ORACLE

Cloud Infrastructure to Support Normative Controlled Data Sharing

Oracle Cloud platform for research and innovation

Marc Ordelman
Cloud Technologist
Oracle

Bas Oudejans
Cloud Representative
Oracle

DL4LD Data Sharing

Partner of **DL4LD**

Data sharing in an open environment within business eco-system

Introducing **Oracle**

We are provider of On-Premises and Cloud solutions:

- SaaS
- Technology (IaaS / PaaS)

Focus of this presentation

- Oracle Cloud Technology

ORACLE
Cloud Infrastructure

Aspirational themes

Data Sharing platform requirements

EFFICIENCY

- Modernise IT infrastructure
- Improve & transform processes
- Improve resilience, performance & service levels

DIGITAL EXPERIENCE

- Modernise & digitalise services
- Speed & agility to innovate
- Improve citizen's / user experience

DATA DRIVEN INTELLIGENCE

- Break data siloes
- From insight to prediction
- Data democratisation

DATA SECURITY, PRIVACY & COMPLIANCE

- Cyber-security threats
- Data security, residency & sovereignty
- Legal considerations

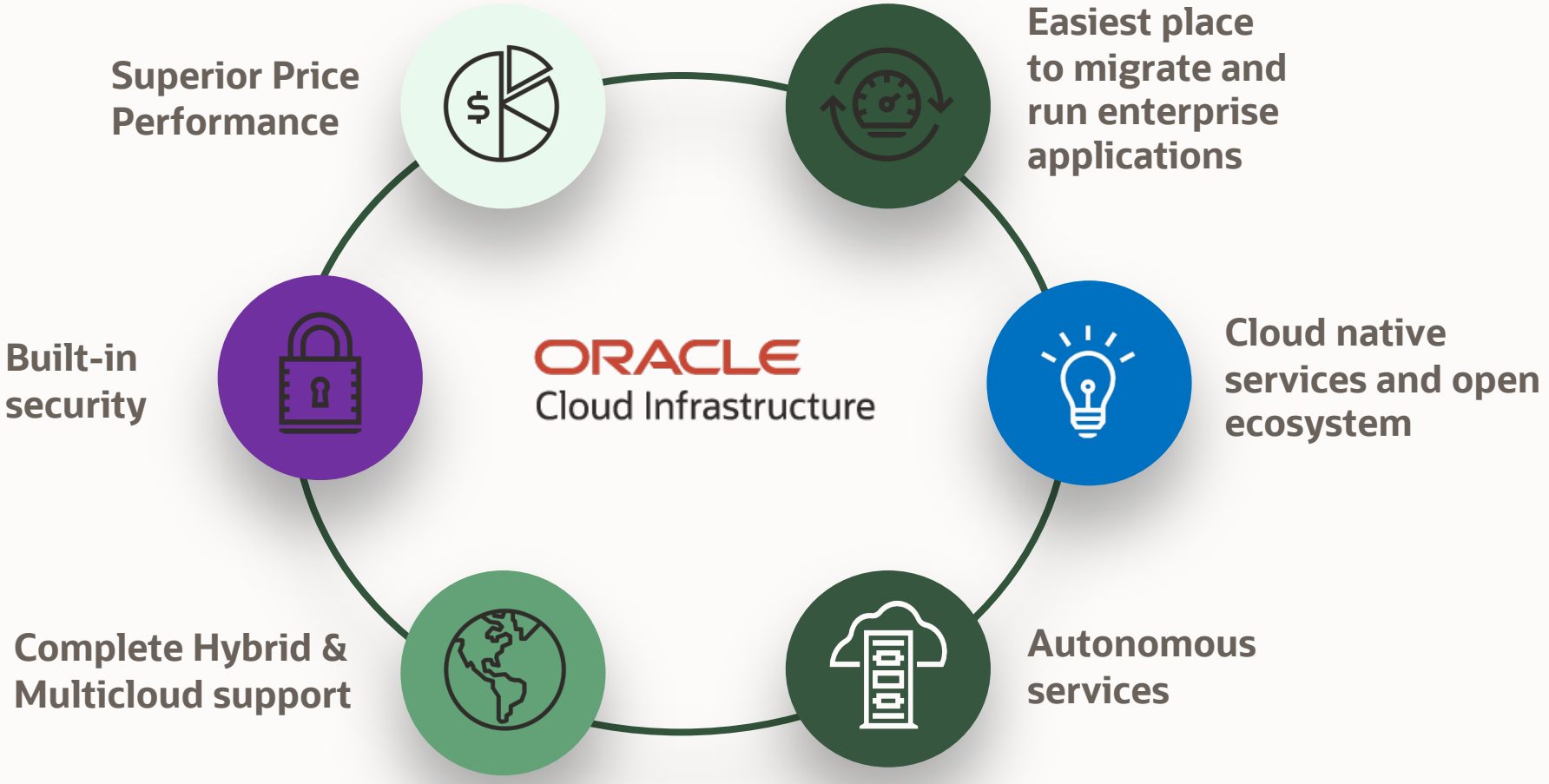
Cost Effectiveness

- IT investments & TCO
- Technology debt reduction
- IT operation automation

Sustainability

Oracle Cloud Infrastructure

Built for all your workloads



We built our cloud from the ground up to break the rules

11 years after the first generation of cloud, we started with a clean sheet

Off-box virtualization

The way we manage OCI is entirely separate from your resources, maximizing isolation, performance, and security

Nonblocking networks, minimal charges

