
ORACLE®

Oracle Database Appliance Transfer of Information

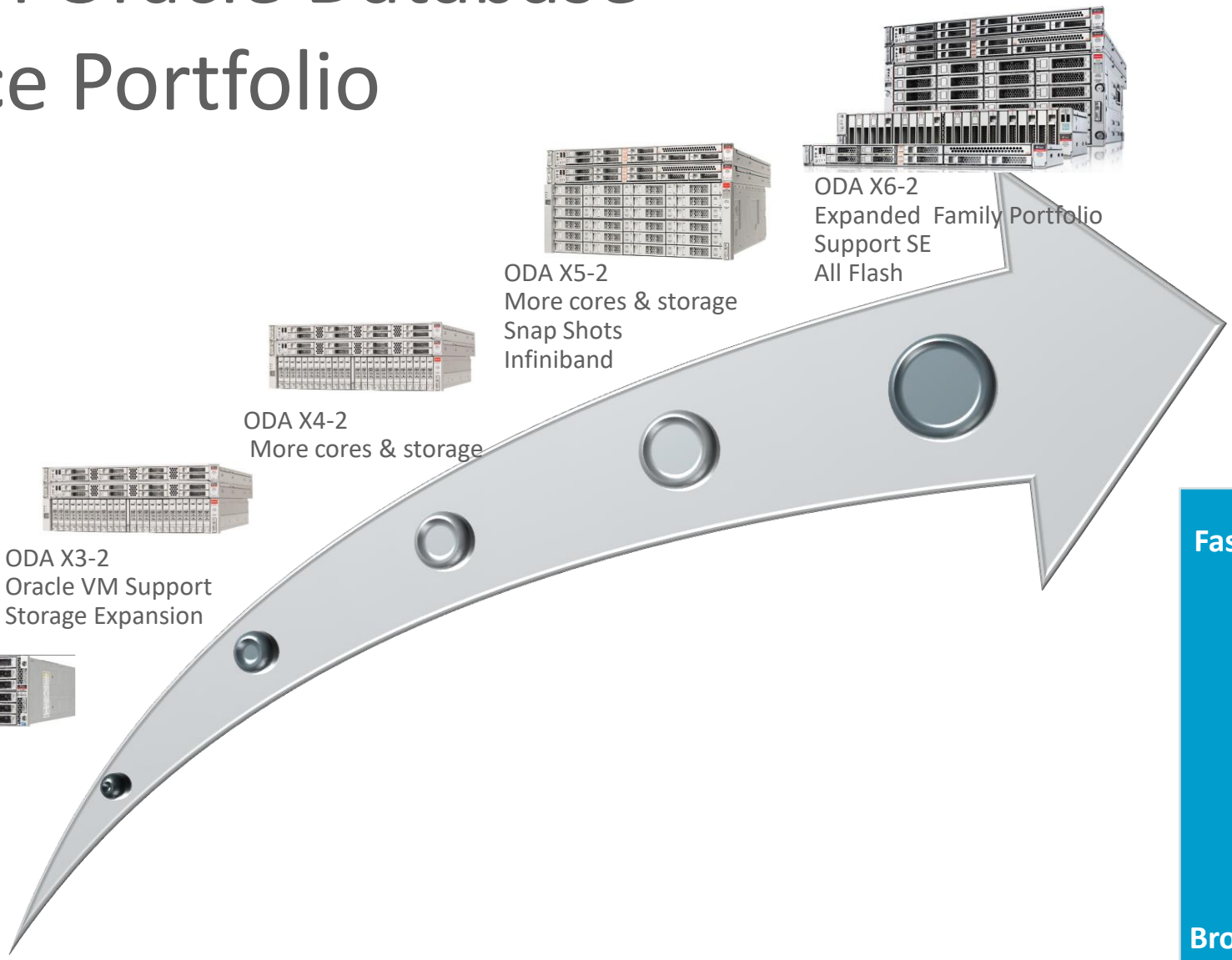
Oracle Database Appliance X7-2

Nov 2017

Agenda

- Overview of Oracle Database Appliance
- The Hardware
- The Software Stack
- Q & A

Evolution Oracle Database Appliance Portfolio



Fastest growing Engineered System

Most diverse appliance in the market.

Common use cases are:
Production,
Remote Branch Office,
Departmental,
Test and Development

Broad adoption across all Industries

Oracle Database Appliances – Proven and Tested

1,000s
of Deployments

100s
of ISVs in ODA Exastack Program

ORACLE DATABASE APPLIANCE OPTIMIZED

ORACLE DATABASE APPLIANCE READY

Oracle Database Appliance X7-2 Model Family

PERFORMANCE HIGHER

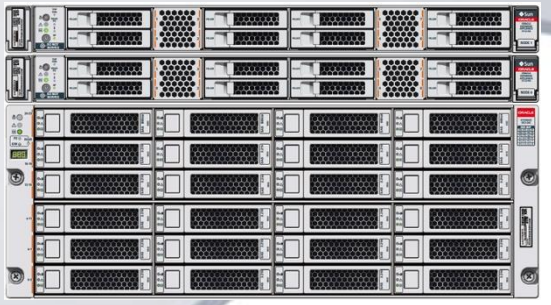
- ✓ Increased storage capacity
- ✓ Virtualization on all models
- ✓ Database Standard Edition 2 RAC
- ✓ Latest Intel Xeon processor
- ✓ Increased core count
- ✓ Database 12 Release 2

Oracle Database Appliance X7-2S

Single-instance
SE/SE1/SE2 or EE
Virtualization
10 Cores
12.8 TB Data Storage (Raw)

Oracle Database Appliance X7-2M

Single-instance
SE/SE1/SE2 or EE
Virtualization
36 Cores
Up to 51.2 TB Data Storage (Raw)



Oracle Database Appliance X7-2-HA

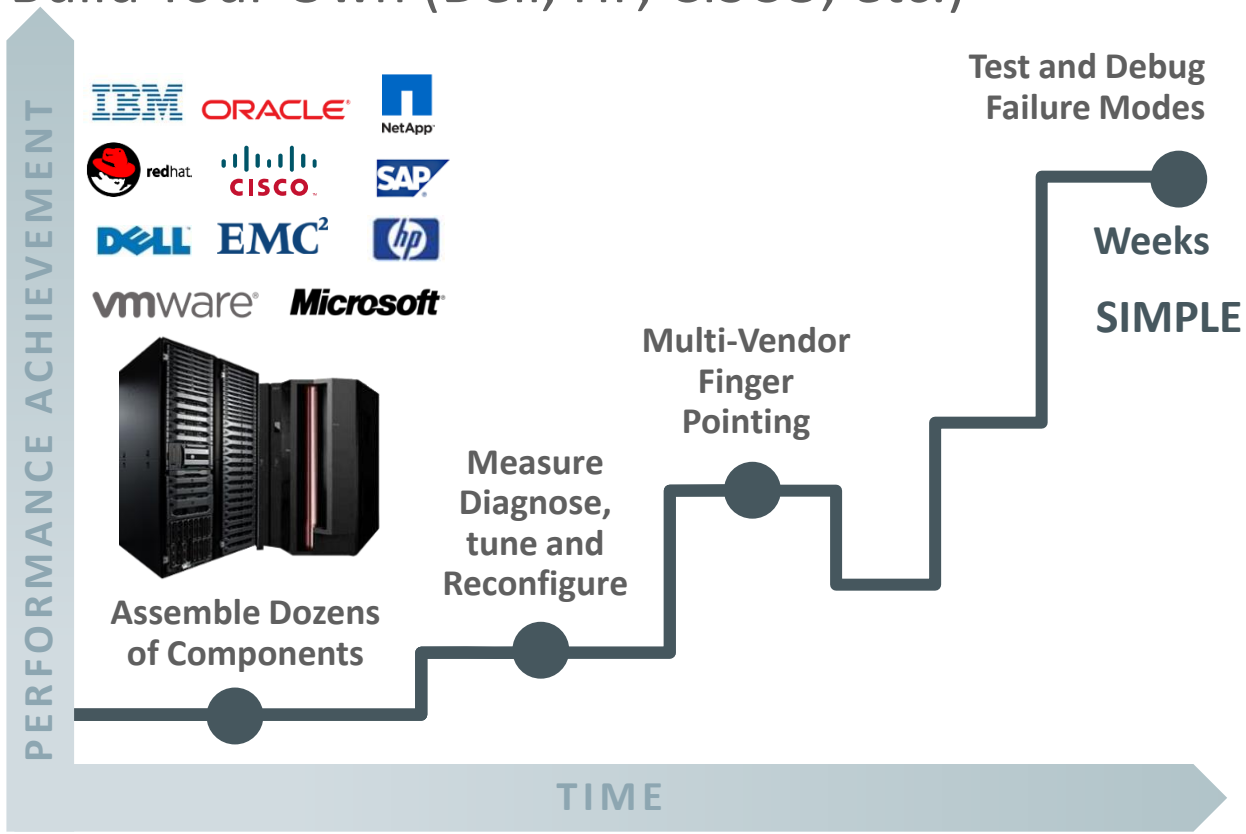
RAC, RAC One, SI
SE/SE1/SE2 or EE
Virtualization
72 Cores
Up to 128TB SSD or
300 TB HDD Data Storage (Raw)

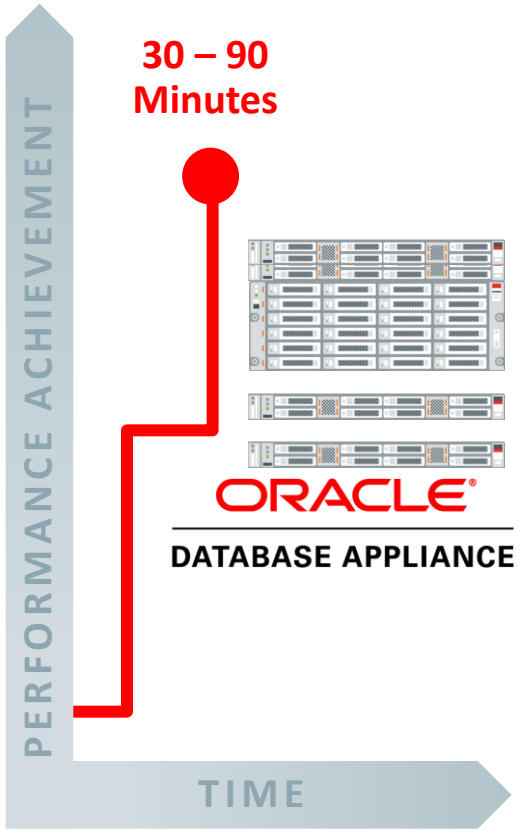
CAPACITY HIGHER

Optimized Infrastructure Delivers Optimized Results

SIMPLE | To Install, Manage and Maintain

Build Your Own (Dell, HP, CISCO, etc.)

