



Private Cloud Appliance

PCA X9 Technical Features and Architecture Storyboard



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Agenda

Hardware Overview

- Physical infrastructure including data center integration

System architecture

- Software architecture
- Logical partitioning (enclaves)

Infrastructure services

- IAM
- Compute
- Containers (Cloud-Native)
- Storage
- Network

Oracle Cloud Compatible Infrastructure on Premises

Engineered for Mission Critical Private Cloud



Image portability to OCI
OCI compatible APIs



Tools and Services

CI/CD
SDK



Business Continuity

Fault Domains
Disaster Recovery



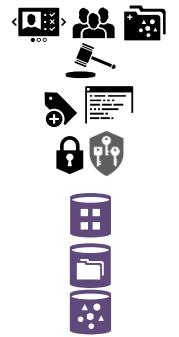
Monitoring and Management

Grafana, Prometheus



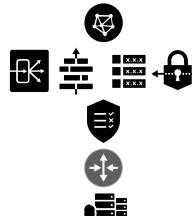
Security and Governance

Identity and Access
Policy
Tagging
Encryption



Storage

Block
File
Object



Network

Virtual Cloud Network
Network Services
Security Lists
Gateway Services
Datacenter Connectivity



Compute

Virtual Machines

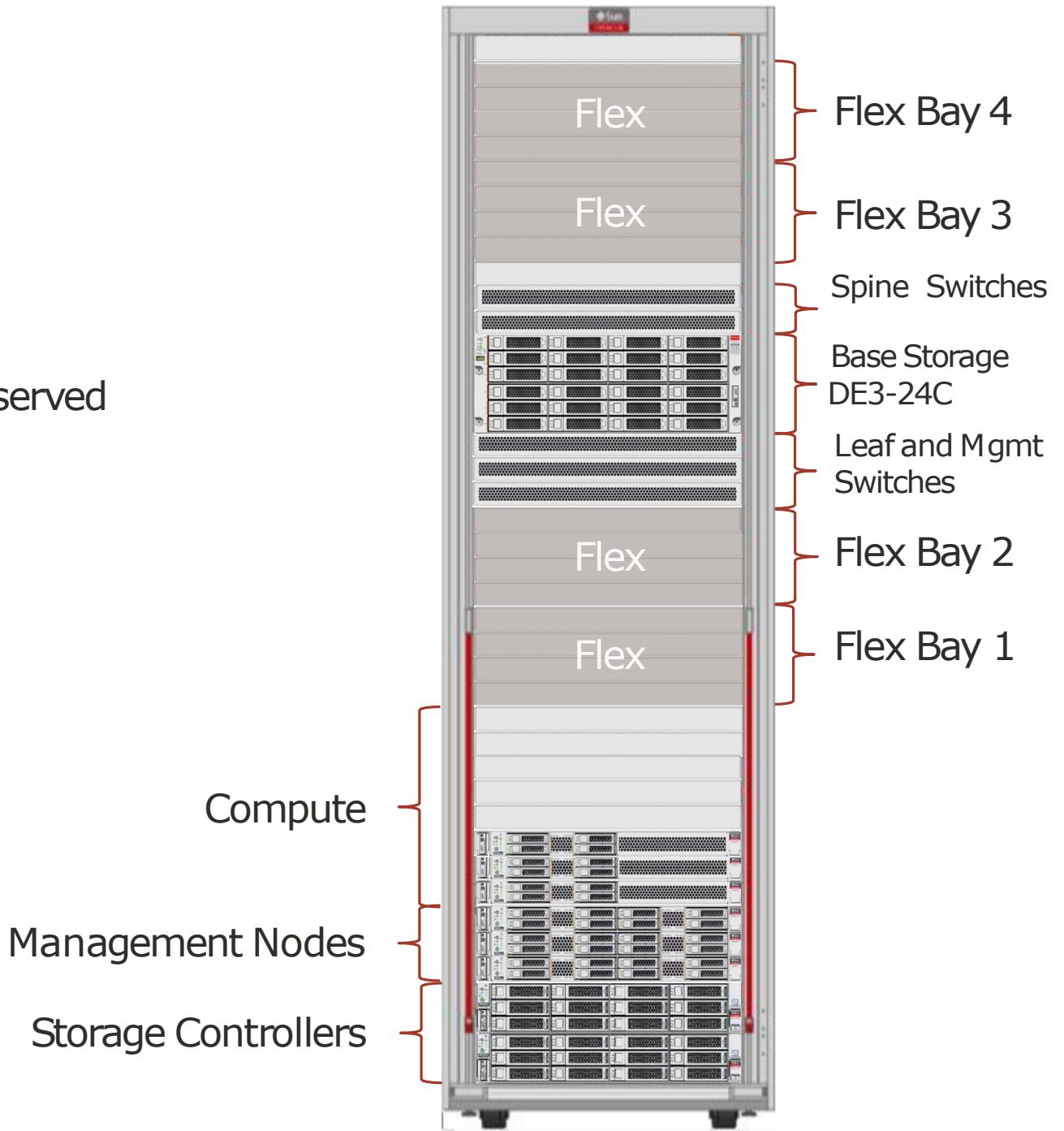
PCA Base Rack

Base Rack configuration includes:

- 3x Management Nodes
- 3x Compute Nodes populated in three reserved rack units
 - 8x RU pre-cabled for compute
- 2x ZFSSA Controllers
- 1x DE3-24C
- 4x Cisco 9336C 100GbE switches
 - 2x Access, 2x Aggregation
- 1x Cisco 9348GC management switch

Remaining rack space can accommodate 4 additional flex bays

- Up to 18 compute nodes total
- Up to 2.1 PB raw storage capacity
 - Using 18TB HDDs; 1.7 PB with 14TB HDDs



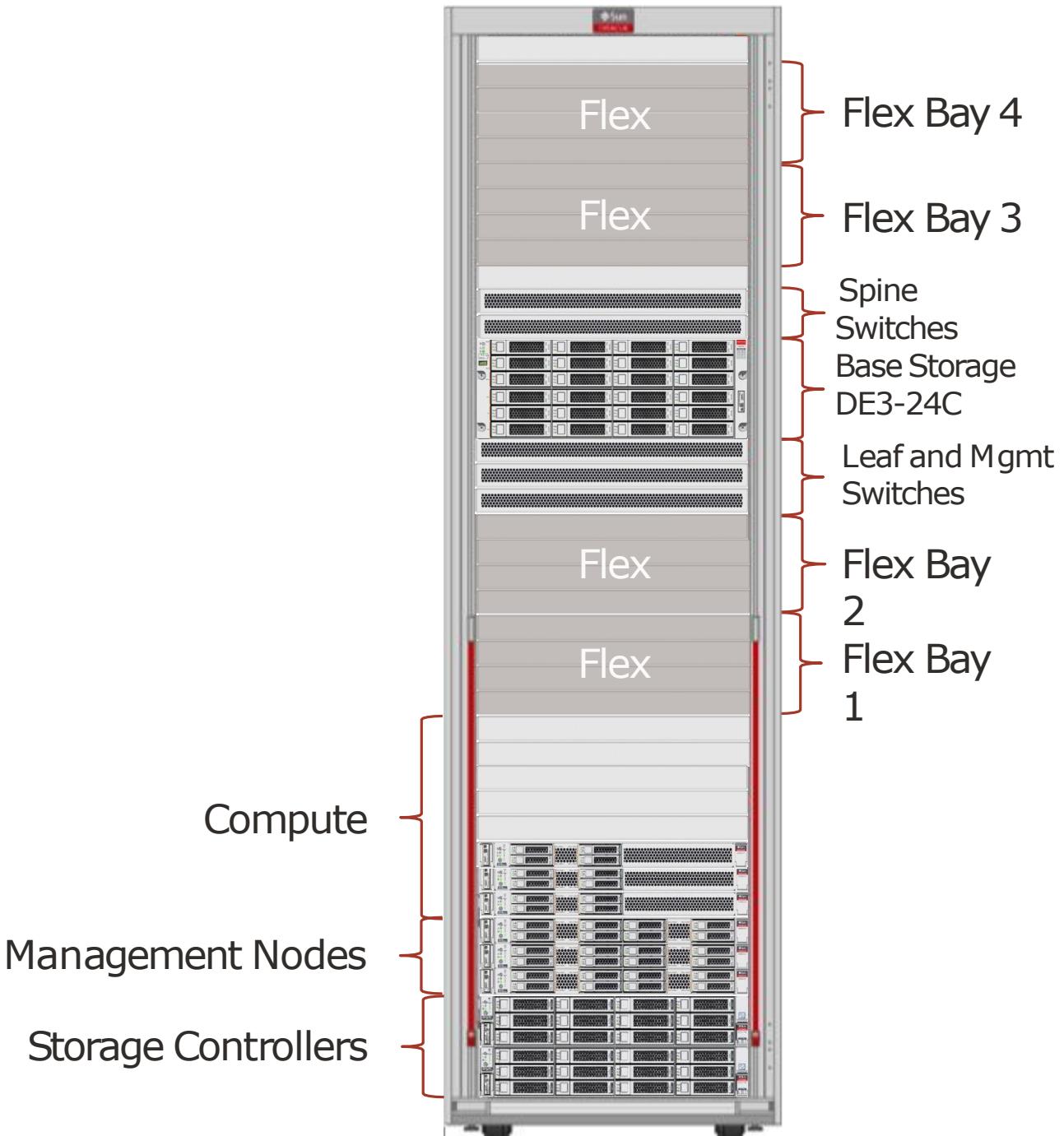
PCA Base Rack – Flex Bays

Flex Bays reserved as 4RU areas in the rack that can accommodate various combinations of rack components

