ORACLE colt

Cost Efficient Hybrid Disaster Recovery using Oracle Cloud

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Safe harbor statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

| OCI as Virtual Data Center | Exadata Cloud Services | Hybrid Disaster Recovery | Cost Calculation | Network on Demand |

Cloud for your critical enterprise apps and data

First Generation Cloud	Oracle Cloud
Elastic resources	Superior performance
Pay for what you use	Superior economics
High scale	Enterprise class
Self-service	Security first
Easy to use	Open ecosystem

Complete cloud services

DEVOPS	APPLICATIONS			ANALYTICS	GOVERNANCE

DEVOPS

LOW CODE
APEX, Digital Assistant

APPDEV
Visual Builder Studio, GraalVM, Helidon, SQL Developer, Shell, APIs/SDKs

INFRASTRUCTURE as CODE
Resource Manager, Terraform, Ansible

APPLICATIONS

SERVERLESS
Events, Functions, API Gateway, Streaming

APPLICATION INTEGRATION

BUSINESS & INDUSTRY SaaS
ERP, HCM, SCM, Sales, Marketing, Service, Vertical Industry

ANALYTICS

BUSINESS ANALYTICS
Analytics Cloud, Fusion Analytics

GOVERNANCE

CLOUD OPS
IAM, Compartments, Tagging, Cost Advisor

DATA PLATFORM

DATA MANAGEMENT
Database Migration, Data Integration, Data Catalog, Golden Gate

DATA LAKE
Data Flow, Big Data, Data Science, Cloud SQL

AUTONOMOUS & ORACLE DATABASES
Transactions, Data Warehouse, JSON, Dedicated, Exadata

DISTRIBUTED & OPEN SOURCE DATABASES
NoSQL, MySQL

SECURITY
Cloud Guard, Security Zones, Vault, KMS, Data Safe, DDoS, WAF

INFRASTRUCTURE

COMPUTE
Bare metal, VM, CPUs, GPUs, HPC

CONTAINERS
Containers, Kubernetes, Registry

OS, VMWARE
Autonomous Linux, OS Mgmt Service, Marketplace

STORAGE
NVMe, Block, File, Object, Archive, Data Transfer

NETWORKING
VCN, LB, Service Gateway, FC, VPN, Cluster Networking

OBSERVABILITY
Monitoring, Logging, Logging Analytics, Notifications, Events
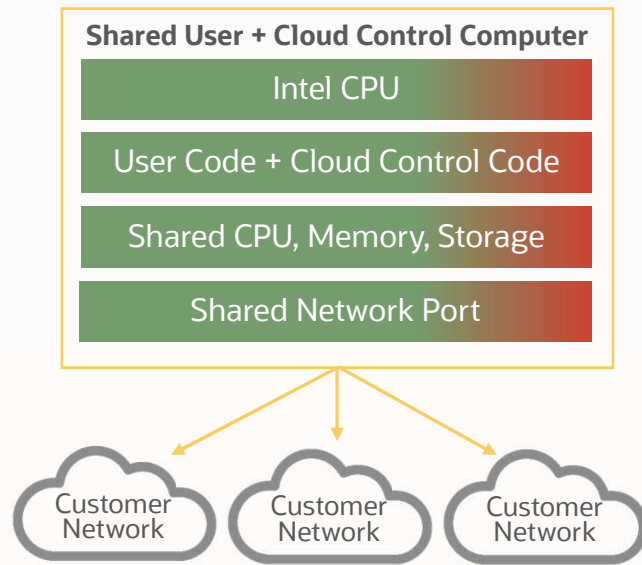
COMMERCIAL REGIONS / GOV REGIONS / CLOUD@CUSTOMER / MULTICLOUD / EDGE

29 Oracle Cloud regions and growing
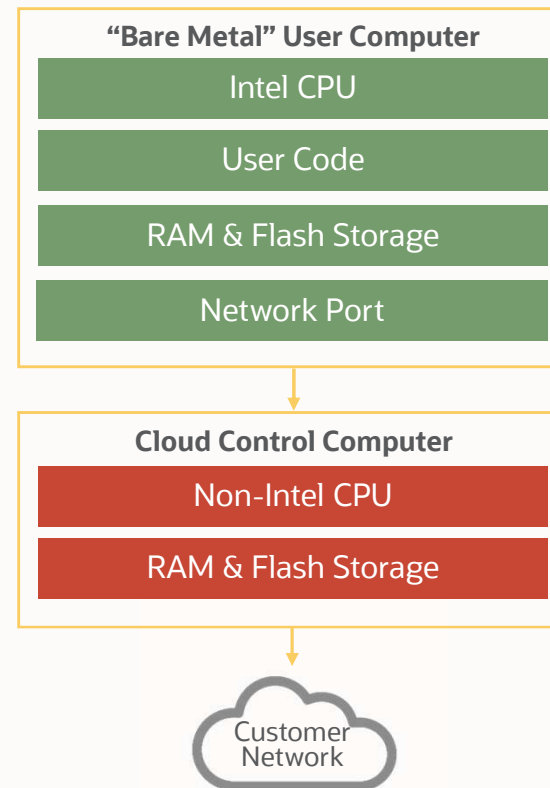November 2020: 29 Regions Live, 9+ Planned; 6 Azure Interconnect Regions

SWEDEN

LONDON
NEWPORT
AMSTERDAM
FRANKFURT
ZURICH
FRANCE
ITALY

TORONTO MONTREAL
CHICAGO
SAN JOSE, CA
ASHBURN
PHOENIX

CHUNCHEON
SEOUL TOKYO
OSAKA

ISRAEL
SAUDI 2
JEDDAH DUBAI
UAE 2
MUMBAI
HYDERABAD

SINGAPORE

VINHEDO
SAO PAULO

JOHANNESBURG

SANTIAGO

SYDNEY
MELBOURNE

- 🔴 Commercial
- ⭕ Commercial Planned
- 🔵 Government
- ⭘ Government Planned
- ⊞ Microsoft Interconnect Azure

Gen 1 Clouds
Shared Computers

- Cloud provider can see customer data
- User code can access cloud control code

Shared User + Cloud Control Computer

Intel CPU
User Code + Cloud Control Code
Shared CPU, Memory, Storage
Shared Network Port

Customer Network Customer Network Customer Network

Oracle Cloud Infrastructure
Separate Cloud Control Computers

✓ Oracle cannot see customer data
✓ No user access to cloud control computer

"Bare Metal" User Computer

Intel CPU
User Code
RAM & Flash Storage
Network Port

Cloud Control Computer

Non-Intel CPU
RAM & Flash Storage

Customer Network

Networking

High fidelity virtual networks and connectivity

VCN	FastConnect	Load Balancing
Fully configurable subnets, routing, firewalls Default IPSec VPN 25Gb network infrastructure	Dedicated, SLA backed connectivity No data transfer charges >50 connectivity partners worldwide	Choice of TCP, HTTP, HTTP/2 End-to-end SSL TLS encryption

Service Gateway	DNS
Private access without traversing internet Full range of IaaS/PaaS services covered	<30ms response time Global load balancing Traffic management Network health checks

