

Oracle® Private Cloud Appliance

Installation Guide for Release 2.4.4

ORACLE®

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Preface

This document is part of the documentation set for Oracle Private Cloud Appliance (PCA) Release 2.4.4. All Oracle Private Cloud Appliance product documentation is available at:

<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/index.html>.

The documentation set consists of the following items:

Oracle Private Cloud Appliance Release Notes

The release notes provide a summary of the new features, changes, fixed bugs and known issues in Oracle Private Cloud Appliance.

Oracle Private Cloud Appliance Licensing Information User Manual

The licensing information user manual provides information about the various product licenses applicable to the use of Oracle Private Cloud Appliance.

Oracle Private Cloud Appliance Installation Guide

The installation guide provides detailed instructions to prepare the installation site and install Oracle Private Cloud Appliance. It also includes the procedures to install additional compute nodes, and to connect and configure external storage components.

Oracle Private Cloud Appliance Safety and Compliance Guide

The safety and compliance guide is a supplemental guide to the safety aspects of Oracle Private Cloud Appliance. It conforms to Compliance Model No. ESY27.

Oracle Private Cloud Appliance Administrator's Guide

The administrator's guide provides instructions for using the management software. It is a comprehensive guide to how to configure, monitor and administer Oracle Private Cloud Appliance.

Oracle Private Cloud Appliance Quick Start Poster

The quick start poster provides a step-by-step description of the hardware installation and initial software configuration of Oracle Private Cloud Appliance, and is intended for data center operators and administrators who are new to the product.

Oracle Private Cloud Appliance Expansion Node Setup Poster

The expansion node setup poster provides a step-by-step description of the installation procedure for an Oracle Private Cloud Appliance expansion node.

Audience

The Oracle Private Cloud Appliance documentation is written for technicians, authorized service providers, data center operators and system administrators who want to install, configure and maintain a private cloud environment in order to deploy virtual machines for users. It is assumed that readers have experience installing and troubleshooting hardware, are familiar with web and virtualization technologies and have a general understanding of operating systems such as UNIX (including Linux) and Windows.

The Oracle Private Cloud Appliance makes use of Oracle Linux and Oracle Solaris operating systems within its component configuration. It is advisable that administrators have experience of these operating

systems at the very least. Oracle Private Cloud Appliance is capable of running virtual machines with a variety of operating systems including Oracle Solaris and other UNIXes, Linux and Microsoft Windows. The selection of operating systems deployed in guests on Oracle Private Cloud Appliance determines the requirements of your administrative knowledge.

Related Documentation

Additional Oracle components may be included with Oracle Private Cloud Appliance depending on configuration. The documentation for such additional components is available as follows:



Note

If your appliance contains components that are not mentioned below, please consult the related documentation list for [Oracle Private Cloud Appliance Release 2.3](#).

- Oracle Rack Cabinet 1242
https://docs.oracle.com/cd/E85660_01/index.html
- Oracle ZFS Storage Appliance ZS7-2
https://docs.oracle.com/cd/F13758_01/index.html
- Oracle Integrated Lights Out Manager (ILOM)
https://docs.oracle.com/cd/E81115_01/index.html
- Oracle VM
<https://docs.oracle.com/en/virtualization/oracle-vm/index.html>
- Oracle Enterprise Manager Plug-in
<https://docs.oracle.com/en/enterprise-manager/cloud-control/enterprise-manager-cloud-control/13.4/empca/index.html>

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Convention	Meaning
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<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
<code>monospace</code>	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Chapter 1 Introduction to Oracle Private Cloud Appliance Installation

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This document provides instructions for installing Oracle Private Cloud Appliance at your site. Instructions are also provided for extending an existing Oracle Private Cloud Appliance at your site. This chapter provides an overview of these system installation procedures, and describes the features and hardware components of Oracle Private Cloud Appliance.

1.1 System Installation Procedures

The following table lists the procedures you need to complete to install Oracle Private Cloud Appliance at your site.

Step	Description	Links
1	Review the product notes for any late-breaking information about Oracle Private Cloud Appliance.	<i>Oracle Private Cloud Appliance Product Notes</i> at: https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/
2	Review important safety information.	Before performing the installation, refer to the following documents: <ul style="list-style-type: none">• <i>Oracle Private Cloud Appliance Safety and Compliance Guide</i>• <i>Important Safety Information for Oracle's Hardware Systems</i>
3	Review information about Oracle Private Cloud Appliance features and hardware components.	Chapter 1, Introduction to Oracle Private Cloud Appliance Installation
4	Complete the site preparation procedures.	Chapter 2, Site Requirements
5	Complete the site network preparation procedures.	Chapter 3, Network Requirements
6	Install Oracle Private Cloud Appliance at your site.	Chapter 4, Installing Oracle Private Cloud Appliance
7	Power on Oracle Private Cloud Appliance and perform initial system configuration.	Chapter 5, Powering On Oracle Private Cloud Appliance
8	(<i>Optional</i>) Extend Oracle Private Cloud Appliance compute capacity with additional compute nodes.	Chapter 6, Extending Oracle Private Cloud Appliance - Additional Compute Nodes

Step	Description	Links
9	(Optional) Extend Oracle Private Cloud Appliance server memory.	Chapter 7, Extending Oracle Private Cloud Appliance - Server Memory Kits
10	(Optional) Extend Oracle Private Cloud Appliance storage capacity.	Chapter 8, Extending Oracle Private Cloud Appliance - Additional Storage

1.2 About Oracle Private Cloud Appliance

Oracle Private Cloud Appliance is an integrated hardware and software system engineered to enable rapid deployment of a converged compute, network, and storage infrastructure for hosting most applications and workloads, whether running on Linux, Oracle Solaris, or Microsoft Windows.

In combination with customer-provided storage from Oracle or other storage vendors, Oracle Private Cloud Appliance incorporates Oracle server and network hardware with Oracle operating system, virtualization, and orchestration software to automate the discovery, configuration, deployment, and management of converged infrastructure for hosting virtual machines (VMs).

Oracle Private Cloud Appliance incorporates high-speed Ethernet connectivity to provide a converged, wire-once, software-defined networking and storage fabric for all servers and storage in the appliance. Leveraging software-defined networking (SDN) technology, users can rapidly and dynamically create or modify private or public networks without having to manually re-cable connections, saving time and reducing the risk of human error. The consolidation of network connections results in up to 70 percent fewer cables and cards.

In addition to rapid infrastructure provisioning, Oracle Private Cloud Appliance also accelerates complete application stack deployment through support for Oracle VM Templates and Assemblies. Oracle VM Templates and Assemblies are preconfigured applications, middleware, and databases packaged as ready-to-run virtual machines (VMs) that can be dynamically configured at deployment time. The result is an unparalleled ability to go from “bare-metal” infrastructure power on to logging in to a newly deployed, running application within days or even hours, instead of weeks or months.

1.3 Features of Oracle Private Cloud Appliance

Oracle Private Cloud Appliance offers the following features:

- **Converged infrastructure orchestration software:** Automated discovery, configuration, and management of included server, network, and storage resources for rapid infrastructure provisioning.
- **Unified, software-defined network fabric:** Incorporated high-speed Ethernet hardware provides a single, consolidated fabric allowing new networks to be dynamically added and existing networks to be modified without the need to manually modify cabling.
- **Rapid application stack deployment, not just infrastructure:** Support for ready-to-run Oracle VM Templates and Assemblies enables users to rapidly deploy not only the infrastructure, but also the applications that are hosted on the infrastructure.
- **Support for a wide variety of guest operating systems:** Support for Linux, Oracle Solaris, and Windows operating systems and applications.
- **Support for customer-provided storage:** Oracle Private Cloud Appliance can be configured with external storage from Oracle or existing storage from other storage vendors.
- **Unified management:** Browser-based orchestration software provides at-a-glance status for all hardware components. A plugin is available to integrate appliance management and monitoring into

Oracle Enterprise Manager. Role-based access control permits secure administration of the appliance across multiple administrators.

1.4 Oracle Private Cloud Appliance Rack Components

Oracle Private Cloud Appliance systems consist of virtualization compute nodes, storage appliances, as well as required networking components. [Table 1.1](#) lists the quantity and description of each component in an Oracle Private Cloud Appliance system, with factory-installed Controller Software Release 2.4.x.



Note

Oracle Private Cloud Appliance base racks are factory installed with the latest supported generation of server nodes. When you order expansion compute nodes, you receive the latest available generation. The Oracle Private Cloud Appliance Controller Software version must match the hardware versions installed in your environment.



Note

The system ships with default passwords assigned to the Oracle ILOM root accounts on Oracle components. This enables the installation process to be performed with a predictable initial access account. Immediately after installation, change the default passwords. Use long, complex passwords to ensure optimal security.

Table 1.1 Oracle Private Cloud Appliance Rack Components

Quantity	Description
2	Oracle Server X8-2, forming the HA management node cluster
2 to 22	Oracle Server X9-2, used as virtualization compute nodes
1	Oracle Rack Cabinet 1242 base
2	Cisco Nexus 9336C-FX2 Switches, providing connectivity for the data network
2	Cisco Nexus 9336C-FX2 Switches, providing connectivity for the spine network
1	Cisco Nexus 9348GC-FXP Switch, providing connectivity for the internal administration network
2	Oracle ZFS Storage Appliance ZS7-2, providing internal system storage

Support for Previous Generations of Hardware Components

The latest version of the Oracle Private Cloud Appliance Controller Software supports only the hardware configurations listed above.

1.5 Server Components

[Table 1.2](#) lists the components of the server models that may be installed in an Oracle Private Cloud Appliance rack and which are supported by the current software release.



Note

Oracle Private Cloud Appliance systems with factory-installed Controller Software release 2.4.4 are delivered with Oracle Server X8-2, in the role of management nodes and Oracle Server X9-2 in the role of compute nodes.

Table 1.2 Server Components

Quantity	Oracle Server X8-2 Management Node	Oracle Server X9-2 Compute Node
1	Oracle Server X8-2 base chassis	Oracle Server X9-2 base chassis
2	Intel Xeon 5218, 16 core, 2.3 GHz, 125W	Intel Xeon 8358, 32 core, 2.6 GHz, 250 W
12 - 32	12x 32 GB DDR4 DIMMs (384 GB total)	32 or 64 DDR4 DIMMs Available configurations: <ul style="list-style-type: none"> • 16x 32 GB (512GB total) • 16x 64 GB (1TB total) • 32x 64 GB (2TB total)
2	1.2 TB, 2.5-inch, 10,000-RPM drives with LSI RAID controller	240GB M.2 SATA boot devices configured as RAID1 mirror
1	Ethernet port for remote management	Ethernet port for remote management
1	Dual-port 100Gbit Ethernet Host Channel Adapter Network Interface Card type CX5	Dual Port 100Gb Ethernet NIC module in OCPv3 form factor
2	Redundant power supplies and fans	Redundant power supplies and fans
1 + 2	Embedded Ethernet: 1x Gigabit + 2x 10/25 Gigabit ports	Embedded Ethernet: 1x Gigabit port

1.6 Operational Procedures for Oracle Private Cloud Appliance

This section provides important operational instructions to help you minimize the risk of injury or damage.

1.6.1 Emergency Power-off Considerations

If there is an emergency, then power to Oracle Private Cloud Appliance should be halted immediately. The following emergencies might require powering off the system:

- Natural disasters such as an earthquake, flood, hurricane, tornado or cyclone
- Abnormal noise, smell or smoke coming from the system
- Threat to human safety

1.6.1.1 Emergency Power-off Procedure

To perform an emergency power-off procedure for Oracle Private Cloud Appliance, turn off power at the circuit breaker or pull the emergency power-off switch in the computer room.

1.6.1.2 Emergency Power-off Switch

Emergency power-off (EPO) switches are required in a computer room when computer equipment contains batteries capable of supplying more than 750 volt-amperes for more than five minutes. Systems that have these batteries include internal EPO hardware for connection to a site EPO switch or relay. Use of the EPO switch will remove power from the Oracle Private Cloud Appliance.

1.6.2 Cautions and Warnings

The following cautions and warnings apply to Oracle Private Cloud Appliance:

- Do not touch the parts of this product that use high-voltage power. Touching them might result in serious personal injury.
- Do not power off Oracle Private Cloud Appliance unless there is an emergency. In that case, follow the [Section 1.6.1.1, "Emergency Power-off Procedure"](#).
- Keep the front and rear cabinet doors closed. Failure to do so might cause system failure or result in damage to hardware components.
- Keep the top, front, and back of cabinets clear to allow proper airflow and prevent overheating of components.
- Use only the supplied hardware.

Chapter 2 Site Requirements

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This chapter describes the site requirements for the Oracle Private Cloud Appliance.



Note

For site checklists, refer to [Appendix E, Site Checklists](#).

2.1 Space Requirements

Oracle Private Cloud Appliance racks have the following space requirements:

- Height: 42U - 2000 mm (78.74 inches)
- Width: 600 mm with side panels (23.62 inches)
- Depth (front door handle to rear door handle): 1197 mm (47.12 inches)
- Depth (doors removed): 1112 mm (43.78 inches)
- Weight (base rack, fully populated): 1000 kg (2204 lbs)

The minimum ceiling height for the cabinet is 2914 mm (114.72 inches), measured from the true floor or raised floor, whichever is higher. This includes an additional 914 mm (36 inches) of space required above the rack height for maintenance access. The space surrounding the cabinet must not restrict the movement of cool air between the air conditioner and the front of the systems within the cabinet, or the movement of hot air coming out of the rear of the cabinet.

2.1.1 Receiving and Unpacking Requirements

Before your Oracle Private Cloud Appliance arrives, ensure that the receiving area is large enough for the package. The following are the package dimensions and weights for an Oracle Private Cloud Appliance system:

- Shipping height: 2159 mm (85 inches)
- Shipping width: 1118 mm (44 inches)
- Shipping depth: 1543 mm (60.75 inches)
- Shipping weight (base rack, fully populated): 1118 kg (2465 lbs)

If your loading dock meets the height and ramp requirements for a standard freight carrier truck, then you can use a pallet jack to unload the rack. If the loading dock does not meet the requirements, then you must provide a standard forklift or other means to unload the rack. You can also request that the rack be shipped in a truck with a lift gate.

When your Oracle Private Cloud Appliance arrives, leave the rack in its shipping packaging until it arrives at its installation site. Use a conditioned space to remove the packaging material to reduce particles before entering the data center. The entire access route to the installation site should be free of raised-pattern flooring that can cause vibration.

Allow enough space for unpacking the system from its shipping cartons. Ensure that there is enough clearance and clear pathways for moving the Oracle Private Cloud Appliance from the unpacking location to the installation location. [Table 2.1](#) lists the access route requirements for the Oracle Private Cloud Appliance.

Table 2.1 Access Route Requirements

Access Route Item	With Shipping Pallet	Without Shipping Pallet
Minimum door height	2159 mm (85 inches)	2000 mm (78.74 inches)
Minimum door width	1118 mm (44 inches)	600 mm (23.62 inches)
Minimum elevator depth	1543 mm (60.75 inches)	1058.2 mm (41.66 inches)
Maximum incline	6 degrees	6 degrees
Maximum elevator, pallet jack, and floor loading capacity	1145 kg (2520 lbs)	1145 kg (2520 lbs)

2.1.2 Maintenance Access Requirements

The maintenance area must be large enough for Oracle Private Cloud Appliance, and have the required access space. For example, the required space to remove the side panels is 675.64 mm (26.6 inches). [Table 2.2](#) lists the maintenance access requirements for the Oracle Private Cloud Appliance.

Table 2.2 Maintenance Access Requirements

Location	Maintenance Access Requirement
Rear maintenance	914 mm (36 inches)
Front maintenance	1232 mm (48.5 inches)
Top maintenance	914 mm (36 inches)

2.2 Flooring Requirements

Oracle recommends that the Oracle Private Cloud Appliance be installed on raised flooring. The site floor and the raised flooring must be able to support the total weight of the system as specified in [Section 2.1, "Space Requirements"](#).

[Table 2.3](#) lists the floor load requirements.

Table 2.3 Floor Load Requirements

Description	Requirement
Maximum allowable weight of installed rack equipment	952.54 kg (2100 lbs)
Maximum allowable weight of installed power distribution units	52.16 kg (115 lbs)

Description	Requirement
Maximum dynamic load (maximum allowable weight of installed equipment including power distribution units)	1004.71 kg (2215 lbs)

2.3 Electrical Power Requirements

The Oracle Private Cloud Appliance can operate effectively over a wide range of voltages and frequencies. However, it must have a reliable power source. Damage might occur if the ranges are exceeded. Electrical disturbances such as the following might damage the system:

- Fluctuations caused by brownouts
- Wide and rapid variations in input voltage levels or in input power frequency
- Electrical storms
- Faults in the distribution system, such as defective wiring

To protect your system from such disturbances, you should have a dedicated power distribution system, power-conditioning equipment, as well as lightning arresters or power cables to protect from electrical storms.

Each rack has two pre-installed power distribution units (PDUs). The PDUs accept different power sources. You must specify the type of PDU that is correct for your data center.

[Table 2.4](#) lists the PDU low-voltage requirements.

Table 2.4 PDU Types and Specifications

Item	15kVA - type 6440A	15kVA - type 6441A	15kVA - type 6442A	22kVA - type 7100873	22kVA - type 7100874	24kVA - type 6444A	24kVA - type 6445A
Region	North and South America, Japan and Taiwan	EMEA and APAC (except Japan and Taiwan)	North and South America, Japan and Taiwan	North and South America, Japan and Taiwan	EMEA and APAC (except Japan and Taiwan)	North and South America, Japan and Taiwan	EMEA and APAC (except Japan and Taiwan)
Number of inputs	1	1	3	3	3	2	2
Source voltage	200-220V	220/380 - 240/415VAC	200-240V	200-240V	200-240V	200-220V	220/380 - 240/415VAC
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Max. line current	40A	21A	24A	36.8A	32A	34.6A	16A
Phase current	23A	21A	N/A	N/A	32A	20A	16A
Recommended circuit breaker	50A	25A	30A	50A	30A	50A	25A
Outlets	42 x C13 6 x C19	42 x C13 6 x C19	42 x C13 6 x C19	42 x C13 6 x C19	42 x C13 6 x C19	42 x C13 6 x C19	42 x C13 6 x C19
Outlet groups	6	6	6	6	6	6	6
Max. group current	20A	20A	20A	20A	20A	20A	18A

Item	15kVA - type 6440A	15kVA - type 6441A	15kVA - type 6442A	22kVA - type 7100873	22kVA - type 7100874	24kVA - type 6444A	24kVA - type 6445A
Output voltage	200-240V	220-240V	200-240V	200-240V	200-240V	220-240V	200-240V
Data center receptacle	3ph 3W + ground 60A IEC60309	3ph 4W + ground 32A IEC60309 5P 6h 400V	1ph 2W + ground 30A NEMA L6-30	1ph 2W + ground 50A Hubbell CS8265C	1ph 2W + ground 32A IEC60309 3P 6H 230V	3ph 3W + ground 60A IEC60309	3ph 4W + ground 32A IEC60309 5P 6h 400V

2.3.1 Facility Power Requirements

Electrical work and installations must comply with applicable local, state, or national electrical codes. Contact your facilities manager or qualified electrician to determine what type of power is supplied to the building.

To prevent catastrophic failures, design the input power sources to ensure adequate power is provided to the power distribution units (PDUs). Use dedicated AC breaker panels for all power circuits that supply power to the PDU. When planning for power distribution requirements, balance the power load between available AC supply branch circuits. In the United States and Canada, ensure that the overall system AC input current load does not exceed 80 percent of the branch circuit AC current rating.

PDU power cords are 4 meters (13.12 feet) long, and 1 to 1.5 meters (3.3 to 4.9 feet) of the cord will be routed within the rack cabinet. The installation site AC power receptacle must be within 2 meters (6.6 feet) of the rack.

2.3.2 Circuit Breaker Requirements

To prevent catastrophic failures, the design of your power system must ensure that adequate power is provided to all of the compute nodes. Use dedicated AC breaker panels for all power circuits that supply power to the compute nodes. Electrical work and installations must comply with applicable local, state, or national electrical codes. Compute nodes require electrical circuits to be grounded to the Earth.

In addition to circuit breakers, provide a stable power source, such as an uninterruptible power supply (UPS) to reduce the possibility of component failures. If computer equipment is subjected to repeated power interruptions and fluctuations, then it is susceptible to a higher rate of component failure.



Note

Circuit breakers are supplied by the customer. One circuit breaker is required for each power cord.

2.3.3 Grounding Guidelines

The cabinets for the Oracle Private Cloud Appliance are shipped with grounding-type power cords (three-wire). Always connect the cords to grounded power outlets. Because different grounding methods are used, depending on location, check the grounding type, and refer to documentation, such as IEC documents, for the correct grounding method. Ensure that the facility administrator or qualified electrical engineer verifies the grounding method for the building, and performs the grounding work.

2.4 Temperature and Humidity Requirements

Airflow through the Oracle Private Cloud Appliance is from front to back. For information, see [Section 2.5, "Ventilation and Cooling Requirements"](#).

Studies have shown that temperature increases of 10 degrees Celsius (18 degrees Fahrenheit) above 20 degrees Celsius (68 degrees Fahrenheit) reduce long-term electronics reliability by 50 percent. Excessive internal temperatures might result in full or partial shutdown of the Oracle Private Cloud Appliance.

Table 2.5 lists the temperature, humidity and altitude requirements for operating and non-operating systems.

Table 2.5 Temperature, Humidity, and Altitude Requirements

Condition	Operating Requirement	Non-operating Requirement	Optimum
Temperature	5 ° to 32 ° Celsius (41 ° to 89.6 ° Fahrenheit)	-40 ° to 68 ° Celsius (-40 ° to 154 ° Fahrenheit)	For optimal rack cooling, data center temperatures from 21 ° to 23 ° Celsius (69.8 ° to 73.4 ° Fahrenheit)
Relative humidity	10 to 90 percent relative humidity, non-condensing	Up to 93 percent relative humidity	For optimal data center rack cooling, 45 to 50 percent non-condensing
Altitude	3,000 meters (9,840 feet) maximum	12,000 meters (39,370 feet)	Ambient temperature is reduced by 1 ° Celsius per 300 meters above 900 meters altitude above sea level

Set conditions to the optimal temperature and humidity ranges to minimize the chance of downtime due to component failure. Operating an Oracle Private Cloud Appliance for extended periods at or near the operating range limits, or installing it in an environment when it remains at or near non-operating range limits could significantly increase hardware component failure.