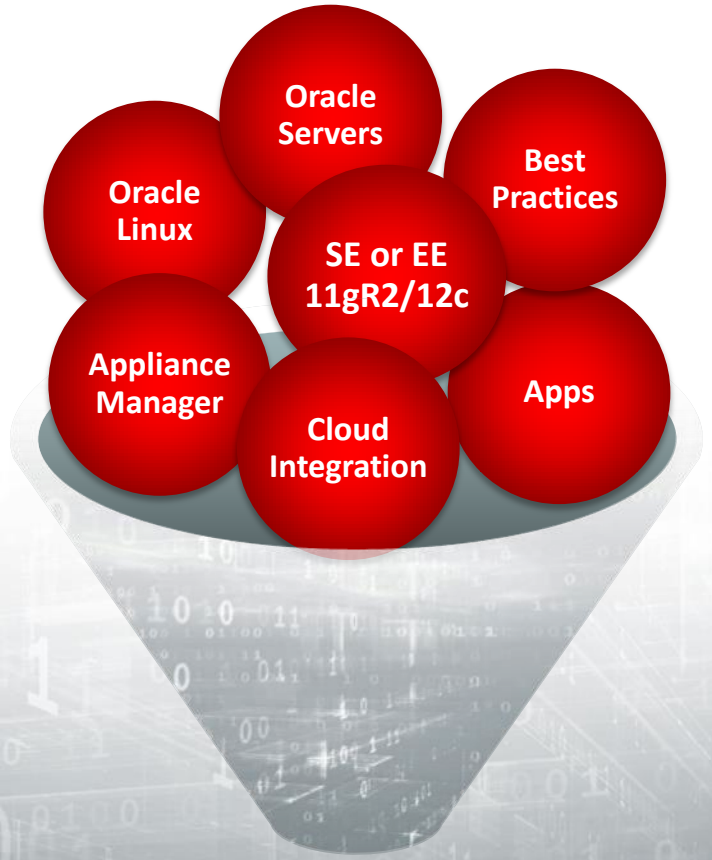




KEY BENEFITS

- Simplify IT Environment
- 40% reduced TCO
- License only the cores you use
- 10X faster deployment time
- 20X less maintenance

OPTIMIZED Solution-In-A-Box



ORACLE DATABASE APPLIANCE

Maximize Your Return on IT Resources

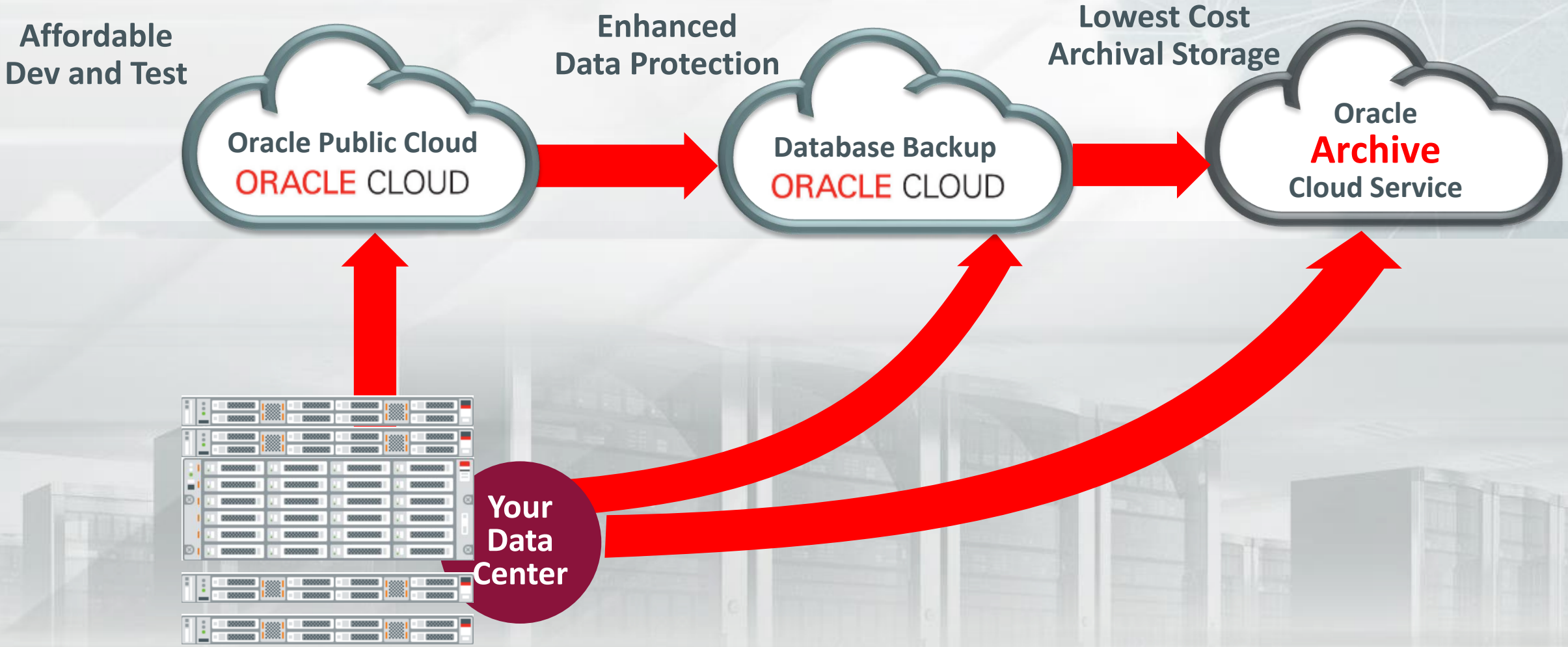
- Everything necessary for a database solution in a single appliance
- Best practices and automation accelerates time to value
- Integrated applications and database in single appliance

ORACLE

Support On-Premises and Oracle Public Cloud

- Same skills and standards on-premises and in Oracle Public Cloud
- Back up critical data in cloud
- Archive non-critical data at an affordable price
- Ready-to-use capabilities, or integrate your choice of frameworks

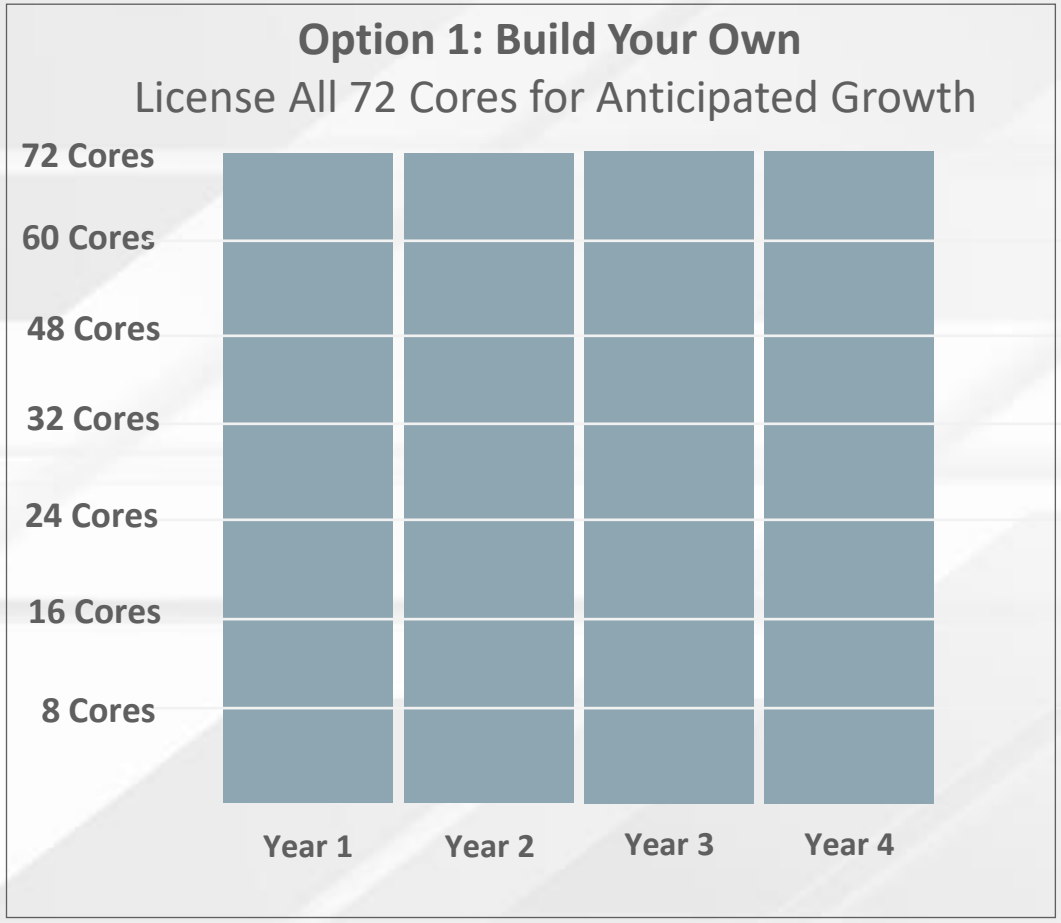
Cloud Integration with Oracle Database Appliance

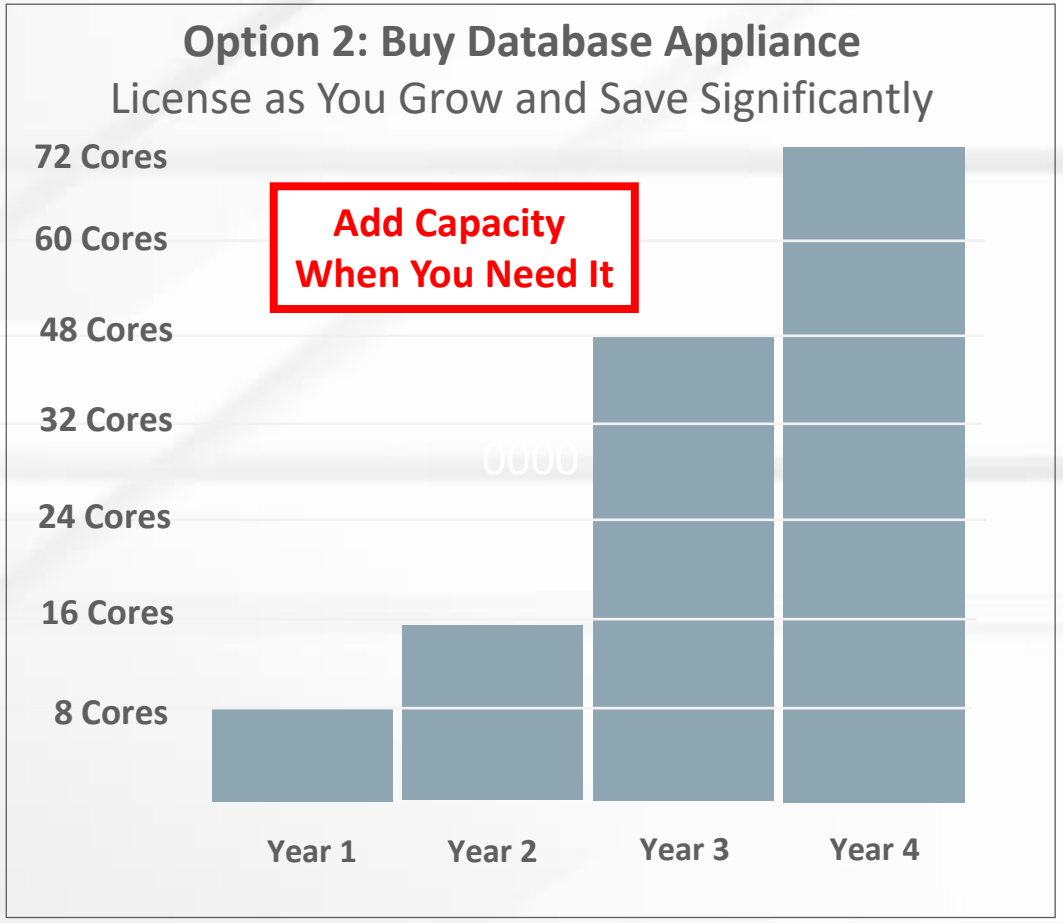


Affordable

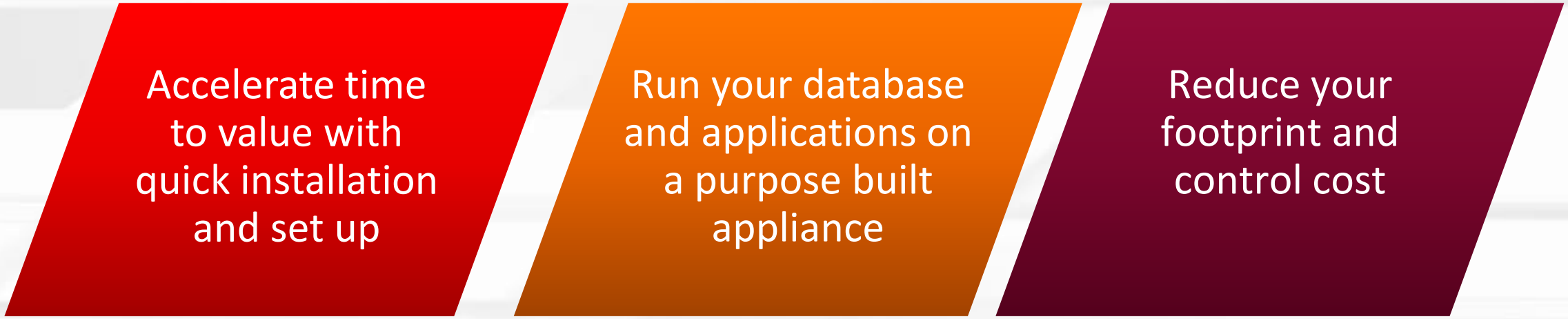
- Broad, compatible family
- Right-sized tool for the task
- Complete engineered appliance
- Capacity on Demand Oracle Software Licensing
- Reduces operational, floor space, power and cooling costs

