Oracle MaxRep for SAN

Hardware Guide

Part Number E53316-03
Oracle MaxRep for SAN release 3.0
2015 October

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Related Documentation

- *Oracle Flash Storage System Glossary*
- *Oracle Flash Storage System Architecture Overview*
- *Oracle FS1-2 Flash Storage System Installation Guide*
- *Oracle MaxRep for SAN User's Guide*
- *Oracle FS1-2 Flash Storage System Release Notes*

Oracle Resources

Important: For the latest version of this document, visit the *SAN Storage – Oracle Flash Storage Systems* section at the Oracle Help Center (http://www.oracle.com/goto/fssystems/docs).

Table 1: Oracle resources

For help with...	Contact...
Support	*http://www.oracle.com/support* (www.oracle.com/support)
Training	*https://education.oracle.com* (https://education.oracle.com)
Documentation	• *SAN Storage – Oracle Flash Storage Systems*: (http://www.oracle.com/goto/fssystems/docs) • From Oracle FS System Manager (GUI): Help > Documentation • From Oracle FS System HTTP access: (http://system-name-ip/documentation.php where system-name-ip is the name or the public IP address of your system)
Documentation feedback	*http://www.oracle.com/goto/docfeedback* (http://www.oracle.com/goto/docfeedback)
Contact Oracle	*http://www.oracle.com/us/corporate/contact/index.html* (http://www.oracle.com/us/corporate/contact/index.html)

CHAPTER 1

Introduction to Oracle MaxRep Replication for SAN

Oracle MaxRep for SAN

Oracle MaxRep for SAN enables you to replicate and restore Oracle FS System data in a SAN environment.

In SAN replication, pairs of LUNs that are made up of source LUNs and target LUNs, are called replication pairs. The LUNs can reside on two Oracle FS Systems in a single location or on separate remotely distributed Oracle FS System, designated as primary and secondary.

One or more Oracle MaxRep Replication Engines manage and monitor the data replication process. The transfer of data takes place automatically as the data on the source LUN changes. Those changes are replicated to the target LUN. The replication pair updates continuously as long as the integrity of both LUNs persists and the communication link between the LUN locations is maintained.

Oracle MaxRep for SAN can replicate between Oracle FS Systems that reside in the same data center, or are geographically distributed between remote locations. The Oracle MaxRep Replication Engines use communication links between the two sites to replicate changes.

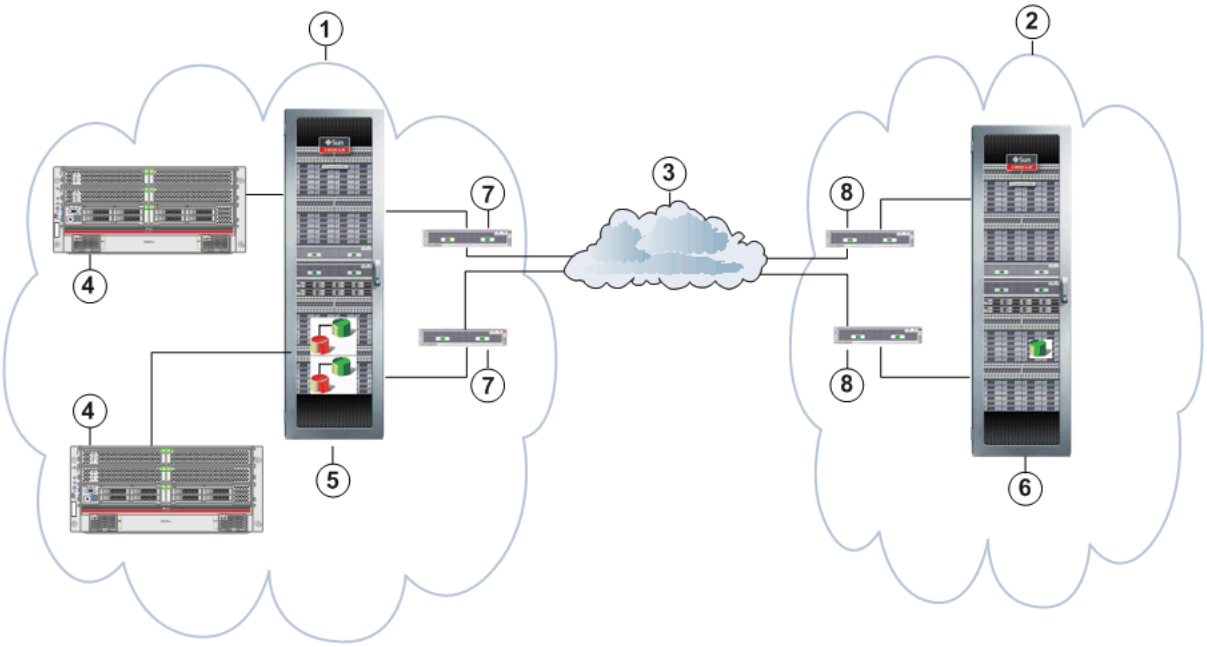
Oracle MaxRep for SAN supports synchronous and asynchronous LUN replication or application consistent volume sets.

- Synchronous replication requires at least one Replication Engine and is supported when the source LUN, the target LUN, and the Replication Engines are all attached to the same SAN fabric. Replication can also be synchronous when the source LUN and the target LUN are located in two data centers that are connected by an extended SAN fabric. The fabric might consist of fiber optic cables that uses dense wavelength division multiplexing (DWDM) between the primary and secondary locations.
- Asynchronous replication requires at least two Replication Engines. Asynchronous replication is supported in most cases when the primary and secondary locations are geographically distributed, and communication is over a wide area network (WAN) link, with separate Replication Engines at each location.

To ensure high availability (HA), Replication Engines can be deployed in HA pairs. One of the Replication Engines is in active mode. The other Replication

Engine in the HA pair is in passive mode, ready to take over if the active Replication Engine should fail.

Figure 1: Asynchronous Oracle MaxRep for SAN configuration



Legend		
	1 Primary site	5 Primary Oracle FS System
	2 Secondary site	6 Secondary Oracle FS System
	3 WAN connection	7 Replication Engines on the primary site clustered for high availability
	4 Host	8 Replication Engines on the secondary site clustered for high availability

Data can be recovered from either the primary or the secondary site, and the direction of replication can be reversed. Several failover and failback scenarios can be planned and implemented using Oracle MaxRep for SAN.

Oracle MaxRep for SAN Replication Engine

Oracle MaxRep for SAN uses one or more Replication Engines to replicate Oracle FS System data in a storage area network (SAN) environment.

The Replication Engine is a 2U server that manages and monitors the replication and recovery process. The administrator can create protection plans to guide the replication operations. Using the Oracle MaxRep for SAN web-based GUI, you can create, monitor, and recover protection plans. Utilization and trending reports and alerts are also managed by the Replication Engine.

A single Replication Engine can be used for synchronous replication. Two Replication Engines are required for asynchronous replication over local area

network (LAN) or wide area network (WAN) replication. An additional Replication Engine can be paired with any single Replication Engine to form a high availability (HA) cluster.

Each Replication Engine has 64 GB memory with two Intel Xeon E5-2658 processors. This memory acts as a cache for the write requests that are received by the Replication Engine.

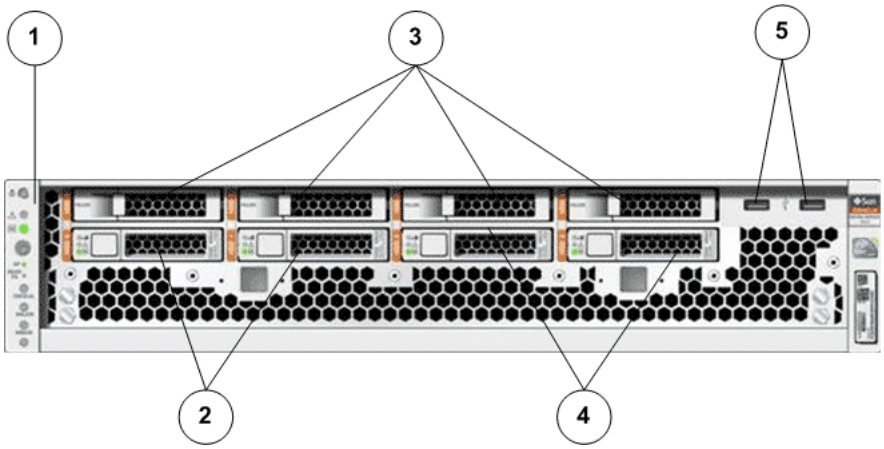
For FC implementations, 8 Gb/s FC ports are used to connect to the SAN fabric(s) to access source or target Oracle FS System. Two 10 Gb/s Ethernet ports are used for management, heartbeat, and wide area network (WAN) connectivity for asynchronous replication. An additional Integrated Lights-Out Manager (ILOM) port is used for remote console accessibility for remote support.

Additionally, the Replication Engine has two redundant power supplies, six PCIe3 HBA slots, one 600 GB SAS RAID controller in PCIe3 slot 1, and four USB ports. (two at the front and two at the back)

The Replication Engines in an HA configuration work in an active-passive mode. The active Replication Engine captures the write requests and replicates them immediately while the other Replication Engine is in passive mode. If the active Replication Engine fails, the passive Replication Engine will be used to resume replication.

The following figure shows the front of the Replication Engine:

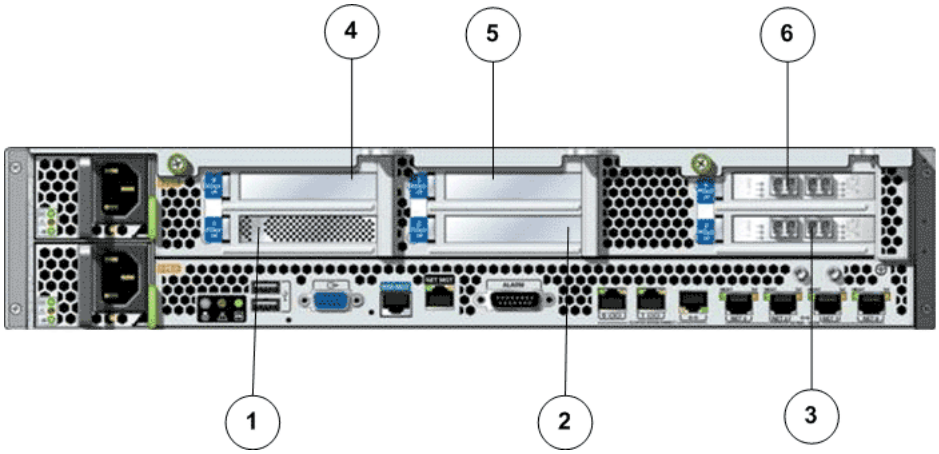
Figure 2: Oracle MaxRep for SAN Replication Engine



Legend		
	1 Front LEDs and power button	4 Drives 2 and 3: Home drive (/home)
	2 Drives 0 and 1: Boot drive	5 USB ports
	3 Drives 4-7: Unused drives	

The following figure indicates the location of the six PCIe slots in the back of the Replication Engine:

Figure 3: Replication Engine PCIe slots



Legend		
	1 PCIe slot 1	4 PCIe slot 4
	2 PCIe slot 2	5 PCIe slot 5
	3 PCIe slot 3	6 PCIe slot 6

Related Links

Supported HBAs
Ports on the Replication Engine
HBA Slot and Port Usage for Supported Configurations
Engine Component Unpacking and Inspection
Replication Engine Service Procedures
Replication Engine Placement in the Rack
Cable the Oracle MaxRep Replication Engine
Insert the Replication Engine Into a Rack
Power On the Replication Engine

Supported HBAs

HBAs are inserted into the PCIe3 slots in the riser board assemblies of the Replication Engine based on the configuration option selected.

The Oracle FS System Replication Engine supports the following HBA options:

Table 2: Supported HBAs on the Replication Engine

HBA	Quantity
8 Gb/s dual-port FC QLogic	Two
10 Gb/s dual-port Ethernet RJ45	Two
10 Gb/s dual-port Ethernet copper or fiber SFP+	Three

Note: A Replication Engine can support either two 10 Gb/s dual-port Ethernet RJ45 HBAs or three 10 Gb/s dual-port Ethernet copper or fiber SFP+ HBAs.

Note: The 8 Gb/s dual-port FC HBAs (if installed), will be in slots 3 and 6. The 10 Gb/s dual-port Ethernet RJ45 HBAs (if installed), will be in slots 2 and 5. The 10 Gb/s dual-port Ethernet copper or fiber SFP+ HBAs (if installed), will be in slots 2, 4, and 5.

CHAPTER 2

Configure the Ports

Ports on the Replication Engine

The Replication Engine contains several types of ports: Ethernet ports, the Integrated Lights Out Manager (ILOM) port, and the FC ports.

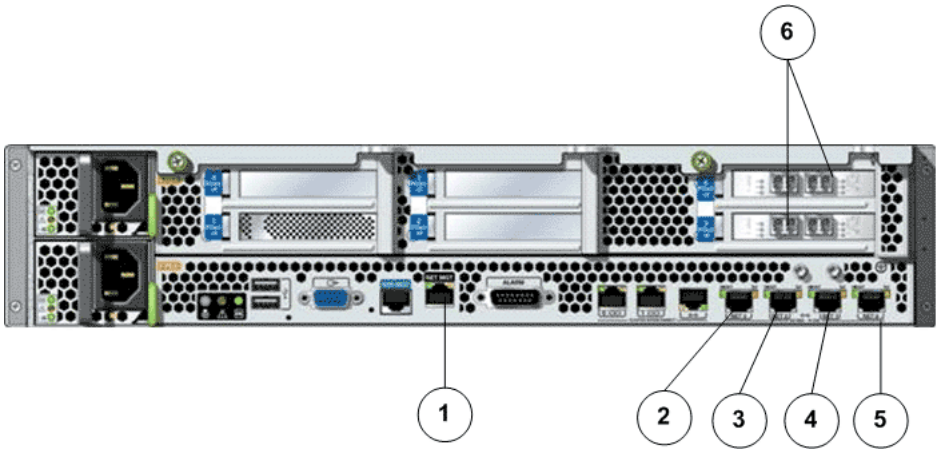
Ethernet ports on a Replication Engine include management ports. Management ports are always located at ETH–0 and ETH–2 on the motherboard.

The optional FC ports on a Replication Engine are always located in PCIe slots 3 and 6.

The Integrated Lights Out Manager (ILOM) port is always located on the motherboard.

The following figure indicates the location of ports at the back of the Replication Engine:

Figure 4: Replication Engine ports



Legend		
	1 Integrated Lights Out Manager (ILOM) port	4 ETH-1
	2 ETH-3	5 ETH-0
	3 ETH-2	6 FC ports (optional)

The location of other ports in a Replication Engine depends upon the hardware configuration of the specific Replication Engine. Oracle MaxRep for SAN supports an FC configuration.

Related Links

ILOM Port
Fibre Channel Ports
Ethernet Ports

HBA Slot and Port Usage for Supported Configurations

Based on the replication configuration, HBAs are installed in the PCIe slots of the Replication Engine.

The following table shows the number of HBAs that must be installed for the various configurations:

Table 3: Number of HBAs required based on configuration type

Configuration	Number of HBAs		
	Dual port 8 Gb/s FC	Dual port 10 Gb/s RJ45	Dual port 10 Gb/s SFP
iSCSI configuration using RJ45 connectors	0	2	0
iSCSI configuration using SFP or optical connectors	0	0	3
FC configuration	2	0	0
FC and iSCSI configuration using RJ45 connectors	2	2	0
FC and iSCSI configuration using optical or SFP connectors	2	0	3

Note: A Replication Engine can have two dual port 10 Gb/s RJ45 HBA or three dual port 10 Gb/s SFP HBA.