Networking flexibility and control
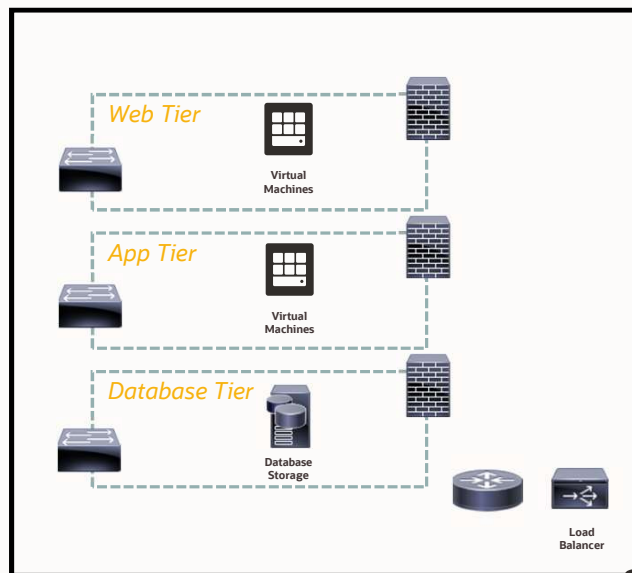
CUSTOMER DATA CENTER

ORACLE CLOUD REGION

Web Tier

Virtual Machines

App Tier

Virtual Machines

Database Tier

Database Storage

Load Balancer

Customer Datacenter

DNS

VPN

FastConnect

DRG

VIRTUAL CLOUD NETWORK

AVAILABILITY DOMAIN-1   *Subnet-A*

AVAILABILITY DOMAIN-2   *Subnet-B*

AVAILABILITY DOMAIN-3   *Subnet-C*

Backbone

OTHER ORACLE CLOUD REGIONS

DNS
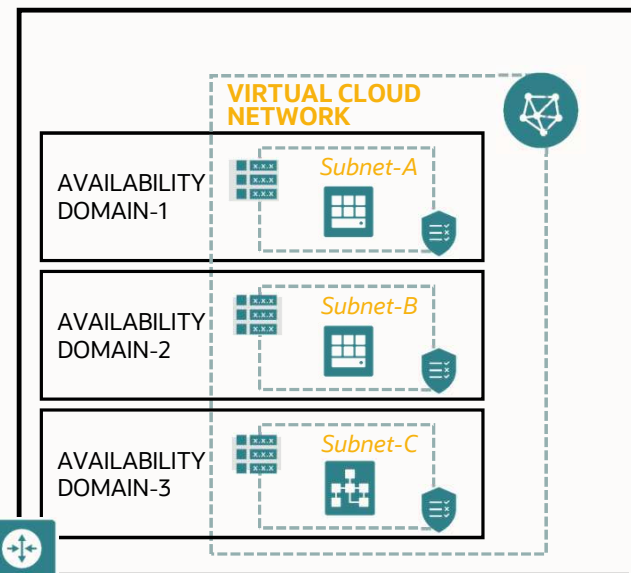
Provisioned bandwidth Load Balancing

End customers

Networking flexibility and control

CUSTOMER DATA CENTER

Web Tier

Virtual Machines

App Tier

Virtual Machines

Database Tier

Database Storage

ORACLE CLOUD REGION

VIRTUAL CLOUD NETWORK

AVAILABILITY DOMAIN-1 — Subnet-A

AVAILABILITY DOMAIN-2 — Subnet-B

AVAILABILITY DOMAIN-3 — Subnet-C

Backbone

OTHER ORACLE CLOUD REGIONS

DNS

Provisioned bandwidth Load Balancing

End customers
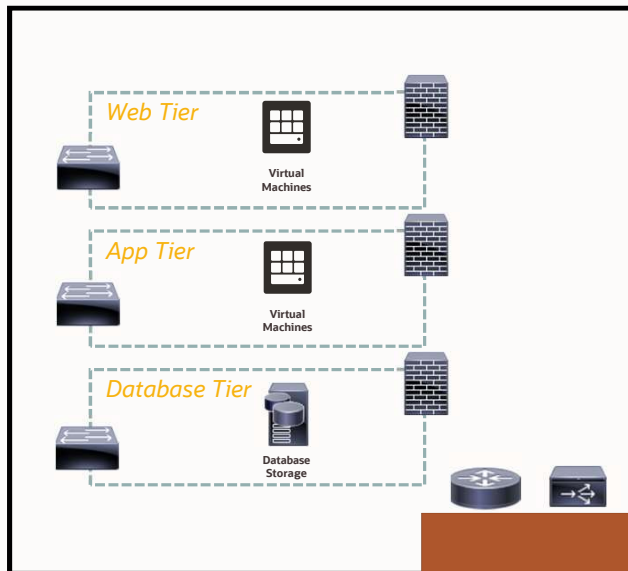
OCI FastConnect

- Dedicated, SLA backed connectivity
- No data transfer charges
- >50 connectivity partners worldwide

Database

The most comprehensive, resilient, high performing database services

| CUSTOMER MANAGED | | SEMI-MANAGED | FULLY-MANAGED |

ORACLE AUTONOMOUS DATABASE

ADW | **ATP**

Auto-scaling
Auto-tuning
Auto-patching
Serverless
Spatial, ML Document
SQL Developer

Auto-scaling
Auto-tuning
Auto-patching
Serverless or dedicated
APEX

Oracle Exadata

Extreme performance
Base – Full rack
RAC
ADG
IORM

Cloud Service or Cloud@Customer

Oracle Database Cloud Service

VM/Bare Metal
RAC
Data Guard
Auto TDE
Automated backup, patching

Oracle DB on Compute

VM/Bare Metal
Data Guard
Auto TDE

MANAGEABILITY

Choice of Deployment Models

On-Premises Traditional	Cloud at Customer	Oracle Cloud
Exadata Database Machine	**Exadata Cloud at Customer (ExaCC)**	**Exadata Cloud Service (ExaCS)**
Customer Data Center Purchased Customer Managed	**Customer Data Center Subscription Oracle Managed**	**Oracle Cloud Subscription Oracle Managed**
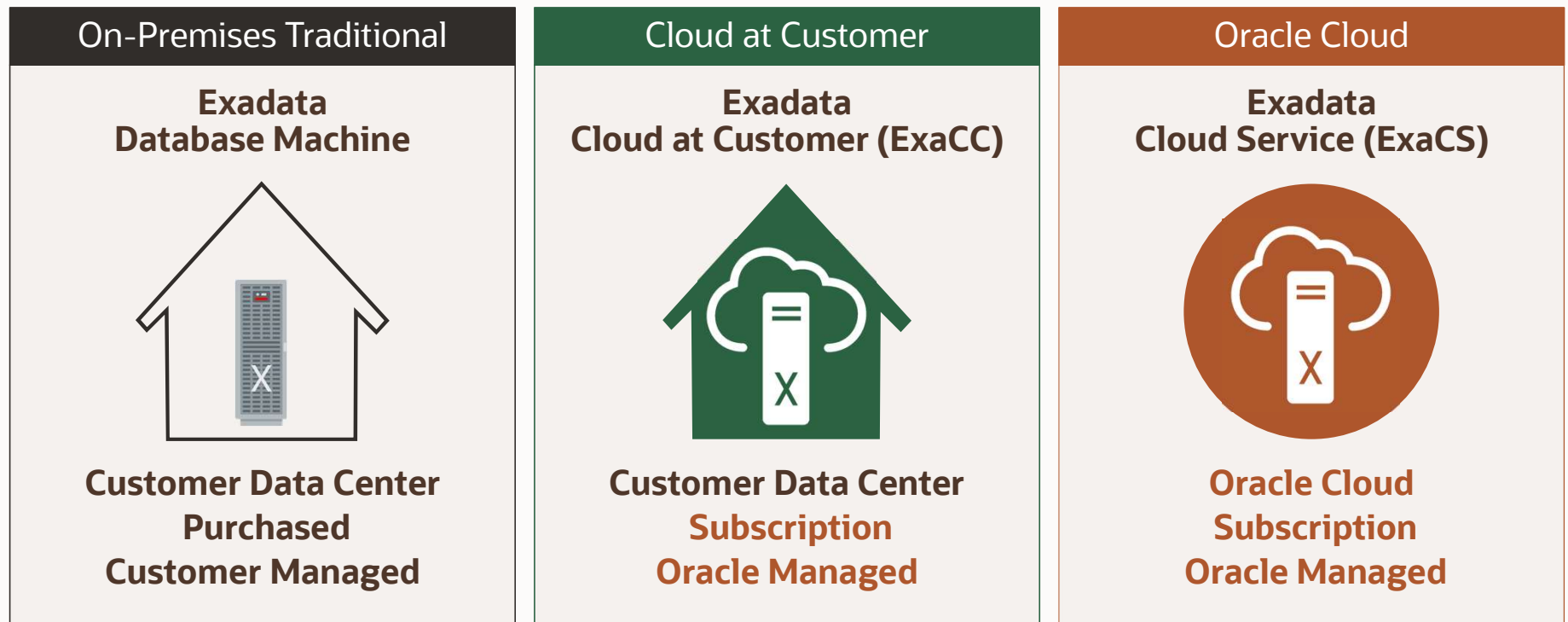
ExaCS & ExaCC | Management Model

