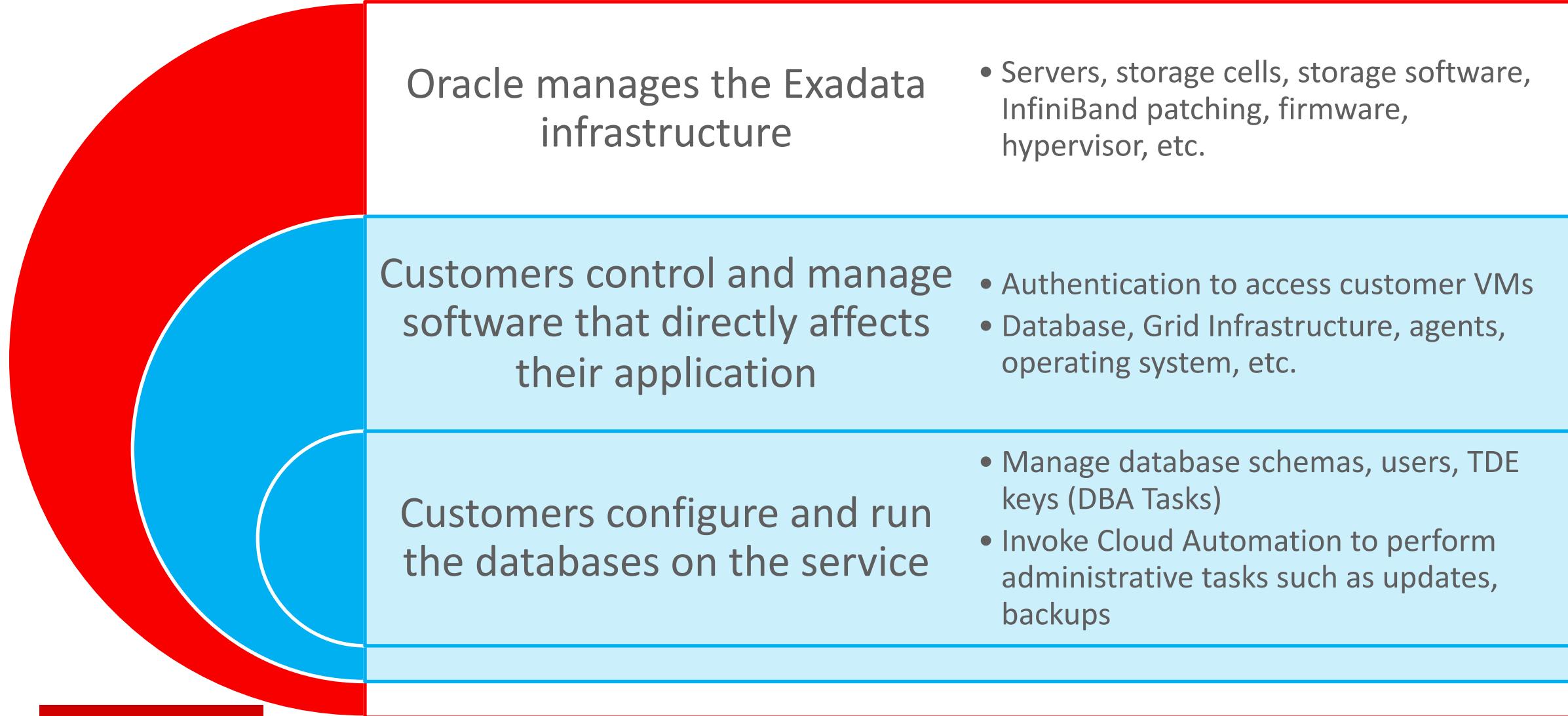
HOST DOMAIN NAME: clientsubnet.exacsnetwork.oraclevcn.com

HOST AND DOMAIN URL: exacs.clientsubnet.exacsnetwork.oraclevcn.com

**Database Information**

DATABASE NAME: [empty]