Related Links

iSCSI Configuration Using RJ45 Connectors
FC Configuration Using RJ45 Connectors
FC Configuration
iSCSI Configuration Using SFP or Optical Connectors
FC Configuration Using SFP or Optical Connectors

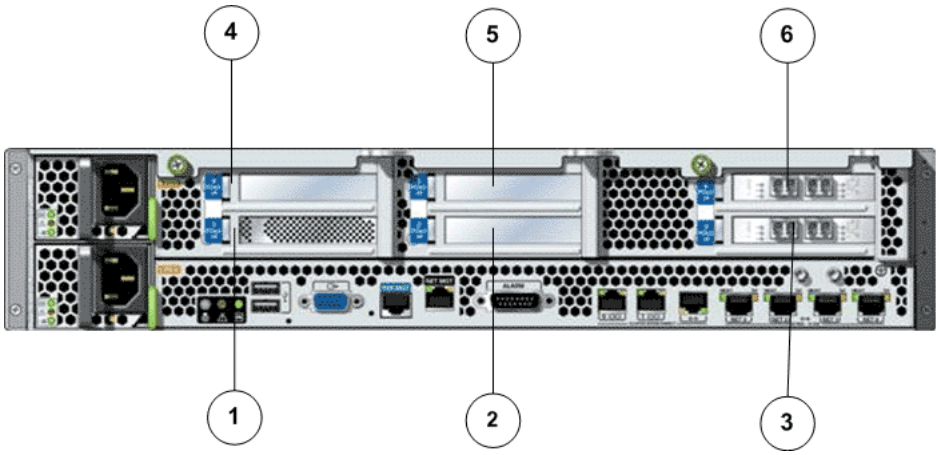
FC Configuration

The FC configuration is the most common implementation of the Oracle MaxRep for SAN. The FC configuration provides an FC data path between the Oracle FS

System and the Oracle MaxRep Replication Engine. The Replication Engine is connected to the customer's SAN network using 8 Gb/s FC connections.

The FC configuration requires two 8 Gb/s FC HBA to be installed in the PCI slots of the Replication Engine, in addition to the standard SAS RAID controller. The following figure indicates the HBAs that must be installed on the Replication Engine PCI slots for the FC configuration.

Figure 5: HBA ports for FC configuration



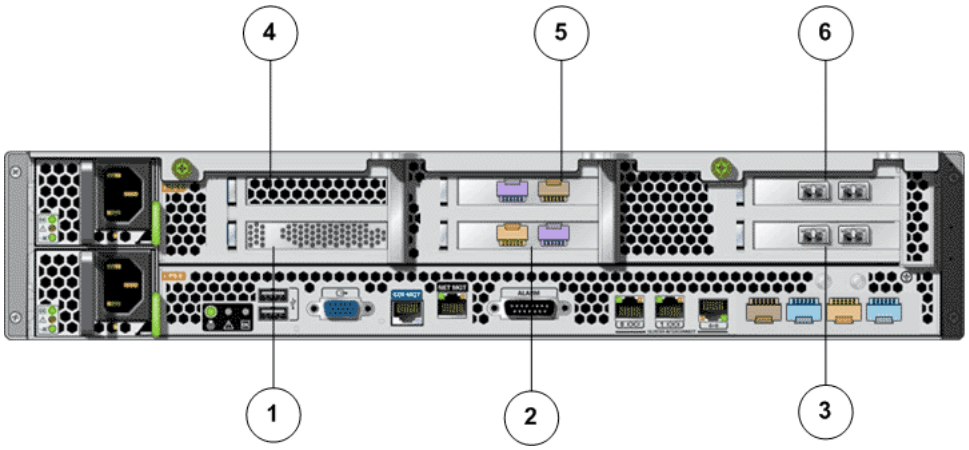
Legend		
	1 Slot 1: SAS RAID controller HBA	4 Slot 4: Empty
	2 Slot 2: Empty	5 Slot 5: Empty
	3 Slot 3: 8 Gb/s FC HBA	6 Slot 6: 8 Gb/s FC HBA

FC Configuration Using RJ45 Connectors

FC configuration using RJ45 connectors is used for implementations, where the Oracle FS System has FC SAN network connectivity. The FC configuration provides an FC SAN data path between the Oracle FS System and the Oracle MaxRep Replication Engine. The FC SAN data path is the primary data path for data transfers between the Oracle FS System and the Replication Engine. The Oracle MaxRep Replication Engine is connected to the customer's LAN using 1 Gb/s or 10 Gb/s RJ45 connections.

The FC configuration using RJ45 connectors requires two 8 Gb/s FC HBAs and two 10 Gb/s RJ45 HBAs to be installed in the PCI slots of the Replication Engine, other than the standard SAS RAID controller. The following figure indicates the HBAs that must be installed on the Replication Engine PCI slots for the FC configuration using RJ45 connectors.

Figure 6: HBA ports for FC configuration using RJ45 connectors



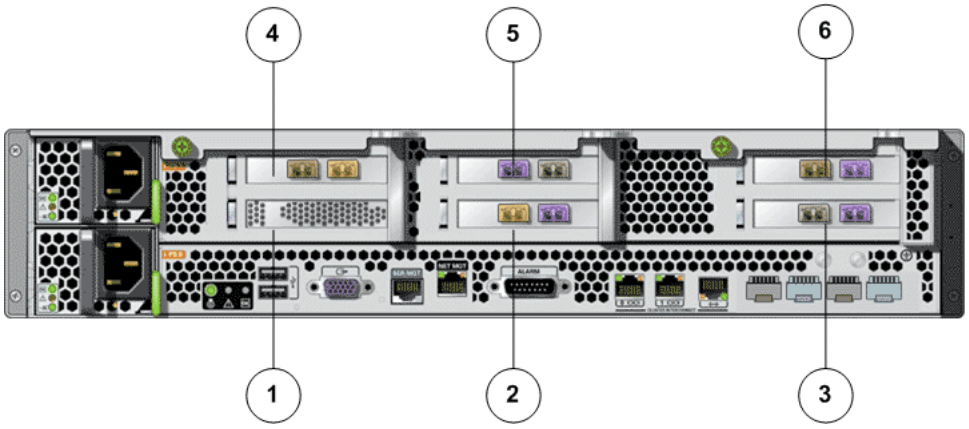
Legend		
	1 Slot 1: SAS RAID controller HBA	4 Slot 4: Empty
	2 Slot 2: 10 Gb/s RJ45 HBA	5 Slot 5: 10 Gb/s RJ45 HBA
	3 Slot 3: 8 Gb/s FC HBA	6 Slot 6: 8 Gb/s FC HBA

FC Configuration Using SFP or Optical Connectors

The FC configuration using SFP or optical connectors is used for implementations, where the Oracle FS System has FC SAN network connectivity. The FC configuration provides an FC SAN data path between the Oracle FS System and the Oracle MaxRep Replication Engine. The FC SAN data path is the primary data path for data transfers between the Oracle FS System and the Replication Engine. The Replication Engine is connected to the customer's LAN using 1 Gb/s or 10 Gb/s optical connections.

The FC configuration using SFP or optical connectors requires three 10 Gb/s SFP HBAs and two 8 Gb/s FC HBAs to be installed in the PCIe slots of the Replication Engine in addition to the standard SAS RAID controller. The following figure indicates the HBAs that must be installed on the Replication Engine PCIe slots for the redundant FC configuration using SFP or optical connectors.

Figure 7: HBA ports for FC configuration using SFP or optical connectors



Legend		
	1 Slot 1: SAS RAID controller HBA	4 Slot 4: 10 Gb/s SFP HBA
	2 Slot 2: 10 Gb/s SFP HBA	5 Slot 5: 10 Gb/s SFP HBA
	3 Slot 3: 8 Gb/s FC HBA	6 Slot 6: 8 Gb/s FC HBA

Ethernet Ports

Based on the configuration, there are four to 10 Ethernet ports on the Replication Engine.

The Ethernet ports on the Replication Engine are used for the following maintenance and management purposes:

- Administrator access to the Oracle MaxRep graphical user interface (GUI)
- Software installation and upgrades
- Management communication with other Replication Engines
- In an asynchronous replication, the transfer of replicated data and metadata between the source Replication Engine and the target Replication Engine
- Communication between Replication Engines and Oracle FS Systems
- Communication between Replication Engines and application servers

Fibre Channel Ports

The FC ports on the HBA of the Oracle MaxRep Replication Engine are used to access the primary and secondary LUNs on the Oracle FS Systems over the SAN fabric.

During synchronous replication, the FC ports allow access to both the source and target LUNs. During asynchronous replication, the FC ports on the Oracle FS System Replication Engine at the primary site allow access to the primary site LUNs and the FC ports on the Replication Engine at the secondary site allow access to the secondary site LUNs.

There are three types of FC ports on a Replication Engine:

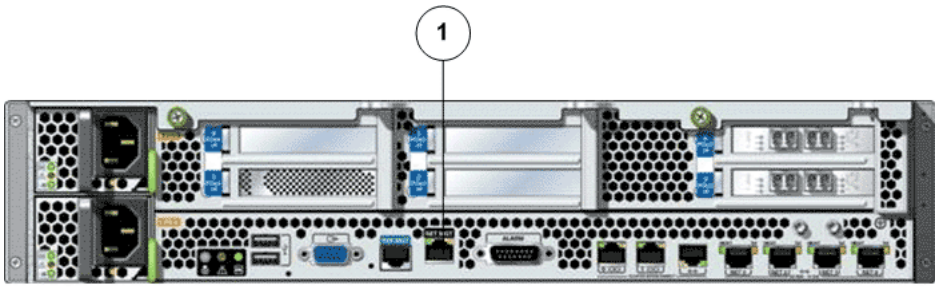
Appliance Initiator Source (AIS) ports or initiator ports for source LUNs:	Used for read-only access to the source LUN during the initial synchronization. The initiator port for source LUNs must be zoned to the Controller ports on the source and target Oracle FS Systems. AIS ports are virtual ports that are located on port 1 of each FC HBA on the Replication Engine.
Appliance Initiator Target (AIT) Ports or initiator ports for target LUNs:	Used for read and write access to the target LUN during the initial synchronization. The AIT ports are used for access to any LUNs that are mounted for use on the Replication Engine. The AIT ports are also used to write data to the source Oracle FS System during data recovery. The AIT ports are used for /home, /Retention, /Web, and /backup LUN mapping. The initiator for the target LUN mapping port must be zoned to the Controller ports on the source and target Oracle FS Systems. AIT ports are virtual ports that are located on port 1 of each FC HBA on the Replication Engine.
Appliance Target (AT) ports or target ports for the write splitter and the write mirror:	Used to accept IOs from the source Oracle FS System. The port on the Oracle FS System Controller behaves like an initiator port when it is used for replication. The AT ports are also used by hosts that access virtual snapshots on the Replication Engine. Target ports must be zoned to the source and target Oracle FS System Controller ports and to any hosts accessing virtual snapshots from the Replication Engine. AT ports are physical ports that are located on port 2 of each FC HBA on the Replication Engine.

Tip: Connect all the FC ports from each HBA to one SAN fabric. Connect HBAs to separate fabrics to minimize points of failure and to ensure redundancy.

ILOM Port

The Integrated Lights Out Manager (ILOM) port, a 100 Base-T Ethernet port, is used by Oracle Customer Support for remote management over TCP/IP to allow console access to the Replication Engine. The ILOM port also allows access to several management features like Call-Home, event logs, and system health information. The ILOM port is used for remote recovery after a component replacement within the Replication Engine or after other system recovery operations and for maintenance and software installation and upgrades.

Figure 8: ILOM port on the Replication Engine



Legend	1 ILOM port	

The ILOM port on the Replication Engine is connected to the customer management network and must be in the same subnet as the Oracle FS System.

Related Links

Log in to the Replication Engine Using the ILOM Port
Set the IP Address of the Workstation
Configure ILOM Network
Default Network Port Settings

Default Network Port Settings

The following table lists the default Ethernet and ILOM port settings:

Table 4: Default network port settings

Network port	Settings	Default value
ETH-0	IP	10.0.0.11
	Subnet mask	255.255.255.0
	Default gateway	10.0.0.1
	User ID	root
	Password	inScott!
ILOM	IP	10.0.0.12
	Subnet mask	255.255.255.0
	Default gateway	10.0.0.1
	User ID	root
	Password	changeme

Table 4: Default network port settings (continued)

Network port	Settings	Default value
MaxRep user interface (UI) access credentials	User ID	admin
	Password	password

Note: Ensure that the ILOM port configuration information is available before contacting Oracle Customer Support for assistance. To adhere to Oracle security best practices, the default ILOM password should be changed prior to connecting the ILOM port to the management network.

Related Links

Configure ILOM Network
Change Default ILOM Password

CHAPTER 3

Install the Replication Engine

Engine Component Unpacking and Inspection

The Oracle MaxRep Replication Engine is shipped in a single box, which includes a rail kit, two 9.84 feet (3 meter) power cords, a cable management arm (CMA), and other accessories in a pink polythene bag.

Caution: A Replication Engine weighs approximately 41 lbs. (18.59 kg). Use caution when lifting or installing it.

Caution: Before you handle a component, make sure that you have taken electrostatic discharge (ESD) precautions:

- The minimum requirement is an anti-static wrist strap connected to a hard ground. Remove components from their packaging and place them on an ESD-qualified table that is equipped with ground points for wrist straps.
- Static charges can build up rapidly on rolling carts. If you transport a hardware component by cart, ground the cart with a drag chain on an ESD floor. If there is no ESD cart available or ESD floor, ground yourself before you touch a component that has been transported on a cart.

Required Tools

Before starting the installation or servicing of a Replication Engine, be sure you have the required equipment and tools available.

Table 5: Required tools

Tool	Purpose	Illustration
Phillips-head Number 1 screwdriver and a Phillips-head Number 2 screwdriver	Remove and secure Replication Engine hardware components.	
Offset box wrench, 13/32 inches (10 millimeters)	Work with adjustable mounting rail assemblies.	
Torx® T20 screwdriver	Attach rail assemblies and secure hardware components to the rails.	
Wire cutters	Cut cable wraps on the power cords.	

Replication Engine Placement in the Rack

Several options are available for placing the Oracle MaxRep Replication Engine in the rack based on the number of Replication Engines that must be installed.

For rack-ready systems that include Oracle MaxRep Replication Engines, the following order for installing the components in the rack to match the factory configuration as closely as possible:

- First, install the Drive Enclosures starting from the bottom of the rack. The amount of RU space used by the Drive Enclosures varies by the number of Replication Engines that must be installed.

  If only one Replication Engine must be installed in the rack, install the Drive Enclosures until the 16 RU slot is reached.

  - After the 16 RU slot is reached, if the next Drive Enclosure to be installed is a 2U DE2-24P Drive Enclosure, install the DE2-24P Drive Enclosure into the rack at 17 RU and 18 RU. Then, install the Replication Engine at 19 RU and 20 RU.
  - After the 16 RU slot is reached, if the next Drive Enclosure to be installed is a 4U DE2-24C Drive Enclosure, install the Replication Engine at 17 RU and 18 RU.