The ambient temperature range of 21 ° to 23 ° Celsius (69.8 ° to 73.4 ° Fahrenheit) is optimal for server reliability and operator comfort. Most computer equipment can operate in a wide temperature range, but near 22 ° Celsius (71.6 ° Fahrenheit) is desirable because it is easier to maintain safe humidity levels. Operating in this temperature range provides a safety buffer in the event that the air conditioning system goes down for a period of time.

The ambient relative humidity range of 45 to 50 percent is suitable for safe data processing operations. Most computer equipment can operate in a wide range (20 to 80 percent), but the range of 45 to 50 percent is recommended for the following reasons:

- Optimal range helps protect computer systems from corrosion problems associated with high humidity levels.
- Optimal range provides the greatest operating time buffer in the event of air conditioner control failure.
- This range helps to avoid failures or temporary malfunctions caused by intermittent interference from static discharges that may occur when relative humidity is too low.



Note

Electrostatic discharge (ESD) is easily generated, and hard to dissipate in areas of low relative humidity, such as below 35 percent. ESD becomes critical when humidity drops below 30 percent. It is not difficult to maintain humidity in a data center because of the high-efficiency vapor barrier and low rate of air changes normally present.

2.5 Ventilation and Cooling Requirements

Always provide adequate space in front of and behind the rack to allow for proper ventilation. Do not obstruct the front or rear of the rack with equipment or objects that might prevent air from flowing through the rack. Rack-mountable servers and equipment typically draw cool air in through the front of the rack and let warm air out the rear of the rack. There is no airflow requirement for the left and right sides due to front-to-back cooling.

If the rack is not completely filled with components, then cover the empty sections with filler panels. Gaps between components can adversely affect airflow and cooling within the rack.

Relative humidity is the percentage of the total water vapor that can exist in the air without condensing, and is inversely proportional to air temperature. Humidity goes down when the temperature rises, and goes up when the temperature drops. For example, air with a relative humidity of 45 percent at a temperature of 24 ° Celsius (75.2 ° Fahrenheit) has a relative humidity of 65 percent at a temperature of 18 ° Celsius (64.4 ° Fahrenheit). As the temperature drops, the relative humidity rises to more than 65 percent, and water droplets are formed.

Air conditioning facilities usually do not precisely monitor or control temperature and humidity throughout an entire computer room. Generally, monitoring is done at individual points corresponding to multiple exhaust vents in the main unit, and other units in the room. Special consideration should be paid to humidity when using underfloor ventilation. When underfloor ventilation is used, monitoring is done at each point close to an exhaust vent. Distribution of the temperature and humidity across the entire room is uneven.

The Oracle Private Cloud Appliance has been designed to function while installed in a natural convection air flow. The following requirements must be followed to meet the environmental specification:

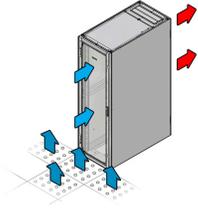
- Ensure that there is adequate airflow through the system.
- Ensure that the system has front-to-back cooling. The air intake is at the front of the system, and the air outlet is at the rear of the system.
- Allow a minimum clearance of 1219.2 mm (48 inches) at the front of the system, and 914 mm (36 inches) at the rear of the system for ventilation.

Use perforated tiles, approximately 400 CFM/tile, in front of the rack for cold air intake. The tiles can be arranged in any order in front of the rack, as long as cold air from the tiles can flow into the rack. Inadequate cold airflow could result in a higher intake temperature in the system due to exhaust air recirculation. The following is the recommended number of floor tiles:

- Four floor tiles for an Oracle Private Cloud Appliance with up to 22 compute nodes (fully loaded)
- Three floor tiles for an Oracle Private Cloud Appliance with up to 16 compute nodes (half loaded)
- One floor tile for an Oracle Private Cloud Appliance with 8 compute nodes (quarter loaded)

[Figure 2.1](#) shows a typical installation of the floor tiles in a data center for Oracle Private Cloud Appliance with more than 16 compute nodes.

Figure 2.1 Typical Data Center Configuration for Perforated Floor Tiles



Chapter 3 Network Requirements

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3.1.1 Network Connection Requirements	15
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New systems with factory-installed Controller Software Release 2.4.4 have an Ethernet-based network architecture.



Note

The networking infrastructure in Oracle Private Cloud Appliance and Oracle Private Cloud at Customer is integral to the appliance and shall not be altered. The networking does not integrate into any data center management or provisioning frameworks such as Cisco ACI, Network Director, or the like, with the exception of the ability to query the switches using SNMP in read-only mode. No changes to the networking switches in Oracle Private Cloud Appliance and Oracle Private Cloud at Customer are supported unless directed to do so by a KM note or Oracle Support.

3.1 Network Connection and IP Address Requirements

This section describes the network connection requirements and IP address requirements to connect the Oracle Private Cloud Appliance to your existing network infrastructure.

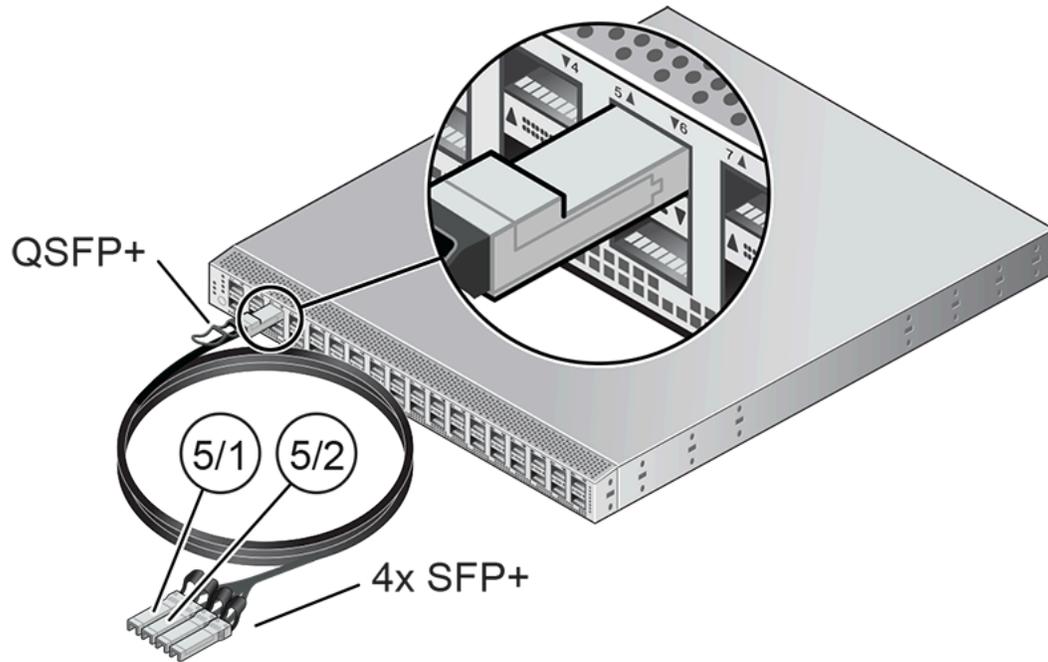
3.1.1 Network Connection Requirements

Before installation, you must run network cables from your existing network infrastructure to the Oracle Private Cloud Appliance installation site.

You must connect 2 high-speed Ethernet ports on each *spine* Cisco Nexus 9336C-FX2 Switch to your data center public Ethernet network. These are ports 5/1 and 5/2, which are configured at 10Gbit and intended as the default connection for appliance management and setup. This configuration is locked and must remain at 10Gbit; it requires breakout cables with a QSFP+ transceiver on the spine switch end and four SFP+ transceivers on the other end.

[Figure 3.1](#) shows the location of the two 10 GbE breakout ports on the spine switches, which must be connected to the data center network.

Figure 3.1 Default 10GbE Breakout Ports on Spine Cisco Nexus 9336C-FX2 Switch



Caution

It is critical that **both** spine switches have **two** 10GbE connections each to a pair of next-level data center switches. This configuration with four cable connections provides redundancy and load splitting at the level of the spine switches, the 10GbE ports and the data center switches. This outbound cabling from the pair of spine Cisco Nexus 9336C-FX2 Switches should be crossed: each spine switch must be connected to two next-level data center switches. The cabling pattern plays a key role in the continuation of service during failover scenarios.

3.1.1.1 Data Center Switch Configuration Notes

When configuring the data center switches to accept incoming Oracle Private Cloud Appliance uplinks – the default uplinks as well as any custom uplinks you define – take these notes into account.

- All uplinks, default and customer, are configured to use link aggregation (LACP). All four switch ports included in an uplink configuration – two per spine switch – must belong to the same link aggregation group (LAG), also known as port channel. The switch ports on the data center side of the uplinks must be configured accordingly.
- The data center switch ports to which the Oracle Private Cloud Appliance uplinks are connected, must be set to trunk mode.
- The spine switches operate with the Virtual Port Channel (vPC) feature enabled. Therefore, the standard Spanning Tree Protocol (STP) is not supported in the data center network ports connected to the Oracle Private Cloud Appliance. If spanning tree protocol is required on the switch ports connected to Oracle Private Cloud Appliance, you must use the Multiple Spanning Tree Protocol (MSTP) or a compatible protocol.
- Auto-negotiation is not available for uplink ports. Transfer speed must be specified on the customer switches' end. For the default uplink ports, this is 10Gbit/s.

Example

Below is an example of a custom uplink configuration for your reference.

In this example, port 3 on both spine switches is split into 4x 25Gbit. Ports 3:1 and 3:2 are cross-cabled to a pair of ToR switches. Like the internal spine switches of the Oracle Private Cloud Appliance, the two ToR switches have the virtual port channel (vPC) feature enabled, allowing ports from both switches to operate within the same port channel.

These are the key configuration parameters:

- The vPC feature must be enabled on both ToR switches: vpc domain 1.
- Ports 49 and 50 on **both** ToR switches must belong to port channel 200.
- Port channel 200 on **both** ToR switches must belong to virtual port channel 200.
- Port channel parameters, such as MTU, speed and spanning tree filter, must be identical on both ToR switches.
- All port channel and switch port interfaces are set to trunk mode.

ToR switch A configuration:

```
feature lacp
feature vpc
vpc domain 1
  peer-switch
  role priority 1
  peer-keepalive destination <ToR-B_IP> source <ToR-A_IP>
  peer-gateway
  layer3 peer-router
  ip arp synchronize

interface port-channel 200
  description "Uplink PCA 3:1 3:2 port channel"
  switchport mode trunk
  switchport trunk allowed vlan 1-4094      ### optional, typical default setting
  switchport trunk native vlan 500         ### optional, for data center vlan
  speed 25000
  mtu 9216
  vpc 200

interface Ethernet 1/49
  description "PCA spine 1 Port 3:1"
  switchport mode trunk
  switchport trunk allowed vlan 1-4094     ### optional, typical default setting
  switchport trunk native vlan 500         ### optional, for data center vlan
  speed 25000
  mtu 9216
  channel-group 200 mode active

interface Ethernet 1/50
  description "PCA spine 2 Port 3:1"
  switchport mode trunk
  switchport trunk allowed vlan 1-4094     ### optional, typical default setting
  switchport trunk native vlan 500         ### optional, for data center vlan
  speed 25000
  mtu 9216
  channel-group 200 mode active
```

ToR switch B configuration:

```

feature lACP
feature vpc
vpc domain 1
  peer-switch
  role priority 2
  peer-keepalive destination <ToR-A_IP> source <ToR-B_IP>
  peer-gateway
  layer3 peer-router
  ip arp synchronize

interface port-channel 200
  description "Uplink PCA 3:1 3:2 port channel"
  switchport mode trunk
  switchport trunk allowed vlan 1-4094      ### optional, typical default setting
  switchport trunk native vlan 500         ### optional, for data center vlan
  speed 25000
  mtu 9216
  vpc 200

interface Ethernet 1/49
  description "PCA spine 1 Port 3:2"
  switchport mode trunk
  switchport trunk allowed vlan 1-4094     ### optional, typical default setting
  switchport trunk native vlan 500         ### optional, for data center vlan
  speed 25000
  mtu 9216
  channel-group 200 mode active

interface Ethernet 1/50
  description "PCA spine 2 Port 3:2"
  switchport mode trunk
  switchport trunk allowed vlan 1-4094     ### optional, typical default setting
  switchport trunk native vlan 500         ### optional, for data center vlan
  speed 25000
  mtu 9216
  channel-group 200 mode active

```

3.1.1.2 Appliance Uplink Configuration

The uplinks are the system's physical connections between the spine switches and the data center network or top-of-rack (ToR) switches. Ports 1-4 on the spine switches are reserved for customer use. The uplink configuration must comply with requirements and restrictions, which are explained in this section.

For the purpose of high availability, uplink ports are always configured in pairs on each spine switch. Each port pair must operate in one of these modes, using the appropriate transceivers and cables:

- 100Gbit full port bandwidth
- 40Gbit full port bandwidth
- 4x 25Gbit with 4-way breakout cable
- 4x 10Gbit with 4-way breakout cable



Caution

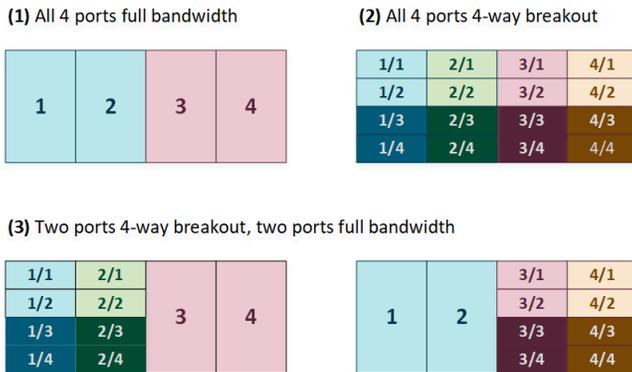
The Cisco Nexus 9336C-FX2 Switch ports are of the QSFP28 100Gbit type. Depending on your data center network infrastructure, each of the customer-reserved ports can be used at maximum bandwidth or split into 25Gbit (SFP28) or 10Gbit (SFP+). External Ethernet connections from the Oracle Private Cloud Appliance require a minimum speed of 10Gbit/s. Verify the cable and transceiver requirements for your intended configuration. Only Oracle-supplied transceivers should be installed in the Oracle Private Cloud Appliance spine switches.

For custom networks through spine switch ports 1-4, the port pairs and their mode of operation are configured through the Oracle Private Cloud Appliance CLI. The configuration of the default uplink ports on spine switch port 5 cannot be modified: it operates in 4x 10Gbit mode with ports 5/1 and 5/2 cross-cabled to the ToR switches, while ports 5/3 and 5/4 remain unused.

Spine switch ports 1 and 2, and ports 3 and 4, must be configured at the same time. If one port uses a breakout cable, then the other port must also be set up that way. All four ports on the same breakout cable must be set to the same speed, but different breakout cables can be set up for different speeds.

This results in the following supported configurations:

Figure 3.2 Supported Uplink Port Configurations



Caution

Each port pair on each individual spine switch must be cross-connected to two ToR switches. Each port pair that is configured for external connectivity – identically on both spine switches by definition – corresponds with a separate VLAN. The deduplication of ports and switches is primarily for redundancy; the VLANs already separate traffic.

The spine switches allow a maximum supported number of 8 custom uplinks, corresponding with 16 port pairs. This number does not include the default uplink.

3.1.1.3 Optional Data Center Administration Network Uplink

In addition to the public Ethernet connection, you may connect the Cisco Nexus 9348GC-FXP Switch to a management or machine administration network at your installation site. If you choose to use such an uplink, consider it as a long-term alternative to the temporary workstation connection described in [Section 3.1.2, “IP Address Requirements”](#). Configure the administration uplink *after* the initialization of the appliance, when the appliance network settings have been applied.



Caution

Connect **port 2** on the Cisco Nexus 9348GC-FXP Switch.

Make sure that the data center Ethernet switch used in this connection is configured to prevent DHCP leakage to the 192.168.4.0/24 subnet used by Oracle Private Cloud Appliance. Do not connect to any network with any kind of broadcast services in addition to DHCP.

For the *bastion host*, which is the name used to describe the machine that is permanently connected to the data center administration network, use the IP

address 192.168.4.199 and assign it statically to its network interface. Make sure there is no other machine on the same subnet using the same IP address and causing IP conflicts.

A connection to the appliance internal management network, either directly into the Cisco Nexus 9348GC-FXP Switch or through an additional Ethernet switch in the data center, is **not required** to access the appliance management functionality of the Oracle Private Cloud Appliance Dashboard. The primary role of the appliance internal management network is to allow the controller software on the management nodes to interact with the compute nodes and other rack components. Connecting to this network from outside the appliance allows you to gain direct administrator access to each component, for example to control the ILOMs.



Caution

Do not make any changes to anything on this network unless directed to do so by Oracle Support.

The Oracle Private Cloud Appliance Dashboard and Oracle VM Manager UI, in contrast, are **not** accessed over the internal management network, but through the management node cluster's virtual IP address. The virtual IP address is public, in the sense that it should be accessible from within your data center network. You reserve this IP address in your data center network in advance, as described in [Section 3.2, "General Network Configuration"](#), and then configure it in the appliance network settings during software initialization. Instructions for first access to the Oracle Private Cloud Appliance Dashboard are provided in [Section 5.3.5, "Connect the Appliance to the Network"](#).

3.1.2 IP Address Requirements

The Oracle Private Cloud Appliance requires a large number of private IP addresses. These are reserved for the normal operation and future expansion of the system and cannot be reconfigured. While system-level subnets and IPs should be avoided, the customer is allowed to choose the network configuration for external and virtual machine traffic that suits their requirements.

For lists of default IP addresses that are preassigned to your Oracle Private Cloud Appliance, see [Appendix A, Default IP Addresses](#).

To gain initial access to the Oracle Private Cloud Appliance Dashboard, you must connect a terminal or workstation with a web browser directly to the internal management network. Connect an Ethernet cable to the available port 48 in the Cisco Nexus 9348GC-FXP Switch, and statically configure the wired network connection of the workstation to use the IP address [192.168.4.254](#).



Caution

The IP address [192.168.4.254](#) and switch port 48 have been reserved specifically for the purpose of connecting a workstation during the first boot, initialization and provisioning of the appliance.

During the initial software configuration of the Oracle Private Cloud Appliance, you configure the network settings of the management nodes. For this purpose, you should reserve three IP addresses in the public (data center) network: one for each management node, and one to be used as virtual IP address shared by both management nodes. If the data center network traffic is tagged, make sure that the VLAN ID is also provided as part of the configuration. The virtual IP address provides access to the Dashboard once the software initialization is complete.

To avoid network interference and conflicts, you must ensure that the data center network does not overlap with any of the infrastructure networks of the Oracle Private Cloud Appliance internal configuration. These are the subnets and VLANs you should keep clear:

Subnets:

- 192.168.4.0/24 – internal machine administration network: connects ILOMs and physical hosts
- 192.168.32.0/21 – internal management network: traffic between management and compute nodes
- 192.168.64.0/21 – underlay network for east/west traffic within the appliance environment
- 192.168.72.0/21 – underlay network for north/south traffic, enabling external connectivity
- 192.168.40.0/21 – storage network: traffic between the servers and the ZFS storage appliance



Note

Each /21 subnet comprises the IP ranges of eight /24 subnets or over 2000 IP addresses. For example: 192.168.32.0/21 corresponds with all IP addresses from 192.168.32.1 to 192.168.39.255.

VLANs:

- 1 – the Cisco default VLAN
- 3040 – the default service VLAN
- 3041-3072 – a range of 31 VLANs reserved for customer VM and host networks
- 3073-3099 – a range reserved for system-level connectivity



Note

VLANs 3090-3093 are already in use for tagged traffic over the /21 subnets listed above.

- 3968-4095 – a range reserved for Cisco internal device allocation

3.2 General Network Configuration

Table 3.1 is a general network configuration worksheet to help you configure your Oracle Private Cloud Appliance. Oracle requests that you collect the information in preparation of the installation in your data center. The parameters entered in this worksheet are used as input during the initialization of the appliance.

Table 3.1 General Network Configuration Worksheet

Item	Your Configuration	Description and Example
Domain Name		Company network domain name. Example: abc.example.com
Region		Name of the country in which Oracle Private Cloud Appliance is installed.
Time Zone		Valid time zone.
IP address of the Domain Name Server		IP address of one or more network name servers (up to three servers). Example: 10.25.45.123 , 10.25.45.125

Item	Your Configuration	Description and Example
NTP Server		IP address of a Network Time Protocol server. Example: <code>10.12.13.14</code>
Search Domains		A list of search domains for name lookup. Example: <code>example.com</code> , <code>example.org</code>
Default Gateway		IP address of the default gateway in your organization. Example: <code>10.203.72.2</code>
IP address of Management node 1		IP address of the first management node in your company network. Example: <code>10.203.72.101</code>
Host name of Management node 1		Host name of the first management node in your company network. Example: <code>manager1</code>
IP address of Management node 2		IP address of the second management node in your company network. Example: <code>10.203.72.102</code>
Host name of Management node 2		Host name of the second management node in your company network. Example: <code>manager2</code>
Management virtual IP address		Virtual IP address of the management node cluster in your company network. Example: <code>10.203.72.100</code>
Management VLAN ID		Data center VLAN tag for the management network, if applicable. Example: VLAN tag <code>20</code>
vPC domain ID		vPC domain ID for spine switches must be unique in your environment, the default value is 1. Example: <code>vpc domain 1</code>

Chapter 4 Installing Oracle Private Cloud Appliance

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This chapter explains how to prepare for the installation of your Oracle Private Cloud Appliance and how to install the system at your site.

4.1 Installation Task Map

[Table 4.1](#) describes the steps for installing an Oracle Private Cloud Appliance at your site.

Table 4.1 Steps for Installing Oracle Private Cloud Appliance

Step	Description	Links
1	Review the safety precautions, guidelines, site checklists, and site requirements.	Section 4.2.2, “Review Safety Guidelines”
2	Ensure that the site is prepared for the installation of the system.	Section 4.2.3, “Prepare the Installation Site”
3	Remove all packaging from the system.	Section 4.2.5, “Unpack the System”
4	Install the system in its allocated place.	Section 4.3, “Install Oracle Private Cloud Appliance in Its Allocated Space”

4.2 Prepare to Install Oracle Private Cloud Appliance

This section describes the preparation steps to perform before installing your Oracle Private Cloud Appliance.

4.2.1 Before You Begin

Before installing your Oracle Private Cloud Appliance, or installing any server equipment into the rack, read the *Important Safety Information for Oracle’s Hardware Systems (7063567)* document that is shipped with the system.