# Oracle Managed vs Customer Managed



# Licensing is Different in the Cloud

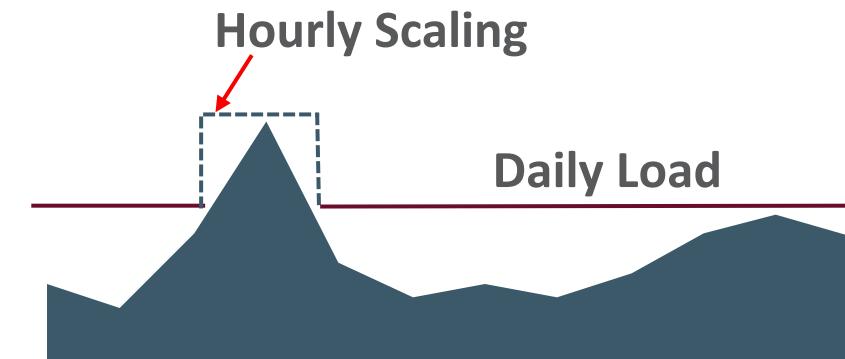
- Oracle Database Enterprise Edition Extreme Performance Included
  - All Oracle Database Enterprise Edition Options, DB Enterprise Manager Packs
  - All Exadata software features included
  - *Best for Customers who want to use all the Oracle database options available*
- Bring Your Own License (BYOL) entitlements to Exadata Cloud
  - Includes DB Enterprise Edition, add preferred DB Options currently used on-premises
  - License entitlements for the following Oracle Database features included
    - Transparent Data Encryption (TDE), Data Masking and Subsetting Pack
    - Diagnostics Pack, Tuning Pack, Real Application Testing
  - One Oracle Processor License maps to 2 OCPUs
  - All Exadata software features included
  - *Best for Customers who want to leverage their on-premises investment in Oracle*

# Scaling the Exadata Cloud Service in OCI

- Use only what you need
  - Start with as many OCPUs as you need to run your day to day workload
  - Scale up in times of need
  - OCPUs are charged hourly
  - Scaling of OCPUs requires no downtime and can be done in seconds



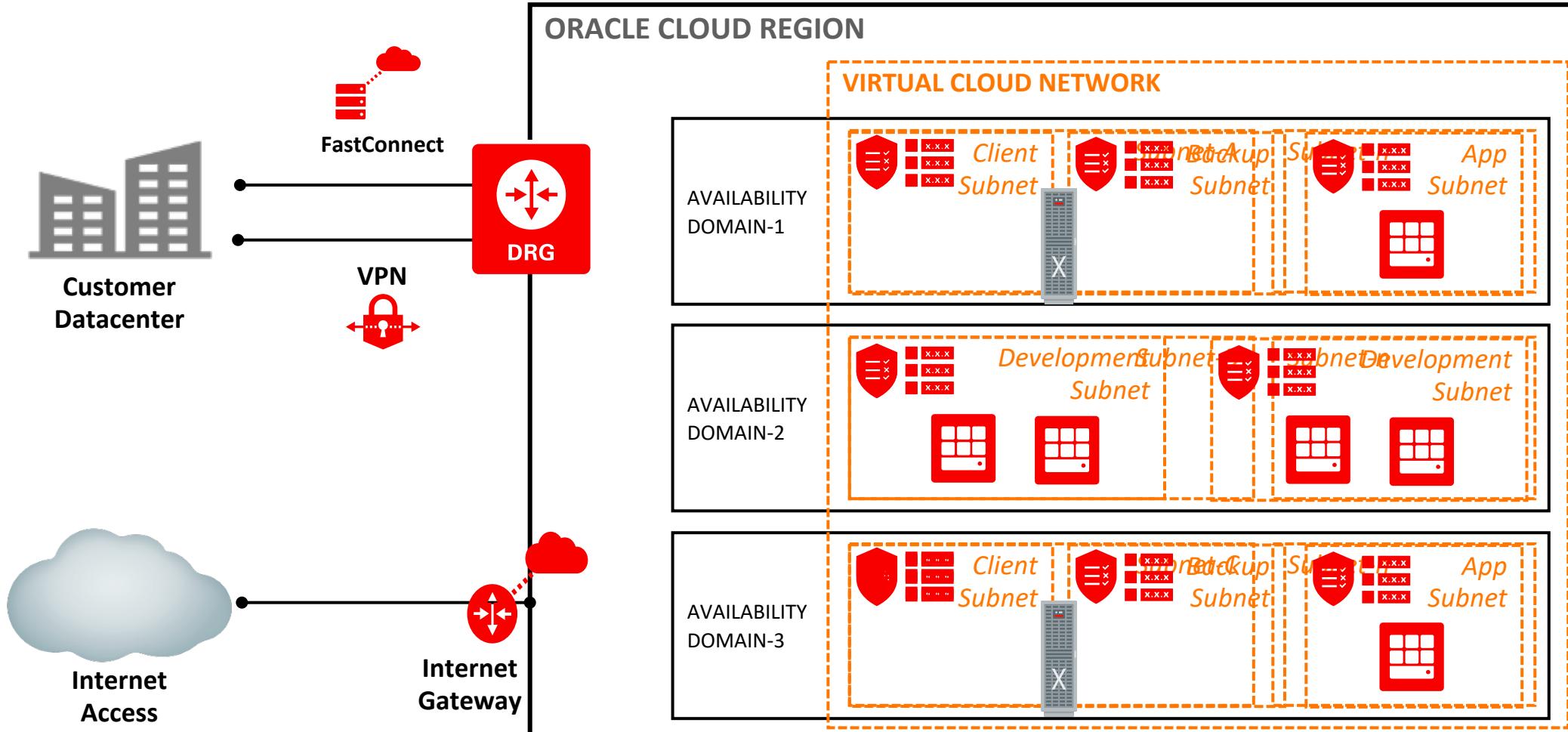
On-premises, purchase CPUs for peek load