We optimized our networks so you get guaranteed bandwidth between your resources, with 90% lower costs to access data and 80% lower costs to serve data

Maximum computing density per MW

We pack over 230,000 cores into each megawatt and can deliver an entire cloud region in only 12 racks

Flex infrastructure

You can choose exactly the amount of cores, memory, and storage performance you need, and pay for exactly that, minimizing waste

Simple, predictable pricing

Our pricing is simple to understand, 50-90% lower than other hyperscalers, and consistent worldwide, so you get predictable savings with no surprises

OCI has all the services you need to build, run, and scale

Infrastructure, platform, and SaaS in one cloud

Oracle Applications
Industry | ERP | EPM | SCM | HCM | ACX

Custom Applications
Polyglot | Traditional | Cloud Native

ISV Applications
Hundreds to choose from


Developer Services


Containers and Functions


Integration


Analytics and BI


Machine Learning and AI


Data Lake


Compute


Storage


Networking


Oracle Databases


Open Source Databases


Operating Systems, Native VMware

Security | Observability | Compliance | Messaging | Governance

OCI's Distributed Cloud

Public Cloud | Hybrid Cloud: Cloud@Customer | Dedicated Cloud | Multicloud: Azure, AWS

100+
platform services to support your workloads

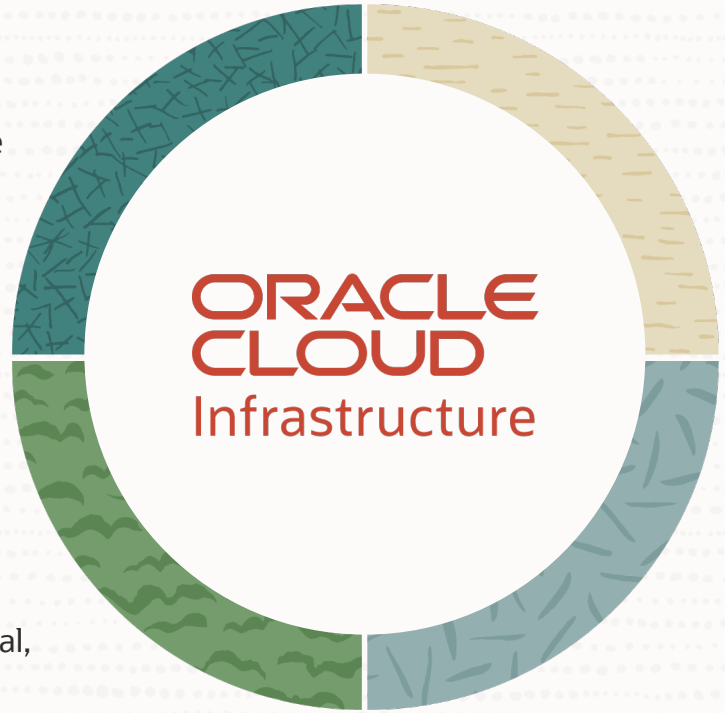
10,000
OCI developers

3,000
field cloud engineers

OCI's distributed cloud offers exceptional flexibility and choice

Multicloud

Our products work with your other providers, including Oracle Database Service for Azure, Oracle Interconnect for Azure, and Oracle MySQL Heatwave on AWS