Observe all safety notices printed on the packaging and listed in the *Oracle Rack Cabinet 1242 Safety and Compliance Guide (Part No: E87279)* and the *Oracle Rack Cabinet 1242 Power Distribution Units User’s*

Guide (Part No: E87281). Go to https://docs.oracle.com/cd/E85660_01/index.html to download these guides.

4.2.2 Review Safety Guidelines

Before your Oracle Private Cloud Appliance arrives, review the following safety precautions to ensure that the site is safe, as well as ready for delivery. Failure to observe these precautions can result in personal injury, equipment damage, or malfunction.

- Do not block ventilation openings.
- Do not install the system in a location that is exposed to direct sunlight or near a device that may become hot.
- Do not install the system in a location that is exposed to excessive dust, corrosive gases, or air with high salt concentrations.
- Do not install the system in a location that is exposed to frequent vibrations. Install the system on a flat, level surface.
- Use a power outlet that uses proper grounding. When using shared grounding, the grounding resistance must not be greater than 10 ohms. Ensure that your facility administrator or a qualified electrical engineer verifies the grounding method for the building, and performs the grounding work.
- Ensure that each grounding wire used for the system is used exclusively for the Oracle Private Cloud Appliance. Also observe the precautions, warnings, and notes about handling that appear on labels on the equipment.
- Do not place cables under the equipment or stretch the cables too tightly.
- Do not disconnect power cords from the equipment while its power is on.
- Do not place anything on top of the system or perform any work directly above it.
- If you cannot reach the connector lock when disconnecting LAN cables, then press the connector lock with a flathead screwdriver to disconnect the cable. You could damage the system board if you force your fingers into the gap rather than using a flathead screwdriver.
- Do not let the room temperature rise sharply, especially in winter. Sudden temperature changes can cause condensation to form inside the system. Allow for a sufficient warm-up period prior to server operation.
- Do not install the system near a photocopy machine, air conditioner, welding machine, or any other equipment that generates loud, electronic noises.
- Avoid static electricity at the installation location. Static electricity transferred to the system can cause malfunctions. Static electricity is often generated on carpets.
- Confirm that the supply voltage and frequency match the electrical ratings indicated on your Oracle Private Cloud Appliance.
- Do not insert anything into any Oracle Private Cloud Appliance opening, unless doing so is part of a documented procedure. The system contains high-voltage parts. If a metal object or other electrically conductive object enters an opening in the system, then it could cause a short circuit. This could result in personal injury, fire, electric shock, and equipment damage.

4.2.3 Prepare the Installation Site

The following procedure describes how to prepare the site prior to unpacking and situating your Oracle Private Cloud Appliance.

1. Thoroughly clean and vacuum the area in preparation for the installation.
2. Note problems or peculiarities at the site that require special equipment.
3. Verify that the installation site flooring has a strength rating to withstand the combined weight of the Oracle Private Cloud Appliance and any other installed equipment.

For more information, see [Section 2.1, "Space Requirements"](#).

4. Install all necessary electrical equipment and ensure that sufficient power is provided.

See also the *Oracle Rack Cabinet 1242 Power Distribution Units User's Guide* for the system Power Distribution Unit (PDU) power requirements.

5. Ensure that the installation site provides adequate air conditioning.

For details, see [Chapter 2, Site Requirements](#).

6. Operate the air conditioning system for 48 hours to bring the room temperature to the appropriate level.

4.2.4 Tools Required for Unpacking and Installation

The following tools and equipment are required for installation and service:

- Unpacking tools (provided in rack ship kit)
 - 17mm and 13mm open-ended double-sided wrench
 - Allen L-key 6mm hex wrench, 5-3/4 inches in length
 - Allen L-key 8mm hex wrench, 6-3/8 inches in length
- Rack setup tools and accessories (provided in rack ship kit)
 - 32 M6 cage nuts and washers
 - 32 M6 pan head screws
 - 8 M5 screws
 - 8 self-tapping Torx screws
 - 4 PDU brackets
 - 4 M5 cage nuts
 - 4 grounded power cables
 - 18mm and 16mm open-ended double-sided wrench
 - T-40 Torx screwdriver
 - T-25 Torx screwdriver
 - T-15 Torx screwdriver

- 8mm and 6mm Allen wrench
- Cage nut tool
- Keys to the front door, rear door, and side panel locks
- 17mm and 13mm open-ended double-sided wrench
- Customer-supplied tools (not provided in rack ship kit)
 - No. 2 Phillips screwdriver
 - Diagonal cutter
 - Antistatic wrist strap

4.2.5 Unpack the System

Before unpacking the rack from the shipping carton, refer to the labels on the carton and to the instructions that they provide. After unpacking the rack, follow local laws and guidelines to recycle the packaging properly.



Caution

Carefully unpack the rack from the packaging and shipping pallet. Rocking or tilting the rack can cause it to fall over and cause serious injury or death. You should always use professional movers when unpacking and installing this rack.



Note

After unpacking the rack from the packaging, save the shipping brackets used to secure the rack to the shipping pallet. You can use these shipping brackets to secure the rack permanently to the installation site floor. Do not dispose of these brackets, because you cannot order replacement brackets.



Caution

Shipping brackets are not for use for bracing or anchoring the rack during seismic events.

4.3 Install Oracle Private Cloud Appliance in Its Allocated Space

This section describes each phase of the hardware installation procedure for the Oracle Private Cloud Appliance.

4.3.1 Move the System

The following procedure describes how to move the Oracle Private Cloud Appliance:

1. Ensure that the rack doors are closed and secured.
2. Ensure that the leveling and stabilizing feet on the rack are raised and out of the way.
3. Push the system from the back of the rack to the installation site.



Warning

Never attempt to move an Oracle Private Cloud Appliance by pushing on the rack side panels. Pushing on the rack side panels can tip over the rack. This action can cause serious personal injury or death, as well as damage to the equipment.

The front casters of the rack are fixed; they do not pivot. When moving your Oracle Private Cloud Appliance to the installation site, you must steer the unit using the rear casters. You can safely maneuver the system by carefully pushing it from behind. See [Figure 4.1](#).

It is preferred that at least three people push and guide the rack: one person in front and two persons in back to help guide the rack and keep people out of the path of the moving rack. When transporting configured racks from one location to another, take care to move them slowly, 0.65 meters per second (2.13 feet per second) or slower.

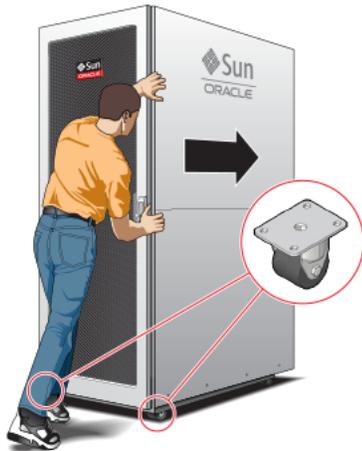
Carefully examine the transportation path. Avoid obstacles such as doorways or elevator thresholds that can cause abrupt stops or shocks. Go around obstacles by using ramps or lifts to enable smooth transport.



Caution

Never tip or rock the Oracle Private Cloud Appliance because the rack can fall over.

Figure 4.1 Carefully Push the Oracle Private Cloud Appliance From the Back of the Rack



4. When the rack is at the installation site, verify that no components or connections have become dislodged or disconnected during transport. If necessary, re-attach components and cables properly.

4.3.2 Stabilize the Appliance Rack

After moving the Oracle Private Cloud Appliance to the installation site, stabilize the rack to ensure that it does not move or tip over. You can stabilize the rack permanently by extending the rack leveling feet, and optionally using the shipping brackets to secure the rack permanently to the floor.



Caution

Shipping brackets are not for use for bracing or anchoring the rack during seismic events.

To secure the rack to the installation floor using the shipping brackets, you must drill the appropriate holes in the floor, re-attach the shipping brackets to the rack, position the rack over the mounting holes, and attach the shipping brackets to the floor firmly with bolts and washers that suit the specific environment. Oracle does not provide mounting bolts and washers for the shipping brackets, because different floors require different bolt types and strengths.

(Optional) If you plan to route data or power distribution unit (PDU) power cords down through the bottom of the rack, you will need to cut a hole in the installation site floor. Cut a rectangular hole below the rear portion of the rack, between the two rear casters and behind the RETMA (Radio Electronics Television Manufacturers Association) rails.



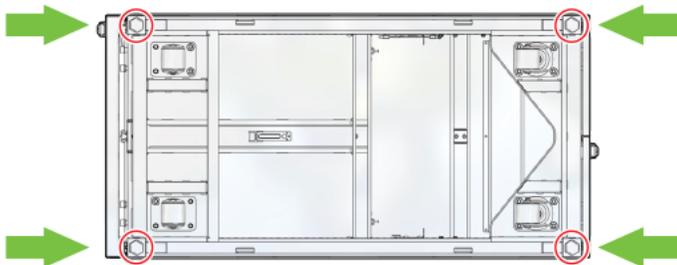
Caution

Do not create a hole where the rack casters or leveling feet brackets will be placed.

When the rack is in position, the leveling feet must be deployed. The rack contains four leveling feet that can be lowered to share the load with the casters. This increases the footprint of the rack, which improves stability and helps prevent rack movement. The leveling feet must be used even when the rack is permanently secured to the floor. To adjust the leveling feet, do the following:

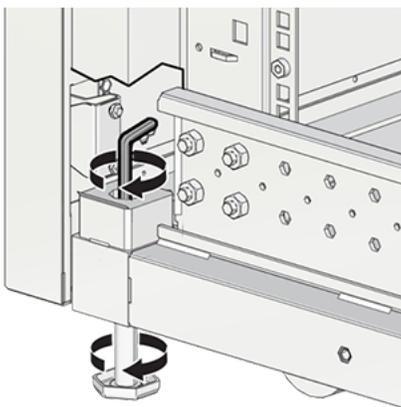
1. Locate the four leveling feet at the bottom four corners of the rack. See [Figure 4.2](#).

Figure 4.2 Location of Leveling Feet on Rack



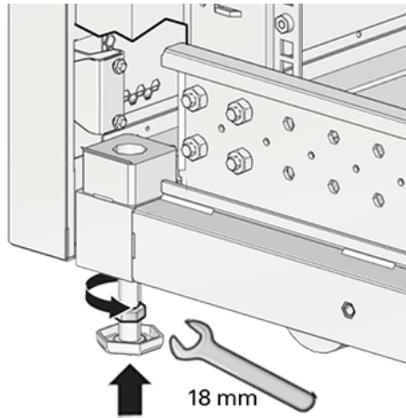
2. Using a 6mm hex wrench, lower the leveling feet to the floor. See [Figure 4.4](#).

Figure 4.3 Lowering the Leveling Feet



3. Lock the four leveling feet using an 18mm open wrench. See [Figure 4.4](#).

Figure 4.4 Locking the Leveling Feet



When lowered correctly, the four leveling feet share the load with the casters to increase footprint, improve stability, and help support the full weight of the Oracle Private Cloud Appliance.



Caution

When the rack needs to be moved to a different location, including repacking, verify that the leveling feet have been retracted before moving the rack. Otherwise the leveling feet may become bent, or the rack could tip over.

4.3.3 Attach a Ground Cable (Optional)

Oracle Private Cloud Appliance power distribution units (PDUs) achieve earth ground through their power cords. Final chassis ground is achieved by way of the ground prong when you connect the power cord to a socket. For additional grounding, attach a chassis earth ground cable to the system. The additional ground point enables electrical current leakage to dissipate more efficiently.



Caution

The PDU power input lead cords and the ground cable must reference a common earth ground. If they do not, then a difference in ground potential can be introduced. If you are unsure of your facility's PDU receptacle grounding, then do not install a ground cable until you confirm that there is a proper PDU receptacle grounding. If a difference in ground potential is apparent, then you must take corrective action.



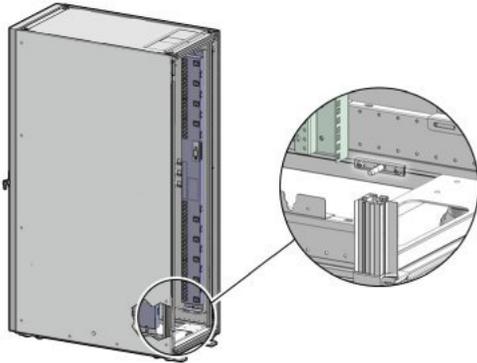
Note

A grounding cable is not shipped with the Oracle Private Cloud Appliance.

1. Ensure that the installation site has a properly grounded power source in the data center. The facility PDU must have earth ground.
2. Ensure that all grounding points, such as raised floors and power receptacles, reference the facility ground.
3. Ensure that direct, metal-to-metal contact is made for this installation. During manufacturing, the ground cable attachment area might have been painted or coated.
4. Attach the ground cable to one of the attachment points located at the bottom rear of the system frame. See [Figure 4.5](#).

The attachment point is an adjustable bolt that is inside the rear of the system cabinet on the right side.

Figure 4.5 Earth Ground Attachment Bolt Location



4.4 What's Next?

After installing the Oracle Private Cloud Appliance rack at your site, continue the installation process by powering on the system and performing the initial configuration. For instructions, see [Chapter 5, *Powering On Oracle Private Cloud Appliance*](#).

Chapter 5 Powering On Oracle Private Cloud Appliance

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This chapter explains how to power on the Oracle Private Cloud Appliance for the first time at your site.



Warning

Before starting the system and applying the initial configuration, read and understand the [Oracle Private Cloud Appliance Release Notes](#). The section [Known Limitations and Workarounds](#) provides information that is critical for correctly executing the procedures in this document. Ignoring the release notes may cause you to configure the system incorrectly. Bringing the system back to normal operation may require a complete factory reset.

5.1 Power On Task Map

[Table 5.1](#) describes the steps for powering on the Oracle Private Cloud Appliance at your site.

Table 5.1 Steps for Powering On Oracle Private Cloud Appliance

Step	Description	Links
1	Review the safety precautions, guidelines, site checklists, and site requirements.	Section 5.3.1, "Review Safety Guidelines"
2	Perform preliminary checks before connecting the power cords.	Section 5.3.2, "Inspect the Appliance"
3	Verify the hardware by visually inspecting the system.	
4	Connect the appliance public interfaces to the data center network. Also connect a workstation with monitor to the appliance internal management network switch.	Section 5.2, "Before Initial Power On"
5	Supply rack power, and perform the power-on self-test device checks.	Section 5.3.3, "Connect the Power Cords"
6	Switch on the two power distribution unit (PDU) circuit breakers located on the rear of the main PDU (PDU A).	Section 5.3.4, "Power On the Appliance"

Step	Description	Links
7	Power on the management nodes.	
8	Wait 5 to 10 minutes and then connect to the Oracle Private Cloud Appliance Dashboard.	

5.2 Before Initial Power On

Before you power on the Oracle Private Cloud Appliance for the first time, ensure that you have made the necessary external network connections.

- [Section 3.1, “Network Connection and IP Address Requirements”](#)

In addition, you need to connect a workstation with a monitor to the appliance internal management network switch.

- Connect the workstation to port 48 in the Cisco Nexus 9348GC-FXP Switch

Statically configure the workstation IP address to [192.168.4.254](#). Start a web browser session in order to initially administer your Oracle Private Cloud Appliance using the pre-defined IP address ([192.168.4.216](#)). For more information, see [Section 5.3.5, “Connect the Appliance to the Network”](#).

5.3 Power On for the First Time

This section provides instructions for each phase of the initial power-on sequence.

5.3.1 Review Safety Guidelines

Before powering on the system or installing any server equipment into the rack, read the *Important Safety Information for Oracle's Hardware Systems (7063567)* document included with the system.

Before powering on the system, review the following safety precautions. Failure to observe these precautions can result in personal injury, equipment damage, or malfunction.

- Do not block ventilation openings.
- Do not place cables under the equipment or stretch the cables too tightly.
- Do not disconnect power cords from the equipment while its power is on.
- If you cannot reach the connector lock when disconnecting LAN cables, then press the connector lock with a flathead screwdriver to disconnect the cable. You could damage the system board if you force your fingers into the gap rather than using a flathead screwdriver.
- Do not place anything on top of the system or perform any work directly above it.
- Do not let the room temperature rise sharply, especially during winter. Sudden temperature changes can cause condensation to form inside the system. Allow for a sufficient warm-up period prior to system operation.
- Avoid static electricity at the installation location. Static electricity transferred to the system can cause malfunctions. Static electricity is often generated on carpets.

- Confirm that the supply voltage and frequency match the electrical ratings indicated on your Oracle Private Cloud Appliance.
- Do not insert anything into any system opening, unless doing so is part of a documented procedure. The system contains high-voltage parts. If a metal object or other electrically-conductive object enters an opening in the system, then it could cause a short circuit. This could result in personal injury, fire, electric shock, and equipment damage.

5.3.2 Inspect the Appliance

The following procedure describes how to visually inspect your Oracle Private Cloud Appliance after it is physically installed at your site, and prior to power being applied to the system.

1. Check for rack damage.
2. Check the rack for loose or missing screws.
3. Check your Oracle Private Cloud Appliance for the ordered configuration. Refer to the Customer Information Sheet (CIS) on the side of the packaging.



Note

Oracle Private Cloud Appliance is preconfigured by Oracle as a self-contained system. You should not move any equipment or add any unsupported hardware to the system.

4. Check that all cable connections are secure and firmly in place as follows:
 - a. Check the power cables. Ensure that the correct connectors have been supplied for the data center facility power source.
 - b. Check the network data cables.
5. Check the site location tile arrangement for cable access and airflow.
6. Check the data center airflow that leads in to the front of the system.

For more information, see [Section 2.5, “Ventilation and Cooling Requirements”](#).

5.3.3 Connect the Power Cords

The following procedure describes how to connect power cords to your Oracle Private Cloud Appliance.

1. Open the rear cabinet door.
2. Ensure that the correct power connectors have been supplied.
3. Unfasten the power cord cable ties.

The ties are for shipping only and are no longer needed.

4. Route the power cords to the facility receptacles either above the rack or below the flooring. See [Figure 5.1](#) and [Figure 5.2](#).
5. Secure the power cords in bundles. See [Figure 5.1](#).

Figure 5.1 Power Cord Routing From the Bottom of the Rack

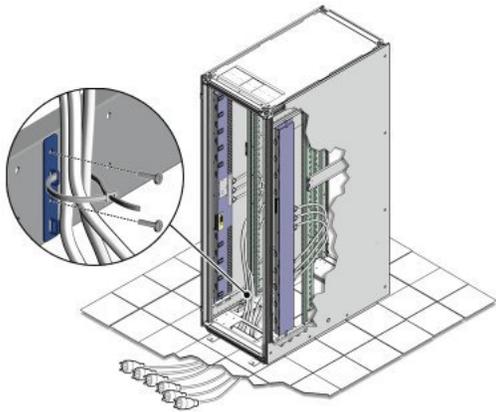
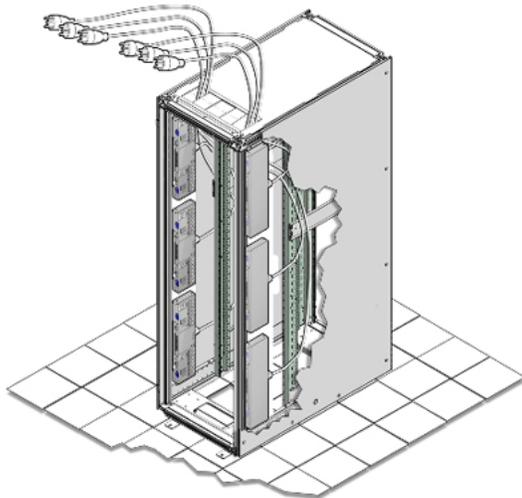


Figure 5.2 Power Cord Routing From the Top of the Rack



6. Plug the power distribution unit (PDU) power cord connectors into the facility receptacles. Ensure the breaker switches are in the OFF position before connecting the power cables.

5.3.4 Power On the Appliance

The following procedure describes how to power on your Oracle Private Cloud Appliance.



Note

You can connect to your Oracle Private Cloud Appliance using a network connection to monitor the system power-on procedure. For instructions, see [Section 5.3.5, “Connect the Appliance to the Network”](#).

1. Ensure that the three main power cords are connected to a reliable power source.

For more information, see [Section 2.3, “Electrical Power Requirements”](#).

2. Switch on the power distribution unit (PDU) circuit breakers located on the rear of PDU A and B inside the Oracle Private Cloud Appliance.

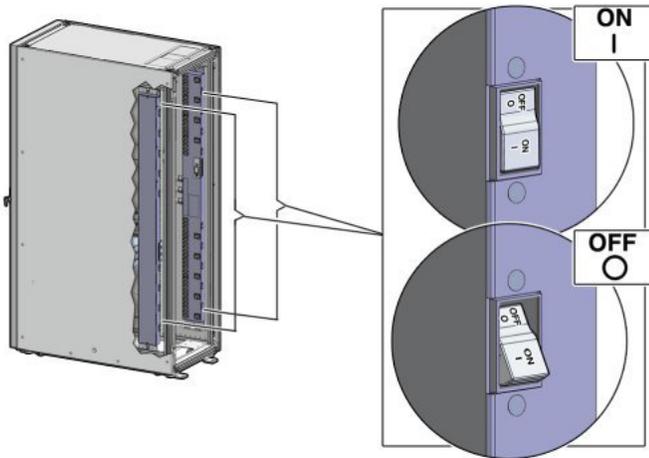
The circuit breakers are on the rear of the system cabinet as shown in [Figure 5.3](#). Press the ON (I) side of the toggle switch.



Note

Ensure that the PDU switches have had power applied for approximately two minutes to complete power-on configuration before starting the management nodes.

Figure 5.3 PDU Switch Locations



3. Make sure that the circuit breakers located on the rear left and right side power supplies of the Oracle ZFS Storage Appliance ZS7-2 are in the ON (I) position.

Figure 5.4 Oracle ZFS Storage Appliance ZS7-2 Circuit Breakers



4. Press the Power button located on the front of the first (bottom) management node. See [Figure 5.5](#).

The first management node is located in rack unit 5 (U5). The second management node is located in rack unit 6 (U6). It is switched on and configured automatically during the initial power-on sequence.

A management nodes take approximately five to ten minutes to power on completely. Once complete, the Power/OK LED illuminates and remains a steady green.

