ORACLE

Otsuka I.T
大塚資訊科技股份有限公司

時間	議程場次	講師
14:00~14:30	最佳化設計與COVID-19疫情的挑戰	大塚資訊-邱創宏 大塚資訊-王炳琦
14:30~15:00	甲骨文HPC/GPU平台支持CAD/CAE應用之介紹	甲骨文 – 莊復貴 首席雲端顧問

ORACLE

Otsuka I.T
大塚資訊科技股份有限公司

Oracle HPC/GPU solution for CAD/CAE

Rick Chuang
莊復貴 首席雲端顧問
Jul, 13 2021

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.

Agenda

- On-premises CAE workload 挑戰跟市場趨勢
- HPC/GPU 雲端效益
- Oracle HPC/GPU 解決方案跟性價比
- Zero Trust Architecture– 如何保護你的關鍵CAE 環境
- HPCGPU Partner Ecosystem - CAE
- Why Oracle Cloud Infrastructure?

On-premises CAE workload challenges

容量規劃

正確平衡計劃內和計劃外需求的能力

供應鏈和採購流程可能導致幾個月的延誤

現有容量無法足夠快地運行我們的工作

高建置成本

過度配置以確保突發能力可能導致超支

傳統硬體性能損失的成本。

電源、冷卻、聯網、存儲、硬體和 軟體增加了本地成本

難以優化維運

HPC 群集必須運行接近容量，以最大限度地提高投資回報率

供應不足會導致新工作、生產率的排長隊時間

封廠停電措施、空調和人員安全。

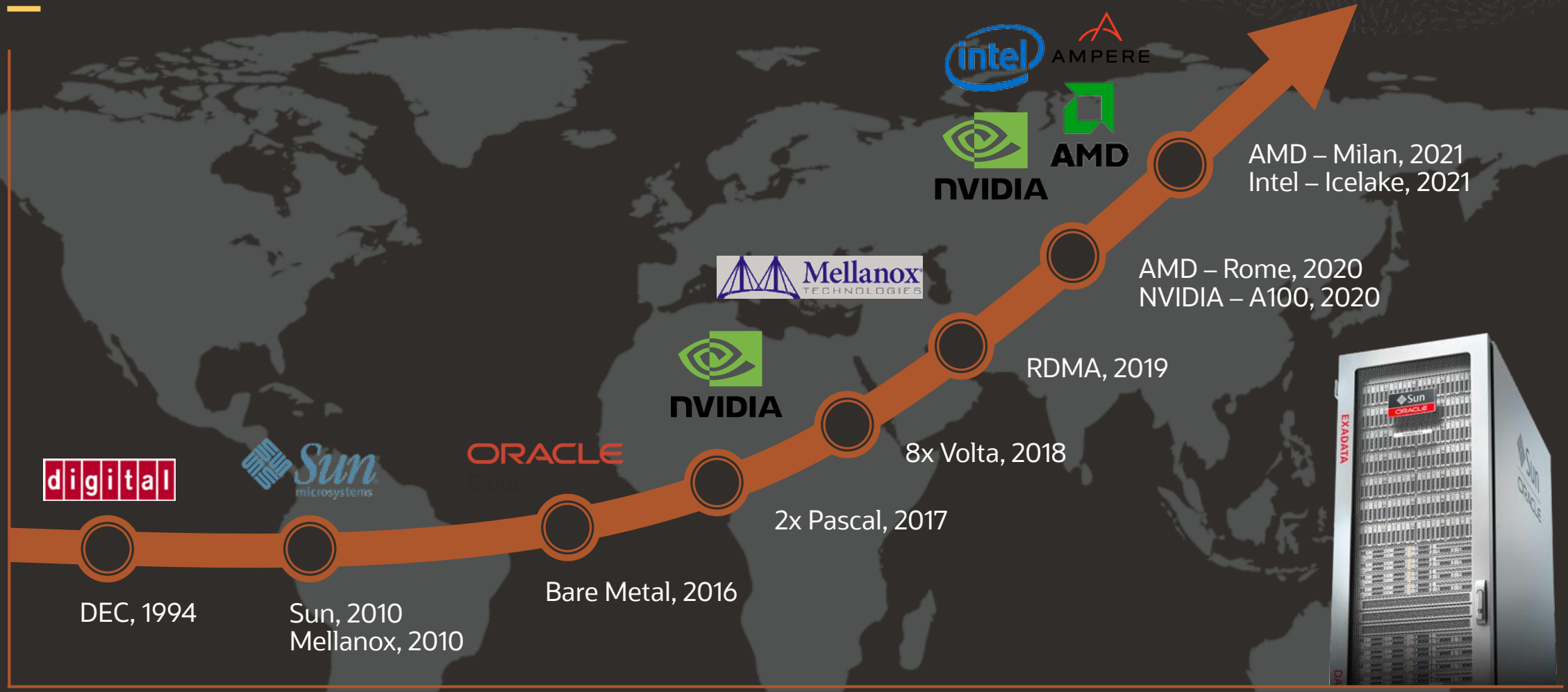
遵守安全和合規要求要求很高，失誤可能是毀滅性的

PSU 12V2 Capability Recommendations – 10th & 11th gen			
Processor TDP	Continuous Current	Peak Current	Test Result
165W	37.5A	40A	
125W	26A	34A	
65W	23A	30A	
35W	13A	16.5A	

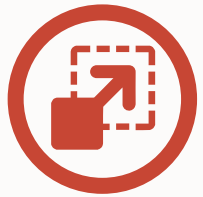
PSU 12V2 Capability Recommendations – ALD-S			
Processor TDP	Continuous Current	Peak Current	Test Result
165W	37.5A	45A	
125W	26A	39A	
65W	23A	38.5A	
35W	11A	20.5A	

Cloudflare也開始朝向淨零碳發展。Prince坦承，當他創立Cloudflare時，從沒想過要減少網路對環境的影響，因為他根本不認為網路會對環境造成太大的影響，一直到他必須在超冷的資料中心安裝伺服器之後，才發覺要運作這些伺服器，以及將它們冷卻所耗費的龐大電力。

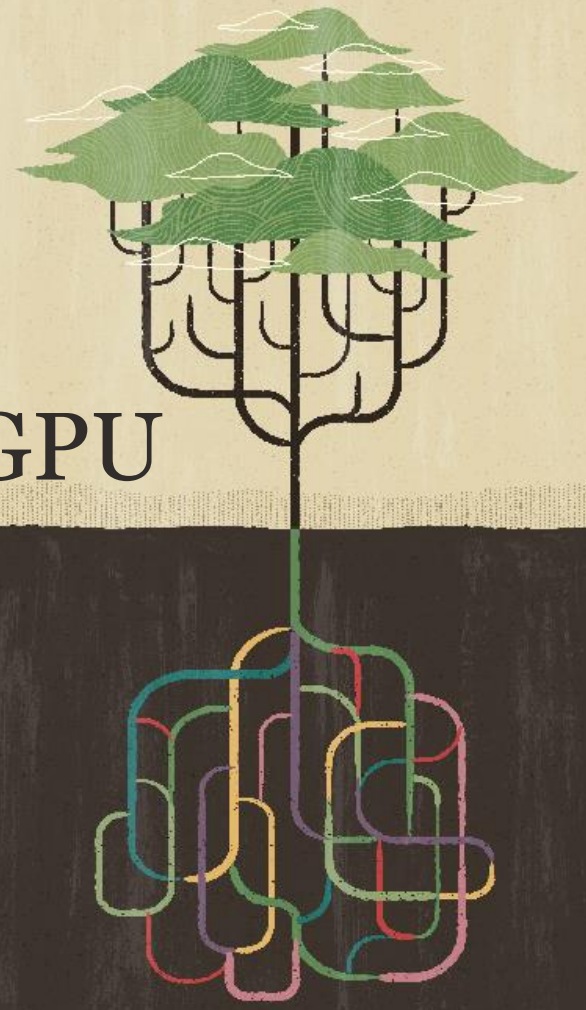
Oracle's HPC journey



How Customers Benefit From Moving HPC/GPU workloads to the Cloud

	成本	容量	彈性	效能
				
工程結果	減少在建基礎設施支出，並根據使用情況預測成本	通過訪問更多的計算和存儲，更快地解決模型	隨時隨需隨地運行作業 HPC 計算能力	任何雲供應商的最佳價格表現。最大的單節點機。最大可用節點存儲
IT 結果	消除硬體更新和容量規劃的惡性循環	利用雲端回應計劃外的工作並消除工作佇列	關注戰略優先事項，而不是管理硬體和軟體	下一代性能匹配或可超越本地 hpc 集群