Hybrid cloud

We bring cloud services to you, including Oracle Exadata Cloud@Customer, Oracle Roving Edge Infrastructure, OCI Observability and Management, and Oracle Database

Public cloud

Access cloud services in 41+ global locations including Commercial, US Government, UK Government, US National Security Regions, and European Sovereign (2023)

Dedicated cloud

We build a cloud just for you, with all 100+ OCI services running in customer data centers, including OCI Dedicated Region and Oracle Alloy

Deploy in our public, government, or sovereign regions

$16B+
Cloud Applications
Cloud Infrastructure
run rate

57%
cloud infrastructure
consumption growth

42
cloud regions

$8.2B
CapEx in the
last 12 months

100% renewable energy by 2025

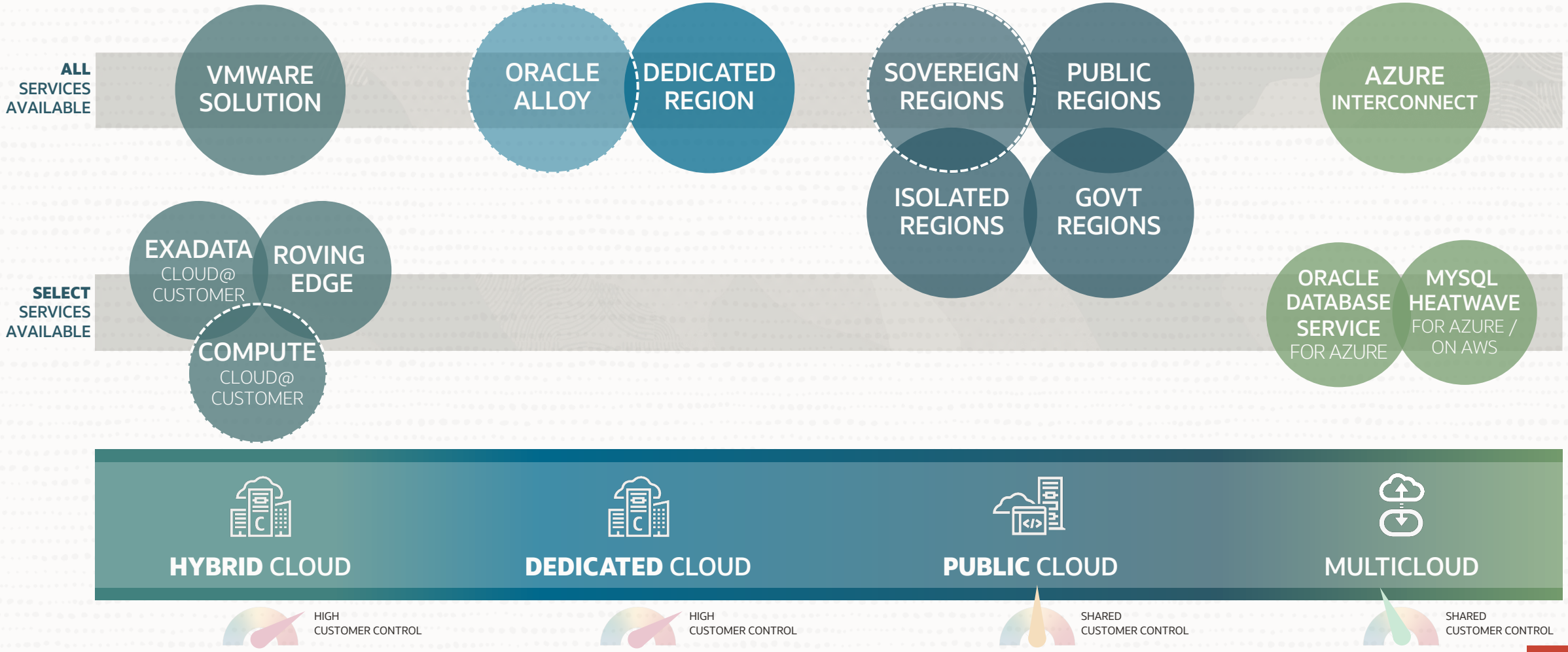
EU sovereignty landscape

Regulations are guiding sovereignty requirements

The European Union technology landscape is experiencing significant change as it confronts citizens' demands and political pressure for data protection, localization, and sovereignty.