  If two Replication Engines must be installed, install the Drive Enclosures until the 14 RU slot is reached.

  - After the 14 RU slot is reached, if the next Drive Enclosure to be installed is a 2U DE2-24P Drive Enclosure, install the DE2-24P Drive Enclosure into the rack at 15 RU and 16 RU. Then, install the first Replication Engine at 17 RU and 18 RU and install the second Replication Engine at 19 RU and 20 RU.
  - After the 14 RU slot is reached, if the next Drive Enclosure to be installed is a 4U DE2-24C Drive Enclosure, install the first Replication Engine at 15 RU and 16 RU. Then, install the second Replication Engine at 17 RU and 18 RU.

  If three Replication Engines must be installed, install the Drive Enclosures until the 12 RU slot is reached.

  - After the 12 RU slot is reached, if the next Drive Enclosure to be installed is a 2U DE2-24P Drive Enclosure, install the DE2-24P Drive Enclosure into the rack at 13 RU and 14 RU. Then, install the first Replication Engine at 15 RU and 16 RU. Install the second Replication Engine at 17 RU and 18 RU. Install the third Replication Engine at 19 RU and 20 RU.
  - After the 12 RU slot is reached, if the next Drive Enclosure to be installed is a 4U DE2-24C Drive Enclosure, install the first Replication Engine at 13 RU and 14 RU. Install the second

Replication Engine at 15 RU and 16 RU. Install the third Replication Engine at 17 RU and 18 RU.

If four Replication Engines must be installed, install the Drive Enclosures until the 10 RU slot is reached.

- After the 10 RU slot is reached, if the next Drive Enclosure to be installed is a 2U DE2-24P Drive Enclosure, install the DE2-24P Drive Enclosure into the rack at 11 RU and 12 RU. Then, install the first Replication Engine at 13 RU and 14 RU. Install the second Replication Engine at 15 RU and 16 RU. Install the third Replication Engine at 17 RU and 18 RU. Install the fourth Replication Engine at 19 RU and 20 RU.
- After the 10 RU slot is reached, if the next Drive Enclosure to be installed is a 4U DE2-24C, install the first Replication Engine at 11 RU and 12 RU. Install the second Replication Engine at 13 RU and 14 RU. Install the third Replication Engine at 15 RU and 16 RU. Install the fourth Replication Engine at 17 RU and 18 RU.

- Then, install the Pilots above the Replication Engines.
- Then, install the Controllers immediately above the Pilots.
- Then, install the remaining Drive Enclosures above the Controllers.
- Finally, install filler panels in all available RU spaces in the rack.

Contact Oracle Customer Support before power cycling a Oracle FS System system except in the event of an emergency. In an emergency, shut off all power and then contact Oracle Customer Support.

Replication Engine Pre-Installation Checklist

Various checks and actions need to be performed to install the Oracle MaxRep for SAN Replication Engine.

Note: Print this pre-installation checklist and check off each task after you complete it.

Table 6: Pre-installation checklist

Pre-installation tasks	
❑	Verify that you have all the components for assembly in the Replication Engine rail kit by matching the components with the parts list inside the package.
❑	Verify that you have all the required tools available for installation. Refer to the required tools listed in this guide.
❑	Verify that the anti-static wrist strap and the electro-static discharge (ESD) cart are available.
❑	Ensure that you have assistance in lifting the Replication Engine.

Table 6: Pre-installation checklist (continued)

Pre-installation tasks	
❑	Check that you have two power cables with IEC 320 C13 connectors. Verify that the source of the power supplies has the available capacity to carry the maximum load for the circuit.
❑	Verify that the circuit contains 120, 208, or 230 V power distribution units (PDUs).
❑	Check that you have two Fibre Channel (FC) connections to each of two storage area network (SAN) fabric switches.
❑	Check that you have access to the SAN fabric switches so that you can gather World Wide Port Name (WWPN) information and perform aliasing and zoning. **Note:** An alias is a descriptive name for a WWPN or port number, which makes the zone configuration much easier to read. Zoning is used as a method of access control for a SAN fabric to keep ports from communicating with one another. Refer to your SAN switch manufacturer's administrator guide for additional information on aliases and zoning.
❑	Check that you have two to nine Ethernet connections to the local area network (LAN) switches. Consult the wiring diagrams to determine the number of Ethernet connections required for your specific Replication Engine configuration.
❑	Check that you have the Replication Engine hostname.
❑	Check that you have the IP address, netmask, and the default gateway address for the Ethernet (ETH-0) port.
❑	Check that you have the IP address, netmask, and the default gateway address for the Integrated Lights Out Manager (ILOM) port.
❑	Check that you have the IP address of the domain name server (DNS) and the DNS domain name.
❑	Check that you have the IP address of the Network Time Protocol (NTP) server.
❑	If more than one Replication Engine must be installed for a high availability (HA) configuration, check that you have the IP address for the active and passive Replication Engine as well as an additional IP address for the high availability (HA) cluster. Additionally, you will also require a ping node and a multicast IP address for HA .
❑	Ensure that you have a copy of the Oracle MaxRep Replication Engine software for upload during installation.
❑	If the Replication Engine will be installed in a non-Oracle rack, verify that the non-Oracle rack will be compatible with the Replication Engine.
❑	Verify that the shipment for the Replication Engine has arrived at the site.
❑	Allow the system to acclimatize (power off) at the customer site.

Replication Engine Installation Checklist

Installation of an Oracle MaxRep Replication Engine is performed by Oracle Customer Support. Certain verifications and actions will be required for each Replication Engine during installation.

Note: Print this installation checklist and check off each task after you complete it.

Table 7: Installation checklist

Installation tasks	
❑	Unpack the shipment and inspect all components.
❑	Unpack the Replication Engine outside the data center to ensure that no contamination or dust is released.
❑	Verify that all packing material has been removed and nothing is blocking the fans and air vents.
❑	Gather all the excess spare parts like cables and documentation together.
❑	Always load equipment into a rack from the bottom upwards so that it will not become top-heavy and tip over. Deploy the rack's anti-tilt bar to prevent the rack from tipping during equipment installation.
❑	Install the rack rails and the Replication Engine in the rack.
❑	Launch a remote session to the Integrated Lights Out Manager (ILOM) port. Configure the Integrated Lights Out Manager (ILOM) port password using a laptop prior to connecting the Replication Engine to the customer network using the steps outlined in the ILOM Security Guide..
❑	Label all the cables clearly and use cable binders.
❑	Connect all Fibre Channel (FC) and Ethernet cables as described in this guide.
❑	Configure the operating system on the Oracle MaxRep Replication Engine. It is important that the Replication Engine has the correct IP addresses upon installation.
❑	Install the correct software version and apply all the required patches and or hotfixes for Oracle MaxRep for SAN.
❑	Verify browser access to the Oracle MaxRep for SAN graphical user interface (GUI) and the command line interface (CLI) for the Replication Engine.

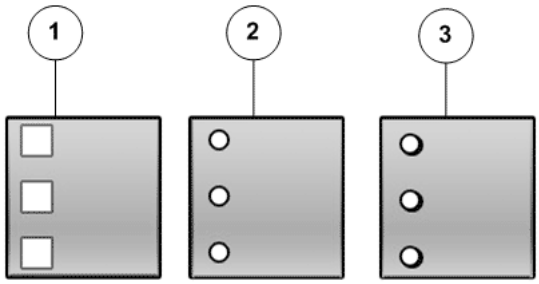
Installing the Replication Engine Rails

Adding Oracle MaxRep Replication Engines in the rack requires you to install rack rails in the rack and slide rails on the chassis for each Replication Engine that you plan to add.

Replication Engine rail kits can be installed in the Sun Rack 900, the Sun Rack 1000, and third-party ANSI/EIA 310-D-1992 or IEC 60927 compliant racks with the following types of holes:

- Square
- Round
- Threaded

Figure 9: Examples of supported rack holes



Legend	1 Square holes	2 Round holes
	3 Threaded holes	

Related Links

Install the Rack Rails for the Replication Engine
Install the Replication Engine CMA
Insert the Replication Engine Into a Rack
Replication Engine Rail Kit Parts

Replication Engine Rail Kits

The Replication Engine rail kit contains the following items:

- One slide rail that attaches to the rack posts
- One mounting bracket that attaches to the Replication Engine chassis
- CMA with six pre-installed cable clips
- Package of mounting screws and nuts in assorted sizes to fit various types of racks and cabinets
- Manufacturer's instruction sheet for the CMA

The following table summarizes the mounting hardware packaged with the Replication Engine rail kits.

Table 8: Replication Engine rail kit mounting screws

Packet Contents	Quantity	Usage
10-32 pan head screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 pan head screw	4	Mount left and right rails to front of cabinet rails
Metric M6 pan head screw	8	• Mount left and right rails to back of cabinet rails • Secure front of chassis to left and right cabinet rails
6–32 flat head screw	2	Secure back of chassis to left and right side rails

Tip: Ensure that you have all of the parts in the Replication Engine rail kit before you begin the installation of the Replication Engine rails on the rack and the Replication Engine chassis.

Note: To locate part numbers for the rail kits, open *Oracle System Handbook* (https://support.oracle.com/handbook_private/index.html) and go to the Oracle FS1 Flash Storage System components list. Part numbers are listed in the components list.

Install the Rack Rails for the Replication Engine

Prior to adding Replication Engines, install rails into the rack for each Replication Engine that you plan to add.

Prerequisites:

- Ensure that you have adequate room to work around the rack while installing the rails and the Replication Engine.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- If you are installing the rails in a rack with threaded holes, make sure you have a Torx Number 20 screwdriver.

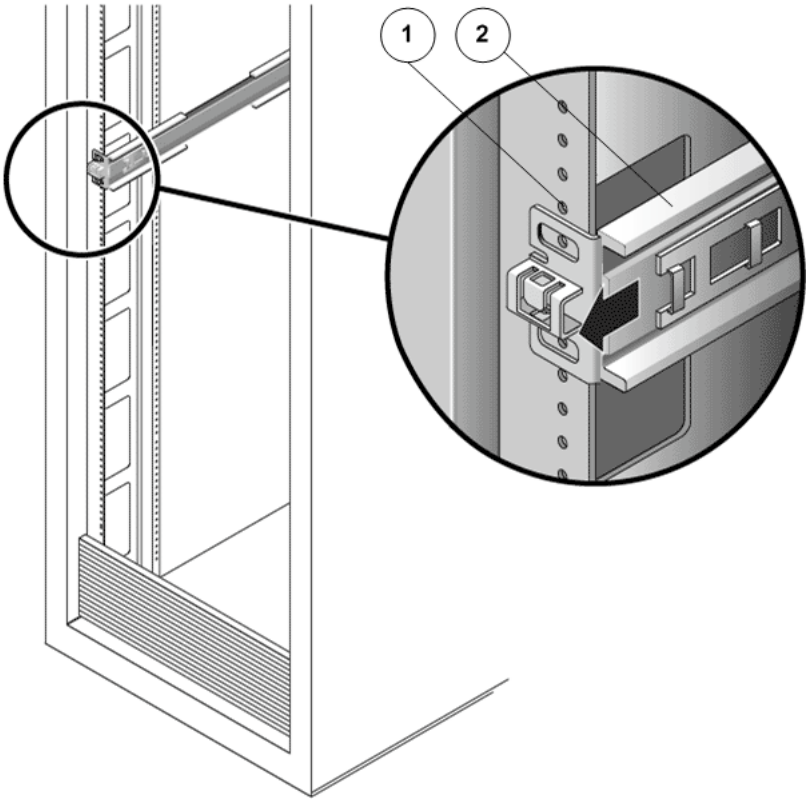
1. Mark the rack mount hole where you plan to mount the Replication Engine.

The Replication Engine requires two standard rack units (2U) of vertical space.

2 Remove the rails from the packaging.

3 Position the front of the left rail behind the left front rack rail.

Figure 10: Replication Engine rack mount location



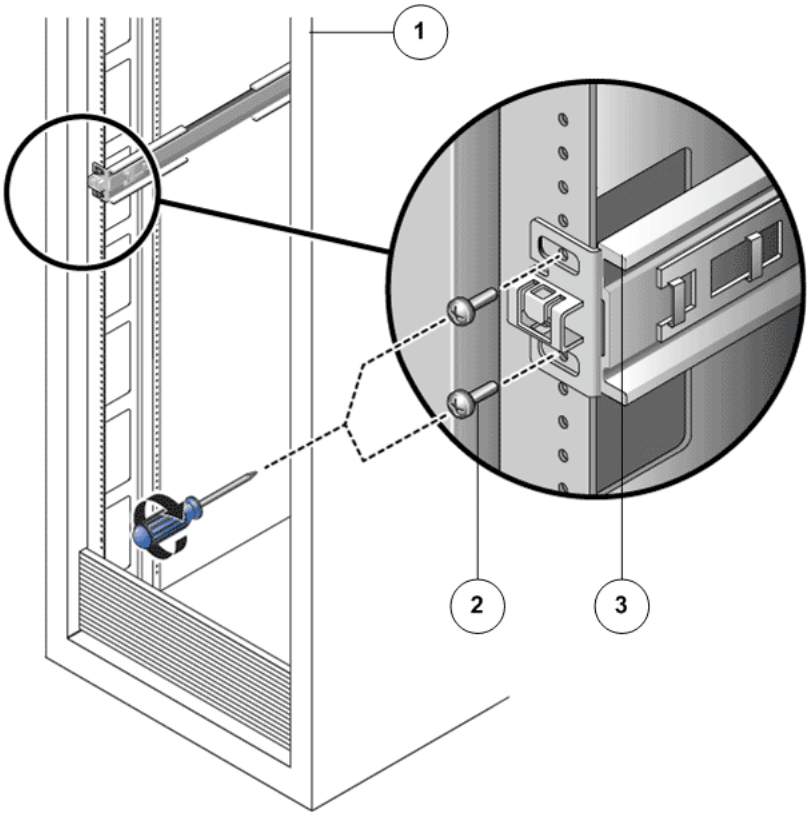
Legend	1 Rack mount holes	2 Left rail

4 Use a Phillips Number 2 screwdriver to insert and tighten two 8-32 panhead screws to secure the left rail to the front of the rack.

Note: Each Replication Engine requires two standard mounting units (2U) of vertical space in the rack. Each standard mounting unit (U) has three mounting holes in the left and right rack rails.

Note: Insert the screws into the lowest holes in the top two mounting units of the 2U slot in which the chassis is to be mounted. These screws pass through the rack rail holes and screw into threaded holes in the left rail.

Figure 11: Left rail secured to the front of the rack

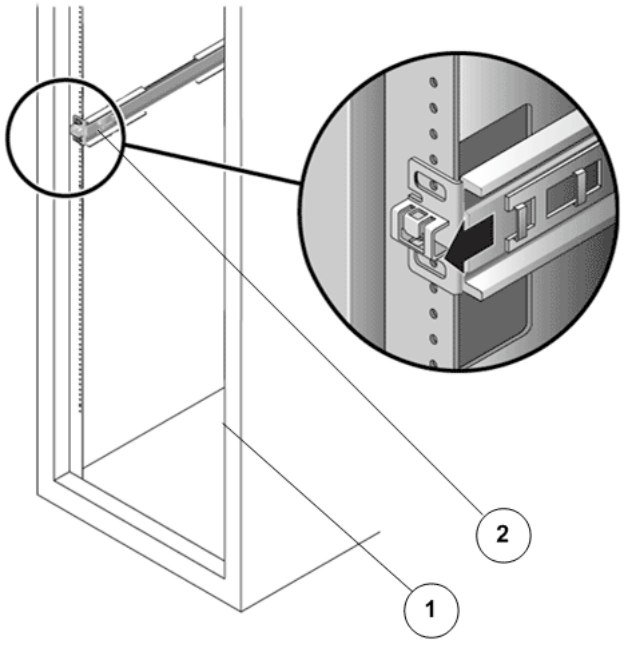


Legend		
	1 Rack	2 8–32 screws to secure left rail to rack
	3 Left rail	

5 Repeat the above two steps for the right rail.

6 At the back of the rack, adjust the length of the left rail as needed to fit the rack, and position the rail flange over the face of the rack rail.