Oracle Cloud Infrastructure for HPC/GPU



Maximize your compute spend to deliver innovation fast

最新計算硬體

- 利用高功率Intel Gold Xeon 跟 AMD EPYC CPUs在最新硬體上運行您的 HPC 工作負載
- 加快複雜數據模型和結構的可視化使用NVIDIA GPUs (V100 and A100)
- 專用裸機實例支援需要高核心計數、大量記憶體和高記憶體頻寬的應用程式
-

"What we really liked about the bare metal offering from Oracle is that there was very little technology between us and the hardware."

David Standingford
Director and Co-founder

ZENOTECH
SIMULATION UNLIMITED

Run HPC on leading-edge processors

EPYC Standard Instance – available now

- Based on AMD EPYC architecture
- Both Bare-Metal & VMs
- Cores: 1 – 128 cores (2.25Ghz base with up to 3.4Ghz boost)
- Memory: up to 2TB
- 100Gbps overall network bandwidth

Skylake processors – available now

- Intel Gold Xeon
- Cores: 18 cores with 3 GHz Clock speed and 3.7 Max Turbo frequency
- Memory: Up to 768GB

X9 Next Gen Intel Instances*

- Next Gen Intel processors
- Cores: 1 – 36 cores with High-Frequency (3.x Ghz+)
- 2x 100G RDMA
- Local NVME SSDs
- Scale to 1000s of cores per cluster

GPU Bare-Metal Instances *

- NVIDIA Ampere Architecture
- Both Bare-Metal and VMs
- GPUs: up to 8 (for BM)
- Memory: Up to 2 TB
- 1.6 Tbps RDMA

* Planned for 2021

用於 HPC/GPU 應用程式的高性能集群網路

- 100 Gbps網路介面卡及 RDMA over converged Ethernet (RoCE) v2
  - Latency as low as 1.5 µs
- 標準裸機伺服器支援雙 25 Gbps 乙太網，可快速存取計算集群.
- 安全、虛擬的雲網路使您能夠輕鬆地將現有網路拓撲移到雲中。
-

"Oracle shows the best performance due to the combination of the latest generation of computing hardware and low-latency / high-bandwidth interconnect network that facilitates efficient."

Timur Bazhirov &
Mohammad Mohammadi
Founders, Exabyte.io

EXABYTE.IO
MATERIALS DISCOVERY CLOUD

易於部署文件系統和高性能存儲

- 只需 3 次單擊，就會在 OCI 上部署 HPC 分享檔案系統
- 從廣泛的分享檔案系統中進行選擇: IBM Spectrum scale, BeeGFS, Lustre, Quobyte and more
- 達到 60 -140 GB/sec 輸送量 for HPC 平行分享的檔案系統
- HPC 機器包括 6.4 TB local NVMe
- 高性能提供全快閃記憶體區共用存儲
-

“Oracle Cloud is the only major cloud provider delivering Spectrum Scale in a shared-storage architecture on bare-metal hardware. The Oracle offering has been tuned for the demands of HPC and big-data analytics and offers 10X performance advantage over virtualized cloud offerings, improved flexibility, scalability, and manageability.”

Michael Sedlmayer
President, Re-Store

Re-Store | AHPC

Oracle HPC Solutions

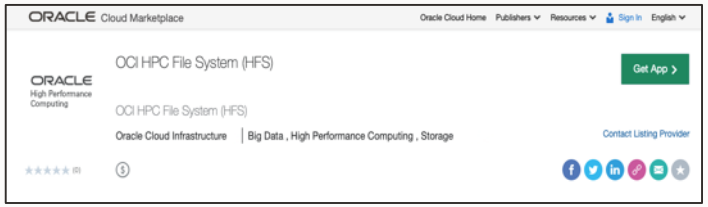
CFD Ready Cluster*

Everything you need to start running your CFD workloads: including CFD libraries - Fluent, Star-CCM+, Converge, OpenFOAM

Automate your CFD Ready HPC cluster deployment

CFD Ready Cluster on Oracle Marketplace

*Note: OpenFOAM and prerequisite libraries are distributed with the cluster. BYOL applicable for commercial packages

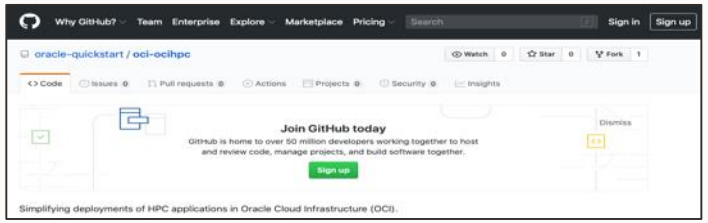


OCI HPC File Systems (HFS)

Just in three clicks you can have a file system up and running at peta-byte scale

Deploy your choice of parallel file system – BeeGFS, Lustre, Gluster, IBM Spectrum Scale

OCI HPC File System (HFS) on Oracle Cloud Marketplace



Easy HPC

Simple command line to deploy HPC clusters of any size on dedicated bare metal HPC compute

No expertise of Terraform or OCI resource manager required to launch network clusters

Deployment includes a complete set of software packages for running parallel processing with RDMA

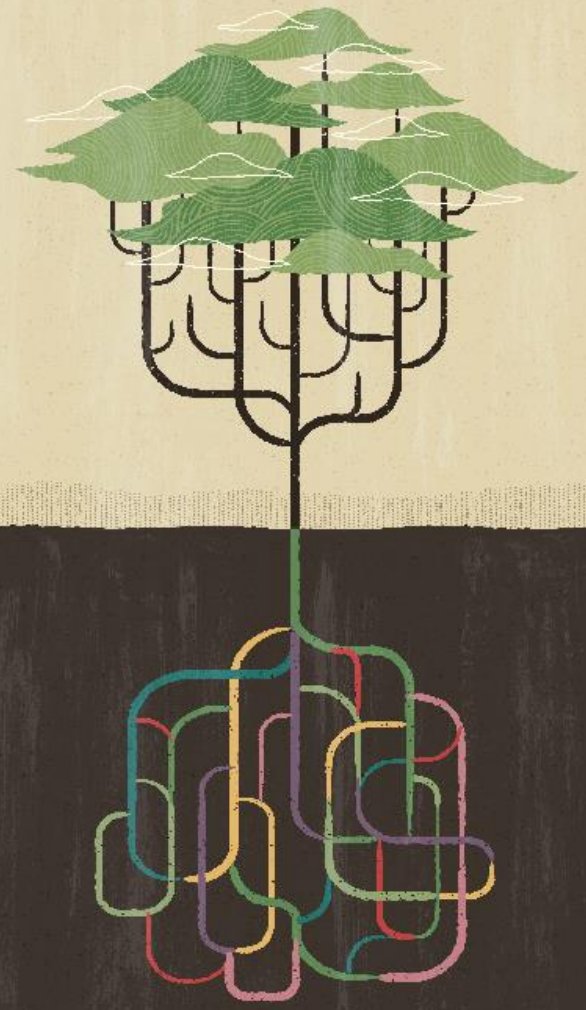
Customizable to execute your own terraform scripts