Manage License Cost





Optimized Infrastructure Delivers Optimized Results



Oracle Database Appliance X7-2S / X7-2M

Hardware

ODA X7-2S - Small Hardware Configuration

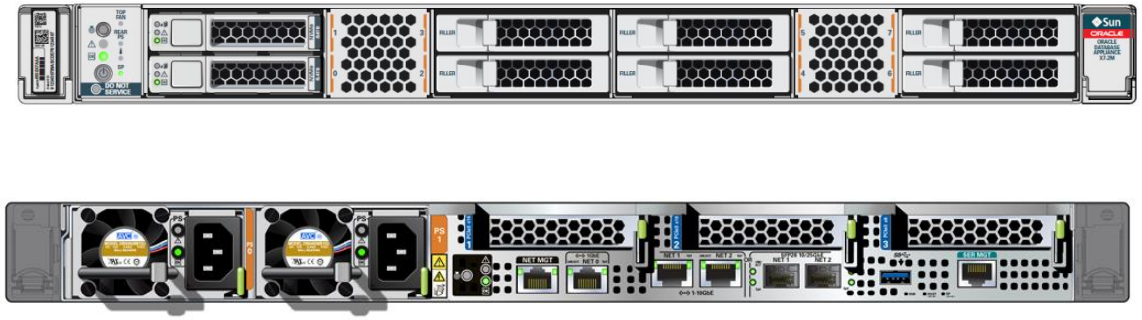
Component	Details
Database	SE/EE
Deployment Option	Bare Metal with optional KVM Virtualization
CPU	10 Core Intel® Xeon® Silver 4114 processor
Memory	192 GB expandable to 384GB
Flash Storage (raw)	12.8 TB NVMe
Boot Disk	480 GB M.2 SATA SSD
Network	2 x 10 GbE ports (RJ45) **or** 2 x 10/25 GbE ports (SFP28)

Expansion

Memory ODA 192GB (6 x 32GB)

ODA X7-2M – Medium Hardware Configuration

Component	Details
Database	SE/EE
Deployment Option	Bare Metal with optional KVM Virtualization
CPU	36 cores Intel® Xeon® Gold 6140 Processors
Memory	384 GB expandable to 768 GB
Flash Storage (raw)	12.8 TB NVMe expandable to 51.2TB
Boot Disk	480 GB M.2 SATA SSD
Network	2 x 10 GbE ports (RJ45) **or** 2 x 10/25 GbE ports (SFP28)

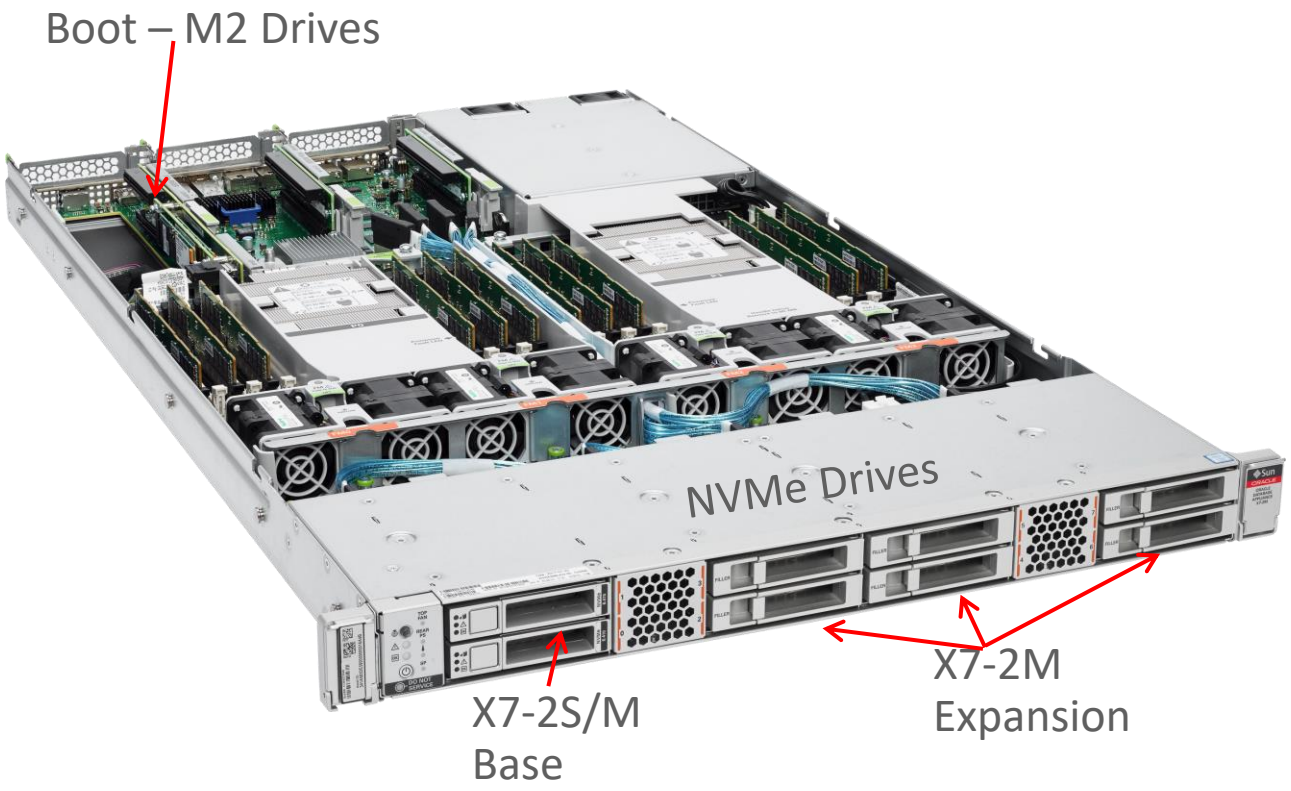


Expansion
19.2 TB Storage (3 X 6.4TB NVMe)
Memory 192GB (6 x 32GB)

What is NVM Express (NVMe)?

- NVMe is the new standard for PCI Express (PCIe) SSDs
- Architected for Flash Storage eliminating all overhead
- Works directly with PCIe interface
- No SCSI protocol overhead resulting in very fast response
- 5x to 10x improvement over SAS based SSDs
- Low latency of 100s of micro seconds
- High reliability
- Oracle is one of the leading contributors to the NVMe consortium

ODA X7-2S/M Hardware



M2 Drives

OS/boot, Oracle Home Software, log files

File systems

database files, redo logs, backups, VM disk and images

ASM Disk Groups

+DATA (database files)

+RECO (db redo logs, archive logs, backups)

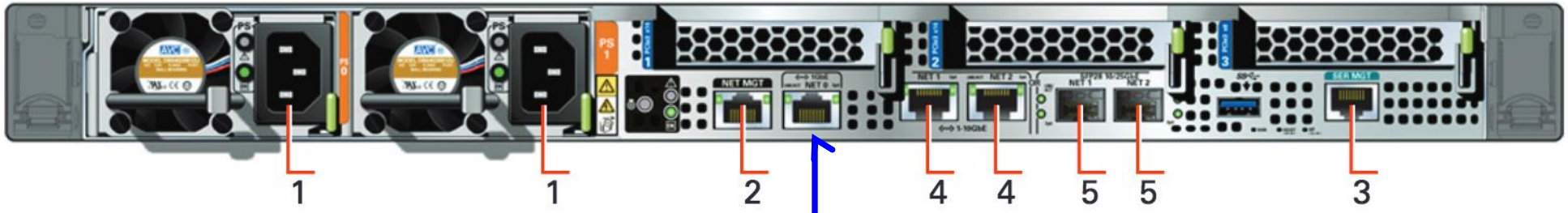
NVMe

Useable Space – ODA X7-2S/X7-2M

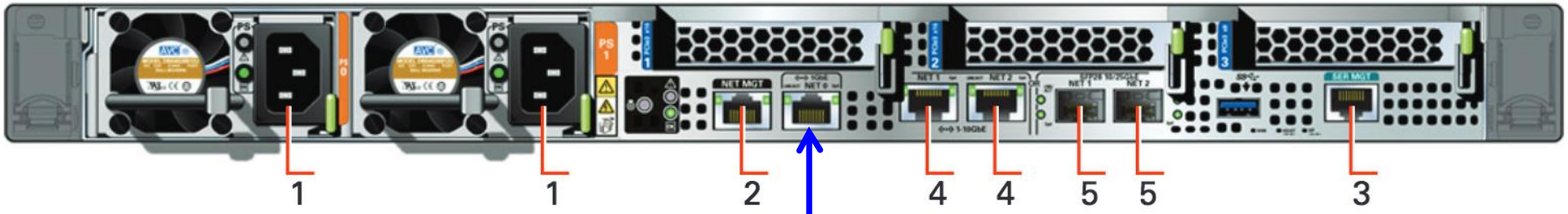
Number of Drives	Normal	High
2 (X7-2S/X7-2M)	DATA: 5.24 TB RECO: 0.58 TB	N/A N/A
5 X7-2M	DATA: 10.48 TB RECO: 1.16 TB Reservation: 2.91 TB	DATA: 5.24 TB RECO: 0.58 TB Reservation: 5.82 TB
8 X7-2M	DATA: 18.34 TB RECO: 2.04 TB Reservation: 2.91 TB	DATA: 10.48 TB RECO: 1.16 TB Reservation: 5.82 TB

Cabling ODA X7-2S/X7-2M

Cabling for Oracle Database Appliance X7-2S



Cabling for Oracle Database Appliance X7-2M



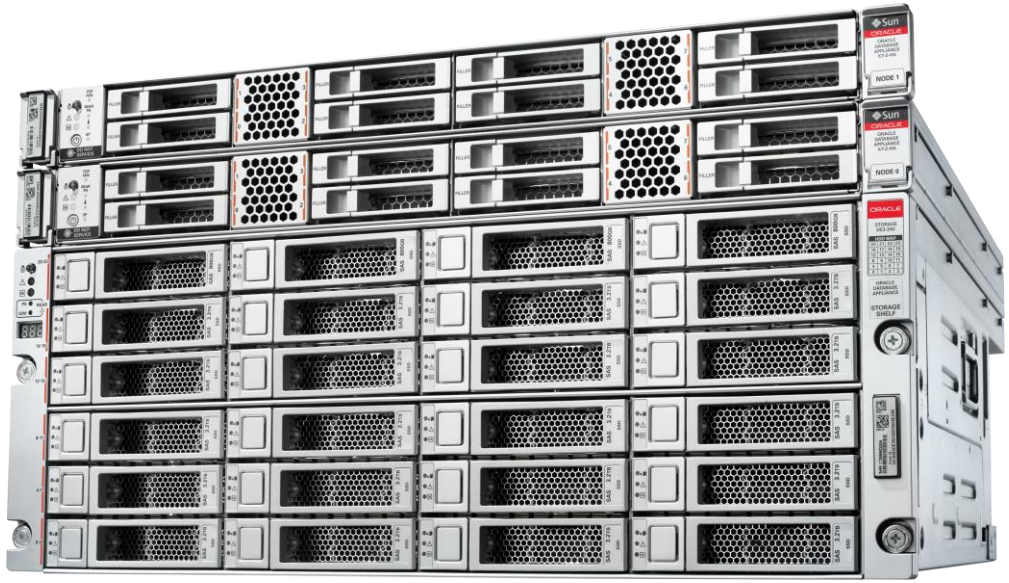
Optional 1GBase-T Public Networking port; manually configured after deployment

Callout	Description
1	Power Cables
2	ILOM NET MGT port. Service processor 10/100/1000Base-T network interface
3	**(Optional)** ILOM SER MGT port. Service processor RJ-45 serial port
4	10 GbE network interface port with RJ-45 connector (btbond1)
5	**(Optional)** 25 GbE SFP+ ports (btbond1)