Figure 12: Left rail adjusted at the back of the rack



Legend	1 Back of the rack	2 Left rail

7 Align the rail flange so that the mounting holes correspond to those at the front of the rack.

8 Use a Phillips screwdriver to insert and tighten four metric M6 screws (two on each side) at the back of the rail.

9 Repeat the above three steps for the right rail.

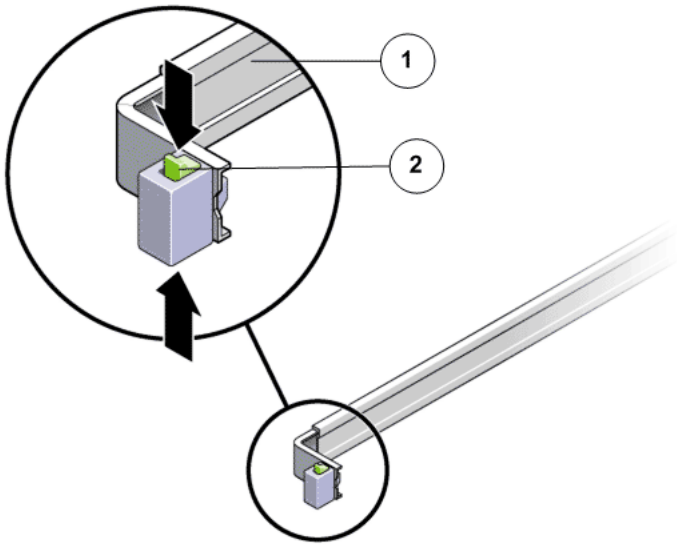
10 Using a Phillips Number 2 screwdriver, tighten the eight 10-32 panhead adjustment screws (four on each side) toward the back of each rail.

Install the Slide Rails for the Replication Engine

1 Extend the mounting brackets completely out of their respective slide rails.

Tip: To extend the mounting brackets out of the slide rails, simultaneously press and hold the upper and lower lock buttons of the slide rail lock. Then, pull the mounting bracket out until it locks in the extended position.

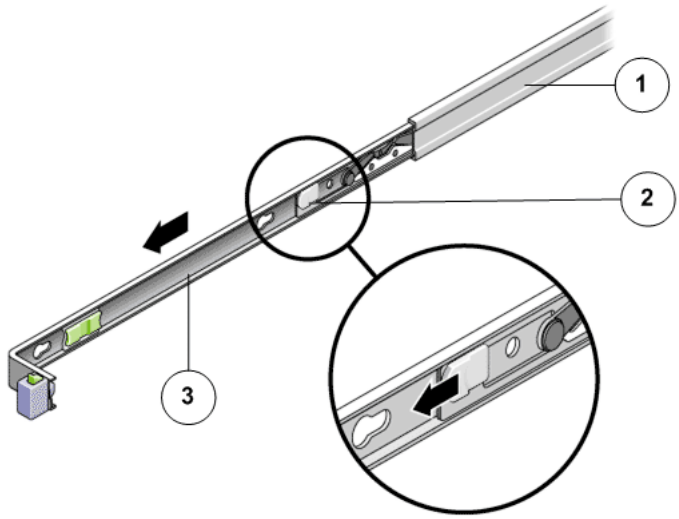
Figure 13: Slide rail assembly unlocked



Legend	1 Slide rail assembly	2 Slide rail lock button

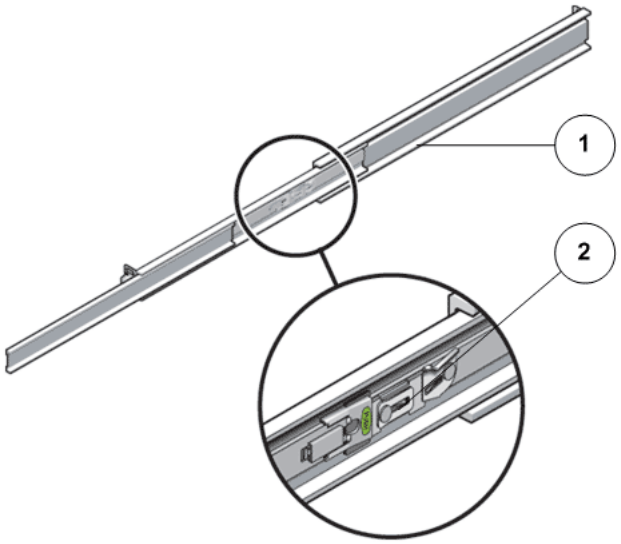
2 Slide the mounting bracket release button, and then slide the mounting bracket out of the slide rail.

Figure 14: Mounting bracket release button



Legend	1 Slide rail	2 Mounting bracket release button
	3 Mounting bracket	

Figure 15: Slide rail middle section unlocked

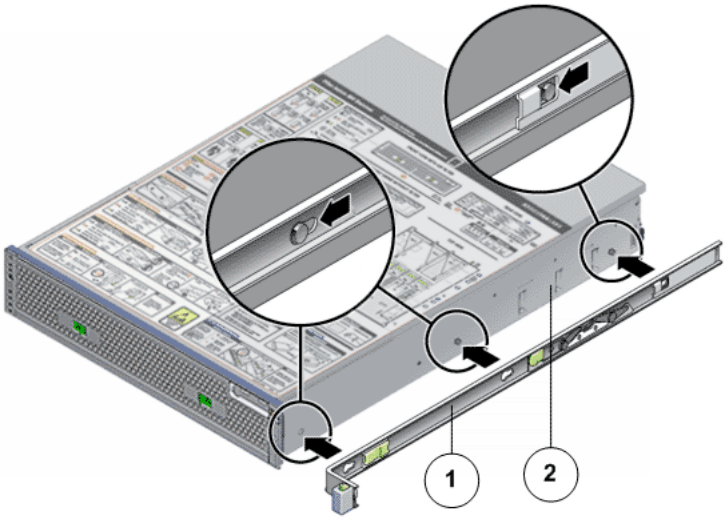


Legend	1 Slide rail	2 Metal lever

Tip: Press the metal lever on the middle section of the slide rail to unlock the slide rail, and then push the middle section back into the rack.

3 Attach a mounting bracket to the right side of the Replication Engine chassis.

Figure 16: Mounting bracket attached to the chassis



Legend	1 Mounting bracket	2 Replication Engine chassis

Tip: Position the mounting bracket against the Replication Engine chassis so that the slide rail lock is at the front and the three keyed openings on the mounting bracket are aligned with the three locating pins on the side of the chassis. With the heads of the three locating pins protruding though the three keyed openings in the mounting bracket, pull the mounting bracket toward the front of the chassis until the bracket locks into place with an audible click.

4 Attach the second mounting bracket to the left side of the Replication Engine chassis.

5 Determine which rack hole numbers to use when attaching the slide rails to the rack posts.

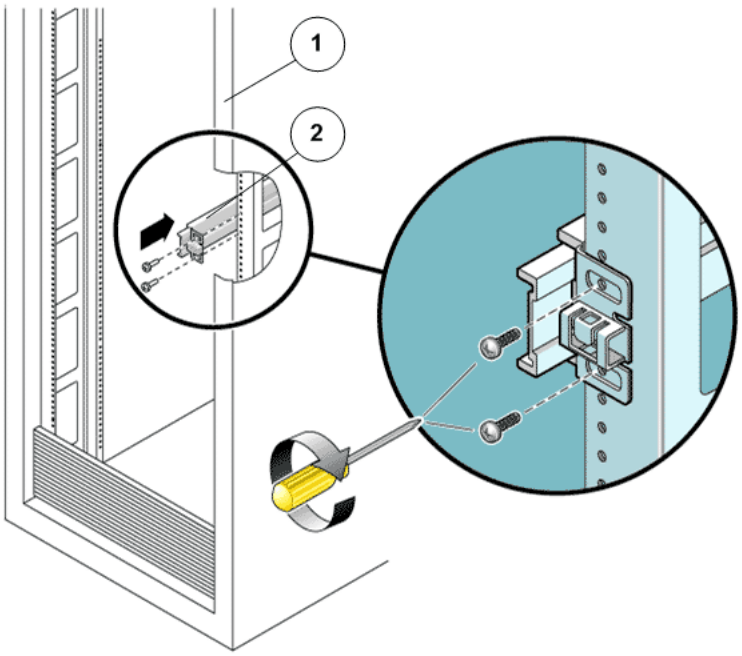
Note: The Replication Engine is two rack units tall (2U). The slide rails will occupy the lower half of the 2U space.

6 Determine which screws you will use to mount the slide rails.

Tip: If your rack has threaded mounting holes in the rack posts, determine whether the threads are metric or standard. Select the appropriate screws from the package included in the mounting kit. If your rack does not have threaded mounting holes, the mounting screws are secured with a caged nut.

7 Attach a slide rail to the right front rack post.

Figure 17: Slide rail mounted on the rack post



Legend	1 Rack post	2 Slide rail

Tip: Loosely attach the front of a slide rail to the right front rack post using two screws but do not tighten the screws yet. Adjust the length of the slide rail by sliding the back mounting flange to reach the outside edge of the

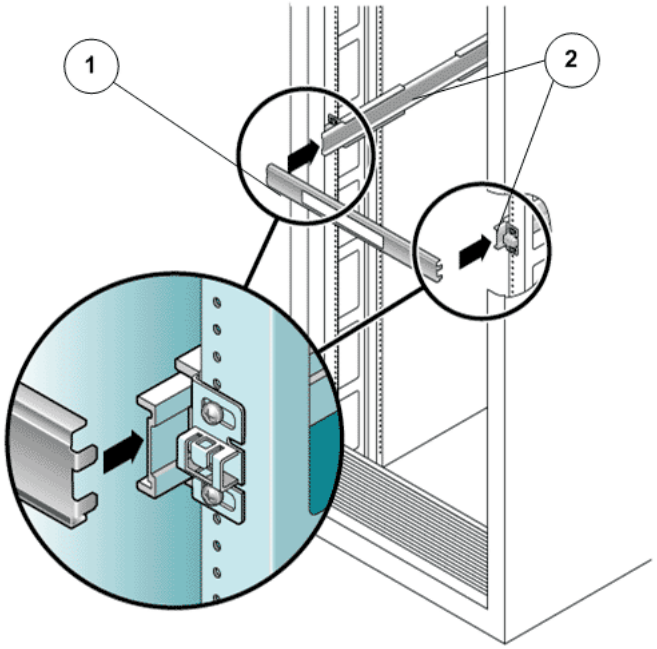
back rack post. Loosely attach the back of the slide rail to the back rack post with two screws.

8 Attach the second slide rail to the left rack posts in a similar manner.

Tip: Do not tighten the screws.

9 Use the slide rail spacing tool to adjust the distance between the slide rails.

Figure 18: Slide rail spacing tool



Legend	1 Spacing tool	2 Slide rails

Tip: At the front of the rack, plug the left side of the tool into slots at the end of the left rail. Insert the right side of the tool into the front end of the right rail, while sliding the end of the rail to the right or left as needed to allow the ends of the tool to enter the ends of both rails. The distance between the rails is now equal to the width of the Replication Engine with mounting brackets.

10 Tighten the screws to lock the front ends of the rails in place.

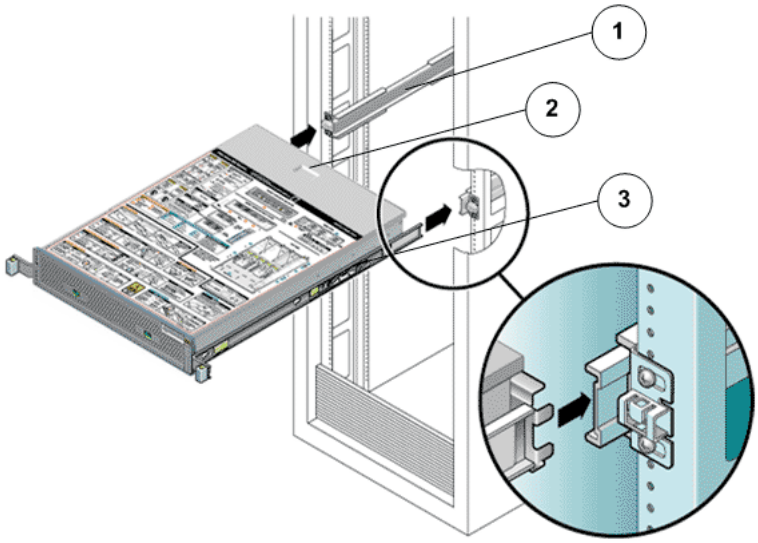
11 Repeat the steps for the back ends of the rails.

12 Deploy the anti-tilt mechanism on the rack, if any.

Caution: The weight of the Replication Engine on extended slide rails can be enough to overturn a rack.

13 Insert the ends of the mounting brackets into the sliding rails.

Figure 19: Replication Engine chassis mounted on the slide rails



Legend	1 Slide rails	2 Replication Engine chassis
	3 Mounting brackets	

Caution: Work with a partner or use a mechanical lift for assistance. The Replication Engine weighs approximately 70 lbs (31.75 kg). Two people are required to carry the chassis.

14 Simultaneously release the rail locks on each side of the sliding rails, and guide the Replication Engine chassis into the rack.

Caution: Verify that the Replication Engine is securely mounted in the rack, and that the slide rails are locked to the mounting brackets, before continuing.

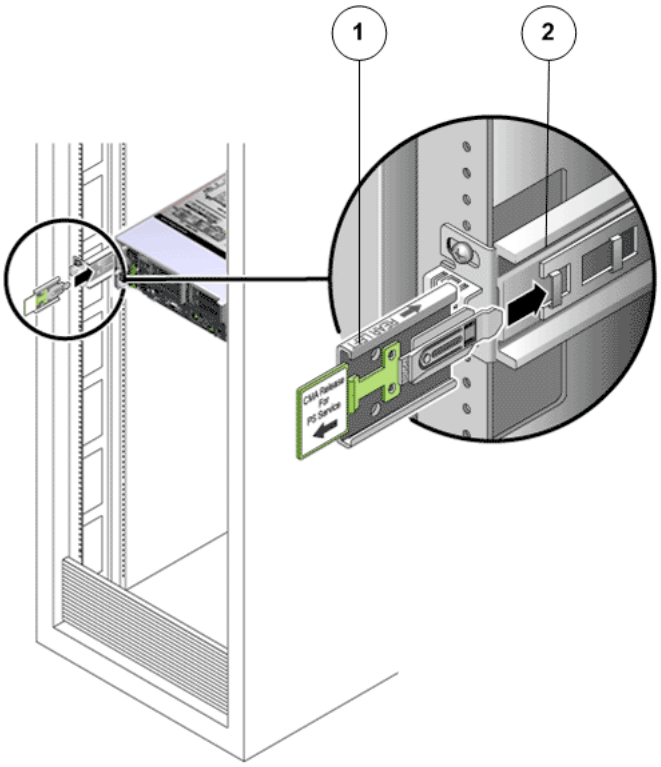
Install the Replication Engine CMA

The cable management arm (CMA) clips into the ends of the left and right Replication Engine slide rail assemblies. No screws are necessary for mounting the CMA. The right sides of the two CMA arms have hinged extensions. On the manufacturer's instruction sheet, the smaller extension is called the CMA Connector for Inner Member. It attaches to the right mounting bracket. The larger extension is called the CMA Connector for Outer Member, and attaches to the right sliding rail.