- European regulators are requiring that technology providers offer protections from the reach of foreign law enforcement.
- Privacy laws such as EU General Data Protection Regulation (GDPR) and related regulatory developments are increasing the need for data and sovereignty solutions.
- Commercial and government industries need cloud services designed for, located in, and operated from within the EU.

Or deploy OCI cloud services exactly where you need them



Use the technologies, tools, and skills you already know

Managed services based on upstream open source

MANAGED CONTAINERS

CONTAINERS

INFRASTRUCTURE AS CODE

DATABASE

BIG DATA

ANALYTICS ENGINE

DATA COLLECTION

EVENT DELIVERY

STREAMING

SERVERLESS PLATFORM

SEARCH AND ANALYTICS

INTERFACE DEFINITION

Run the technologies you already use


Red Hat
Oracle Linux
Ubuntu
CentOS
Debian
SUSE
LINUX OS

WINDOWS SERVER OS

VIRTUAL ENVIRONMENT

CACHING DATABASE


DATABASE

DATABASE

PROGRAMMING LANGUAGE

NOSQL DATABASE

APPLICATION FRAMEWORK

BLOCKCHAIN


APPLICATION FRAMEWORK

MACHINE LEARNING FRAMEWORK

Native integrations with the dev tools you're used to

DEVOPS


AUTOMATION


DEV-SEC-OPS

AUTOMATION

CONTAINER MANAGEMENT

PACKAGE MANAGEMENT

INFRASTRUCTURE AS CODE

TEAM COLLABORATION


RISK MANAGEMENT

Communities we contribute to

OCI is recognized as a visionary

2022 Gartner® Magic Quadrant,™ Cloud infrastructure and platform services

*"Oracle continues an impressive year-over-year pace of **feature velocity** that brings it closer to the market leaders in terms of hyperscale cloud capabilities."*

*"If the pace continues, **Oracle will meet or exceed** some of the providers in the Leaders quadrant in terms of capabilities within the foreseeable future."*

https://blogs.oracle.com/cloud-infrastructure/post/oci-visionary-2022-gartner-magic-quadrant

Gartner, Magic Quadrant for CIPS
Published: October 28, 2022
Analysts: Raj Bala, Dennis Smith, Kevin Ji, David Wright, Miguel Angel Borrega

Elevate your efficiency & productivity

Achieve more with less effort

Modernize at your pace with unique infrastructure options

Bare Metal, VMware Solution

On-premises performance and control for demanding workloads

Quickest migration path for existing applications

Exadata Cloud@Customer, Database Service

Optimized instances for the Oracle Database, including Autonomous DB

Upgrade and consolidate multiple Oracle Databases

Flex Virtual Machine

Flexible and scalable compute resources at enterprise scale

Adapt to dynamic usage patterns with familiar environments

Containers, Kubernetes

Managed container instances or Kubernetes orchestration

Focus on the essentials of a scalable application

Functions

Focus on the code, not the infrastructure

No hardware or compute resources to manage

Lift-and-shift → Upgrade → Cloud powered → Cloud native → Serverless

Use familiar technologies

- Retain your investment in skills and technologies
- Work in a familiar environment
- Get up to speed on OCI fast
- Save time and effort
- Reduce risk

Red Hat
Ubuntu
CentOS
Oracle
Debian
SUSE

Linux
OPERATING SYSTEM

Microsoft

Windows
OPERATING SYSTEM

vmware

VMware
VIRTUAL ENVIRONMENT

MySQL

MySQL
DATABASE

redis

Redis
CACHING DATABASE

mongoDB.

