

Oracle RAC on KVM Hypervisor Virtualized by Unified Compute Platform

Implementation Guide

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Revision history

Changes	Date
Initial release	January 20, 2023

Chapter 1: Introduction and overview

This guide provides comprehensive steps to design and implement Hitachi Solution for databases for Oracle Real Application Clusters Virtualized on Oracle Kernel-based Virtual Machine (KVM) Hypervisor with Hitachi Advanced Server DS220 G2 servers and Hitachi Virtual Storage Platform E1090 storage systems.

Walk through the planning and deployment of an on-premises environment with an Oracle KVM hypervisor as the foundation. This design uses an Oracle KVM Hypervisor on the host as a virtualization technology. This solution includes configuring storage, configuring the network, and best practices for designing and streamlining the environment using Oracle Linux Virtualization Manager (OLVM).

Because the Oracle KVM hypervisor virtualization technique is used, the native operating system on the server machine is Oracle Linux 8. In this guide, two DS220 G2 bare metal servers are connected to VSP E1090 over a Fibre Channel network. The storage area network is accessible by both hosts, and zoning configured on switches to allow LUN access to only dedicated servers.

The two bare metal servers are configured with Oracle Linux 8.6. On top of it, Oracle KVM hypervisor software is installed for host virtualization. OLVM is used as a management server to install, configure, and manage all the virtualization resources such as network, storage, and VMs across the KVM hosts and logical volume management (LVM) VMs.

Virtualization benefits

Virtualization technology includes the following benefits:

- Reduces the overhead of purchasing multiple servers and managing them.
- Minimizes infrastructure and software licensing costs.
- Transfers between VMs and LUNs can be easily migrated from one physical device to another.
- Simplifies backup of the VM with encapsulation.
- Uses different configurations of physical servers for hardware platform independence.
- Allows effective use of resources with enhanced utilization.
- Lowers RPO and RTO.

Intended audience

This guide is designed for technical professionals who are looking for end-to-end installation and configuration of Oracle RAC database over virtualized UCP solutions provided by Hitachi Vantara. They should be proficient in Oracle database architecture and administration, and have experience working with servers, networking, and storage.

Chapter 1: Introduction and overview



Note: These procedures were developed in a lab environment. Many factors affect production environments beyond prediction or duplication in a lab environment. Follow recommended practice by conducting proof-of-concept testing for acceptable results before implementing this solution in your production environment. Test the implementation in a non- production, isolated test environment that otherwise matches your production environment.

Chapter 1: Introduction and overview

Chapter 2: Solution components

The following table lists the hardware components used in this implementation.

Vendor	Hardware	Description	Version	Quantity
Hitachi Vantara	Hitachi Virtual Storage Platform E1090	6 × CHA pairs (8 × 32 Gbps Fibre Channel ports in use)	93-06-01-80/00	1
		1024 GB cache memory		
		48 × 1.9 TB NVMe SDDs		
Hitachi Vantara	Hitachi Advanced	2 × Intel Xeon Platinum 8368	BIOS: S5XH3A12.H03	2
Server DS220	38C CPU @ 2.40 GHz	BMC: 3.16.06		
		768 GB (64 GB ×12) DIMM	CPLD: 07	
		DDR5 Synchronous Registered (Buffered) 3200 MHz		
		2 × Intel E810	Driver: ice	
		dual port 25 GbE NIC cards	Driver Version:0.8.2- k	
			Firmware: 2.42	
		2 × Emulex LightPulse	Driver: lpfc	
		Gb Fibre Channel Adapter	Driver Version: 12.8.0.10	
			Firmware: 12.8.542.26	
Hitachi Vantara	Hitachi Advanced	2 × Intel Xeon Processors 4310,	BIOS: S5XH3A12.H03	2
Server DS120	12-core, 2.10 GHz, 120W	BMC: 3.16.06		
		256 GB (32 GB ×8) DIMM	CPLD: 07	
		DDR4-3200 Synchronous Registered		

Chapter 2: Solution components

Vendor	Hardware	Description		Version	Quantity
		(Buffered) 3200 MHz 1 × 256 GB NVMe 0.3DWPD M.2 SSD for boot			
		1 × Dual Port 25 GbE NIC Intel E810 PCIe card	Dri Ve Fir	iver rsion:1.8.1.6 mware: 7.30	
		1 × Emulex LightPulse LPe35002-M2 2-Port 32 Gb Fibre Channel Adapter	Dri Dri Ve Fir 6	iver: lpfc iver rsion:12.8.0.10 mware:12.8.542.2	
Brocade	G720 Fibre Channel switches	48 × 32 Gbps ports Fibre Channel switch 32 Gbps SF	Ps	Kernel: 2.6.34.6 Fabric OS: v9.0.1c	2
Cisco	Nexus 93180YC-FX	48 × 10/25 GbE port 6 × 40/100 Gbps Quad SFP (QSFP28) ports		BIOS version: 07.65 NXOS version: 9.3.7	2
	Cisco- C92348GC-X	1 GE 48-Port Gb Ethernet Switch		BIOS version: 5.37 NXOS version: 9.3.7	1

Chapter 2: Solution components

The following table lists the minimum hardware requirements.

Server Number	List	Details
1	Server Hardware Configuration	16 Gb of RAM Memory
		Modern Intel/AMD x86_64 CPU
		80 GB of disk space
2	KVM Virtual Machine requirement	2 vCPUs
		4 Gb of RAM
		50 Gb hard disk
3	OLVM management host	2 vCPUs
		6 Gb RAM, 30 Gb hard disk

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Note: These hardware components and software versions were used in a lab environment. This may vary in a production environment.

Chapter 2: Solution components

Chapter 3: Server and application architecture

This implementation uses two Hitachi Advanced Server DS220 G2 servers as compute nodes and two Hitachi Advanced Server DS120 G2 servers as management nodes for installation of a two-node Oracle RAC database cluster using a KVM hypervisor on a virtualized platform. This provides the compute power for the Oracle RAC database to handle complex database queries and a large volume of transaction processing in parallel. The following table lists a summary of the server configuration for this solution.

Hitachi Advanced Server	Server	Server Name	Role	CPU Core	RAM
Bare Metal host 1 DS220 G2	KVM hypervisor VM1	rac01	Oracle RAC node 1	36	768 GB (64 GB × 12)
Bare Metal host 2 DS220 G2	KVM hypervisor VM2	rac02	Oracle RAC node 2	36	768 GB (64 GB × 12)
VM host 3 DS120 G2	Management server Oracle Linux Virtual Management (OLVM)	Olvm- host	Manager for KVM hypervisor	18	256 GB (32 GB × 8)

DS220 G2 servers are configured with the following:

- Fully redundant hardware
- Dual fabric connectivity between hosts and storage

Chapter 3: Server and application architecture

The following illustration shows the high-level architecture diagram using Hitachi Virtual Storage Platform E1090 and Hitachi Advanced Server DS220 G2 for a 2-Node Oracle 19c RAC configuration.



Note: Management servers are not used in this implementation, they are shown for reference only.

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Chapter 3: Server and application architecture



The following diagram shows the OLVM flowchart for this implementation.

Chapter 3: Server and application architecture

Chapter 4: Compatibility matrix

Before starting, check the compatibility of software and hardware components at their respective vendor site.

Hardware, OS, and database software compatibility

To check OS (Linux) compatibility with Hitachi hardware see the following URL:

https://linux.oracle.com/ords/f?p=117:1::::RP This page shows the Server Systems tab.

Hardware Certi	fication List			
Oracle Linux and Virtua	lization			Contraction of the second
Systems Storage Systems Oracle	Linux KVM			
	Search			Palated Links
ORACLE	Filter Hitachi Vantara 🗸 Oracle Linux	8 🗸 Al	Environments V Reset	Hardware Certification List /HC
The HCL Program	Server	Vendor	Operating System or Virtualization Platform	Hardware HCL FAQ
The HOL Program	Hitachi Advanced Server HA820 G2	Hitachi Vantara	Oracle Linux 8	Component Compatibility Guide
The Oracle Linux and	Hitachi Advanced Server HA810 G2	Hitachi Vantara	Oracle Linux 8	ISV Catalog
Virtualization Hardware Certification List (HCL) provides	Hitachi Advanced Server DS120 G2	Hitachi Vantara	Oracle Linux 8	Oracle Linux
users with information about	Hitachi Advanced Server DS220 G2	Hitachi Vantara	Oracle Linux 8	Oracle Virtualization
and Oracle Linux with Unbreakable Enterprise Kernel, and storage certified with Oracle	Hitachi Advanced Server D51B-2U	Hitachi Vantara	Oracle Linux 8	Download Software
	Hitachi Advanced Server T41S-2U	Hitachi Vantara	Oracle Linux 8	Shop Oracle Linux Support
VM.	Hitachi Advanced Server DS7020	Hitachi Vantara	Oracle Linux 8	
This HCL web site provides information about hardware certified specifically with Oracle Unbreakable Enterprise Kernel.	Hitachi Advanced Server DS7040	Hitachi Vantara	Oracle Linux 8	
	Hitachi Advanced Server DS7080	Hitachi Vantara	Oracle Linux 8	
	Hitachi Advanced Server DS225	Hitachi Vantara	Oracle Linux 8	
For certification information using a different kernel, please visit	Hitachi Advanced Server DS120	Hitachi Vantara	Oracle Linux 8	
Frequently Asked Questions on	Hitachi Advanced Server DS220	Hitachi Vantara	Oracle Linux 8	
the right side of the page.	Hitachi Advanced Server DS240	Hitachi Vantara	Oracle Linux 8	

You can also check OS software compatibility from the Storage Systems tab.

Hardware Certin Oracle Linux and Virtua	fication List		-	
ver Systems Storage Systems Oracle	Linux KVM			
ORACLE	Search Filter Hitachi Vantara	All Oracle VM versions	s 🗸 Reset	Related Links
The HCL Program	Array Model	Vendor	Operating System or Virtualization Platform	Hardware Certification List (HCL) Hardware HCL FAQ
3	Hitachi VSP 5500H	Hitachi Vantara	Oracle VM 3.4	Component Compatibility Guide
The Oracle Linux and	Hitachi VSP 5100	Hitachi Vantara	Oracle VM 3.4	ISV Catalog
Virtualization List (HCL) provides users with information about servers certified with Oracle VM and Oracle Linux with Unbreakable Enterprise Kernel, and stream certified with Oracle	Hitachi VSP 5100H	Hitachi Vantara	Oracle VM 3.4	Oracle Linux
	Hitachi VSP 5500	Hitachi Vantara	Oracle VM 3.4	Oracle Virtualization
	Hitachi VSP E990	Hitachi Vantara	Oracle VM 3.4	Download Software
	Hitachi VSP E590	Hitachi Vantara	Oracle VM 3.4	Shop Oracle Linux Support
VM.	Hitachi VSP E790	Hitachi Vantara	Oracle VM 3.4	
This HCL web site provides			1 - 7	

Chapter 4: Compatibility matrix

Check KVM compatibility from the Oracle Linux KVM tab.

Server Systems Storage Systems Oracle Linux KVM

ORACLE Oracle Linux KVM Server Certification

Oracle Linux KVM Certification is Part of Server Certification

The HCL Program

The Oracle Linux and Virtualization Hardware Certification List (HCL) provides users with information about servers certified with Oracle VM and Oracle Linux with Unbreakable Enterprise Kernel, and storage certified with Oracle VM.

This HCL web site provides information about hardware certified specifically with Oracle Unbreakable Enterprise Kernel. For certification information using a different kernel, please visit Frequently Asked Questions on the right side of the page.

Oracle Linux KVM hosts provide the compute resources for Kernel-based Virtual Machines (KVM) in an Oracle Linux environment.
Compute host (VDSM) minimum requirements

Server virtualization, the Kernel-based Virtualization Machines (KVM) component of Oracle Linux, is supported on any Intel VT, AMD-V, or ARM server that is certified for Oracle Linux 7 with UEK Release 5, Oracle Linux 7 with UEK Release 6, or Oracle Linux 7 with UEK Release 7, or Oracle Linux 7, with UEK Release 7, or Oracle L

Release	Platform	Oracle Linux KVM host requirement	Minimum kernel required	Supported KVM hos in OLVM
	x86-64	7 Update 6 and higher	UEK R5 Update 1 (4.14.35- 1844) and higher	OLVM 4.3, OLVM 4.4
Oracle Linux 7	x86-64	7 Update 7 and higher	UEK R6 (5.4.17-2011) and higher	OLVM 4.3, OLVM 4.4
	aarch64	7 Update 9 and higher	UEK R6 (5.4.17-2011) and higher	Not applicable
Oracle Linux 8	x86-64	8 Update 5 and higher	UEK R6 Update 3 (5.4.17-2136) and higher	OLVM 4.4
	x86-64	8 Update 5 and higher	RHCK (4.18.0-348) and higher	OLVM 4.4
	aarch64	8 Update 5 and higher	UEK R6 Update 3 (5.4.17-2136) and higher	Not applicable

Oracle Linux Virtualization Manager Requirements

Oracle Linux Virtualization Manager (OLVM) is a complete and fully supported open source solution that provides a graphical user interface to configure, monitor, and manage complex Oracle Linux KVM environments, including enterprise and clustered

Software compatibility

See <u>https://support.oracle.com/</u> and browse to the Certifications tab to check the database version compatibility with Oracle Linux or any other operating system (support account credentials are needed).

ORACLE' MY ORACLE SUPPORT	Last Login: November 10, 2022 2:27 PM IST Switch to Cloud Support 🛞 Bhagwat (Available) • 🧧 (0) Cont	act Us Help 🕶
**** Knowledge Service Requests Patches & Updates d Commun	nity Certifications Advanced Customer Services Settings	2
Certifications	Give	Feedback
Recent Updates to Certify Compare multiple releases and platforms for a single pr Download software release media from the certify detail improved support date layout, updates for Engineered Systems (Dia), Sun Systems, Di Vew the latest additions restem.	oduct (a matrix view). J page. atabase, EBS, Fusion Apps, Fusion Middleware, JD Edwards, Siebel, Financial Services, newly acquired companies, and more.	8
Certification Quick Links	Search Search	
What's New for Certifications Watch a Video Tutorial Tops for Using Certifications Professional Certification Exams	Compare Releases and Platforms Kelease Release Platform Release Platform Any Conce Database Conce cetifications with another product Conce Cetifications with another product Conce Cetifications Cetificati Cetifications Cetifications Cetificati Cetifications C	8
Getting Started with Certifications	Clear Save	Search
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Chapter 5: Hardware pre-checks

After the hardware stack is ready in the lab and mounted in rack, verify that all components are intact and in good condition. Log in to the bare metal host using the BMC console (iLO for Advanced Server HA800 series servers), verify firmware, BIOS, NIC, HBA and other components status.

The Hitachi Advanced Server DS220 BMC management console and login screen for bare metal host looks like the following illustration. The home page shows component names, status, and version details.



On the home page, check firmware information, software versions, model numbers, and the hardware BIOS version. On the same page you can check other hardware-related information such as processors and PCIe devices.



Chapter 5: Hardware pre-checks

Upgrade firmware and BIOS

If the firmware and BIOS versions are not the latest, download them from the Hitachi Support Connect portal link at <u>https://support.hitachivantara.com/en/user/answers/downloads.html</u> (Hitachi login credentials are required).



Note: See the README.txt file before continuing the upgrade and follow standard practices.

Procedure

- 1. After logging in click Hardware Download.

 Support Home > Answers > Downloads

 Downloads

 Search Downloads...

 Cick here

 SOFTWARE DOWNLOAD

 HARDWARE DOWNLOAD

 NETWORK DOWNLOAD

 Advanced Server DS120

 Advanced Server DS120 G2

 Advanced Server DS220 G2
- 2. Select Advanced Server DS220 G2. Advanced Server DS220 G2

Hitachi Advanced Server DS220 G2 (2U 2 Socket) delivers supreme performance, scalable IO capability and improved security based on the latest technologies adopt Intel Whitley platform architecture and support Ice Lake CPU (ICX).



- **3.** In the **Components** section, select **BMC/BIOS Firmware** from the drop down menu and start downloading software.
- **4.** After the download is successful, copy software binaries to their associated directories and log in to the BMC console.
- 5. Go to Maintenance > Firmware Update > Choose File (Upload binary) > Start Firmware Update.



6. Click Choose File (browse from local path).

🍘 Sensor	Firmware Update
 System Inventory 	Home Maintenance Firmware Update
FRU Information	
Server Identify	0
네 Logs & Reports >	Note: Following are the Firmware update methods and components supported
Settings	in this page. • Dual Firmware update
🖵 Remote Control	BIOS Firmware update CPLD Firmware update
Image Redirection	Select Firmware Image Upload Firmware Binary from local
Host System Diagnostics	Choose File No file chosen path
එ Power Control	Start firmware update
🗲 Maintenance	Click here

7. Select the **Preserve BIOS NVRAM Region** check box and click **Proceed** to flash the BIOS.

Chapter 5: Hardware pre-checks

Note:	
Following are the firmware update methods and components supported in this	
page.	
Dual firmware update	
BIOS firmware update	
CPLD firmware update	
elect Firmware Image	
E105220 G2\2022WW13.4 S5XH3A14 H00\S5XH3A14 H00 RIN # Browse	
Start firmware update	
Distance BIOC N/DAM Dealog	
C reserve broshinken kegon	
Proceed to flash BIOS	

Result

The message The device has been updated successfully appears.

Note:			
INVESTIGATION CONTRACTOR CONTRACT			
Following are the firmware update methods and components supported in thi	5		
page.			
Dual firmware update			
BIOS firmware update			
CPLD firmware update			
ielect Firmware Image			
E-\D5220 G2\2022WW13.4_S5XH3A14.H00\S5XH3A14.H00.BIN_c Browse	1		
Start firmware update			
Disease BIOC MUDAN Basias			
Preserve bios NVRAM Region			
Undates completed. Resetting			
Updates completed Resetting			
Updates completed Resetting	Message from webpage	×	
Updates completed Resetting Flashing (100%)	Message from webpage		
Updates completed Resetting Flashing (100%)	Message from webpage		
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Updates completed Resetting Flashing (100%)	Message from webpage	ataly.	
Updates completed Resetting Flashing (100%)	Message from webpage	alah.	

Note: After the firmware update is successful, power cycle the server for the latest BIOS version to take effect.

Chapter 5: Hardware pre-checks

Chapter 6: Network configuration

The network is the most crucial part between the storage system and servers. To maintain resiliency, two paths are needed for storage access.

Hitachi Vantara recommends using pairs of 25 Gbps NICs for the cluster interconnect network and public network with dual ports. Use NIC bonding to provide failover and load balancing of interconnections within a server.



Note: When creating NIC bonding pairs, ports should be used on different cards to avoid single points of failure (SPoF).



1 GbE LAN Link 10/25 GbE LAN Link 10 GbE Uplink

Note:

Management servers are not used in this implementation; they are shown for reference only.

SAN zoning

Zoning is a fabric-based service in a storage area network (SAN) that groups together hosts and storage nodes that require communication. Zoning means restricting the scope of an initiator (host) to a particular target (storage system) in the fabric. An initiator can see only the devices from a particular storage system that is zoned to it. Zoning provides security to data by restricting unauthorized access at the switch level.

A zone is made up of several devices grouped by their Worldwide Names (WWN), or is a group of switch ports. Devices can only see other devices in the same zone, so zones enable servers and storage devices they use to be isolated from other servers and their storage devices.

If one server has two HBAs and dual ports each, two paths are needed from the server to access storage LUNs logically to avoid any storage access failure and to maintain redundancy.

See *Managing Fibre Channel switches* at <u>https://knowledge.hitachivantara.com/Documents/</u> Converged/UCP_Advisor/4.0.0/Managing_Fibre_Channel_switches for details.

Determine WWNN or WWPN information

To create a zone, determine WWNN or WWPN information of components. This information is used to create zone aliases for zone A (Server > Switch) and zone B (Switch > Storage PORT ID).

Path1: Server/host HBA 1 (WWNN) > Fabric switch port 1 (any port on switch device) (WWPN) > Storage PORT (WWNN)

Path2: Server/host HBA 2 (WWNN) > Fabric switch port 2(any port on switch device) (WWPN) > Storage PORT (WWNN)

Procedure

1. Run the following command from the server to determine the HBA port WWNN/WWPN.

more /sys/class/fc_host/host?/port_name

[root@ig-virt01 host20]# cat /sys/class/fc_host/host20/port_name 0x100000109bd8222e [root@ig-virt01 host20]# cat /sys/class/fc_host/host19/port_name 0x100000109bd8222d [root@ig-virt01 host20]# cat /sys/class/fc_host/host18/port_name 0x100000109bd8226d [root@ig-virt01 host20]# cat /sys/class/fc_host/host17/port_name 0x100000109bd8226c

You can also run the following command.

systool -c fc_host -v | grep port_name

[root@ig-virt01	fc host]#	systool -c fc host -v grep port name
		"0x100000109bd8226c"
		"0x100000109bd8226d"
		"0x100000109bd8222d"
		"0x100000109bd8222e"

You can also run the following command.

ls -l /sys/class/fc host/

2. Log in to the SAN switch, and determine its WWN.

SWG720:FID128:a	dmin> switchshow		
switchName:	SWG720		
switchType:	181.0		
switchState:	Online	Login to SAN switch	
switchMode:	Native	Loginto or in outen	
switchRole:	Principal	and execute	
switchDomain:			
switchId:	fffc01		
switchWwn:	10:00:d8:1f:cc:88:31:6e		
zoning:	ON (ASE JG 20220502 6)		
switchBeacon:	OFF		
FC Router:	OFF		
Tabric Name:	IDSE-FC		
HIF Mode:	OFF		
Allow XISL Use:	OFF		

3. Log in to Hitachi Storage Navigator and determine the storage port information (CL5-B with WWN number 50060Eb0233ABF41 in this example).