Data/Schema	
Databases	**Customer**
VMs (DomU)	
Hypervisor	
Exadata DB Servers	
Network Fabric	**Oracle**
Exadata Storage Servers	
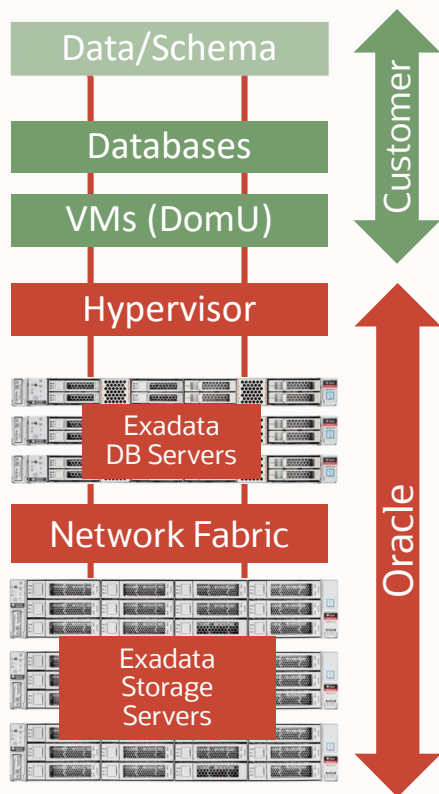
Customer owns, manages, and controls

- VMs and Databases
- Automation for create, delete, patch, backup, scale up/down, etc.
- Runs all supported Oracle Database versions
- Controls access to VMs
- Install and manage additional software on VMs if needed
- No Oracle access to VMs and the databases

Oracle owns, manages, and controls

- Infrastructure, network, hypervisor, physical database and storage servers
- Patching, security scans, security updates
- Monitoring and maintenance
- No customer access or control, <u>Oracle owns all issues</u>

Cloud Automation

On Premises

Oracle Cloud / C@C

Automatic backups
Encryption by default

Provisioning
Patching
Upgrade
Cloning
CPU/Storage Scaling
Restore
Build HA (RAC)
Build DR (Data Guard)
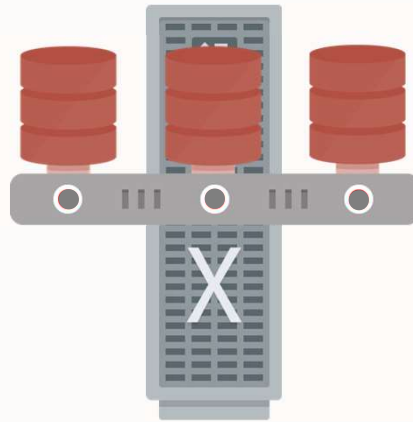
- Same on-premise architecture and software
- Automation and flexibility of Oracle Cloud