MongoDB
DATABASE

Spring Boot
APPLICATION FRAMEWORK

PostgreSQL
DATABASE

OpenJDK
GraalVM

OpenJDK & GraalVM
JAVA + HIGH PERFORMANCE JVM

helidon.io

Helidon.io
APPLICATION FRAMEWORK

PyTorch

PyTorch
MACHINE LEARNING FRAMEWORK

HYPERLEDGER

Hyperledger
BLOCKCHAIN

Use your existing tools

Retain your investment in skills and technologies

Continue using your existing tools and processes

Integrate OCI into your environment quickly

Save time and effort

Reduce risk

GitHub
VERSION CONTROL & DEVOPS

Jenkins
AUTOMATION

GitLab
DEV-SEC-OPS PLATFORM

Java
PROGRAMMING ENVIRONMENT

Kubernetes
CONTAINER MANAGEMENT

Terraform
INFRASTRUCTURE AS CODE

Atlassian / JIRA
TEAM COLLABORATION

Coherence
RELIABLE APP PLATFORM

Ansible
AUTOMATION

ProcessBolt
RISK MANAGEMENT

Helm
PACKAGE MANAGEMENT

Open source
MANY PACKAGES AND TOOLS

Lower product pricing across the stack

On-demand pricing

			Oracle (OCI)	Amazon (AWS)	Microsoft Azure	Google (GCP)
COMPUTE	**Virtual Machine Instance** [1]	(AMD, 4 vCPU, 16 GB RAM, Monthly)	$54	+134%	+132%	+157%
	DenseIO Virtual Machine Instances	($/OCPU/Hour)	$0.025	+54%	+70%	+46%
	Bare Metal Standard	($/OCPU/Hour)	$0.064	+50%	N/A [2]	N/A [3]
	Kubernetes Cluster	(100 vCPU, 750 GB RAM, Monthly)	$1,734	+142%	+142%	+119%
STORAGE	**Block Storage**	(1x1TB, 15K IOPS, 125 MB/s, Monthly)	$522	3×	3×	3×
	Object Storage [4]	(30K objects @ 100MB, Std/Infrq/Arch, Monthly)	$70	7×	Same	3×
NETWORK	**Public Bandwidth Transferred Out**	(50 TB, Monthly)	$340	13×	10×	10×
	Private Line Network	(100 TB Data, 1 Gbps, Monthly)	$155	14×	19×	13×
DATABASE	**MySQL Database**	(16 vCPU, 64 GB RAM, 500 GB, Monthly)	$345	3×	4×	3×

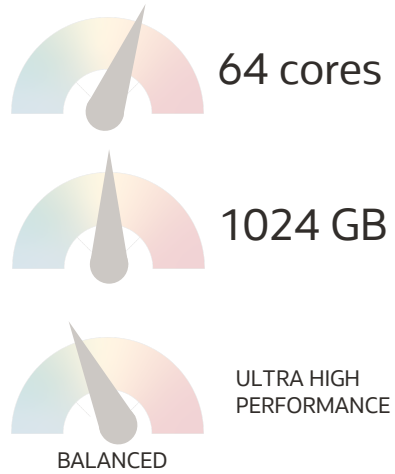
1 Comparisons performed with the eastern U.S. equivalent region.
2 Microsoft has sunset its Bare Metal server and there is no announced replacement
3 Google does not publish its bare metal server pricing
4 10K new objects into standard, 10K objects moved to infrequent, 10K objects moved to archive. 40K objects retrieved from standard. 2.5K objects retrieved from infrequent. 1K object retrieved from archive. Directory listing of all objects every 15 minutes. Auto-tiering is enabled, if available.

Green = Lowest cost
Based on published pricing as of April 9, 2023

Simple compute resource sizing and usage

Virtual Machine Flexible Sizing

1. Pick processor — intel. AMD arm
2. Select performance — 1 core … 64 cores
3. Select memory — 1 GB … 1024 GB
4. Select storage performance (optional) — LOWER COST … ULTRA HIGH PERFORMANCE; BALANCED



Burstable

Low-use virtual machines that burst with your workload

Adapt to dynamic usage patterns with familiar environments

Reduce cost for workloads that are intermittent

Reservations

Ensure compute resources are available when needed

Prepare in advance for DR and HA scenarios

Unused reservations charged at 85% of normal rate

Non-Blocking Network

OCI network designed for low-latency, high-performance

Entire OCI network designed to allow full network access for all instances (avoid “noisy neighbor” syndrome)

Included automatically with all compute resources, with performance SLA

OCI helps you get the best from all your cloud providers

Apps and Data in

Microsoft Azure

aws

Google Cloud

Apps and Data

On-premises

Oracle offers secure, low latency interconnection and interoperability

Oracle Database Service for Azure

Oracle Interconnect for Azure

OCI integration services

OCI Observability and Management

Oracle Security

Apps and Data in

ORACLE CLOUD Infrastructure

Address security and regulatory changes

Improve cybersecurity and address evolving compliance and sovereignty needs in new ways

Oracle helps you navigate uncertainty and build security

Guard

against attacks & malware

Protect your valuable data from ransomware, vulnerabilities, and cybercrime with significantly greater automation and lower risk of human error

> *We chose Oracle Cloud Infrastructure because of its security-first approach and performance. Together, we will deliver unmatched visibility and risk reduction to our global customer base.*
>
> **CYBEREASON**