Oracle quickstart on GitHub

快速佈建你需要的CAE 運算資源與環境 – 3 Clicks Only

https://www.youtube.com/watch?v=Gjf5L3TcsD0

HPC/GPU 提供最佳性價比

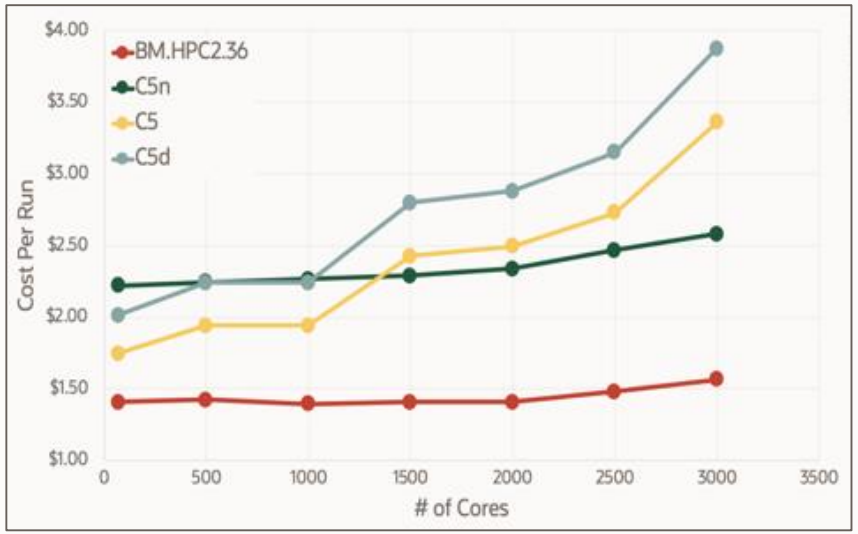


HPC: Supercomputing at your fingertips

Price Performance for Running Ansys Fluent (CFD software) – Cost of a Single Job

Running a CFD workload OCI HPC is 44% less expensive than AWS

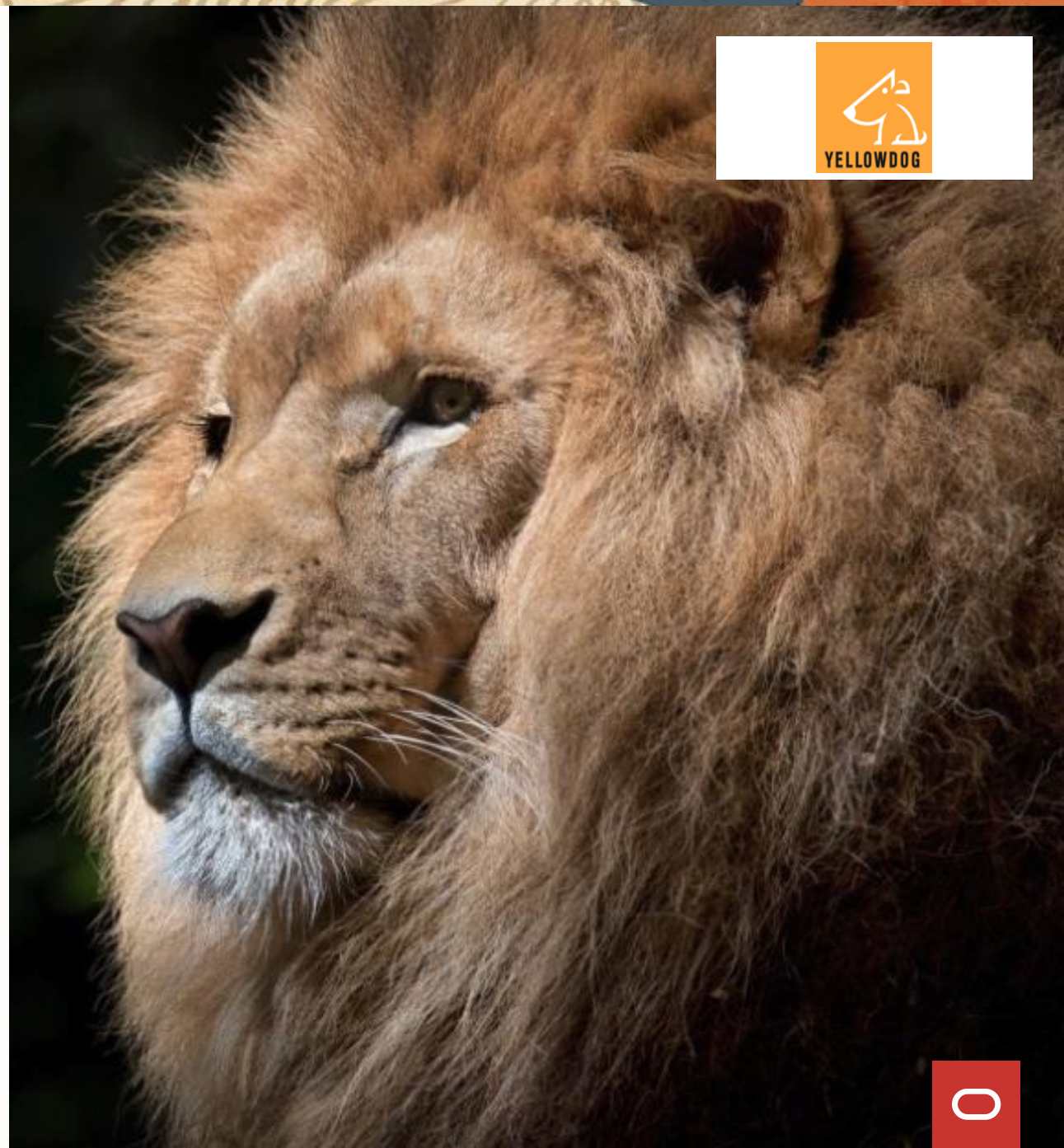
HPC	OCI BM.HPC2.36	AWS c5n.metal
List price ($USD)	$2.70	$3.888 (US East)
Storage	Local NVME SSDs	No Local NVMe SSD
Memory	384GB	192GB
Networking	RDMA	No RDMA
Performance SLA	Yes	No
Benchmark		
SPECrate 2017 Integer	238	237
SPECrate 2017 Floating Point	206	206
Stream (Mb/s)	146,984	140,833
Summary	**Lower costs for better performance with RDMA and performance guarantee**	**44% more expensive, no local SSD storage, half the RAM, with no RDMA, and no performance SLA**



YellowDog provides on-demand 3D rendering solutions with Oracle Cloud

United Kingdom
Technology Company | Cloud 3D Rendering

- Provides rendering options for small to medium media houses
- Sought to expand rendering options and capabilities for customers
- Increased performance 10x vs prior solution and 2x vs. AWS
- Moved from first gen Oracle Compute to second gen in less than a year at no incremental cost
- Reduced infrastructure costs resulted in savings passed to customer