ExaCS X8-M | Elastic Scaling

Compute Scaling

OLTP

OLTP and Warehouse

Consolidate up to Thousands of Databases

Add Compute

Starter Configuration

Petabyte Data Warehouse

Add Storage

Storage Scaling
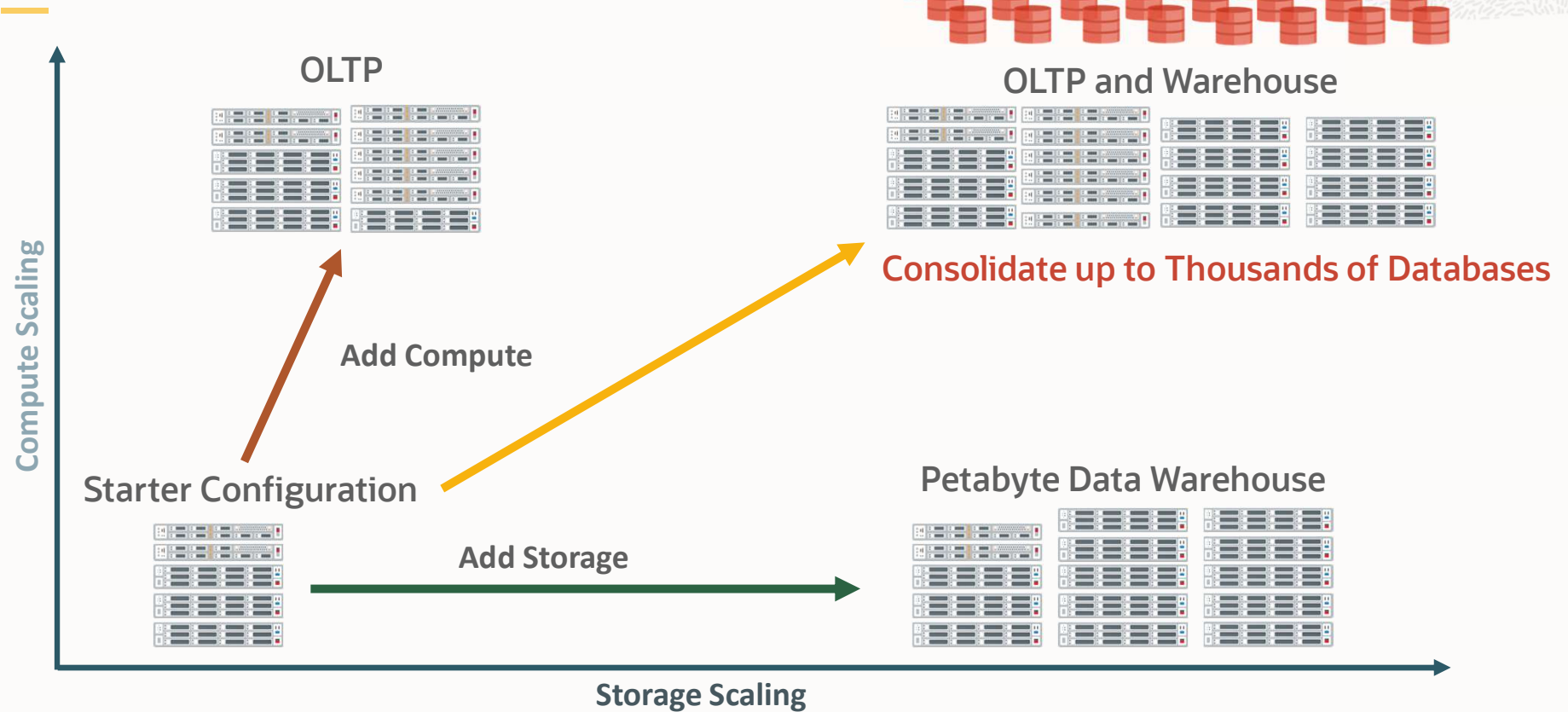
CPU Scale Up/Down

Configured CPUs

Unused CPUs

CPU Usage

Enabled OCPUs

CPU Usage
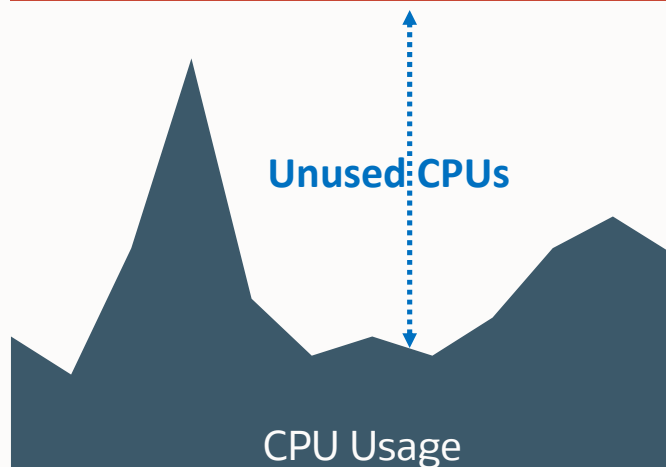
On-Premises - Static

Purchase CPUs and software licenses for highest projected peak load
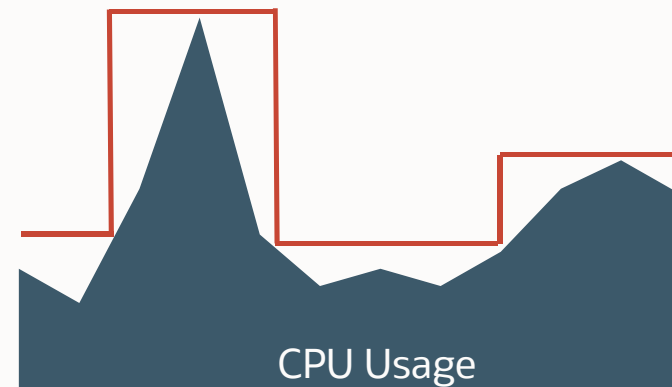
Cloud - Elastic

Adjust enabled OCPUs to match actual load via APIs and web UI - OCPUs are charged per second

ExaCS & ExaCC | Options & Licensing

EE - License Included

- Includes all Oracle Database Options and Management Packs
- Includes all software support
- 1,20€ OCPU/h

RAC

Active Data Guard

Partitioning

Multi-tenant

Advanced Compression

in-Memory DB

Plus all other options and management packs.
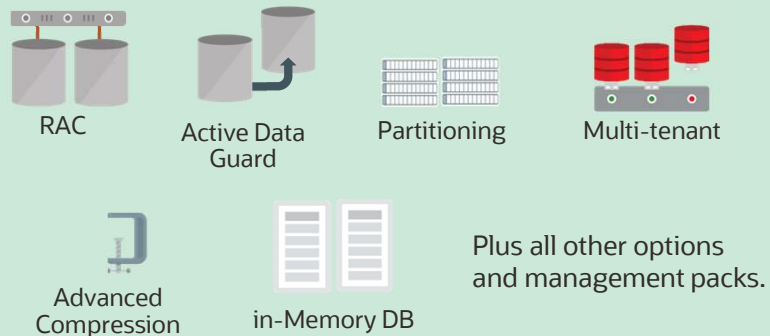
EE - Bring Your Own License (BYOL)

- Use only options you have licensed
- Software support paid separately
- 1 on-premises license = 2 OCPUs
- 0,29€ OCPU/h

Options included with BYOL
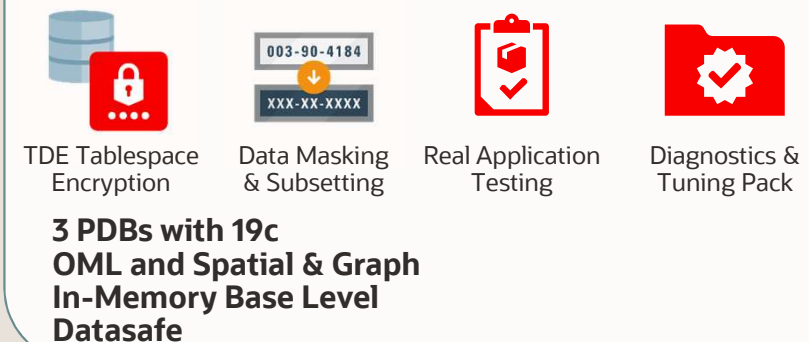
TDE Tablespace Encryption

003-90-4184
XXX-XX-XXXX
Data Masking & Subsetting

Real Application Testing

Diagnostics & Tuning Pack

3 PDBs with 19c
OML and Spatial & Graph
In-Memory Base Level
Datasafe

| OCI as Virtual Data Center | Exadata Cloud Services | Hybrid Disaster Recovery | Cost Calculation | Network on Demand |

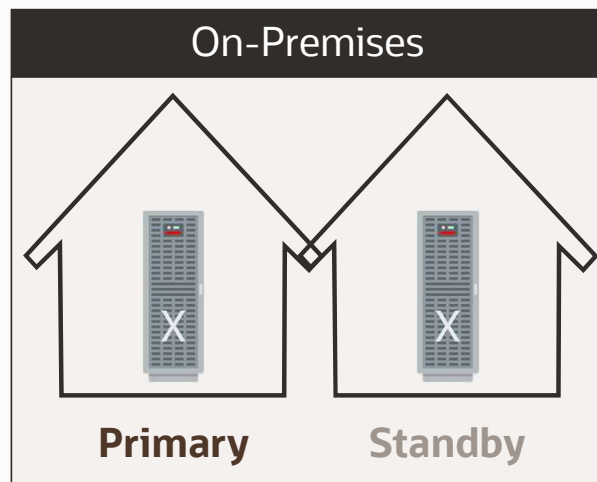# Enterprises often don't have good off-site DR

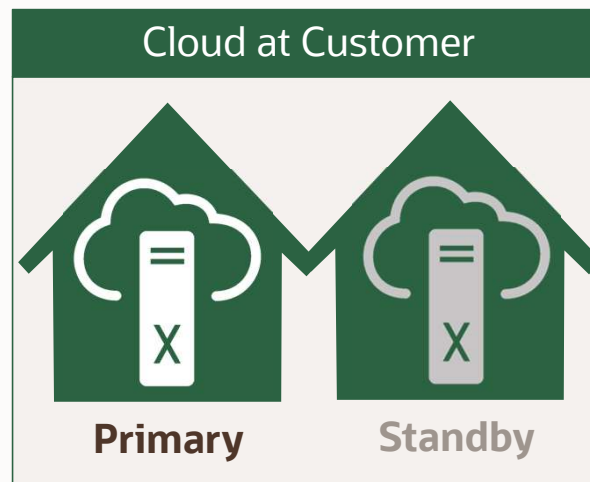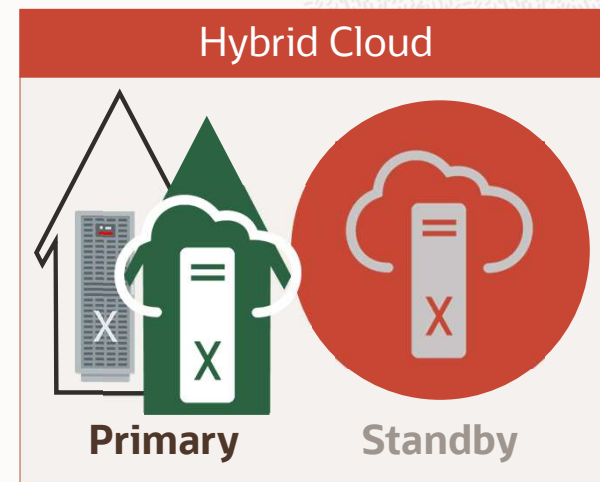| Second Datacenter needed | Long project / Low Priority | Too Expensive |