Explorer	CL5-B							Last Updated :	2022/11		63
Storage Systems	VSP.E series(S/N:7)	5039] > Ports/Host Grou	ps/iSCSLTargets > CL5-B								
• 🕵 Pools 🔗	WWN		50060E80233ABF41		Address (i	Loop (D)		DC (6)			_
Ports/Host Groups/iSCS	Speed		Auto(32 Gbps)	_	Fabric			ON			
CL1-A	SFP Data Transfe	r Rate	32 Gbps		Connectio	n Type		P-to-P			
1 CL3-A	Security		Enabled		T10 PI Mo	de		Disabled			
10 CL5-A	Number of LUNs				18 (Max A	llowed: 2048)					
1 CL7-A	Number of Hosts				1 (Max All	owed: 255)					
1 CL1-8	International In	and the second se									
· C CL3-6	Host Groups	losts									
CLS-B	Create Host Gro	Add LUN Paths	Add Hosts More Action						Sel	ected: 0	of
(00) 58-G00 (00)	AFilter ON	Select All Pages 0	Column Settings					Options +	(e) 1	/ 1	3
05220G1_73	Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	Number of LUNs	Resource Group Name (ID)				
CL2-A	CL3-8	10 28-000	00 [Standard]	Enabled	0	0	meta_resource				
		DE22003 73 MRA 1	[backed3] 00	Eashled		18	meta resource				

Now we have HBA, switch, and storage WWNs. Use this information to create zone aliases.

- 4. Log in to the SAN switch (https://<ip address>/) with user credentials.
- 5. On the home page, under the **Switch Ports** tab, view the switch WWN and remote host server HBA WWN.

The following illustration shows storage port WWN (50060Eb0233ABF41) connected to port12 on the switch.

4	Dast	nboard Switch	Overview Switch Ports	Events Zor	ning Settings	Б	:41	1/2 ~ ~ ×	witch : 128 - G720-115 🛩	
					Switch I	Ports (6	54)		Act	lions
									FC Ports	e.
	Name *	Port# +	WWN +	Type +	Speed (Gb/s) +	Status +	Health @	Remote Port +	Remote Node	
	port4	4(0x4)	20.04:d8:1f.cc:5f.b1:f8	F-Port	N32	Online	HEALTHY	50.06.0e.80.23.3a.ac.10	50.06.0e.80.23	4
	port5	5(0x5)	20.05.d8 1f cc:5f.b1.f8	F-Port	N32	Online	HEALTHY	50:06:0e:80:23:3a:ac:30	50.06:0e:80:23	~
	port6	6(0x6)	20:06:d8:1f.cc:5f.b1:f8	F-Port	N32	Online	HEALTHY	50:06:0e:80:23:3a:ac:50	50:06:0e:80:23:	~
	port7	7(0x7)	20:07:d8 1f:cc:5f:b1:f8	F-Port	N32	Online	HEALTHY	50.06:0e:80:23:3a:ac:70	50:06:0e:80:23:	~
	port8	8(0x8)	20:08:d8:1f:cc:5f:b1:f8	F-Port	N32	Online	HEALTHY	50.06:0e:80:23:3a:ac:11	50.06:0e:80:23:	~
	port9	9(0×9)	20.09.d8.1f.cc.5f.b1.f8	F-Port	N32	Online	HEALTHY	50.06.0e.80.23.3a.ac.31	50.06:0e:80.23	\sim
	port10	10(0xA)	20:0a:d8:1f:cc:5f.b1:f8	F-Port	N32	Online	HEALTHY	50.06.0e.80.23.3a.ac.51	50.06.0e.80.23	~
	port11	11(0×B)	20.0b:d8.1f.cc.5f.b1:f8	E-Port	N32	Online	HEALTHY	50.06.0e.80:23:3a.ac.71	50.06.00.80.23	
C 1	port12	12(0xC)	20:0c:d8:1f:cc:5f:b1:f8	F-Port	N32	Online	HEALTHY	50:06:0e:80:23:3a <mark>bf:41</mark>	50:06:0e:80:23:	~
11	port13	13(0xD)	20:0d:d8:1f:cc:5f:b1:f8	F-Port	N32	Online	HEALTHY	10:00:94:40:c9:d0.e3:eb	20:00:94:40:c9	~
	port14	14(0×E)	20.0e:d8:1f.cc:5f.b1.f8	F-Port	N32	Online	HEALTHY	10:00:94:40:c9:d0:93:0a	20.00.94:40:c9	~

Zone aliases

A zone alias is a name given to an object or set of objects for zoning purposes. Zone aliases simplify zone administration by eliminating the repetitive entry of WWNs or port numbers.

After assigning a zone alias to one or more objects, you can perform zoning operations on the alias instead of having to specify the individual ports and WWNs for the objects.

See Managing zone aliases <u>https://knowledge.hitachivantara.com/Documents/Converged/</u> <u>UCP_Advisor/4.0.0/Managing_Fibre_Channel_switches/08_Managing_zone_aliases</u> for details.

Create a zone alias for storage ports

Procedure

Log in to the SAN switch controller and choose Zoning > Zone aliases > > + (add member)



2. Provide the zone alias name and search WWN number of the storage (50060Eb0233ABF41 or 51).

	▲ Not secure https://10.76.32.						
10	and Bankel Galaxies, March Society, 1		dd Members			Territoria di	×
Zone Cento			Add Members				<u></u>
ture L	Select discovered Devices/Ports Enter manually]					
	WWN -	•	Selec	oted Members			
	Members	Vendor		Members	Type	Vendor	
	50.06.0e:80.23.3a.bf.51						

3. Confirm the zone alias (for example, E1090_136_4B).

Zone Cont	Dashboard Switch Overview	Switch Ports Events Z	E1000 126 4P		Logical Switch : 128 - SW
Zone Com	ingurations zones zon	e Allases Preferences	E1090_130_4B		
Name	E1090_136_4B				
a	1 Item		Members		
	Members	Туре	Vendor		Add
	50:06:0e:80:23:3 <mark>a:bf:31</mark>	WWN	-	~	Remove
	Note: This is a	an example for	reference purposes. The WV	VN nu	mber and

Create a zone alias for HBA ports

Procedure

- 1. Click Zoning > Zone aliases > Search with WWN number.
- When the results appear, click the associated check boxes and press Add > Save. The following example shows four dual port HBA aliases: DS220G2_75_HBA1_1, DS220G2_75_HBA1_2, DS220G2_75_HBA2_1, and DS220G2_75_HBA2_2.

	Add Members	×
 Select discovered Devices/Ports 		
Enter manually		
Alias 👻 Q DS220	G2_75 © Selected Members	
Members	Members	Туре
DS229_C2_67_HBA2_2	↓ ·	
DS220G2_75_HBA1_1		
DS220G2_75_HBA1_2		
DS220G2_75_HBA2_1		
DS220G2_75_HBA2_2		
DS220G2_76_HBA1_1		
DS220G2_76_HBA1_2		
DS220G2_76_HBA2_1		
DS220G2_76_HBA2_2		
E1090_113_1A		
E1090_113_1B		

Result

There are two zones as follows:

- Storage <-> SAN switch > E1090_136_4B
- SAN Switch <-> Server (HBA port) > DS220G2_75_HBA1_1

Create a zone for storage port zone aliases and HBA port zone aliases

The storage port zone aliases and HBA port zone aliases need a zone and associated name. In the following example, zone DS220G2_75_HBA1_1_E1090_136_1A) is created.

Procedure

1. Go to Zoning > Zones > Specify Zone Name > Search for Member (zone aliases created earlier) > Add > Save.

Type St	landard			
a	2 Items	Members	_	
	Members	Туре		Add
D	S220G2_75_HBA1_1	ALIAS	~	Remove
DE	1090_136_1A	ALIAS	~	

See *Managing zones* at <u>https://knowledge.hitachivantara.com/Documents/Converged/</u> UCP_Advisor/4.0.0/Managing_Fibre_Channel_switches/09_Managing_zones for more information.

- **2.** Create a zone for each HBA port.
- 3. After the zones are created, add them to the zone configuration.

Zone configuration

A zone configuration is a set of SAN zones. SAN zoning is a fabric-based service for grouping the devices in a SAN into logical segments to control communications between those devices.

Procedure

1. Go to Zoning > Zone Configurations > + (Add).



2. Provide a name for the zone configuration (for example, ASE_mkale_0920) and add zone members.

Verify the existing zones that were created previously, as shown before the zone configuration.

🖸 🔠 Weblock Denset Manager 🛛 🗶 🦿 1	https://10.16.32.73/Hogin 🛛 🖌 🔀 KOSE Switches - KOSE	GHLC:: x I II 17407/06-0020-12/1 x +	- 0 X
Characters Destan Destan Destan	forth form (Tarring) services	Logical Switch	120-0720-115 - 🔕
Zone Configurations Zones Zone Aliases	Protestices Zone Configura	ations(3)	•
Q 3 terra			
Name #	Status. 4	Member Count #	
ASE-ljung-0708	InActive	42	4
ASE_mikale_2022-03-29	InActive	42	1. No.
ASE-lyang-0708	Active	42	

3. Add the zone members that were created.

		Add Mem	bers		5	
a						
	Name *	Type ©		Member	Count +	
	DS220G2_75_HBA1_1_E109	Standard		2		-
	DS220G2_75_HBA1_2_ASE	Standard		2		
	DS220G2_75_HBA1_2_E109	Standard		2		
	DS220G2_75_HBA2_1_ASE	Standard		2		and services
	DS220G2_75_HBA2_1_E109	Standard		2		
	DS220G2_75_HBA2_2_ASE	Standard		2		
	DS220G2_75_HBA2_2_E109	Standard		2		
	DS220G2_76_HBA1_1_ASE	Standard		2		
	DS220G2_76_HBA1_1_E109	Standard		2		
	OK Cancel	mete a 🗶 1995 Saddi ing/const.ist/create/fid=128	w (197 - 199 Ger.)	a manaca	29-9271 K +	6 4 6
1	OK Cancel	mole a 🗶 201 Salah Ingjaconstationeste Hot- 128 Add I	w est ast to	e 🔳 frantske og	200 92.77 K +	0 ¢ 6
•	OK Cancel Node (Jaconi Marager	note a 2014 Salah ang konset hitoronata Meter 128 Add 1	e se anter	e 🔳 Proprocos	28.32.71 K +	с р е х
•	OK Cancel	mole a 200 Saloh ing bennet lab (meter Hot = 128 Add 1	e 122 dag Ge Members Selected M	embers	20 2 M C 4	0 0 0 ×
	OK Cancel Under Unward Manager Mathematic docovered Devices/Ports Enter manually Mate Members	minta a 2 the familie ang/tecnet.ibit/creater/fiel=128 Add 1	Members	embers	20 22.71 K +	
	C Cancel Catche University C A Net secure Arrest C A Net secure Arrest C A Net secure Concess C C C C C C C C C C C C C C C C C C C	note 8 22 KM failed angtoonet.tab.constration.tab Add 1	Members	embers etters	20 22.71 K +	
	CAC Cancel Added (Invested Manager C A Net secure Adapted (10.74.32.1154/200 C A Net secure Adapted (10.74.32.1154/200 C A Net secure Adapted (10.74.32.1154/200 Adapted (10.75.32.1154/200 Adap	note a 2 004 factor ang sound introduction filter to a Add I	Members	embers oci73.HbA1.2	20.32.71 x 4	C 0 0
	OK Cancel	note a 2 20 Salah ang kanan bistorean Mur- 128 Add	Members	embers etters	Toer ALAS	0 0 G
	OK Cancel	note a 2 Ott Saint org/sound bit/weeks/Mid- 128 Add	Members	embers oberg 001,75,4641,2	20 32.71 K) 4 7 19 F A 3 4 3	0 0 G
	OK Cancel	Add	Members	embers 01.7324641.2	20 32.71 K) +	×
	OK Cancel	note a 2 Chi Sanh Ing Sound Int Constant Mar - 120 Add I	Members	embers 001.73.H6A1.2	200 32.71 K) + 201 (201) 7 (201) ALAAS	×

Note: Note down the member count before and after zone configuration.

Ê

E

After Zone configuration (ASE_mkale_0920), the new zone with a status of InActive needs to be changed to Active.



Before zone configuration, the Member Count was 42 and after addition, zone configuration is 44 members. A zone configuration with 44 members must be activated.

lame ASE	-mikale-0920					
	44 Items		Members			
Name		Type +	Member Count +		Add	
05220	G1_73_HBA_1_1_E1090_136_58	Standard	2	v A	Remove	
05220	G1_73_HBA_1_2_E1090_136_68	Standard	2	~		
05220	.G2_180_HBA-1-p1-ASE_47_11	Standard	2	~		
0\$220	.G2_180_H8A-1-p2-ASE_47_11	Standard	2	~		
DS220	_G2_180_HBA2-p1-VSP5600-1	Standard	2	~ .		

Note: Only one zone configuration can be enabled at a time.

Chapter 7: Storage configuration

Hitachi Device Manager Storage Navigator is used to administer storage tasks such as capacity management, availability management, continuity management, and financial management.

Create host groups

Log in to Hitachi Device Manager Storage Navigator to create host groups so LUNs created on storage systems can be mapped and visible on the server.

See Configuring host groups at https://knowledge.hitachivantara.com/Documents/ Management_Software/SVOS/9.3/Volume_Management_-_VSP_G130%2C_G%2F %2FF350%2C_G%2F%2FF370%2C_G%2F%2FF700%2C_G%2F%2FF900/Provisioning/ 13_Configuring_host_groups for details.

Procedure

 Log in to Hitachi Device Manager and select Ports/Host Groups/iSCSI > Create Host Groups.

Explorer	Ports/Host Gro	oups/iSC	SI Targets							16 25
Storage Systems	VSP.E.secies(5/N	715039) >	Ports/Host Groups/ISCS1 Tergets							
* 🎁 VSP & series(5/N:715039)	Number of Port	ta			16					
Taska	Hart Courses	ICCCL TO	unante Moste Dorte Loolo MOMB	ACCEL Manuar	CHAD HEAT					
Reports	Host Groups /	riscsi la	ingets Hosts Ports Login www	s/iscsi names	CHAP Users					
Components	Create Host 0	Groups	Create ISCSI Targets Add LUN Paths	More Actions					Selected	0 of 3
Logical Devices	RFilter ON	011 5	elect All Pages Column Settings					Options 🛩 🛛 H	+ + 1 / 1	
			Host Group Name / (SCSI Target	ISCSI Target		Port	Number of	Number	Authentication	
* Ports/Host Groups/iSCS	E POR ID	Type	Alias	Name	Host Mode	Security	Hosta	of LUNs	Method	Mutur
- Harrison and a second	EL CLA	Elbra	No. 14-000		00 [Steederd]	Enabled	0			and the second
* 💦 Replication	CLI-B	Fibre	18-000		00 [Standard]	Enabled	0	0		
	CL2-A	Fibre	2A-000		00 (Standard)	Enabled	0	0	-	
	CL2-8	Fibre	28-000		00 (Standard)	Enabled	0	0		
	C	Fibre	3A-900		00 (Standard)	Enabled	0	0		
	CL2-8	Fibre	B 28-000	(a) ((brandard)	Enabled	0	0	-	
	SL4:0	Fibre	000-AA-000		00 (Standard)	Enabled	0	0		
	GL4:8	Fibre	48-000		00 [Stendard]	Enabled	0	0		
р <u> </u>	SLE:0	Fibre	5A:020		00 [Standard]	Enabled	0	0		
Analytics	CL3-0	Fibre	000-80		00 (Standard)	Enabled	0	0		
Administration	SLE:A	Fibre	6A-000	. * 2	00 [Standard]	Enabled	0	0	(+	
	SLEE	Fibre	68-000	. 4	(brandard)	Enabled	0	0	14 C	
General Tasks	SLZ-A	Fibre	ZA-000		00 (Standard)	Enabled	0	0		
Create Host Groupe	GLZ:0	Fibre	28-999		00 [Standard]	Enabled	0	0		-
M Create (ICI) Targets	SLA:0	Fibre	000-A4		00 [Standard]	Enabled	0	0		
	LL SL0-0	Fibre	000-000		00 [Standard]	Enabled	0	0		

- 2. Go to Host Group Name > Resource Group > Host Mode > Add New Host > Add > > Finish.
- 3. Go to Tasks and monitor the progress (it takes a few minutes).

Hitachi Device Manage	M Storage Nevigator Reports Settings Maintenance Uti	ity Van Tool Halp	1	e Aint E	Autom C. Orean			С +
Explorer	Tasks					Last Updated 1 202	2/11/20 22:59 🖬	l
Storage Systems	15P.E.merime(5/30.715029) = Tenko							
* () VSF 8 series(\$/9.715039)	Completed	143		Buspende	1	0		1
Raports	In Progress Walling	0		Failed		28		
* Components • 🎇 Parity Groups	Tasks			*				
Logical Devices	Suspend Tasks Resume Tasks	Delete Tasks Hore Actions	-				Salactad: 0 of 23	2
Party Party Street Concerning	BRINN ON THE Select All Po	eges Column Settings				Options w	3 / 3 + 3	6
* External Storage	Task Same	Status 2.4	Type	User Name	Bubmission Time	Blait Time	End Time	î
* Replication	211122-Overlement/Press	Ch. In Process Completed	Create Hoat	maintan	2022/11/20 22-59-41 2022/04/22 02-43-45	2022/11/20 22:59-43 2022/54/22 02:43:47	2022/04/22 02-48	ļ
	220422-CreatedDin	Consisted	Create LDEVs Add LUN Pa-	maintan	2022/04/22 04:00:09 2022/04/29 10:09:47	2022/04/22 04/00/14 2022/04/29 10:09:48	2022/04/22 04:05 2022/04/29 10:12	

4. Upon completion, verify host group creation.

Hitachi Device Manag	Paporta Setting	dos a Marinanca (1975) Vian	Test Malp		19 Aug (19)	NARCOART IS	- Designation	Logged to and mail	nanara 📰
Explorer	G11-A							Last Opdates + 2003/	LL/20 23-04 👘
Storage Systems	100 A second hits	(715028) > Butalment Douveald	CELTernets > CLI-A						
Legent Devices	work		004068023348400		Address (Loop (D)		RF (0)	
	Spand		Au(32 Ohjet)		Fabrie			CR .	
* th Parts/Host Groups/IDC	SPD Data Tran	ofer Rate 3	2 dbpe		Connection	n Type		8-52-9	
CLU-A	Security		telder		T10 FE Ho	de		Disabled	
100.034	Number of LUI	5w			20 (Maix A	floored: 2048	P. 1		
10 CLD-4	Rumber of Hu	rta			2 (Max Al	lumed: 298)			
100.014	This area	Providence			10				
·C 0.1-0	Host Groups	muses							
10 0.24	Greate Host	Groups Add LUR Paths Add	More Actors						ielactadi il of 1
10 0.3-8	African L ON	Salart All Pages Colum	ne Bettings	100 A.S.			111	Cations w 24111	1 (7.8. (H))
10 cu + e	C) Part ID	Hoat Group Name	must Mode	Part	Aurobac of	Number	Resource Group		
· C 0.2+4	and the second second	and the second se		Destarting	manna	of LUNE	maxing (10)		
10 CAA	< L CL1-A	14:000	00 [Standard]	Enabled	-0	0	mela_resource		
10 C.4-A	LL CLI-A	BRIZCOI 75 HEAL & LA	00 (Standard)	Enabled	1	20	meta_resource		
10 0.8-4	LL CL1-A	Ballo 70 H841 1 14	00 (Standard)	Enabled	1		meta_resource		

Create LUNs

Creating LUNs on storage systems is necessary in a SAN environment to use disk space in chunks so that it can be assigned to specific hosts. Make sure the SAN area is accessible to hosts with two HBAs to ensure fault tolerance.



Note: Before LUN creation, make sure you have sufficient space available in the storage system as well as the dynamic provisioning pool.