ODA X7-2S/X7-2M Public Network Details

Choice of 10GBase-T or 10/25 GbE SFP28 Network Interfaces

Type	Interfaces	Bonds	IP Addresses
10GBase-T or 10/25GbE SFP28	em2 em3	btbond1	Assigned during deployment for public networking
private	priv0	priv0	Private Interface 192.168.16.24
Optional 1GBase-T	em1		Configured after deployment

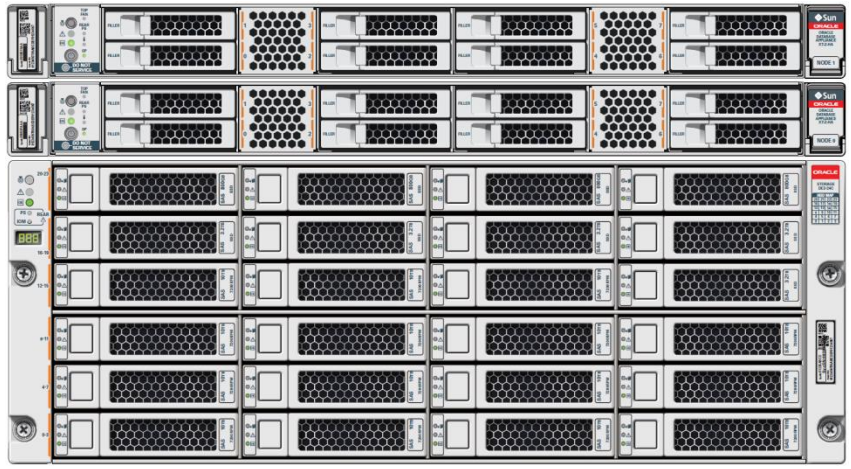


Oracle Database Appliance X7-2-HA

Hardware

ODA X7-2-HA – High Availability Configuration

Component		Details
Database		SE/EE
Deployment Option		Bare Metal with optional KVM or OVM Virtualization
Each Server	CPU	36 cores Intel® Xeon® Gold 6140 Processors
	Memory	384 GB expandable to 768 GB
	Boot Drive	480 GB M.2 SATA SSD
	Public Network	2 x 10 GbE ports (RJ45) **or** 2 x 10/25 GbE ports (SFP28)
	Interconnect	Ethernet 25GB
SSD – REDO (raw)		3.2TB SSD
SSD – FLASH/DATA (raw)		16TB SSD



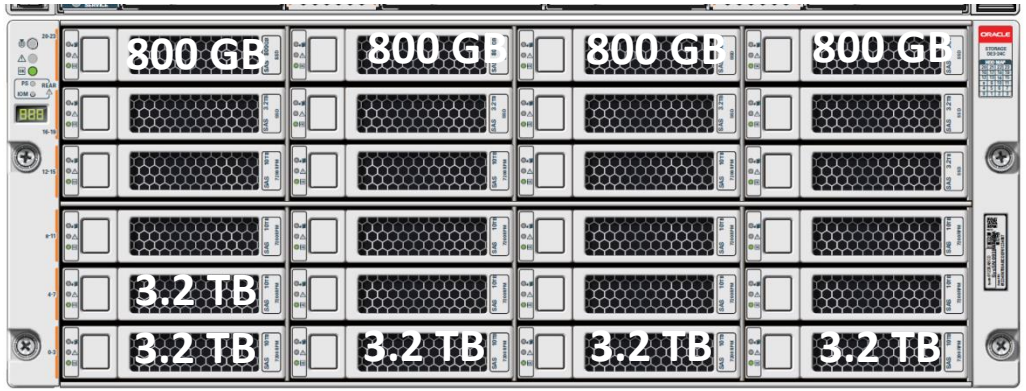
Expansion Options
SSD 3.2 TB - 5 Pack (16TB)
HDD 10TB - 15 Pack (150TB)
Memory ODA 192GB
Expansion Shelf 4 x 800GB + 20 x 3.2TB
Expansion Shelf 4 x 800GB + 5 x 3.2TB + 15 x 10TB

Expanding Storage on the ODA X7-2-HA

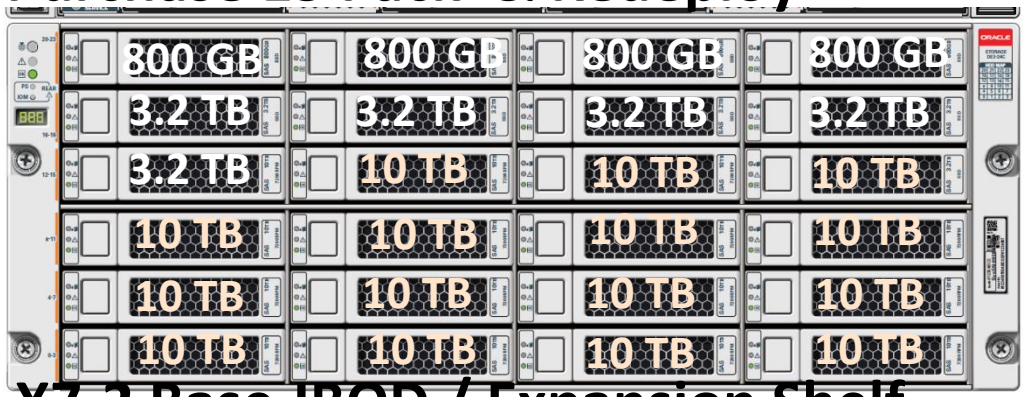
High Capacity

- You can purchase the 15 pack of 10 TB HDDs after the initial base system deployment, but you will need to redeploy the ODA
- You can add fully populated HDD expansion shelf for additional 150 TB HDD raw storage for DATA, 3.2 TB SSD for REDO, and 16 TB SSD for FLASH
- The base storage shelf must be fully populated before you can add expansion shelf
- Expansion shelf must be the same as the base shelf

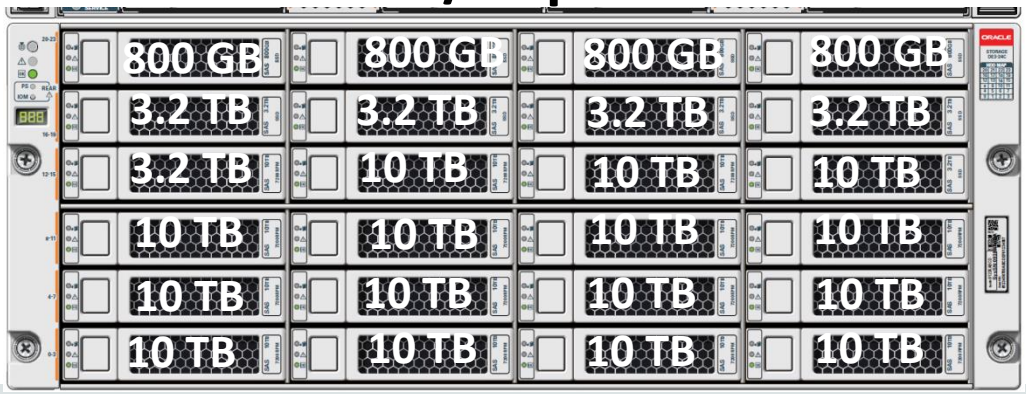
Base JBOD



Purchase 15 Pack & Redeploy

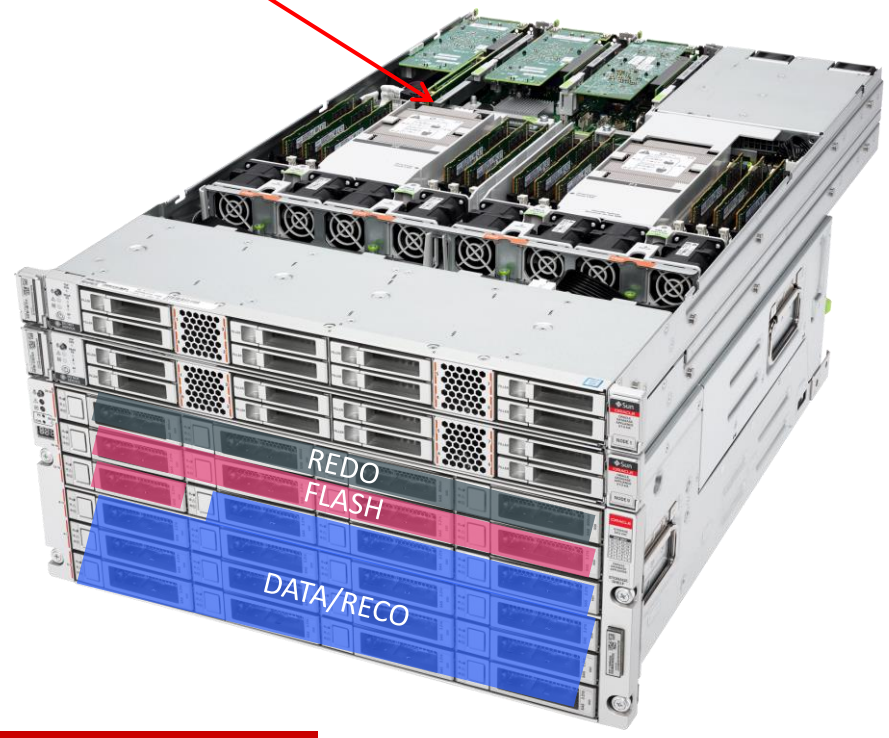


X7-2 Base JBOD / Expansion Shelf



ODA X7-2-HA High Capacity Hardware

Boot – M2 Drives



M2 Drives

OS, KVM libraries, Oracle Home Software, log files

File systems

database files, redo logs, backups, VM disk and images

ASM Disk Groups
+DATA (database files)
+RECO (archive logs, backups)
+REDO (db redo log files)
+FLASH (HDD meta data file, database files, DB buffer cache)

HDDs	Cache SSDs	Log SSDs

Useable Space – ODA X7-2-HA High Capacity

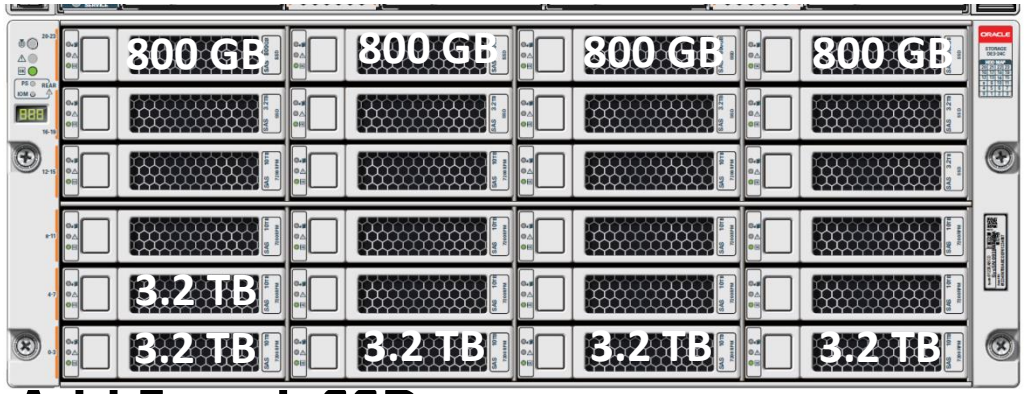
Number of Drives - 90% allocated to Data	Normal Redundancy	High Redundancy
15	DATA: 57.30 TB RECO: 6.37 TB REDO: 0.97 TB FLASH: 5.52 TB Reservation: 4.5 TB	DATA: 35.47 TB RECO: 3.94 TB REDO: 0.97 TB FLASH: 2.61 TB Reservation: 9 TB
30	DATA: 118.69TB RECO: 13.19 TB REDO: 1.94 TB FLASH: 12.50 TB Reservation: 4.5 TB	DATA: 76.40 TB RECO: 8.49 TB REDO: 1.94 TB FLASH: 7.16 TB Reservation: 9 TB