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$$$

DR Options

On-Premises	Cloud at Customer	Hybrid Cloud
Primary Standby	**Primary** Standby	**Primary** Standby
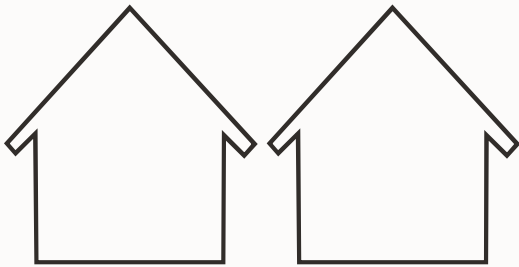
On-Premises
- Purchased
- Customer Managed
- Fixed Shapes

Cloud at Customer
- Subscription
- Oracle Managed
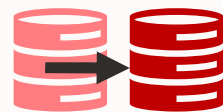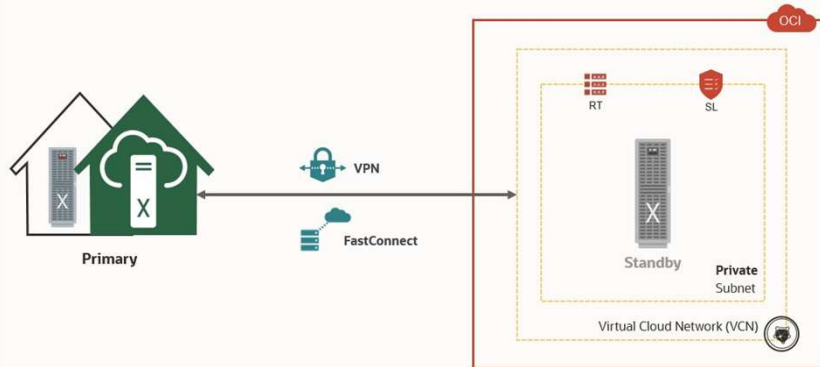- Fixed Shapes
- Min. usage: 48 Months
- Activation Fee ($30k)

Hybrid Cloud
- Subscription
- Oracle Managed
- Flexible Shapes
- Min. usage: 48h
- No Activation Fee

Isolation | Private Cloud

Primary

VPN

FastConnect

OCI

RT

SL

Standby

Private Subnet

Virtual Cloud Network (VCN)

Hybrid Cloud | Use Cases

Exadata for 48h

🔥 **Disaster Recovery**

OCI

RT   SL

Standby

Private Subnet

Virtual Cloud Network (VCN)

Primary

VPN

FastConnect
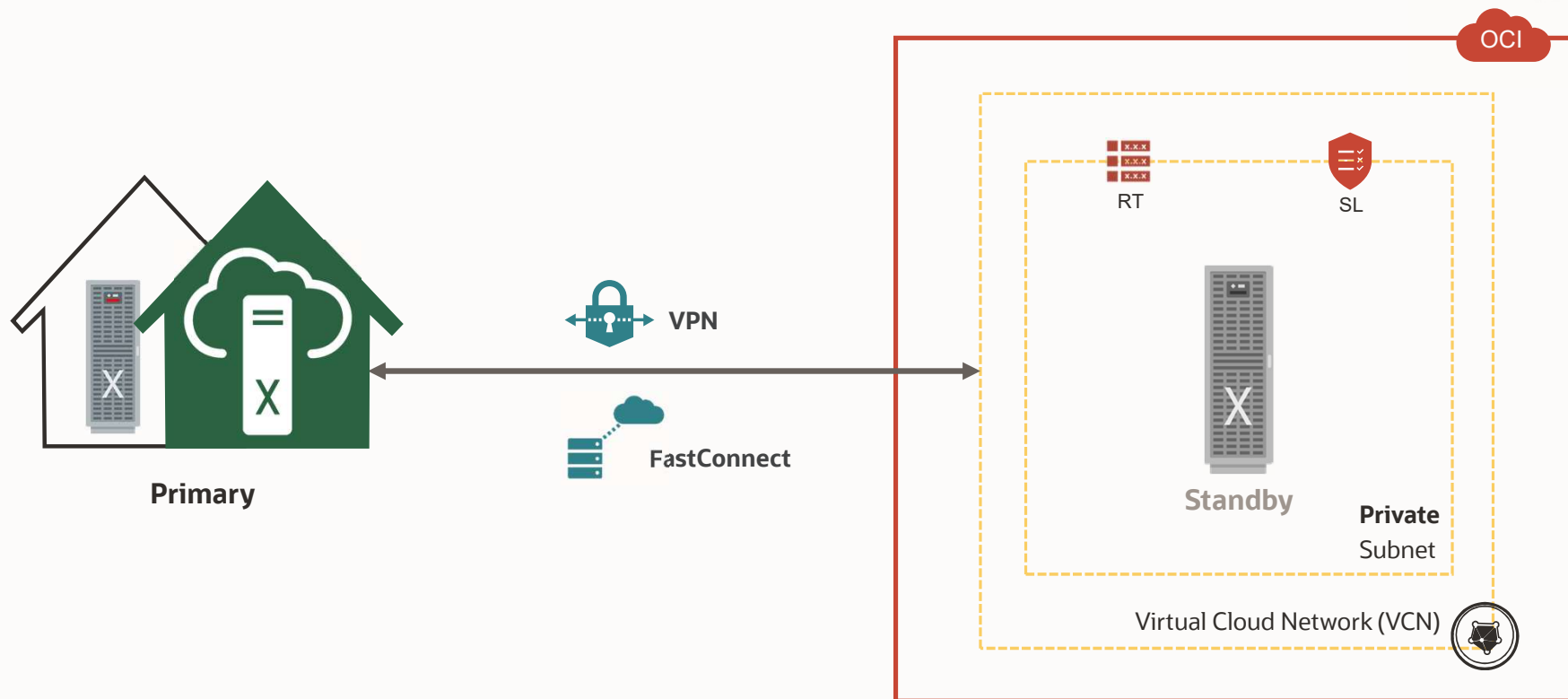
Backup

Test/Dev

Standby-First Patching
Database Rolling Upgrades

Reporting

Real-Time Queries

Build DR | Zero Downtime Migration (ZDM)