Procedure

1. Log in to Hitachi Device Manager and select Logical Devices > Create LDEVs.

Explorer	Logical Devices							Last Updated		02:21 62
Storage Systems	VSP & series(S/N:715	029) > Logical Devices								
* 🎁 VSP E series(S/N1715039)	Volume Migration	-								
🙆 Tasks	Number of LDEVs	Allocated		0		Reserved	1	36		
Reports		Unallocated		12		V-VOLs		95		
' 🛱 Components						Total		143		
Parity Groups	Format/Shredding	Tesk Status								
Cogical Devices	LDEVs				^					
* A Ports/Host Groups/iS	CS Create LDEVs	Add LUN Paths Edit LDEVs	More Actions	•					Selecte	1 0 of 14
* DExternal Storage	\$Filter ON	Select All Pages Column S	ettings					Options 👻	E E 1	/1 +
Replication	LDEV ID	LDEV Name 1 4	Status	Capacity	Number of Paths	Provisioning Type	Attribute		Pool Name(ID)	Parity Group
			Normal	9215.47	0	DP	Deduplication	System D	Oracle(0)	
	2		Normal	9215.47	0	DP	Deduplication	System D	Oracle(0)	
				0715 47		00	Deduplication	Sustan D	Ounder(0)	
	ALIBRIDO 🕃 🔜		Normal	9213.47			Decopilication	ayatem bin	Custon (c)	
			Normal	9215.47	0	DP	Deduplication	System D	Oracle(0)	-

2. Select the Provisioning Type, Capacity Saving, and Pool Selection and then click **Select Pool**.

wizard lets you create a	nd provision LDEVs enter the informatio	on for LDEVs you want to c
rovisioning Type:	Dynamic Provisioning	CON paths for the LDEVs.
ata Direct Mapping:	Enable 🕑 Disable	
apacity Saving:	Disabled	
Multi-Tier Pools	Enable Disable Active Flash	
ool Selection:		
Drive Type/RPM:	SSD/-	
	6(6D+2P)	•

3. Make a selection from the list of Available Pools.

A	vailable Pools		-	-	-	_	-	-	Options ¥	661	/1 -) -)(
	Pool	FAID	Capacity		_			User-Defined T	weshold (%)	Tier	Subscription
	Name(ID)	Level	Total	Used	Used (%)	Drive Type/RPM	Encryption	Warning	Depletion	Management	Current
0	CVDHANA(1)	6 6D+2P)	15835.47	154.75 08	4	SSD/-	Disabled	70	60	Auto	32

4. Select an LDEV ID and Name and click Next.

LDENIE											
Anufable LDCVs	Alexandra and a second					102	elected LDNV	ñ			
Alter On The	Salari Al Pages	Cathorn		14 4 4		1	inst Al Paper				Cphane ar
C riska to	LDEV Northe	Parity Group 12	Pool forme (10)	AAU A		×	LORY ID	LDEV Neme	Party Bread 10	Pool Serve (25)	Caped
00-00-06	P00686	11	1.	6(62+27)			00.04.00	10, Dra, Rooth		CHOHMMA(1)	100.00
00-00-07	P00487	14		6(62+2F)		1.0	Receiption in the	Alexandra and		10-000	1
00-00-08	P00534	1-2		4(42-3P)							
00-00-04	P00L15	112		6(62+2P)							
00-00-14	P00522	1-0		4(40-2P)							
00-00-17	P00523	1-0	4	4(40+37)							
B1-00-08	P00530	2.4		4(40+37)	AND						
00-00-37	P00531	14		4(40+3F)							
00.00.38	POOL38	1-9		4(40+27)	4 farme						
00-00-37	POOL39	1-8		4(40+37)	Contraction of the	100					
00-00-38	POOL46	1-6		4(40+3F)							
00-00-34	POOL47	14		4(80+3P)							
00-00-30	DLVM_D3_DWA_D	400	Oracle(2)	4(40+3P)							
00-00-50	alon_damain_std	+	Oracle(2)	4(60+3F)							
00-00-82	CVD_D1,HAMA_EH	*	OVDHAMM(1)	4(90-3F)					1.0		
00-00-83	CVD_DS_HARA_LODE	411	(CVDHABA(1)	6(60-2F)							
00-00-54	EVE, 65, HARA, LOSS	+	(CVDHABA(1)	8(80+2P)							
00-00-88	EVE, FL, HANA, LOES		(VDHAMA(1)	8(80+2P) v							
4	and the second se							1.0			

Note: In this example, there is already a data pool on the storage system. If a data pool does not exist, then create one with the help of the storage administrator.

5. Select the name of the hostgroup on which the LUN will be mapped or visible on the host. Select multiple paths to the LUN to avoid any single point of failure, and then click Add.

reate LDEVs	P										10	
	 2.5elect LDTvs > 3.5elect Hoel Drouge 2 	OCSI Tergeta										
	and the second											
Belait host grow and then click A	upp from the Available most Groups list, and t Add. Click field to map the host proups or G	fren click Add. If i CSI Targets to US	you want to a R paths.	-04-1	ICEI targeta, a	elect it	ICEE from S	election Object. select	ISCRI targets from	the Arailabi	a IOCBI Targeta la	M
Selection Object	A C Fire C. OCS											
must Groups:												
Available II	lest Greeps					107	-				_	_
Armar 1 ON	Collect Al Pages Options	. (+(+) +	WANT-	14		100	art al faut			_		_
- Put 10	Heat Group Name 1.4	Heat Made	Part Descript	T		5	Port ID	Host Group Name	most Mode	Part	Runcher of	-
0.74	CVD_01_99_HBA_1_74 (01)	00 (Standard)	tratial									-
0.84	CV0_01_99_HEA_1_BA (01)	00 (Standard)	Enabled									
0.5-4	CV0_02_000_HBA_0_SA (02)	00 (Standard)	Enabled									
CL6-A	CVD_00_000_HBA_0_6A (02)	00 (Bandard)	Enabled									
G.7-A	GV0_50_000_HBA_1_7A (002)	00 (standard)	Enabled									
CLE-A	CV0_02_010_HB4_1_84 (02)	(bretnetit) 00	Enabled		401.9	100						
0.5-8	0622001_73_HEA_1_5_58 (01)	(brandand)	Enabled		Contractor and	10						
C.6-8	0822001_73_HBA_1_2_68 (DL)	(Intendent)	Enabled		4 familie	100			In Date			
0.1-4	0422002_75_HBAL_5_LA (01)	(thethestic) 00	Enabled	1					A0-1590	ą		
0.2-4	0622062_75_HEAL_2_2A (01)	00 (Standard)	Enabled									
0.14	0622062_75_HBA2_1_18 (01)	(transant) 00	Enabled	11								
0.3-8	D832062_79_HEA2_2_28 (01)	(Instantant)	Enabled									
1 CL3+A	0612060_76_HBA1_1_DA (01)	(00 [Standard]	Inabled									
CLA-8	0532050_75_HBA1_2_6A (013	to [thandard]	trabied									
d 013-8	D622000_76_HBA2_2_20 (01)	ID [Bandard]	Instead									
C.4.8	0612060_76_HBA3_2_48 (01)	00 (Bandard)	Instead	1								
										1.1		-
Concernant Intelligence			Contraction of	and in		100				_		COLUMN IN COLUMN
Detail		Salari	ndi 4 'af	34		6	Datail				Selected: 0	4.0

6. Verify LUN and path details.

Ores	abe EDEVs											
				CSI Targeta in 🗖	(View/Change)	LUN Partne						
The set	e LUN IDa are av I select LDEVs y	domatically set, but you to used to change and the	can change a LUN en tilick Change L	by clicking Change Jil Ibs. Click Final	LUN IDs. You the	nust first select t	he check box	for the host gr	oup (in the table subhe	ading) you want to	change.	
w	ter.											
10	udded LUNS		_	_	_	_	_	_				
	Initian OR CO	3 Delast All Pages								options w [1+]+	1 7.8	* (et)
									LUX 00(4 Sets of P	atha)		
×	1.04V 10	LDEV Name	Party Drove 10	Pool Rame (10)	Capacity	Provisioning Type	Attribute	758.01	CL3- A/DE32002_7 8_HBA1_1_34	CL3- E 8/052306 2,74,4642	C.4 A/063200 2,76,9643	-
	50:04:00	10_0m_6xi04		CYDHAMA(1)	500.00 08	09		Disabled	1.10			

7. Confirm details.

	(man.)	CreateLDEVs ID Characters)														
Selected	LDEVS											_				
					Date	Scatt Happin	6									
LDEV 1D	LDEV	hama	Sam	a(10)	LOW	10 I	wity Imag 10	Drive	Type/3794	8.410	avel	Capacity		Type	0.74	-
00-04-00	10,0	a boot's	CVD	HARA(1)	14			\$90/		4(40-	241	200.00 (0.0	0-0,940	A.4
		_	_	_	_	_	_	_	_	_	_	_	_	_		
and the second second second	LAW ID	LORV 3D	LDEV Rame	Notific Ratio	-	Parity Group 12	Pool Nem (10)	•	Capacity	Provisioning Type		ture A	1.04.14	Rada Appr	en Station	
Pure 10		00-04-00	10,010,	652204	1.1-	4	CVOMANA	C13	500.00 08	0.0		0	inable	ed Activ	-040's	
Port 10			10.04	043304	1.5	4	CVDHAMA	(1)	500.00 08	0#		0	laable	ed Adiv	#/Dy0	
Purt 10 0.3-4 0.3-8	*	00-04-00		6423.044	2,7-	4	CYDHARA	(1)	500.00 08	0.0	A.	0	inable	ed Adle	e/OyR	
Port 10 0.3-4 0.3-8 0.4-4	* *	00-04-00	10,0m,	Construction of the second			Cydnishi	(1)	\$00.00 08	0.0		0	lashie	ed Atto	N/Oy8	
Put D 0.3-4 0.3-8 0.4-8 0.4+8	9 9 9 9	00-04-00 00-04-00 00-04-00	10,010,	043304	a,7											
Purt 10 CL3-4 CL3-8 CL4-8 CL4-8	*	00-04-00 00-04-00 00-04-00	N.04	063306	2,7											

Result

After the LUN is created and the details are verified, the new LUN is listed under Logical Devices.

File Actions	Reports Settings N	faintenance Utility View 1	Tool Help		😃 Alert 🛛 🚺 A	udit Log 🏻 🐴 (Operation Unio	kked Logged	in as: maintenar	ce Logo
Explorer	Logical Devices			_		_	_	Last Updat	ed : 2022/09/28	00:02 73
Storage Systems	VSP E series(S/N:7150)	39) > Logical Devices								
* 1 VSP E series(S/N:715039)	Volume Migration									
🙆 Tasks	Number of LDEVs	Allocated		0		Reserve	đ	3	6	
Reports		Unallocated		12		V-VOLs		7	0	
*🚰 Components						Total		1	18	
'🎇 Parity Groups	Format/Shredding Ta	isk Status								
Cogical Devices	In case of the local sector of the local secto				<u>^</u>					
• 👯 Pools	LDEVS									
1 Ports/Host Groups/ISCS	Create LDEVs A	dd LUN Paths Edit LDEVs	More Actions	•					Selected	0 of 118
* 💏 External Storage	AFilter ON OFF	Select All Pages Column Se	attings					Options w	16 6 1	1
* 📢 Replication	LDEV 1D	LDEV Name 1 A	Status	Capacity	Number of Paths	Provisioning Type	Attribute	Pool Name(ID)	Parity Group ID	RAID ^
	00:00:94	DATA01_LAB	Normal	100.00 GB	4	DP		Oracle(0)		6(6D+2P
	28:00:00 C	D5220G2_75_DATADG00	Normal	200.00 GB	4	DP		Oracle(0)		6(6D+2P
	00:00:64	ESXI7_Boot75	Normal	900.00 GB	4	DP	2	Oracle(0)		6(6D+2P
	00:00:65	ESXi7_Boot76	Normal	900.00 GB	4	DP		Oracle(0)		6(6D+2P
	00:04:00	IG_Ora_Boot76	Normal	500.00 GB	4	DP		CVDHANA(1)		6(6D+2P
3 	05,00,00 🖸 🛄	OLVM_OS_Disk_DS220G2	W Blocked	500.00 GB	0	DP		Oracle(0)	-	6(6D+2P
Analytics	86:00:00	OL_BH_RAC11	Normal	100.00 GB	8	DP		Oracle(0)		6(6D+2P
Administration	A6100100	OL_BH_RAC1_2	Normal	100.00 GB	4	DP		Oracle(0)		6(6D+2P

Chapter 8: Cluster software installation and configuration

Two bare metal hosts are needed to configure clusters. With the help of virtualization, we can configure multiple VMs on each bare metal host.

The following illustration shows the components and associated software used to implement the virtualized solution.



There are two Hitachi Advanced Server DS220 G2 bare metal hosts, and LUNs are shared across these hosts for the Oracle clusterware environment. Oracle Linux 8.6 uek6 (x86_64) is installed on both hosts. After the OS installation, the Oracle KVM hypervisor is installed for virtualization. On top of the KVM hypervisor, VMs are created on each bare metal host with the help of Oracle Linux Virtualization Manager (OLVM), which resides on a separate management host.

Install the operating system

Before you begin

- Before proceeding with the OS installation, both bare metal hosts must be configured with boot LUNs provisioned from Hitachi Device Manager.
- Download the Oracle Linux ISO images from Oracle Software Delivery Cloud at https://edelivery.oracle.com/linux.

Procedure

- 1. Log in to the bare metal host at http://<IP address>/ using admin credentials.
- **2.** Log in to the BMC host, go to the Boot menu, and find the boot LUN to be used for OS installation.
- **3.** If the boot LUN is visible, go to the Boot menu by pressing the arrow □ keys on the keyboard and selecting **Boot Option #1**.

▲ Security Boot Save	Aptio Setup - AMI a & Exit	
Boot mode select	[UEFI] Root device	Select boot mode LEGACY/UEFI
FIXED BOOT ORDER Pric	orities order priorities	
Boot Option #1	[HardSK:Linux OS (Fibre(WWN50060E80233A BF00,Lun0000)/HITACHI DPEN-V 9301)]	
Boot Option #2	[USB]	-
Boot Option #3	[Network:UEFI: Slot8 Port0 PXE IPv4 Intel(R) Ethernet Network Adapter I350-T4 for OCP NIC 3.0]	<pre>++: Select Screen f↓: Select Item Enter: Select +/-: Change Opt. F1: Help for more Keys F8: Previous Values</pre>
Boot Option #4	[Disabled]	F9: Optimized Defaults ▼ F10: Save & Reset ESC: Exit

4. Because this is an empty server the OS will boot primarily from CDROM. Go to the Boot menu (Press F11 or F2 for the Boot menu during startup) and select CDROM for the boot device.

Please select boot device:
UEFI: AMI Virtual CDROMO 1.00
UEFI: Slot8 Port0 PXE IPv4 Intel(R) Ethernet Network Adapter I350-T4 for 0
UEFI: Slot8 Port1 PXE IPv4 Intel(R) Ethernet Network Adapter I350-T4 for 0
UEFI: Slot8 Port1 HTTP IPv4 Intel(R) Ethernet Network Adapter I350–T4 for
UEFI: Slot8 Port2 PXE IPv4 Intel(R) Ethernet Network Adapter I350-T4 for 0
UEFI: Slot8 Port2 PXE IPv4 Intel(R) Ethernet Network Adapter 1350-14 for 0
UEFI: Slot8 Port3 HTTP IPv4 Intel(R) Ethernet Network Adapter I350–T4 for
UEFI: Slot1-3 PortO Network Card
UEFI: Slot1-3 Porti Network Card
↑ and ↓ to move selection
ENTER to select boot device
ESC to hoot using defaults

5. Click Media Boost and upload the ISO image that was downloaded previously.



6. Go to BMC > Remote Control > Launch H5Viewer.

Firmware Information 3.16.06 Nov 10 2021 09:51:12 UTC	Remote Control Remote KVM
Host Offline	# Home = Remote Control
Quick Links 👻	
🖷 Dashboard	H5Viewer
🖚 Sensor	
System Inventory	C Launch HSViewer
FRU Information	
Server Identify	JViewer
Logs & Reports >	
• Settings	📥 Launch JViewer
Remote Control	

7. Walk through the Oracle Linux 8.6.0 installation.



8. Select English (United States) as the language.

WELCOME TO OR	ACLE LINUX 8.6.	ORACLE LINUX 8.6 INSTALLATION
What language would yo	u like to use during the inst English	allation process?
Afrikaans ১ পার্সে আসমীয়া Asturianu	Afrikaans Amharic Arabic Assamese Asturian	English (India) English (Australia) English (Canada) English (Denmark) English (Ireland)
Беларуская Български वाश्ला	Belarusian Bulgarian Bangla	English (New Zealand) English (Nigeria) English (Hong Kong SAR China)

9. Select the installation destination, for example, the Boot LUN that is assigned.

 LOCALIZATION	SOFTWARE	SYSTEM
Keyboard English (US)	Installation Source	Installation Destination
Language Support English (United States)	Software Selection Server with GUT	KDUMP Kitump is enabled
O Time & Date Americat/New York timezone		Network & Host Name
USER SETTINGS		Security Policy No profile selected

10. Select the boot disk (LUN) that was created earlier and configure storage as needed. Also specify the root user password.



11. Restart the system and accept the license agreement.

OBACIE	INITIAL SETUP				ORACLE LINUX	SERVER 8.6
		k			📰 us	Helpl
			LICENSING	USER SETTINGS		

12. Click Done.

ise Inf	formation	ORACLE LINUX S	SERVER
ne		🖾 us	Help
	License Agreement:		
	ORACLE LINUX LICENSE AGREEMENT		
	"We," "us," "our" and "Oracle" refers to Oracle America, Inc. "You" and "your" refers to the individual or entity that has acc Linux programs. "Oracle Linux programs" refers to the Linux software product which you have acquired. "License" refers the Oracle Linux programs under the terms of this Agreement and the licenses referenced herein. This Agreement is gov substantive and procedural laws of the United States and the State of California and you and Oracle agree to submit to th jurisdiction of, and venue in, the courts of San Francisco or Santa Clara counties in California in any dispute arising out of Agreement.	quired the Oracle to your right to use remed by the he exclusive or relating to this	
1. pro vari add acc Lini	Grant of Licenses to the Oracle Linux programs. Subject to the terms of this Agreement, Oracle grants to you a licensi grams under the GNU General Public License version 2.0. The Oracle Linux programs contain many components develo lous third parties. The license for each component is located in the licensing documentation and/or in the component's liton, a list of components may be delivered with the Oracle Linux programs and the Additional Oracle Linux programs essed online at http://oss.oracle.com/linux/legal/oracle-list.html. The source code for the Oracle Linux Programs and th ux programs can be found and accessed online at https://oss.oracle.com/sources/. This agreement does not limit, supl or rights under the license associated with any separately licensed individual component.	e to the Oracle Linux ped by Oracle and source code. In (as defined below) or ne Additional Oracle ersede or modify	

13. Click FINISH CONFIGURATION.

,	LICENSING	USER SETTINGS	
	License Information	User Creation No user will be created	
GUIT			FINISH CONFIGURATION

Oracle Linux 8 installation is complete and the following screen appears.



14. After installation, restart the node and enter the Boot menu by pressing F11 to change the Boot order from **CDROM** to **Disk**.

Coccurate boot bave t	2 EA41	
Boot Configuration Setup Prompt Timeout Quiet Boot	5 [Enabled]	 Sets the system boot order
Boot mode select	[UEFI]	
FIXED BOOT ORDER Prior	ities	
Doot Option #2 Boot Option #3	105D) [Network:UEFI: Slot8 PortO PXE IPv4 Intel(R) Ethernet Network Adapter I350-T4 for OCP NIC 3.0]	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: Help for more Keys F8: Previous Values F9: Optimized Defaults</pre>
Boot Option #4	(Disabled)	 F10: Save & Reset ESC: Exit

15. Select Linux OS (SCSI Disk) and then Save & Reset.



Perform LUN discovery

After the KVM host is ready, verify that the boot LUN and other mapped LUNs are visible on both KVM hosts.