Pricing comparison – HPC Shapes

Oracle price performance is higher than our competitor's offerings

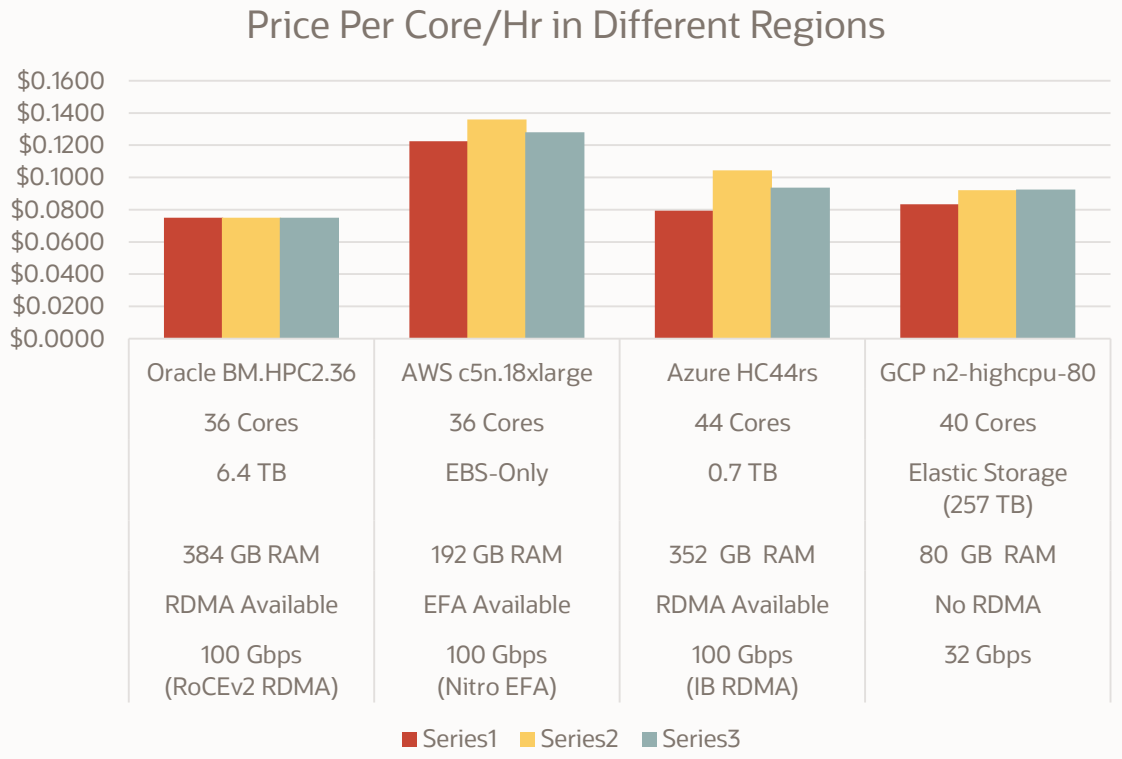
Oracle HPC shape has

- Bare metal
- The lowest network latency
- More memory per core
- More local NVME SSD storage
- Low and consistent pricing

* Any compute can be used for HPC, the instances here are the "High Frequency" instances offered by the respective cloud

Price Comparisons across 3 regions for HPC Shapes

Oracle offers globally consistent pricing across regions, at lower cost than its competitors



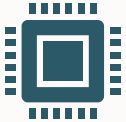
Lower product pricing than other clouds

	Oracle	AWS	Azure	GCP
Virtual Machine Standard ($/OCPU/Hour)	**$0.0638**	+49%	+49%	+46%
Virtual Machine Dense IO ($/OCPU/Hour)	**$0.1275**	+18%	+48%	+20%
Bare Metal Standard ($/OCPU/Hour)	**$0.0638**	+45%	N/A	N/A
Bare Metal Dense IO ($/OCPU/Hour)	**$0.1275**	+4%	N/A	N/A
Kubernetes Cluster (monthly, 50 cores, 750GB RAM)	**$2,297**	+56%	+50%	+32%
Block Storage High IO (monthly, 400GB 30K IOPS)	**$23.80**	+7,900%	+2,900%	+400%
Object Storage ($/GB/Month/200M Requests)	**$0.7055**	+13,00%	+400%(複雑)	+1,100%
Data Archive ($/GB/Month)	$0.0026	+35%	**-30%**	+63%
Internet Data Egress (50TB/Month)	**$340 (10Tb Free)**	+1,300%	+1,300%	+1,300%
Private Line Network (1 Gbps, 100TB Data, Monthly)	**$155**	+2,100%	+3,700%	+1,500%
Site to Site VPN	**$0**	$35	$30	$35

GPU実例 (V100): 比較 – 東京機房

ORACLE	A社	M社
Compute (BM.GPU3.8; 8GPU, 52OCPU, 768GB)	A社 Compute (p3.24xlarge; 8GPU, 96vCPU, 768GB)	VM (NC24s v3; 4GPU, 24核心, 448GB)
$2.95 /GPU/時	$5.348/RI 3.153 /GPU/時	$4.194 /GPU/時

Why HPC/GPU is better on Oracle than other clouds



最新計算硬體

在下一代硬體上運行您的 HPC 工作負載

使用專用裸機實例獲得根自有機房同等或優於的性能和控制水準

獲得比其他雲供應商更好的性價比– Oracle is 44% less expensive than AWS for CFD workloads.

可擴展、獨立存儲

6.4 TB本地NVMe快閃記憶體裸機實機，比任何其他供應商優的規格

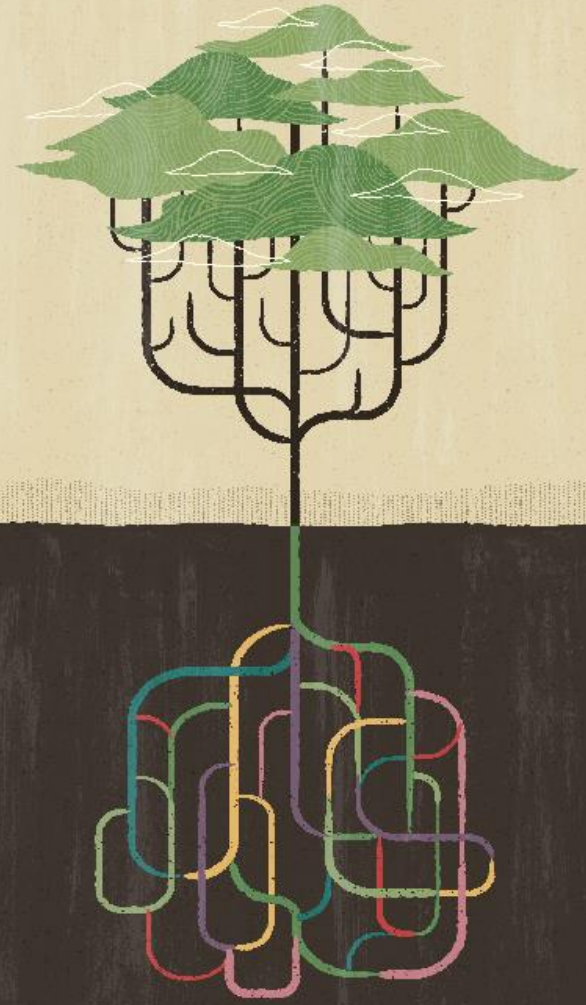
Get extreme low latency storage for shared-nothing architectures or fast local scratch storage

- 對於額外的存儲，利用彈性塊存儲量，每個容量可提供高達 32 TB，每卷可提供高達 35，000 個 IOPS，並輔以性能 SLA
- 從可多樣的平行共享的檔案系統,在 3 次單擊中部署中進行選擇