Note: The CMA shown in the graphics might vary slightly from the CMA shipped with your product.

1 At the back of the rack, plug the CMA rail extension into the end of the left slide rail assembly.

Figure 20: CMA rail extension inserted into the back of the left slide rail

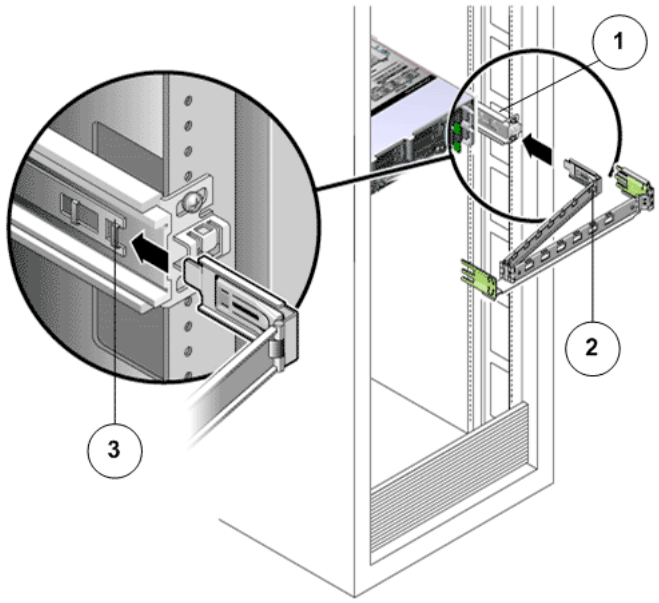


Legend	1 CMA rail extension	2 Slide rail

Caution: Support the CMA during this installation. Do not allow the assembly to hang by its own weight until it is secured by all three attachment points.

2 Insert the smaller extension into the clip located at the end of the mounting bracket.

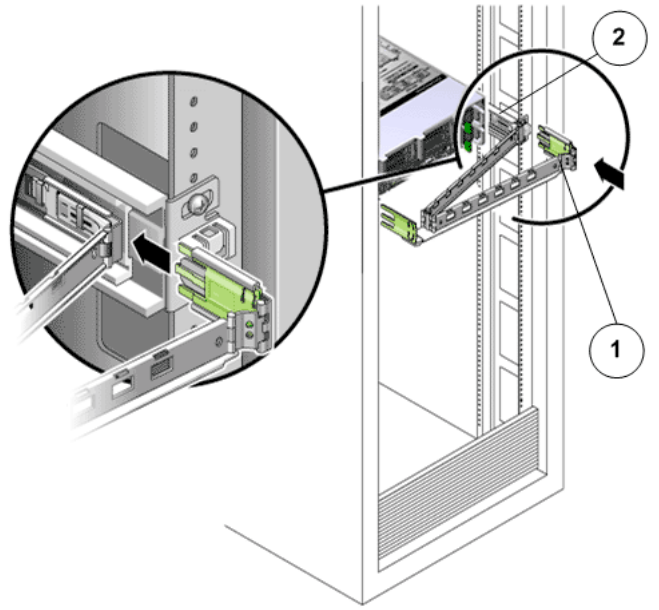
Figure 21: Inner CMA connector mounted



Legend	1 Slide rail	2 Inner CMA connector
	3 Clip	

3 Insert the outer CMA connector into the end of the right sliding rail.

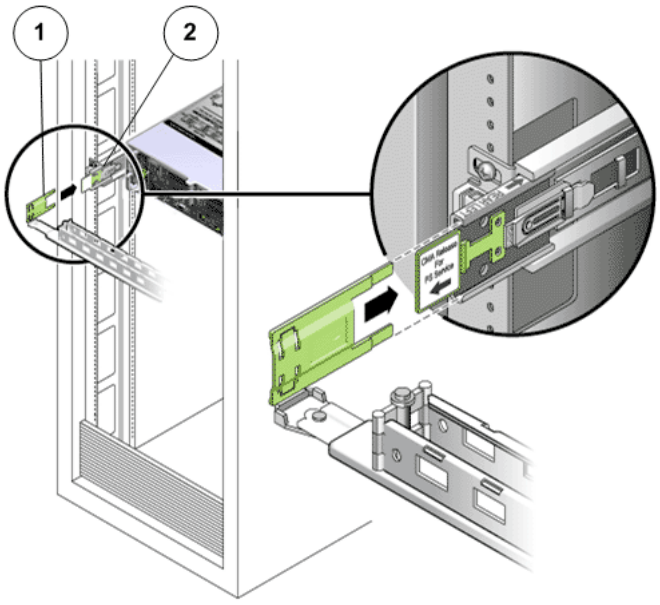
Figure 22: Outer CMA connector attached



Legend	1 Outer CMA connector	2 Slide rail

4 Fully insert the hinged plastic connector at the left side of the CMA into the CMA rail extension.

Figure 23: Left side of the slide rail mounted



Legend	1 Plastic tab on CMA rail extension	2 Slide rail

Verify Operation of the Slide Rails and the CMA

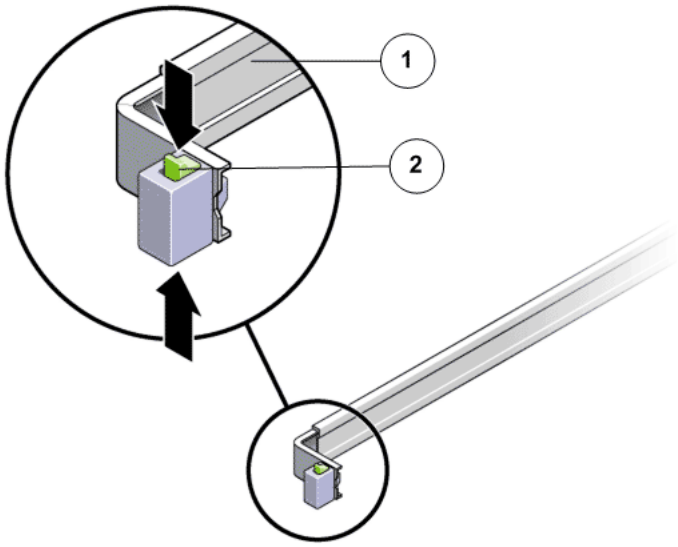
Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Two people are needed to verify the operation of the slide rails and the cable management arm (CMA): one to move the Replication Engine in and out of the rack and one to observe the cables and CMA.
- To reduce the risk of personal injury, stabilize the expansion rack cabinet and extend all anti-tilt devices before extending the Replication Engine from the rack.

Caution: Work with a partner or use a mechanical lift for assistance. The Replication Engine weighs approximately 70 lbs (31.75 kg). Two people are required to unmount and carry the chassis.

1 Unlock the slide lock buttons at the right and left sides of the Replication Engine chassis, and slowly pull the Replication Engine out of the rack until the slide rails reach their stops.

Figure 24: Replication Engine slide rails unlocked



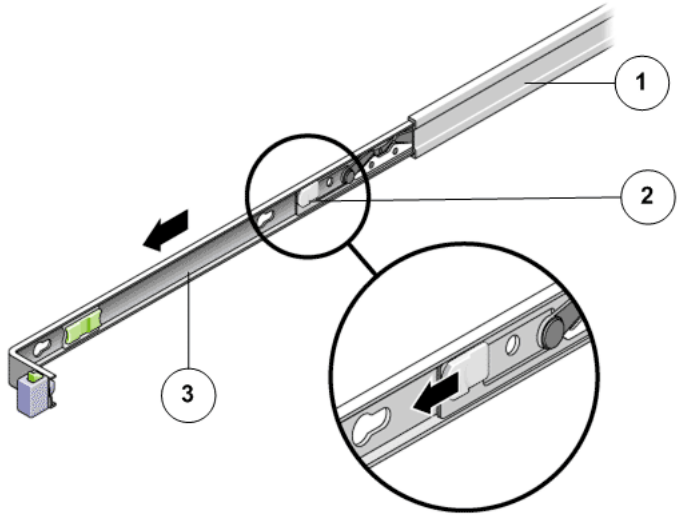
Legend	1 Slide rail assembly
	2 Slide rail lock button

2 Inspect the attached cables for any binding or kinks.

3 Verify that the CMA extends fully and does not bind in the slide rails.

4 When the Replication Engine is fully extended out, release the mounting bracket release button.

Figure 25: Mounting bracket release button

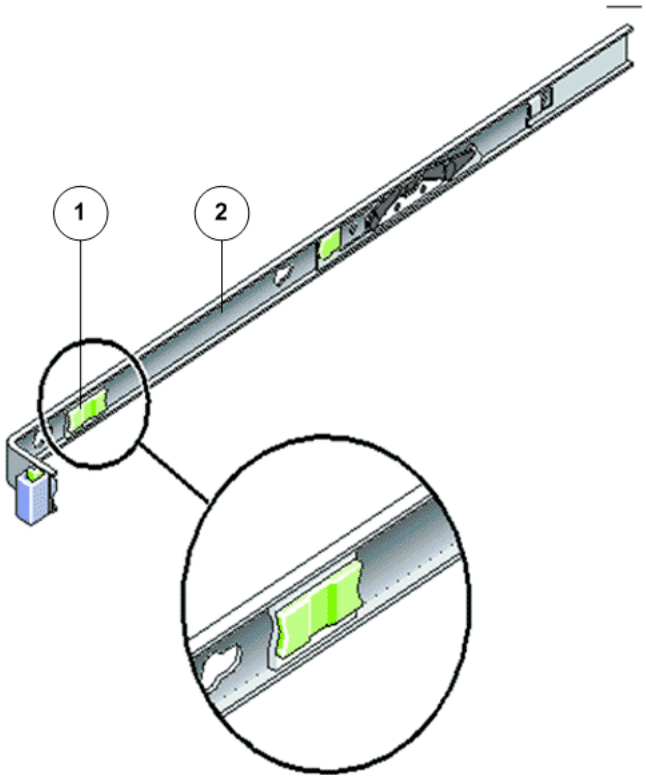


Legend	1 Slide rail
	2 Mounting bracket release button
	3 Mounting bracket

5 Slide the Replication Engine back into the rack.

6 Simultaneously unlock both slide rail release buttons, and push the Replication Engine completely into the rack.

Figure 26: Slide rail release button



Legend	1 Slide rail release button
	2 Slide rail

Note: The Replication Engine should stop after approximately 15 inches (40 cm) of travel.

7 Verify that the cables and the CMA retracted without binding.

8 Adjust the cable hangers and CMA as required.

Insert the Replication Engine Into a Rack

Prerequisites:

- Ensure that you have a magnetic-tipped Phillips Number 2 screwdriver with at least a four-inch shank.

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and ensure that you have an ESD mat. Stand on the ESD mat while replacing components.

Caution: Do not power on the Replication Engine until after you have connected the Replication Engine to the network.

Caution: Work with a partner or use a mechanical lift for assistance. The Replication Engine weighs approximately 70 lbs (31.75 kg). Two people are required to unmount and carry the chassis.

Caution: Deploy any rack anti-tilt mechanisms before installing the Replication Engine into the rack to prevent the rack from tipping over during component installation.

Caution: Always load equipment into a rack from the bottom up so that the rack will not become top-heavy and tip over.

Caution: Slide-rail-mounted components are not to be used as a shelf or a workspace.

Caution: Elevated operating ambient temperature: If the Replication Engine is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment might be greater than room ambient temperature. Therefore, consideration should be given to installing the components in an environment compatible with the maximum ambient temperature (TMA) specified for the Replication Engine.

Caution: Reliable earthing: Maintain reliable earthing of rack-mounted components. Pay particular attention to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Caution: Circuit overloading: Consideration should be given to the connection of the component to the supply circuit and the effect that overloading of the circuits might have on supply wiring. Appropriate consideration of component power ratings should be used when addressing this concern.

Caution: Reduced airflow: Installation of the components in the rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.

Caution: Mechanical loading: Mounting of the components in the rack should be such that a hazardous condition is not created due to uneven mechanical loading.

1 Using two people, one at each side of the Replication Engine, carefully lift and position the Replication Engine on the bottom ledge of the left and right rails.

Note: Do not use the power supply handles to lift the chassis. Using the power supply handles to lift the chassis can damage the power supplies and disrupt electrical power to the Replication Engine.

2. Carefully slide the Replication Engine into the rack until the front flanges of the Replication Engine touch the vertical face of the rack.
3. Use a Phillips screwdriver to install and tighten the four M6 panhead screws (two on each side) to secure the chassis to the front of the rack.
4. Install and tighten two 6-32 screws (one on each side) at the back of the chassis, to secure the back of the chassis to the rack.

Related Links

Replication Engine Placement in the Rack
Engine Component Unpacking and Inspection
Install the Rack Rails for the Replication Engine
Install the Slide Rails for the Replication Engine
Install the Replication Engine CMA
Replication Engine Pre-Installation Checklist
Replication Engine Installation Checklist

CHAPTER 4

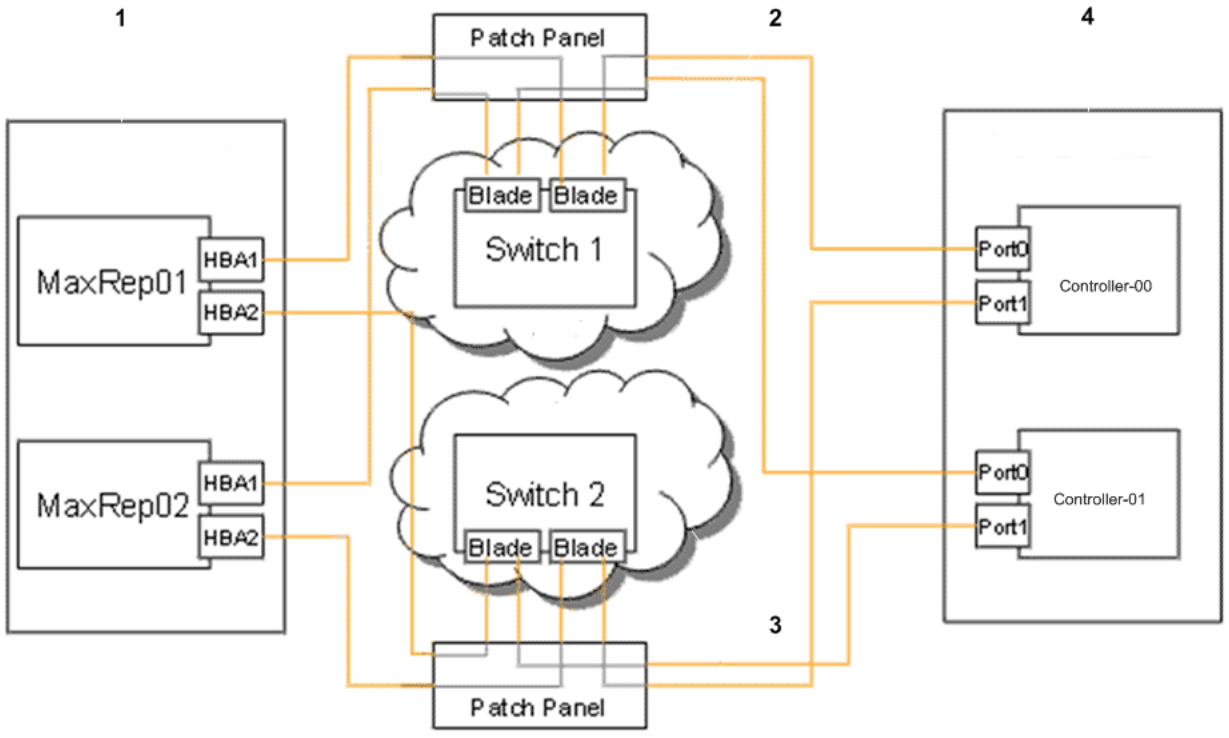
Cable the Replication Engine

Cabling Overview for the Replication Engine

Typical customer configurations include Replication Engines with redundant HBAs connected to the ports on the Oracle FS System Controller through redundant SAN switches. All ports of one HBA in the Replication Engine connect to the same SAN switch fabric, while all ports of the redundant HBA connect to an alternate SAN switch fabric.