Deliver

on compliance requirements

Address core compliance needs across multiple regions and industries

> *Compliance with GDPR was a very important requirement for LSSN. Oracle's security solutions, like OCI Web Application Firewall, will help us prepare for future compliance audits.*
>
> **REPUBLIC OF LIBERA**

Simplify

security across deployments

Centralize visibility and control of access to data and workloads across the distributed cloud

> *Oracle Database's on-premises and cloud security tools streamline and structure our disaster recovery capabilities for a key differentiation in the cloud native market*
>
> **THOMSON REUTERS**

Oracle offers a full stack of cybersecurity capabilities

Prevent

Block attacks and malicious traffic

Distributed Denial of Service protection
Automatic DDoS protection

Web Application Firewall
Internet-facing endpoint protection

INTERNET & EDGE

Monitor

Log, analyze, and audit activity

Cloud Guard
Security posture management

Security Zones
Security policy compliance

Threat Intelligence
Multi-source, actionable guidance

Threat Detector
Monitor for known threats

Logging
Single pane for service logs

Fusion Apps Detector
Monitor ERP and HCM apps

Vulnerability Scanning
Patch and port monitoring

Auditing
OCI API logging

MONITORING & PREVENTION

Mitigate

Isolate communications with secure and reliable networks

Virtual Cloud Network
Secure, isolated network

Security Lists
Virtual network firewall rules

Network Firewall
Advanced firewall service

Bastion
Time-limited SSH access

Dynamic Routing Gateway
Virtual router

Fast Connect
Dedicated, high-speed connection

Virtual Private Network
Secure connectivity over any network

NAT Gateway
Protected access to the internet

NETWORK

Protect

Hardware-enabled security built into the architecture

Bare Metal Servers
Servers with full customer control

Hardware Root of Trust
Protect from firmware attacks

Signed Firmware
Prevent rootkit installation

Hardened Disk Images
OS with expert security settings

Off-box Control Plane
Isolated admin of compute hardware

Off-box Network Virtualization
Encapsulated, separated traffic

Oracle Linux & Oracle Enterprise Linux
Performant, secure, enterprise Linux

COMPUTE

Encrypt

Encrypt and protect all data

Data Safe
Monitor data usage in database

Vault
Hardware security module protection

Key Management
Encryption key administration

Secrets Management
Credential and similar administration

Certificates
Validation certificate administration

STORAGE & DATABASE

Access

Ensure authentication, authorization, and accounting

Access Governance
Proactive guidance for user actions

OCI Identity and Access Management
Control access to cloud resources

Policies
User access rules

Federation
Identity provider inter-operation

IDENTITY & OPERATOR ACCESS

We manage 70+ compliance programs to support your regulatory needs

Americas

DoD DISA SRG IL5

PIPEDA [Canada]

JAB P-ATO

HIPAA

LGPD

CJIS

Canada Protected B

HITRUST CSF

NIST SP 800-171

BACEN

CCPA

NERC CIP

EMEA

GDPR [EU]

BSI C5 [Germany]

ENS [Spain]

POPIA

FINMA [Switzerland]

EBA [EU]

Cyber Essentials Plus [UK]

G-Cloud 12 [UK]

TISAX

Cloud Security Principles [UK]

CITC [Saudi Arabia]

AIDSS [UAE]

JAPAC

ABS Guide [Singapore]

RBI Guidelines [India]

FISC [Japan]

IRAP [Australia]

K-ISMS [Korea]

MeitY [India]

My Number [Japan]

NISC [Japan]

IRDAI /5/142/2017 [India]

APRA CPS 231, SPS 231, HPS 231 [Australia]

Multi-Tier Cloud Security (SS584) [Japan]

Hosting Certification Framework [Australia]