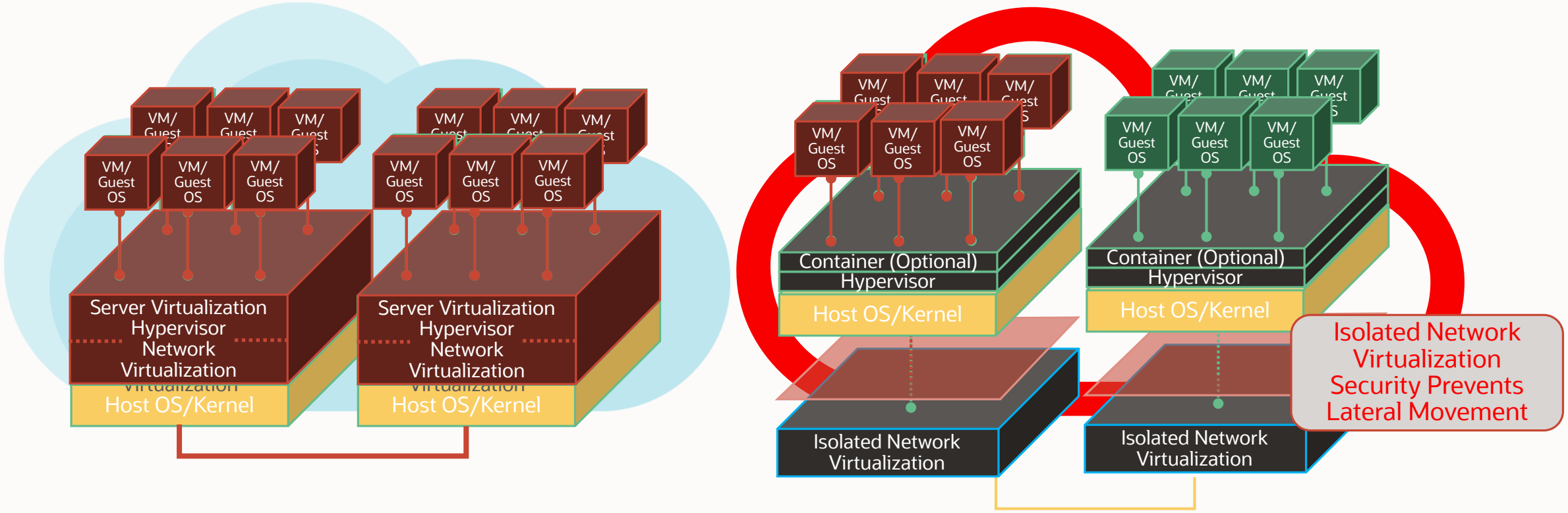
專業網路

- 實現 100 Gbps 網路輸送量，延遲低於 2 微秒，具有安全、隔離RDMA over converged ethernet (RoCE) v2
- 在單個 RDMA 集群中支持超過 20，000 個內核
- 使用雙 25 Gbps 頻寬的非超額訂閱網路, 快速存取計算集群
- 通過虛擬雲網路輕鬆將現有網路拓撲移到雲中
- 僅有網路性能 SLA 的雲端服務商
-

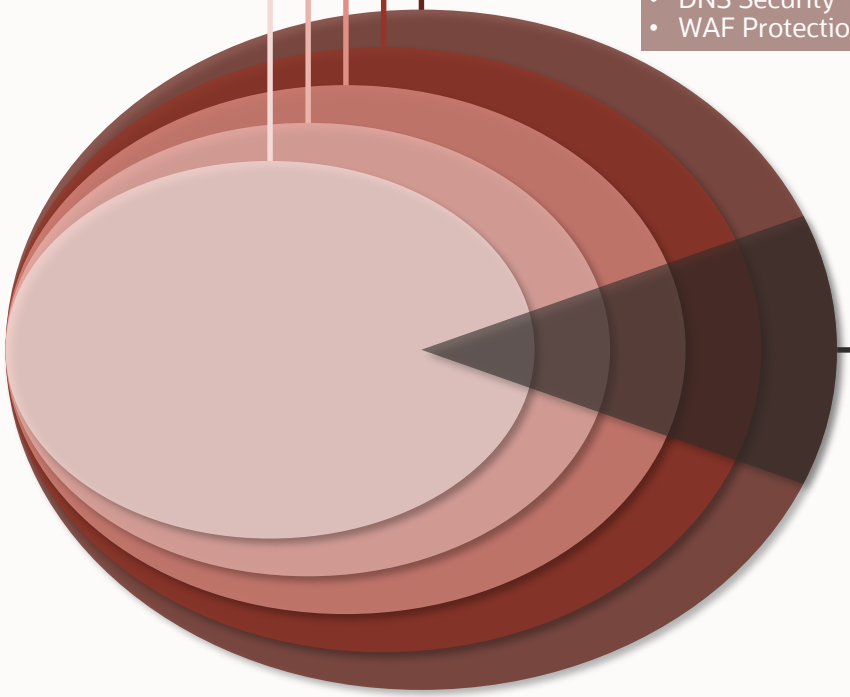
Zero Trust Architecture–
如何保護你的關鍵CAE 環境



Isolation: threat containment and reduced risk



Multiple layers of defense in depth



Data

- At-Rest-Crypto
  - TDE
  - DataGuard
- In-Transit-Crypto
  - SSL/TLS
  - NNE
- Keys
  - Managed Keys
  - Custom Keys
  - Managed Vault

Instance

- Tenant Isolation
- Hardened Images
- Virtual Taps
- Hardware Entropy
- SSH Keys
- Certificates
- Root-Of-Trust Card
- Signed Firmware
- Hardware Security Modules

Virtual Network

- Interface Segmentation
- Security Lists
- Private Networks
- Bastion Access
- SSL Load Balancing
- FastConnect (Direct)
- FastConnect (Carrier)
- IPSec VPN

Monitoring

- 3rd Party Security
  - FW
  - NGFW
  - IPS
- User Monitoring
- Configuration Monitoring
- Logging
- Compliance

Edge Services

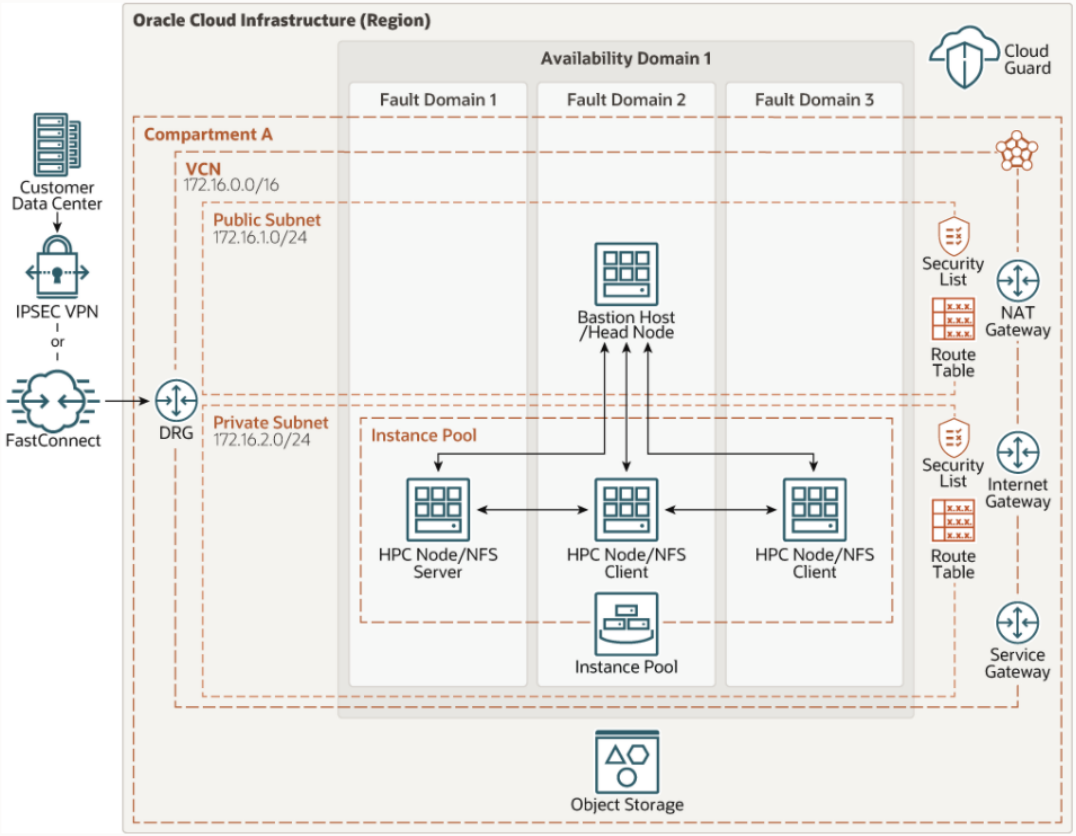
- Global PoPs
- DDoS Protection
- DNS Security
- WAF Protection