The following figure illustrates the cabling connections of the Replication Engines in a typical Oracle MaxRep for SAN configuration.

Figure 27: Typical cabling connections of Oracle MaxRep Replication Engines



Legend		
	1 MaxRep high availability cluster with two redundant Replication Engines	3 SAN fabric switch 2
	2 SAN fabric switch 1	4 Oracle FS System Controllers

Following cables are required to connect the Replication Engine in the rack.

Table 9: Cables

Type	Description	Cable length
Fibre Channel (FC) patch cables	Connect the FC ports at the back of the Replication Engine to the SAN Switch or SAN fabric to which the Oracle FS System is connected. These cables provide connectivity to the Oracle FS System for replication.	50/125 optical FC have a distance limit of 164.04 feet (50 meters) for 8 Gb/s fabric speed.
Ethernet cables	Connect the Ethernet ports on the Replication Engine to management network switches for management and to create NIC bonding for port virtualization.	1Gb/s Twisted Pair 10 Gb/s Twisted Pair 1 Gb/s Optical 10 Gb/s Optical

The Replication Engine user interface is web-based and can be accessed through an HTTP server running on port 80. The following table summarizes the firewall rules that must be configured:

Table 10: Firewall configuration

Purpose	Replication Engine	Primary LUN	Secondary LUN
User Interface	Inbound HTTP		
Default: TCP Port 80	N/A	N/A	N/A
Configuration	Inbound HTTP		
Configuration Management: Port 3306	N/A	N/A	N/A
Default: TCP Port 80	N/A	N/A	N/A
Or TCP (21 + configured passive port range)	N/A	N/A	N/A
Or TCP (20 + 21)	Outbound FTP or (>1024)	Outbound FTP or (>1024)	N/A
Data resync	Inbound TCP Port 873	N/A	N/A
FX data (Push)	N/A	N/A	N/A
FX data (Pull)	N/A	N/A	N/A

Note: Optionally, port 162 can be used through the fire-wall for SNMP traffic.

The following ports must be enabled for installation and deployment:

Table 11: Firewall configuration during installation

Purpose	Firewall configuration
Linux	VNC server with VNC viewer (Port: 5500) Secure shell (SSH) (Port: 22)
Windows	Remote desktop connection or terminal client (3389) PC Anywhere (TCP 5631, UDP 5632)

Related Links

Cable the Oracle MaxRep Replication Engine
Oracle MaxRep Replication Engine Wiring Diagrams
Cabling Guidelines for the Replication Engine

Cabling Guidelines for the Replication Engine

Follow these guidelines when cabling an Oracle MaxRep Replication Engine.

- Make sure that the cable is not too taut to avoid strain on the connectors.
- Run the data cables along the side of the rack that is opposite from the power cables. Placing the Ethernet cables next to the power cables can result in signal interference.

  Note: If power and data cables cross, they must cross at right angles.
- Use only soft velcro or equivalent ties for routing or grouping data cables. Do not use hard plastic ties or other hard cinching type of wraps. Using hard plastic ties can cause performance degradation and cable damage.
- Do not bend the cables beyond its minimum bend radius (MBR). MBR is the tightest bend that the cable can safely tolerate during or after installation. The MBR for all data cables is two inches (5.1 cm).
- If you do not know the MBR, do not bend the cable to a radius of less than two inches (5.1 cm). Also, the permanent bend radius of the cable is usually larger than the temporary bend radius.
- Do not pull the cables using a mechanical device. If you need to pull a cable, pull by hand.
- String cables with service loops so that it is possible to remove components without removing the cables.
- Ensure no damage occurs during cable routing by not leaving cables exposed in high traffic areas.

- Do not set any hardware components or other objects on top of the cables.
- Do not let the cables get pinched by closed doors or door lock hardware. Do not twist the cables.
- Do not wrap the fiber optic cables around your hands, arms, or shoulders, as this may result in causing sharp bends or a small coiling radius. This can also impart a twist to the cable upon uncoiling.
- Ensure that all cables are labeled correctly.

Note: Ethernet and fibre channel (FC) cables are not shipped with the Replication Engines. Cables must be ordered separately.

Note: We recommend 50/125 multi-mode optical cable for data paths. However, we also support a 62.5/125 core diameter for the multi-mode optical cables, if the cable distance limitations are followed.

Cable the Oracle MaxRep Replication Engine

Connect the ports as indicated below to cable the Oracle MaxRep Replication Engine.

Prerequisites:

- Refer to the site preparation plan to identify the Oracle MaxRep for SAN configuration to deploy before installing or cabling the Oracle MaxRep Replication Engine.
- Identify the Ethernet ports that are to be used on the Replication Engine.
- Obtain a range of IP addresses for the Replication Engine Ethernet ports.
- Ensure that the customer's network firewalls are configured to permit access to the Integrated Lights Out Manager (ILOM) interface.

- Refer to the site preparation plan to identify the Oracle MaxRep for SAN configuration to deploy before installing or cabling the Oracle MaxRep Replication Engine.
- Identify the Ethernet ports that are to be used on the Replication Engine.
- Obtain a range of IP addresses for the Replication Engine Ethernet ports.
- Ensure that the customer's network firewalls are configured to permit access to the Integrated Lights Out Manager (ILOM) interface.

1 Connect the Ethernet ports to the management network switches.

Needed connections:

Ethernet port (ETH-0) and (ETH-2) of the Replication Engine must be connected to the management network switches using Cat5e Ethernet cables.

Note: ETH-2 is connected for redundant port bonding. If ETH-2 is not connected, only ETH-0 is used for management communications. In case of port bonding (FC-only), the Ethernet port (ETH-1) may be connected to the management network.

2 Connect the ILOM port to the management network to permit remote serviceability.

The ILOM port is required for Call-Home functionality. Not connecting or configuring the ILOM port for the management network prevents notification of hardware failures.

3 Connect all four ports of HBA1 on the Replication Engine to the customer's main Fibre Channel (FC) fabric.

In a dual fabric environment, connect both FC ports of HBA2 to the alternate FC fabric.

Note: To ensure that the Replication Engine can recover from SAN fabric failures, two HBAs are required on each Replication Engine.

Related Links

Cabling Overview for the Replication Engine
Cabling Guidelines for the Replication Engine
Oracle MaxRep Replication Engine Wiring Diagrams

Oracle MaxRep Replication Engine Wiring Diagrams

Use the appropriate wiring diagram for your replication configuration to cable the Oracle MaxRep Replication Engine.

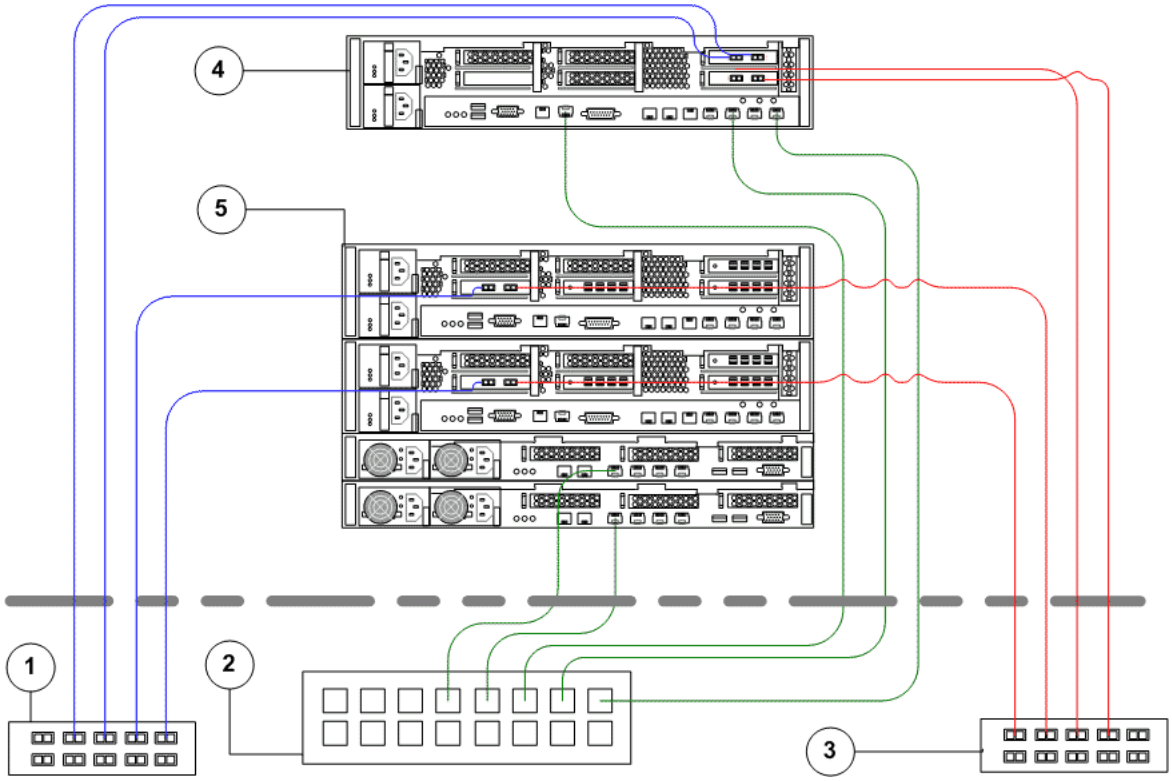
The wiring diagrams below represent the following Oracle MaxRep for SAN configurations:

- Fibre Channel (FC) configuration
- iSCSI configuration using RJ45 connectors
- FC and iSCSI configuration using RJ45 connectors
- iSCSI configuration using SFP or optical connectors
- FC and iSCSI configuration using SFP or optical connectors

The following figure provides information on the cable connections with FC configuration.

Note: The dotted line in the following illustrations separate the Oracle FS System hardware from the customer environment.

Figure 28: FC configuration

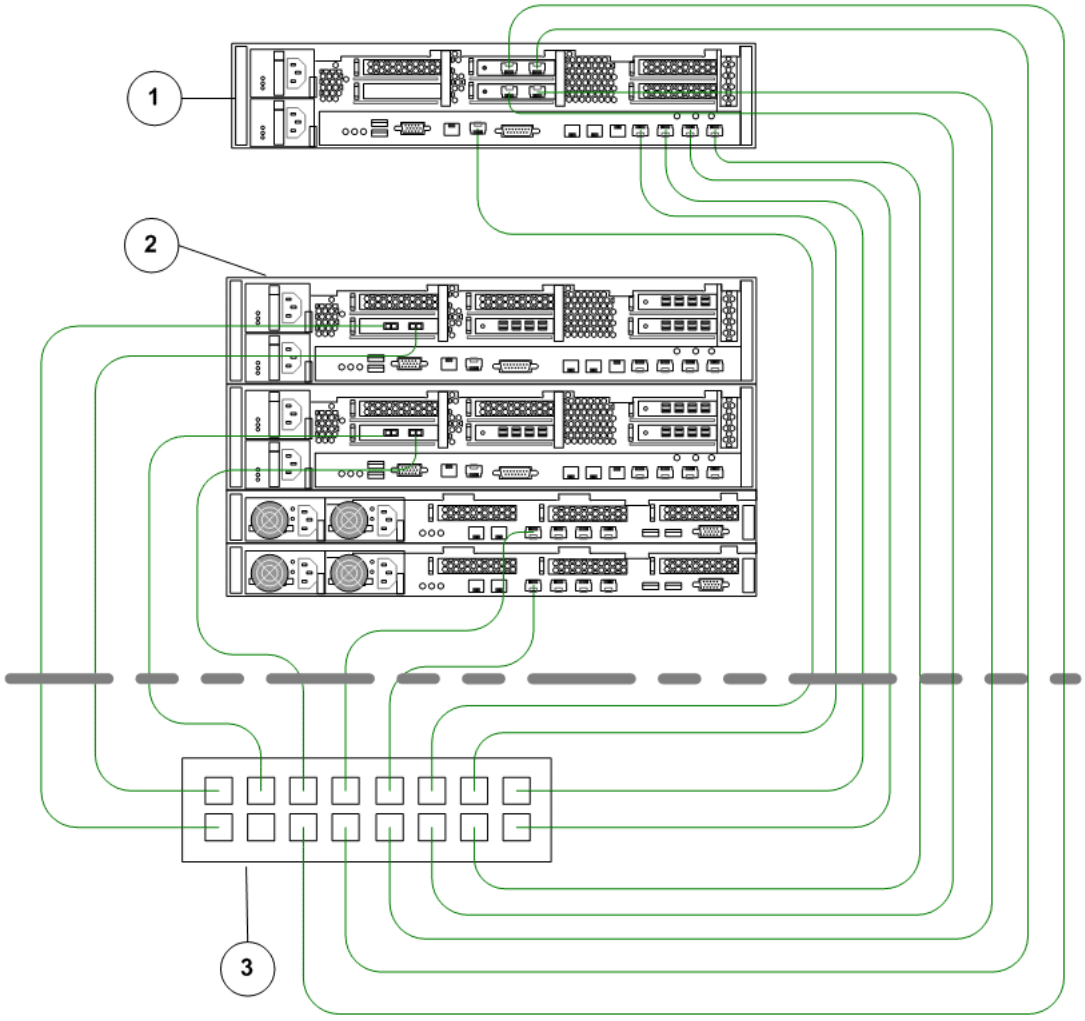


Legend		
	1 SAN fabric switch A	2 Ethernet switch
	3 SAN fabric switch B	4 Oracle MaxRep Replication Engine
	5 Oracle FS System Controllers and Pilots (Drive Enclosures not shown)	

Note: For FC configuration, both ports of HBA 1 are connected to the SAN fabric switch A and both ports of HBA 2 are connected to SAN fabric switch B. The ports ETH-0 and ETH-2 are Gigabit Ethernet (GbE) or 10 Gb/s auto-negotiated. The Integrated Lights Out Manager (ILOM) port is 100 Bit Torrent (BT) auto-negotiated.

The following figure provides information on the cable connections with iSCSI configuration using RJ45 connectors.