Zero Downtime Migration
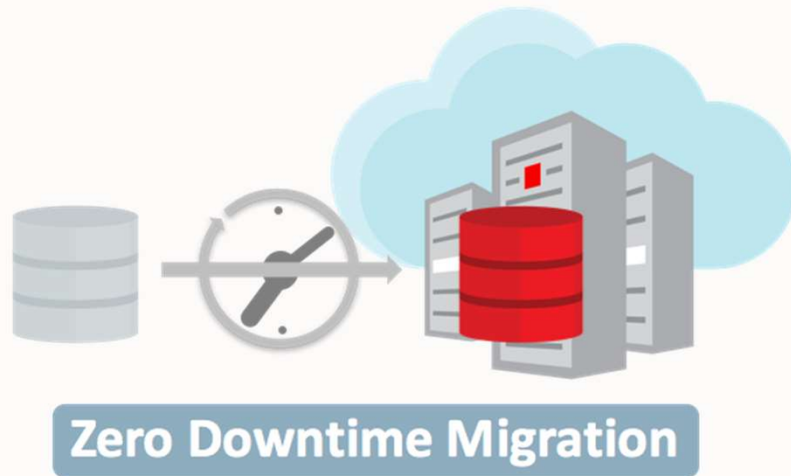
Single Button Approach

MAA Compliant

Extensive Pre/Post-checks

Customizable Workflow

For Free

oracle.com/goto/zdm

Easy and Cost Effective Hybrid Cloud

Cloud as Second Datacenter	Simplified Management	Lower Cost
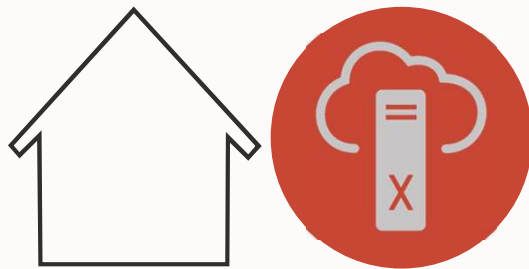
Immediate Provisioning
Elastic Configuration
Test & Dev environments

Automated Set Up
Decrease Admin Tasks
Increase Data Security

Reduce CapEx
Only OpEx in the Cloud
Bring Your Own License

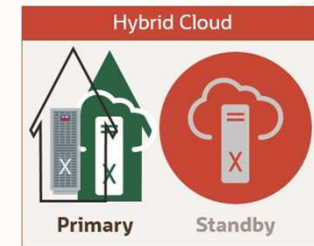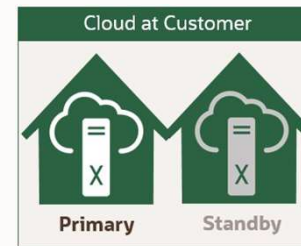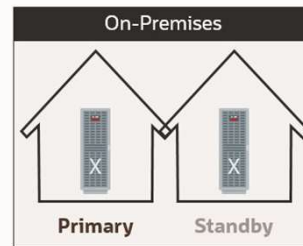| OCI as Virtual Data Center | Exadata Cloud Services | Hybrid Disaster Recovery | Cost Calculation | Network on Demand |

Pricing Example | Assumptions

- Database Disaster Recovery (Application Disaster Recovery not considered here)
- Term period over 4 years
- Hardware & Software
    - Primary: Exadata ¼ Rack, 80 cores activated
    - Standby: Exadata ¼ Rack, 8 cores activated
    - Role switch: 5 days/year
    - DB Options on-premises: RAC, MT, ASO, Diagnostic & Tuning Pack
    - Discount Included
- Network
    - Two connections for HA
    - On-premises: data center 1 in FRA, data center 2 is e-shelter
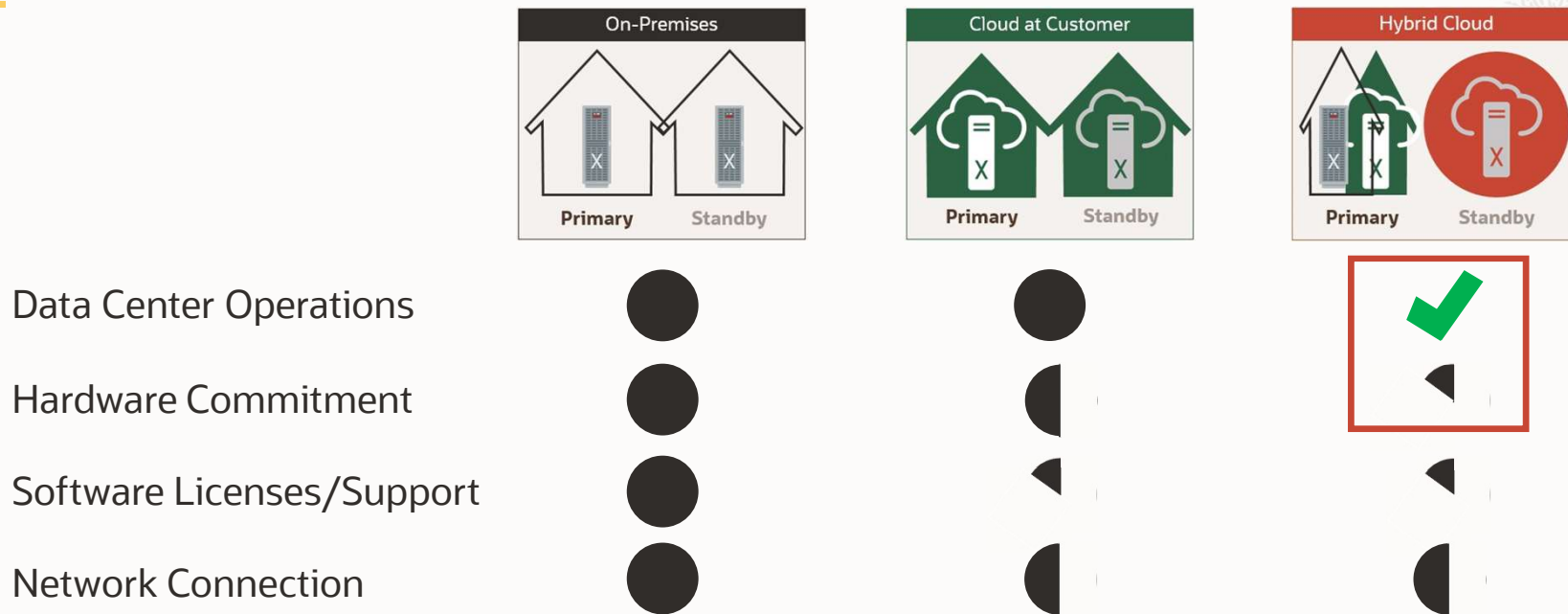   - Hybrid: data center 1 in FRA, data center 2 is OCI FRA

Pricing Example

	On-Premises	Cloud at Customer	Hybrid Cloud
	Primary — Standby	Primary — Standby	Primary — Standby
Data Center Facilities	27,776 €	27,776 €	Included
Operations	82,350 €	55,732 €	17,745 €
Exadata HW + Storage SW	414,435 €	411,099 €	456,816 €
Exadata Support	61,705 €	Included	Included
Database Licenses (EE)	342,000 €	380,092 €	380,092 €
Database Options	489,600 €	Included (All)	Included (All)
Database Oracle Support	731,808 €	Included	Included
Network Connections	199,000 €	130,652 €	122,168 €
Total:	**2,348,674 €**	**1,005,351 €**	**976,822 €**
		- 57%	- 58%

Effort & Commitment

	On-Premises	Cloud at Customer	Hybrid Cloud
	Primary / Standby	Primary / Standby	Primary / Standby
Data Center Operations	●	●	✔
Hardware Commitment	●	◐	◢
Software Licenses/Support	●	◖	◢
Network Connection	●	◖	◖

Further Reading

Hybrid Data Guard to Exadata Cloud Services (Jul. 2019)
https://www.oracle.com/technetwork/database/availability/hybrid-data-guard-to-exaoci-5600751.pdf