Procedure

1. To discover the mapped LUNs, run the following commands.
Scanning SCSI subsystem for new devices Scanning host 0 for all SCSI target IDs, all LUNs Scanning for device 0 0 0 48 OLD: Host: scsi0 Channel: 00 Id: 00 Lun: 48 Vendor: HITACHI Model: OPEN-V Rev: 9301
Scanning host 0 for all SCSI target IDs, all LUNS Scanning for device 0 0 0 48 OLD: Host: scsi0 Channel: 00 Id: 00 Lun: 48 Vendor: HITACHI Model: OPEN-V Rev: 9301
Scanning for device 0 0 0 48 OLD: Host: scsi0 Channel: 00 Id: 00 Lun: 48 Vendor: HITACHI Model: OPEN-V Rev: 9301
OLD: Host: scsi0 Channel: 00 Id: 00 Lun: 48 Vendor: HITACHI Model: OPEN-V Rev: 9301
Vendor: HITACHI Model: OPEN-V Rev: 9301
Type: Direct-Access ANSI SCSI revision: 03
Scanning for device 0 0 0 38
OLD: Host: scsi0 Channel: 00 Id: 00 Lun: 38
Vendor: HITACHI Model: OPEN-V Rev: 9301
Type: Direct-Access ANSI SCSI revision: 03
Scanning for device 0 0 0 28
OLD: Host: scsi0 Channel: 00 Id: 00 Lun: 28
Vendor: HITACHI Model: OPEN-V Rev: 9301
Type: Direct-Access ANSI SCSI revision: 03
Scanning for device 0 0 0 46

[root@ hpeora	akvm1~]#	lsscsi			
[0:0:0:0]	cd/dvd	AMI	Virtual CDROM0	1.00	/dev/sr0
[1:1:123:0]	enclosu	QCT	D52BQ-2U	0340	-
[3:0:0:0]	disk	AMI	Virtual HDiskO	1.00	/dev/sda
[3:0:0:1]	disk	AMI	Virtual HDiskl	1.00	/dev/sdb
[6:0:0]	disk	HITACHI	OPEN-V	9301	/dev/sdc
[6:0:0:1]	disk	HITACHI	OPEN-V	9301	/dev/sdd
[6:0:0:2]	disk	HITACHI	OPEN-V	9301	/dev/sde
[6:0:0:3]	disk	HITACHI	OPEN-V	9301	/dev/sdf
[6:0:0:4]	disk	HITACHI	OPEN-V	9301	/dev/sdg
[6:0:0:5]	disk	HITACHI	OPEN-V	9301	/dev/sdh
[6:0:0:6]	disk	HITACHI	OPEN-V	9301	/dev/sdi
[6:0:0:7]	disk	HITACHI	OPEN-V	9301	/dev/sdj
[6:0:0:8]	disk	HITACHI	OPEN-V	9301	/dev/sdk
[6:0:0:9]	disk	HITACHI	OPEN-V	9301	/dev/sdl
[6:0:0:10]	disk	HITACHI	OPEN-V	9301	/dev/sdm
[6:0:0:11]	disk	HITACHI	OPEN-V	9301	/dev/sdn
[6:0:0:12]	disk	HITACHI	OPEN-V	9301	/dev/sdo
[6:0:0:13]	disk	HITACHI	OPEN-V	9301	/dev/sdbc
[6:0:0:14]	disk	HITACHI	OPEN-V	9301	/dev/sdbg
[6:0:0:15]	disk	HITACHI	OPEN-V	9301	/dev/sdbm
[6:0:0:16]	disk	HITACHI	OPEN-V	9301	/dev/sdbq
[6:0:0:17]	disk	HITACHI	OPEN-V	9301	/dev/sdbt
[6:0:0:18]	disk	HITACHI	OPEN-V	9301	/dev/sdby
[6:0:0:19]	disk	HITACHI	OPEN-V	9301	/dev/sdcc
[18:0:0:0]	disk	HITACHI	OPEN-V	9301	/dev/sdp
[18:0:0:1]	disk	HITACHI	OPEN-V	9301	/dev/sdq
[18:0:0:2]	disk	HITACHI	OPEN-V	9301	/dev/sdr
[18:0:0:3]	disk	HITACHI	OPEN-V	9301	/dev/sds
[18:0:0:4]	disk	HITACHI	OPEN-V	9301	/dev/sdt
[18:0:0:5]	disk	HITACHI	OPEN-V	9301	/dev/sdu
[18:0:0:6]	disk	HITACHI	OPEN-V	9301	/dev/sdv
[18:0:0:7]	disk	HITACHI	OPEN-V	9301	/dev/sdw
[18:0:0:8]	disk	HITACHI	OPEN-V	9301	/dev/sdx
[18:0:0:9]	disk	HITACHI	OPEN-V	9301	/dev/sdy
[18:0:0:10]	disk	HITACHI	OPEN-V	9301	/dev/sdz
[18:0:0:11]	disk	HITACHI	OPEN-V	9301	/dev/sdaa
[18:0:0:12]	disk	HITACHI	OPEN-V	9301	/dev/sdab
[18:0:0:13]	disk	HITACHI	OPEN-V	9301	/dev/sdbd
[18:0:0:14]	disk	HITACHI	OPEN-V	9301	/dev/sdbh

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[18:0:0:15]	disk	HITACHI	OPEN-V	9301	/dev/sdbk
[18:0:0:16]	disk	HITACHI	OPEN-V	9301	/dev/sdbo
[18:0:0:17]	disk	HITACHI	OPEN-V	9301	/dev/sdbv
[18:0:0:18]	disk	HITACHI	OPEN-V	9301	/dev/sdbx
[18:0:0:19]	disk	HITACHI	OPEN-V	9301	/dev/sdcb
[19:0:0:0]	disk	HITACHI	OPEN-V	9301	/dev/sdac
[19:0:0:1]	disk	HITACHI	OPEN-V	9301	/dev/sdad
[19:0:0:2]	disk	HITACHI	OPEN-V	9301	/dev/sdae
[19:0:0:3]	disk	HITACHI	OPEN-V	9301	/dev/sdaf
[19:0:0:4]	disk	HITACHI	OPEN-V	9301	/dev/sdag
[19:0:0:5]	disk	HITACHI	OPEN-V	9301	/dev/sdah
[19:0:0:6]	disk	HITACHI	OPEN-V	9301	/dev/sdai
[19:0:0:7]	disk	HITACHI	OPEN-V	9301	/dev/sdaj
[19:0:0:8]	disk	HITACHI	OPEN-V	9301	/dev/sdak
[19:0:0:9]	disk	HITACHI	OPEN-V	9301	/dev/sdal
[19:0:0:10]	disk	HITACHI	OPEN-V	9301	/dev/sdam
[19:0:0:11]	disk	HITACHI	OPEN-V	9301	/dev/sdan
[19:0:0:12]	disk	HITACHI	OPEN-V	9301	/dev/sdao
[19:0:0:13]	disk	HITACHI	OPEN-V	9301	/dev/sdbf
[19:0:0:14]	disk	HITACHI	OPEN-V	9301	/dev/sdbj
[19:0:0:15]	disk	HITACHI	OPEN-V	9301	/dev/sdbn
[19:0:0:16]	disk	HITACHI	OPEN-V	9301	/dev/sdbr
[19:0:0:19]	disk	HITACHI	OPEN-V	9301	/dev/sdcd
[root@ig-vir	t01 ~]#				

Configure a network for KVM hosts

To configure a resilient network, two dual port NICs on both KVM hosts are used to create network bonding.

The nmcli command line utility is used to create four network bonding interfaces (ens65f0, ens65f1, ens67f0, and ens67f1) followed by IP assignments for each configured bond.

Oracle Real Application Cluster Database requires the following separate networks:

- Private Network also called the cluster interconnect This network must be scalable. In addition, it must meet the low latency needs of the network traffic generated by the cache synchronization of RAC clusters and inter-node communication among the nodes in the cluster.
- Public Network This network provides client connections to the applications and Oracle Real Application Clusters.

Chapter 8: Cluster software installation and configuration

The networks are configured as follows:

- A pair of 25 Gbps NICs are used for the private and public interconnect in this solution.
- Use NIC bonding to provide failover and load balancing of interconnections within a server.
- Set all NICs to full duplex mode.
- Configure network bonding as follows:
 - ens65f0 + ens67f1 □ bond0 public network
 - ens65f1 + ens67f0 □ bond1 private network

Procedure

1. Run the following commands to configure public IP addresses.

```
# nmcli connection show
# nmcli dev status
# nmcli connection add type bond con-name bond0 ifname bond0 bond.options
"mode=active-backup"
# nmcli con add type ethernet slave-type bond con-name bond0:1 ifname ens65f0
master bond0
# nmcli con add type ethernet slave-type bond con-name bond0:2 ifname ens67f1
master bond0
# nmcli con mod bond0 ipv4.addresses "10.76.33.94/24" <<<< Put IP address
which should be resolve on DNS.
# nmcli con mod bond0 ipv4.gateway 10.76.33.1
# nmcli con mod bond0 ipv4.method manual
# nmcli con up bond0</pre>
```

Note: When creating NIC bonding pairs, ports should be used on different cards to avoid single points of failure.

2. Run the following commands to configure private IP addresses.

```
# nmcli dev status
# nmcli connection add type bond con-name bondl ifname bondl bond.options
"mode=active-backup"
# nmcli con add type ethernet slave-type bond con-name bondl:1 ifname ens65f1
master bondl
# nmcli con add type ethernet slave-type bond con-name bondl:2 ifname ens67f0
master bondl
# nmcli con mod bondl ipv4.addresses 192.168.1.94/24" <<<< This is a private IP
so give any IP from a private IP range.
# nmcli con mod bondl ipv4.gateway 192.168.1.1
# nmcli con mod bondl ipv4.method manual
# nmcli con up bondl</pre>
```

See *Configure network bonding* at <u>https://access.redhat.com/documentation/en-us/</u> red_hat_enterprise_linux/8/html/configuring_and_managing_networking/configuringnetwork-bonding_configuring-and-managing-networking for details.



Note: A DNS entry is not required for private IP addresses (that is, the Bond1 private network).

See the activity log for details.

[root@ig-virt0 [root@ig-virt0	1 network-	scripts]#	i connection add type bond con-r	ane boo	d0 ifname bond0	bond.options "modewactive-ba	ckup*
Connection 'bo	ind0* (7d18	95ed-ad1a-4678	-9068-7045bffbd678) successfully	added.			
[rootBig-virt0	Di network-	scripts]# nmcl	i con add type ethernet slave-ty	pe bond	con-name bond0	1 ifname eng65f0 master bond	
Connection 'bo	ind0:1' (5d	013905-7541-40	70-9534-b0552aac6a64) successful	lly adde			
[rootBig-virt]	1 network-	scripts]#	i con add type ethernet slave-ty	ne bond	con-name bond0:	2 ifname ens67fl master bond	
Connection 'bo	ond012* (55	18062b-96f8-4b	88-9ec5-337c3f4c37b7) successful	ly adde			
[rootBig-virt0	11 network-	acripta]#	Loon and hond? Lovi. addresses *	10.76.3	13.320/24*		
[root8ig-virt0	1 network-	acripta]# nmcl	i con mod bond0 ipv4.gateway 10.	76.33.3			
[root8ig-virt0	1 network-	scripts]# nmcl	i con mod bond0 igv4.dns *10.76.	32.111*			
[root8ig-virt0	1 network-	ecriptel med	i con modify bond0 connection.au	itoconne	ot-slaves 1		
[root@ig-virt0	11 network-	scripts]# nmc]	1 con up bond0				
Troot81g-virt0	icessfully 11 network-	activated (mas scripts)#	ter waiting for alaves) (D-Bus a	ictive p	ath: /org/freede	ssktop/NetworkNanager/ActiveC	connection/18)
[root@ig-	-virt01	network-	scripts]# nmcli con	show			
NAME	UUID				TYPE	DEVICE	
bond0	7d18	95ed-adla	-4678-9068-7045bffbd				
ovirtmgmt		0133-b413	-4c19-bc76-abdc211ab	fal	bridge	ovirtmgmt	
bond0:1		39c5-7541	-4c70-9534-b0552aac6	a64		ens65f0	
bond0:2	5518	062b-96f8	-4b88-9ec5-337c3f4c3			ens67f1	
ens67f3	82d8	a653-c221	-4192-82ff-2e22a08cc	648		ens67f3	
ens8f0	3420	d06e-4245	-4244-9e54-ac686a47f	ca6	ethernet	ens8f0	
ens65f0	2a29	3831-4730	-e3b0-bcfb-3e59e095e	907	ethernet		
ens65f1	6489	a246-cf0e	-4a90-8529-a462b4046	902	ethernet		
ens65f2	4dfa	47ba-85a6	-458e-bcb7-ba8619f5f	615	ethernet		
ens65f3	1968	5517-6c1b	-4cdb-8301-299d94398	64e	ethernet		
ens67f0	3c84	d215-5415	-4469-afc9-3505e6a93	178	ethernet		
ens67f1	17fb	7998-6166	-9023-36f6-0f0e60c66	000	ethernet		
ens67f2	c612	d65f-7d4e	-4673-b8e3-de9c9996e	c42	ethernet		
ens8f1	6c3c	bf98-fcde	-496f-aalf-830335e0b	ca7	ethernet		
ens8f2	3303	ebaa-deaf	-4630-9b39-f585a32a6	951	ethernet		
ens8f3	£696	2890-c4ae	-4007-95ef-b0fea689f	150	ethernet		
usb0	http://discustorestatusesta			035	ethernet		
[root@ig-	ns65f3 19b85517-6c1b-4cdb-8301-299d9439864e ethernet ns65f3 19b85517-6c1b-4cdb-8301-299d9439864e ethernet ns67f0 3c84d215-54f5-4469-afc9-3505e6a93178 ethernet ns67f1 17fb7998-6166-9023-36f6-0f0e60c660c0 ethernet ns67f2 c612d65f-7d4e-4673-b8e3-de9c9996ec42 ethernet ns8f1 6c3cbf98-fcde-496f-aa1f-830335e0bca7 ethernet ns8f1 6c3cbf98-fcde-496f-aa1f-830335e0bca7 ethernet ns8f3 f6962890-c4ae-4007-95ef-b0fea689ff50 ethernet sb0 7abf5f51-2981-4e8b-8553-39c32ca91035 ethernet root@ig-virt01 network-scripts]# bot@ig-virt01 network-scripts]# bot@ig-virt01 network-scripts}						
[root#ig-virt0]	1 network-s	cripts] . nmcli	connection add type bond con-na	me bood	1 ifname bond1 b	ond.options "mode=active-back	rup [*]
rootēig-virtūl network-scripts]# nmoli connection add type bond con-name bondl ifname bondl bond.options "mode=active-backup" Donnection 'bondl' (bf92e998-lb44-410f-9c97-9f9a8371510f) successfully added.							
[root@ig-virt0	1 network-s	scripts] mmcli	1 con add type ethernet slave-typ 14-9825-1a9707sa1059) successfull	v added	con-name bondlil	ifname ens65f1 master bondl	
[root@ig-virt0.	1 network-s	cripts]# nmcli	con add type ethernet slave-typ	e bond	con-name bond1:2	ifname ens67f0 master bondl	
Connection 'bo	ndl:2' (27f	dec12-43ad-467	<pre>le-a093-2a89e7e7769f) successfull con mod bond1 tout addresses *1</pre>	y added			
[root@ig-virt0	1 network-s	cripte]# nmcli	con mod bondl ipv4.gateway 192.	168.1.1			
root#ig-virt0	1 network-s	cripts] macli	con mod bondl ipv4.method manua				
[root#ig-virt0. [root#ig-virt0.	1 network-s	cripts] macli	con up bondl	oconnec	C-slaves 1		
Connection suc	cessfully a	otivated (mast	er waiting for slaves) (D-Bus ac	tive pa	th: /org/freedea	ktop/NetworkHanager/ActiveCos	mection/34)
[root#ig-virt0]	1 network-s	cripte] macli	dev status				
DEVICE	TYPE	STATE	CONNECTION				
bondl	bood britdee	connected.					
WIRths220Pub	beidge		ovictDe220Fub				
bond0	bond	obnected .	bond0				
en#6551	ethernet	connected	bond1:1				
nn+720	ethernet	connected	bondi:2				
ensergi	etherist	connected	ens6723				
015610							
1006322							
88.88723							
ana 522							
nn#123							
1160		disconnected					
10	loopback	unmanaped					
(root@ig-virt0)	1 network-s	eripts]#					

Chapter 8: Cluster software installation and configuration

Chapter 9: Virtualization configuration

To virtualize bare metal hosts configure VMs on them, we need software that virtualizes the hosts. In this implementation guide we used the Oracle KVM hypervisor software on top of Oracle Linux 8.6. See the *Oracle Linux KVM User's Guide* at <u>https://docs.oracle.com/en/operating-systems/oracle-linux/kvm-user/</u> for more details.

Oracle Linux KVM

The Kernel-based Virtual Machine (KVM) is opensource software. KVM is a full virtualization solution for Linux on x86_64 hardware containing virtualization extensions (Intel VT or AMD-V). It consists of a loadable kernel module, kvm.ko, that provides the core virtualization infrastructure and a processor specific module, kvm-intel.ko or kvm-amd.ko.

The KVM feature provides a set of modules that enable you to use the Oracle Linux kernel as a hypervisor. KVM supports both x86_64 and aarch64 processor architectures and is supported on Oracle Linux 7 and Oracle Linux 8 operating systems using either RHCK or any UEK release as of Unbreakable Enterprise Kernel Release 4.

Using KVM, you can run multiple virtual machines running unmodified Linux or Windows images. Each virtual machine has private virtualized hardware: a network card, disk, and graphics adapter. The kernel component of KVM is included in mainline Linux as of release 2.6.20.

Virtualization packages

Oracle Linux provides several virtualization packages that enable you work with KVM. You can install virtualization packages from the Oracle Linux YUM server or from the Unbreakable Linux Network (ULN). In most cases, the following packages are the minimum required for a virtualization host:

- libvirt This package provides an interface to KVM, as well as the libvirtd daemon for managing guest virtual machine
- qemu-kvm This package installs the QEMU emulator that performs hardware virtualization so that guests can access host CPU and other resources.
- virt-install This package provides command line utilities for creating and provisioning guest virtual machines.
- virt-viewer This package provides a graphical utility that can be loaded into a desktop environment to access the graphical console of a guest virtual machine.

See the following references for more information:

- <u>https://www.linux-kvm.org/page/Main_Page</u>
- https://libvirt.org/
- https://www.qemu.org

Install KVM on Oracle Linux 8

Before you begin

Verify that your system has the correct YUM repository or ULN channel enabled for the virtualization package versions that you want to install.

Procedure

- 1. Log in as the root user on the target Oracle Linux system.
- **2.** For Oracle Linux 8 run the following commands to install the base virtualization packages and additional utilities.

```
# dnf install -y oraclelinux-release-el8
# dnf config-manager --enable ol8_appstream ol8_kvm_appstream
# dnf update
# dnf module install virt
# dnf install virt-install virt-viewer
# systemctl enable libvirtd
# systemctl start libvirtd.service
# systemctl status libvirtd
# virt-host-validate qemu
# yum repolist all
# yum repolist all|grep -I ol8_UEKR6
# dnf config-manager -enable ol8_UEKR7
# dnf update -y
```

3. The following examples show activity logs for reference.

[root@localhos Oracle Linux 8 Oracle Linux 8	t ~]# dnf install -y oraclelinux-release-el8 Baseus Latest (x80_64) Application Stream (x86_64)	88 85	MB/s MB/s	50 38	MB MB	00:00 00:00
Userid : ' Fingerprint: ' From : ' Key imported s: Running transac Transaction che Running transac Transaction tes Running transac Preparing	Oracle OSS group (Open Source Software group) <build@o: 66FD 3DB1 3AB6 7410 B89D B10E 8256 2EA9 AD98 6DA3 (etc/pki/rpm-gpg/RPM-GPG-KEY-oracle iccessfully tion check eck succeeded. tion test t succeeded. tion : : : : : : : : : : : : :</build@o: 	ss.oracle.c	com>"			1/1
Upgrading Rupping scrit	: oraclelinux-release-el8-1.0-25.el8.X8b_b4					1/2
Cleanup	: oraclelinux-release-el8-1.0-23.el8.x86 64					2/2
Verifying	: oraclelinux-release-el8-1.0-25.el8.x86 64					1/2
Verifying	: oraclelinux-release-el8-1.0-23.el8.x86_64					2/2
Upgraded: oraclelinux-	release-el8-1.0-25.el8.x86_64					
Complete! [root@localhos1	: ~]#					