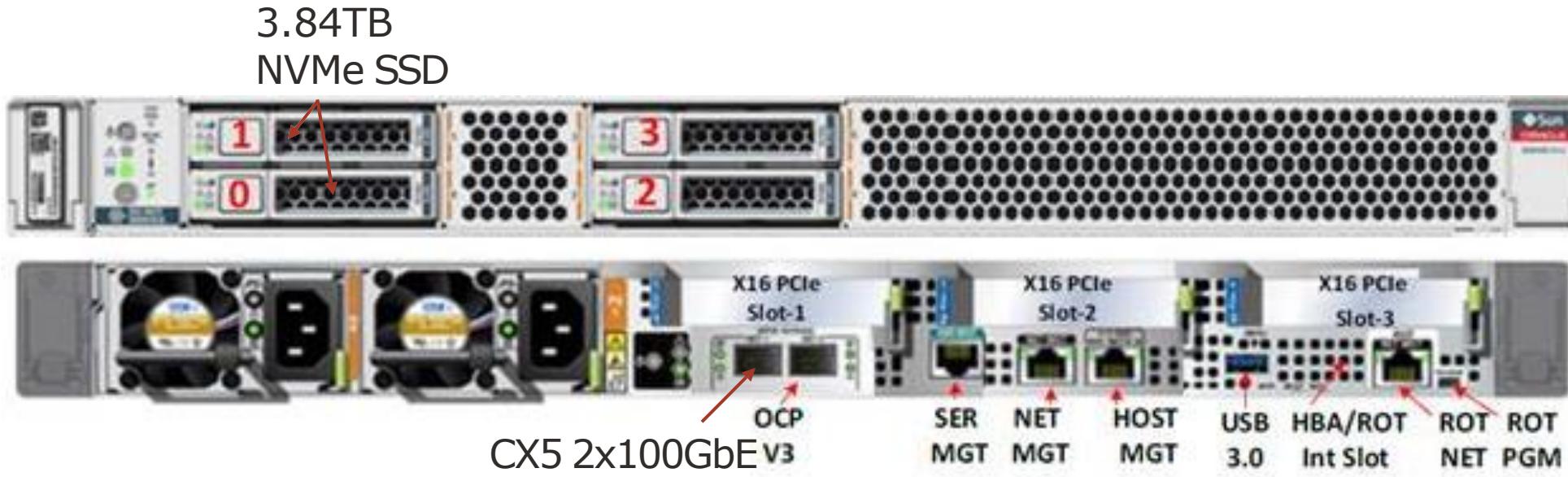
- 1 to 4x Compute Nodes
- 1 to 2x DE3-24P drive enclosures
- 1x DE3-24C drive enclosure

Once a bay type is selected, the 4RU area is set for that purpose

- Compute Node bay will accommodate only compute nodes
 - Additional compute nodes added until 4RU bay is completely populated
- DE3-24P bay accommodates only DE3-24P
 - 2nd enclosure added to fully populate bay before adding additional DE3-24P bays. Otherwise, 2RU populated with solid filler panels



PCA X9 Management Node Configuration



CPU: 2x Ice Lake 24C/2.0GHz/165W

DRAM: 1TB, 16x 64GB DDR4-3200

Boot: 2x M.2 SATA 240GB

Storage: 2x NVMe 3.84TB

IO: CX5 2x100Gb Ethernet OCP v3 module

Mgmt: NET0 + Sideband

System Network Interfaces

Customer Interface

- Application
- Client/User
- Data load
- Local Archive

Intra-region Interface

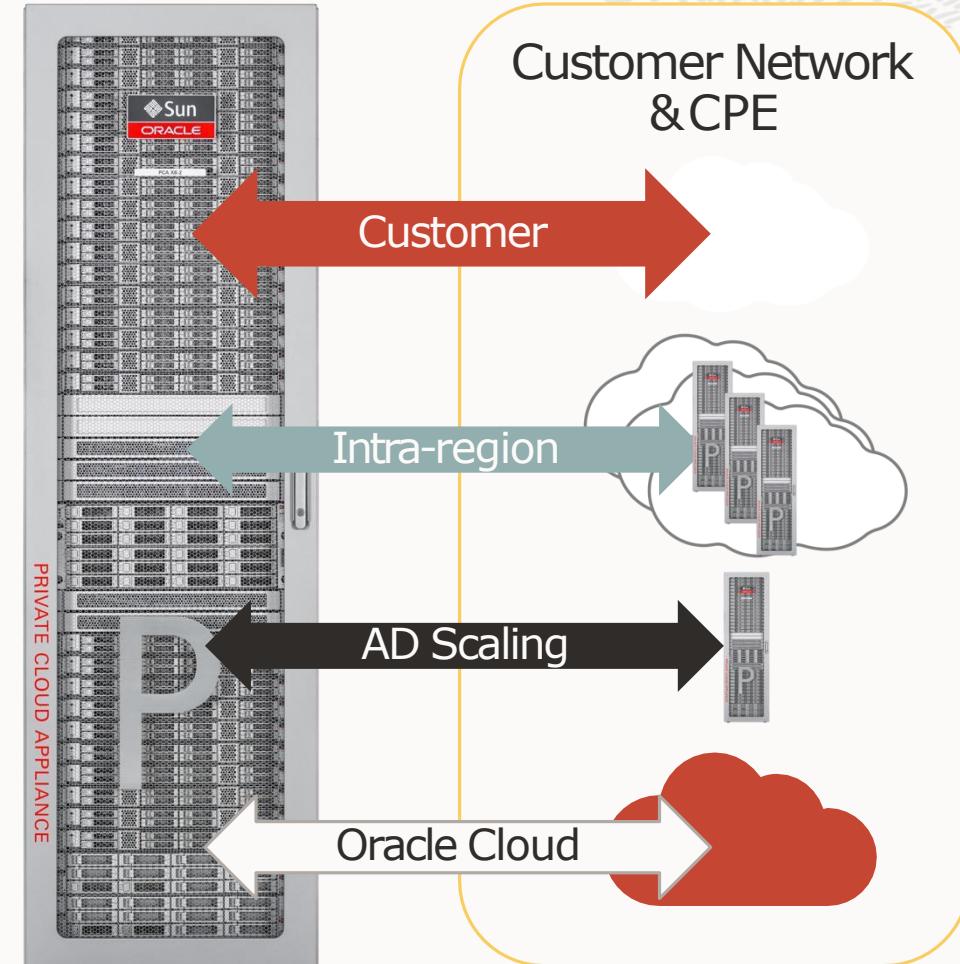
- Backup, Disaster Recovery
- AD – AD service communication

Availability Domain scaling

- Scaling AD compute/storage/services with additional infrastructure racks
- Exadata/Exa-CC connectivity