Expanding Storage on the ODA X7-2-HA

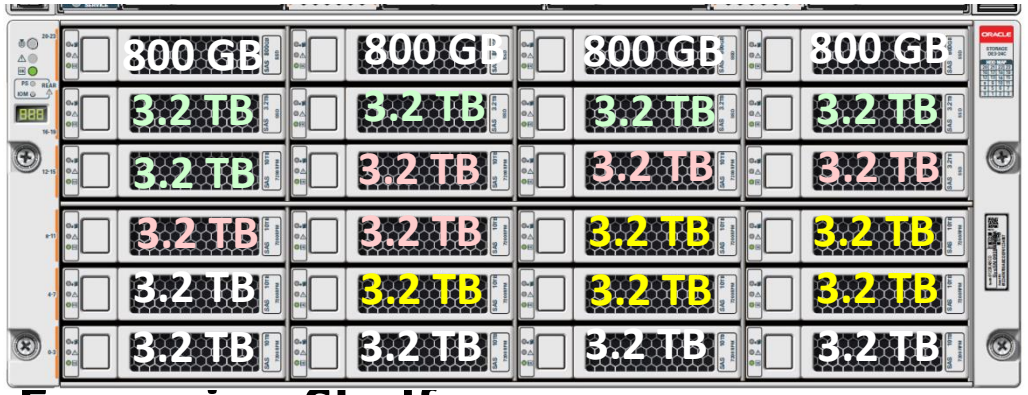
High Performance

- Start with the base ODA X7-2-HA system with 16 TB SSD raw storage for DATA and 3.2 TB SSD raw storage for REDO
- Add up to three 5 Pack SSD on base expansion for a total of 64 TB SSD raw storage
- Zero downtime to expand with SSD storage
- Double the storage by adding fully populated SSD expansion shelf for additional 64 TB SSD raw storage for DATA, 3.2 TB SSD raw storage for REDO, and 16 TB SDD raw storage for FLASH
- The base storage shelf must be fully populated before you can add expansion shelf
- Expansion shelf must be the same as base shelf

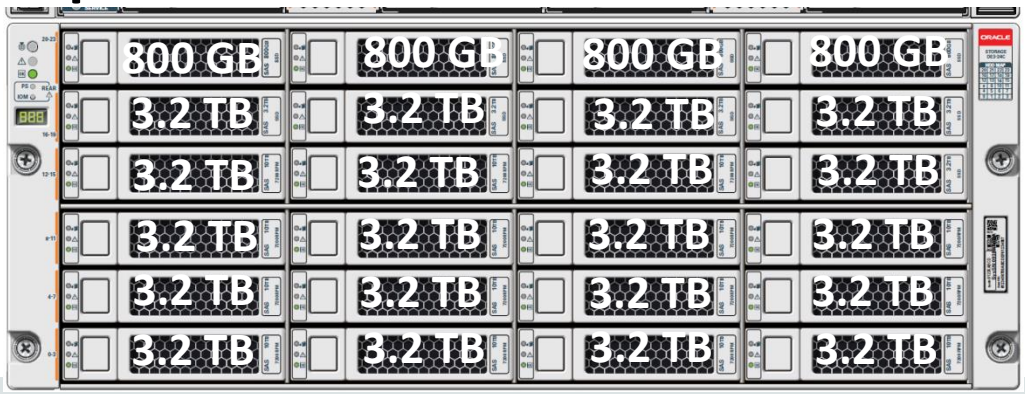
Base JBOD



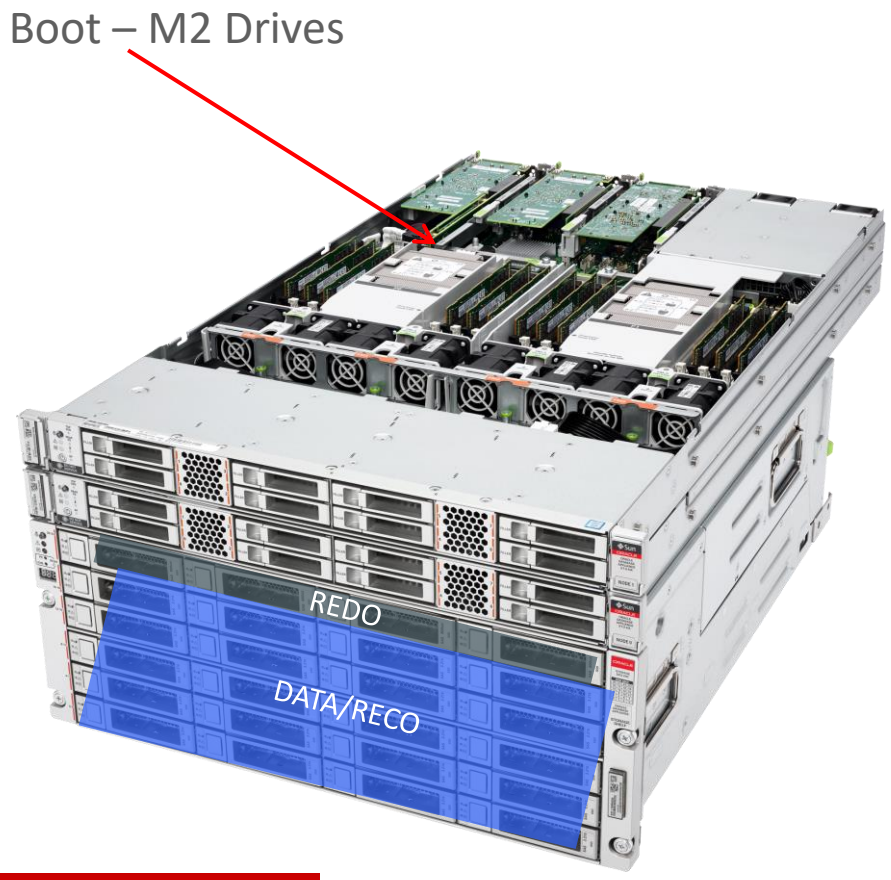
Add 5 pack SSD



Expansion Shelf



ODA X7-2-HA High Performance Hardware



M2 Drives

OS, KVM libraries, Oracle Home Software, log files

File systems

database files, redo logs, backups, VM disk and images

ASM Disk Groups
+DATA (database files)
+RECO (archive logs, backups)
+REDO (db redo log files)

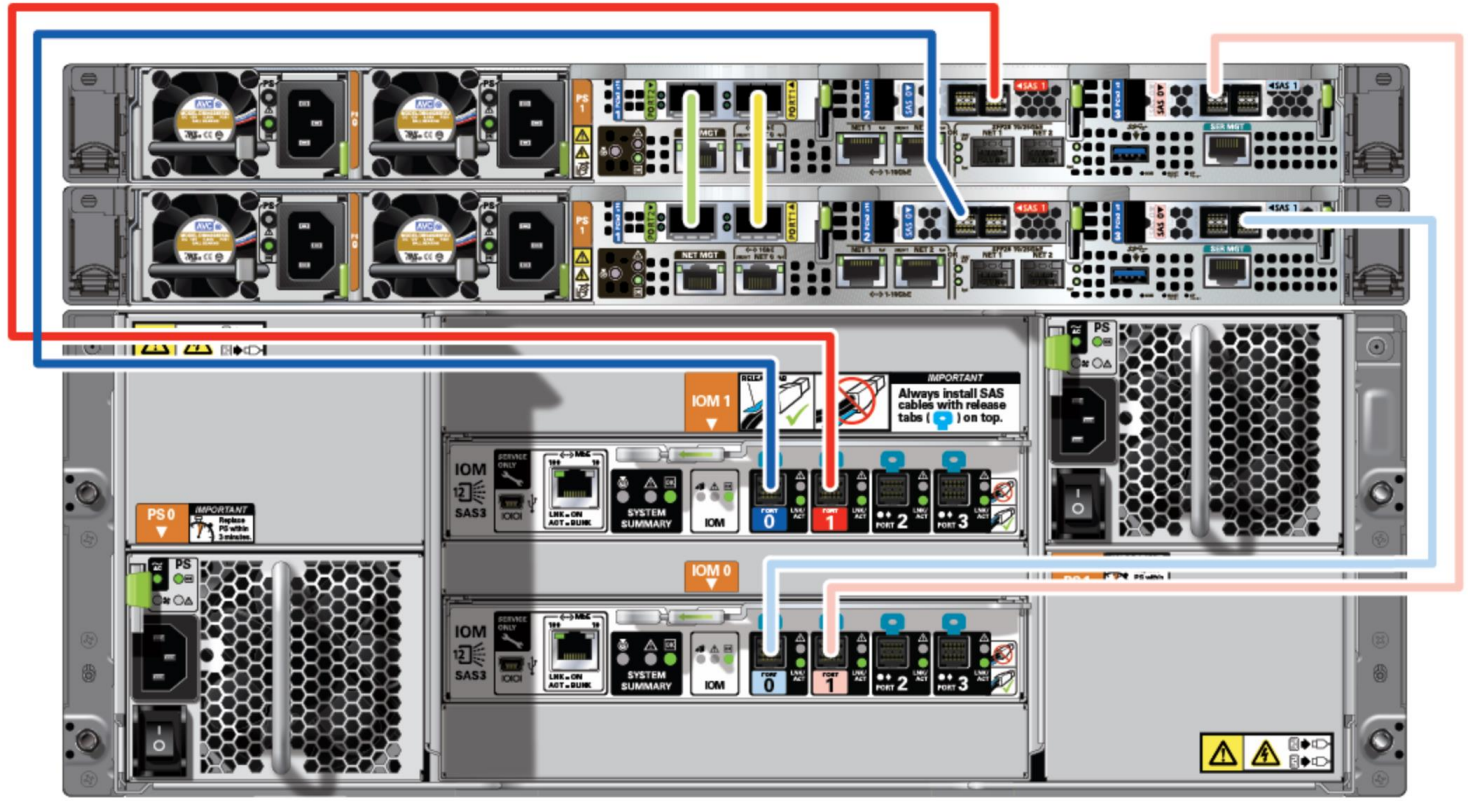
SSDs

Log SSDs

Useable Space – ODA X7-2-HA High Capacity

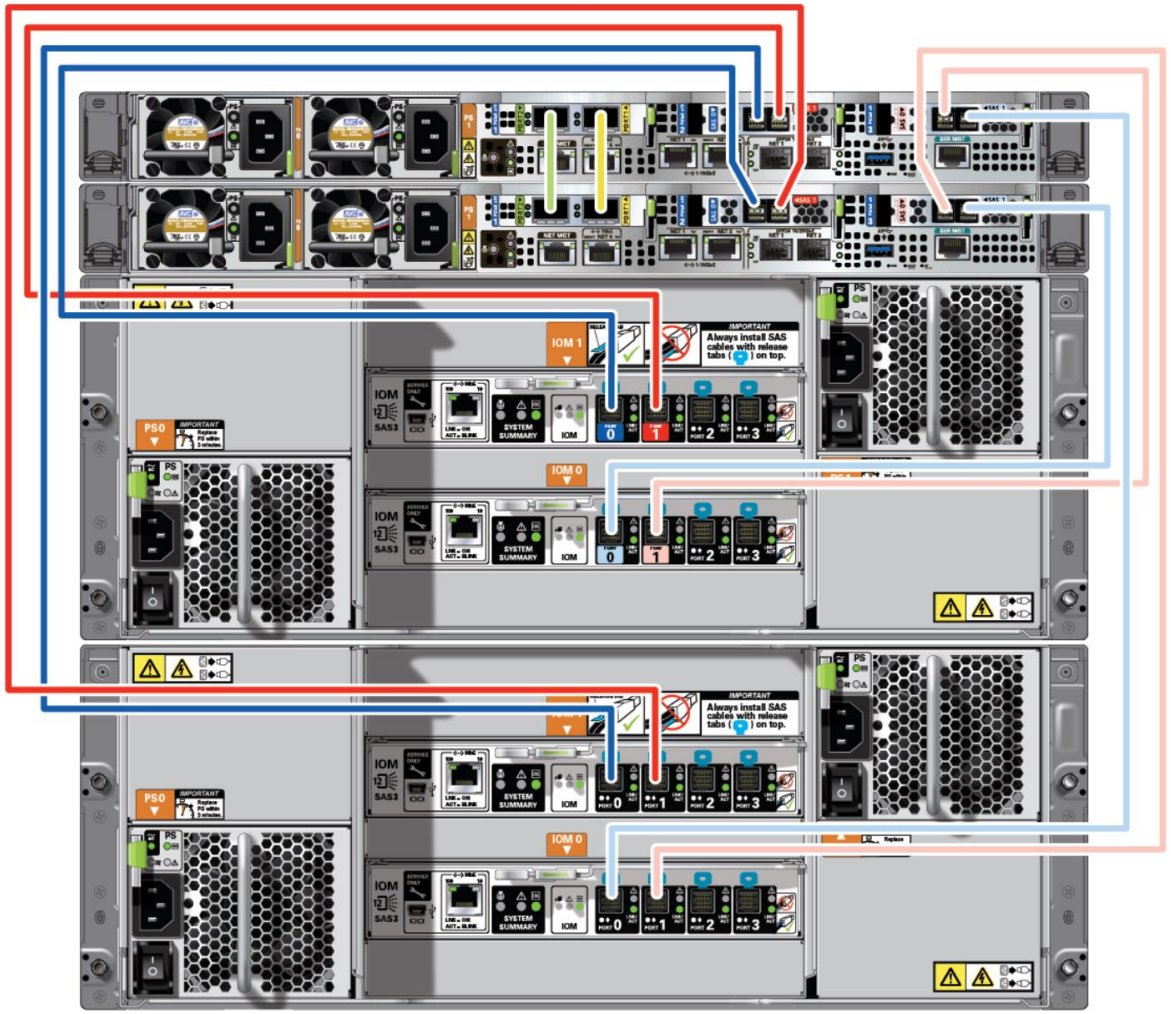
Number of Drives – 90% allocated to Data	Normal Redundancy	High Redundancy
5	DATA: 5.24 TB RECO: 0.58 TB REDO: 0.97 TB Reservation: 1.5 TB	DATA: 2.62 TB RECO: 0.29 TB REDO: 0.97 TB Reservation: 3 TB
10	DATA: 11.79 TB RECO: 1.31 TB REDO: 0.97 TB Reservation: 1.5 TB	DATA: 6.98 TB RECO: 0.78 TB REDO: 0.97 TB Reservation: 3.0 TB
15	DATA: 18.34 TB RECO: 2.04 TB REDO: 0.97 TB Reservation: 1.5 TB	DATA: 11.35 TB RECO: 1.26 TB REDO: 0.97 TB Reservation: 3.0 TB
20	DATA: 24.88 TB RECO: 2.76 TB REDO: 0.97 TB Reservation: 1.5 TB	DATA: 15.72 TB RECO: 1.75 TB REDO: 0.97 TB Reservation: 3.0 TB
40	DATA: 51.08 TB RECO: 5.68 TB REDO: 1.94 TB Reservation: 1.5 TB	DATA: 33.18 TB RECO: 3.69 TB REDO: 1.94 TB Reservation: 3.0 TB