Disaster Recovery using Exadata Cloud (Mar. 2020)
https://www.oracle.com/a/tech/docs/hybrid-data-guard-to-exaoci-update-gen2-exacc-exacs.pdf

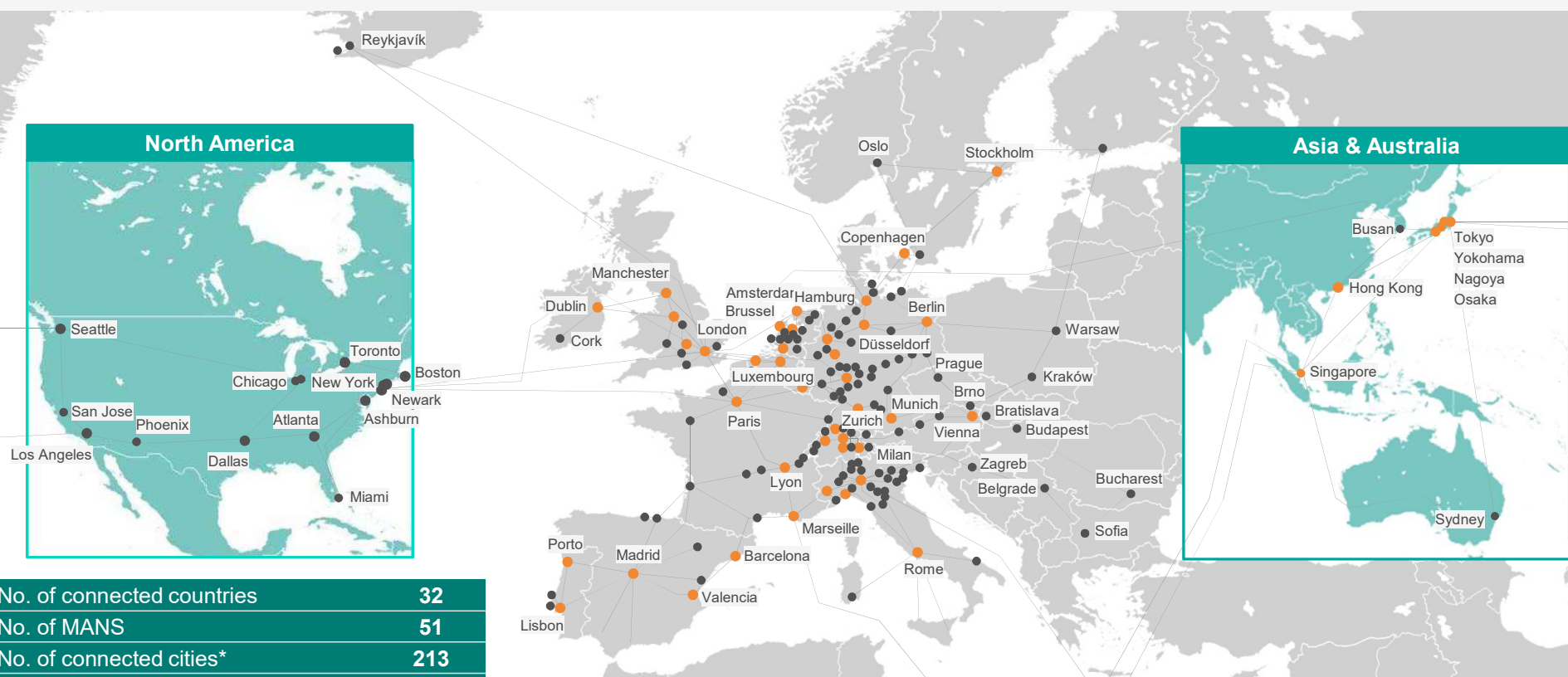| OCI as Virtual Data Center	Exadata Cloud Services	Hybrid Disaster Recovery	Cost Calculation	Network on Demand

Connectivity to Oracle Cloud and Beyond

Infrastructure Matters

Colt IQ Network – The Global Intelligent Network

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North America

Seattle, San Jose, Los Angeles, Phoenix, Chicago, Dallas, Atlanta, Toronto, New York, Newark, Ashburn, Boston, Miami

Asia & Australia

Busan, Tokyo, Yokohama, Nagoya, Osaka, Hong Kong, Singapore, Sydney

Reykjavík, Oslo, Stockholm, Copenhagen, Manchester, Dublin, Cork, Amsterdam, Brussel, Hamburg, Berlin, Warsaw, London, Düsseldorf, Prague, Kraków, Luxembourg, Brno, Bratislava, Munich, Vienna, Budapest, Paris, Zurich, Milan, Zagreb, Bucharest, Belgrade, Lyon, Marseille, Porto, Madrid, Barcelona, Rome, Sofia, Valencia, Lisbon

No. of connected countries	32
No. of MANS	51
No. of connected cities*	213
No. of connected data centres	900k+
No. of connected buildings	29k+
No. of connected cloud PoP's	180+
No. of delivered circuits to public cloud	1500+

The Colt IQ Network is a 100Gbps enabled intelligent network distributed to 900+ data centres globally and is **optimised for SDN, NFV and cloud services**

Powered by Colt IQ Network

KEY

- ● Metropolitan Area Network
- ● Colt connected city
- — Operational network managed end-to-end

Benefits of dedicated cloud connectivity to oracle cloud infrastructure

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*Customers want a more secure and reliable cloud networking experience
- the public internet does not always provide this*

Top CIO Priorities

SECURITY — With Enterprises shifting their core infrastructure and services to Cloud, security has become #1 priority

LATENCY — Deterministic latency is important for mission critical services that Enterprises are moving to Cloud