Figure 29: iSCSI configuration using RJ45 connectors

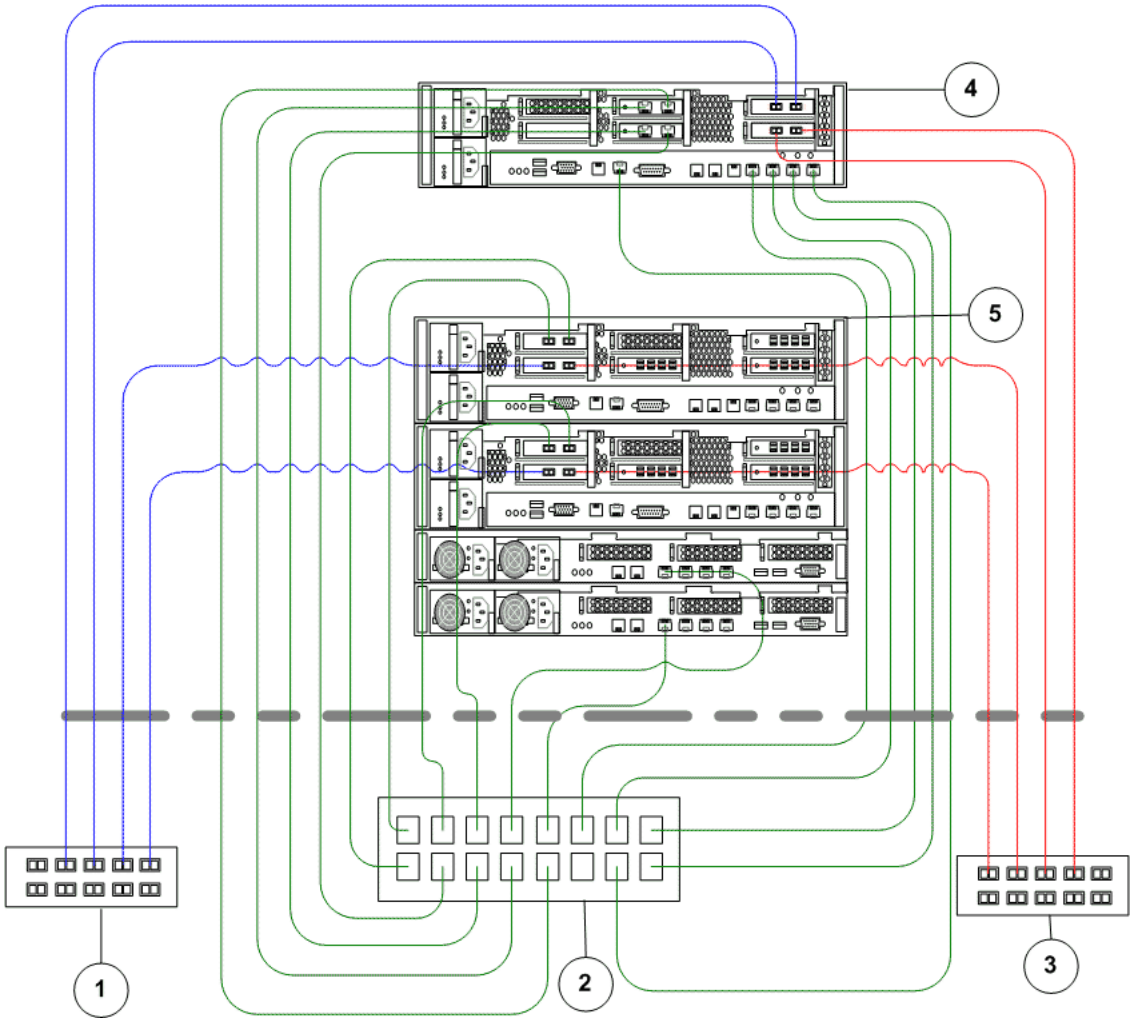


Legend		
	1 Oracle MaxRep Replication Engine	2 Oracle FS System Controllers and Pilots (Drive Enclosures not shown)
	3 Ethernet switch	

Note: For iSCSI configuration using RJ45 connectors, ports ETH-0 through ETH-7 are GbE or 10 Gb/s auto-negotiated. The ILOM port is 100 BT auto-negotiated.

The following figure provides information on the cable connections for a FC and iSCSI configuration using RJ45 connectors.

Figure 30: FC and iSCSI configuration using RJ45 connectors

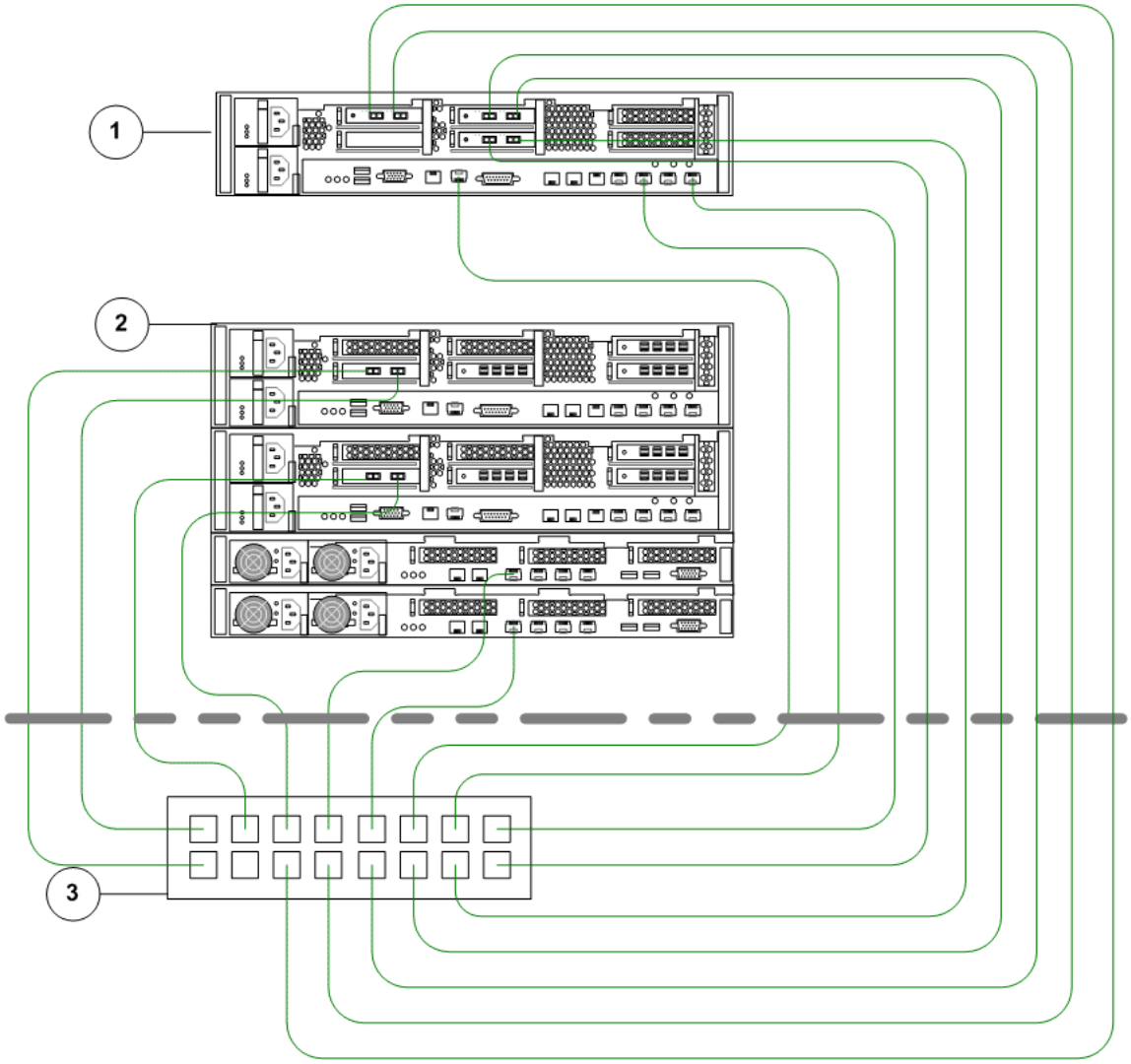


Legend		
	1 SAN fabric switch A	2 Ethernet switch
	3 SAN fabric switch B	4 Oracle MaxRep Replication Engine
	5 Oracle FS System Controllers and Pilots (Drive Enclosures not shown)	

Note: For FC and iSCSI configuration using RJ45 connectors, both ports of HBA1 are connected to SAN fabric switch A and both ports of HBA2 are connected to SAN fabric switch B. The ports ETH-0 through ETH-7 are GbE or 10 Gb/s auto-negotiated. The ILOM port is 100 BT auto-negotiated.

The following figure provides information on the cable connections for an iSCSI configuration using SFP or optical connectors.

Figure 31: iSCSI configuration using SFP or optical connectors

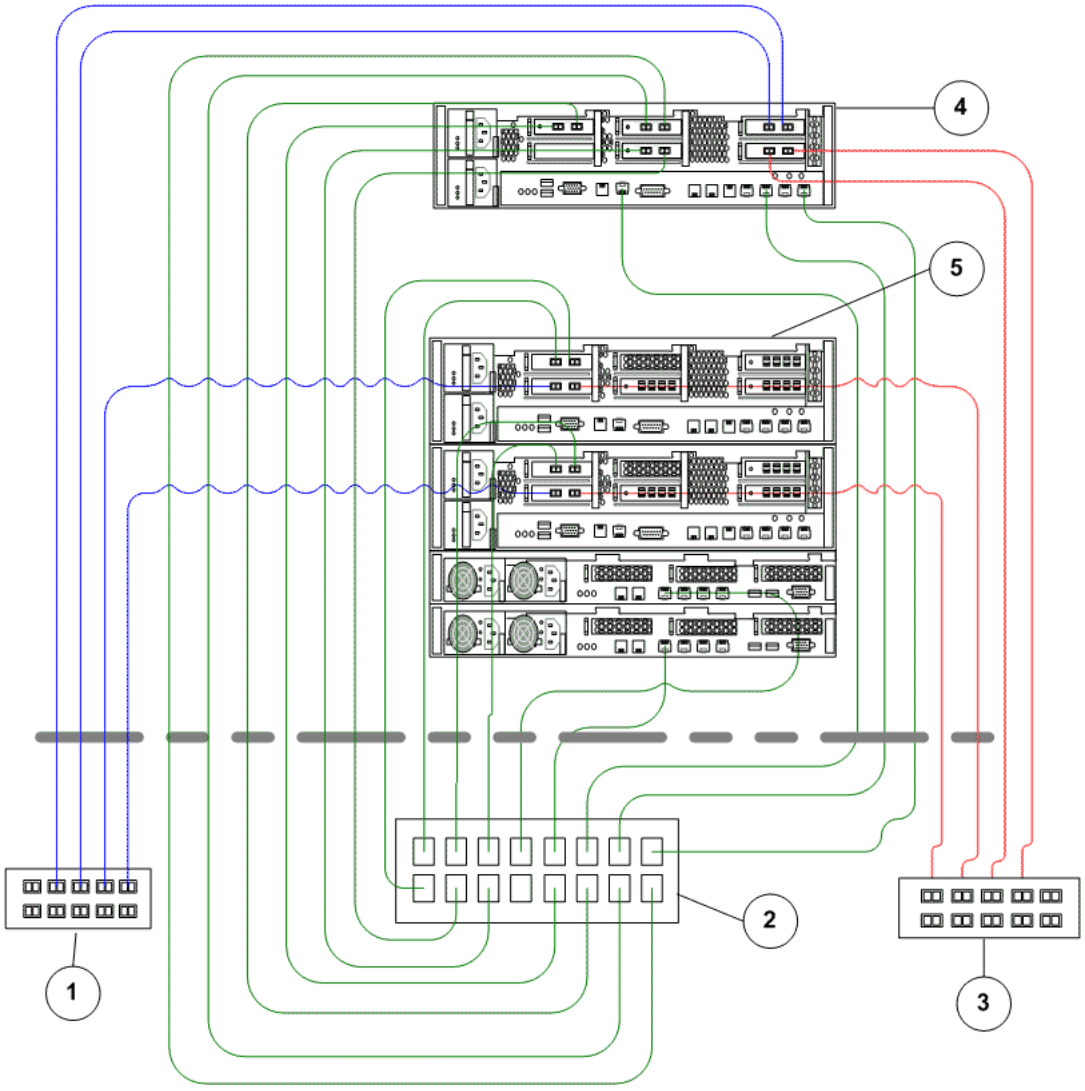


Legend	1 Oracle MaxRep Replication Engine	2 Oracle FS System Controllers and Pilots (Drive Enclosures not shown)
	3 Ethernet switch	

Note: For iSCSI configuration using SFP or optical connectors, ports ETH-0 and ETH-2 are GbE or 10 Gb/s auto-negotiated twisted pair and ports ETH-4 through ETH-9 are GbE or 10 Gb/s auto-negotiated optical. The ILOM port is 100 BT auto-negotiated.

The following figure provides information on the cable connections for an FC and iSCSI configuration using SFP or optical connectors.

Figure 32: FC and iSCSI configuration using SFP or optical connectors



Legend		
	1 SAN fabric switch A	2 Ethernet switch
	3 SAN fabric switch B	4 Oracle MaxRep Replication Engine
	5 Oracle FS System Controllers and Pilots (Drive Enclosures not shown)	

Note: For FC and iSCSI configuration using SFP or optical connectors, both ports of HBA1 are connected to SAN fabric switch A and both ports of HBA2 are connected to SAN fabric switch B. The ports ETH-0 and ETH-2 are GbE or 10 Gb/s auto-negotiated twisted pair. The ports ETH-4 through ETH-9 are GbE or 10 Gb/s auto-negotiated optical. The ILOM port is 100 BT auto-negotiated.

CHAPTER 5

Complete the Installation

Routing Power

Redundant power supplies are located on the back of the Replication Engine. With redundant power supplies, the amperage capacity for each power cord is rated to allow for the failure of one circuit. A circuit failure increases the amperage draw on the other cord.

The C13 to C14 left-angled power cords used to connect the Replication Engine to power distribution units (PDUs) are designed to keep the power cords snug against the PDU and to enable maximum access to the replaceable components. The Replication Engine has redundant power cords that must be plugged into different PDUs on separate circuits. AC power is thus drawn from two separate AC power sources, similar to the Oracle FS System.

The Replication Engine power cords are routed through the cable management arm (CMA), one for each Replication Engine. The top power supply (PS-1), is routed to the right PDU, and the bottom power supply (PS-0) is routed to the left PDU.

A power switch, which is located on the front of the Replication Engine powers on the Replication Engine and starts the operating system and the applications. The Replication Engine powers on automatically when AC power is applied to either one of the power supplies.

Related Links

Connect Power Cords

Power On the Replication Engine

Connect Power Cords

Caution: Be sure to maintain reliable grounding of rack-mounted equipment.

1. Review the Oracle MaxRep Replication Engine power characteristics.
2. Verify that your power distribution units (PDUs) meet the Replication Engine power characteristics.
3. Plug the two power cords into the Replication Engine, verifying that no PDU amperage limits are exceeded.

Each power cord must be connected to a separate PDU, which draws power from separate, external AC power sources.

4 Secure the power cords to the rack.

Use the cable management arm (CMA) to route the power cords so that they do not restrict the removal of any other component.

Power On the Replication Engine

As part of your site planning, set up a separate circuit and power outlet for each power distribution unit (PDU). These outlets should be located within reach of the 15 ft (4.57 m) PDU power input cables.