Cable the Oracle Database Appliance X7-2-HA



Purpose – Cabling Interconnect	Start - Node 0	End – Node 1
Connect green Ethernet cable	Connect into green port (PORT2) in PCIe slot 1	Connect into green port (PORT2) in PCIe slot 1
Connect yellow Ethernet cable	Connect into yellow port (PORT1) in PCIe slot 1	Connect into yellow port (PORT1) in PCIe slot 1
Purpose – Cabling Storage	**Start - Compute Node**	**End - Storage Shelf**
Connect dark blue SAS cable	Connect into dark blue port (SAS0) in PCIe slot 2 in Node 0	Connect into dark blue port in top IO Module (port 0)
Connect light blue SAS cable	Connect into light blue port (SAS1) in PCIe slot 3 in node 0	Connect into light blue port in bottom IO Module (port 0)
Connect dark red SAS cable	Connect into dark red port (SAS1) in PCIe slot 2 node 1	Connect into dark red port in top IO Module (port 1)
Connect light red SAS cable	Connect into light red port (SAS0) in PCIe slot 3 node 1	Connect into light red port in bottom IO Module (port 1)

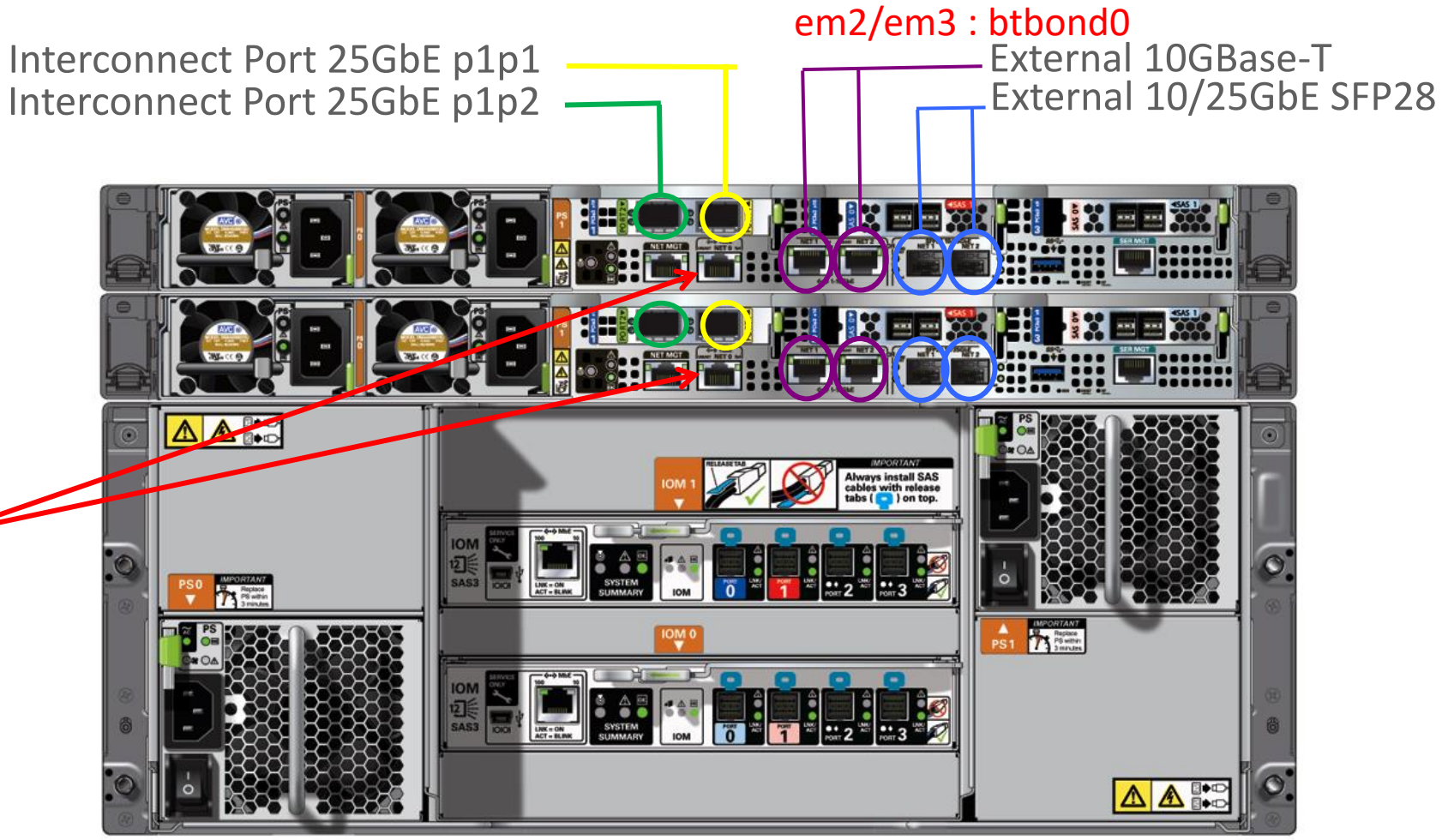
Cable the ODA X7-2-HA w/ Storage Expansion Shelf



Purpose – Cabling Storage Expansion	Start - Compute Node	End - Storage Expansion Shelf
Connect dark blue SAS cable	Connect into dark blue port (SAS0) in PCIe slot 2 in node 1	Connect into dark blue port in top IO Module (port 0)
Connect light blue SAS cable	Connect into light blue port (SAS1) in PCIe slot 3 in node 1	Connect into light blue port in bottom IO Module (port 0)
Connect dark red SAS cable	Connect into dark red port (SAS1) in PCIe slot 2 in node 0	Connect into dark red port in top IO Module (port 1)
Connect light red SAS cable	Connect into light red port (SAS0) in PCIe slot 3 in node 0	Connect into light red port in bottom IO Module (port 1)

ODA X7-2-HA Bare Metal Network Details

- Base configuration
  - 25GbE Interconnect
  - Choice of 10GBase-T or 10/25GbE SFP28 public network
- Optional 1GBase-T Public Networking
  - Manually configured after deployment



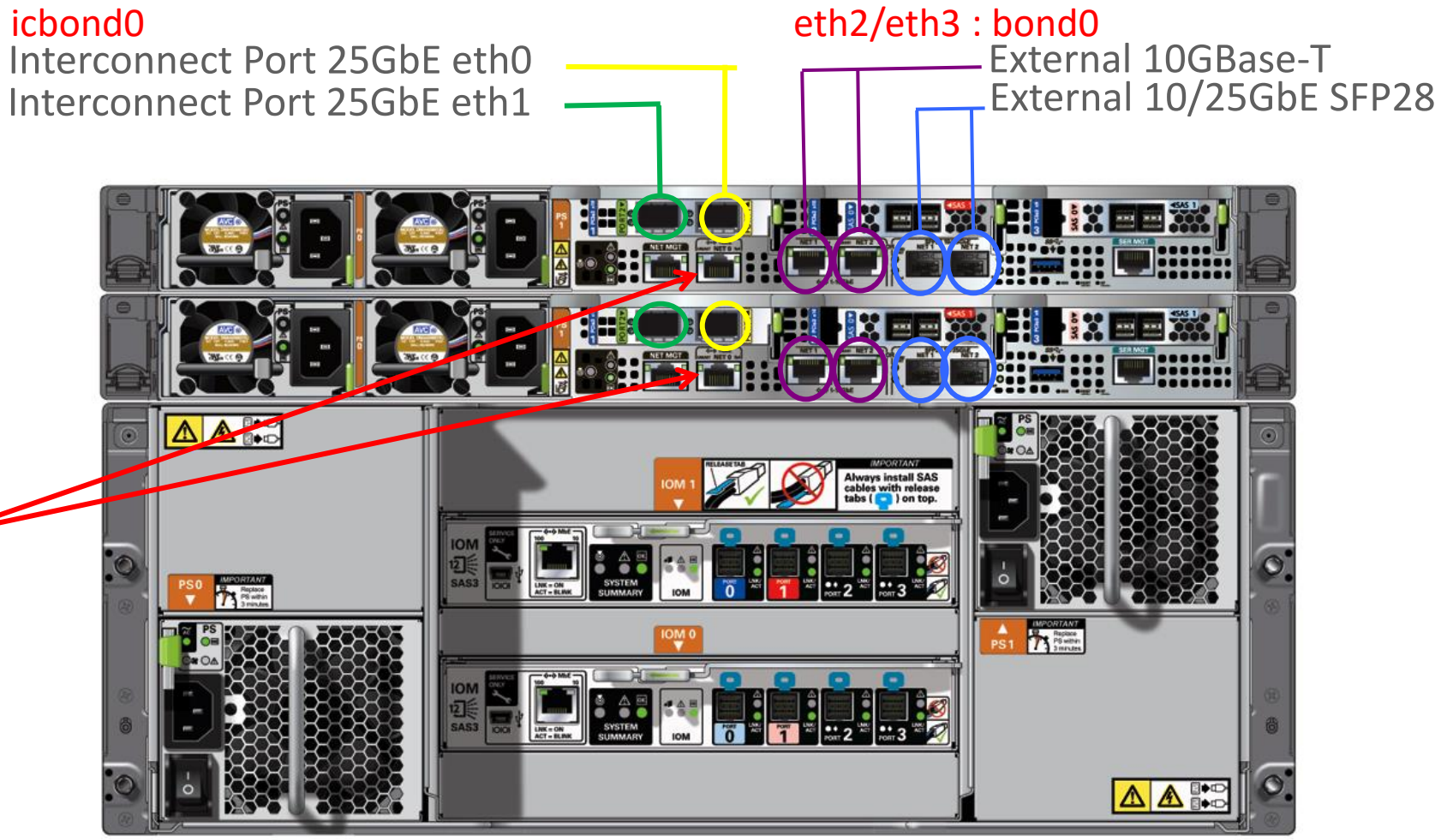
ODA X7-2-HA Network Details

Bare Metal

Type	Interfaces	Bond/Bridge	Default IP address
Ethernet (private interconnect)	p1p1 p1p2	**HAIP is used** **Grid Infrastructure will load balance and provide failover**	**Bare Metal** **Node 0** 192.168.16.24 192.168.17.24 **Node 1** 192.168.16.25 192.168.17.25
10GBase-T or 10/25GbE SFP28	em2 em3	btbond1	Assigned during deployment for public networking
1GBase-T (optional)	em1		Configured after deployment