THROUGHPUT — High throughput is another key requirement that helps Customers get the best out of their Cloud platform
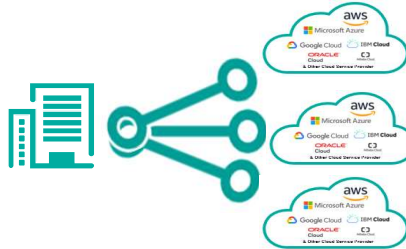
RELIABILITY — Reliability of private connectivity services is an obvious choice for most customers looking to get the best out of their Cloud platform
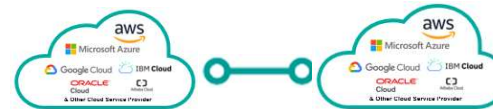
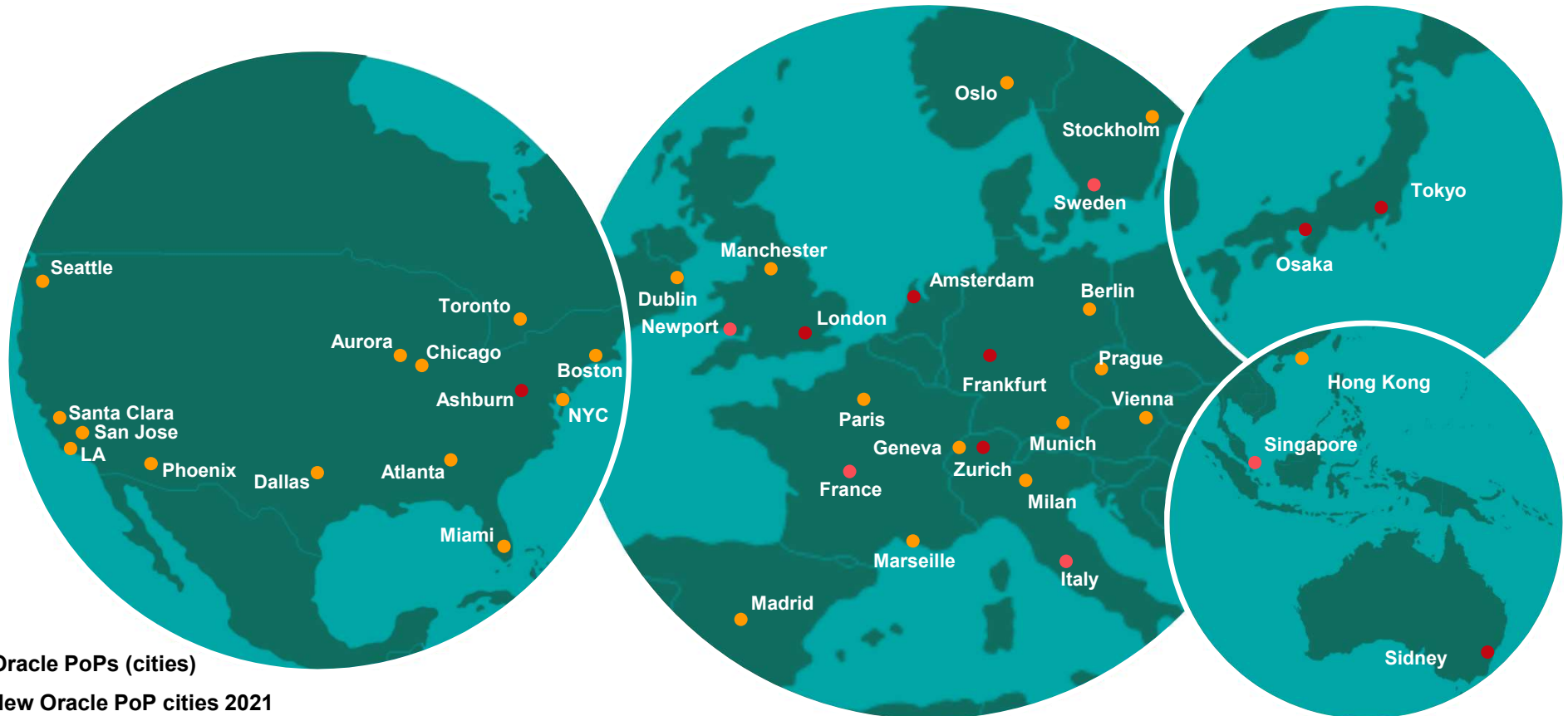**On-Premise to Cloud**

On-Premise to Multi-Cloud

Cloud - Cloud

Multi site – Multi-Cloud

Overview – Cloud Provider Network Access Cities (180+ connected Cloud PoP's worldwide)

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- ● Oracle PoPs (cities)
- ● New Oracle PoP cities 2021

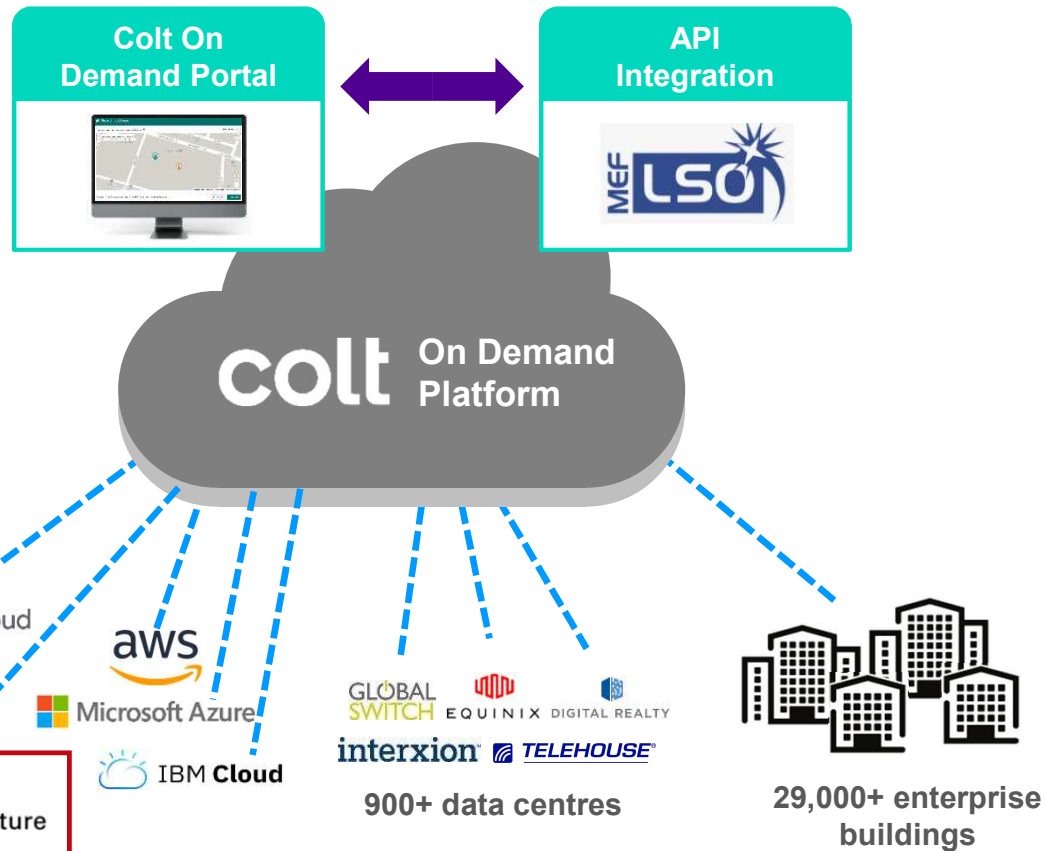| aws	Microsoft Azure	Google Cloud	IBM Cloud	ORACLE Cloud	salesforce	SAP	vmware	Alibaba Cloud
45 PoP's	29 PoP's	45 PoP's	41 PoP's	13 PoP's	2 PoP's	2 PoP's	3 PoP's	7 PoPs

Colt On Demand for Oracle Cloud Infrastructure

A Cloud-like, Networking Experience

Colt On Demand for OCI – delivering a cloud-like, networking experience

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Colt On Demand Portal ⟷ API Integration

MEF LSO

colt On Demand Platform

Google Cloud

aws

Microsoft Azure

IBM Cloud

ORACLE
Cloud Infrastructure

GLOBAL SWITCH EQUINIX DIGITAL REALTY

interxion TELEHOUSE

900+ data centres

29,000+ enterprise buildings

On Demand Services

For Cloud Connectivity

Key service features

- Connectivity from Data Centre & Enterprise buildings into the **public cloud**

- **API** enabled **hosted port-**connectivity and **dedicated port connectivity** to the cloud

- Available for **Oracle Cloud Infrastructure via OCI Fast Connect**

Why the right connectivity partner matters

21,000X

Faster Provisioning of bandwidth when you need it

12,000X

Faster for Flexing bandwidth to meet your needs

75%+

Cost savings compared to standard network architectures

Optimised CX

For a partnership you can trust in

Optimised Value

Reduced Time to Value (TtV) delivered across the organisation

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Want to learn more about Colt Cloud services? Click on the links below.

Try it out: Request an Oracle & Colt Proof of Concept (PoC)
Connect to OCI: Colt Dedicated Cloud Access & On Demand
Explore: Cloud connectivity solutions

Cloud – What you need to know
Guide: The definitive guide to NetOps for cloud migration
Report: Cloud migration trends, challenges & opportunities

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Q & A

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