In the Cloud, use what you need

# OCI Networking: High-Fidelity Private Networking and Connectivity

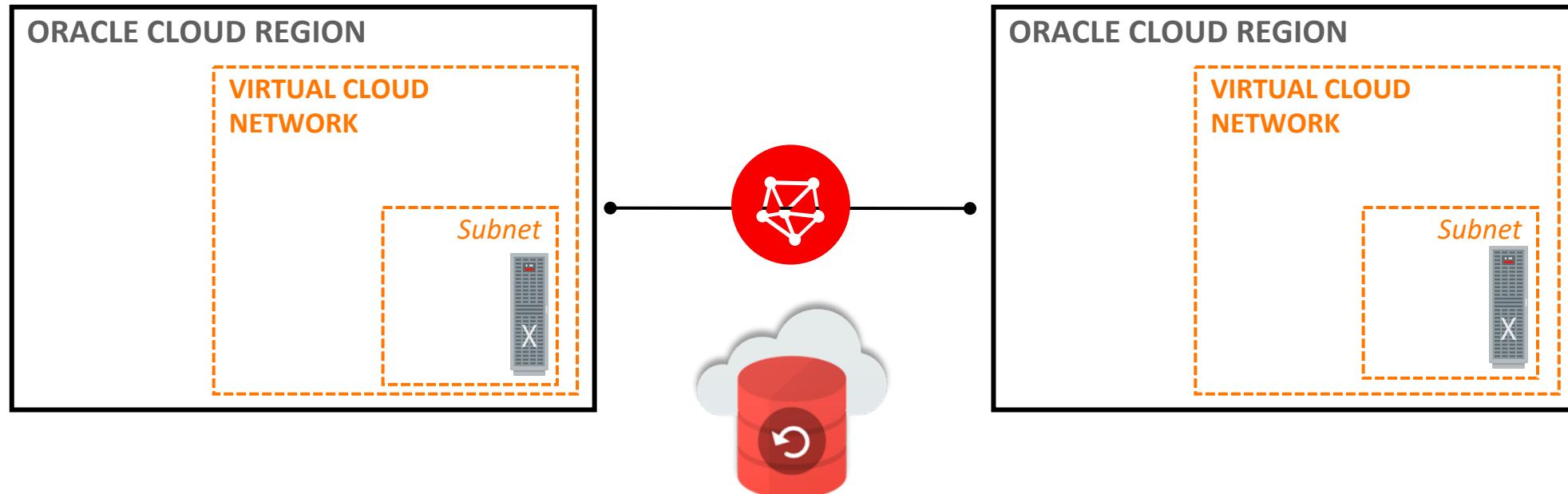
The Public Cloud does not have to be Public



# OCI Networking: High-Fidelity Private Networking and Connectivity

## Disaster Recovery

Virtual Cloud Network Region Peering over a Private Network



# Exadata Cloud Service CLIs and APIs

- Operations are exposed through Web Interfaces, CLIs and RESTful APIs
  - Scale OCPUs
  - Virtual Network Operations
  - Database/PDB Lifecycle
  - ExaCLI
  - OS/DB/GI Patching
  - Database Backups
- Allows integration with customers' existing automation infrastructure
  - ServiceNow, OpenStack, Cloud Foundry, Terraform

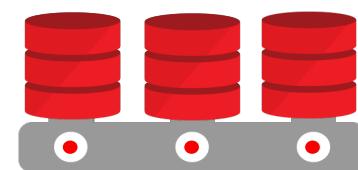


# Exadata Cloud Service | Key Use Cases

Mission Critical Production  
Databases



Database Consolidation



OLTP



Disaster Recovery



In-Memory Analytics



*100% Compatible with on-premises databases:  
Extend your Data Center beyond the physical boundaries ...*