Oracle Cloud Interface

- Service delivery
- Management, monitoring, maintenance



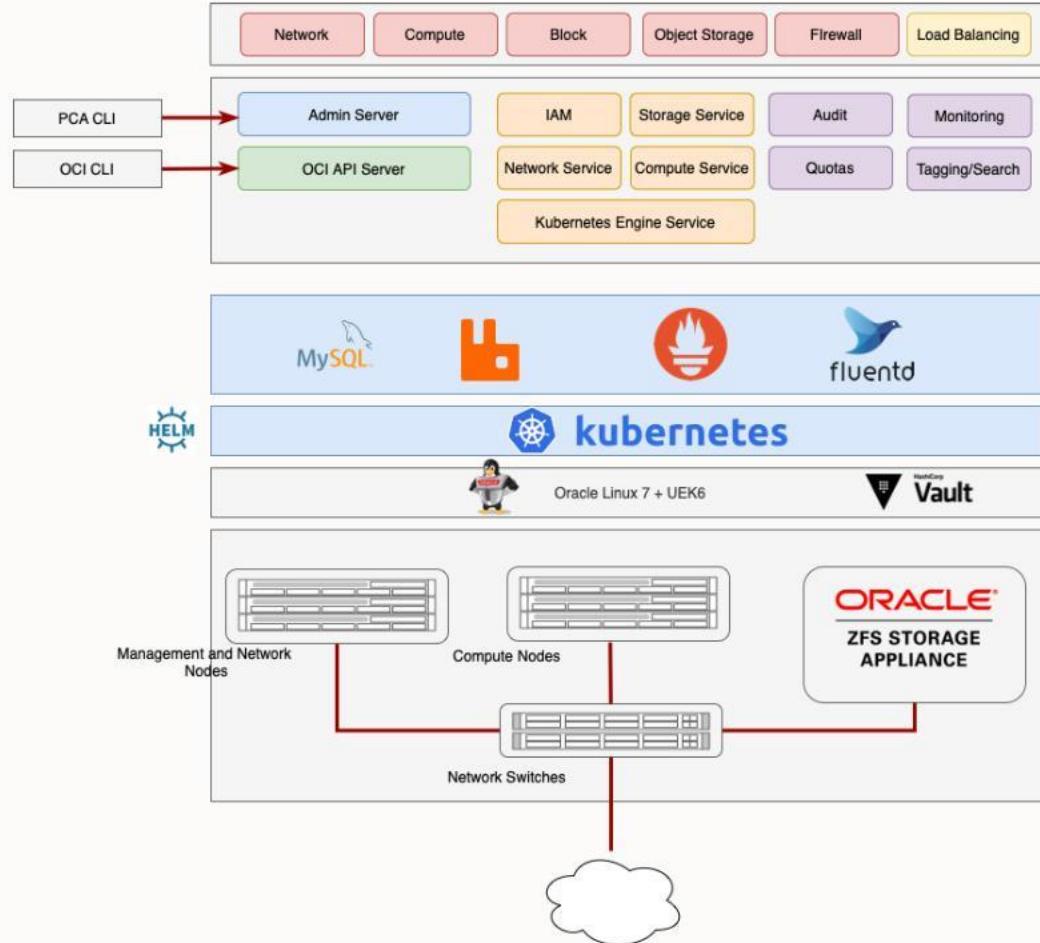
System Architecture



PCA X9



Software Architecture



Microservices-based architecture

- Maximizes Availability
- Enables non-disruptive upgrade
- Hardware independent

Software Architecture

Customer
Instance

In-guest
Agent

API



Controllers



Common
Services



Layer 0/1



Physical



Deployer



Platform Strategy – Kubernetes Cluster



Management Node

Master

Worker

Management Node

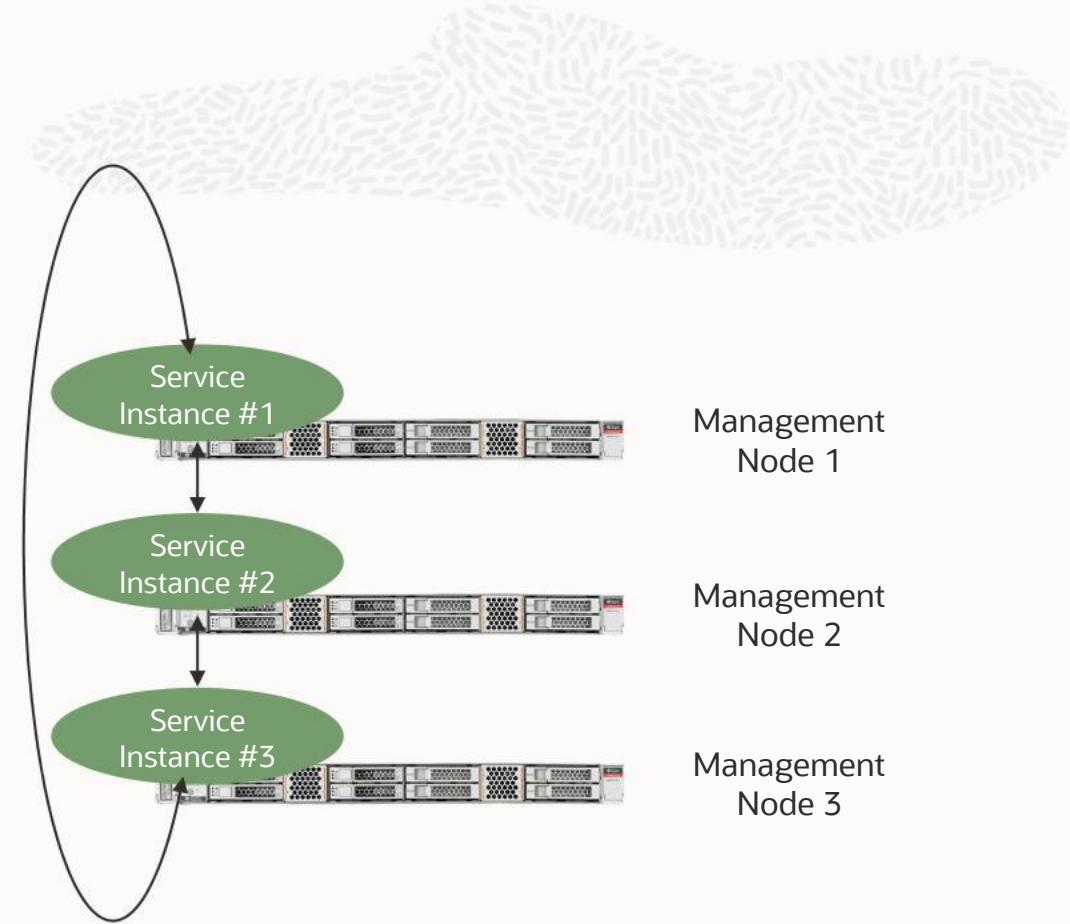
Worker

Management Node

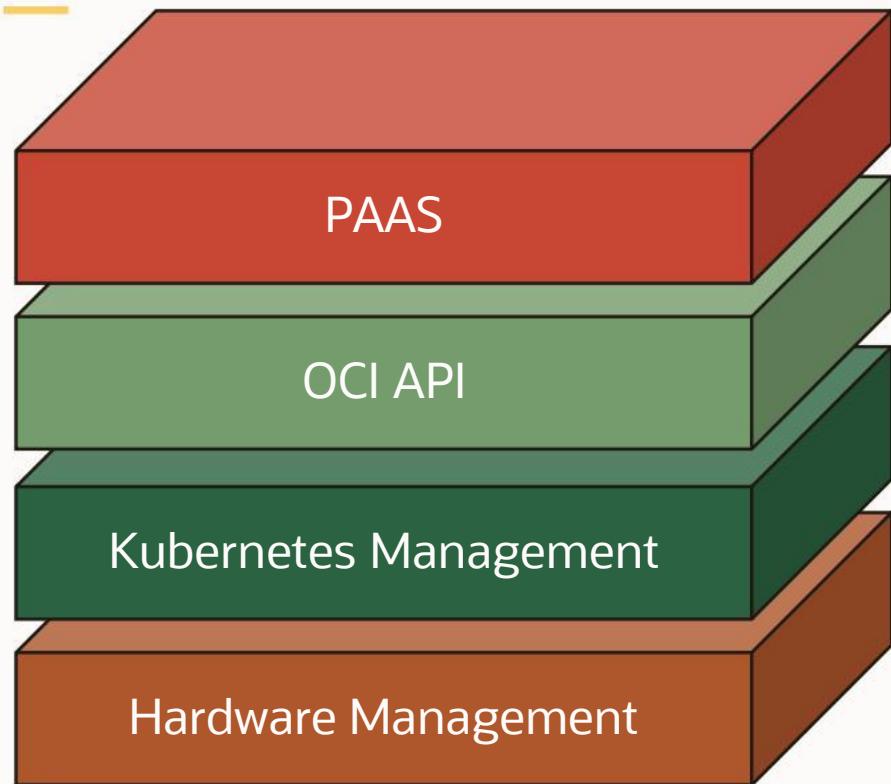
Worker

PCA Microservices

- Packaged within a Docker container that is managed & deployed via Kubernetes
- HA is attained by running one container on each of three Management Nodes
- RabbitMQ is used to communicate with other microservices within the PCA system
- Loki used for log aggregation
- Prometheus used for statistics collection



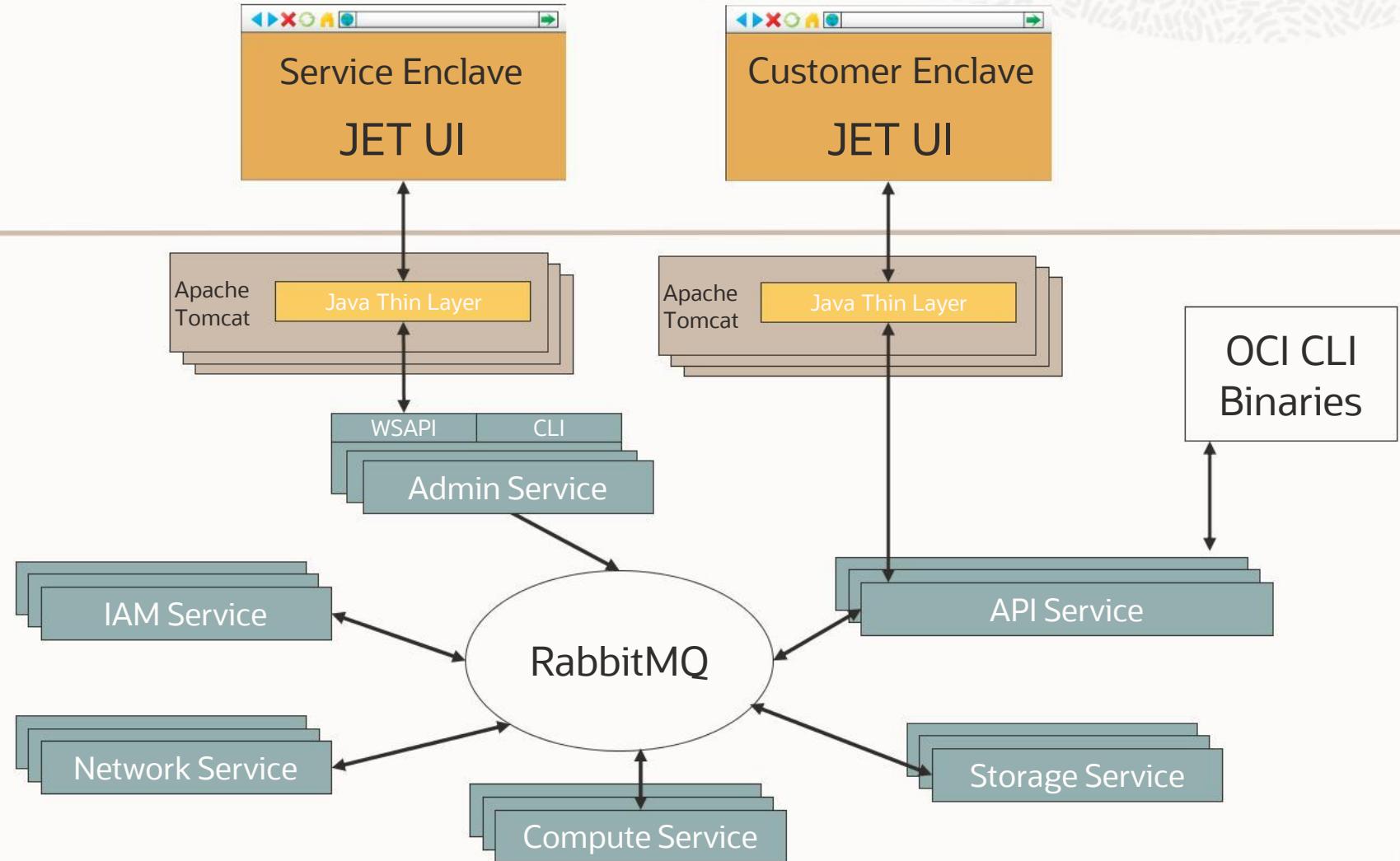
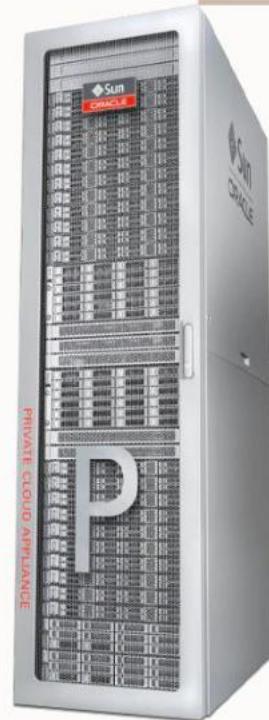
Upgrades - System Platform Services



- Upgrades to micro-services done by deploying newer version to the registry
 - Kubernetes determines when and how to replace older apps
 - Rollback built into Kubernetes
-
- OS, kernel, and PCA L1 stack updated with yum
 - Yum repo managed by pca-upgrader
 - Firmware upgrades can be synchronized with OS upgrades to minimize reboots
 - Firmware HMP and OS modules can always be on the same version
 - Unified utility simplifies patching for Platinum and PCC

User Interfaces and Service Communication

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PRIVATE CLOUD
APPLIANCE



Infrastructure Services

Services supported at release



OCI IaaS – Initial Release

OCI Service	Features
Identity and Access Management	SAML 2.0 Federation
Compute	Fixed Virtual Machine Shapes (X9)
VCN	Subnets, vnics, gateways, routing tables, security lists, ...
Block Storage	Balanced and Performance
Object Storage	OCI
File Storage	NFS, SMB



Infrastructure Services



IAM



IAM

Identity and access management features such as authentication, single sign-on (SSO), and identity lifecycle management

IAM Components

RESOURCE

- The cloud objects that your company's employees create and use when interacting with Oracle Cloud Infrastructure (for example, compute instances, block instances, block storage volumes, virtual cloud networks, subnets, etc.), third-party applications, Software-as-a-Service (SaaS) applications, on-premises software, and retail web applications.

USER

- An individual employee or system that needs to manage or use your company's Oracle Cloud Infrastructure resources. Users might need to launch instances, manage remote disks, work with your virtual cloud network, etc. End users of your application are not typically IAM users. Users have one or more IAM credentials (see User Credentials).



IAM

GROUP

- A collection of users who all need the same type of access to a particular set of resources or compartment.



User



Groups

NETWORK SOURCE

- A group of IP addresses that are allowed to access resources in your tenancy.

COMPARTMENT

- A collection of related resources. Compartments are a fundamental component of Oracle Cloud Infrastructure for organizing and isolating your cloud resources. You use them to clearly separate resources for the purposes of measuring usage and billing, access (through the use of policies), and isolation (separating the resources for one project or business unit from another). A common approach is to create a compartment for each major part of your organization.



Compartments



Policies

TENANCY

- The root compartment that contains all of your organization's Oracle Cloud Infrastructure resources.

POLICY

- A document that specifies who can access which resources, and how. You can write policies to control access to all of the services within Oracle Cloud Infrastructure. Access is granted at the group and compartment level, which means you can write a policy that gives a group a specific type of access within a specific compartment, or to the tenancy itself. If you give a group access to the tenancy, the group automatically gets the same type of access to all the compartments inside the tenancy.