Figure 5.5 Oracle Private Cloud Appliance Management Node

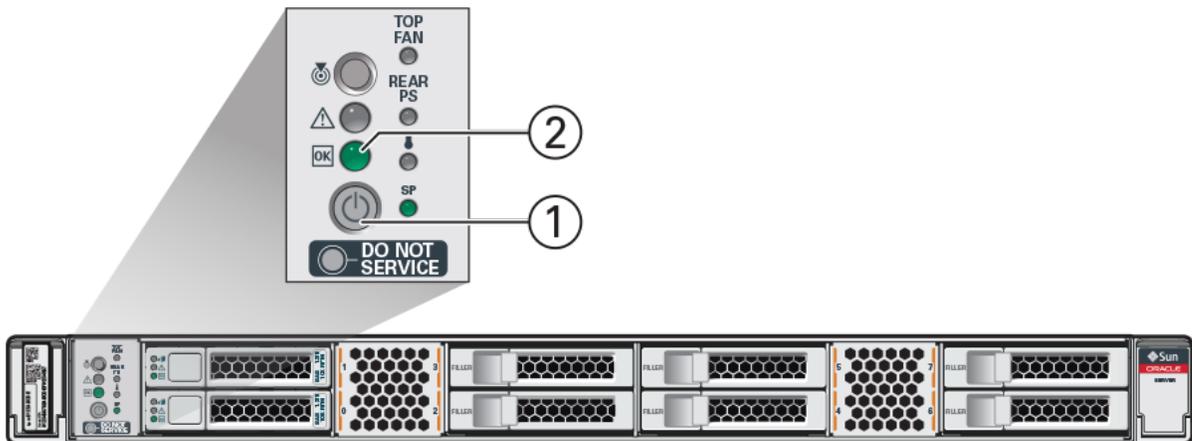


Table 5.2 Figure Legend

Item	Description
1	Power button
2	Power/OK LED

5. After powering on the first management node, wait while the second management node and all compute nodes are powered on and discovered.



Note

After power is applied, the LEDs on all compute nodes and storage server heads will start to blink after approximately two minutes. From the rear of the rack, you can see the green LEDs on the power supply units (PSUs) on the compute nodes turn on instantly after power is applied. In addition, from the rear of the rack, you can see the display on the power distribution units (PDUs) illuminate once power is available.

The management nodes will verify all components within the system. The management nodes ensure that the correct networking switches and storage devices are installed in the system, and search for compute nodes to add to the compute fabric. Once compute nodes are located, the management software automatically installs the proper drivers and the Oracle VM Server version on each compute node.

Depending on your system configuration, the Oracle Private Cloud Appliance power-on process should take approximately five to ten minutes before the system becomes available for initialization, and up to several hours for the entire configuration to be ready. When initialization is completed, use the Oracle Private Cloud Appliance Dashboard web interface to configure initial system settings (for example: network properties and passwords). For instructions on connecting to the Oracle Private

Cloud Appliance and accessing the Dashboard UI, see [Section 5.3.5, “Connect the Appliance to the Network”](#).

5.3.5 Connect the Appliance to the Network

For initial access to Oracle Private Cloud Appliance, you must connect a workstation with a monitor to the reserved Ethernet port in the appliance internal management network switch. The Oracle Private Cloud Appliance Dashboard can be reached by means of a web browser.



Note

You can connect the workstation to the Ethernet port at any time during the system power-on process. However, you should wait approximately two to three minutes after starting the power-on process to allow the IP address to become active. If you connect too soon to the port, you will see an HTTP error code 404 or similar code. If this occurs, wait a few minutes and try to connect again.

You can connect your Oracle Private Cloud Appliance to the network as follows:

1. Ensure that the appliance public interfaces are connected to your data center (public) network.
For details, refer to [Section 3.1.1, “Network Connection Requirements”](#).
2. Connect a workstation with a web browser directly to the management network using an Ethernet cable connected to the appropriate port:
 - port 48 in the Cisco Nexus 9348GC-FXP Switch
3. Configure the wired network connection of the workstation to use the static IP address [192.168.4.254](#).
4. Using the web browser on the workstation, connect to the Oracle Private Cloud Appliance Dashboard on the active management node at <http://192.168.4.216>.
[192.168.4.216](#) is the predefined virtual IP address of the management node cluster for configuring Oracle Private Cloud Appliance. If there is another device on your network that is using this IP address, you should change the conflicting device's IP address prior to connecting to the Oracle Private Cloud Appliance.
5. Log into the Dashboard using the user name `admin` and the default password, which is provided during the installation process. Contact your Oracle representative if you need the default password.



Note

For security reasons, you must set a new password at your earliest convenience.

When you have logged in to the Dashboard successfully, the home page is displayed. The central part of the page contains Quick Launch buttons that provide direct access to the key functional areas. Click to open the Hardware View.

The **Hardware View** indicates the status of the appliance as it is being powered on. All the networking and storage should be green. As the compute nodes are discovered, they will change from yellow to green. Wait until all compute nodes have been discovered and provisioned before making configuration changes in the Dashboard interface.

6. Using the Dashboard, configure the system environment parameters, including: domain name, NTP and DNS servers.



Warning

Before reconfiguring the system network settings, make sure that no provisioning or upgrade processes are running. For details, refer to the section “Do Not Reconfigure Network During Compute Node Provisioning or Upgrade” within [Known Limitations and Workarounds](#) in the *Oracle Private Cloud Appliance Release Notes*.

7. Go to the Network Environment window and enter the configuration details. Insert the reserved management node IP addresses and environment parameters of your data center network.
 - a. In the Management Nodes tab, enter the IP addresses and host names for both management nodes.



Note

During the initial configuration of the Oracle Private Cloud Appliance, you change the predefined configuration IP address to the reserved virtual IP

address in your data center network. For details, see [Section 3.2, “General Network Configuration”](#).

Figure 5.6 Management Nodes Tab

The screenshot displays the Oracle PCA Admin Console interface for the Network Environment. The top navigation bar includes a menu icon, the text 'ORACLE PCA Admin Console', and a button labeled 'Open OVM Manager...'. The main content area is titled 'Network Environment' and contains a sub-tabbed interface with 'Management Nodes', 'Data Center Network', and 'DNS'. The 'Management Nodes' tab is active and shows three sections: 'Management Node 1' with IP Address '10.19.1.101' and Host Name 'manager1'; 'Management Node 2' with IP Address '10.19.1.102' and Host Name 'manager2'; and 'Management Virtual IP Address' with IP Address '10.19.1.100'. At the bottom, there is a field for '* PCA Admin Password(Required for changes)' and two buttons: 'Reset' and 'Apply Changes'.

- b. In the Data Center Network tab, enter the domain name, netmask, default gateway and NTP server of the network to which the appliance must be connected. If this network is a VLAN, set the slider to *active* and enter the VLAN ID in the field next to it.

Figure 5.7 Data Center Network Tab

The screenshot shows the Oracle PCA Admin Console interface. At the top, there is a blue header with the Oracle logo and 'PCA Admin Console' text. A 'MENU' icon is on the left, and an 'Open OVM Manager...' button with a user icon is on the right. Below the header, the main content area is titled 'Network Environment'. A note states: 'Changes to the Network Environment configuration data requires entering the PCA Admin Password before selecting the 'Apply Changes' button.' There are three tabs: 'Management Nodes', 'Data Center Network' (which is selected), and 'DNS'. The 'Data Center Network' tab contains the following configuration options:

- Management Network VLAN:** A toggle switch is turned on, and a dropdown menu shows the value '20'.
- * Domain Name:** A text input field containing 'example.com'.
- * Netmask:** A text input field containing '255.255.0.0'.
- * Default Gateway:** A text input field containing '10.19.1.1'.
- * NTP:** A text input field containing '10.19.1.1'.

At the bottom of the form, there is a field for the 'PCA Admin Password (Required for changes)', a 'Reset' button, and an 'Apply Changes' button.

- c. In the DNS tab, enter at least one and up to three name servers for the network to which the appliance must be connected.

Figure 5.8 DNS Tab

The screenshot shows the Oracle PCA Admin Console interface for the DNS configuration tab. The header includes the Oracle logo and 'PCA Admin Console'. A navigation bar at the top has 'MENU', 'ORACLE PCA Admin Console', and 'Open OVM Manager...'. The main content area is titled 'Network Environment' and contains a sub-header 'Changes to the Network Environment configuration data requires entering the PCA Admin Password before selecting the 'Apply Changes' button.' Below this are three tabs: 'Management Nodes', 'Data Center Network', and 'DNS'. The 'DNS' tab is active and shows three input fields for DNS Server 1, 2, and 3. The first two fields contain the IP addresses 217.6.34.47 and 144.20.190.70, respectively. The third field is empty. At the bottom, there is a password field labeled '* PCA Admin Password(Required for changes)', a 'Reset' button, and an 'Apply Changes' button.

- d. Enter the Administrator password and click Apply Changes to confirm and apply the configuration parameters you provided.
8. Reconnect to the Oracle Private Cloud Appliance Dashboard at the new virtual IP address of the management node cluster: https://<virtual_ip>:7002/dashboard.

For details about the software configuration process, and for advanced configuration and update options, refer to the *Oracle Private Cloud Appliance Administrator's Guide*.

5.4 What's Next?

After powering on your Oracle Private Cloud Appliance and performing the initial system configuration, the environment is ready for virtual machine deployment. Refer to the *Oracle Private Cloud Appliance Administrator's Guide* for information about working with an operational environment:

- See [Monitoring and Managing Oracle Private Cloud Appliance](#) for instructions to work with the Oracle Private Cloud Appliance Dashboard.
- See [Managing the Oracle VM Virtual Infrastructure](#) for instructions to work with virtual machines within Oracle VM.
- See [Updating Oracle Private Cloud Appliance](#) for instructions to update the Oracle Private Cloud Appliance controller software.
- See [Servicing Oracle Private Cloud Appliance Components](#) for instructions to service customer-replaceable components in the Oracle Private Cloud Appliance.



Note

Optionally, you can extend Oracle Private Cloud Appliance by adding more compute nodes to the system, by installing extra memory in the compute nodes, or by connecting the appliance to additional external storage. For more information and instructions, refer to the following chapters:

- [Chapter 6, *Extending Oracle Private Cloud Appliance - Additional Compute Nodes*](#)
- [Chapter 7, *Extending Oracle Private Cloud Appliance - Server Memory Kits*](#)
- [Chapter 8, *Extending Oracle Private Cloud Appliance - Additional Storage*](#)

Chapter 6 Extending Oracle Private Cloud Appliance - Additional Compute Nodes

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Extension of Oracle Private Cloud Appliance involves increasing the number of compute nodes within a rack to maximize the number of virtual machines that are capable of running on the appliance and to increase the processing power and memory available to existing virtual machines. The process of extending the Oracle Private Cloud Appliance in this way requires that you install additional servers into the rack. This operation does not require that the system is powered down, but physical changes are made to the system. Therefore you should review the task map provided in [Section 6.1, “Extending Compute Capacity Task Map”](#) before continuing. Each step to perform the operation is described in detail in this chapter.

This chapter explains how to extend your Oracle Private Cloud Appliance by adding compute nodes to the system. After hardware installation, when compute node provisioning has completed, the servers are automatically added to the default tenant group *Rack1_ServerPool*. Depending on the tenant group configuration in the environment, you should add each newly provisioned server to the appropriate tenant group.



Note

This section applies to systems with factory-installed Software Controller release 2.4.4, that already include Oracle Server X9-2 compute nodes. These Oracle Private Cloud Appliance racks are cabled specifically to support Oracle Server X9-2 compute nodes. If you are expanding this type of rack, refer to [Appendix C, Compute Node Rack Location Reference](#) for guidelines and appropriate rack locations for expansion Oracle Server X9-2 compute nodes.

If you have upgraded an Oracle Private Cloud Appliance 2.4.3, or earlier rack to Software Controller release 2.4.4, and intend to install an Oracle Server X9-2 into this rack, consult your Oracle representative to ensure proper planning for power and data cabling to allow for proper Field Service upgrade installation.

6.1 Extending Compute Capacity Task Map

Table 6.1 describes the steps for extending the Oracle Private Cloud Appliance at your site by installing additional compute nodes within the rack.

Table 6.1 Steps for Extending Oracle Private Cloud Appliance By Adding Compute Nodes

Step	Description	Links
1	Review safety guidelines and site checklists.	Section 6.2, "Review Safety Guidelines"
2	Review safety precautions for rack-mounting a server.	Section 6.3, "Rack-mount Safety Precautions"
3	Prepare to add the server to the rack, including: <ul style="list-style-type: none"> • Unpacking the upgrade kit • Removing the rear doors from the rack 	Section 6.4, "Prepare to Add a Server"
4	Install the server into the rack, including: <ul style="list-style-type: none"> • Installing mounting brackets to the server • Attaching slide-rail assemblies to the rack • Installing the server into the slide-rail assemblies • Installing the cable management arm • Cabling the server • Replacing the doors on the rack 	Section 6.5, "Install the Server Into the Rack"

6.2 Review Safety Guidelines

Before expanding Oracle Private Cloud Appliance, read the following important safety information:

- *Important Safety Information for Oracle's Hardware Systems (7063567)*
- [Section 2.3, "Electrical Power Requirements"](#)
- [Section E.5, "Facility Power Checklist"](#)

6.3 Rack-mount Safety Precautions

This section describes rack-mount safety precautions you must follow when installing a compute node into your Oracle Private Cloud Appliance.



Caution

Leveling feet position: When unpacking at the installation site, or when repackaging and moving the rack to a new location, verify that the leveling feet are up before moving the rack.



Caution

Stabilize rack: Deploy the anti-tilt bar on the equipment rack before starting an installation.



Caution

Shipping brackets: The rack shipping brackets are not for use for bracing or anchoring the rack during seismic events.



Caution

Equipment loading: Always load equipment into a rack from the bottom up so that the rack does not become top-heavy and tip over. Deploy your rack anti-tilt bar to prevent the rack from tipping during equipment installation.



Caution

Lifting equipment: Oracle Server X9-2 weighs approximately 45 lbs (20.41 kg). Two people are needed to mount the server into the rack enclosure.



Caution

Communicate instructions: When performing a two-person procedure, communicate your intentions clearly to the other person before, during, and after each step to minimize confusion.



Caution

Elevated operating ambient temperature: If you install the server in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment might be higher than the room ambient temperature. Install the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified for the server. For information, refer to [Section 2.5, "Ventilation and Cooling Requirements"](#).



Caution

Reduced airflow: Install the equipment in a rack so that it does not compromise the amount of airflow required for safe operation of the equipment.



Caution

Mechanical loading: Mount the equipment in the rack so that it does not cause a hazardous condition due to uneven mechanical loading.



Caution

Circuit overloading: Consider the connection of the equipment to the supply circuit and the effect that overloading the circuits might have on over-current protection and supply wiring. Also consider the equipment nameplate power ratings used when you address this concern.



Caution

Reliable earthing: Maintain reliable earthing of rackmounted equipment. Pay attention to supply connections other than direct connections to the branch circuit (for example, use of power strips).



Caution

Mounted equipment: Do not use slide-rail-mounted equipment as a shelf or a workspace.

6.4 Prepare to Add a Server

This section describes the preparation steps to perform before installing an additional compute node as part of your Oracle Private Cloud Appliance.



Caution

When adding expansion nodes, always populate the compute rack units starting from the bottom most open slot, and work your way up. If you do not populate the rack units in the right order, the controller software may no longer report the correct status of the rack components.

Based on the increased power requirements of the Oracle Server X9-2, you must follow additional configuration guidelines when adding servers to a supported Oracle Private Cloud Appliance rack. See [Appendix C, Compute Node Rack Location Reference](#).

6.4.1 ESD Precautions

Electronic equipment is susceptible to damage by static electricity. To prevent electrostatic discharge (ESD) when you install or service the server:

- Use a grounded antistatic wrist strap, foot strap, or equivalent safety equipment.
- Place components on an antistatic surface, such as an antistatic discharge mat or an antistatic bag.
- Wear an antistatic grounding wrist strap connected to a metal surface on the chassis when you work on system components.



Caution

Equipment damage: Electrostatic damage can permanently disable the system or require repair by authorized service technicians.

Before installing the server, read the safety information in the [Oracle Server Safety and Compliance Guide](#), as well as the [Important Safety Information for Oracle's Hardware Systems](#).

6.4.2 Unpack the Server Upgrade Kit

Perform the following procedure to unpack the server upgrade kit.

1. Inspect the shipping cartons for evidence of physical damage. If a shipping carton appears damaged, request that the carrier agent be present when the carton is opened. Keep all contents and packing material for the agent inspection.
2. Remove the packaging from the Oracle Private Cloud Appliance Expansion Node upgrade kit.
3. Verify that all items are included. The upgrade kit should contain the following:
 - Oracle Server
 - Cable management arm assembly with installation instructions
 - Rackmount kit including rack rails, mounting brackets, screws and Rackmounting Template
 - Getting Started Guide

- Legal and safety documents



Note

Cables are not included in the server upgrade kit. Oracle Private Cloud Appliance comes with pre-installed and labeled cables for all rack units. These should not be unplugged or removed from the rack.

6.4.3 Prepare the Appliance Rack

Perform the following procedure to prepare the rack.



Caution

To reduce the risk of personal injury, stabilize the rack cabinet and extend all anti-tilt devices before performing this procedure.

1. Remove the Oracle Private Cloud Appliance front and rear rack doors, as follows:
 - a. Unlock and open the front and rear rack doors.
 - b. Detach the top and bottom grounding straps by separating the banana jacks (1).
 - c. Unlatch the bottom hinge, then the top hinge.
 - Pinch the two studs on the hinge towards the center of the hinge (2).
 - Rotate the studs away from the door (3) so that they stay in place and the hinge remains unlatched.
 - d. Lift the door away from the cabinet (4).
 - e. Repeat these steps for the two rear doors.

These steps are illustrated in [Figure 6.1](#).



Caution

The doors are heavy. Have one person hold the door in place while the other operates the hinge latching mechanism. Execute the steps carefully and in the correct order, to avoid damage to the hinges.

Figure 6.1 Removing the Rack Doors

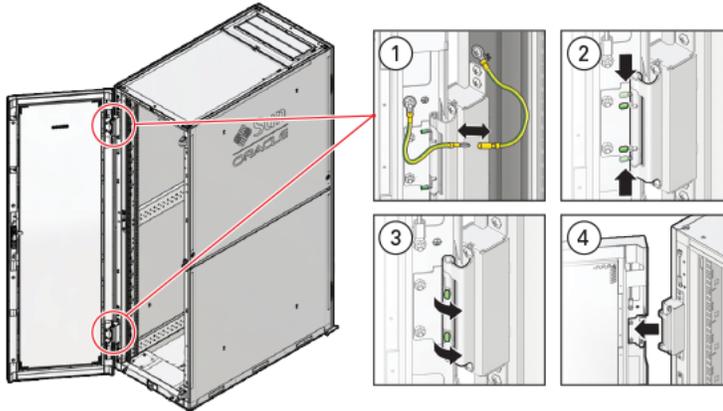


Table 6.2 Figure Legend

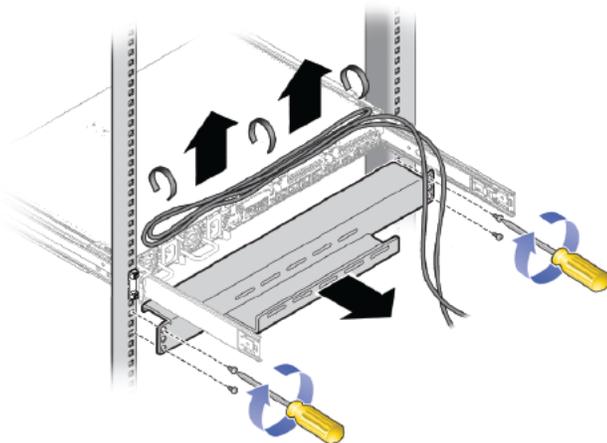
Item	Description
1	Detaching the grounding cables.
2	Pinching the hinge studs.
3	Rotating the studs away from the door.
4	Lifting the door away from the cabinet.

2. Remove the filler panel(s) where the upgrade server will be installed.

The filler panels have snap-in attachments. No screwdriver is required to remove them.

3. Remove the cable tray that holds the pre-installed cables in place at the rear side of the rack. See [Figure 6.2](#)
 - a. Detach the pre-installed cables from the cable tray on the rack unit for the new expansion node.
 - b. Use a No. 2 Phillips screwdriver to remove the M6 screws from the cable tray.
 - c. Remove the cable tray from the rack. Save cable tray and screws for future use.

Figure 6.2 Removing the Cable Tray



6.5 Install the Server Into the Rack

This section describes the steps to install an additional compute node as part of your Oracle Private Cloud Appliance.

6.5.1 Install Mounting Brackets

Perform the following procedure to install mounting brackets onto the sides of the server.

1. Position a mounting bracket against the chassis so that the slide-rail lock is at the server front, and the five keyhole openings on the mounting bracket are aligned with the five locating pins on the side of the chassis. See [Figure 6.3](#).

Figure 6.3 Aligning the Mounting Bracket With the Server Chassis

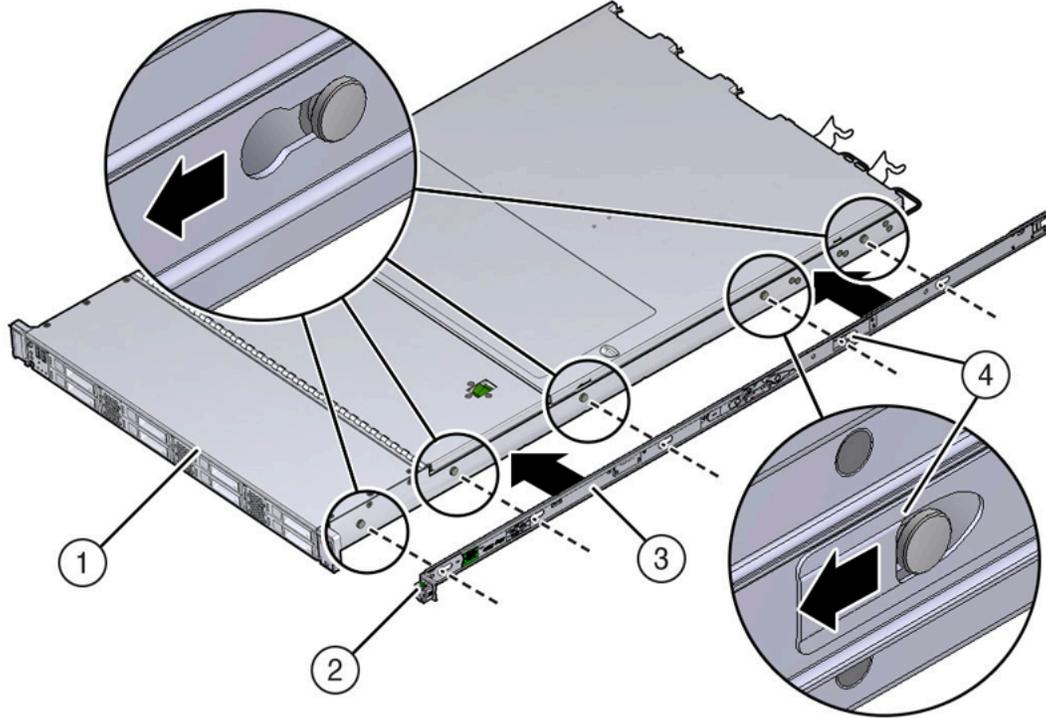


Table 6.3 Figure Legend

Item	Description
1	Chassis front
2	Slide-rail lock
3	Mounting bracket
4	Mounting bracket clip

2. With the heads of the five chassis locating pins protruding through the five keyhole openings in the mounting bracket, pull the mounting bracket toward the front of the chassis until the mounting bracket clip locks into place with an audible click.
3. Verify that the rear locating pin has engaged the mounting bracket clip.
4. Repeat these steps to install the remaining mounting bracket on the other side of the server.