[root@localhost ~] dnf	config-m	anagerer	able ol8_appstream ol8	kvm_appstream	
[root@localhost ~]					
<pre>[root@localhdst -]# dnf update Last metadata expiration check: 0:08:20 Dependencies resoluted</pre>	ago on Thu 29 Se	p 2022 02:05:18 AM	t EDT.		
Package	Architecture	Version		Repository	Size
Installing; kernel	x86_64		0.1.el8_6	olf_baseos_latest	
Upgrading: NetworkManager	x86 64	1:1.36.0-7.0.1.0	el0 6	ol8 baseos latest	2.3 M
NetworkManager-ads1	x86_64	1:1.36.0-7.0.1.	218 6	ol8 baseos latest	149 k
NetworkManager-config-server	noarch	1:1.36.0-7.0.1.0	10_6	ol5_baseos_latest	136 k
NetworkManager-libnm NetworkManager-team	x86_64 x86_64	1:1.36.0-7.0.1.0	10_6	ol8_baseos_latest ol8_baseos_latest	1.8 M
NetworkManager-tui	x86_64	1:1.36.0-7.0.1.0	18_6	ol8_baseos_latest	346 k
NetworkManager-wifi NetworkManager-wwan	x86_64 x86_64	1:1.36.0-7.0.1.0	*18_6 *18_6	olf_baseos_latest olf_baseos_latest	194 k 161 k
alsa-sof-firmware	noarch	1.9.3-4.e18_6		olf baseos latest	781 k
binutils	x86_64	2.30-113.0.3.el		ol6_baseos_latest	5.9 M
bpftool btrfs-progs	x86_64 x86_64	4.18.0-372.26.1. 5.15.1-0.e18	.0.1.el8_6	olf_baseos_latest olf_UEKR6	8.8 M
sssd-common-2.6.2-4.0.2.e18_6.1.x86_64			sssd-common-pac-2.6.2-5.0.2.el8	_6.1.x86_64	
sssd-ipa-2.6.2-4.0.2.el8_6.1.x86_64			sssd-kcm-2.6.2-4.0.2.el8_6.1.x8	6 64 1 6 1 496 64	
sssd-ldap-2.6.2-4.0.2.el0_6.1.x86_64			sssd-nfs-idmap-2.6.2-4.0.2.el0	6.1.x06_64	
sssd-proxy-2.6.2-4.0.2.e18_6.1.x86_64			swtpm-0.7.0-3.20211109gitb79fd5	1.module+e18.6.0+20743+999ad699.x86	_64
swtpm-libs-0.7.0-3.20211109gitb79fd91.m	iodule+el8.6.0+2	0743+999ad699.x86_	64 swtpm-tools-0.7.0-3.20211109gitl	b79fd91.module+e18.6.0+20743+999ad6	99.x86_64
systemd-libs-239-58.0.1.e18 6.7.x86 64			systemd-pam-239-58.0.1.e18 6.7.	x86_64	
systemd-udev-239-58.0.1.e18_6.7.x86_64			tuned-2.18.0-2.0.1.e18_6.1.noar		
vim-common-2:8.0.1763-19.0.1.e18 6.4.x8	16 64		vim-enhanced-2:8.0.1763-19.0.1.	el8 6.4.x86 64	
vim-filesystem-2:8.0.1763-19.0.1.e18_6.	4.noarch		vim-minimal-2:8.0.1763-19.0.1.e	18_6.4.x06_64	
webkit2gtk3-2,36.7-1.e10_6,x06_64 xfsprogs-5.4.0-1.0.3.e10.x06_64			webkit2gtk3-jsc-2.36.7-1.e18_6. xorg-x11-server-Xorg-1.20.11-5.	x06_64 e10 6.2.x06 64	
xorg-x11-server-Xwayland-21.1.3-2.el8_6	.3.x86_64		xorg-x11-server-common-1.20.11-	5.e18_6.2.x86_64	
xz-5.2.9-9.el0_6.x06_69 Installed:			xz-libs-5.2.4-4.els_6.x86_64		
grub2-tools-efi-1:2.02-123.0.9.el8_6.8. kernel-modules-4.18.0-372.26.1.0.1.el8_	x86_64 6.x86_64	kernel-4.18.0-372. kernel-uek-5.4.17-	26.1.0.1.el8_6.x86_64 ker 2136.311.6.1.el8uek.x86_64 lib	nel-core-4.18.0-372.26.1.0.1.el8_6. stomic-8.5.0-10.1.0.1.el8_6.x86_64	x86_64
Complete:					
(rootêlocalhdet -)# dnf module install vi	irt				
Dracle Linux & Research Larent (will fat				136 kB/s 3.6 kB	00:00
Oracle Linux 8 Application Stream (x86_64 Oracle Linux 8 KVM Application Stream (x8	4) 26 64)			322 kB/s 3.9 kB 7.1 MB/s 319 kB	00:00
Dependencies resolved.					
Package	Arc	bitecture Vera	ion	Repository	51z
Upgrading:					
libvirt-daemon	×56	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8 appstream	419
libvirt-daemon-driver-interface	x04	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8_appstream	209
libvirt-daemon-driver-network	200	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8_appstream	235
libvirt-daemon-driver-nodedev	x0(64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 Old_appstream	235
libvirt-daemon-driver-gemu	x8	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8_appstream	923
libvirt-daemon-driver-secret libvirt-daemon-driver-storage	xc x5	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad 0-5.4.0.1.module+e18.6.0+20743+999ad	699 ols_appstream 699 ol8_appstream	198
libvirt-daemon-driver-storage-core	x84	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8_appstream	253
libvirt-daemon-driver-storage-disk libvirt-daemon-driver-storage-gluster	x84 x84	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad 0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8_appstream 699 ol8_appstream	76
libvirt-daemon-driver-storage-iscsi	x04	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8_appstream	
libvirt-daemon-driver-storage-locical	ect x80	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad4	699 ol8_appstream 699 ol8_appstream	75
libvirt-daemon-driver-storage-mpath	x8	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad4	699 ol8_appstream	
libvirt-daemon-driver-storage-rbd	x84	64 8.0.	0-5.4.0.1.module+e18.6.0+20743+999ad	699 ol8_appstream	81 1
libvirt-daemon-kvm	x86	64 8.0.0	0-5.4.0.1.module+el8.6.0+20743+999ad6	(99 oll appatream	65.)
libvirt-libs	x86	_64 8.0.0	0-5.4.0.1.module+el8.6.0+20743+999ad6	018_appstream	4.7 1
Installing group/module packages: libouestfs		64 1-1-1	14.0-5.0.1.module+el8 6.0+20659+34ef7	1070 ol8 appat ream	769
libvirt-client	x86	64 8.0.0	0-5.4.0.1.module+el8.6.0+20743+999ad6	010_appstream	414 1
Installing dependencies:		64 97-9	11.36-3.e18	old baseos lareas	1.1.1
dhcp-client	x86	64 12:4	3.6-47.0.1.el8	ol8_baseos_latest	518 1
dhap-common dhap-libe	104	rch 12:4	3.6-47.0.1.e18	ol8_baseos_latest	207.1
hivex	x86 x86	64 1.3.	18-23.module+e18.6.0+20659+3dcf7c70	ol8 appstream	113 1
ipcalc	x86	64 0.2.4	-4.el8	ol8_baseos_latest	38 1
libguestfs-appliance scrub	×86	61 1:1.	<pre>st.0-5.0.1.module+el8.6.0+20659+3dcf7 2-16.el8</pre>	olS_appstream olS_appstream	2.1 1
supermin	x86	_64 5.2.1	1-1.module+e18.6.0+20659+3dcf?c70	ol0_appatream	713 1
syslinux syslinux-extlinux	x86	64 6.04	-5.e18 -	old baseos latest	578 1
syslinux-extlinux-nonlinux	noa	rch 6.04	-5.el8	olt_baseos_latest	386 1
syslinux-nonlinux	204			ol8_baseos_latest	553)
virt/common					
Transaction Summary					
Install 15 Packages					
upgrade 20 Packages					
Total download size: 16 M					

[root\$localboxt -]# dnf install v Last metadata exmination check: 0 Dependencies resolved.	int-install virt-viewe 106:26 ann om Thu 29 5	25 1411 2022 02:05:18 AM EDT.			
Package	Architecture	Version		Repository	Size
Installing: virt-install virt-viewer Installing dependencies: libgovirt muthors argogenlate	noarch x86_64 x86_64	3.2.0-5.e18 9.0-12.e10 0.3.7-4.e18		ol8_kvm_appstream ol8_appstream ol8_appstream	40 k 426 k 86 k
python3-libvirt virt-manager-common	x86_64 noarch	8.0.0-1.1.module+el8.6.0 3.2.0-5.el8	+20743+999ad699	ol8_appstream ol8_kvm_appstream	332 k 1.0 H
Transaction Summary					
Install 6 Packages					
Total download size: 1.9 M Installed size: 0.8 M Is this ok [y/N]:					
Downloading Fazkages: (1/6): python3-argosmplete-1.9.3- (2/6): libgovirt-0.3.7-4.818.x84 (3/6): python3-libvirt-8.0.0-1.1.5 (4/6): virt-install-3.2.0-5.e18.ns (5/6): virt-viewer-9.0-12.e18.x86 (6/6): virt-imanger-common-3.2.0-	8.el8.noarch.rpm 64.rpm module+el8.6.0+20743+5 oarch.rpm 54.rpm 5.el8.noarch.rpm	199əd699.x86_64.rpm		1.3 MB/s 60 kB 1.8 MB/s 86 kB 6.1 MB/s 332 kB 38 kB/s 40 kB 322 kB/s 40 kB 605 kB/s 1.0 MB	00:00 00:00 00:00 00:01 00:01 00:01
Total Running transaction check Transaction check succeeded. Running transaction test Transaction test succeeded.				1.1 MB/s 1.9 MB	
Running transaction Preparing : Installing : python3-libV: Installing : python3-argo Installing : virt-manager Installing : virt-viewer-i Installing : virt-viewer-i Installing : virt-install Running scriptlet virt-install Verifying : python3-libV Verifying : virt-viewer-i Verifying : virt-viewer- Verifying : virt-install Verifying : virt-install Verifying : virt-install	<pre>xrt-0.0.0-1.1.module+e mplete-1.9.3-6.el8.no -common-3.2.0-5.el8.no 7.7-4.el8.x86_64 9.0-12.x86_464 9.0-12.x86_464 9.0-12.848_646 mplete-1.9.3-6.el8.no 17-4.el8.x86_64 9.0-12.x86_64 9.0-12.818.no 2.2.0-5.el8.no ecommon-3.2.0-5.el8.no</pre>	115.6.0+20743+999ad699.x86_64 March March Darch 118.6.0+20743+999ad699.x86_64 Darch			1/1 1/6 2/6 3/8 6/6 6/6 6/6 1/6 2/6 3/8 4/6 5/6 6/6
<pre>Installed: libgovirt-0.3.7-4.el8.x86_64 virt-install-3.2.0-5.el8.noarch</pre>	python3-argcom virt-manager-o	plete-1.9.3-6.el8.noarch common-3.2.0-5.el8.noarch	python3-libvirt-8.0.0-1.1.m virt-viewer-9.0-12.el8.x86_	odule+e18.6.0+20743+999ad699.x 64	86_61
Complete!					

All the rpms required for KVM are installed.

4. Enable and start the libvirtd daemon to start KVM services.

root@local	host - 18 Systemici Scate Liovita
	And the second design of the s
Loaded:	<u>loaded (/usr/lib/system//system/lib/ird.scr/loc</u> enabled; vendor preset: enabled)
Docas	active (tuning) since in 2022-09-29 0212313 LDI; k8 ago
	https://libvirt.org
Main PID:	169099 (libvirtd)
Tasks:	21 (limit: 32768)
Memory:	45.0M
CGroup:	/system.slice/libvirtd.service
	 5739 /usr/sbin/dsmaaqconf-file*/var/lb/lb/itr/dsmaag/default.confleasefile-rodhcp-script=/usr/libexec/libvirt_leaseshelper 5730 /usr/sbin/dsmaaqconf-file*/var/lb/lb/itr/dsmaag/default.confleasefile-rodhcp-script=/usr/libexec/libvirt_leaseshelper 14099 /usr/sbin/lb/itrdtimeout 120
Sep 29 02:2	3:13 localhost.localdomain systemd[1]: Starting Virtualization daemon
Sep 29 02:12	3:13 localhost.localdomain systemd[1]: Started Virtualization daemon.
Sep 29 02:12	3:13 localhost.localdomain dnsmasq[5729]: read /etc/hosts = 2 addresses
Sep 29 02:2	3:13 localhost.localdomain dnsmasq[5729]: read /var/lib/libvirt/dnsmasq/default.addnhosts - 0 addresses
Sep 29 02:1	3:13 localhost.localdomain dnsmaaq-dhcp[5729]: read /var/lib/lib/irt/dnsmasq/default.hostsfile
[POOT \$10001	boat -18

5. Check the status of gemu.

[root localhost -]# virt-host-validate gemu	
QEM . Checking for hardware mirtualization	
QEMU: Checking if device /dev/kvm exists	
QEMU: Checking if device /dev/kvm is accessible	
QEMU: Checking if device /dev/vhost-net exists	
QEMU: Checking if device /dev/net/tun exists	
QEMU: Checking for cgroup 'cpu' controller support	
QEMU: Checking for cgroup 'cpuacot' controller support	
QEMU: Checking for cgroup 'cpuset' controller support	
QEMU: Checking for cgroup 'memory' controller support	
QEMU: Checking for cgroup 'devices' controller support	
QEMU: Checking for cgroup 'blkio' controller support	
QEMU: Checking for device assignment IOMMU support	
QEMU: Checking if IOMMU is enabled by kernel	
QEMU: Checking for secure guest support	: WARN (Unknown if this platform has Secure Guest support)
[root@localhost ~]#	

Switch to the Oracle KVM stack

On an existing Oracle Linux 8 system, you can switch from the default KVM stack to the Oracle KVM stack in the virt:kvm utils stream by running the following commands:

```
# sudo dnf module remove virt -y -all <<<<< Remove any packages from the existing
default virt stream
# sudo dnf module reset virt -y <<<<< Reset the virt module state so that it is
neither enabled nor disabled
# sudo dnf module enable virt:kvm_utils -y <<<<< Enable the virt:kvm_utils module
and stream
# sudo dnf --allowerasing distro-sync <<<<> Perform any necessary package upgrade
or downgrade operations to handle dependencies for the enabled module and stream
# sudo dnf module install virt:kvm_utils -y <<<<< Install the base packages from
the virt:kvm_utils stream</pre>
```



Note: Although you can switch to the Oracle KVM stack and install the packages while using RHCK, the stack is not compatible. You must be running a current version of UEK to use this software.

With this installation, node 1 is ready with Oracle Linux 8.6 and KVM hypervisor installed on it to make the host virtualized so we can create multiple VMs and share resources among them.



Note: Repeat the previous steps on node 2 as well.

Sr.no.	Task Description	Node 1	Node 2	Status
1.	Hardware pre-checks	Myhost1	Myhost2	Done
2.	Configure LUN (storage)	Boot LUN	Boot LUN	Done
3.	Configure Zoning	\checkmark	\checkmark	Done
4.	OS (OL8.6) installation on bare metal host	\checkmark	\checkmark	Done
5.	Configure network bonding and assign IP addresses (Public/Private)	\checkmark	~	Done
6.	Install Oracle Linux KVM hypervisor	\checkmark	\checkmark	Done

The following table shows progress to this point.

OLVM Management host

When both nodes are ready for virtualization, we must create another host for Oracle Linux virtualization manager which will act as a management agent to manage both KVM hosts, VMs, and all other resources running on them.

See Oracle Linux Virtualization Manager (OLVM) (on page 46) for the next steps.

Chapter 10: Oracle Linux Virtualization Manager (OLVM)

Oracle Linux Virtualization Manager introduction and requirements

Oracle Linux Virtualization Manager (OLVM) is a management server that manages KVM stacks. It creates and allocates resources and performs maintenance activities.

OLVM is a server virtualization management platform based on the open source oVirt project. It is used to configure, monitor, and manage an Oracle Linux KVM environment, including hosts, virtual machines, storage, networks, and users. You can access OLVM through the Administration Portal or VM Portal.

OLVM also provides a Representational State Transfer (REST) Application Programming Interface (API) for managing your KVM infrastructure, allowing you to integrate OLVM with other management systems or to automate repetitive tasks with scripts.

To install Oracle Linux Virtualization Manager, we performed a fresh installation of Oracle Linux 8.6 on a separate host, installed the **ovirt-engine** package, and then ran the engine-setup command to configure OLVM.

Install the OS (Oracle Linux 8.6)

Download the installation ISO for Oracle Linux 8.6 from the Oracle Software Delivery Cloud at <u>https://edelivery.oracle.com</u>. See the section titled *Install the OS on Bare Metal Hosts*.

Install the OLVM engine

The main component of Oracle Linux Virtualization Manager is the **oVirt engine** (engine), which is a JBoss-based Java application that runs as a web service and provides centralized management for server and desktop virtualization. The engine provides many features including:

- Managing the Oracle Linux KVM hosts.
- Creating, deploying, starting, stopping, migrating, and monitoring virtual machines.
- Adding and managing logical networks.
- Adding and managing storage domains and virtual disks.

- Configuring and managing cluster, host, and virtual machine high availability.
- Migrating and editing live virtual machines.
- Continuously balancing loads on virtual machines based on resource usage and policies.
- Monitoring all objects in the environment such as virtual machines, hosts, storage, networks.

See the OLVM installation Guide for details.

Run the following commands to install and configure the engine.



Configure the OLVM engine

After you install the OLVM engine, run the engine-setup command to configure the Manager, which sends a series of prompts.

Procedure

- 1. Log in to the host using **root** credentials through the GUI.
- 2. Open a terminal session and run the following commands:

```
[root@olvmhost]# cd /etc/ovirt-engine-setup.conf.d
[root@olvmhost]# ./engine-setup
[root@olvmhost]#Configure Engine on this host (Yes, No) [Yes]:
```

Activities Terminal	Oct 6 01:33	
۵	root@ora-olym204	×
File Edit View Search Terminal Help		
<pre>[root@ora-olvm204 -]# engine-setup [1890] Stage: Environment setup Configuration files: /et nf.d/10-packaging.conf Log file: /var/log/ovirt Version: otopi-1.9.6 (ot [18F0] DNF Downloading 1 files, [18F0] DNF Error: Failed to dow s in mirrorlist [18F0] DNF Egnoring repositorie [18F0] DNF Downloading 1 files, [18F0] DNF Downloaded Latest oV [18F0] DNF Downloaded Latest ov</pre>	c/ovirt-engine-setup.conf.d/10-packaging-jboss.conf, /etc/ -engine/setup/ovirt-engine-setup-20221003101237-ds6cjc.log opi-1.9.6-2.el8) 0.00KB irt 3.6 Release nload metadata for repo 'ovirt-3.6': Cannot prepare intern s: ovirt-3.6 0.00KB irt 3.6 Release ges setup 0.00KB irt 3.6 Release nload metadata for repo 'ovirt-3.6': Cannot prepare intern	ovirt-engine-setup.co al mirrorlist: No URL al mirrorlist: No URL

- **3.** After answering the prompts, Setup displays a list of the values you entered. Review the list carefully and then press **Enter** to configure the Manager.
- **4.** When the configuration is complete, details about how to log in to the Administration Portal are displayed.
- 5. Image I/O Proxy: The Image I/O Proxy (ovirt-imageio-proxy) enables you to upload virtual disks into storage domains.

systemctl status ovirt-imageio-daemon

6. After the installation finishes a summary of Web URLs that can be used to log in to the administration portal is provided. Note the URL details.

The following shows an activity log for reference.

```
--== SUMMARY ==--
[ INFO ] Restarting httpd
         Please use the user 'admin@internal' and password specified in order
to login
         Web access is enabled at:
         http://olvmhost.unified.local:80/ovirt-engine
        https://olvmhost.unified.local:443/ovirt-engine
         Internal CA 3F:68:8E:0B:68:A2:2E:94:92:B3:F4:36:F4:39:00:08:DE:B3:67:4B
         SSH fingerprint: SHA256:aSaun4FrnSmqUMp0t7b6xTnG5bR7JS7M3ygL5Sfbrx8
[WARNING] Less than 16384MB of memory is available
         Web access for grafana is enabled at:
             https://olvmhost.unified.local/ovirt-engine-grafana/
         Please run the following command on the engine machine
olvmhost.unified.local, for SSO to work:
         systemctl restart ovirt-engine
         --== END OF SUMMARY ==--
[ INFO ] Stage: Clean up
         Log file is located at /var/log/ovirt-engine/setup/ovirt-engine-setup-
20221003101237-ds6cjc.log
[ INFO ] Generating answer file '/var/lib/ovirt-engine/setup/answers/
```

```
20221003102130-setup.conf'
[ INFO ] Stage: Pre-termination
[ INFO ] Stage: Termination
[ INFO ] Execution of setup completed successfully
[root@olvmhost]#
```

Activities	Crt 6 01:35	
	root@ora-olvm204:-	
File Edit	View Search Terminal Help	
	Web access is enabled at: http://ora-olvm204.unified.local:80/ovirt-engine https://ora-olvm204.unified.local:443/ovirt-engine	
(WAPNING)	SSH fingerprint: SH236:aSaun4FrnSmqUMp0t7b6xTnG3bR7JS7H3ygLS5fbrx8 Less than 16384MB of memory is available Web access for grafana is enabled at: https://ora-olvm204.unified.local/ovirt-engine-grafana/ Please run the following command on the engine machine ora-olvm204.unified.local, for SSD to work: systemctl restart ovirt-engine	
	END OF SUMMARY	
[INFO] [INFO] [INFO] [INFO]	Stage: Clean up Log file is located at /var/log/ovirt-engine/setup/ovirt-engine-setup-20221003101237-ds6cjc.log Generating answer file '/var/lib/ovirt-engine/setup/answers/20221003102130-setup.conf' Stage: Pre-termination Stage: Termination	
[INFO] [root@ora	Execution of setup completed successfully olvm204 ~]#	

Access the OLVM administration portal

After successful installation of OLVM, access the administration portal to add, configure, and manage KVM hosts.

Log in to the OLVM administration portal.