Tagging



Oracle Cloud Identifier

FEDERATION

- A relationship that an administrator configures between an identity provider and a service provider.



IAM Service: Overview

- Supports two main OCI features
 - Policies
 - Tagging
- Authenticates and uses policies to authorize all incoming requests
- Supports other OCI objects and operations
 - Users
 - UserGroups, UserGroupMemberships
 - Compartments
 - ApiKeys
- Supports federation with IdPs supporting SAML 2.0
 - Active Directory federation



Infrastructure Services

Compute



Compute

Virtual Machine

- A virtual machine (VM) is an independent computing environment that runs on top of physical bare metal hardware. The virtualization makes it possible to run multiple VMs that are isolated from each other. VMs are ideal for running applications that do not require the performance and resources (CPU, memory, network bandwidth, storage) of an entire physical machine.



Virtual Machine

Compute - Supported VM Shapes

VM Shapes

- Fixed 1:16 ratio (OCPUs:GB Memory)

Resources reserved for the hypervisor

- 4 cores
- 40 GB memory

OCI Portability

- OCI supports shapes up to 18 OCPUs on X9 (VM.Optimized3.Flex)

Shape	OCPUs	Memory (GB)	OCI Portable
VM.PCAStandard1.1	1	16	✓
VM.PCAStandard1.2	2	32	✓
VM.PCAStandard1.4	4	64	✓
VM.PCAStandard1.8	8	128	✓
VM.PCAStandard1.16	16	256	✓
VM.PCAStandard1.24	24	384	✗
VM.PCAStandard1.32	32	512	✗
VM.PCAStandard1.48	48	768	✗
VM.PCAStandard1.Max	60	960	✗

PCA X9 – Guest OS Matrix

Guest Operating System	Platform Image	Custom Image
Oracle Linux Release 8.x	✓	✓
Oracle Linux Release 7.x	✓	✓
Red Hat Enterprise Linux 8.x		✓
Red Hat Enterprise Linux 7.x		✓
CentOS 8.x		✓
CentOS 7.x		✓
SUSE Linux Enterprise Server 12 SP5		✓
SUSE Linux Enterprise Server 15 SP1		✓
Ubuntu 20.04 and later		✓
Ubuntu 18.04 and later		✓
Oracle Solaris 11		✓
Microsoft Windows Server 2019		✓
Microsoft Windows Server 2016		✓
Microsoft Windows Server 2012 R2		✓
Microsoft Windows Server 2012		✓



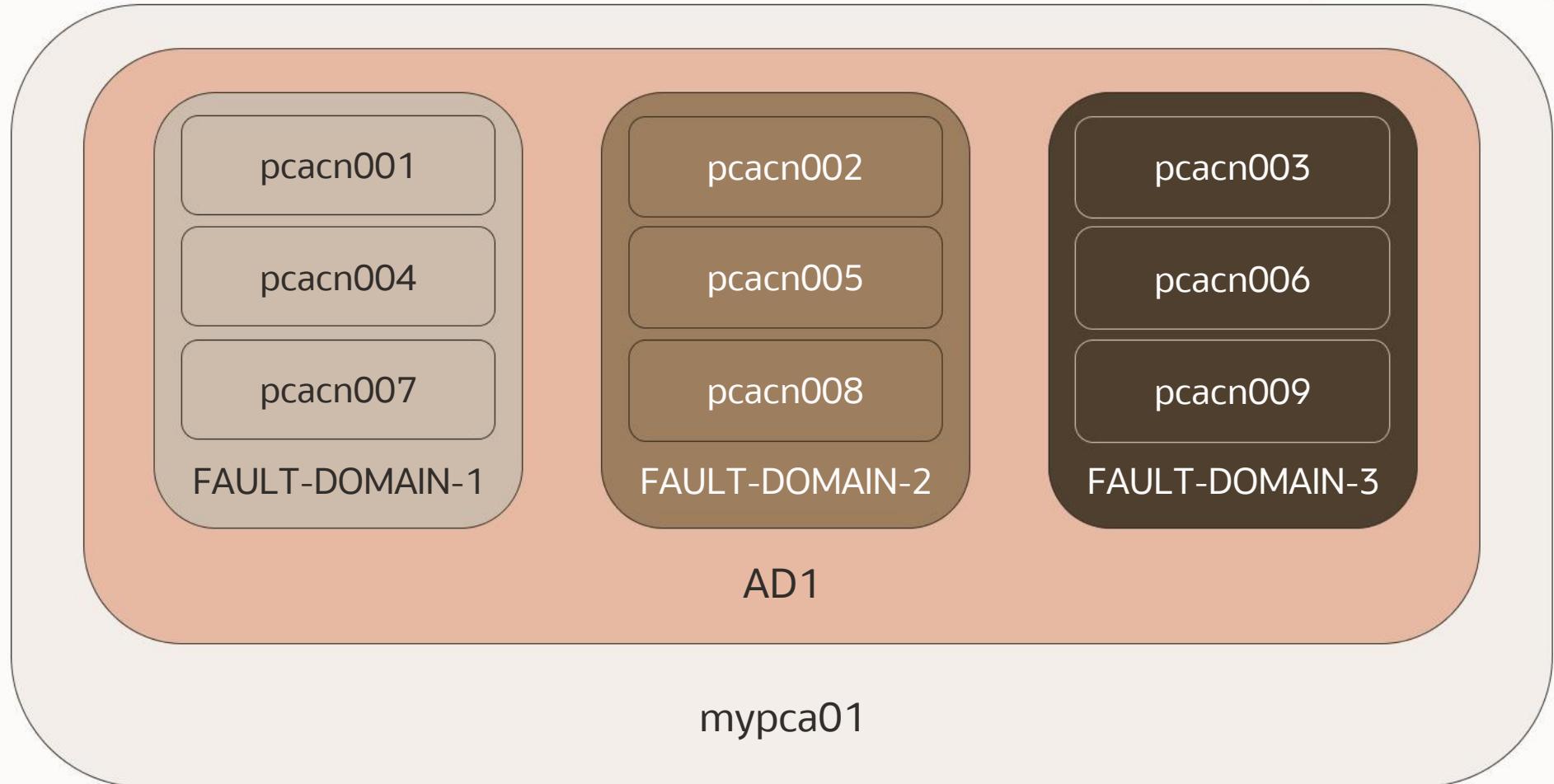
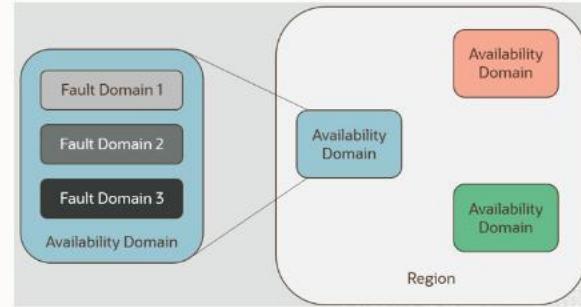
Compute - Recommended System Sizing to Support Zero Down Time Upgrade

1. Calculate required system OCPU capacity leveraging supported VM shapes
2. Select system size which provides “Available Capacity” greater than required OCPU capacity
3. When using large VM shapes (OCPU 16 or greater), increase “reserve capacity” to ensure that large VMs can be moved during upgrade.
4. When configuring the system set alerts to ensure that desired “reserve capacity” is available

System Size		Reserve Capacity		Available Capacity	
Compute Nodes	OCpus	%	OCpus	%	OCpus
3	180	33%	60	67%	120
6	360	17%	60	83%	300
9	540	11%	60	89%	480
12	720	8%	60	92%	660
15	900	7%	60	93%	840
18	1,080	6%	60	94%	1,020

Note: Reserve Capacity is simply 20 cores per fault domain.

PCA X9 Architecture In Practice



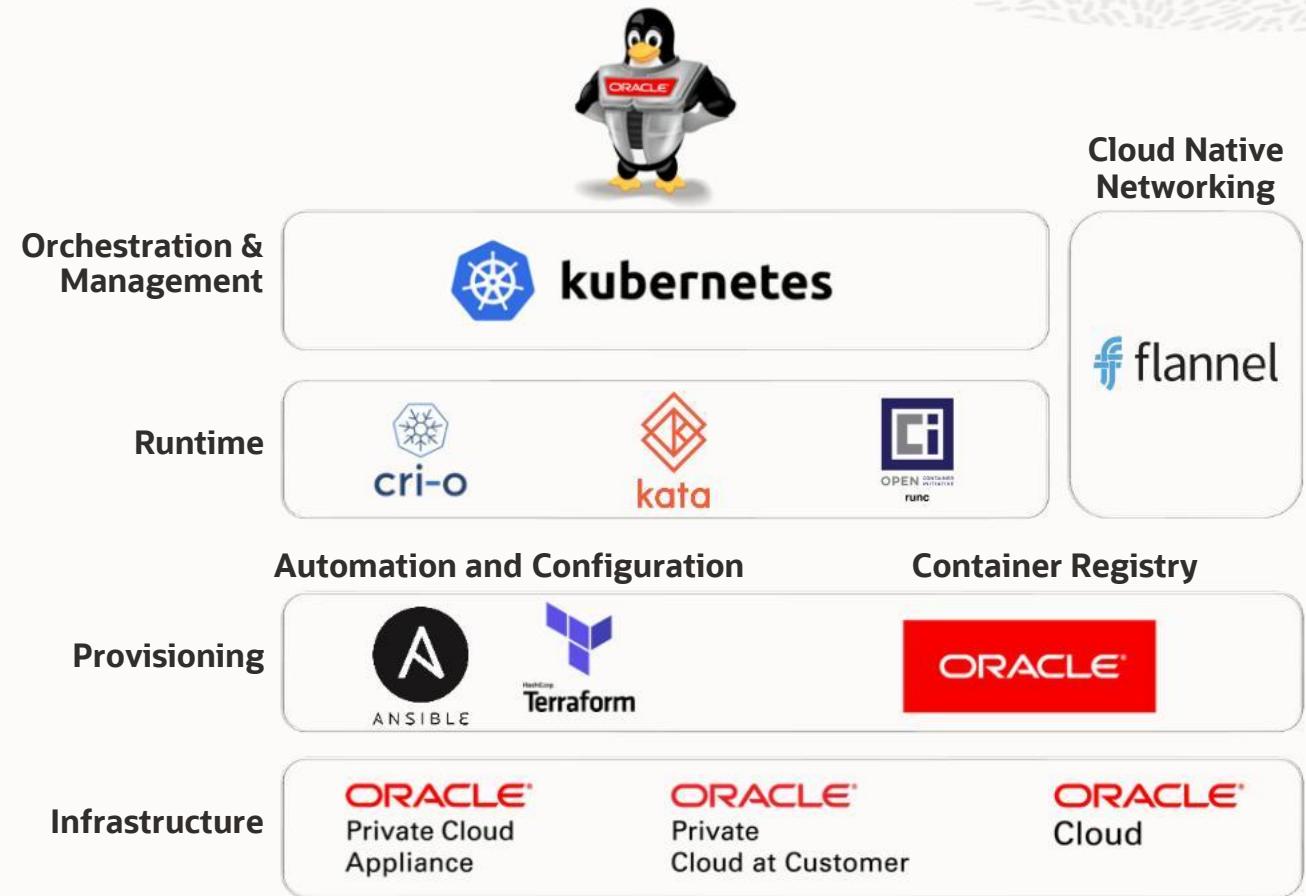
Infrastructure Services

Containers – Cloud Native



Cloud Native Environment for Private Cloud

- Oracle Linux Cloud Native Environment included
- An open, integrated operating environment that is popular with developers and easy for IT operations to deliver:
 - Containers and orchestration
 - Management tools
 - Development tools
- Supports the open standards, specifications, and APIs defined by the Cloud Native Computing Foundation (CNCF)