Internet

Identity

- Identity Federation
- Role-Based Policy
- Compartments & Tagging
- Instance Principals

Key service to protect your environment



區域Oracle Cloud Infrastructure 區域是包含一或多個資料中心 (稱為可用性網域) 的本地化地理區域。

可用性網域可用性網域是區域內獨立的獨立資料中心。每個可用性網域中的實體資源都會與其他可用性網域中的資源隔離，以提供容錯。可用性網域不會共用基礎架構，例如電源、冷卻或內部可用性網域網路。

容錯域容錯域是一組可用網域內的硬體和基礎架構。每個可用網域都有三個具有獨立電源與硬體的容錯域。

虛擬雲端網路 (VCN) 和子網路VCN 是您在 Oracle Cloud Infrastructure 區域中設定的可自訂軟體定義網路。VCN 就像傳統資料中心網路一樣，可讓您完全控制網路環境。VCN 可以有多個非重疊的 CIDR 區塊，供您在建立 VCN 之後變更。您可以將 VCN 區隔為子網路，子網路範圍可設為某個區域或可用網域。

雲端保全您可以使用 Oracle Cloud Guard 來監督及維護您在 Oracle Cloud Infrastructure 中的資源安全。「雲端保全」使用 *可定義的偵測器方法*來檢查安全弱點的資源，以及監督操作員和使用者是否有風險活動。

BM GPU/CPU使用裸機 GPU/HPC 資源配置進行硬體輔助分析與其他運算。

區塊儲存將您的應用程式儲存在區塊儲存中。

網路閘道網際網路閘道可讓 VCN 中的公用子網路與公用網際網路之間的流量。

安全清單您可以為每個子網路建立安全規則，以指定子網路中必須允許的來源、目的地以及流量類型。

路由表虛擬路由表包含將流量從子網路路由至 VCN 外部之目的地的規則，通常會透過閘道。

Oracle Cloud Infrastructure和零信任

- OCI 是預設拒絕（連接、身份驗證和使用以拒絕為前提）
- 未經許可，您就無法執行任何操作：安全清單、隔間、策略設置等。
-

非常安全的地方

Maximum Security Zone

- 始終打開安全設置
  -你不能從"拒絕"中更改它
-

持續監控安全位置

Cloud Guard

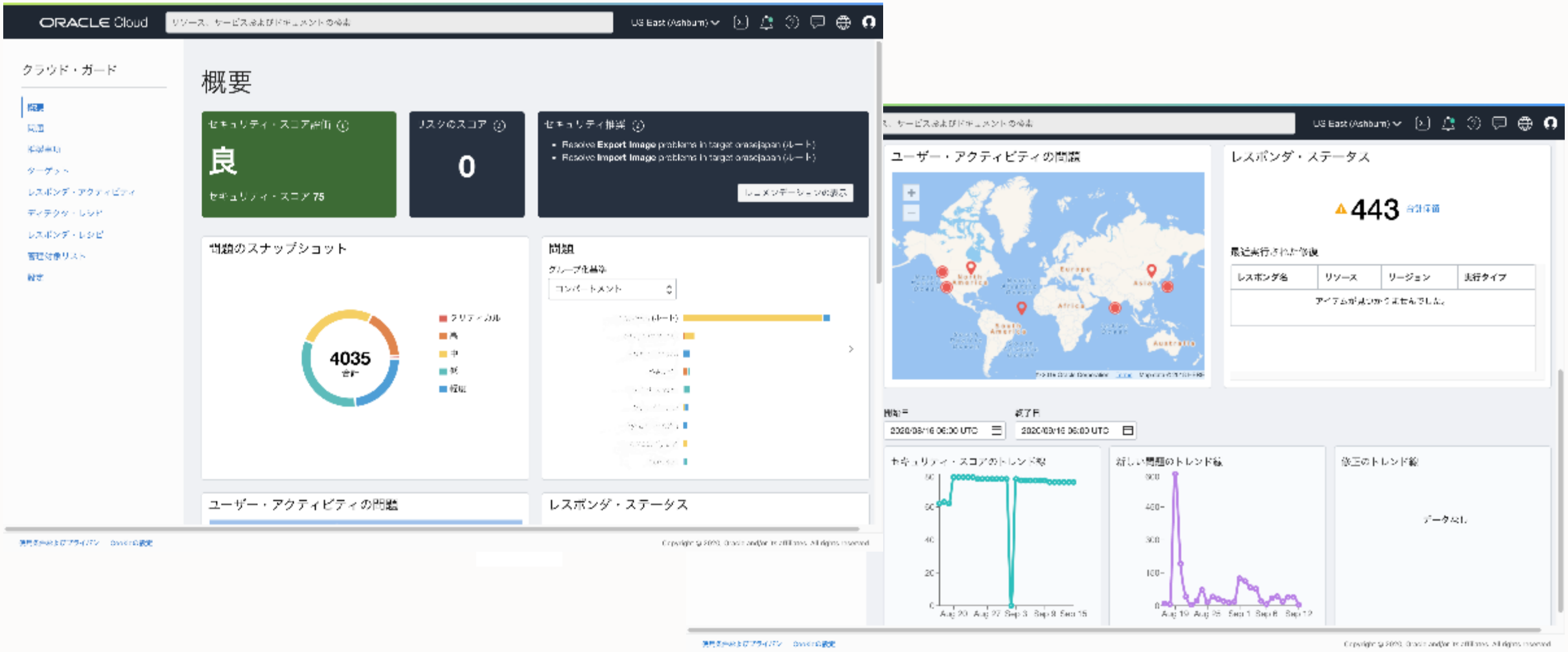
- 自動識別從「拒絕」更改時的問題，
  根據需要自動糾正
-

Cloud Guard

Pervasive watch and kill

- Cloud Guard constantly watches and collects data from Audit, Data Safe, OS Management, Logging, and Network Flow Logs services.
  - Gen 1 clouds don't offer a unified system to collect data from all services.
- Cloud Guard analyzes data, and detects threats and misconfigurations. It can alert you, and better yet, it can kill threats with no human intervention.
  - Gen 1 clouds are only reactive and alert you. You're left with the hard, slow, and manual task of killing the threat yourself.