Log in to your account				\mathbf{X}
Username			ACLE	
admin				
Password	20			
		Oracle Linux Virtualization	Manager is a distribut	ted virtualization
Profile		solution, designed to manage	ge your entire enterpr	rise infrastructure
internal	-			
Log In				
Log in		1		

The following figure shows the home page of the administration portal.

		Virtualization Manager					■ 4 [™] 0 - 4 -
	Dashboard	C C Lest Updated 10150	022, 4 53:02 AM PST				2
	Compute	1 Data Centers	1 Ousters	C 2 Hosts	4 Data Storage Domains	© 4 Virtual Machines	158 Events
覀	Network	o 1		o 2	o 4	o 4	►156 <u>▲</u> 2
	Storage	Global Utilization					
	Administration	CPU		Memory		Storage	
		100% available of 100%		444.2 available of Sol. 9 Gas		0.2 available	
۴	Events	Virtual resources - Comm	ninež 21%, Alocatež 21%	Virtual resources - Comm	nitted BN, Allocated BN	Virtual resources - Commit	ted: 88%, Allocated: 88%

Upon login, configure clusters, data centers, and storage disks.

Clusters

Oracle Linux Virtualization Manager creates a default cluster in the default data center during installation. You can use the default cluster or set up new clusters.

See the <u>Oracle Linux Virtualization Manager Administrator's Guide</u> > Administration tasks for details.

Data centers

Oracle Linux Virtualization Manager creates a default data center during installation. You can use the default data center or set up new data centers. A data center requires a functioning cluster, host, and storage domain to operate in your virtualization environment.



Note: The new data center remains in an Uninitialized state until a cluster, host, and storage domain are configured for it.

Storage

Oracle Linux Virtualization Manager uses a centralized storage system for virtual machine disk images, ISO files, and snapshots. You can use Network File System (NFS), Internet Small Computer System Interface (iSCSI), or Fibre Channel Protocol (FCP) storage. You can also configure local storage attached directly to hosts.

Storage devices in Oracle Linux Virtualization Manager are referred to as data domains, which are used to store virtual hard disks, snapshots, ISO files, and templates. Every data center must have at least one data domain. Data domains cannot be shared between data centers.

Add KVM hosts to the Manager

Add hosts and perform management tasks such VM creation and network creation to OLVM.

Procedure

1. Log in to OLVM administration portal > Compute > Hosts to add KVM hosts that will be administered.



2. Provide the host name of **KVM target host** > **IP address** > **root** as well as username and password. The target host will be added to OLVM. Similarly, add another host.



3. View the progress of the host addition in the Events section.

Eliver Virtualization Manager				A 0- 4-
B Cashboard Tasks				
Compute >				
The Network > C Adding new Heat Ig verifit to	Cluster KVM_Cluster		Start	Onte
🗐 Storage -> @valuaring			Complet	ME OCT 7, 2022, 2:54:10 AM
Administration > Clenting			Start	nd. Oct 7, 2022, 254,10 AM
/* Events	Distating Host (g-virit)1		Skart	ed. Cris 7, 2022, 2.54 10 AM
-				
ORACLE Virtualization Hanager			• •	E* 4* 0- 4-
22 Dathboard D Last Updated 15/15/2022 45	13-02 AM PST			
Compute >	1 Clusters 2 H	osts 👼, 4 Data Storage Domains	© 4 Virtual Machines	158 Events
The Network > • 1	0.	2 04	o 4	⊨ 156 △ 2
CRACLE Vitualization Manager	1 August 1		•••	B* 4* 0. 4.
Computer - matte				
Compute) 2 -	(8)8) -	Q. New Lift Sensor Hangement	e - mouliation - most Censol	Yest in the second seco
The Network	Altanani Overan Bata Cantan A.31.216 KIM, Overan OC, What KIM	Nature Writeal Machines Memory OFU Up 0 C28_2 C1	Network SPM	
Storege >	C31296 KWK,Durler DC,Wood,KW	w + 070 0	8. [18.] Nend	
O Administration >				

Create a logical network for VMs in OLVM

Create a virtual machine network that is assigned to the KVM host that was added in <u>Add</u> <u>KVM hosts to the Manager (on page 51)</u>. This network is used as the virtual machine network for VMs created in <u>Create virtual machines (on page 55)</u>.

To create a virtual machine network:

Procedure

1. Go to Network > Networks > New.

		tualization Manage			P		<u> </u>			/=	• #	6 0- 4
		Network > Netwo	as .							-		
	20	Network:			× ±	- Q					New Import	Edit Remov
	2	0 -										1-3 6 2
	100	Name	Comment	Data Center	Description	Role	VLAN Tap	QoS Nam	Label	Provider	MTU	Port Isola
Network	2	ovivrtD5220priv		DC_Vinue(XVM	Private network for D522062 KV				ovirt.p.,		Default (1500)	No
		evint0x220Pub	Owner-Bha	DC, Virtual, KVM	public network for DS22062 KV				ovirt.p.;		Default (1500)	No
Storage	5	ovirtingrit		DC_Wrue_KVM	Default Management Network	-					Default (1500)	No
		1										
	8											

The new **Logical Network** dialog box opens with the **General** tab selected on the sidebar.

General	>	Data Center	DC_Virtual_KVM ~
		Name 🕚	ovirtDs220Pub
		Description	public network for DS220G2 KVM Hosts
		Comment	Owner- XYZ
		Edit Network Parameters Network Label	ovirt-public
		Enable VLAN tagging	
		VM network 😄	
		Port Isolation	
		мти	Default (1500) Custom
		Host Network QoS	[Unlimited]

Note: For Oracle RAC optimum performance, we recommend configuring jumbo frames with an MTU size of 9000.

2. Similarly, create the ovirtDS220Priv network for private communication between nodes.

49	Dashboard		Network + Netwo	and a										
			Network:			*	0 - Q				N	w Import	664	Remov
	Compute	- 80	0 -										1+3	6.3
_			Name	Comment	Data Center	Description	Role	VLAN Te	Qo5 Nam	Label	Provider	MTU		Port iso
	Network	- 27	evert05220pm		DC_WINH_KVM	Private network for 0522062 kir.	-			ovist-private.		Default (1500)	1	N0
			eventDs220Pub	Owner	DC_Wmuil_KVM	public retwork for 0522062 KV	1.00			evin-public		Default (1500)	í.	500
	Storage	- 20	owinged		DC WHEN AVM	Default Management Network						Default (1500)	6	No
														110

3. After the logical network is created, assign a virtual machine network to a KVM host.

•	Dashboard	Compute		ig-virt	02 =	-	t formers M	anagement ~ build	lation - Hest Cer	naalia Copy Hast Natura	rha I
	Compute >	General	wire	tual Machines	between teterfac	most Devices		Permissions	Affectly Labers	Errata Events	
201	Network >	Shene sin	Road Rate	ctions - Expan	d AR	-	L	Setup Host Network	a lana Nataori ku	unfigiaration (Spric All Is	at the total
	storage >	۲	٩	bond0	MAC	Rx Rate drives	Tx Ra	te miyos +1	\$ [N/A]	↓ 2 Pkts	
• •	Administration >				(30	Total Rx (Bytes) 117.322	Total	TH (Byten) 252			3
*	Events		Þ0	Lignal Networks	⊁ t Maveri						

4. Drag ovirtDS220priv and assign it to bond1 as a private network. Similarly, assign ovirtDS220Pub to bond0 as a public network.

Drag to make changes	1. C			
interfaces		Assigned Logical Networks	Networks Labels	
§bond0		on network antioned	Unassigned Logical Network	vorks
• 😇 ens67f1	1		 ovirtDS220priv 	
§bond1	1		 ovirtDs220Pub 	-
. 400 ens65/1	1	no network assigned		

The network looks like the following.

ORACLE			
	Setup Host ig-virt01 Networks		3
	Drag to make changes		
Compute 0	Interfaces	Assigned Logical Networks	Networks Labers
	(the second sec		Unassigned Logical Networks
Network 2	. 605 ens65f0		Required
Storage >	• @#ens67f1 /		Non Required
			External Logical Networks
	\$bond1		
	• 🚭 ensisti 🦯	• • ovirtD5220priv	
	• 😅 ens6710 🛛 🥖		
	- ATTA equilib	las assure sugare	
		the carlange and public	

Configure and create VMs on KVM hosts

Configure storage domains for VM boot LUNs

To create VMs on KVM hosts, a separate bootable disk is needed for new VMs that are created from the storage domain. Therefore, create a disk that is the right size for a boot disk for VM1.

• Select the LUN ID created for the boot disk.

=	ORACLE									0 - 4 -
-6		Storage Logical Network	Data Center - Guit There are still uncon	de Me figured entitie	1		×	-	stant Activate M	urrien en ce
		New Storage								×
77		Data Center	DC,Virtua	ONM (VS)		•	ame	DC_0	1	
		Domain Function Storage Type	Data Fibre Char	-			lescription omment	Boot	DCJWN_1	
0		Host 0	15 words			-				
1		1							1-2.0	0
		LUN ID		See	spath	Vender ID	Product ID	Serial	Add	
		360060e80233ab7005079	346400000402	500 G/B	3	HITACHI	OPEN-V	SHETACHLOPEN-V_S0715039	Add	1
		\$60060e80233ab4905070	34640000403	800 GiB	3	HITACHI	OPEN-V	SHITACHI_OPEN-V_50715039	- K81	

Create virtual machines

Types of virtual machines (VMs)

There are two types of VMs configured for Hitachi solutions for Oracle database, namely VMs optimized for server class and VMs optimized for high performance.

We have compared the performance results for different Oracle database workloads with standard recommended configurations along with CPU hard partitioning for server class VMs and high performance VMs. We noticed comparatively best results for random, transactional, analytics, and database background processes-related workloads with high performance VMs that are closer to bare metal performance. Therefore high performance VMs are recommended over server class VMs.

See the High Performance VMtech note for details.

Procedure

1. Go to Compute > Virtual machines > New.



2. Provide memory and CPU parameters.

= ORACLE	-				
Linux	Edit Virtual Machine				×
	General	Ouster		KVM Cluster	
Compute	System	>		Data Center: DC_Virtual_XVM	
	Initial Run	Template		maria (im	
The Network	Console	Operating System		Oracle Linux 8.x x64	~
	Host	Optimized for		Server	
Administration	High Availability	Manuary Size			
le Events	Resource Allocation	Maximum memory 0	-	16384 MB	
	Boot Options	Physical Memory Guaranteed 0		4096-548	
	Random Generator	Total Virtual CPUs 0	-	2	
	Edit Virtual Machine				
Linux	Edit Virtual Machine				
	General	Cluster		KVM_Cluster	
Compute	System			Doto Center: DC_Virtual_XVM	
T Maturet	Initial Run	Template		Blank (10)	14
	Console	Operating System		Oracle Linux 8.x x64	
	Host	Continuent for	0	Custom	× 1
 Administration 	Mak Australia	- Advertise of the second		Server	
	righ Avanability	Start Running On: O Any Host in Cluster			
	Resource Allocation	Specific Host(s)		ig-virt01	~
	Boot Options	CPU Options:			
	Random Generator	Pais-Through Host CPU			

VMs are created on KVM hosts.

3. Install Oracle Linux 8 on the VMs.

	Name	Comment	Hostname/IP	Cluster	Data Center	Status	Virtual Machines	Memory	c
AL 57	lig viet01	KVM Host01	10.76.33.205	KVM, Cluster	DC,Wtsel,KVM	Up	0	34	
a 1	ig virt02	KVM Host02	10.76.33.121	KVM_Cluster	DC_V/rtual_XVM	Up	•	178.3	

Install the Oracle OS on VMs for cluster software

Procedure

1. Go to disk > Images > upload Oracle Linux 8 ISO image > host (on which VM resides) > Test connection.

-	

Note: For a test check, the ovirt-imageio-proxy daemon should be running on the **OLVM host**.

compute > Disk Type: A	mages Direct LIN Managed Block Content Type	a = 1		500
Network > 2 +	10 to An	ach Virtual Size LUN ID	Serial Vendor ID	Pace Spurse Product
ize (GiB)	11		Wipe After Delete Chamable	
lias	OracleLinux-R8-U6-x86_64-dvd.	iso	Enable Incremental Ba	ckup
Description	OracleLinux-R8-U6-x86_64-dvd.	iso		
Data Center	DC_Virtual_KVM	÷		
itorage Domain	DC_01 (367 GiB free of 799 GiB	, v		
Disk Profile	DC_01	÷		
Quota	Default	~		
łost O	ig-virt02	v]	
Test Connection				
Connection to ov	irt-imageio was successful.			
				ok

2. Click Start VM to begin the OS install. Open the VM console and click Install OS.

Dashboard	Compute + Virtual Machines										
	Vmt:				1	• ☆ ~ Q					
Compute >		New Edi	t 🕨 Rum 🖂	6 Suspend	Export	Shutdown	C Reboot	-	Gensole v	Create St	na,
The Automatic	0 -							1	Console Options		

3. Similarly, create one more VMs and install the OS for Oracle RAC on node 2. When both VMs are up and running, the status is green on the home page.

-	Dashboard		Comp	ute × Ve	tual Machine	ni i														
	Compute	>	Ving			New	LfR	Flat v	6. Suspe	nt top	x û - 0	n -	C Reboot	- 4	Canso	le +	Create 5	nap	het Mg	rate I
而	Network	×	0	•															1+4	< >
					Name	Comme	Host	IP Addres	ses.	FQON	Chuster	Data	Center	Memo	NY NY	CPU 7N	Networt	05	Graphics	Statu
	Storage	- 20		-	NAC2	RAC	ig vients	10.76.33.2	11 10.76	RAC2.0	KVM_Chatter	DC.)	Artual, KVM	-	56%	4 23	_	0%	VNC	Up

Chapter 11: Installation and configuration of Oracle Grid infrastructure

Now we have created two VMs for RAC configuration. We can begin to process the RAC prerequisites.

Prepare VMs for Grid software

Prepare VMs for Grid software as the first step in the installation and configuration of the Oracle Grid infrastructure.

Install required RPMs on VM

```
# yum update -y
# yum install -y oracle-database-preinstall-19c.x86_64
or
# yum -y install oracle-database-preinstall-19c
# cd /tmp
# wget https://publicyum.oracle.com/repo/OracleLinux/OL8/addons/x86_64/getPackage/
oracleasm-support-2.1.12-1.el8.x86_64.rpm
# yum localinstall ./oracleasm-support-2.1.12-1.el8.x86_64.rpm
# yum install oracleasm-support
# wget https://download.oracle.com/otn_software/asmlib/oracleasmlib-2.0.17-
1.el8.x86_64.rpm
# yum localinstall ./oracleasmlib-2.0.17-1.el8.x86_64.rpm
# yum install bind* -y
# sysctl -p
```

OS level prerequisites

Procedure

1. Assign an IP address to nodes.

```
#vi /etc/hosts
127.0.0.1 localhost localhost.localdomain localhost4 localhost4.localdomain4
#Public IP
10.76.33.123 racdb1 racdb1.unified.local
10.76.33.124 racdb2 racdb2.unified.local
#Private IP
192.168.1.201 racdb1-priv racdb1-priv.unified.local
```

Chapter 11: Installation and configuration of Oracle Grid infrastructure

Oracle RAC on KVM Hypervisor Virtualized by UCP Implementation Guide

```
192.168.1.202 racdb2-priv racdb2-priv.unified.local

#Virtual IP

10.76.33.125 racdb1-vip racdb1-vip.unified.local

10.76.33.126 racdb2-vip racdb2-vip.unified.local

#Scan IP

10.76.33.127 racdb12-scan racdb12-scan.unified.local

10.76.33.129 racdb12-scan racdb12-scan.unified.local
```

2. Create a directory structure and file system.

```
# lvcreate -n home -L 50GB ol
# lvcreate -n u01 -L 50GB ol
# lvcreate -n u02 -L 50GB ol
# mkfs -t xfs /dev/mapper/ol-home
# mkfs -t xfs /dev/mapper/ol-u01
# mkfs -t xfs /dev/mapper/ol-u02
# mount -t auto /dev/mapper/ol-home /home
# cd /
# mkdir -p /u01
# mount -t auto /dev/mapper/ol-u01 /u01
# mkdir -p /u02
# mount -t auto /dev/mapper/ol-u02 /u02
# lsblk
```

Note: Make an entry in /etc/fstab to auto-mount the file system after a restart of a node.

Create groups and users for RAC.

```
# groupadd -g 54327 asmdba
# groupadd -g 54328 asmoper
# groupadd -g 54329 asmadmin
# groupadd -g 54329 dba
# useradd -u 54322 -g oinstall -G dba grid
# usermod -G asmdba,asmoper,asmadmin,dba grid
# usermod -G asmdba,asmoper,asmadmin oracle <<<< if oracle user already
presents then change its mode
# Passwd grid
# Passwd oracle</pre>
```

4. Create directories for grid and Oracle software binaries.

```
# mkdir -p /u01/app/grid
# chmod -R 775 /u01
# chown -R grid:oinstall /u01
# mkdir -p /u01/app/oraInventory
# chown -R grid:oinstall /u01/app/oraInventory
# mkdir -p /u01/softwares
# chown -R grid:oinstall /u01/softwares
```

```
# mkdir -p /u02/app/oracle
# chmod -R 775 /u02
# chown -R oracle:oinstall /u02
# mkdir -p /u02/app/oracle/product/19c/dbhome 1
# su - grid
$ vi .bash profile
export TMP=/tmp
export TMPDIR=$TMP
export ORACLE BASE=/u01/app/grid
export ORACLE_HOME=/u01/app/19c/grid_home1
export ORACLE_SID=+ASM1
export ORACLE TERM=xterm
export BASE_PATH=/usr/sbin:$PATH
export PATH=$ORACLE HOME/bin:$BASE PATH
export LD LIBRARY PATH=$ORACLE HOME/lib:/lib:/usr/lib
export CLASSPATH=$ORACLE HOME/JRE:$ORACLE HOME/jlib:$ORACLE HOME/rdbms/jlib
alias grid=' ./home/oracle/grid.env'
alias db=' ./home/oracle/db.env'
#su - oracle
$vi .bash profile
export TMP=/tmp
export TMPDIR=$TMP
export ORACLE_BASE=/u02/app/oracle
export ORACLE_HOME=/u02/app/oracle/product/19c/dbhome_1
export GRID HOME=/u01/app/19c/grid home1
export ORACLE SID=<Instance name>
export ORACLE TERM=xterm
export BASE PATH=/usr/sbin:$PATH
export PATH=$ORACLE HOME/bin:$BASE PATH
export LD LIBRARY PATH=$ORACLE HOME/lib:/lib:/usr/lib
export CLASSPATH=$ORACLE HOME/JRE:$ORACLE HOME/jlib:$ORACLE HOME/rdbms/jlib
```

5. Stop the firewall.

```
# systemctl stop firewall.service
# systemctl stop firewalld
# systemctl status firewalld
# systemctl disable firewalld
```

6. Run the chroney ntp configuration.

```
# systemctl enable chronyd.service
# systemctl restart chronyd.service
# chronyc -a `burst 4/4'
# chronyc -c makestep
```

- **7.** Configure temporary OS settings to avoid passwordless SSH user issues or errors during installation. These settings can be reverted after installation.
 - a. Change scp.

```
# cd
# mv /usr/bin/scp /usr/bin/scp.orig
# vi /usr/bin/scp <<<< add below lines
/usr/bin/scp.orig -T $*
# chmod 555 /usr/bin/scp</pre>
```

b. Disable SELINUX.

```
# cat /etc/selinux/config|grep 'SELINUX=d'
# getenforce
# vi /etc/selinux/config
SELINUX=disabled
```

Create a shared LUN for OCR

Grid software needs a shared disk to store OCR and votedisk files. Create three LUNs for an OCR disk of 20 Gb in size and share it between both VMs.