Oracle Products currently supported inside Docker containers

Available on Oracle Container Registry



- Oracle Linux
6 and 7 with slim variants
- MySQL Community Server
- MySQL Server Enterprise Edition
- Oracle Java SE
- Oracle NoSQL Database
- Oracle Database
- Oracle GoldenGate
- Oracle Business Intelligence
- Oracle Coherence
- Oracle Fusion Middleware Infrastructure
- Oracle Data Integrator
- Oracle SOA Suite
- Oracle Tuxedo
- Oracle WebLogic Server
- Oracle HTTP Server
-more

Infrastructure Services



Storage



Storage Overview

Support for fundamental storage services

- **Block**
 - Performance tiers dependent upon disk enclosure hardware
 - “Balanced” and “Performance”
- **File**
 - NFS (v3/v4)
 - SMB
 - **Note** - file is “very expensive” in public clouds
- **Object**
 - OCI object store



Block Storage



File Storage



Object Storage



Buckets

Storage

Base storage

- Base includes a single high-capacity tray
 - 140 TB user storage
 - 40 TB reserved capacity (system use)

	Min	Max
High Capacity Tray	1	48
High Performance Tray (optional)	0	47

High Capacity Storage

- Storage services supported: balanced block, file, object

High Performance Storage (optional)

- Storage services supported: performance block

Sizing Considerations

- Include the following in sizing calculations: data storage, user storage, VM images, backups, snapshots, clones, ...



Infrastructure Services



Networking



PCA-X9 Networking – Core Components

PCA-X9 Networking functionality consists of the following Kubernetes (K8s) controllers and Management services:

- A Network Controller (NC/nwctrl)
- A Load Balancing Controller (LBC/lbctrl)
- Ethernet Switches - underlay network
- OVN/OVS - Overlay network
- DNS, and Switch Manager micro-service modules
- PCA management nodes
- A ZFSSA.
- MySql Data Base (DB)

Functionality provided by PCA-X9 networking include:

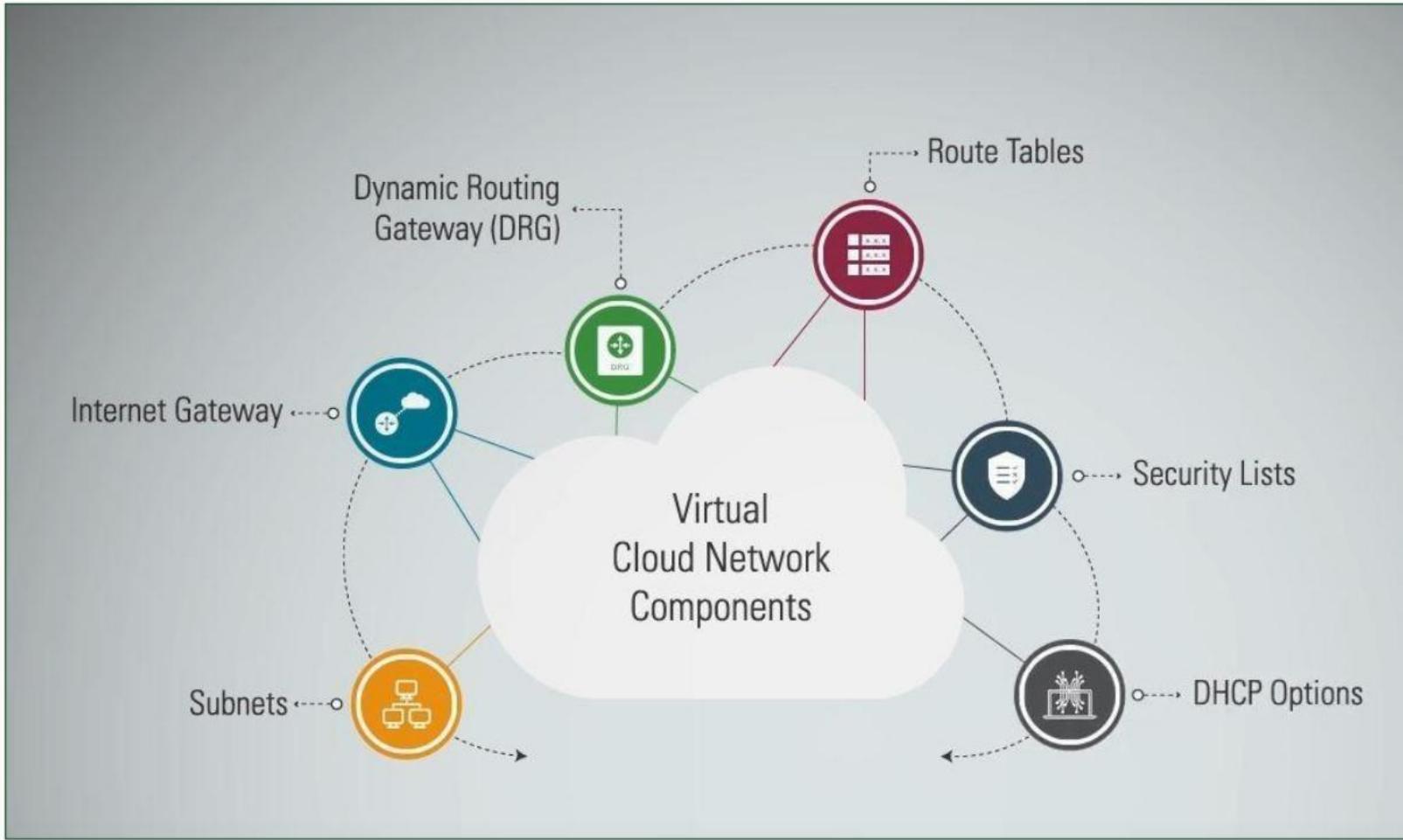
- Supporting the OCI networking CLI/APIs
- Conforming with OCI networking model:
 - OCI VCN, subnet, VNIC constructs,
 - Private and public IP address,
 - Private and public subnets, and
 - Various L3 services
- Providing DHCP, firewall, DNS, and Load Balancing networking services,
- Supporting management and storage network traffic.
- Creating MySQL DB objects for OCI objects (VCN, Subnet etc) and any related PCA specific objects.



Networking language of the Cloud (OCI)

Overview

Virtual Cloud Network (VCN)



- Virtual Cloud Network is a software-defined version of a traditional physical network including subnets, route tables, gateways, and firewall rules. Essentially a “Virtual Data Centre”.
- VCN covers a single, contiguous IPv4 CIDR block of your choice
 - Oracle recommends using one of the private IP address ranges in [RFC 1918](#) (10.0.0.0/8, 172.16/12, and 192.168/16) for VCN address space. However, you can also use a publicly routable range
- Allowable VCN size range is from /16 to /30 (VCN reserves the first two IP addresses and the last one in each subnet's CIDR)



Securing your VCN

- **Public vs Private Subnets** - designate a subnet to be private, which means instances in the subnet cannot have public IP addresses
- **Security Lists** - To control packet-level traffic in/out of an instance by defining security rules in your VCN
- **Firewall Rules** - configure firewall rules directly on the instance itself to control packet-level traffic in/out of an instance
- **Gateways and Route Tables** - Control general traffic flow from your cloud network to outside destinations (the internet, your on-premises network, or another VCN)
- **IAM Policies** - control who has access to the PCA-X9 customer tenancies or console

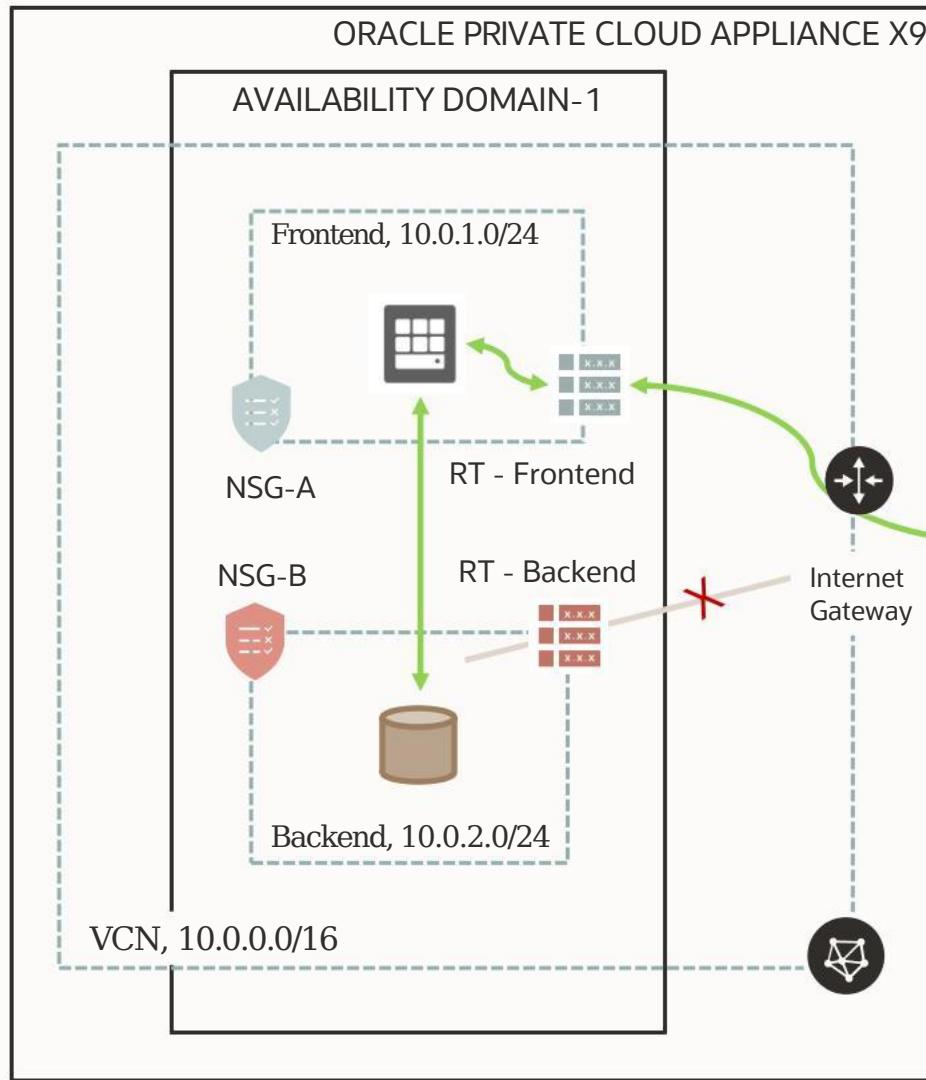


VCN Definitions

- Subnets can have one Route Table and multiple Security Lists associated to it
- Route table defines what can be routed out of VCN
- Private subnets are recommended to have individual route tables to control the flow of traffic outside of VCN
- All hosts within a VCN can route to all other hosts in a VCN (no local route rule required)
- Security Lists manage connectivity north-south (incoming/outgoing VCN traffic) and east-west (internal VCN traffic between multiple subnets)
- PCA-X9 follows a white-list model (i.e. you must manually specify whitelisted traffic flows). By default, things are locked down
- Instances cannot communicate with other instances in the same subnet, until you permit them to!
- Oracle recommends using NSGs instead of SLs because NSGs let you separate the VCN's subnet architecture from your application security requirements