Oracle Cloud Guard：儀表板

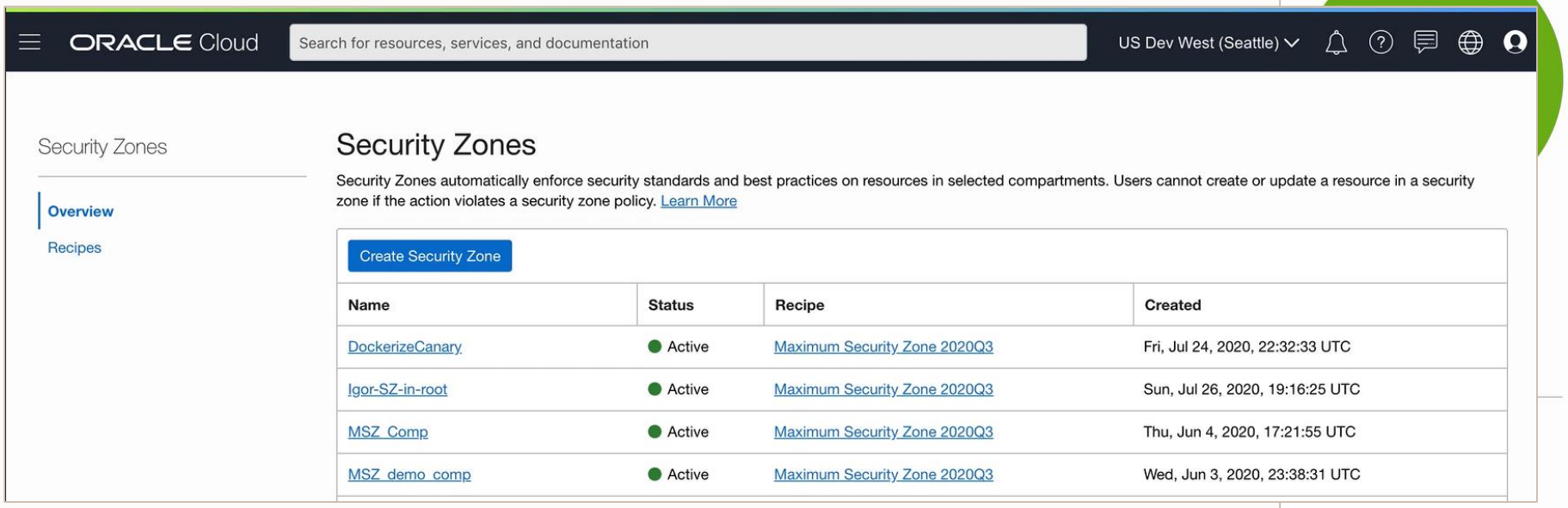


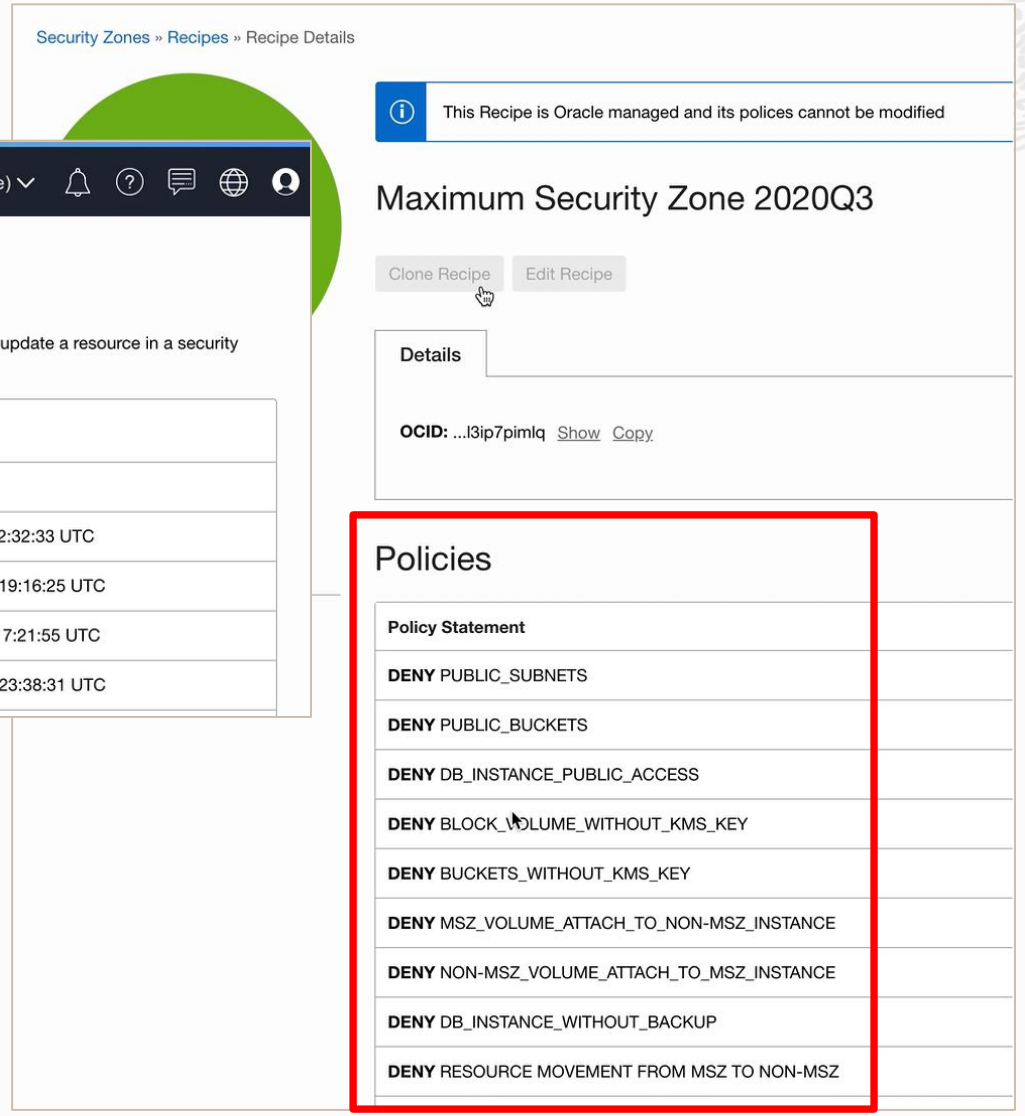
Maximum security zones

Maximum security can be easy and always on

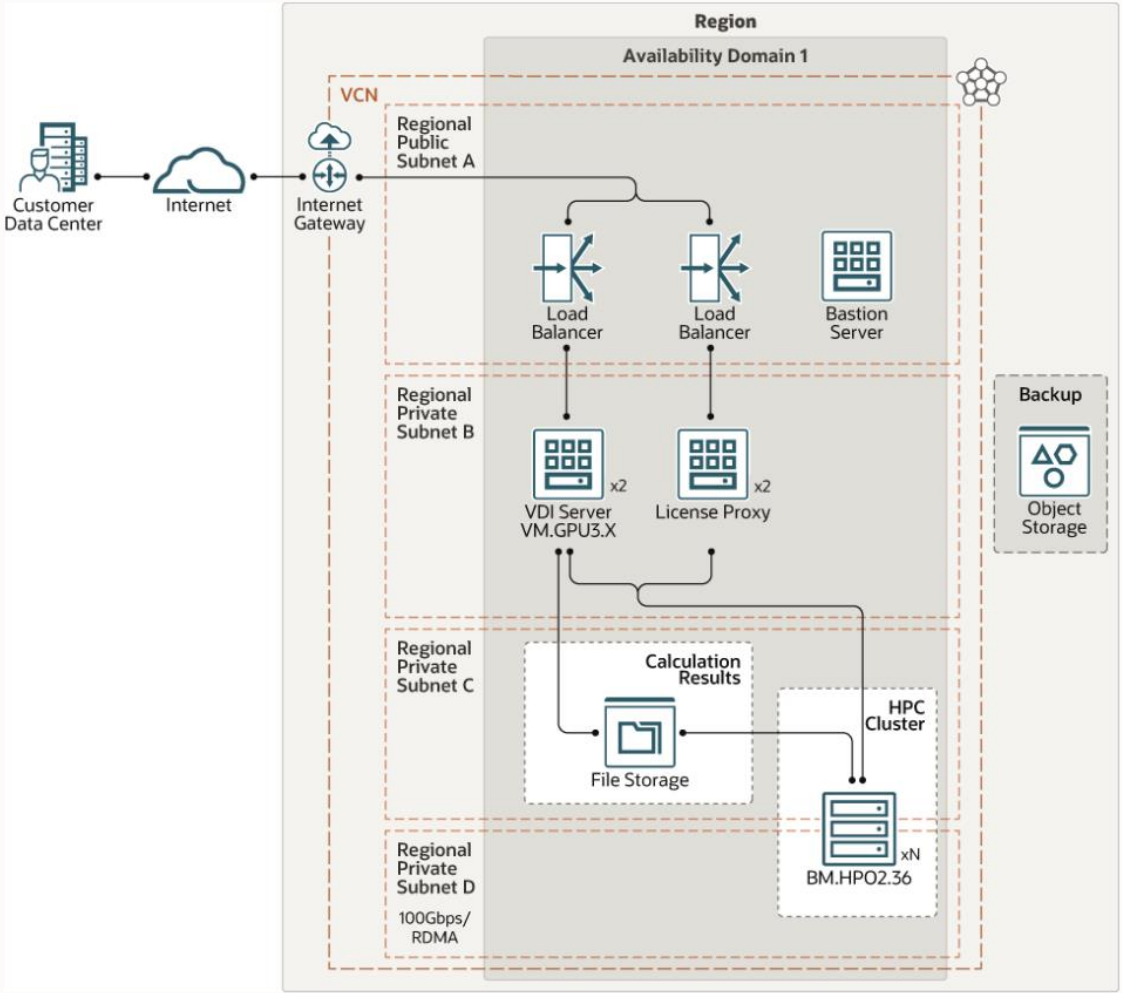
- Oracle Maximum Security Zone is a zone within your environment where security is not a choice. It's always on.
- Resources launched in this zone will be on dedicated infrastructure with the highest levels of data encryption and network security.
- Gen 1 clouds offer a long list of security tools that are extremely complex to set up, and very easy to screw up.