Global

SOC 1 : SOC 2 : SOC 3

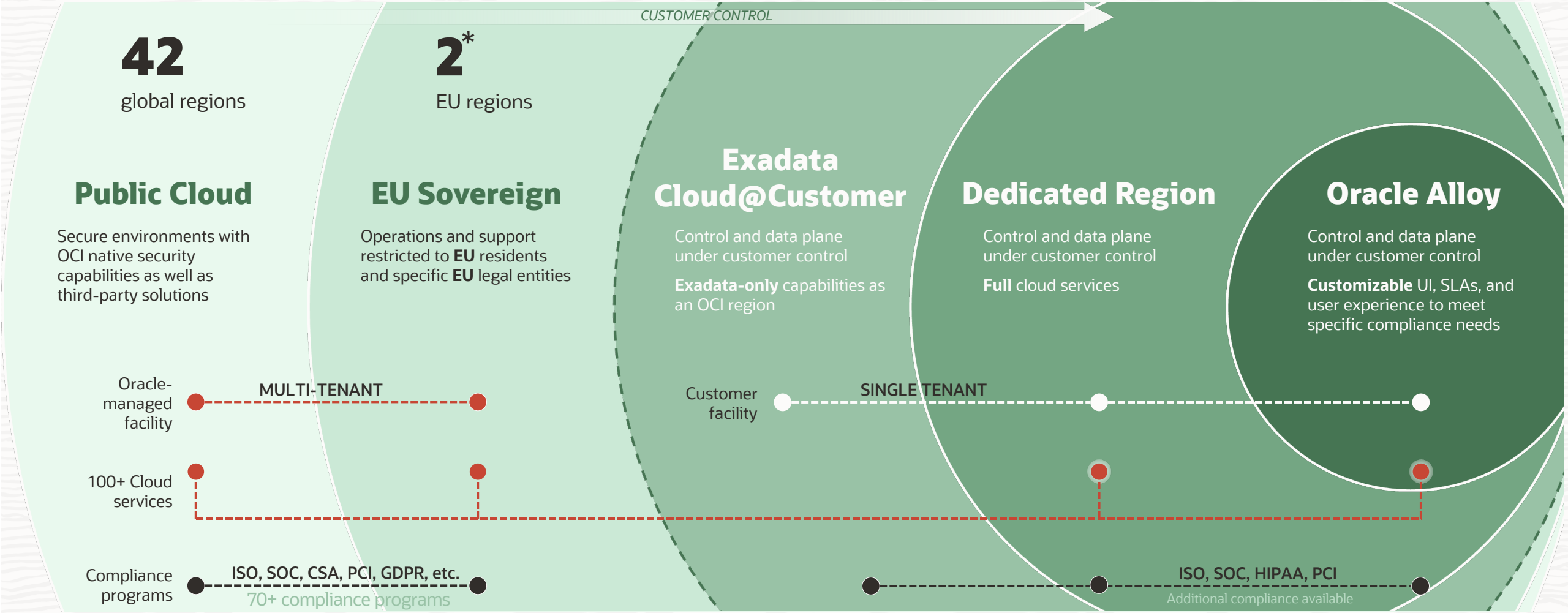
9001 : 27001 : 27017 : 27018 : 27701 : 20000-1

Level 2

Level 1

GxP

OCI's Distributed Cloud enables customer control



* Sovereign cloud regions available mid-2023

Innovate faster, bigger, bolder

Leverage AI, Machine Learning, and supercomputing power with all your data

Create new products and start new businesses faster

Launch

in days, not months

Introduce a new product or grow globally by standing up a new integration, database, application, storefront, or finance system rapidly

> *We can spin up a new business **in just a few weeks**, all without switching to a different platform. That's the beauty of Oracle Cloud.*
>
> **XEROX**

Analyze

massive data volumes

Apply analytics at scale to hundreds of data streams to gain insights

> *We have **3 million** students a month on our platform, and every user who accesses estuda.com has to see their assessment report in **real time**.*
>
> **Estuda.com**

Gain

supercomputing power

Build and test complex products, run massive simulations, and train billion parameter machine learning models without building the infrastructure

> *With the scalability and computing power of OCI and NVIDIA technology, we are training a neural network to use every software application, website, and API in existence*
>
> **ADEPT**

Deliver new products, faster, at scale

Leverage any data type


Relational

Documents

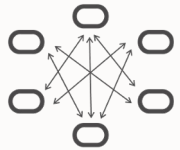

Graph

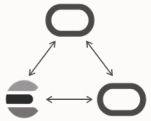

Text


Spatial

Scale your existing architecture

Many vendors


Single vendor, distributed


Fewer vendors


Centralized & converged

Extend with additional capabilities


Containers & Kubernetes


APIs


Serverless functions


Low-code development

Accelerate with AI


Machine Learning


Speech


Digital Assistant


Vision

Enhance with ready-to-go AI capabilities

Add intelligence to your applications quickly with pre-trained services

Document Understanding
Extract text and tables

Language
Perform sophisticated text analysis, including sentiment analysis and key phrase extraction

Would you like to know more?