VCN Deployment Architecture



Destination CIDR	Route Target
0.0.0.0/0	Internet Gateway

Type	CIDR	Protocol	Source Port	Dest Port
Stateful	Ingress	0.0.0.0/0	TCP	All 80
Stateful	Egress	NSG-B	TCP	All 1521

Destination CIDR	Route Target
0.0.0.0/0	NAT/ Service gateway /DRG

Type	CIDR	Protocol	Source Port	Dest Port
Stateful	Ingress	NSG-A	TCP	All 1521
Stateful	Egress		All	All



ZFS Storage Management

The screenshot shows the Oracle ZFS Storage ZS7-2 Configuration interface. The top navigation bar includes tabs for Configuration, Maintenance, Shares, Status, and Analytics. The Configuration tab is selected. Below the tabs, there are sub-tabs: SERVICES, STORAGE, NETWORK, SAN, CLUSTER, USERS, PREFERENCES, SETTINGS, and ALERTS. The main content area is titled "Network". It displays three sections: Devices, Datalinks, and Interfaces.

Devices (Total: 9):

- Motherboard: igb0 (1Gb (full))
- PCIe 4: i40e2 (40Gb (full)), i40e3 (40Gb (full))
- PCIe 5: i40e4 (1Gb (full)), i40e5 (1Gb (full)), i40e6 (link down), i40e7 (link down)
- PCIe 8: i40e0 (40Gb (full)), i40e1 (40Gb (full))

Datalinks (Total: 22):

- Management_vNIC1 (vnic1, via i40e4)
- Management_vNIC2 (vnic2, via i40e5)
- Storage_vNIC (VLAN 3093, via vnic3, Custom MTU(9000), via aggr1)
- Storage_vNIC.3073 (VLAN 3073, via vnic4, via aggr1)
- Storage_vNIC.3074 (VLAN 3074, via vnic5, via aggr1)
- Storage_vNIC.3075 (VLAN 3075, via vnic6, via aggr1)
- Storage_vNIC.3076 (VLAN 3076, via vnic7, via aggr1)
- Storage_vNIC.3077 (VLAN 3077, via vnic8, via aggr1)
- Storage_vNIC.3078 (VLAN 3078, via vnic9, via aggr1)
- Storage_vNIC.3079 (VLAN 3079, via vnic10, via aggr1)
- Storage_vNIC.3080 (VLAN 3080, via vnic11, via aggr1)
- Storage_vNIC.3081 (VLAN 3081, via vnic12, via aggr1)
- Storage_vNIC.3082 (VLAN 3082, via vnic13, via aggr1)
- Storage_vNIC.3083 (VLAN 3083, via vnic14, via aggr1)
- Storage_vNIC.3084 (VLAN 3084, via vnic15, via aggr1)
- Storage_vNIC.3085 (VLAN 3085, via vnic16, via aggr1)
- Storage_vNIC.3086 (VLAN 3086, via vnic17, via aggr1)
- Storage_vNIC.3087 (VLAN 3087, via vnic18, via aggr1)

Interfaces (Total: 5):

- Management_Interface (IPv4 static, 192.168.4.100/24, via vnic1, vnic2)
- Storage_Interface (IPv4 static, 192.168.40.1/24, via vnic3)
- i40e4 (IPv4 static, 192.168.4.1/24, via i40e4)
- vnic1 (IPv4 static, 0.0.0.0/0, via vnic1)
- vnic2 (IPv4 static, 0.0.0.0/0, via vnic2)

Buttons at the top right: REVERT and APPLY.

Storage Pools

Sun ORACLE ORACLE ZFS STORAGE ZS7-2 Super-User@ovcasn01r1 LOGOUT HELP

Configuration Maintenance Shares Status Analytics

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES SETTINGS ALERTS

About Storage Configuration
Storage is configured in pools that are characterized by their underlying data redundancy, and provide space that is shared across all filesystems and LUNs.

During the configuration process, you will select which devices to allocate to a storage pool and the redundancy profile most appropriate to your workload, balancing performance, availability, and capacity.

Importing storage will search all devices attached to the system for existing pool configurations, from which you can select one as the system pool. This option is used to migrate pools between systems, and in some cases can recover pools that were destroyed inadvertently.

Available Pools

HOST : POOL	DATA PROFILE	LOG PROFILE	STATUS	ERRORS ENCRYPTED
ovcasn01r1:OVCA_POOL	Mirrored	Mirrored log	Degraded	0
ovcasn01r1:VM_Data_Pool	Mirrored	Mirrored log	Online	0

Allocation

Pool Name: OVCA_POOL
Data Profile: Mirrored
Log Profile: Mirrored log
Pool Status: Degraded
Data Errors: No known persistent errors
Scrub Schedule: 30 days
Scrub Status: Scrub completed: 0 errors
2023-1-31 06:27:44 (10h48m)
SCRUB

Device Status
A device in a replicated configuration could not be opened. The pool is no longer providing the configured level of replication. Attach or replace the missing device.
2 errors

DEVICE	TYPE	STATE (DETAILS)
2214NMQ80P-HDD 6	Data	Faulted (Active problem)
2214NMQ80P-HDD 11	Data	Hot Spare (for HDD 6)

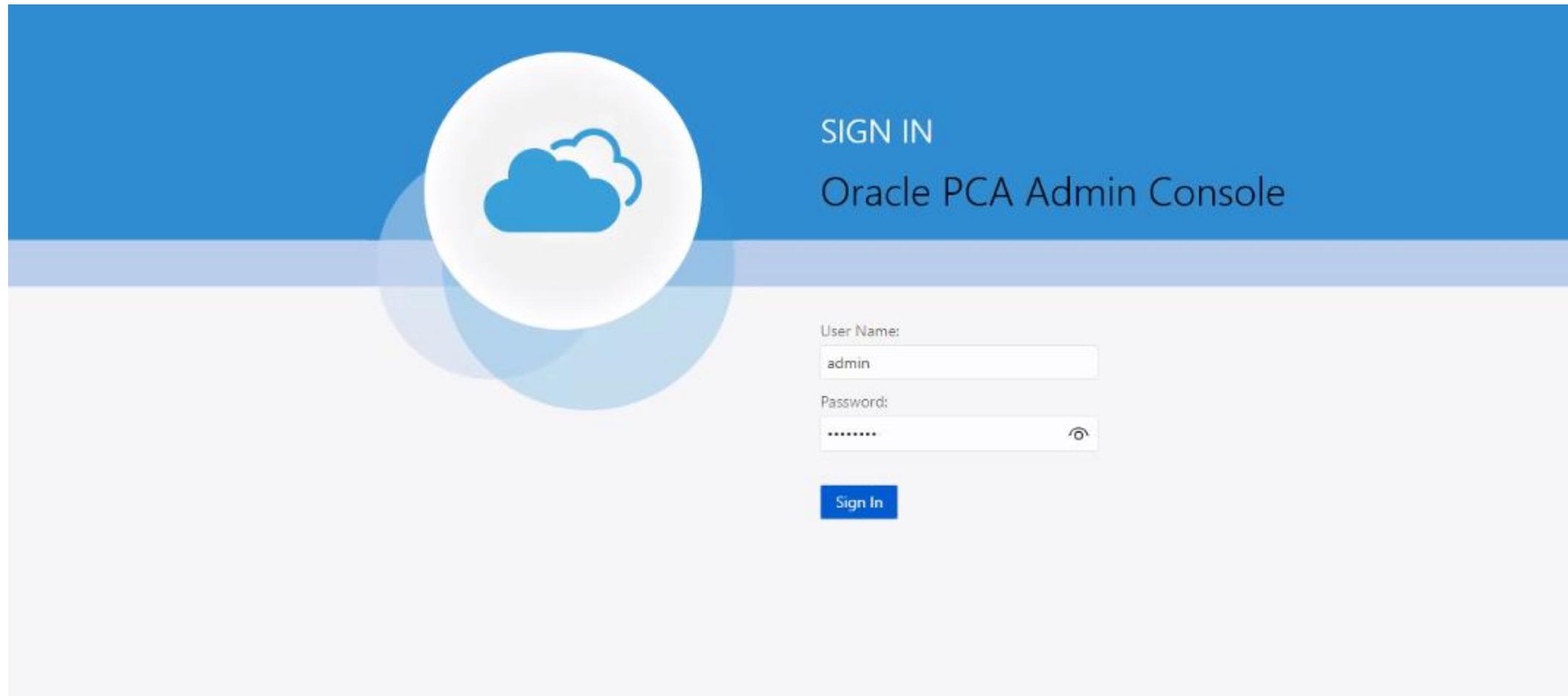
Allocation Data

Type	Size
Data	142T
Reserve	147T
Spare	32.1T

Allocation Summary

Type	Count
Data + Reserve	18 disks
Spare	2 disks
Log	2 disks
Cache	2 disks
Meta	0 disks

PCA Admin Console



Networking Configurations

For quick access, place your favorites here on the favorites bar. [Manage favorites now](#)



ORACLE®
PCA Admin Console

0

Quick Launch



Hardware View



Network Environment



Password Management

Network Setup

ORACLE
PCA Admin Console Open OVM Manager... 

Network Environment

Changes to the Network Environment configuration data requires entering the PCA Admin Password before selecting the 'Apply Changes' button.

Management Nodes Data Center Network DNS

Management Node 1

* IP Address * Host Name

Management Node 2

* IP Address * Host Name

Management Virtual IP Address

* IP Address

↓

* PCA Admin Password(Required for changes) Reset Apply Changes

Network Setup – DNS, Netmask, Default Gateway

ORACLE
PCA Admin Console

Open OVM Manager...