6.5.2 Attach Slide-Rail Assemblies

Perform the following procedure to attach slide-rail assemblies to the rack.

1. Orient the slide-rail assembly so that the ball-bearing track is forward and locked in place.

Figure 6.4 Orienting the Slide-Rail With the Ball-Bearing Track

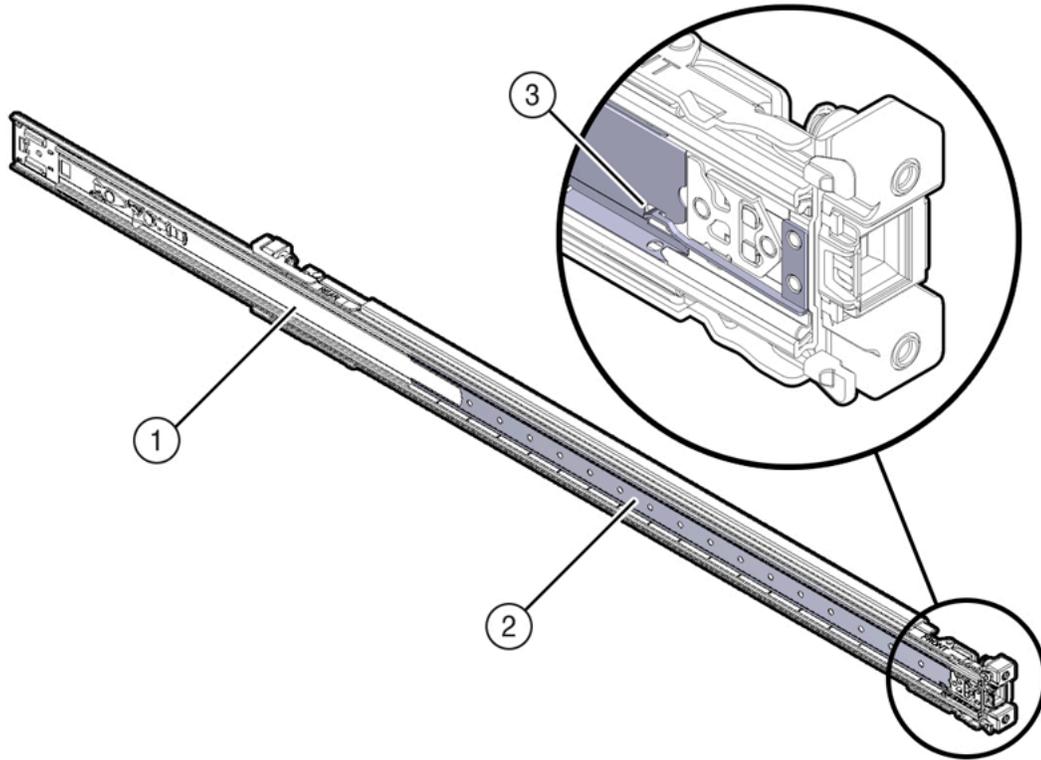
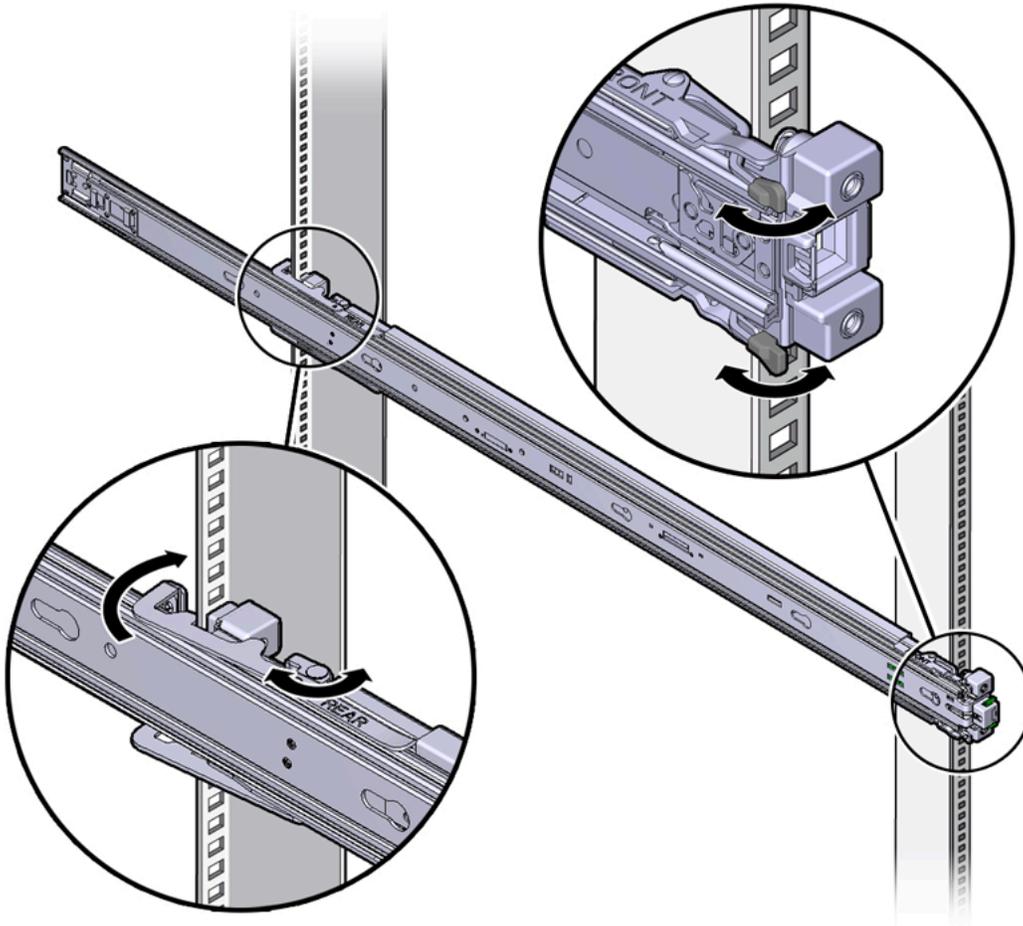


Table 6.4 Figure Legend

Item	Description
1	Slide-rail
2	Ball-bearing track
3	Locking mechanism

2. Starting with either the left or right side of the rack, align the rear of the slide-rail assembly against the inside of the rear rack rail, and push until the assembly locks into place with an audible click. See [Figure 6.5](#).

Figure 6.5 Aligning the Slide-Rail Assembly With the Rack



3. Align the front of the slide-rail assembly against the outside of the front rack rail, and push until the assembly locks into place with an audible click. See [Figure 6.5](#).
4. Repeat these steps to attach the slide-rail assembly to the other side of the rack.

6.5.3 Install the Server Into the Slide-Rail Assemblies

Perform the following procedure to install the server, with mounting brackets, into the slide-rail assemblies that are mounted to the rack.



Caution

This procedure requires a minimum of two people because of the weight of the server. Attempting this procedure alone could result in equipment damage or personal injury.



Caution

Always load equipment into a rack from the bottom up so that the rack will not become top-heavy and tip over. Extend your rack's anti-tilt bar to prevent the rack from tipping during equipment installation.

1. Push the slide-rails as far as possible into the slide-rail assemblies in the rack.
2. Position the server so that the rear ends of the mounting brackets are aligned with the slide-rail assemblies that are mounted in the rack. See [Figure 6.6](#).
3. Insert the mounting brackets into the slide-rails, and then push the server into the rack until the mounting brackets encounter the slide-rail stops (approximately 30 cm, or 12 inches).

Figure 6.6 Inserting the Server With Mounting Brackets Into the Slide-Rails

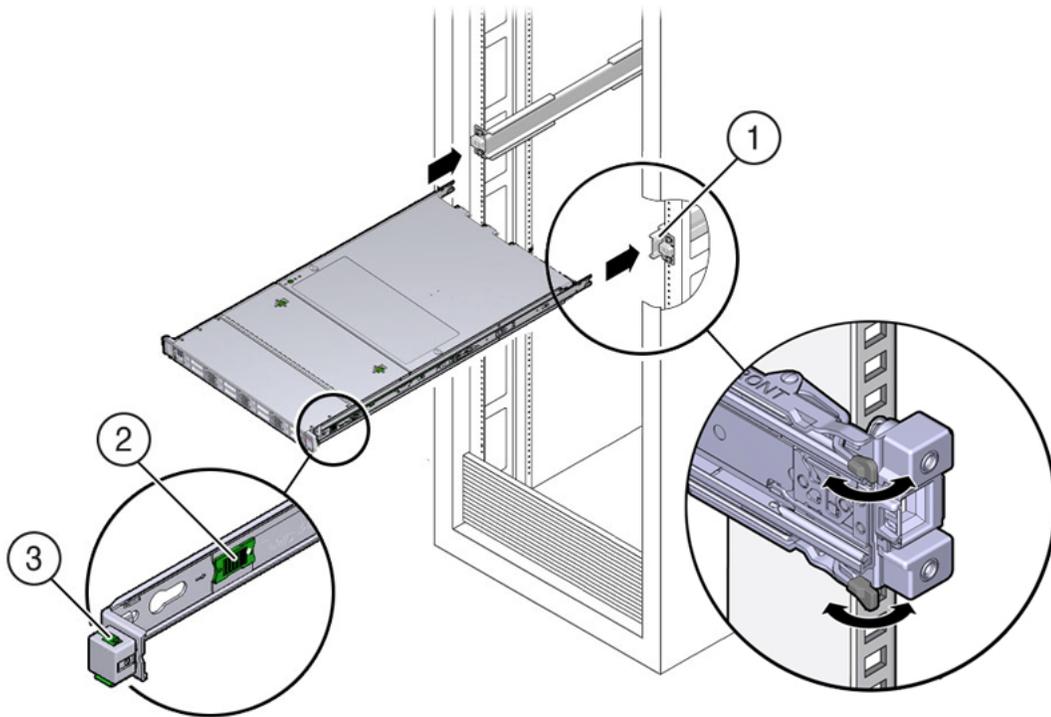


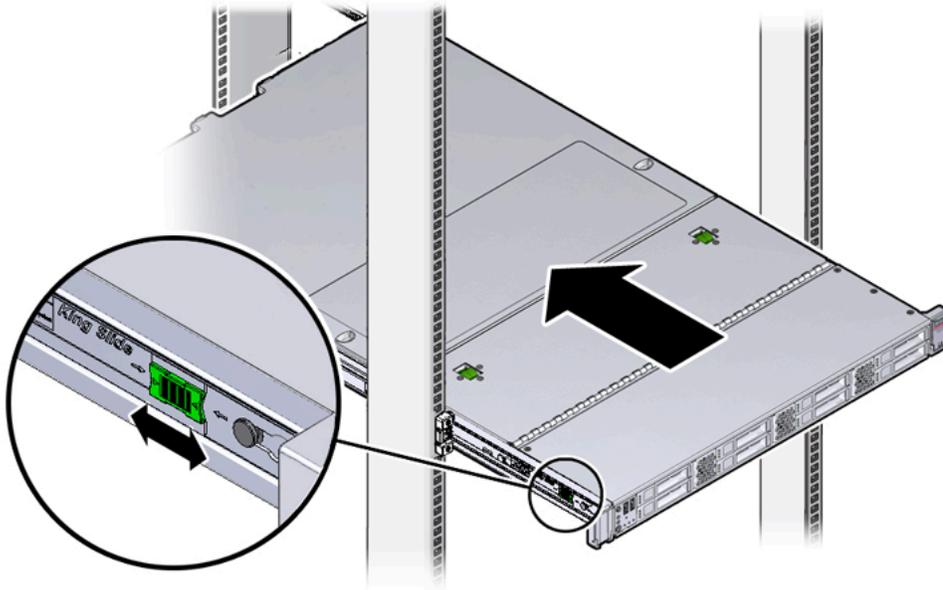
Table 6.5 Figure Legend

Item	Description
1	Inserting mounting bracket into slide-rail
2	Slide-rail release button
3	Slide-rail lock

4. Simultaneously push and hold the green slide-rail release buttons on each mounting bracket while you push the server into the rack. Continue pushing the server into the rack until the slide-rail locks (on the front of the mounting brackets) engage the slide-rail assemblies. See [Figure 6.7](#).

You will hear an audible click.

Figure 6.7 Sliding the Server Into the Rack



6.5.4 Install the Cable Management Arm

Perform the following procedure to install the cable management arm (CMA) to rear of the server.

1. Unpack the CMA.
2. To make it easier to install the CMA, extend the server approximately 13 cm (5 inches) out of the front of the rack.
3. Take the CMA to the back of the equipment rack, and ensure that you have adequate room to work at the back of the server.



Note

References to “left” or “right” in this procedure assume that you are facing the back of the equipment rack.



Note

Throughout this installation procedure, support the CMA and do not allow it to hang under its own weight until it is secured at all four attachment points.

4. Insert the CMA's connector A into the front slot on the left slide-rail until it locks into place with an audible click. See [Figure 6.8](#), frames 1 and 2.

The connector A tab (see call-out 1) goes into the slide-rail's front slot (call-out 2).

Gently tug on the left side of the front slide bar to verify that connector A is properly seated.

Figure 6.8 Installing Connector A Into the Left Slide-Rail

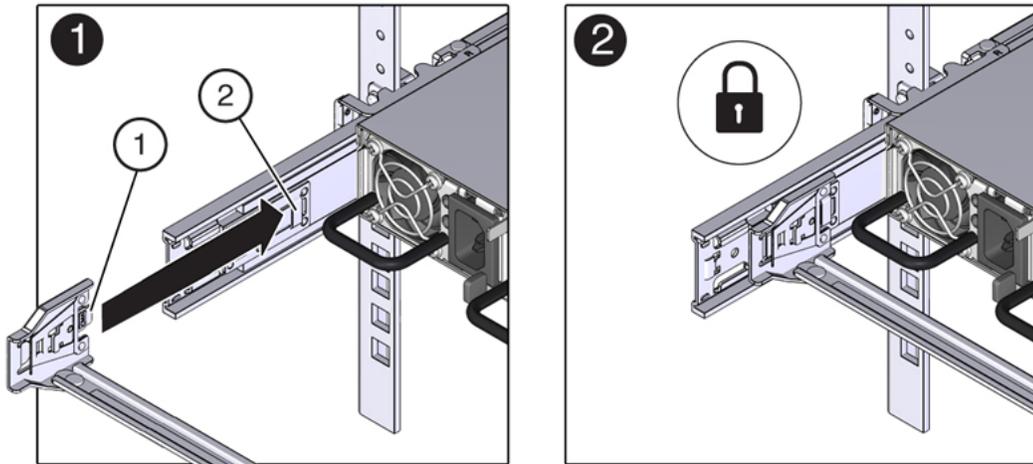


Table 6.6 Figure Legend

Item	Description
1	Connector A tab
2	Left slide-rail front slot

5. Insert the CMA's connector B into the front slot on the right slide-rail until it locks into place with an audible click. See [Figure 6.9](#), frames 1 and 2.

The connector B tab (call-out 1) goes into the slide-rail front slot (call-out 2).

Gently tug on the right side of the front slide bar to verify that connector B is properly seated.

Figure 6.9 Installing Connector B Into the Right Slide-Rail

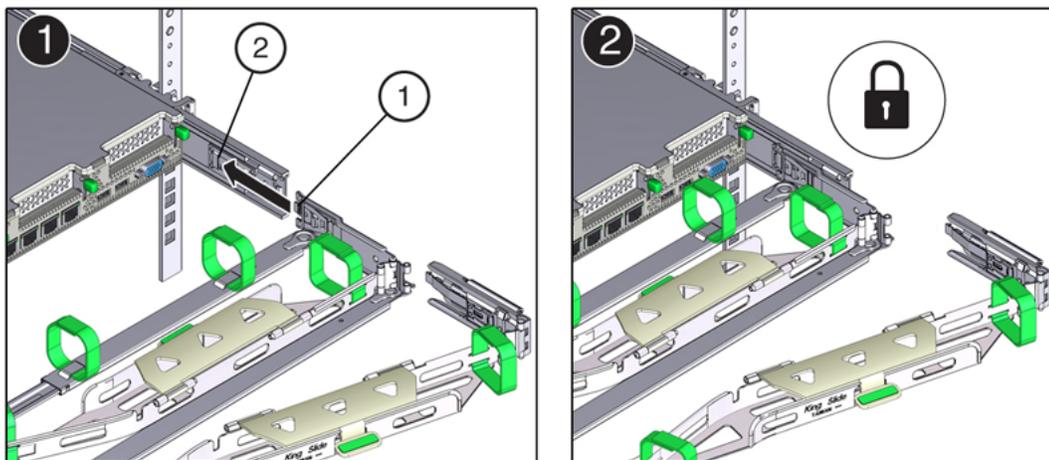


Table 6.7 Figure Legend

Item	Description
1	Connector B tab

Item	Description
2	Right slide-rail front slot

6. To install the CMA's connector C into the right slide-rail, perform the following steps:
 - a. Align connector C with the slide-rail so that the locking spring (call-out 1) is positioned inside (server side) of the right slide-rail. See [Figure 6.10](#), frame 1.

Figure 6.10 Installing Connector C Into the Right Slide-Rail

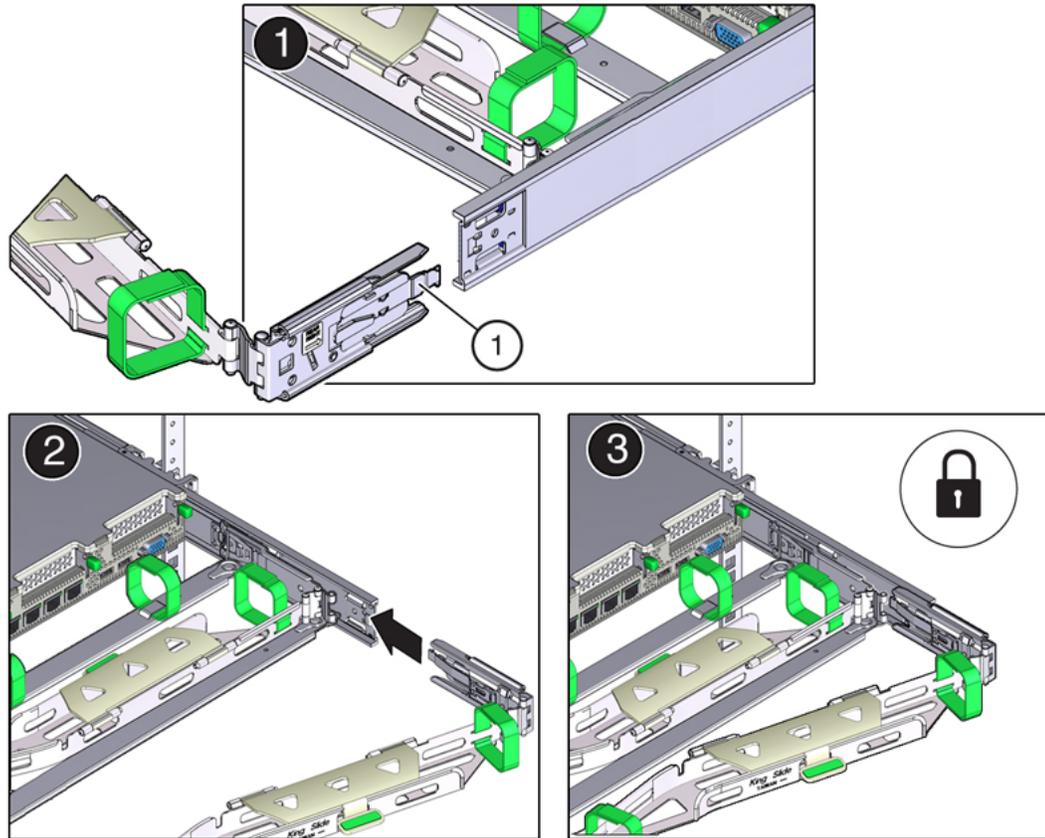


Table 6.8 Figure Legend

Item	Description
1	Connector C locking spring

- b. Insert connector C into the right side-rail until it locks into place with an audible click (frames 2 and 3).
- c. Gently tug on the right side of the CMA's rear slide bar to verify that connector C is properly seated.

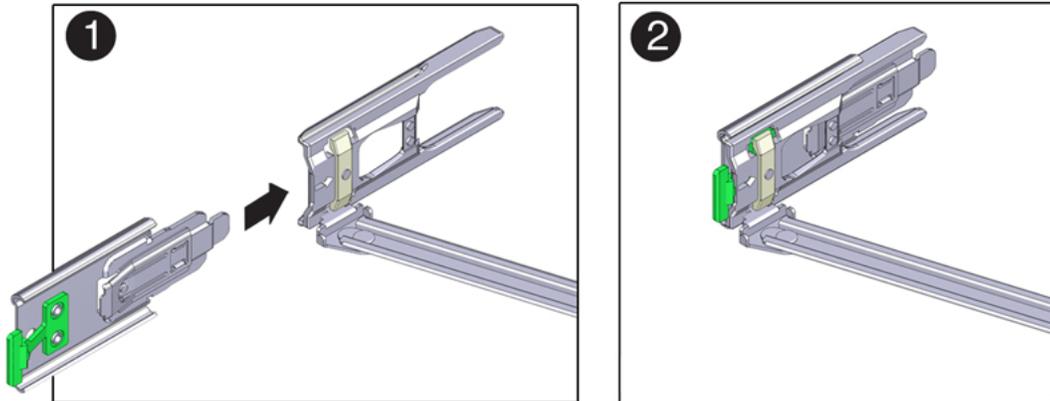
7. To prepare the CMA's connector D for installation, remove the tape that secures the slide-rail latching bracket to connector D and ensure that the latching bracket is properly aligned with connector D. See [Figure 6.11](#), frames 1 and 2.