sate LDEVs											10.00
Deate LOON											
his staard lats you lick Finish to confir	meate and provision LD rm the creation, or dick	Eve enter the info feat. If you went to	emation for LDEVs a add LUN paths fo	r you want to one or the LDEVs.	rate, and then do	k Add. Chik	Optione to exp	and the LDEV settings.			
1					-	Select	od LDEVs	_	_	-	
LDEV Capacity	Capacity	- Compatibility M	ode (Offeet bound)	fire		Defect A	Pages			1.6	Options
	-			08 1+)						Data Direct	t Mappin
Burnhar of 1000	(0-0)					i≥ 100	V 10- U	DEV Name	Rame(30)	LDEV 1D	1
	(0-0)					1 00-0	14-03 3	6_RAC13_0CR1	CVDHAME13		1
	1021201					e oo e	14.04	6_RAC13_0CR3	CVDHAMA(1)		
LOEV Name:	Prafix		Initial Number		1	2 00 0	14:09 2	6_6AC13_0CK3	CNOHANA(1)		
					0						
e LDEVs ex LDEVs > 2.5	lefert LOTVa 🔹 3.Sefert	Host Groups / Il	CSI Targets - N	(Verd Dange)		Gurlem					T
LUN IDs are auto select LDEVs you	matcally set, but you o want to change and the	en change a UUK n dick Change U	by clicking Change Ut IDs. Click Finish	to confirm the	must first select to UDI paths.	he check box	for the host g	roup (in the table subher	ading) you sant	to change.	
Sections.						_					
and the local	Frint Al Pater								and the local division of the local division	- 1 E	
and the second	Sento Act ages	1		1		1	1	LLW ID(5 Sats of 6	(artical)		-
			12002/876					the state and			
LOEV ID	LDEV Name	Party Group 10	Pool Name (10)	Capacity	Type	Abribule	T10 P1	CLI-	CL3-	R.7 1	1.1-
								T'HEAT'L'TH	6,HEALL	C34	U06220
00.04.03	30_KAC13_0CR1	14	CVCHAMA(1)	20.00 GB	0#	+1	Onabled	11	6,HEAL,I	10	/062204 _75_H64
00104103 00104104	30, KAC13, OCR1 16, KAC13, OCR3	-	CV0+464(1) CV0+464(1)	20.00 GB	DP DP	4.1	Onabled Onabled	13	4,06AL,1	13	/062294

Procedure

1. Go to OLVM > Compute > Virtual Machines > VM1 > Disks > New > Direct LUN.



2. Go to VM2 > Disks > Attach > Direct LUN for the second LUN.

	Edit	▶ Run →	6. Suspend	Shutdow	n - Expor	C Reboot	- QCons	sle 👻 🤅	Create Snap	pshot Mip	prate 1
General Network	Interfaces	Snapsh	ots App Frrata E	plications vents	Containers	Host Devi	ces Vm De	wices	Affinity Gr	oups	
								New	Attach	Edit Ren	nove I
Disk Type: All Images	Direct LUN Manage	ed Block									
Disk Type: All Images Attach Virtual D	Direct LUN Manage	ed Block							×	0-0	< > 1
Disk Type: All Images Attach Virtual D Image Direct LU	Direct LUN Manage Nsks N Managed Block	ed Block						Activate C	× hiskęty	0 - 0 tached To	< > 1 Interf
Disk Type: All Images Attach Virtual I Image Direct LL Allas	Direct LUN Manage Nsks Managed Block Description	ed Block			10	size e	Dath Vendor II	Activate 0	× 25k(1)	0 - 0 tached To	< → I Interf

3. Attach the other two OCR disks as well as other ASM disks for database installation and activate them as shown.

Disk	Type: All Images	Dire	a uun	M	maged Block						
										1-3	\leftrightarrow I
	Alias	100	-	80	Virtual Size	LUN ID	Secial	Vendor ID	Product ID	Attached To	Interf
	OCRVOTE1		-		20 G/8	360060e80233ab/0_	SHITACHI_OPEN-V	HITACHI	OPEN-V	2 VM6	VitiO-
	OCRVOTE2		-		20 G/B	360060e80233ab/0	SHITACHLOPEN-V	HITACHI	OPEN-V	2 VMs	VirtiO
	OCRVOTES		-	14	20 Gill	360060+802334040	SHITACHE OPEN V_	HITACHI	OPEN-V	2 105	Virtitio

Configure UDEV rules for shared disks

UDEV uses files with rules that determine how it identifies devices and creates device names. The UDEV daemon (udevd) reads the rules files at system startup and stores the rules in memory.

In the older kernels, the /dev directory contained static device files. But with dynamic device creation, device nodes for only those devices that are present in the system are created.

If the kernel discovers a new device or an existing device goes offline, the kernel sends an event action (uevent) notification to udevd, which matches the in-memory rules against the device attributes in /sys to identify the device. As part of device event handling, rules can specify additional programs that should run to configure a device. Rules files, which have the file extension .rules, are in stored in the following directories:

```
/lib/udev/rules.d <<<< Contains default rules files. Do not edit these files
/etc/udev/rules.d/*.rules <<<< Contains customized rules files. You can modify
these files.</pre>
```

See **Doc ID 1528148.1** on the Oracle support site for additional configuration details.

The following shows shared disks (sdb, sdc, and sdd) mounted to VMs. To create UDEV the same number of WWN disks are needed to be uniquely identified on both hosts.



Procedure

1. Format all three disks on node1 (this is not required on node 2).

```
# fdisk /dev/sdc
Welcome to fdisk (util-linux 2.32.1).
Changes will remain in memory only, until you decide to write them.
```

```
Be careful before using the write command.
Device does not contain a recognized partition table.
Created a new DOS disklabel with disk identifier 0x05446bfb.
Command (m for help): n
Partition type
  p primary (0 primary, 0 extended, 4 free)
  e extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1):
First sector (2048-33554431, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-33554431, default 33554431):
Created a new partition 1 of type 'Linux' and of size 16 GiB.
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.
# fdisk -l /dev/sdc*
Disk /dev/sdc: 16 GiB, 17179869184 bytes, 33554432 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x05446bfb
Device Boot Start End Sectors Size Id Type
/dev/sdc1 2048 33554431 33552384 16G 83 Linux
```

2. Find the WWN of the disk.

```
# /lib/udev/scsi_id -g -u -d /dev/sdb
or
# /usr/lib/udev/scsi_id -g -u -d /dev/sdb
or
# lsblk -o +WWN,serial
or
# udevadm info --query=all --name=/dev/sdo | egrep "WWN|SERIAL"
```



cd /etc/udev/rules.d

```
# vi 99-oracle-asmdevices.rules
KERNEL=="sd*", PROGRAM=="scsi_id --page=0x83 --whitelisted --device=/dev/%k",
RESULT=="36000c29c97c3b1d37878a1aff92426fb" SYMLINK+="asm-OCRVD1", OWNER="grid",
GROUP="oinstall", MODE="0660"
KERNEL=="sd*", PROGRAM=="scsi_id --page=0x83 --whitelisted --device=/dev/%k",
RESULT=="36000c29d15638ed7d62c304bb3dc749f" SYMLINK+="asm-OCRVD2", OWNER="grid",
GROUP="oinstall", MODE="0660"
KERNEL=="sd*", PROGRAM=="scsi_id --page=0x83 --whitelisted --device=/dev/%k",
```

```
RESULT=="36000c29d15638ed7d62c304bb3dc749f" SYMLINK+="asm-OCRVD2", OWNER="grid",
GROUP="oinstall", MODE="0660"
```



Note: Change the highlighted number with the actual LUN ID for your environment and save the file.

3. Run the following commands.

```
# udevadm control --reload-rules && udevadm trigger --action=add
# udevadm trigger
```

4. Copy the 99-oracle-asmdevices.rules file from node1 to node2 at /etc/udev/ rules.d and run the previous commands on VM2 to reload UDEV.

Download Oracle RAC 19c Grid software and copy to VMs

Download Oracle database and 19c grid software from the following link:

https://www.oracle.com/database/technologies/oracle19c-linux-downloads.html

Oracle Database 19c (19.3) for Linux x86-64 (RPM)	
Download	Description
🛃 oracle-database-ee-19c-1.0-1x86_64.rpm	(2,694,664,264 bytes) (sha256sum - c599397aea7af91097cbde6597783f17964e5d53ea3fd90da04264b65d379652)
Oracle Database 19c (19.3) for Linux x86-64	
Download	Description
🛃 LINUX.X64,193000_db_home.zip	(3,059,705,302 bytes) (sha256sum - ba8329c757155da315ed3bdd7186c5ac42cd9970a28bf2e6235f3255255aa8d8)
Oracle Database 19c Grid Infrastructure (19.3) for Li	inux x86-64
Download	Description
LINUX.X64_195000_grid_home.zip	(2,889,184,575 bytes) (sha256sum - d66800266-4d9399c161eb03c0d1e3687121tc890b1ddd50b35dcbe13c5307d2e)

Start a remote putty session on **VM1**, and copy software binaries on **host1**, and unzip the downloaded file.

Table 1 Summary

Sr.no.	Task Description	Node 1	Node 2	Status
1	Hardware pre-checks	Myhost1	Myhost2	Done
2	Configure LUN (storage)	Boot LUN	Boot LUN	Done
3	Configure Zoning	Yes	Yes	Done
4	OS (OL8.6) installation on bare metal host	Yes	Yes	Done

Sr.no.	Task Description	Node 1	Node 2	Status
5	Configure network bonding and assign IPs (Pub/Private)	Yes	Yes	Done
6	Install Oracle Linux KVM hypervisor	Yes	Yes	Done
7	Install Oracle Linux Virtualization Manager (OLVM) and add KVM hosts	It is a separate man	agement host	Done
8	Create Logical network for VM in OLVM	Yes	Yes	Done
9	Create VM on KVM host through OLVM	Yes	Yes	Done
10	Install OS on VM and GRID pre-requisite	Yes	Yes	Done
11	Download GI software to VM	Yes	Yes	Done

Grid installation

To install Grid software, use the remote GUI console to VM1 from OLVM.

Procedure

1. Log in with **GRID** user credentials.

B Dashboard		Compute + Virtual Mach	nes						
	-	Vmt/				ж ☆ ~ Q			
Compute	>		New 8	idit 🕨 Rum 🖂	& Suspend Export	Shutdown -	C Reboot -	🖵 Console 🔍	Create Sna
TI Annual		0 -						Console Options	

2. Log in with Grid and go to the directory where the GI software is unzipped.

#	cd /	/u01/app/	'19c/grid_home1/cv/rpm			
#	yum	install	cvuqdisk-1.0.10-1.rpm	<<<<<	install	RPM

3. Run the ./runcluvfy.sh utility to check RAC prerequisites.

<pre>[root@RAC1 ~]# [root@RAC1 ~]4 su - grid [grid@RAC1 ~]\$ cd /u01/app/19c/grid_home1 [grid@RAC1 grid home1]\$</pre>	Software path where it unzipped		
[grid@RAC1 grid_home1]\$ export CV_ASSUME_DISTID=OEL7.4 [grid@RAC1 grid_home1]\$ export SRVM_DISABLE_MTTRANS=t [grid@RAC1 grid_home1]\$./runcluvfy.sh stage -pre crs	B rue Inst -n RAC1,RAC3	-verbose	execute this

4. Upon completion check failures and take corrective action and then proceed with GI software installation.

 Activities 	Terminal •	Nov 9 03:03			A +0 -
0	9	rid@RAC1:/v01/app/19c/grid_home1		×	
File [root [grid [grid [grid [grid [grid	Edit View Search Terminal @RAC1 -]\$ cd /u01/app/ @RAC1 grid_homel]\$ ls "rx 1 grid_onstall @RAC1 grid_homel]\$ exp @RAC1 grid_homel]\$ exp @RAC1 grid_homel]\$./gi @RAC1 grid_homel]\$./gi	Help Dec/grid_home1 Litt grid* 3294 Mar 8 2017 gridSetup.sh prt CV_ASSUME_DISTID=0EL7.8 prt SRVM DISABLE_MTTRANS=true ridSetup.sh	n gridsetup		

A GUI opens to install GI software. Select an icon and proceed with the installation. Change directory path, location, and permissions as needed.

a. Choose Configure Oracle Grid infrastructure for a new Cluster.



b. Choose Configure an Oracle standalone Cluster.



c. Specify Cluster name and SCAN listener name with port number.

Grid Plug and Play Inform	ation 19° GracLe Grid Infrastructure
Confinencial Datas Conter Conferences Conter Conferences Conter Program Conter Program Datase Departmenter Conter Administration Conter Administration Con	Single Clear Access Name (SCAN) allows clearts to use and min connection attings to connect to the cluster as a whole. Clear connect requests to the SCAN name can be handled by any

d. Give **2nd node name**, **details** for the cluster (give all nodes name that are going to be part of cluster).



e. Check SSH connectivity between cluster nodes by clicking SSH connectivity.

	Testing passworders the selected rates mendes	SSH connectivity between This may take several please web.	The Add State Strengt
And some pages And some results Surgery Without And and And and And And And And And And And And And And And And And	Et transme (put	dis Peringen a actable pr the Law Jame	e (erre

f. Choose **Network interface usage** for the environment configuration.

Confraction Onton Destry Confraction	Private interfaces are used	by Dracle Grid Whattructure h	ir internode traffic	
Cold Plus and Play	Interface Name	Bulanet	Use for	
Numerous Advancements	segist	10.76.93.0	Public	
Classer, Node, Proceeding	2 Project		ASM & Private	
Betwork Interface Unage	weers	195 198 172 0	Do NOT USA	_
Storage Option				
	S -			
Crypts ADA Disk Design				
Garraing System Sciences				
Operating System Design metalogies (as above				
Typerating Epotenci Senage metalaptan Location Roat script association				
Typerating System Senare metallation London Austi uning automation Franciscular October				
Tarraing Italies Desar excludes Locator Fact angle associate Permanent Charles Tarray				
Egenating Epitem Emission methodomic Location Paral script association Procession Chanles Terresponse Screenway				
Exercises Epideo Sevan excelutions in other fract angle another Processing Another Second Processing Another Second Processing				

g. Choose a storage option (we used Flex ASM for OCR, vote disk).



h. There is no need to configure a management repository.



i. Choose ASM disks for OCR and Vote disk to be Present.

Configuration Dation Chaster Configuration Gold Flow and Play Chaster Node Information Visiteurs Interface Unage	OCR and Yoting disk data will be stored in the following ADM characteristics of the Disk group. Bok group name OCCNO Redundancy Office Original Optimial ADM Allocation Stat Save 4 (1998)	Diek group. Select disks	ed.
- Storese Cotion	Select Disks	Show All Disks	
Create Grid Infrastructure Ma	Disk Path	Size (in HB)	5145/4
ADM Parametri - Spenstreg System Senger - Installation Location - And anoth Senger Sentencies - Permanente Checks		20479 20479 20479	Provisioned Provisioned Provisioned
Summary Install Product Print	Configure Drack ASH (liter Driver Solicit this option to configure ASH Filter Driver(APD) to same disk devices by Drack ASH	illy configuration and mar	ragement of

j. Set a password for SYS to log in to ASM instances.

Specify ASM Password			19	Grid Infrestructure
Y Cardinatelian Datam Y Charge Cardinatelian Y Charge Cardinatelian Y State State Y Dester Mails Information Y Instance Mails Y State State Y State State Y State State Y State State Y Cardinate State Y Cardinate State Y Cardinate State Y Cardinate Mail	The new Oracle Automa with SYSACM provideges Addressed user with SY Specify the password fo O Use gifferent password Use	to Dorage Manage for administration, SDBA privileges to r ir these user acceu ords for these acceu	ment (Grade ADH) instance o Oracle recommends that you motor the ADH instance. etc. Instance Laster former I	epures de ses SYS user create a less profisped
ASM Password				
Canadian Section Section Section Section Section Section Programming Programming Section Section Section Section	C Use Long Longert	s for these account	s funfirm Passmont	VINCENCE .
Dep.			- Back Sert -	Cancel

k. Choose Do not use IPMI.

Failure Isolation Support	19° Grid Infrastructure
Cantactelian Datase Charter Cantheontain Sint Flue and Flue Claster State Information State State Information States Antiferior States Create State Information States Create State Information Create State Information Create State Information Create Information	Crease are of the following Fahrer Isotation Support options.
21-10	s Back Bent a modul Cancel

I. Choose EM to configure enterprise manager (EM) control, otherwise click NEXT.

Specify Management Opt	lons	19°	Grid Infrastructure
Cardinacetten Option Cardinacetten Option Conter Cardinacetten Conter Nation Cardina Nation Statuss Option Statuss Option Cardina Coll Inhantiouten Ho Cardina Coll Inhantiouten Ho Cardina Coll Inhantiouten Ho Cardina Coll Inhantiouten Ho Cardina Scholm Status Damagement Options Demotion Internation	Too can canfigure to have this instance of Or througe Hanagement to be managed by the Point Could Control configuration to particine the Point Could Control configuration to particine the Point Could Control control (Control (Co	racie Grid Infrastructure and C rights Manager Cloud Central a registration vid Confinal	racie Automatic Specify the details of
Nuth script associate Processing Charles Teamway Social Product Provid			

m. Choose groups and environment ownership as needed.



n. Specify the Oracle base for Grid software.



o. Specify the inventory location for Grid software.


p. Monitor the progress of prerequisite checks.



q. Check for any prerequisite failures and take corrective action.



r. Check the progress of Grid software installation.



Execute C	Configuration Scripts	3				
The following configuration scripts need to be executed as the "root" user on each listed cluster node. Each script in the list below is followed by a list of nodes on which it has to be executed.						
Scripts	Nodes					
/u01/app/orainventory/orainstRoot.sh	RAC1, RAC3					
/u01/app/19c/grid home1/root sh	RAC1, RAC3					
To execute the configuration scripts:						
To execute the configuration scripts: 1. Open a terminal window 2. Login as "root" 3. Run the scripts 4. Return to this window and click "OK" !	to continue					
To execute the configuration scripts: 1. Open a terminal window 2. Login as "root" 3. Run the scripts 4. Return to this window and click "OK" ! Furn the script on the local node first. After parallel on all other nodes.	to continue successful completion, you can start the	e script in				

s. Run orainstRoot.sh and root.sh on nodes according to the sequence given on the screen.

```
[root@RAC1 ~]# /u01/app/oraInventory/orainstRoot.sh
Changing permissions of /u01/app/oraInventory.
Adding read, write permissions for group.
Removing read, write, execute permissions for world.
 Changing groupname of /u01/app/oraInventory to oinstall.
The execution of the script is complete.
[root@RAC1 ~] #
  [root@RAC3 ~] # /u01/app/oraInventory/orainstRoot.sh
 Changing permissions of /u01/app/oraInventory.
Adding read, write permissions for group.
Removing read, write, execute permissions for world.
 Changing groupname of /u01/app/oraInventory to oinstall.
The execution of the script is complete.
[root@RAC3 ~]#
            (#RAC1 -]# /u01/app/190/gri
          OBACLE_OMMER= grid
OBACLE_OMMER= grid
OBACLE_DOME= /u01/app/190/grid_bomm1
         er the full pathname of the local bin directory: (/uer/local/bin):
Copying dBhome to /uer/local/bin ...
Copying oraenv to /uer/local/bin ...
Copying oraenv to /uer/local/bin ...
       sting /sto/orstab file...
plas will be added to the /sto/orstab file as meeded by
added to the /sto/orstab file...
plass Configuration Assistant when a database is created
table function Assistant part of root approximation
create which red contone for the performent.

Assistant assistant function as the found at

assistant assistant function as the found at

assistant as assist
```

```
CLSRSC-594: Executing installation step 16 of 19: "InitConfi
   SN has been created and started successfully.
   DBT-30001] Disk groups created successfully. Check /u01/app/grid/cfgtocollogs/asmca/asmca-221109320051357.log for details.
  2022/11/09 05:14:45 CLSRAC-482: Running command: '/u01/app/19c/grid_homel/bin/ocrconfig -upgrade grid oinstall'
CRS-4234: Updating the profile
Successful addition of voting disk Boael46847e34f23bf5e50138043ed3d.
Doccessful y replaced voting disk group with +OCRVD.
CRS-4254: Updating the profile
CRS-4254: Voting file(s) successfully replaced
## STATE file Universal Id File Name Disk group
          ONLINE Scael46547e34f23bf5e50138043ed3d (/dev/cracleasm/disks/OCRDISE) [OCRVD]
     1. CHILD DESERTED FOR A CONTRACT OF A CON
                @RAC3 ~]# /u01/app/19c/grid_homel/root.sh
   erforming root user operation.
             ORACLE_OWNER= grid
ORACLE_NOME= /u01/app/19c/grid_home1
        Copying dbhome to /usr/local/bin ...
Copying oraenv to /usr/local/bin ...
         Copying coraenv to /usr/local/bin ...
  ntries will be added to the /etc/oratab file as needed by
matabase Configuration Assistant when a database is created
inished running generic part of root script.
  ow product-specific root actions will be performed.
elinking oracle with rac_on option
sing configuration parameter file: /u01/app/19c/grid_homel/crs/install/crsconfig_params
 the log of current session can be found at:
   /v02/app/grid/crsdata/rac3/crsconfig/rootcrs_rac3_2022-11-09_05-21-17AN.log
   022/11/09 05:21:20 CLSRSC-594: Executing installation step 1 of 19: 'SetupTA'.
   022/11/09 05:21:20 CLSRSC-594: Executing installation step 2 of 19: 'ValidateEnv'.
   1022/11/09 05:21:20 CLSRSC-594: Executing installation step 3 of 19: 'CheckFirstNode'.
   1022/11/09 05:21:20 CLSRSC-594: Executing installation step 4 of 19: 'GenSiteOUIDs'.
   1022/11/09 05:21:21 CLSRSC-594: Executing installation step 4 of 19: 'GenSiteOUIDs'.
   1022/11/09 05:21:21 CLSRSC-594: Executing installation step 5 of 19: 'SetupOSD'.
   1022/11/09 05:21:21 CLSRSC-594: Executing installation step 6 of 19: 'CheckCRSConfig'.
   1022/11/09 05:21:21 CLSRSC-594: Executing installation step 7 of 19: 'SetupLocalGPNP'.
   1022/11/09 05:21:22 CLSRSC-594: Executing installation step 7 of 19: 'CreateRootCert'.
   1022/11/09 05:21:22 CLSRSC-594: Executing installation step 10 of 19: 'CreateRootCert'.
   1022/11/09 05:21:22 CLSRSC-594: Executing installation step 10 of 19: 'CreateRootCert'.
   1022/11/09 05:21:22 CLSRSC-594: Executing installation step 10 of 19: 'CreateRootCert'.
   1022/11/09 05:21:29 CLSRSC-594: Executing installation step 10 of 19: 'CreateRootCert'.
   1022/11/09 05:21:29 CLSRSC-594: Executing installation step 10 of 19: 'CreateRootCert'.
   1022/11/09 05:21:30 CLSRSC-594: Executing installation step 10 of 19: 'CreateRoAtD'.
   1022/11/09 05:21:30 CLSRSC-594: Executing installation step 10 of 19: 'CreateRoAtD'.
   1022/11/09 05:21:30 CLSRSC-594: Executing installation step 12 of 19: 'CreateRoAtD'.
   1022/11/09 05:21:30 CLSRSC-594: Executing installation step 12 of 19: 'CreateRoAtD'.
   1022/11/09 05:21:30 CLSRSC-594: Executing installation step 12 of 19: 'InstallAtD'.
   1022/11/09 05:21:46 CLSRSC-594: Executing installation step 13 of 19: 'InstallAtD'.
   1022/11/09 05:21:47 CLSRSC-594: Executing installation step 13 of 19: 'InstallAtD'.
   1022/11/09 05:21:47 CLSRSC-594: Executing installation step
             log of current session can be found at:
      22/11/09 05:21:47 CLSRSC-594: Executing installation step 14 of 19: 'InstallACF5'
2022/11/09 05:21:47 CLSRSC-594: Executing installation step 14 of 19: 'InstallACFS'.
2022/11/09 05:21:48 CLSRSC-594: Executing installation step 15 of 19: 'InstallKA'.
2022/11/09 05:21:49 CLSRSC-594: Executing installation step 16 of 19: 'InitConfig'.
2022/11/09 05:21:56 CLSRSC-594: Executing installation step 17 of 19: 'StartCluster'.
 2022/11/09 05:22:38 CLSRSC-343: Successfully started Oracle Clusterware stack
2022/11/09 05:22:38 CLSRSC-594: Executing installation step 18 of 19: 'ConfigNode'.
2022/11/09 05:22:47 CLSRSC-594: Executing installation step 19 of 19: 'PostConfig'.
  2022/11/09 05:22:51 CLSRSC-325: Configure Oracle Grid Infrastructure for a Cluster ... succeeded
 [root8RAC3 -]#
```

t. Monitor the installation progress.



u. Grid software installation completes successfully.