Network Environment

Changes to the Network Environment configuration data requires entering the PCA Admin Password before selecting the 'Apply Changes' button.

Management Nodes Data Center Network **DNS**

Management Network VLAN 5

* Domain Name

* Netmask 255.255.255.192

* Default Gateway 10.194.72.1

* NTP 10.4.0.54

* PCA Admin Password(Required for changes) **Apply Changes**

This screenshot shows the 'Network Environment' configuration page in the Oracle PCA Admin Console. The 'Data Center Network' tab is selected. The 'Management Network VLAN' is set to VLAN 5. The 'Domain Name' field is redacted. The 'Netmask' is set to 255.255.255.192. The 'Default Gateway' is set to 10.194.72.1. The 'NTP' server is set to 10.4.0.54. At the bottom, there is a note about requiring the PCA Admin Password for changes, followed by a password input field, a 'Reset' button, and a prominent blue 'Apply Changes' button.

Networking DNS

ORACLE®
PCA Admin Console

Open OVM Manager... 

Network Environment

Changes to the Network Environment configuration data requires entering the PCA Admin Password before selecting the 'Apply Changes' button.

Management Nodes Data Center Network **DNS**

* DNS Server 1
DNS Server 2
DNS Server 3


* PCA Admin Password(Required for changes) **Reset** **Apply Changes**

OVM Manager

For quick access, place your favorites here on the favorites bar. [Manage favorites now](#)

ORACLE VM Manager

Logged in as: itcadmin [Logout](#) [Settings](#) [Help](#)

Health Servers and VMs Repositories Networking Storage Reports and Resources Jobs

Name	Tag(s)	Keymap	Virtual IP	Master Server	Pool File System	Secure VM Migrate	Description
Rack1_ServerPool	en-us				Pool filesystem for Rack1_ServerP...	Yes	

 Job Summary: 0 Total Jobs 0 Pending 0 In Progress 0 Failed 0 Aborted 0 Complete

Compute Nodes Options

ORACLE VM Manager

Health Servers and VMs **Repositories** Networking Storage Reports and Resources Jobs

View ▾ Perspective: Virtual Machines ▾

Name	Status	Tag(s)	Event Severity	Server	Max. Memory (MB)	Memory (MB)	Max. Processors	Processors	Keymap	Operating System
vp281502p	Running		Informational	ovcacn07r1	16384	16384	2	2	en-us	Oracle Linux 5
vp284802n	Running		Informational	ovcacn07r1	16384	16384	2	2	en-us	Oracle Linux 5
vp288301n	Running		Informational	ovcacn07r1	24576	24576	2	2	en-us	Oracle Linux 7
Edit...				ovcacn07r1	24576	24576	4	4	en-us	Red Hat Enterprise Linux 7
				ovcacn07r1	16384	16384	2	2	en-us	Oracle Linux 5
				ovcacn07r1	16384	16384	2	2	en-us	Oracle Linux 5
				ovcacn07r1	8192	8192	1	1	en-us	Oracle Linux 5
				ovcacn07r1	49152	49152	2	2	en-us	Red Hat Enterprise Linux 7

Rows Selected: 10

Right-clicked item: Edit...

- Edit...
- Delete
- Start
- Stop
- Launch Console
- Launch Serial Console
- Restart
- Kill
- Suspend
- Resume
- Export to OCI...
- Migrate or Move...
- Clone...
- Export to Virtual Appliance...
- Manage Clone Customizers...
- Send VM Messages...
- Display VM Config File Content...
- Display VM Hierarchy Viewer...
- Display Events...
- Generate Report

Compute Nodes Setup Details

ORACLE VM Manager

Logged in as: itcadmin Logout Settings Help

Health Servers and VMs Repositories Networking Storage Reports and Resources Jobs

View Perspective: Virtual Machines Name Filter Go

Server Pools Rack1_ServerPool ovcacn07r1 ovcacn08r1 ovcacn09r1 Unassigned Servers Unassigned Virtual Machines

Virtual Machine Configuration Details:

Name	Status	Tag(s)	Event Severity	Server	Max. Memory (MB)	Export to OCI...	Max. Processors	Processors	Keymap	Operating System
VM_02p	Running	Informational	o[REDACTED]r1	16384	16384	2	2	2	en-us	Oracle Linux 5
VM_02n	Running	Informational	o[REDACTED]r1	16384	16384	2	2	2	en-us	Oracle Linux 5
VM_01n	Running	Informational	o[REDACTED]r1	24576	24576	2	2	2	en-us	Oracle Linux 7

Configuration Tab (Selected):

Name:	[REDACTED]n	Max. Memory (MB):	24576	Huge Pages:	No
Status:	Running	Memory (MB):	24576	Repository for Configuration File:	Prod_Repo_02
Operating System:	Oracle Linux 7	Priority:	50	Boot Order:	Disk
Keymap:	en-us	Mouse Type:	OS Default	Network Boot Path:	
Max. Processors:	2	Domain Type:	Xen HVM PV Drivers	Restart Action On Crash:	Restart
Processors:	2	Start Policy:	Use Pool Policy		
Processor Cap:	100	High Availability:	No		
ID:	0004fb0000060000b464cb11f0016b46				
Origin:	[REDACTED]	VE.ova			
Description:	A virtual machine				
Config File Absolute Path:	/dev/mapper/3600144f0e2b554040000627a9af90002/VirtualMachines/0004fb0000060000b464cb11f0016b46/vm.cfg				
Config File Mounted Path:	/OVS/Repositories/0004fb00000300083aa8a45d558165c/VirtualMachines/0004fb0000060000b464cb11f0016b46/vm.cfg				

Networks Tab:

vlan_02p	02p	Running	Informational	o[REDACTED]r1	24576	24576	4	4	en-us	Red Hat Enterprise Linux 7
vlan_01n	01n	Running	Informational	o[REDACTED]r1	16384	16384	2	2	en-us	Oracle Linux 5
vlan_02n	02n	Stopped	Informational	o[REDACTED]r1	16384	16384	2	2	en-us	Oracle Linux 5
vlan_01p	01p	Running	Informational	o[REDACTED]r1	8192	8192	1	1	en-us	Oracle Linux 5

Rows Selected: 1

Job Summary: 0 Total Jobs 0 Pending 0 In Progress 0 Failed 0 Aborted 0 Complete

Description	Status	Progress	Message	Timestamp	Duration	Abort	Details
No data to display							

PCA Admin

```
[root@ov-1 ~]# pca-admin
Welcome to PCA! Release: 2.4.4.2
PCA> help

Documented commands (type help <topic>):
-----
add      create  deprovision  get    list    reprovision  set    start  update
backup   delete  diagnose     help   remove  rerun     show  stop

Undocumented commands:
-----
EOF  exit  q  quit  shell

PCA> list help

Status: Failure
Error Message: Error (MISSING_TARGET_000): Missing command target for command: list. Command targets can be: ['management-node', 'iscsi-storage', 'lock', 'compute-node', 'er', 'backup-task', 'storage-profile', 'network-port', 'oci-backup', 'uplink-port', 'network-switch', 'mgmt-switch-port', 'update-task', 'uplink-port-group', 'task', 'oci-'

PCA> list compute-node

Note: Provisioning_Status is unrelated to node status in Oracle VM Manager Web UI.

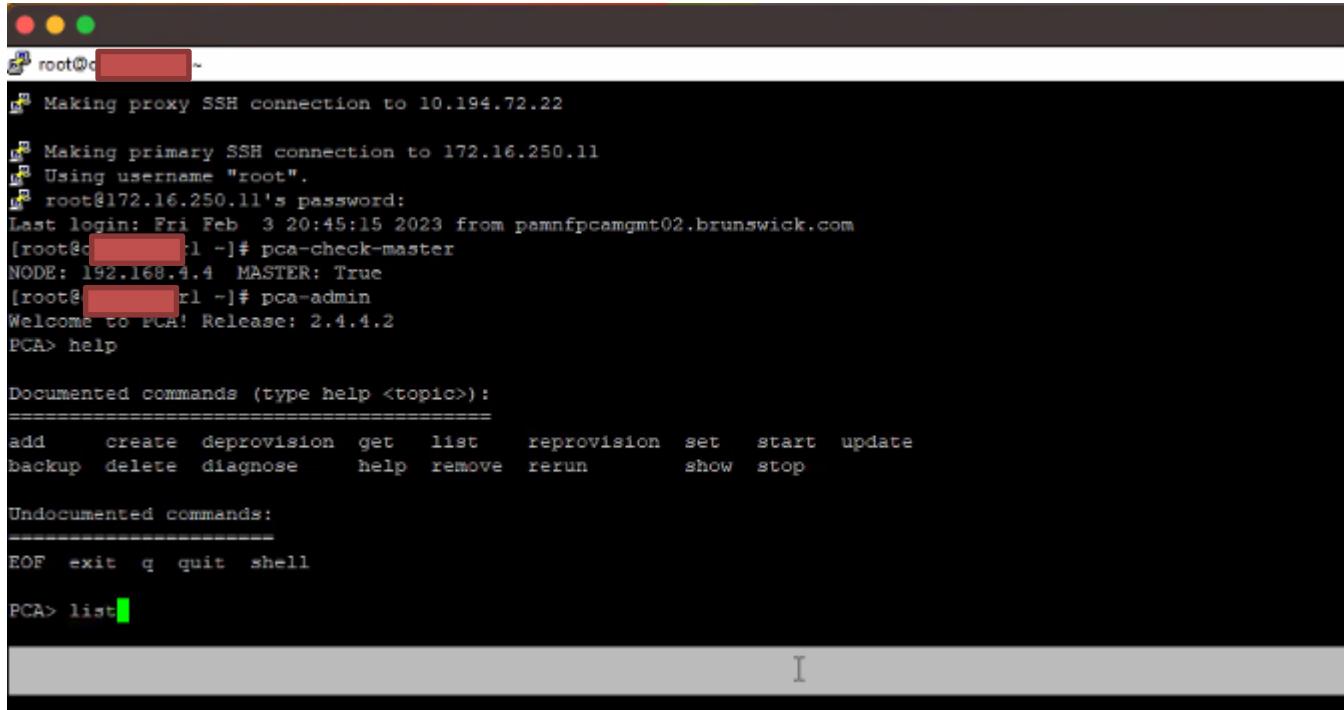
Compute_Node  IP_Address  Provisioning_Status  ILOM_MAC          Provisioning_State
-----
ov-1          192.168.4.7  RUNNING            a8:69:8c:06:59:9f  running
ov-1          192.168.4.6  RUNNING            a8:69:8c:06:50:fb  running
ov-1          192.168.4.5  RUNNING            a8:69:8c:06:52:e3  running

3 rows displayed
→
Status: Success

PCA> █
```