Note

The CMA is shipped with the slide-rail latching bracket taped to connector D. You must remove the tape before you install this connector.

Figure 6.11 Aligning the CMA Slide-Rail Latching Bracket With Connector D



8. While holding the slide-rail latching bracket in place, insert connector D and its associated slide-rail latching bracket into the left slide-rail until connector D locks into place with an audible click. See [Figure 6.12](#), frames 1 and 2.

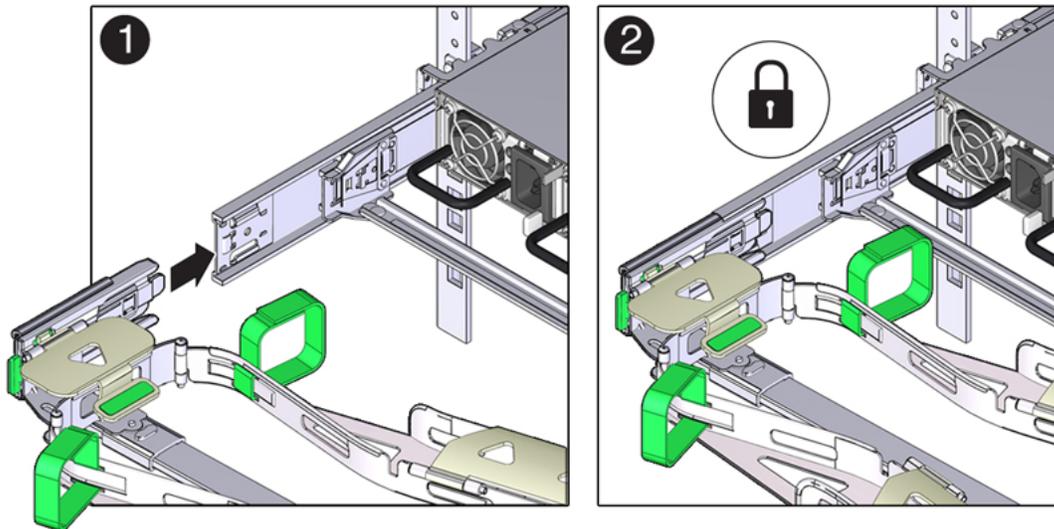


Note

When inserting connector D into the slide-rail, the preferred and easier method is to install connector D and the latching bracket as one assembly into the slide-rail.

Gently tug on the left side of the CMA's rear slide bar to verify that connector D is properly seated.

Figure 6.12 Installing Connector D Into the Left Slide-Rail



Note

The slide-rail latching bracket has a green release tab. This tab is used to release and remove the latching bracket so that you can remove connector D.

9. Gently tug on the four CMA connection points to ensure that the CMA connectors are fully seated before you allow the CMA to hang by its own weight.

10. To verify that the slide-rails and the CMA are operating properly before routing cables through the CMA, perform the following steps:

- a. Extend the server from the front of the rack until the CMA is fully extended.



Caution

To reduce the risk of personal injury, stabilize the rack cabinet and extend all anti-tilt devices before extending the server from the rack.

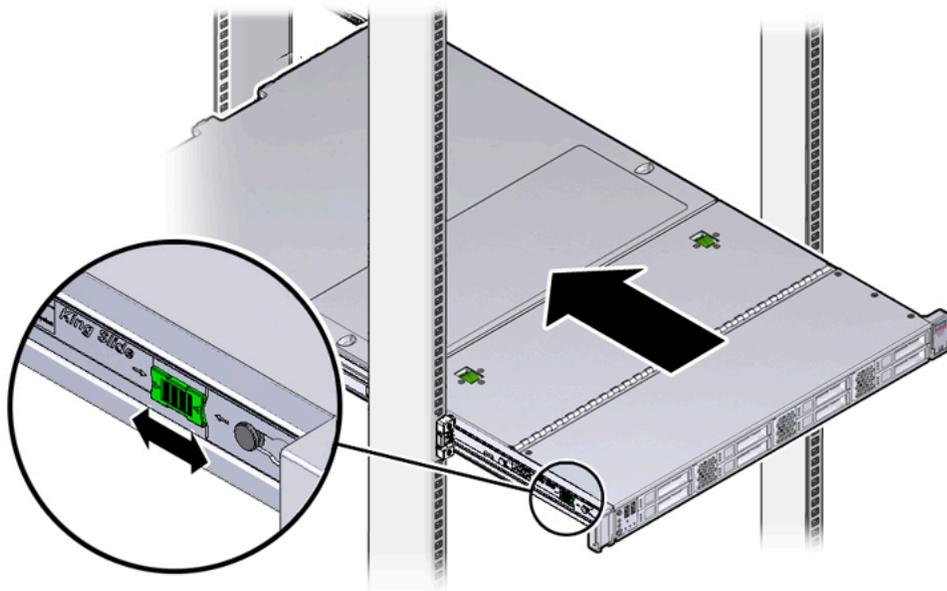
- b. Simultaneously pull and hold the two green release tabs (one on each side of the server) toward the front of the server (see the following figure) while you push the server into the rack. As you push the server into the rack, verify that the CMA retracts without binding. See [Figure 6.13](#).



Note

To pull the green release tabs, place your finger in the center of each tab, not on the end, and apply pressure as you pull the tab toward the front of the server.

Figure 6.13 Location of the Slide-Rail Release Tabs



- c. Continue pushing the server into the rack until the slide-rail locks (on the front of the server) engage the slide-rail assemblies.

You will hear an audible click when the server is in the normal rack position.

11. Connect the cables to the server, as required.

Instructions for connecting server cables are provided in [Section 6.5.5, "Cable the Server"](#).

6.5.5 Cable the Server

After the server is installed in the rack and proper cable management arm (CMA) operation is verified, perform the procedures in this section to cable the server.



Note

If you are installing more than one server into the rack, perform the procedures in the previous sections for each server before performing the cabling steps in this section.

You should observe the following guidelines when attaching cables to a newly rack-mounted server:

- Do not remove existing cable connections in the rack.
- Attach and route cables in the CMA and rear panel one server at a time. Do not slide out more than one server at a time.
- Start from the bottom of the rack, and work upward. Route cables through the CMA with the dongle on the top and power cables on the bottom.



Note

The Oracle Private Cloud Appliance rack is entirely pre-cabled for all components, including future compute nodes. Cable bundles are cable-tied to the correct rack unit for each future server. You should not modify any of the cabling on the already installed components. For detailed cabling information, see [Appendix B, Cabling Reference](#).

1. Connect the pre-installed power and data cables of the appropriate rack unit to the back of the expansion node. The cables are labeled for your convenience, and should be connected according to the diagram below.

Figure 6.14 Oracle Server X8-2 Server Cabling Requirements

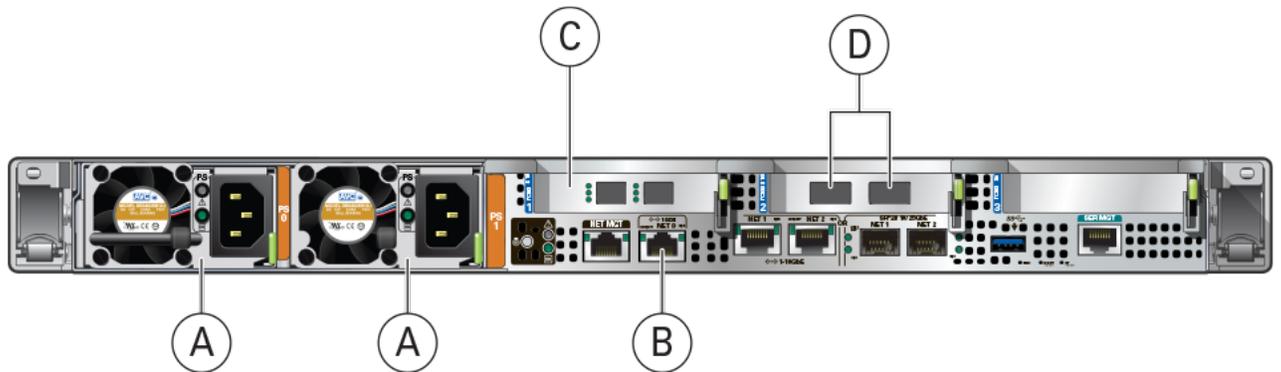


Table 6.9 Figure Legend

Item	Description
A	Power supplies
B	NET0 Ethernet port
C	Optional Fibre Channel HBA



Caution

Physical Fibre Channel expansion cards are available as an option for Oracle Server X8-2 or newer compute nodes. The appliance rack does not contain pre-installed Fibre Channel cables.

Item	Description
D	Internal appliance data network connectors

Figure 6.15 Oracle Server X9-2 Server Cabling Requirements

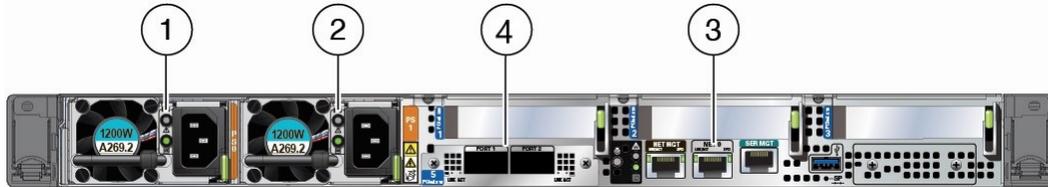


Table 6.10 Figure Legend

Item	Description
1, 2	Power supplies
3	NET0 Ethernet port
4	Open Compute Project NIC with two x 100 Gbit QSFP ports (PORT 1 and PORT 2)

2. Open the CMA cable covers, route server cables through the CMA's cable troughs, close the cable covers, and secure the cables with the six Velcro straps. See [Figure 6.16](#).
 - a. First through the front-most cable trough.
 - b. Then through the small cable trough.
 - c. Then through the rear-most cable trough.

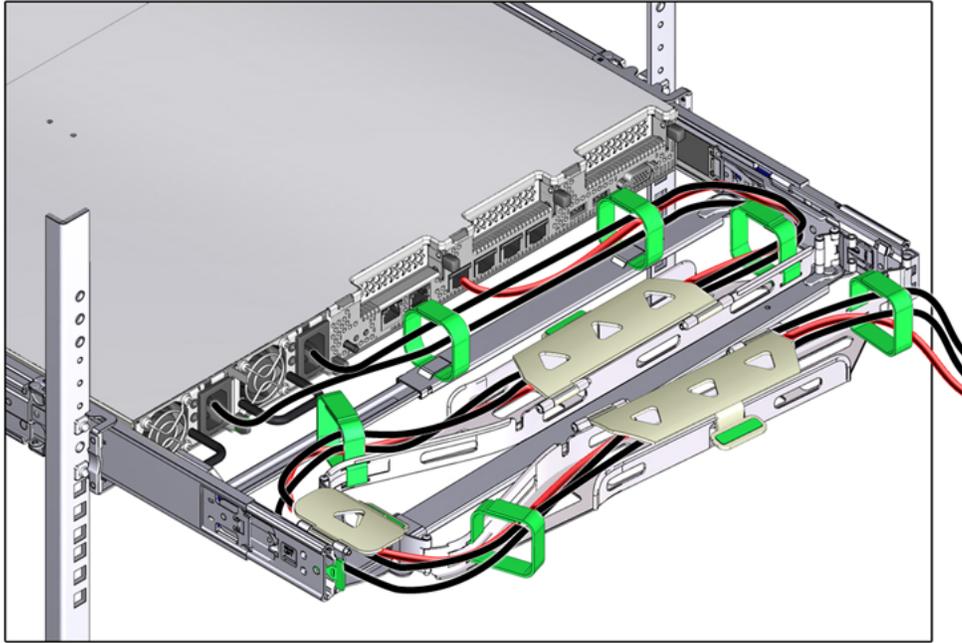


Note

When securing the cables with the Velcro straps located on the front slide bar, ensure that the Velcro straps do not wrap around the bottom of the slide

bar; otherwise, expansion and contraction of the slide bar might be hindered when the server is extended from the rack and returned to the rack.

Figure 6.16 CMA With Cables Installed



3. Ensure that the secured cables do not extend above the top or below the bottom of the server to which they are attached; otherwise, the cables might snag on other equipment installed in the rack when the server is extended from the rack or returned to the rack.



Note

If necessary, bundle the cables with additional Velcro straps to ensure that they stay clear of other equipment. If you need to install additional Velcro straps, wrap the straps around the cables only, not around any of the CMA components; otherwise, expansion and contraction of the CMA slide bars might be hindered when the server is extended from the rack and returned to the rack.

4. Verify the operation of the CMA with all cables installed.



Note

Oracle recommends that two people execute this step. One person to move the server in and out of the rack, and another person to observe the cable and CMA operation.

- a. Slowly pull the server out of the rack until the slide rails reach their stop.
 - b. Inspect the attached cables for any binding or kinks.
 - c. Verify that the CMA extends fully from the slide rails.
5. Push the server back into the rack.
 - a. Simultaneously pull and hold the two green release tabs (one on each side of the server) toward the front of the server while you push the server into the rack. See [Figure 6.13](#).



Note

To pull the green release tabs, place your finger in the center of each tab, not on the end, and apply pressure as you pull the tab toward the front of the server.

- b. Verify that the CMA retracts without binding.
- 6. Repeat the previous steps for each additional server that you add to the rack.

The Oracle Private Cloud Appliance controller software detects that one or more new compute nodes are present in the rack. It automatically powers on the new hardware and executes the provisioning procedure. The expansion compute nodes are incorporated seamlessly into the active system. This requires no further interventions by an administrator.

6.5.6 Replace the Rack Doors

Perform the following procedure to replace the rack front and rear doors:

1. Lift the door into place, and align the pins on the door with the sleeve on the cabinet (1).
2. On the top hinge, rotate the two studs on the hinge away from the center of the hinge (2). The pins snap into place (3). Do the same with the bottom hinge.
3. Repeat these steps to reinstall the other rack doors.
4. Reconnect all grounding straps on all doors (4).
5. Close the doors. Optionally, lock the doors.

These steps are illustrated in [Figure 6.1](#).



Caution

The doors are heavy. Have one person hold the door in place while the other operates the hinge latching mechanism. Execute the steps carefully and in the correct order, to avoid damage to the hinges.

Figure 6.17 Installing the Rack Doors

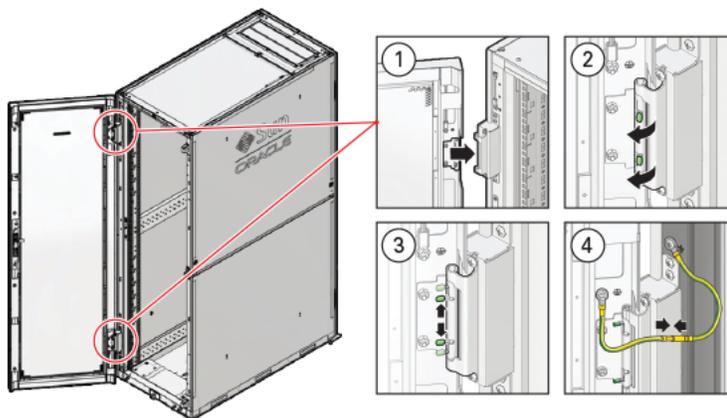


Table 6.11 Figure Legend

Item	Description
1	Lifting the door into place.
2	Rotating the hinge studs away from the center.
3	Pins on the latching mechanism snap into place.
4	Attaching the grounding cables.

Chapter 7 Extending Oracle Private Cloud Appliance - Server Memory Kits

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Extending the Oracle Private Cloud Appliance by installing additional physical RAM can enhance the product by providing more resources for virtual machines performing memory-intensive tasks beyond the capacity already available in the default compute node configuration. This process requires the server to be powered down, but virtual machines can be migrated to other compute nodes temporarily to avoid unnecessary downtime.

There are different memory kits available for the different generations of server hardware that may be installed in an Oracle Private Cloud Appliance environment. Be sure to select the RAM that matches your server model.

7.1 Extending Server Memory Task Map

[Table 7.1](#) describes the steps for extending the Oracle Private Cloud Appliance at your site by installing additional RAM to upgrade the compute nodes.

Table 7.1 Steps for Extending Oracle Private Cloud Appliance By Installing Additional Memory

Step	Description	Links
1	Review safety guidelines and site checklists.	Section 6.2, "Review Safety Guidelines"
2	Identify the servers to upgrade. Depending on the base memory configuration and the desired amount of RAM, select the memory kit to install.	Section 7.2, "Selecting a Server Memory Kit"
3	Install the memory upgrade kit. This involves migrating running virtual machines to avoid service interruptions, and powering down the compute node.	Section 7.3, "Installing the Memory Upgrade Kit"
4	When the upgraded compute nodes are back online, verify in Oracle VM Manager that the amount of RAM is correct. When the compute node reboots after a memory upgrade, <code>dom0</code> memory settings are adjusted automatically to the new total amount of RAM. The settings are persistent across future (re-)provisioning and controller software updates.	No manual reconfiguration required.

7.2 Selecting a Server Memory Kit

Any Oracle Private Cloud Appliance may contain more than one generation of server hardware. This depends on when the system was purchased and installed, and whether it has since been extended with additional compute nodes. These server hardware generations may be part of your installation:

Table 7.2 Oracle Private Cloud Appliance Server Hardware Generations

Server Hardware	Memory Configuration
Oracle Server X9-2	<p>Default configuration</p> <p>orderable in three memory configurations:</p> <ul style="list-style-type: none"> • 512GB – 16x 32 GB • 1TB – 16x 64 GB • 2TB – 32x 64 GB <p>Expansion options</p> <p>512GB to 1TB memory upgrade configurations are supported with no limitations. 512GB and/or 1TB memory configurations must abide by the 1TB Compute Node Server limitation and location requirements as indicated in Appendix C, Compute Node Rack Location Reference for the various supported PDU types. Likewise, if one or more servers include a 2TB memory configuration, the Rack Server locations must exclusively abide by the 2TB Compute Node Server limitation and location requirements as indicated in Appendix C, Compute Node Rack Location Reference for the various supported PDU types.</p> <p>The default memory configuration can be extended up to the maximum of 2TB. Consult your Oracle representative for the latest information about available memory kits.</p>
Oracle Server X8-2	<p>Default configuration</p>
Oracle Server X7-2	<p>orderable in three memory configurations:</p> <ul style="list-style-type: none"> • 384GB – 12x 32GB DDR4-2666 DIMMs • 768GB – 12x 64GB DDR4-2666 DIMMs • 1.5TB – 24x 64GB DDR4-2666 DIMMs <p>Expansion options</p> <p>The default memory configuration can be extended up to the maximum of 1.5TB. Consult your Oracle representative for the latest information about available memory kits.</p>
Oracle Server X6-2	<p>Default configuration</p> <p>256GB – 8x 32GB DDR4-2400 DIMMs, 16 free slots</p> <p>Expansion options</p> <p>add 8x or 16x 32GB DDR4-2400 DIMMs in the free slots, for a total of 512GB or 768GB</p>
Oracle Server X5-2	<p>Default configuration</p> <p>256GB – 8x 32GB DDR4-2133 DIMMs, 16 free slots</p>

Server Hardware	Memory Configuration
	Expansion options add 8x or 16x 32GB DDR4-2133 DIMMs in the free slots, for a total of 512GB or 768GB
Sun Server X4-2	Default configuration 256GB – 16x 16GB DDR3-1600 DIMMs, no free slots
Sun Server X3-2	Expansion options replace with 16x 32GB DDR3-1600 DIMMs, for a total of 512GB



Caution

Be sure to select the RAM modules with the correct speed rating that matches your server model.

7.3 Installing the Memory Upgrade Kit

In general, installing or replacing memory modules are tasks performed by an Oracle-qualified service technician. DIMMs are not hot-swappable parts, so the server must be powered down for this procedure. This section provides a high-level overview of the steps required for a server memory extension.

Detailed information is available in the chapter [Servicing Oracle Private Cloud Appliance Components Oracle Private Cloud Appliance Administrator's Guide](#) and the Service Manual for the server model in question.

Table 7.3 Summary of the Compute Node Memory Extension Procedure

Step	Description	Detailed Instructions
1	Read and follow the safety considerations and prerequisites for component replacement procedures.	Refer to the section <i>Preparing Oracle Private Cloud Appliance for Service</i> in the “ Servicing Oracle Private Cloud Appliance Components ” chapter of the Oracle Private Cloud Appliance Administrator's Guide.
2	Migrate virtual machines to another compute node and place the server in maintenance mode.	In the Service chapter of the Oracle Private Cloud Appliance Administrator's Guide, refer to the power-down instructions section for the server model in question.
3	Power down the server, disconnect all power cords and data cables, and then extend the server to the maintenance position.	Consult the Service Manual for your server model. Instructions are provided in the chapter “Preparing for Service”.
4	Open the server fan door, and then remove the server top cover.	Consult the Service Manual for your server model. These specific instructions are part of the section “Preparing the Server for Component Replacement” in the chapter referenced in step 3.
5	Install the new DIMMs.	For these detailed steps, you must navigate to a particular section in the Service Manual of your server model.

Step	Description	Detailed Instructions
		<ul style="list-style-type: none">a. In the Service chapter of the Oracle Private Cloud Appliance Administrator's Guide, refer to the Service Procedures section for the server model in question.b. Click the URL for the service procedures for DIMMs. This opens the Service Manual.c. Follow the steps in the section entitled "Install a DIMM".
6	Install the server top cover, and then close the server fan door.	Consult the Service Manual for your server model. Follow the steps in the section "Install the Server Top Cover", which is near the start of the chapter referenced in step 7.
7	Return the server to its normal rack position, and then reconnect all data cables and power cords.	Consult the Service Manual for your server model. Refer to the chapter "Returning the Server to Operation".
8	Power on the server. When it comes back online, take the compute node out of maintenance mode and verify that it resumes all normal operations in the server pool.	<p>In the Service chapter of the Oracle Private Cloud Appliance Administrator's Guide, refer to the power-down instructions section for the server model in question.</p> <p>The steps in this procedure are identical to placing the compute node in maintenance mode, except that you must clear the check box you selected previously.</p>

Chapter 8 Extending Oracle Private Cloud Appliance - Additional Storage

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Extending the Oracle Private Cloud Appliance by connecting and configuring additional storage can enhance the product by providing the disk space required for large repositories, for backup and recovery storage, and to provision virtual machines with virtual disks beyond the capacity already available on the appliance. This process does not require that the system is powered down, but cabling and configuration must match the Oracle Private Cloud Appliance requirements.