Fir	nish	19° ORACLE Grid Infrastructure
こののでものできたものでものできたのできます。 そうそう そうかん	Configuration Option Cluster Canfiguration Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create Grid Infrastructure Create ASM Disk Group ASM Password Pailure Isolation Anagement Options Operating System Groups Installation Lecation Create Inventory Rost script execution Prerequisite Checks Summary Install Product	The configuration of Oracle Grid Infrastructure for a Cluster was successful, but some configuration assistants failed, were cancelled or skipped.
-	Finish	
•		
-	Deib	L Cose

Chapter 12: Installation and configuration of Oracle RDBMS

RDBMS installation

Procedure

1. For database software installation, log in with Oracle user credentials and unzip the DB software. Go to the location where the software is unzipped and set environment variables.



 Choose Set Up Software Only (optionally you can choose to create a database as well).



3. Choose the database installation type (RAC or standalone database).

Select Database Installati	on Option	19° Database
Carfaeration Cattan	Select the type of database installation you want to perform.	
Datal Los Space Statistication Space Statistication Space Statistication Space Statistication Space Statistication Space Statistication	Oracle geal Application Churters database imstallation	
Hele	s Beth 1	level a line and Cancel in

4. Choose Real application cluster (choose standalone if you are not using RAC).



5. Choose the nodes on which RDBMS software must be installed.

Select List of Nodes		19° Database
T Configuration Dation	Select nodes in addition to RAC or Oracle RAC One.	the local node) in the cluster where the installer should install Gracle
T Catalogue materiation contacts		Node name
w Hodes Selection	2 1 recl	
T. Install. Doke		
P Toperal Initialization		
Part script searchest		
Preference Conta		
 Immuny 		
🖕 instal President		
C. Revela		
	\$5H connectivity	Select all Deselect all
	Land Contraction of Contract	Children (Manager
(Mala)		Contract of Sector 1 Contract of Contract

6. Choose Enterprise edition or Standard edition (according to the license purchased).



7. Specify the RDBMS software location.

Specify Installation Locatio	n 19°5	
Cathlane Man Dation	Specify a path to place all Gracie software and configuration-related files installed installation sweer. This location is the Gracie base directory for the installation ow	by this lier
tiodes Selection	grade base (w02/app/orable	Briese.
Intakana Editan Installation Location	This software directory is the Oracle Database home directory	
Construct Lastern Counts Next period secondary Secondary Charles Secondary Instant Product Press	Sofbeare location: Aut2ingederaclinityroduct(13kolithionne_1	
Elela .	« Back Sent >	Cancel

8. Specify OS groups.

Privileged Operating Syst	em groups	19	Database
Confraeration Sotion Database installation Confion Todes Selection Contained Sotion Operating System Groups Surveys Sotion Surveys set arright results Surveys Surveys	SYS proleges are required to create a database using open tembership in OS Group grants the corresponding SYS pro grants the SYSDB prolege. Database génerator (OSDRR) group (Optional) Database Backip and Recovery (OSBRCKUPOBA) group Data guard administrative (OSBRCKUPOBA) group Data guard administrative (OSBRCKUPOBA) group Becyption gay Management administrative (OSBRCOBA) group geal Application Cluster administrative (OSBRCOBA) group	ating system 1053 billings, eg mentde mental mental mental mental mental mental mental mental mental mental mental	authentication. rehe in OSDBA
Erle	- Dath	Set a	Cancel

9. Enter the root user password if you would like to run the root.sh script automatically. We recommend running it manually from a separate putty session using root user credentials.

Root script execution con	figuration		19° Database
Confineration Option Database Installation Options Notes Selection Estabase Edition Installation Location Constitute Sciences Constitute Checks Services Proceedings Proceedings	During the software cor can choose to have the one of the options below additional prerequisite : @ Jube "reof" user : Passgord : Program soft Program soft Passagrd Passagrd	Hguration, certain operations h installer perform these sperals installer perform these specials theols. Inspected will also b theols. Inspected will also b theols. Inspected will also b theols of the performance of the Inspected will also b theols of the Inspected will also b the	we to be performed as 'root' user. You me automatically by specifying inputs for a used by the installer to perform
Help			ack Next > Destat Cancel

10. Check for any failures and correct them.



	Prostation	IC Database
Configuration Option		
Detabase Installation Col	tan 10	
Nodes Selection	Building ASH Client Shared Libraries	
Database Edition		
Installation Location	Status	201-11-11-11-11-11-11-11-11-11-11-11-11-1
Operating System Group	Configure Local Node	In Progress
	 Prepare 	Succeeded
	🔶 • Link binaries	in Progress
Prerequilits Checks	• Setup	Pending
	Copy Files to Remote Nodes	Pending
and and a second second	Configure Remote Nodes	Pending
Install Product	• Prepare	Pending
Finish	• Setup	Pending
	Setup Oracle Base	Pending
	Execute Root Scripts	Pending
	19° ORACLE'	i) (Report) (Every) (Sh
	Details (Report of Database	d) Report (Setty) (34
tjelp	Details Reviet a	d) Egnent (Antry) (24
Help	Details Securit a	d) Fgreet (Arby) (2) (-) jestal (Canc X

11. The database RDBMS software is installed successfully.



Database creation

Separate disk groups for DATA, FRA, and REDO are needed for database creation.

Create n number of LUNs from Storage Navigator that are the necessary size. In this implementation, we have created a **200 GB LUN** for each disk group. Add these newly created disks to UDEV rules and format them.

We can also use **ASMLib** instead of UDEV rules to create ASM disks that can be further used for respective disk group creation.

Database creation using Oracle ASMLib

ASMLib is an optional support library for the Automatic Storage Management (ASM) feature of the Oracle Database. ASM simplifies database administration and greatly reduces kernel resource usage. It eliminates the need for the DBA to directly manage potentially thousands of Oracle database files.

You can choose to use Oracle Automatic Storage Management library driver (Oracle ASMLib) or set UDEV rules for device persistence.

See Configuring Storage Device Path Persistence Using Oracle ASMLIB for details.

Procedure

1. Log in to a Grid user and ASM instance.

```
[grid@RAC1 ~]$ . oraenv
ORACLE_SID = [+ASM1] ? +ASM1
ORACLE_HOME = [/home/oracle] ? /u01/app/19c/grid_home1
The Oracle base remains unchanged with value /u01/app/grid
[grid@RAC1 ~]$ asmca
[grid@RAC1 ~]$ []
```



2. Click Disk Groups.

Disk Groups					1	9° ORACLE Grid Infrastruct
A SPI Indakes Settings	Disk Group Name OCR/O	58/99	Pres (58) 59.01	Usable (GB) 59-63	Redundancy EXTERN	State MOUNTED(2 of 2)
D-a	Note: Use cylit club is see [more options. Interest All [Better				

3. Specify Disk group name and then check Select disks.

ate besk Group	Tab Grant Name	Instant				-	19	Grid Infrastructu
All Halances Contract Contract Contract All Strategy All Strategy	Bedundancy: Alecation (just Size 1988) Show Blaphin () Show		gormal 💽 Experi	will there i () p	en.			د وانت بابد ایون (
	P Disk Path P identification	NANGATAOL	Header St. PROVISIONED	Disk Name	504 (Guerum	Site	
	Disk Discovery Path: 1044	der ache aunsch	aka'				Change	Disk Discovery Fath

4. Create the disk groups.

ASM	Contraction of Contraction	First Lines	These states	The shirt state	-	Terrary Control of Con
ASM Putances	OCRVD	59.99	59.61	59.61	EXTERN	MOUNTED(2 of 2)
Cockvo	FRADE	200.00	199.86	199.86	EXTERN	MOUNTED(2 of 2)
Co parado	(DATAD)	200.00	1355.66	199.95	Excellent	MOUNTED(2 (K 2)
B volumes						
ACFS File Systems						
Particida						
	Note: Use right click to see	mara optionio.				

Database creation using DBCA

You can use the graphical interface to create a database.

Procedure

1. Log in to the host using Oracle user credentials and set environment variables.

```
bash-4.4$ export CV_ASSUME_DISTID=OEL7.6
bash-4.4$ export SRVM_DISABLE_MTTRANS=true
bash-4.4$ dbca
```

2. Choose Create a database.



3. Choose Advanced configuration.

Database Operation	 Typical configuration 		
Creation Mode	Shibal database name		
Deployment, Type	Shirage type	Automatic Storage Hanagement (ASH)	
Database MentPostion	Detelace fire location.		Research
Fast Receivery Option	Fgit Becovery Area (FER)		firgers
Databasa Options	Database gharacter ant	ALEXITY - UNITED UTTER Universal Instant	er set
Carifiguration Options Hanagement Options Uses Createrbals Ereaters Option Summary Progress Page Progress Page	Administrative password Confirm gassword Crysts as Container database Pjagable database name () Adgenced configuration		

4. Select a database template such as Data warehouse, Custom, or General (OLTP).

Catabana Consultan	Select the type of a	fatabase you want to create.		
Deployment Type	Faractes Obs.	Oracle Real Application Cluster (RAC) datab.		
Detabase Identification After eye Option Part Recovery Option Landons Options	Select a template f	Admin Managed or your database lude datafiles contein pre-created databases. The templates without datafiles only when ner	They allow you to cr	reate a new
Hanagament Options Unor Credentatis Creation Option Summary Progress Fede Docel	te change attribute Data warehousi Custem Databa General Purpos	a like block size that cannot be altered after d Template name se e or Transaction Processing	alabase creation clude datafiles Yes No Yes	Details View detail View detail
	Template location	/wD2/app/oracle/product/15c/dbhome_1/assis	lants/dbca/template	• Chang

5. Choose the nodes on which the database will be created.

Select List of Nodes	19° Database
Districtions Reservations Creations Reservations Distributions Types Restors Selection	Select the nodes on which you want to create the cluster database. The local node "rac1" should always be selected.
Ontolasse Martification Horage Option Hard Resources Options Radiature Options Configuration Options Haragement Options Deer Cristiantals Cristians Option Resources Page Propress Page Prople	(gelect all) [Develect all
Hain .	e Back Brot a Cancel

6. Choose storage attributes such as Automatic Storage Management (ASM) or OMF (Oracle Managed Files).

Select Database Storag	e Option		19°	ORACLE Database
Establisher Operation Creation Hilds Deployment Type Modes Selector Detabase Mentification	O the peripher file for details Storage type and location for iGeneral Purpose or Transac (•) Use following for the databas All the database files will be and location of each datafile	 Manage attributes database files will be ton Processing). e storage attributes put at the specified loci in the subsequent scre 	picked up from the specifi ation below. You can custs en.	ed template mize the name
Storage Option	Database files storage type:	Automatic Storage M	anagement (ASM)	-
Past Recovery Option Outsidese Options Configuration Options	Database files jocation: Oracle Managed files option datafiles for simplified datab	will enable Oracle to av	(COMP) standically generate the n	Browse
Hanapement Options User Creditionals Creation Option Prorequisite Checks Summary	() Use <u>O</u> racle-Manaped Files	(OMP)	Bultiplex redo logs a	nd control files
C Program Page			File loc	ation variables

7. Choose disk groups for Oracle files (default tablespace, FRA, and archive location).

	Multiplex redo logs and control files	×
It is loca	is recommended that online redo logs and control files be written to multiple ocations spread across different disks to provide greater fault tolerance.	
1	Location	
1	+DATA01/{DB_UNIQUE_NAME}	
2	+FRA01/{DB UNIQUE NAME}	
3		
4		
5		
-		

8. Select **Specify Fast Recovery Area** and specify its location (it is recommended to use FRA for recovery-related files for faster recovery in case of any failure).

Select Fast Recovery Op	tion	19	C ORACLE Database
Ustabase Operation Creation Hade Deployment Type	Choose the recovery options for Specify East Recovery Area Recovery files glorage type	Automatic Storage Management (ASM)	
Vodes Selection Catabase Identification Storeae Option	Fast <u>B</u> ecovery Area Fast Recovery Area sige	+FRA01	Brogse
Fast Recovery Option Fast Recovery Option Outabase Options Cerrifiquitation Options Hanagement Options User Credentials Creation Option Proreguiste Checks Summary Progress Rege Printh	Enable archiving East prov	ve mude parameters)	

9. Select Configure Oracle Database Vault, otherwise click Next.

Select Oracle Data Vault	Config Option	19° Database
Database Operation Creation Holle Deployment Type Robes Talectors Database Identification Biorage Option	Configure Oracle Database Yault Database Vault gener Excended Dynate a second eccount manager ground manager	
Fast Recovery Option	Pagamerit	Cardger passager
Data Vault Option		
Configuration Options Hampprment Options User Douberthals Draston Option Prerequisite Checks Summary Progress Page Plaush	Configure dracts Label Decordy with Op	
Help		a Back Next a Train

10. Choose Management Options to configure Enterprise Manager (EM).

Specify Management Op	tions		19° Database
Estabase Operation Creation Protect Organization Type Restauction Estabase internet	Specify the management uption I han Cluster gerification Ubit Configure Enterprise Hanage EH database express port Begister with Enterprise Han	is for the database y ICVUI checks periodically ir IBNI database express [5500 ager (BNI) cloud control	
Fart Becovery lipmon Cata You't Culture Catheurstian Calana	QMS basil OUS part EM advers generation		
Management Options User Credentials Credentials Credentials Credentials Credentials Credentials Credentials	20 give proved		
Transferration Program			

11. Select **User Credentials** to specify passwords (they can be different or the same for all accounts).

Estabase Operation Creation Highs Registered Type Boden Betector	You must specify passwords for th reasons. O Use different administrative pas Personnel	e following user accounts in the swords Confirm put	new database for security
Enclosers Information Electropy Contrast Fact Recommend Contrast Enclosers Contrast Contraportation Contrasts Historecontext Contrasts Historecontext Contrasts	STA ADDITION CRICONAR (*) Use the same administrative pa Basament (********	seword for all accounts	[4
Union Credentials Creation Dation Processed to Checks Summary Programs Page French			

12. Select **Creation Option** to specify information for database scripts.

ielect Database Creati	on Option 19°	ORACLE Database
Relations Specation Creation Made Destingment Type Hodes Selection	Select the database creation options.	onpts are run in
Database identification Merrege diplom Feat Recovery Datase Data Yea/E Option Configuration Options Management Datases User Credentials	Terrafiate (scattere permittere))))	Brgwse
Creation Option Formation Checks Summary Program Fage French	Destination directory: (ORACLE_BASE)/admin/(DB_UNIOUE_NAME)/surjets Pollowing advanced configuration options can be used to configure initialization customize database storage locations. All initialization garameters. Customize Sto	Brogse

13. Select **Creation Option** to verify that prerequisites have been met.

Chapter 12: Installation and configuration of Oracle RDBMS

Database Operation Creation Mode	(yenfication Result) Some of the minimum requirements for installation are not completed. Rev listed in the following table, and recheck the system.	ien and fix the issues
- Depingerand Type Modes Delection - Database startification	(phack A.) (gir & Check Again) (show Parks) *) (\$ Al houses Checks	- Rignor Status Pixabi
- Blorage Option Fast Receivery Option - Onto World Option - Configuration Options	Checks Checks Skap Son	Ignored No
Management Californi Unor Credentiale Credien Octor		

14. Monitor the database creation progress.

Progress Page		19° Database
Database Operatore Deaton Mails Dealsymmet Type Nedro Sciertran	Progress 34% Creating and starting Oracle instance : in Progress	
Manager Option Througe Option Fest Recovery Option Onto You't Option Configuration Options Management Options User Conducture	DB Creation Prepare for db operation Copying database files Creating and starting Oracle instance Creating cluster database views Completing Database Creation Executing Post Configuration Actions	In Progress Succeeded Succeeded In Progress Pending Pending Pending
Oreston, Option Promounde Decks Sammery Progress Page Fresh	DBCA Log Location /w02/app/oracle/cfgtoollogs/dbca/orcldb/trace log_2022-11-10_01-2 Database Alert Log Location /w02/app/oracle/diag/rdbms/orcldb1/trace/alert_orcldb1 log	130) (Ngurt) (guny) (gun 23-354M

Result

The database is created successfully.

Fin	lish			19° Database
	Detabase Optication Oracium Rodo Deployment Type Hodes Detection	Database creation complete /u02/app/oracle/cfgtoollogs/ Database Information: Global Database Name. System Identifier(SID) Prefix: Secure Parameter File name	For details check the logfiles at: dbca/orcidb. orcidb orcidb	aulie 220 1120365475
Ý	fistations bleet/fication	EM Database Express URL	https://RAC13-scan.5500/em	april 1/0 1110/05/77
	Sharayar Option Paul Antoning Option Data Vault Option Configuration Options	Note: All database accounts Password Management butto the database accounts (exce unlock only the accounts you passwords immediately after	except SYS, SYSTEM and DBSNMP in to view a complete list of locke opt DBSNMPI. From the Password will use. Oracle strongly recomm unlocking the account.	are locked. Select the d accounts or to manage Management window, ends changing the default
1	Management Catture			Eassword Management
÷.	User Ordentials			
÷	Overables Option			
Ŷ	Prevenuents Checks			
÷	Summery			
Ŷ	Progress Page			
ŵ	Finish			

Chapter 13: Conclusion

Hitachi Virtual Storage Platform E1090 and Hitachi Advanced Server DS220 G2 have been tested and validated as an ideal platform for a virtualized environment using the Oracle KVM hypervisor.

This solution was tested on Oracle RAC database as well as with multiple environments running at the same time.

See the *Hitachi Solution for Databases – Oracle RAC Virtualized on OLVM with DS220 G2 and VSP E1090 Reference Architecture Guide* at <u>https://knowledge.hitachivantara.com/</u> <u>Documents/Application_Optimized_Solutions/Oracle/Hitachi_Solution_for_Databases_</u> <u>%E2%80%93_Oracle_RAC_Virtualized_on_OLVM_with_DS220_G2_and_VSP_E1090_Refe</u> <u>rence_Architecture_Guide</u> for details about sizing, network design, and configuration.



Hitachi Vantara

Corporate Headquarters 2535 Augustine Drive Santa Clara, CA 95054 USA HitachiVantara.com/contact