Command Line Interface

pca-check-master



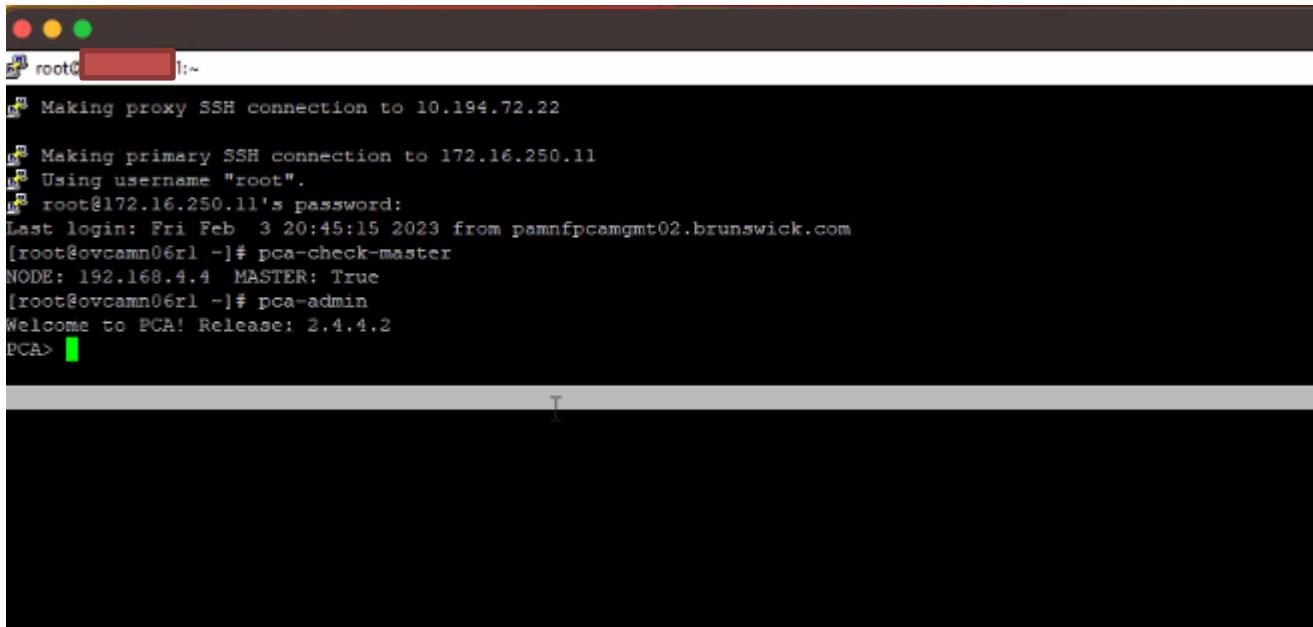
A terminal window titled "root@ovcamn06rl ~" showing the output of the "pca-check-master" command. The output includes proxy and primary SSH connection details, user authentication, and PCA version information. It also lists documented and undocumented commands, and ends with a "list" command.

```
[root@ovcamn06rl ~]# Making proxy SSH connection to 10.194.72.22
[root@ovcamn06rl ~]# Making primary SSH connection to 172.16.250.11
[root@ovcamn06rl ~]# Using username "root".
[root@ovcamn06rl ~]# root@172.16.250.11's password:
Last login: Fri Feb  3 20:45:15 2023 from pamnfpcamgmt02.brunswick.com
[root@ovcamn06rl ~]# pca-check-master
NODE: 192.168.4.4 MASTER: True
[root@ovcamn06rl ~]# pca-admin
Welcome to PCA! Release: 2.4.4.2
PCA> help

Documented commands (type help <topic>):
=====
add      create    deprovision   get      list      reprovision   set      start    update
backup   delete   diagnose     help     remove   rerun      show    stop

Undocumented commands:
=====
EOF  exit  q  quit  shell

PCA> list
```



A terminal window titled "root@ovcamn06rl ~" showing the output of the "pca-check-master" command. The output includes proxy and primary SSH connection details, user authentication, and PCA version information. It ends with a blank command line.

```
[root@ovcamn06rl ~]# Making proxy SSH connection to 10.194.72.22
[root@ovcamn06rl ~]# Making primary SSH connection to 172.16.250.11
[root@ovcamn06rl ~]# Using username "root".
[root@ovcamn06rl ~]# root@172.16.250.11's password:
Last login: Fri Feb  3 20:45:15 2023 from pamnfpcamgmt02.brunswick.com
[root@ovcamn06rl ~]# pca-check-master
NODE: 192.168.4.4 MASTER: True
[root@ovcamn06rl ~]# pca-admin
Welcome to PCA! Release: 2.4.4.2
PCA>
```

Diagnose ILOM

```
PCA> diagnose-ilom
*** Unknown syntax: diagnose-ilom
PCA> diagnose ilom
Checking ILOM health; please wait.

IP_Address      Status      Health_Details
-----  
192.168.4.129  Not Connected  None
192.168.4.128  Not Connected  None
192.168.4.127  Not Connected  None
192.168.4.126  Not Connected  None
192.168.4.125  Not Connected  None
192.168.4.124  Not Connected  None
192.168.4.123  Not Connected  None
192.168.4.122  Not Connected  None
192.168.4.121  Not Connected  None
192.168.4.120  Not Connected  None
192.168.4.101  OK          None
192.168.4.103  OK          None
192.168.4.102  OK          None
192.168.4.105  OK          None
192.168.4.104  OK          None
192.168.4.107  Faulty       Fri Jan 27 17:55:54 2023 System MB (Motherboard)
                           The Field Programmable Gate Array (FPGA) has detected a malfunctioning
                           component and has powered-off the system. (Probability:100,
                           UUID:432b473a-8409-c087-b374-ff4laa1b0ea9, Resource:/SYS/MB, Part
                           Number:8207753, Serial Number:465136J+2152GA00BP, Reference
                           Document:http://support.oracle.com/msg/SPENV-8000-D1)  
-----  
192.168.4.106  OK          None
192.168.4.109  Not Connected  None
192.168.4.108  Not Connected  None
192.168.4.112  Not Connected  None
192.168.4.113  Not Connected  None
192.168.4.110  Not Connected  None
192.168.4.111  Not Connected  None
192.168.4.116  Not Connected  None
192.168.4.117  Not Connected  None
192.168.4.114  Not Connected  None
192.168.4.115  Not Connected  None
192.168.4.118  Not Connected  None
192.168.4.119  Not Connected  None  
-----  
29 rows displayed
```

Status: Success

```
PCA>
```

Diagnose Hardware RACK

```
PCA> diagnose hardware rack

Hostname          IP_Address   Last_Seen    Pingable  Status   Type
-----          -----        -----      -----      -----   -----
ovcasn01rl      192.168.4.1   02-03-2023 21:09:05 True     OK      zfs
ilom-d[1]rl      192.168.4.101 02-03-2023 21:09:05 True     OK      zfs-ilom
ilom-d[2]rl      192.168.4.102 02-03-2023 21:09:05 True     OK      zfs-ilom
ilom-d[5]rl      192.168.4.103 02-03-2023 21:09:05 True     OK      mn-ilom
ilom-d[6]rl      192.168.4.104 02-03-2023 21:09:05 True     OK      mn-ilom
ilom-d[7]rl      192.168.4.105 02-03-2023 21:09:05 True     OK      ilom
ilom-d[8]rl      192.168.4.106 02-03-2023 21:09:05 True     OK      ilom
ilom-d[9]rl      192.168.4.107 02-03-2023 21:09:05 True     OK      ilom
ov[1]cl          192.168.4.2   02-03-2023 21:09:05 True     OK      zfs
ov[2]cl          192.168.4.202 02-03-2023 21:09:05 True     OK      cisco_leaf
ov[3]cl          192.168.4.203 02-03-2023 21:09:05 True     OK      cisco_leaf
ov[4]cl          192.168.4.204 02-03-2023 21:09:05 True     OK      cisco_spine
ov[5]cl          192.168.4.205 02-03-2023 21:09:05 True     OK      cisco_spine
ov[J-Arl]       192.168.4.210 02-03-2023 21:09:05 True     OK      pdu
ov[J-Brl]       192.168.4.211 02-03-2023 21:09:05 True     OK      pdu
ov[6]cl          192.168.4.230 02-03-2023 21:09:05 True     OK      cisco
ov[7]cl          192.168.4.3   02-03-2023 21:09:05 True     OK      mn
ov[8]cl          192.168.4.4   02-03-2023 21:09:05 True     OK      mn
ov[9]cl          192.168.4.5   02-03-2023 21:09:05 True     OK      cn
ov[10]cl         192.168.4.6   02-03-2023 21:09:05 True     OK      cn
ov[11]cl         192.168.4.7   02-03-2023 21:09:05 True     OK      cn
-----
21 rows displayed

Status: Success

PCA>
```

Setup Details

```
[root@ov [REDACTED] ~]# fwupdate list all
=====
SP
=====
ID      Product Name          System Firmware Version    ILOM Version           BIOS/OBP Version        Fallback Boot Version   XML Support
sp      ORACLE SERVER X8-2     -                   v5.1.0.20 r145377       51070400                -                     N/A
=====

CONTROLLER
=====
ID      Type      Manufacturer Model      Product Name          FW Version      BIOS Version      EFI Version      FCODE Version    Package Version  NVDATA Version   XML Support
c0      SAS       LSI Logic      0x00ce     Avago MegaRAID SAS 9361-1 4.740.00-8466 6.36.00.3    06.24.02.05    4.19.08.00     -              -              -             N/A
=====

DISKS
=====
ID      Manufacturer Model      ATA Model            Chassis Slot  Type      Media      Size(GiB) FW Version ATA FW Ver XML Support
c0d0    SEAGATE      ST1200IN9SUN1.2T  -               -          0         sas       HDD       1118     ORAB      -          N/A
c0d1    SEAGATE      ST1200IN9SUN1.2T  -               -          1         sas       HDD       1118     ORAB      -          N/A
=====

CONTROLLER
=====
ID      Type      Manufacturer Model      Product Name          FW Version      BIOS Version      EFI Version      FCODE Version    Package Version  NVDATA Version   XML Support
c1      NET       Mellanox      0x1019     Oracle Dual Port 100Gb Ro -          -          -          -          -          -          -          -             N/A
=====

CONTROLLER
=====
ID      Type      Manufacturer Model      Product Name          FW Version      BIOS Version      EFI Version      FCODE Version    Package Version  NVDATA Version   XML Support
c2      NET       Broadcom     0x16d9     Oracle Dual Port 10Gb/25G -          -          -          -          -          20.08.01.17    -             N/A
=====

CONTROLLER
=====
ID      Type      Manufacturer Model      Product Name          FW Version      BIOS Version      EFI Version      FCODE Version    Package Version  NVDATA Version   XML Support
c3      NET       Intel        0x1533     Intel(R) I210 Gigabit Net -          -          -          -          80000690      -             N/A
[root@ov [REDACTED] ~]#
```

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