8.1 Extending Storage Capacity

This section describes the options to extend storage capacity for systems with an Ethernet-based network architecture.

8.1.1 Adding Disk Space to the Internal Storage Appliance

Systems with an Ethernet-based network architecture are built with an internal Oracle ZFS Storage Appliance ZS7-2. A major advantage is that the standard disk shelf already provides a significant amount of disk space at approximately 100TB. This is sufficient for the appliance internal 'system disk', as well as an Oracle VM storage repository for a virtualized production environment. Another significant feature is that, for environments with high storage demands, more disk shelves can be attached to the internal storage appliance.

Some additional storage hardware can be installed inside the Oracle Private Cloud Appliance base rack. It takes up 4 rack units – the space of two empty rack units and two compute nodes –, thereby reducing the maximum capacity of the rack compute nodes. For the extra storage inside the base rack, the customer can choose between one high-capacity disk shelf or two high-performance disk shelves.

If a larger amount of additional storage capacity is required, up to 14 extra disk shelves can be installed in an additional rack. All of the extra disk shelves are connected to, and managed by, the two storage appliance controllers located in the bottom rack units of the Oracle Private Cloud Appliance base rack.

The addition of disk shelves to the Oracle ZFS Storage Appliance ZS7-2 is handled entirely by Oracle Advanced Customer Services. The process includes cabling, removal of compute nodes where required, and updating server pool configurations. Please contact Oracle for more details about extending the capacity of the ZFS storage appliance.

8.1.2 Adding External Ethernet Storage

Ethernet-based external storage hardware must be made accessible over the data center network. Oracle Private Cloud Appliance, and the virtualized environment it hosts, access the storage through a custom network with external connectivity. Each external network corresponds with an isolated tunnel.

For instructions to set up a custom network, refer to the section entitled *Network Customization* in the [Monitoring and Managing Oracle Private Cloud Appliance](#) chapter of the *Oracle Private Cloud Appliance Administrator's Guide*. For information about discovering and using storage resources within Oracle VM, refer to the section *Viewing and Managing Storage Resources* section of the [Managing the Oracle VM Virtual Infrastructure](#) chapter, and the Oracle VM documentation.

8.1.3 Adding External Fibre Channel Storage

Oracle Server X9-2 expansion compute nodes can be ordered with *optional* 32Gbit Fibre Channel cards pre-installed. Field installation at a later time is possible as well. However, it is not possible to order new base racks with FC cards already installed in the compute nodes. Therefore, if Fibre Channel storage is part of your intended design, you should order a minimal base rack configuration and expansion compute nodes with the FC option.

Fibre Channel cables, switches and patch panels must be supplied by the customer. The installation of compute nodes with FC cards is performed by Oracle Advanced Customer Services. Once these compute nodes are integrated in the Oracle Private Cloud Appliance environment, the fibre channel HBAs can connect to standard FC switches and storage hardware in your data center. External FC storage configuration is managed through Oracle VM Manager. For more information, refer to the [Fibre Channel Storage Attached Network](#) section of the *Oracle VM Concepts Guide*.



Note

When re-provisioning an Oracle Server X8-2 or Oracle Server X9-2 compute node with an optional dual-port FC HBA card installed, the provisioning process fails if the SAN Zoning model is not amended. During the provisioning step where you install Oracle VM, all FC presented disks remain visible to the installer. This creates an error as the installer cannot find the correct disk to install Oracle VM onto. Eventually, the provisioning process times out and flag the compute node as **DEAD**.

Avoid this error by updating the existing SAN Zoning model to disable FC storage presentation to the compute node being re-provisioned, prior to starting the re-provision process. You can re-enable the SAN Zoning after the provisioning process completes.

It is required that you configure Fibre Channel Zoning on the external FC switches you connect to in your data center. For more information see [Section 8.1.4, "Zone Configuration"](#).

8.1.4 Zone Configuration

The Oracle Private Cloud Appliance requires that Fibre Channel Zoning is configured on the external FC switches to control and limit the amount of traffic on the storage network for efficient LUN discovery and to maximize stability within the environment.

FC Zoning is also used to enhance security by providing an extra layer of traffic separation on the storage network. Even if you are using storage initiator groups to perform LUN masking, it is generally considered good practice to also configure FC zones to limit the exposure of LUNs and unrestricted use of this network medium. Zone configuration is very useful in the situation where the FC switch or switches are shared with other devices apart from the Oracle Private Cloud Appliance.

The Oracle Private Cloud Appliance supports single initiator pWWN zoning, in line with industry best-practice. It is highly recommended that you configure single initiator pWWN zoning for all Fibre Channel connections to the rack. This requires a Fibre Channel switch that supports NPIV.

For all storage clouds that are cable-connected, at least one zone should be configured per WWPN on each compute node. However, multiple zones may be created for each WWPN depending on your cabling.

In a setup using all four storage clouds, four zones should exist on the Fibre Channel switch for each compute node. You can obtain a listing of the WWPNs for the compute nodes by running the `pca-admin list wwpn-info` command.

Using a Fibre Channel storage device with two controller heads in an active/active cluster, and two targets configured for each head, every LUN has 4 storage paths. A storage path is a connection between a target and a storage cloud. Each LUN has two active paths between a storage cloud and the controller head that owns the LUN, and an additional two standby paths between the same storage cloud and the other controller head. If the storage head that owns the LUN should fail, the other storage head takes over and the standby paths become active. This way the storage connectivity for a given cloud remains uninterrupted. To better support failover/failback operations, consider employing a zoning strategy using two zones per storage cloud. This approach involves one zone connecting a given cloud to a target of one controller head, and a second zone connecting that same cloud to a target of the other controller head.

The configuration of Fibre Channel single initiator pWWN zones is *not* optional. If you had previously attempted to extend your storage using Fibre Channel and did not configure any zones on your FC switch, you should do so now. Furthermore, if you previously configured D,P zones, it is important that you rezone your switches to use single initiator pWWN zones.

Please refer to the documentation of your switch vendor for more information on the configuration steps that you must perform to configure single initiator pWWN zoning.

Appendix A Default IP Addresses

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This appendix lists the default IP addresses assigned to the Oracle Private Cloud Appliance components during manufacturing.

A.1 Default Management IP Addresses

The management IP address represents a component's connection to the internal administration network.



Caution

For hardware management, Oracle Private Cloud Appliance uses a network internal to the system. It is not recommended to connect the management ports or the internal administration network switches to the data center network infrastructure.

Table A.1 Default Management IP Addresses for Oracle Private Cloud Appliance with Ethernet-based Network Architecture

Rack Unit	Rack Component	Management IP Address Assigned During Manufacturing
23	Spine Cisco Nexus 9336C-FX2 Switch	192.168.4.205
22	Spine Cisco Nexus 9336C-FX2 Switch	192.168.4.204
21	Cisco Nexus 9348GC-FXP Switch	192.168.4.230
16	Leaf/Data Cisco Nexus 9336C-FX2 Switch	192.168.4.203
15	Leaf/Data Cisco Nexus 9336C-FX2 Switch	192.168.4.202
6	Management Node	192.168.4.4 management VIP: 192.168.4.216 ILOM: 192.168.4.104
5	Management Node	192.168.4.3 management VIP: 192.168.4.216 ILOM: 192.168.4.103
3-4	Oracle ZFS Storage Appliance ZS7-2 Controller Server (2 rack units)	192.168.4.2 storage VIP: 192.168.4.100 ILOM: 192.168.4.102
1-2	Oracle ZFS Storage Appliance ZS7-2 Controller Server (2 rack units)	192.168.4.1 storage VIP: 192.168.4.100

Rack Unit	Rack Component	Management IP Address Assigned During Manufacturing
		ILOM: 192.168.4.101
(none)	PDU-B	192.168.4.211
(none)	PDU-A	192.168.4.210

Compute nodes are assigned an IP address in the internal administration network during the provisioning process. The system IP address is DHCP-based; the ILOM is assigned the system IP plus 100. For example: if a compute node receives IP 192.168.4.17, then its ILOM has IP 192.168.4.117. Once assigned to a host, these IP addresses are stored and persisted in the DHCP database.

A.2 Default Storage Network IP Addresses



Caution

The storage network is internal to the Oracle Private Cloud Appliance. You should not create additional connections to this network.

Storage traffic between appliance components uses a subnet that is separate from the administration network and virtual machine connectivity. [Table A.2](#) lists the default storage network IP addresses assigned to hardware components in your Oracle Private Cloud Appliance.

Table A.2 Default Storage Network IP Addresses for Oracle Private Cloud Appliance

Rack Unit	Rack Component	Storage IP Address Assigned During Manufacturing
6	Management Node	192.168.41.4
5	Management Node	192.168.41.3
3-4	Oracle ZFS Storage Appliance ZS7-2 Controller Server (2 rack units)	192.168.40.1 (shared)
1-2	Oracle ZFS Storage Appliance ZS7-2 Controller Server (2 rack units)	192.168.40.1 (shared)

Appendix B Cabling Reference

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This appendix provides a reference for the cabling between components of Oracle Private Cloud Appliance.

B.1 Cisco Nexus 9348GC-FXP Switch Management Ethernet Connections

This section lists the cabling connections for the Cisco Nexus 9348GC-FXP Switch. They are Ethernet connections intended for the internal administration network.

Table B.1 Cabling Connections for Cisco Nexus 9348GC-FXP Switch

From Rack Unit	From Component and Port	To Cisco Nexus 9348GC-FXP Switch Rack Unit and Port
U39	compute node: NET0	U21: port 20
U38	compute node: NET0	U21: port 19
U37	compute node: NET0	U21: port 18
U36	compute node: NET0	U21: port 17
U35	compute node: NET0	U21: port 16
U34	compute node: NET0	U21: port 15
U33	compute node: NET0	U21: port 42
U32	compute node: NET0	U21: port 41
U31	compute node: NET0	U21: port 40
U30	compute node: NET0	U21: port 39
U29	compute node: NET0	U21: port 38
U28	compute node: NET0	U21: port 37
U27	compute node: NET0	U21: port 36
U26	compute node: NET0	U21: port 35
U23	Cisco Nexus 9336C-FX2 Switch: NET MGMT	U21: port 14
U22	Cisco Nexus 9336C-FX2 Switch: NET MGMT	U21: port 13
U16	Cisco Nexus 9336C-FX2 Switch: NET MGMT	U21: port 34
U15	Cisco Nexus 9336C-FX2 Switch: NET MGMT	U21: port 33

From Rack Unit	From Component and Port	To Cisco Nexus 9348GC-FXP Switch Rack Unit and Port
U14	compute node: NET0	U21: port 12
U13	compute node: NET0	U21: port 11
U12	compute node: NET0	U21: port 10
U11	compute node: NET0	U21: port 9
U10	compute node: NET0	U21: port 8
U09	compute node: NET0	U21: port 7
U08	compute node: NET0	U21: port 6
U07	compute node: NET0	U21: port 5
U06	management node: NET0	U21: port 32
U05	management node: NET0	U21: port 31
U03	ZFS storage appliance controller: NET0	U21: port 28
U03	ZFS storage appliance controller: PCIe 5/0	U21: port 29
U03	ZFS storage appliance controller: PCIe 5/1	U21: port 30
U01	ZFS storage appliance controller: NET0	U21: port 25
U01	ZFS storage appliance controller: PCIe 5/0	U21: port 26
U01	ZFS storage appliance controller: PCIe 5/1	U21: port 27
N/A	PDU-A	U21: port 24
N/A	PDU-B	U21: port 43
N/A	Oracle Support	U21: port 1

B.2 Cisco Nexus 9336C-FX2 Switch Data Network Connections

This section lists the cabling connections for the Cisco Nexus 9336C-FX2 Switch. They are high speed Ethernet connections up to 100Gbit, intended for the internal data network.

Table B.2 Cabling Connections for Cisco Nexus 9336C-FX2 Switch

From Rack Unit	From Component and Port	To Cisco Nexus 9336C-FX2 Switch Rack Unit and Port
U39	compute node: CX-5 HCA port 1	U15: port 28
U39	compute node: CX-5 HCA port 2	U16: port 28
U38	compute node: CX-5 HCA port 1	U15: port 27
U38	compute node: CX-5 HCA port 2	U16: port 27
U37	compute node: CX-5 HCA port 1	U15: port 26
U37	compute node: CX-5 HCA port 2	U16: port 26
U36	compute node: CX-5 HCA port 1	U15: port 25
U36	compute node: CX-5 HCA port 2	U16: port 25
U35	compute node: CX-5 HCA port 1	U15: port 24

From Rack Unit	From Component and Port	To Cisco Nexus 9336C-FX2 Switch Rack Unit and Port
U35	compute node: CX-5 HCA port 2	U16: port 24
U34	compute node: CX-5 HCA port 1	U15: port 23
U34	compute node: CX-5 HCA port 2	U16: port 23
U33	compute node: CX-5 HCA port 1	U15: port 22
U33	compute node: CX-5 HCA port 2	U16: port 22
U32	compute node: CX-5 HCA port 1	U15: port 21
U32	compute node: CX-5 HCA port 2	U16: port 21
U31	compute node: CX-5 HCA port 1	U15: port 20
U31	compute node: CX-5 HCA port 2	U16: port 20
U30	compute node: CX-5 HCA port 1	U15: port 19
U30	compute node: CX-5 HCA port 2	U16: port 19
U29	compute node: CX-5 HCA port 1	U15: port 18
U29	compute node: CX-5 HCA port 2	U16: port 18
U28	compute node: CX-5 HCA port 1	U15: port 17
U28	compute node: CX-5 HCA port 2	U16: port 17
U27	compute node: CX-5 HCA port 1	U15: port 16
U27	compute node: CX-5 HCA port 2	U16: port 16
U26	compute node: CX-5 HCA port 1	U15: port 15
U26	compute node: CX-5 HCA port 2	U16: port 15
U14	compute node: CX-5 HCA port 1	U15: port 14
U14	compute node: CX-5 HCA port 2	U16: port 14
U13	compute node: CX-5 HCA port 1	U15: port 13
U13	compute node: CX-5 HCA port 2	U16: port 13
U12	compute node: CX-5 HCA port 1	U15: port 12
U12	compute node: CX-5 HCA port 2	U16: port 12
U11	compute node: CX-5 HCA port 1	U15: port 11
U11	compute node: CX-5 HCA port 2	U16: port 11
U10	compute node: CX-5 HCA port 1	U15: port 10
U10	compute node: CX-5 HCA port 2	U16: port 10
U09	compute node: CX-5 HCA port 1	U15: port 9
U09	compute node: CX-5 HCA port 2	U16: port 9
U08	compute node: CX-5 HCA port 1	U15: port 8
U08	compute node: CX-5 HCA port 2	U16: port 8
U07	compute node: CX-5 HCA port 1	U15: port 7
U07	compute node: CX-5 HCA port 2	U16: port 7
U06	management node: CX-5 HCA port 1	U15: port 6
U06	management node: CX-5 HCA port 2	U16: port 6

From Rack Unit	From Component and Port	To Cisco Nexus 9336C-FX2 Switch Rack Unit and Port
U05	management node: CX-5 HCA port 1	U15: port 5
U05	management node: CX-5 HCA port 2	U16: port 5
U04	Oracle ZFS Storage Appliance ZS7-2 controller: slot 4 port 1	U22: port 35
U04	Oracle ZFS Storage Appliance ZS7-2 controller: slot 4 port 2	U23: port 35
U03	Oracle ZFS Storage Appliance ZS7-2 controller: slot 8 port 1	U22: port 36
U03	Oracle ZFS Storage Appliance ZS7-2 controller: slot 8 port 2	U23: port 36
U02	Oracle ZFS Storage Appliance ZS7-2 controller: slot 4 port 1	U22: port 33
U02	Oracle ZFS Storage Appliance ZS7-2 controller: slot 4 port 2	U23: port 33
U01	Oracle ZFS Storage Appliance ZS7-2 controller: slot 8 port 1	U22: port 34
U01	Oracle ZFS Storage Appliance ZS7-2 controller: slot 8 port 2	U23: port 34

B.3 Data and Spine Switch Interconnects

This section lists the cabling connections between the Cisco Nexus 9348GC-FXP Switches performing the role of either data switch or spine switch. They are 100GbE Ethernet connections intended for high bandwidth traffic between the data and spine switches.

B.3.1 Spine Switch to Data Switch Connections

[Table B.3](#) lists the cabling connections between the data switches and spine switches.

Table B.3 Cabling Connections Between Spine and Data Switches

From Rack Unit	From Component and Port	To Rack Unit	To Component and Port
U22	spine switch: port 23	U15	data switch: port 33
U22	spine switch: port 24	U15	data switch: port 34
U22	spine switch: port 25	U16	data switch: port 35
U22	spine switch: port 26	U16	data switch: port 36
U23	spine switch: port 23	U16	data switch: port 33
U23	spine switch: port 24	U16	data switch: port 34
U23	spine switch: port 25	U15	data switch: port 35
U23	spine switch: port 26	U15	data switch: port 36

B.3.2 Data Switch to Data Switch Connections

[Table B.4](#) lists the cabling connections between the data switches.

Table B.4 Cabling Connections Between Data Switches

From Rack Unit	From Component and Port	To Rack Unit	To Component and Port
U15	data switch: port 3	U16	data switch: port 3
U15	data switch: port 4	U16	data switch: port 4

B.3.3 Spine Switch to Spine Switch Connections

[Table B.5](#) lists the cabling connections between the spine switches.

Table B.5 Cabling Connections Between Spine Switches

From Rack Unit	From Component and Port	To Rack Unit	To Component and Port
U22	spine switch: port 28	U23	spine switch: port 28
U22	spine switch: port 29	U23	spine switch: port 29
U22	spine switch: port 30	U23	spine switch: port 30
U22	spine switch: port 31	U23	spine switch: port 31
U22	spine switch: port 32	U23	spine switch: port 32

Appendix C Compute Node Rack Location Reference

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This appendix describes the appropriate rack locations for expansion Oracle Server X9-2 compute nodes, when you are adding those compute nodes to an Oracle Private Cloud Appliance shipped out of the factory with Controller Software version 2.4.4.

Starting with factory release 2.4.4, Oracle Private Cloud Appliance power configurations have been updated to accommodate the additional power needs of the Oracle Server X9-2. You must carefully follow these compute node upgrade guidelines to ensure your Oracle Private Cloud Appliance is adequately powered based on compute node configurations and the Power Distribution Units (PDUs) in your rack. Observe these additional guidelines:

- Install servers by memory size, with the largest memory configurations lowest in the rack, and the smallest memory configurations highest.
- If all server memory sizes within a rack are 512GB and/or 1TB, it must follow the limitations and rack locations for 1TB Max Configurations for all PDU types.
- If any server memory size within a rack is 2TB memory size, it must follow the limitations and rack locations for 2TB Max Configurations for all PDU types.
- Install servers with FC cards at the top of all installed compute nodes.



Note

If you have upgraded Oracle Private Cloud Appliance 2.4.3, or earlier, rack to Software Controller release 2.4.4, and intend to install an Oracle Server X9-2 into this rack, consult your Oracle representative to ensure proper planning for power and data cabling.

C.1 Oracle Server X9-2 Compute Node Configurations for Oracle Private Cloud Appliance 2.4.4

The following sections describe rack locations for Oracle Server X9-2 compute nodes, based on which PDUs are installed in the rack.

C.1.1 Maximum Configuration for 15kVA PDU Racks

This section describes the maximum number of compute nodes, and their locations for Oracle Private Cloud Appliance 2.4.4 Racks equipped with 15 kVA power distribution units.

- 10 — Maximum compute nodes with 512GB and/or 1TB memory configuration
- 6 — Maximum compute nodes with 2TB memory configuration

Figure C.1 Maximum Configuration for 15kVA PDU Racks

1TB Max Configuration	RU	2TB Max Configuration
Empty Filler	42	Empty Filler
Empty Filler	41	Empty Filler
Empty Filler	40	Empty Filler
Empty Filler	39	Empty Filler
Empty Filler	38	Empty Filler
Empty Filler	37	Empty Filler
Empty Filler	36	Empty Filler
Empty Filler	35	Empty Filler
Empty Filler	34	Empty Filler
Empty Filler	33	Empty Filler
Empty Filler	32	Empty Filler
Empty Filler	31	Empty Filler
Empty Filler	30	Empty Filler
Empty Filler	29	Empty Filler
Empty Filler	28	Empty Filler
X9-2 Compute Node	27	Empty Filler
X9-2 Compute Node	26	Empty Filler
Empty Filler	25	Empty Filler
Empty Filler	24	Empty Filler
Cisco 9336 Switch	23	Cisco 9336 Switch
Cisco 9336 Switch	22	Cisco 9336 Switch
Cisco 9348GC-FXP Switch	21	Cisco 9348GC-FXP Switch
	20	
	19	
	18	
	17	
DE3-24C		DE3-24C
Cisco 9336 Switch	16	Cisco 9336 Switch
Cisco 9336 Switch	15	Cisco 9336 Switch
X9-2 Compute Node	14	Empty Filler
X9-2 Compute Node	13	Empty Filler
X9-2 Compute Node	12	X9-2 Compute Node
X9-2 Compute Node	11	X9-2 Compute Node
X9-2 Compute Node	10	X9-2 Compute Node
X9-2 Compute Node	9	X9-2 Compute Node
X9-2 Compute Node	8	X9-2 Compute Node
X9-2 Compute Node	7	X9-2 Compute Node
X8-2 Management Node	6	X8-2 Management Node
X8-2 Management Node	5	X8-2 Management Node
	4	
Z57-2 Storage Node	3	Z57-2 Storage Node
	2	
Z57-2 Storage Node	1	Z57-2 Storage Node
PDU	B	PDU
PDU	A	PDU

C.1.2 Maximum Configuration for 22kVA PDU Racks

This section describes the maximum number of compute nodes, and their locations for Oracle Private Cloud Appliance 2.4.4 Racks equipped with 22 kVA power distribution units.