ODA X7-2-HA OVM Network Details

- Base configuration
  - 25GbE Interconnect
  - Choice of 10GBase-T or 10/25GbE SFP28 public network
- Optional 1GBase-T Public Networking
  - Manually configured after deployment



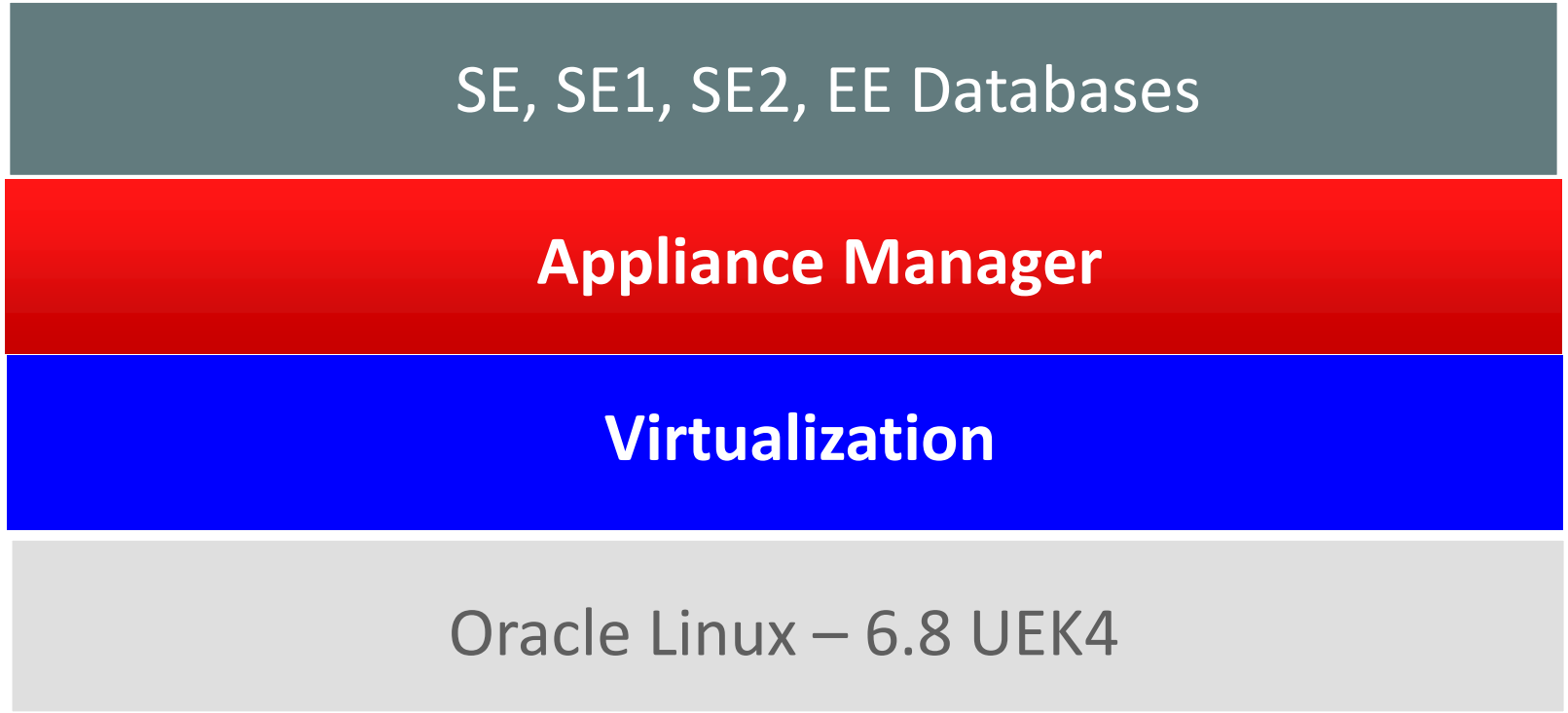
ODA X7-2-HA Network Details

Virtualization Deployments

Type	Interfaces	Bond/Bridge	Default IP address
Ethernet (private interconnect)	eth0 eth1	**icbond0/priv1**	**Dom0** 192.168.16.24(Node 0) 192.168.16.25(Node1) **ODA_Base** 192.168.16.27 (Node 0) 192.168.16.28 (Node 1)
10GBase-T or 10/25GbE SFP28	eth2 eth3	bond0/net1	Assigned during deployment for public networking
1GBase-T (optional)	eth4		Configured after deployment

Oracle Database Appliance X7-2

Optimized For Database



SE DB Versions and Features Supported on ODA

DB edition	Database Version	RAC	RAC One	Notes	Supported ODA Model Deployments
SE	11.2.0.4	Yes	Yes	• Can run on 4 Sockets • Is not sold by Oracle • Migrate to SE2 licenses	• X7-2S/M Single Instance • X7-2-HA Bare Metal - RAC and Single Instance • X7-2-HA OVM – RAC and Single Instance
SE1	11.2.0.4	No	No	• Is not sold by Oracle • Migrate to SE2 licenses	• X7-2S/M Single Instance • X7-2-HA Bare Metal - Single Instance • X7-2-HA OVM – Single Instance
SE2	12.1.0.2	Yes *	Yes	• RAC is limited to 1 socket server • Can only run on ODA Virtualized Platform	• X7-2-S/M Single Instance • X7-2-HA Bare Metal - Single Instance • X7-2-HA OVM – RAC and Single Instance

EE DB Versions and Features Supported on ODA

DB edition	Database Version	RAC	RAC One	Notes	Supported ODA Model Deployments
EE	12.2.0.1, 12.1.0.2, 11.2.0.4	Yes	Yes	• Supports all EE options • Fault tolerant option of in-memory is not supported	• X7-2S/M Single Instance • X7-2-HA Bare Metal - RAC and Single Instance • X7-2-HA OVM – RAC and Single Instance

Database and Storage Option

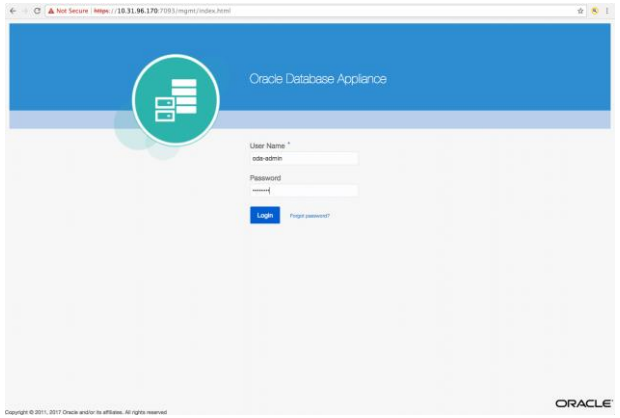
- ASM
  - Databases version >= 12.1.0.2 are supported
- ACFS
  - Version 11.2.0.4 databases must use ACFS for storage
  - All database versions are supported to use ACFS
  - Each database created under ACFS has it own mount points
  - /u02/app/oracle/oradata/<dbid>
  - When the database is deleted, the files should be cleaned up

Appliance Manager – X7-2S/X7-2M/X7-2-HA Bare Metal

Simplifies Deployment, Management, and Support of Oracle Database Appliance

Web Console

- Gather configuration and deploy system
  - System information
  - Network information
  - Database information



Command Line

- ODACLI & ODAADMCLI provides simple commands to streamline administration
  - Database creation
  - Patching
  - Management
  - Support

Background Processes

- Continual monitoring and management to ensure best practices compliance and optimal performance
  - Servers
  - Storage
  - Database

ODACLI – Command List

Feature	Command
Appliance	create-appliance describe-appliance
Component	describe-component
CPUCore	describe-cpucore list-cpucores update-cpucore
ASR	configure-asr delete-asr describe-asr test-asr update-asr
Job	describe-job list-jobs
Credential	set-credential

Feature	Command
Database	create-database delete-database describe-database list-databases register-database upgrade-database
DB Home	create-dbhome delete-dbhome describe-dbhome list-dbhomes update-dbhome
DBStorage	create-dbstorage delete-dbstorage describe-dbstorage list-dbstorages

Feature	Command
DCSAgent	update-dcsagent
Latest Patch	describe-latestpatch
Repository	update-repository
Server	update-server
Storage	update-server
Network	create-network delete-network describe-network list-networks update-network
Network Interface	describe-networkinterface list-networkinterfaces

ODAADMCLI – Management/Status

Appliance Maintenance Commands

	Command
commands	show|manage|stordiag|power|expand
objects	disk|diskgroup|controller|server|processor|memory|iraid|power|cooling|network|storage|fs|raidsyncstatus|env_hw

```
odaadmcli show       - Shows disk, diskgroup, controller, server, processor,
                       memory, iraid, power, cooling, network,
                       storage, fs, raidsyncstatus, env_hw
odaadmcli manage     - Manages the OAK repository, diagcollect etc.,
odaadmcli stordiag   - Run storage diagnostic tool on this Node
odaadmcli power      - Power on|off|status disk
odaadmcli expand     - Expand storage
```

Appliance Manager – Built-In Best Practices

Simplifies Deployment, Management, and Support of Oracle Database Appliance

GUI Configurator

- Gather configuration and deploy system
  - System information
  - Network information
  - Database information

Command Line

- OAKCLI provides simple commands to streamline administration
  - Database creation
  - Patching
  - Management
  - Support

Background Processes

- Continual monitoring and management to ensure best practices compliance and optimal performance
  - Servers
  - Storage
  - Database

OAKCLI – ODA X7-2-HA Virtualized Stack

oakcli show - Shows disk, diskgroup, expander, controller, server, processor, memory, iraid, power, cooling, network, ib, enclosure, vlan, storage, version, dbhomes, dbstorage, databases, db_config_params, VM, VMtemplate, VMconsole, CPU pool, Repo, env_hw, ASR, Vdisk

oakcli configure - Configures the Network or ASR or VM or VMtemplate or CPU pool or Repo or Additional Net

oakcli locate - Locates a disk
oakcli deploy - Deploys the Database Appliance
oakcli update - Updates the Database Appliance
oakcli validate - Validates the Database Appliance
oakcli manage - Manages the OAK repository, diagcollect etc.,
oakcli unpack - Unpack the given package to OAK repository
oakcli copy - Copies the deployment config file
oakcli upgrade - Upgrades database
oakcli stordiag - Run storage diagnostic tool on both Nodes
oakcli reconfigure- Reconfigures kernel params
oakcli test - Test ASR

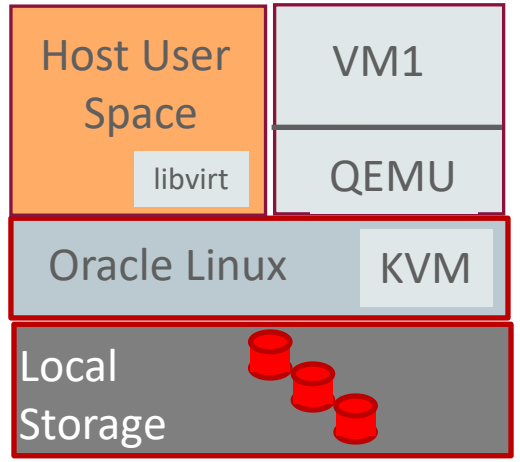
OAKCLI – ODA X7-2-HA Virtualized Stack

oakcli orachk - Performs configuration settings check on ODA
oakcli import - Imports a VMtemplate given image files and repository,
oakcli clone - Clones a VM given VMtemplate name and repository (or)
- Clones a VM given a VM (or)
- Clones a VM given a VMtemplate (or)
- Clones a VDisk given a VDisk
oakcli start - Starts the Repo, VM
oakcli stop - Stops the Repo, VM
oakcli modify - Manage VDisks and VLAN Networks for the User VMs or resize Database parameters
oakcli create - Creates CPU pool, Database, DB storage, snapshotdb, dbhome, db_config_params file, VLAN, Shared Repo, VDisk
oakcli delete - Deletes CPU pool, VM, VMtemplate, Database, DB Storage, dbhome, db_config_params file, VLAN, Shared Repo, VDisk
oakcli resize - Resizes DB Storage
oakcli migrate - Migrates a VM to other Node