Security Zones – Maximum Security





Deploy virtual desktop infrastructure (VDI) with high-performance computing (HPC)



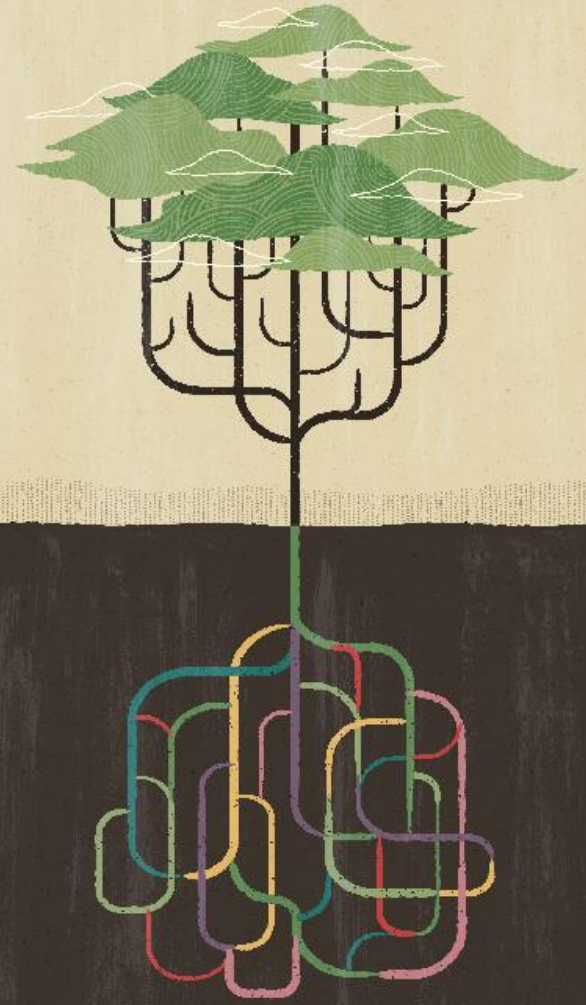
- 支援多種的VDI 方案如 – Citrix 或 Open Source VDI.
- 隨選迅速佈建基礎架構有助於快速進行疊代和水平擴充

雲端保全複製並自訂 Oracle 提供的預設方法，以建立自訂偵測器和回應器方法。這些處方可讓您指定哪些類型的安全違規會產生警告，以及允許對它們執行哪些動作。

安全區域對於需要最高安全性的資源，Oracle 建議您使用安全區域。安全區域是與以最佳做法為基礎之 Oracle 定義的安全原則方法關聯的區間。**防禦主機節點** 節點是用來作為防禦主機並排定 HPC 工作，因此不需要在本機連附的儲存體或 GPU 處理。

VDI 伺服器 使用 VM.GPU3。X Compute 資源配置，因為此節點用於視覺化，且可能是以圖形密集的應用程式安裝。

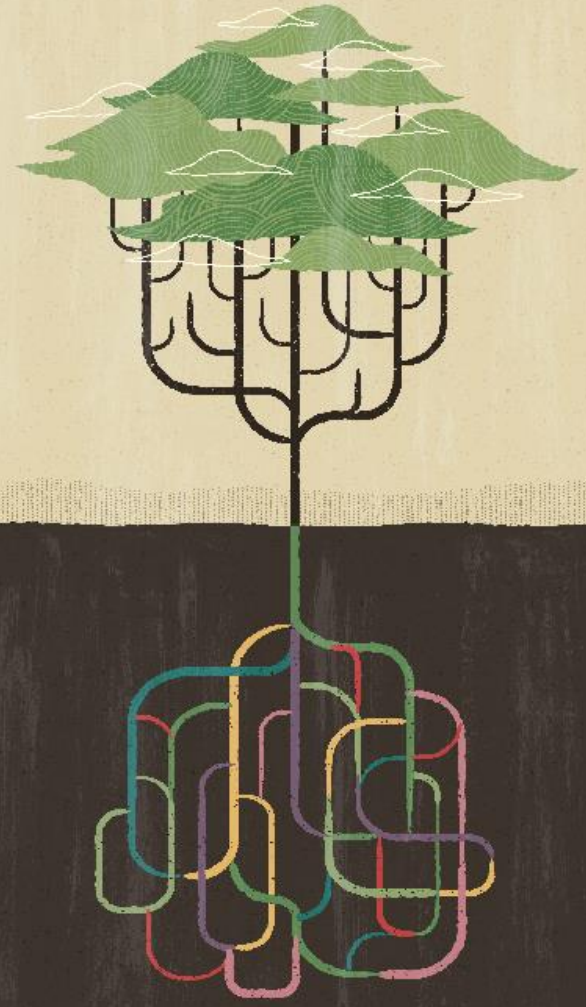
HPC/GPU ISV Ecosystem



HPC ISV Ecosystem

Visual effects rendering	NUKE BY THE FOUNDRY, PIXAR's RenderMan®, V-Ray, MAYA, AUTODESK® 3DS MAX®
Artificial intelligence & deep learning	K, torch, PYTORCH, Caffe2, TensorFlow™
Manufacturing Automotive Aerospace	Altair, CD-adapco www.cd-adapco.com, ANSYS FLUENT®, LSTC Livermore Software Technology Corp., d3VIEW®
Open source HPC applications	slurm workload manager, OPEN MPI, blender™, ParaView, GROMACS FAST. FLEXIBLE. FREE.

Summary



Oracle Cloud Infrastructure :經濟而強大的基礎支持您的CAE 應用

性能

- 最強大的裸機實例，無使用虛擬化
- <2 us latency with RDMA 網路
- Flat non-oversubscribed network for fast ingress/egress of data
- 超快超大的 IOPS/GB 超快的 IOPS/instance
- 匹配甚至超越自有資料中心的運行效能

價格

- 更好的性價比，比AWS便宜44%，以運行差價合約的工作量
- 獲取或服務數據的最低價格-低出口費用- 比其他雲端業者少75%, 每個月提供10Tb免費
- 跨區域全球一致定價
- 專線網路定價-沒有額外的或不同的費用數據量移動線
-

規模和靈活性

- 在單個 RDMA 集群中擴展至 20，000 個內核
- 在每個可用域（AD）中擁有約100萬個網路埠的非常大的網路
- 全球數據中心足跡
- 幾分鐘內快速部署基礎設施
- 加速您的執行工作, 快速反應客戶跟市場需求
-

安全性和可靠性

- 唯一提供跨計算、網路和儲存的性能、管理和可用性 SLA 的雲端供應商
- 隔離的網路虛擬化，提高安全性，降低風險
- 基礎設施監測和身份執行
-

ORACLE