- 20 — Maximum compute nodes with 512GB and/or 1TB memory configuration
- 15 — Maximum compute nodes with 2TB memory configuration

Figure C.2 Maximum Configuration for 22kVA PDU Racks

1TB Max Configuration	RU	2TB Max Configuration
Empty Filler	42	Empty Filler
Empty Filler	41	Empty Filler
Empty Filler	40	Empty Filler
Empty Filler	39	Empty Filler
Empty Filler	38	Empty Filler
X9-2 Compute Node	37	Empty Filler
X9-2 Compute Node	36	Empty Filler
X9-2 Compute Node	35	Empty Filler
X9-2 Compute Node	34	Empty Filler
X9-2 Compute Node	33	Empty Filler
X9-2 Compute Node	32	X9-2 Compute Node
X9-2 Compute Node	31	X9-2 Compute Node
X9-2 Compute Node	30	X9-2 Compute Node
X9-2 Compute Node	29	X9-2 Compute Node
X9-2 Compute Node	28	X9-2 Compute Node
X9-2 Compute Node	27	X9-2 Compute Node
X9-2 Compute Node	26	X9-2 Compute Node
Empty Filler	25	Empty Filler
Empty Filler	24	Empty Filler
Cisco 9336	23	Cisco 9336
Cisco 9336	22	Cisco 9336
Cisco 9348GC-FXP	21	Cisco 9348GC-FXP
	20	
	19	
	18	
DE3-24C	17	DE3-24C
Cisco 9336	16	Cisco 9336
Cisco 9336	15	Cisco 9336
X9-2 Compute Node	14	X9-2 Compute Node
X9-2 Compute Node	13	X9-2 Compute Node
X9-2 Compute Node	12	X9-2 Compute Node
X9-2 Compute Node	11	X9-2 Compute Node
X9-2 Compute Node	10	X9-2 Compute Node
X9-2 Compute Node	9	X9-2 Compute Node
X9-2 Compute Node	8	X9-2 Compute Node
X9-2 Compute Node	7	X9-2 Compute Node
XB-2 Management Node	6	XB-2 Management Node
XB-2 Management Node	5	XB-2 Management Node
	4	
Z57-2 Storage Node	3	Z57-2 Storage Node
	2	
Z57-2 Storage Node	1	Z57-2 Storage Node
PDU	B	PDU
PDU	A	PDU

C.1.3 Maximum Configuration for 24kVA PDU Racks

This section describes the maximum number of compute nodes, and their locations for Oracle Private Cloud Appliance 2.4.4 Racks equipped with 24 kVA power distribution units.

- 22 — Maximum compute nodes with 512GB and/or 1TB memory configuration
- 17 — Maximum compute nodes with 2TB memory configuration

Figure C.3 Maximum Configuration for 24kVA PDU Racks

1TB Max Configuration	RU	2TB Max Configuration
Empty Filler	42	Empty Filler
Empty Filler	41	Empty Filler
Empty Filler	40	Empty Filler
X9-2 Compute Node	39	Empty Filler
X9-2 Compute Node	38	Empty Filler
X9-2 Compute Node	37	Empty Filler
X9-2 Compute Node	36	Empty Filler
X9-2 Compute Node	35	Empty Filler
X9-2 Compute Node	34	X9-2 Compute Node
X9-2 Compute Node	33	X9-2 Compute Node
X9-2 Compute Node	32	X9-2 Compute Node
X9-2 Compute Node	31	X9-2 Compute Node
X9-2 Compute Node	30	X9-2 Compute Node
X9-2 Compute Node	29	X9-2 Compute Node
X9-2 Compute Node	28	X9-2 Compute Node
X9-2 Compute Node	27	X9-2 Compute Node
X9-2 Compute Node	26	X9-2 Compute Node
Empty Filler	25	Empty Filler
Empty Filler	24	Empty Filler
Cisco 9336	23	Cisco 9336
Cisco 9336	22	Cisco 9336
Cisco 9348GC-FXP	21	Cisco 9348GC-FXP
	20	
	19	
	18	
DE3-24C	17	DE3-24C
Cisco 9336	16	Cisco 9336
Cisco 9336	15	Cisco 9336
X9-2 Compute Node	14	X9-2 Compute Node
X9-2 Compute Node	13	X9-2 Compute Node
X9-2 Compute Node	12	X9-2 Compute Node
X9-2 Compute Node	11	X9-2 Compute Node
X9-2 Compute Node	10	X9-2 Compute Node
X9-2 Compute Node	9	X9-2 Compute Node
X9-2 Compute Node	8	X9-2 Compute Node
X9-2 Compute Node	7	X9-2 Compute Node
X8-2 Management Node	6	X8-2 Management Node
X8-2 Management Node	5	X8-2 Management Node
	4	
Z57-2 Storage Node	3	Z57-2 Storage Node
	2	
Z57-2 Storage Node	1	Z57-2 Storage Node
PDU	B	PDU
PDU	A	PDU

Appendix D Connectivity Diagrams

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Oracle Private Cloud Appliance network architecture relies on physical high speed Ethernet connectivity. These diagrams depict the to connections to external storage hardware, and compute and management node networking.

D.1 External Ethernet Connections

This section shows the external Ethernet connectivity of an Oracle Private Cloud Appliance using the ports of the Cisco Nexus 9336C-FX2 Switch.

Figure D.1 External Ethernet Connectivity

D.2 Compute Node Networking

This section shows how Oracle Private Cloud Appliance networking is virtualized and configured on a compute node.

Figure D.2 Compute Node Networking

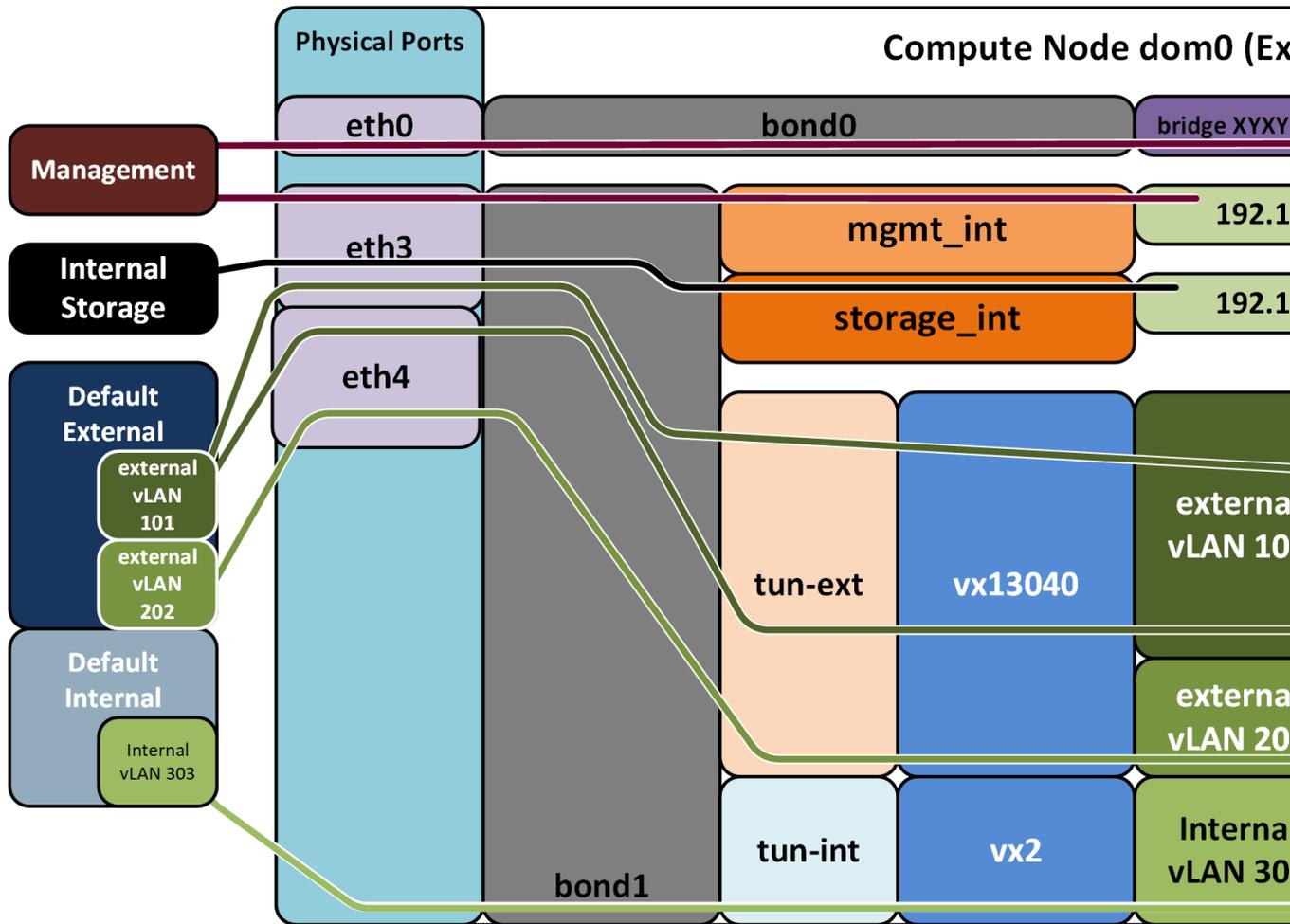


Diagram Notes

- vx13040 is the default external network.

- Internal and External vLAN IDs are specified when creating the network in Oracle VM Manager
- IP addresses in the 10.0/8 range used here are examples. The actual IP addresses are assigned in the VMs themselves.
- storage-int is a network for hypervisor access to the storage nodes
- The virtual networks connecting the network bonds numbered 0-4 are configured by default on every Oracle Private Cloud Appliance. The network connecting all `bond6` interfaces is an example of a custom private VM network. The network connecting all `bond5` interfaces is an example of a custom public VM network. This type of network requires the configuration of additional I/O ports, which must also be cabled to the next-level data center switches for public access.

D.3 Management Node Networking

Figure D.3 Management Node Networking

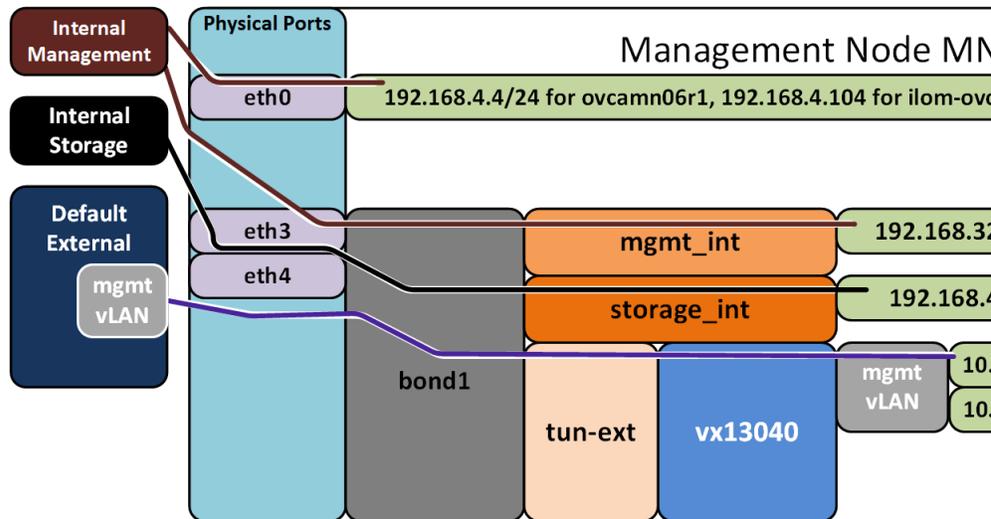
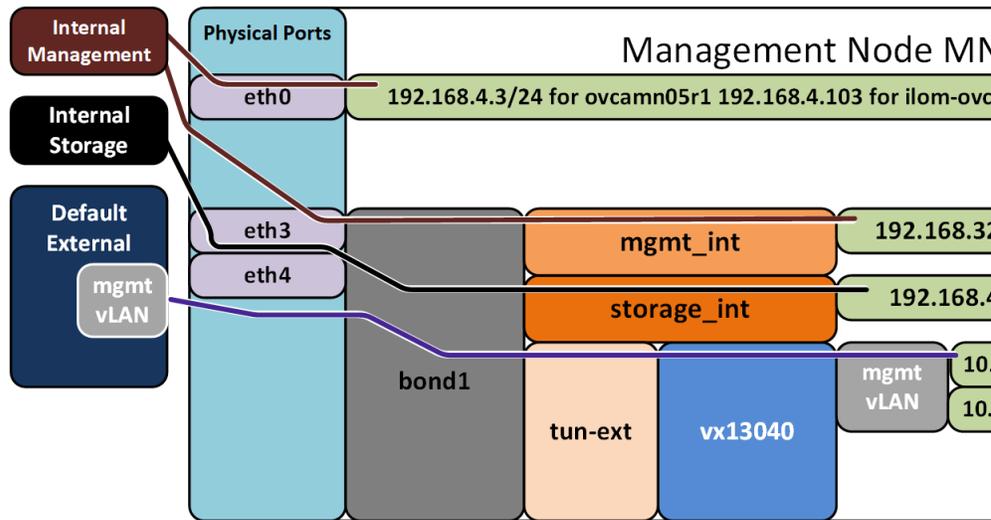


Diagram Notes

- 10.10.10.10/24 is the external address of management node 05
- 10.10.10.11/24 is the external address of management node 06
- 10.10.10.12 is the external address of the VIP for management
- External addresses of mgmt vLAN are specified in the PCA dashboard and are used for access to the PCA Dashboard and OVMM for managing the PCA.

- storage-int is an underlay network for hypervisor access to the storage nodes

Appendix E Site Checklists

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This appendix contains site checklists to help you ensure that your site is prepared for installing the Oracle Private Cloud Appliance.

E.1 System Components Checklist

Complete the following checklist to ensure that the systems component considerations have been addressed.

Table E.1 System Component Checklist

System Components Considerations	Yes	No	N/A	Comment
Will more than one base rack be installed?				
Is the rack installation a new system or an addition to an existing system?				
Will the base rack be connected to an expansion rack?				
Are all machine racks adjacent to each other?				
If the connecting racks are not within the specified proximity, then have the following been done:				
				<ul style="list-style-type: none">• Purchased approved longer InfiniBand cables from an approved third-party vendor?• Asked Oracle Support Services to provide and schedule the custom multi-rack cabling service with the installation?

E.2 Data Center Room Checklist

Complete the following checklist to ensure that the data center room requirements are met. For information about the data center requirements, see [Section 2.2, "Flooring Requirements"](#).

Table E.2 Data Center Room Checklist

Data Center Room Considerations	Yes	No	N/A	Comment
Has the Oracle Private Cloud Appliance location been allocated?				
Is there a vacant location for the new equipment?				
Does the floor layout meet the equipment maintenance access requirements?				
Is there adequate space available for maintenance?				
Will the equipment be positioned so that the exhaust air of one rack does not enter the air inlet of another rack?				
Have cabinet stabilization measures been considered?				
Does the raised floor satisfy the weight requirements for the new hardware?				
Can floor tiles be removed without permission to accommodate service?				
Are there cable routing channels or cutouts?				
Are you providing any additional hardware?				
Is the hardware you are providing fully compatible with the Oracle Private Cloud Appliance?				
Will the new hardware location require any non-standard cable lengths?				
Is the floor to ceiling height a minimum of 3214 mm or 3.2 m (10.5 feet)?				
Is the depth of the raised floor a minimum of 46 cm (18 inches)?				

E.3 Data Center Environmental Checklist

Complete the following checklist to ensure that the data center environment requirements are met. For information, see [Section 2.5, "Ventilation and Cooling Requirements"](#).

Table E.3 Data Center Environmental Checklist

Data Center Environmental Considerations	Yes	No	N/A	Comment
Does the computer room air handling meet temperature and humidity requirements?				
Does the installation floor layout satisfy the ventilation requirements?				
Will the equipment be positioned so the exhaust air of one rack does not enter the air intake of another rack?				
Are the perforated floor tiles each rated at 400 CFM or greater?				
Do the data center air conditioners provide sufficient front to back airflow?				
Is airflow adequate to prevent hot spots?				
Can the data center continuously satisfy environmental requirements?				
Can more vented floor tiles be obtained if required?				

E.4 Access Route Checklist

Complete the following checklist to ensure that the access route requirements are met. For information about preparing your data center access route, see [Section 4.2, “Prepare to Install Oracle Private Cloud Appliance”](#).

Table E.4 Access Route Checklist

Access Route Considerations	Yes	No	N/A	Comment
Has the access route been checked for clearances of the packaged equipment?				
Do all the doors and entry ways conform to the width and height requirements for transportation, including the width of the unpacked unit?				
Do all the doors meet the height requirement of minimum 218 cm (86 inches) for packaged delivery?				
Does the access route provide sufficient space for transport of the packed devices?				
Are there any ramps or thresholds that are of concern? If yes, then provide details.				

Access Route Checklist

Access Route Considerations	Yes	No	N/A	Comment
Are there any stairs or ramps in the path when moving the new hardware?				
Have you confirmed that all route incline angles are within the permitted range?				
Have you confirmed that the access route is free of any obstacles that would expose the device to shock?				
Are all the surfaces acceptable for rolling the new unpacked and packed equipment?				
If a pallet jack is to be used, then have you confirmed the following:				
<ul style="list-style-type: none"> • The pallet jack supports the device weight? • The pallet jack tines are compatible with the shipping pallet? 				
If there are stairs, then is a loading elevator accessible for the equipment?				
If an elevator is to be used, then have you confirmed the following:				
<ul style="list-style-type: none"> • The elevator car is wide enough for the device to be carried into it? • The elevator car is high enough for the device to be carried into it? • The load limit of the elevator is greater than the device weight? • Are elevators available to handle up to 996 kg (2197 lbs) fully-loaded rack capacity? • The elevator door meets the minimum height requirement of 218 cm (86 inches) for packaged rack delivery? 				
Does the path from the receiving location to the designated data center area support the weight of the unpacked equipment?				
Is the path onto the raised floor rated for dynamic loading of the				

Access Route Considerations	Yes	No	N/A	Comment
server? Refer to Section 2.2 , "Flooring Requirements".				

E.5 Facility Power Checklist

Complete the following checklist to ensure that the facility power requirements are met. For information about power requirements, see [Section 2.3](#), "Electrical Power Requirements".

Table E.5 Facility Power Checklist

Facility Power Considerations	Yes	No	N/A	Comment
Do you know the required operating voltage and electric current level of the device and peripherals?				
Will you be using single-phase (low-voltage or high-voltage) or 3-phase (low-voltage or high-voltage) power?				
Are enough power outlets provided within 2 meters (6.5 feet) for each rack?				
Do the power outlets have appropriate socket receptacles for the PDU option ordered? Options are low voltage or high voltage, single-phase or 3-phase.				
Will optional ground cables be attached to the rack?				
Are the circuit breakers for the equipment suitable in terms of voltage and current-carrying capacities?				
Does the power frequency meet the equipment specifications?				
Are power outlets available for the new equipment at the designated location?				
Will system power be delivered from two separate grids?				
Is there a UPS to power the equipment?				
Do you have the minimum required power sources to support the power load for the new hardware? Use kilowatt (kW) /kilovolt (kVA) to express power load.				

E.6 Safety Checklist

Complete the following checklist to ensure that the safety requirements are met. For information about safety, see [Section 1.6, “Operational Procedures for Oracle Private Cloud Appliance”](#) and [Section 2.5, “Ventilation and Cooling Requirements”](#).

Table E.6 Safety Checklist

Safety Checklist Considerations	Yes	No	N/A	Comment
Is there an emergency power shut off?				
Is there a fire protection system in the data center room?				
Is the computer room adequately equipped to extinguish a fire?				
Is antistatic flooring installed?				
Is the floor below the raised floor free of obstacles and blockages?				

E.7 Logistics Checklist

Complete the following checklist to ensure that the logistics requirements are met. For information about unpacking and space requirements, see [Section 2.1, “Space Requirements”](#).

Table E.7 Logistics Checklist

Logistics Checklist Considerations	Yes	No	N/A	Comment
Do you have contact information for the data center personnel?				
Is there security or access control for the data center?				
Are there any security background checks or security clearances required for vendor personnel to access the data center? If yes, then do you have a recommended agency?				
How many days in advance must background checks be completed?				
Are there any additional security access issues?				
Is computer room access available for installation personnel?				
Are laptops, cell phones, and cameras allowed in the data center?				
Does the building have a delivery dock?				
Is there a delivery/unpacking/staging area?				

Logistics Checklist

Logistics Checklist Considerations	Yes	No	N/A	Comment
Is the delivery inside?				
If the delivery is not inside, then is the site prepared for uncrating?				
Is the unpacking/staging area protected from the elements?				
Does the building have adequate receiving space?				
Is the unpacking area air-conditioned to avoid thermal shock for various hardware components?				
Will sufficient moving personnel be available to install the hardware?				
Is union labor required for any part of the delivery or installation?				
Are you prepared for uncrating and trash removal?				
Is uncrating of cabinet and cabinet trash removal required?				
Are there any restrictions on delivery truck length, width, or height?				
Does the customer allow cardboard boxes and other packing material in the computer room? If no, then do ground level deliveries require a truck with a side rail lift?				
Is there a time constraint on dock access? If yes, then provide time constraints.				
Is tail lift required on delivery carrier to unload the equipment at the delivery dock?				
Will any of the following be required to place equipment in computer room?				
<ul style="list-style-type: none"> • Stair walkers • Lifters • Ramps • Steel plates • Floor covers 				
Does the delivery carrier require any special equipment, such as non-				

Logistics Checklist Considerations	Yes	No	N/A	Comment
floor damaging rollers, transport dollies, pallet jacks, or fork lifts?				

E.8 Network Specification Checklist

Complete the following checklist to ensure that the network specification requirements are met. For information about IP addresses, see [Chapter 3, Network Requirements](#) and [Appendix A, Default IP Addresses](#).

Table E.8 Network Specification Checklist

Network Specification Considerations	Yes	No	N/A	Comment
Did you complete the networking worksheet, which is included in Section 3.2, "General Network Configuration" ?				
Have you received the site-specific installation template from your Oracle technical representative?				
Did you review the installation template and consult with your Oracle technical representative regarding any site-specific changes, if any?				
Did you verify that IP addresses in the installation template are currently not in use?				
Have you performed the required configuration within your network infrastructure to allow the Oracle Private Cloud Appliance to use the IP addresses specified in the template?				
Have you registered IP addresses in the installation template with DNS?				
Did you run the required network cables from your network equipment to the location where the Oracle Private Cloud Appliance will be installed?				
Did you label the network cables that will connect to the Oracle Private Cloud Appliance?				

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