Digital Assistant
Help users accomplish tasks in natural language conversations

Speech
Transcribe voice, create subtitling, and generate metadata

Vision
Detect and classify objects in images

Anomaly Detection
Identify undesirable events or observations in business data in real time

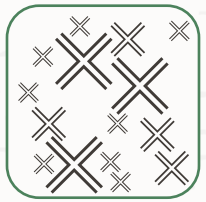
Forecast
Predict what will happen tomorrow from today's trends

Build bigger, faster AI and HPC infrastructure

Equal to or better than on-premises

Workloads that previously needed to be on-premises

Move to **OCI computer clusters or OCI Superclusters**



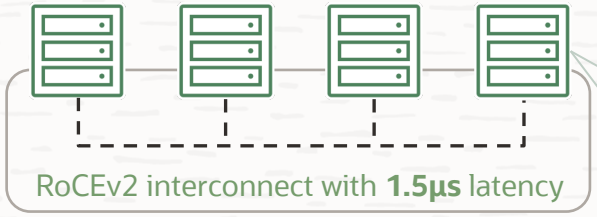
Billions of parameters
Intense AI computation

High performance file system
Rapid, parallel read & write

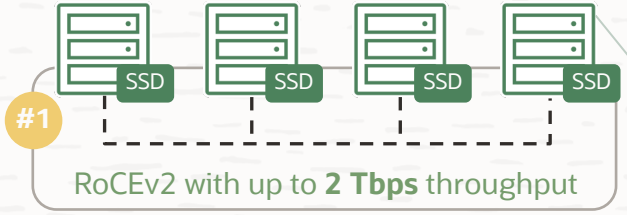
Computational fluid dynamics
Intense matrix computation

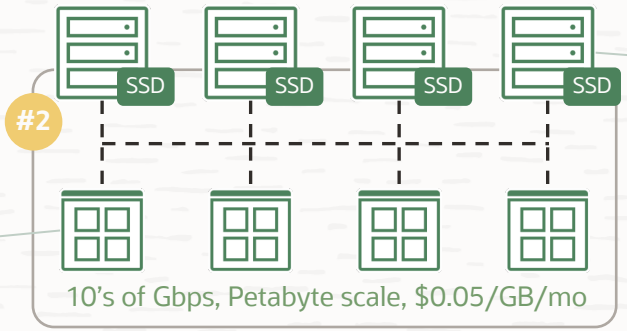
Monte Carlo Simulations
Multivariate computation and analysis

Build a high performance compute cluster
Choose between optimized CPU or accelerated GPU



Build a high performance clustered file system
WEKA, BeeGFS, Lustre, GlusterFS, or IBM Spectrum Scale





Block Storage
Low latency
Up to 32 TB *per volume*
Up to 300K IOPS *per volume*

Choose:

GPU
NVIDIA: 8x A100
AMD: 64 cores
2TB memory
1.6 Tbps RDMA
Up to 32K GPUs
NVIDIA
AMD

High Frequency CPU
Intel: 36 cores
512GB memory
100 Gbps RDMA
Up to 20K cores
intel

High Frequency CPU
Intel: 36 cores
512GB memory
100 Gbps RDMA
Up to 20K cores
Petabytes capacity
intel

SURF Research Cloud: collaboration portal for research

SURF Research Cloud is a portal for building virtual research workspaces efficiently. You can use preconfigured workspaces and datasets, or add your own. Institutions, research communities and service providers can contribute to the functionality by integrating compute and storage resources with SURF Research Cloud.

Contact us

Create reproducible research environments

As a researcher or research supporter you can create a workspace for a specific research project. In SURF Research Cloud this research environment is called a workspace. But how do you keep track of the things you have installed in the workspace? And what if you want to reuse the workspace later with some small adjustments?

Research Cloud is based on the principle of infrastructure-as-code. Research Cloud catalogue items are human readable scripts that can be versioned. When executed within Research Cloud they provision the research workspace exactly as the configuration file specifies. The specified research workspace may consist of IaaS, PaaS or SaaS resources and may contain datasets so you can rebuild your workspace at any time. Or you can choose to only reuse certain parts of the script to generate a new workspace for a new research project.

https://www.surf.nl/en/surf-research-cloud-collaboration-portal-for-research

https://servicedesk.surf.nl/wiki/display/WIKI/Research+Cloud+Documentation


ORACLE

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