KVM on Oracle Database Appliance

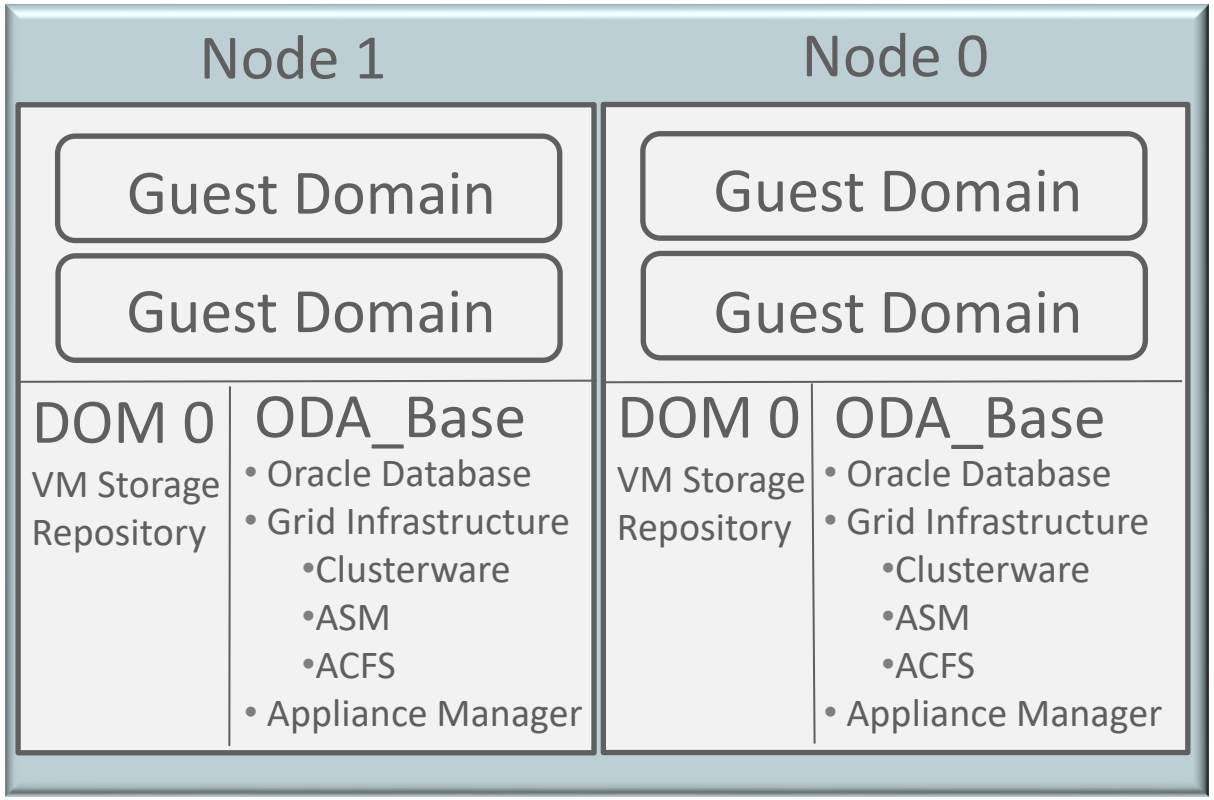
ORACLE LINUX

- Supported with X7-2S/X7-2M/X7-2-HA Bare Metal
- Must use KVM native commands to provision/manage guestVMs
- Documentation is posted in Oracle Database Appliance blog
  - blogs.oracle.com/oda/kvm
- Limitations
  - Only Linux OS for guestVM
  - No support for Oracle databases in guestVM
  - No hard partitioning of cores
  - No capacity-on-demand licensing for databases or applications in guestVM
- Start the KVM service - libvirtd



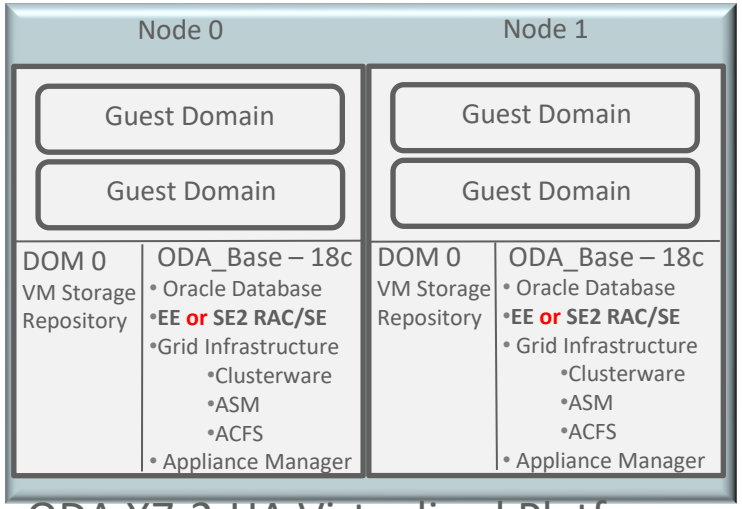
ODA X7-2-HA : OVM Platform Option

- Partition cores to VMs to isolate workloads
- Creation of shared repositories for VM and VDisk storage
- High Availability of Guest VMs with automatic restart and failover
- VDisk Management
- Support VLANs to provide additional networks and security
- Start/Stop VMs

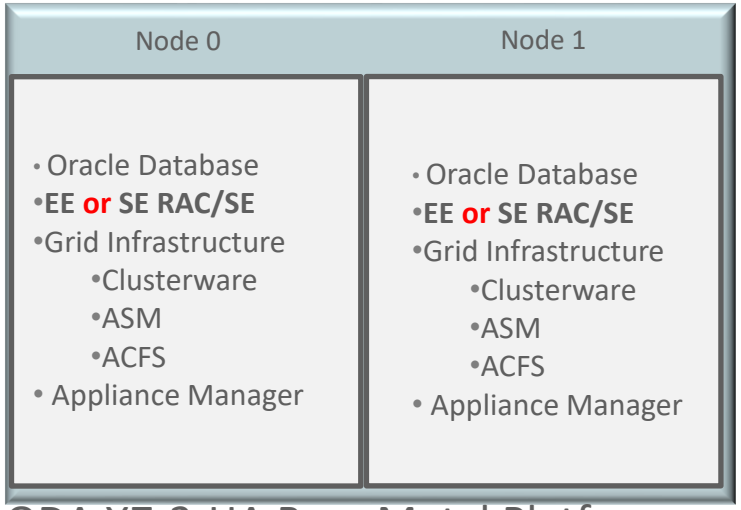


ODA Supports SE2 RAC

- SE2 RAC Licensing requirement limited to two-1 socket servers
- ODA supports SE2 RAC using the OD X7-2-HA OVM stack
  - Deploy ODA_BASE with max number of 18 cores/server
  - Provision SE2 RAC only in ODA_BASE
  - Remaining cores can be used for applications
- SE RAC Licensing requirements has no socket restrictions
  - Can provision SE databases in bare metal or virtualized stack
- You can provision SE and SE2 RAC databases, but you are limited to use the OVM virtualization on ODA X7-2-HA and follow the SE2 socket restrictions



ODA X7-2-HA Virtualized Platform



ODA X7-2-HA Bare Metal Platform

Capacity-On-Demand Licensing

- Set ODA core count high water mark via Appliance Manager
- Set the cores in multiples of 2
  - 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36

```
update-cpucore –c <cores>
```

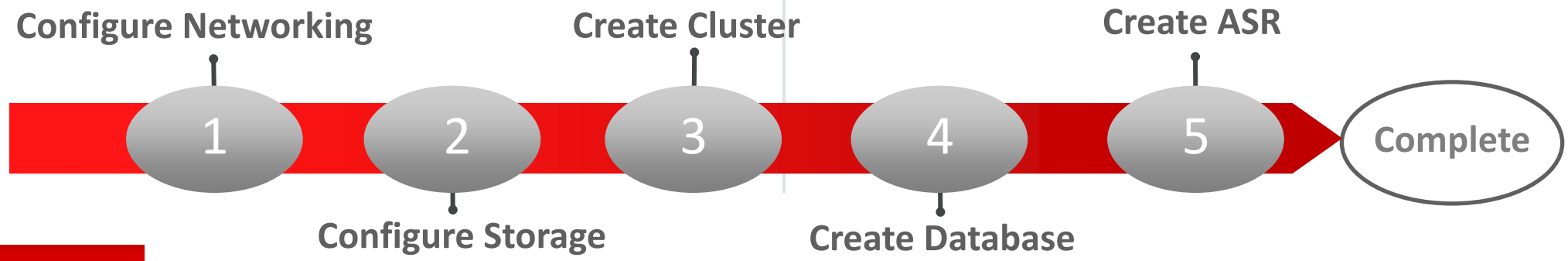
Simplified Deployment

Faster Time To Value

- Download latest ODA software bundle
- Gather configuration info through a Wizard
- Deploys Oracle Database Appliance with Single Instance in 30 minute and with Oracle RAC in 90 minutes

Benefits

- No need to install or configure the OS
- No knowledge required to install Oracle Clusterware, RAC and Database
- Completely tested and validated by Oracle



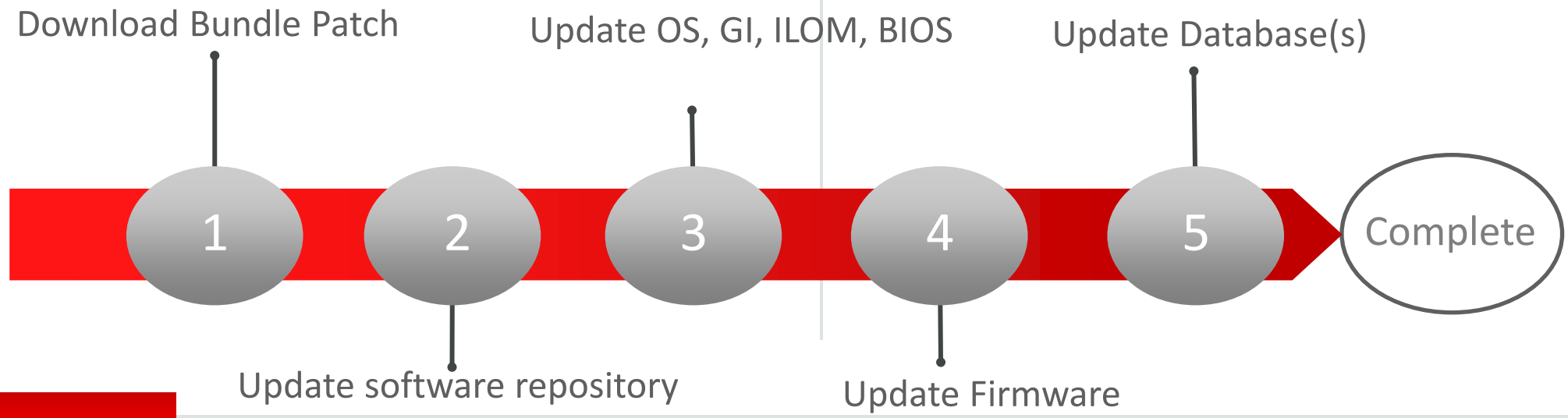
End-to-End Patching

Latest Patches for Entire Stack

- Single patch for entire stack includes latest DB bundle patch, security updates, and firmware
- Oracle thoroughly tests the entire stack
- Automated patching process

Benefits

- Eliminate the time required to determine patches
- Reduce the need to test end-to-end inter-operability
- Single command to patch



Diagnostics

- ASR (Auto Service Request)
  - Monitors and creates automatic service request on any hardware component failure with Oracle Support
- System check for all hardware and software components
  - Oracle orachk
  - Validates hardware and software components and quickly identifies any anomaly or violation of best practice compliance
- Diagnostics collection
- odaadmcli manage diagcollect
  - Gathers all relevant logs from hardware and software components and produces single bundle for support to triage the issue

Questions?

Hardware and Software
Engineered to Work Together


ORACLE®