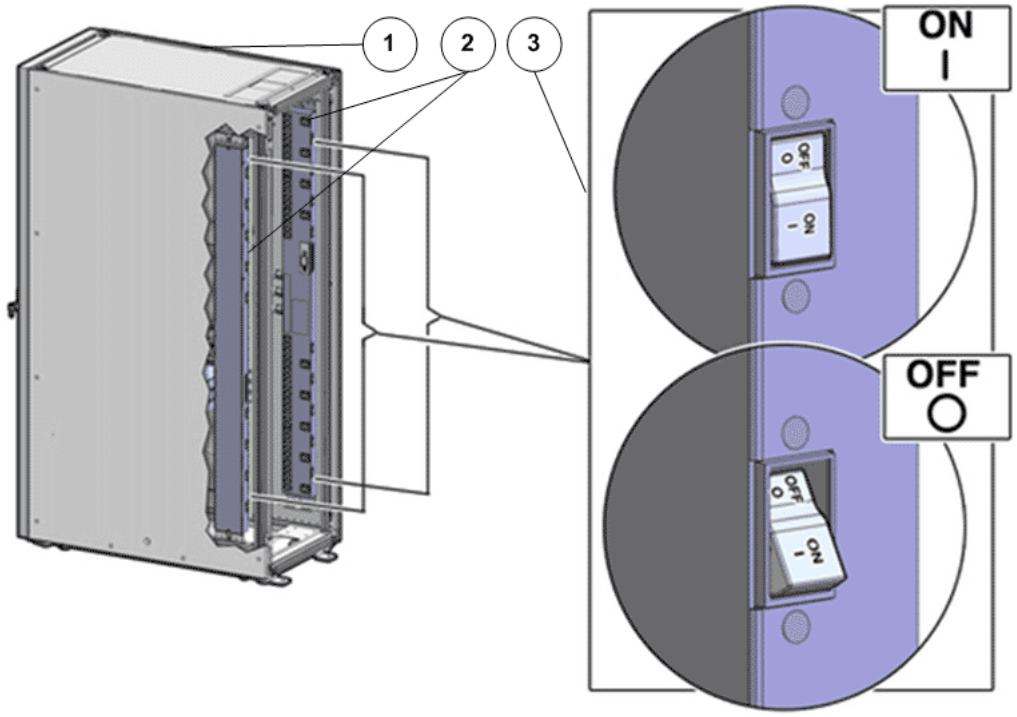
Note: When powering down an Oracle FS System, always identify if there is a Replication Engine in the rack. Ensure that the PDU switch for the Replication Engine (if applicable) is untouched so that the Replication Engine can continue uninterrupted when powering down the Oracle FS System.

Note: Before powering on the Oracle MaxRep Replication Engine, ensure that all the power cords plugged into the PDU are seated properly in their sockets. The power cords can get unseated from their sockets during shipping, which can cause the amber LEDs to flash when the system is powered on. The flashing amber LEDs can be mistaken for a faulted power supply.

Note: All Oracle FS System components be powered on or off individually so that any faults can be easily isolated and corrected.

1 Power on the PDU circuit breakers to apply power to the Replication Engine.

Figure 33: PDU circuit breakers



Legend		
	1 Oracle rack	2 PDU circuit breakers
	3 Toggle switch	

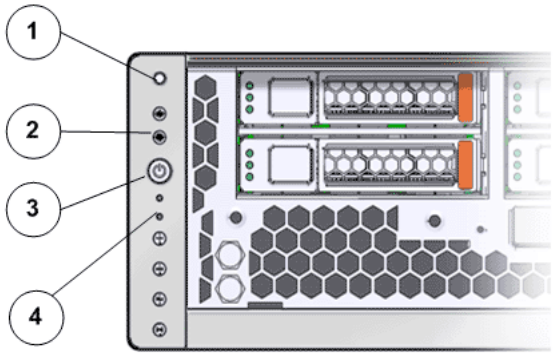
Note: The PDU circuit breakers are at the back of the rack. Press down on the ON (1) toggle switch.

Note: The example illustrates the process for powering on the PDU for rack mounted systems. The process for powering on the PDU might vary for rack-ready systems.

2 If the Replication Engine does not power on automatically, use the power switch on the front panel of the Replication Engine to power on.

3 Check the Power or OK LED on the front panel of the Replication Engine for activity.

Figure 34: Replication Engine front panel LEDs



Legend	1 Chassis identification LED or Locator LED	2 Motherboard or Power or OK LED
	3 Power switch	4 Back power supply LED

The LEDs turns green when the Replication Engine is powered on.

4 Check the back power supply LEDs that is located on the front panel and indicate the state of the power supplies.

5 Contact Oracle Customer Support if the power LED or OK LED on the Replication Engine front panel is not green.

The power LED or OK LED not being green indicates that there is no hard drive activity.

Related Links

Routing Power

Connect Power Cords

Verify the Status of the Replication Engine

Verify the status of the installation of the Oracle MaxRep Replication Engine by checking the LEDs on the Replication Engine or by logging in to the Oracle MaxRep Support user interface and configuring the Integrated Lights Out Manager (ILOM) network.

Note: The ILOM port must be configured prior to connecting the Replication Engine to the customer network for security reasons.

For more information on how to access the Oracle MaxRep Support user interface, refer to the *Oracle MaxRep for SAN User's Guide*.

Configure the ILOM port on the Replication Engine to send hardware fault notices to the Call-Home server.

Call-Home is a feature that, when enabled, allows the Oracle FS System to send the Replication Engine status information, the appropriate logs, and the system configuration information to Oracle Customer Support.

The Call-Home feature also notifies Oracle Customer Support about certain issues that might exist in the Replication Engine. For example, when a hardware component operates in degraded mode or fails, the system automatically performs actions to maintain the availability of the services that are provided by the failed component.

Although a component failure does not cause downtime, manual intervention is sometimes required to repair or to replace the failed component. In these situations, the system sends a Call-Home message to initiate a repair process or a replacement process of the failed component. Call-Home messages are also sent for normal events, such as a system shutdown or a system restart.

Related Links

Test Call-Home

Set the IP Address of the Workstation

In order to communicate with the Integrated Lights Out Manager (ILOM) port of an Oracle MaxRepReplication Engine during its initial installation at a customer's site, you must set the IP address of your workstation manually.

1. Connect your Windows workstation to the ILOM port using a crossover Ethernet cable.
2. From the Windows Start menu, select Control Panel > Network Connections.
3. In the Network Connections window, double click Local Area Connection. The Local Area Connection Status dialog box is displayed.
4. In the Local Area Connection Status window, select Properties. The Local Area Connection Properties dialog box displays.
5. In the Local Area Connection Status window, select Internet Protocol Version 4 [TCP/IPv4] and select Properties. The Internet Protocol [TCP/IP] Properties dialog box is displayed.
6. Select Use the following IP address and set the IP address to 10.0.0.100 with a netmask of 255.255.255.0.
7. Click OK.

Change Default ILOM Password

To adhere to Oracle security best practices,Oracle recommends that the default Integrated Lights Out Manager (ILOM) password be changed before connecting the ILOM port to the customer management network.

Prerequisites:

- IP address of the workstation or the laptop is configured to be on the 10.0.0.0 network.
- A network cable is connected between the workstation or the laptop and the ILOM port.

1. On the workstation or laptop, launch a browser to http://10.0.0.12.
2. Login using the default ILOM credentials.
3. In the ILOM context tree on the left side of the GUI, select ILOM Administration->User Management.
4. From the User Management screen, select the User Accounts tab.
5. In the Users table, select the root user, and select the Edit button. A new window opens.
6. In the New Password: field, enter a new password.
7. Click Save to save the new password.
8. Logout of the ILOM session.

Note: For more information on authentication principles in the current version of the Oracle Integrated Lights Out Manager (ILOM) Security guide, see *http://docs.oracle.com/cd/E24707_01/index.html*.

Related Links

Set the IP Address of the Workstation
Log in to the Replication Engine Using the ILOM Port
Configure ILOM Network

Configure ILOM Network

Configure the Integrated Lights Out Manager (ILOM) for the Oracle MaxRep Replication Engine to send hardware fault notices to the Call-Home server.

Prerequisites:

- Default ILOM password is reset.
- IP address to the Oracle FS System Pilot management interface.

  Note: Use the Pilot that is registered to the Replication Engine so that Call-Home notifications and replication logs originate from the same Replication Engine.

Oracle Customer Support receives critical Oracle MaxRep Replication Engine activity notices by way of the Call-Home feature of the Oracle FS System. When

you configure the Replication Engine network with the ILOM system, you are establishing the connection to the Call-Home server.

1. Connect your Windows workstation to the Net–0 port using a crossover Ethernet cable.
2. Open a browser session to http://10.0.0.11/support.
3. Log in to the Support User Interface page on the control service Replication Engine.
   The Dashboard page displays.
4. Select Management Tasks > **ILOM Configuration**.
5. From the Host list, select the Replication Engine that is running the Oracle MaxRep replication services.
6. Enter the ILOM network information.
   - ILOM IP Address
   - ILOM Subnet Mask
   - ILOM Default Gatewary
7. Enter the Trap Receiver Details.

   Note: Use the IP address to the Oracle FS System Pilot management interface.
8. Logout of the support interface.
9. Disconnect the laptop from the Net–0 port
10. Reconnect the Ethernet cables to the ILOM and Net–0 ports.

When you save your changes, the system displays the Task Status page. You can monitor the task progress and, in some cases, cancel the change from this page.

Related Links

Change Default ILOM Password
Log in to the Replication Engine Using the ILOM Port
Set the IP Address of the Workstation
Default Network Port Settings
ILOM Port

Test Call-Home

Test the Call-Home feature as part of the installation process of the Replication Engine.

Prerequisites:

- Call-Home is configured to access the ASR functions in MOS.

- Event triggering and periodic triggering for Call-Home are enabled and, the parameters are set to the default settings.
- Administrator privileges exist to the ASR asset that is registered in MOS.

1. Navigate to System > **Global Settings** > Networking.
2. To send the ASR activation request, select Actions > Test Call-Home.
3. Confirm that you want to send test Call-Home information, and click OK.

   The Call-Home test is an ASR activation request in MOS. MOS should receive your request in a few minutes, but no longer than 60 minutes.

   Note: You can repeat the activation request again, as necessary.

You or the customer user administrator (CUA) performs the following steps to verify that the ASR activation request was successful.

4. Verify the receipt of an email from MOS with instructions to complete the ASR activation process.

   For information that describes how to complete the activation process, login to *My Oracle Support* (https://support.oracle.com/). Search for the article titled "How to complete Auto Service Request (ASR) asset activation using My Oracle Support."
5. Log in to MOS and verify that the ASR asset status shows "pending".

   An "inactive" state means that MOS has not received your activation request.

If you did not receive an email from MOS, or if the ASR asset in MOS is "inactive", then perform the detailed ASR activation (Call-Home) troubleshooting.

Note: Do not contact Oracle Customer Support until you have completed the troubleshooting checks.

CHAPTER 6

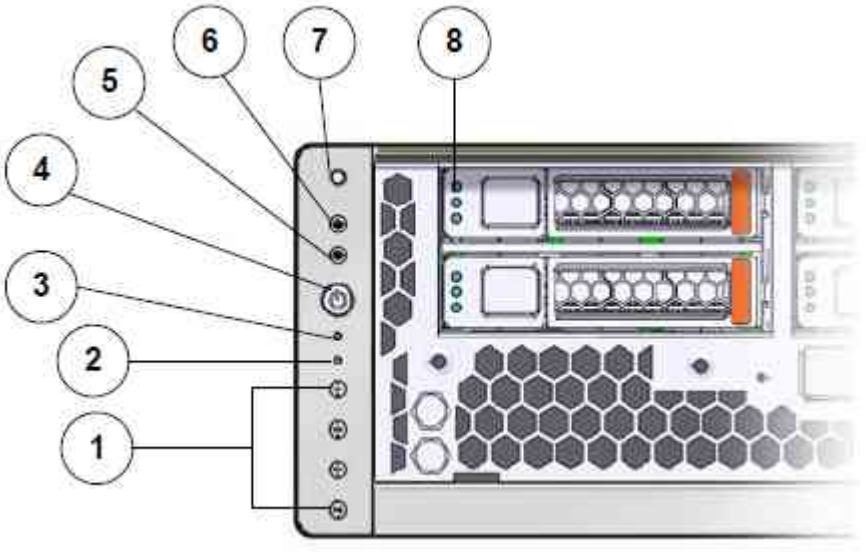
Service the Replication Engine

Replication Engine LED Indicators

The LED alarm assembly is a high-level status indicator of the Replication Engine and Replication Engine components. Use these diagnostic LEDs to determine if a system component has failed. The LED alarm assembly also includes a power button to power on the Replication Engine.

The following figure shows the front display panel of the LED alarm assembly on the Replication Engine:

Figure 35: LED alarm assembly front display



Legend		
	1 Alarm LEDs	2 Rear power supply LED
	3 Service Processor (SP) LED	4 Power button
	5 OK LED	6 Service Action Required LED or Fault LED
	7 Locator LED	8 Hard drive status LED

The following table provides status information on the LEDs on the front display panel of the LED alarm assembly on the Replication Engine:

Table 12: Replication Engine LED status and description (front panel)

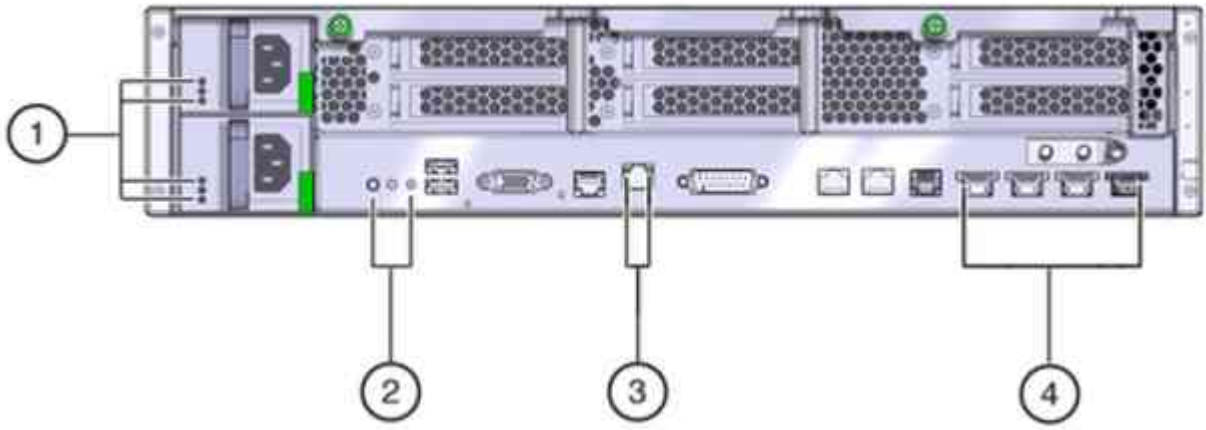
No.	LED	LED color	Status
1	Alarm LEDs	• Critical Alarm LED—Red • Major Alarm LED—Red • Minor Alarm LED—Amber • User Alarm LED —Amber	Indicate level of concern.
2	Rear power supply LED	Amber	Indicates a fault with one of the power supplies.
3	Service Processor (SP) LED	Green	Indicates these conditions: • Flashing: Indicates the SP is booting. • Steady: Indicates a steady state; no action required.
4	Power button	N/A	Used to power on, or power off, the Replication Engine.
5	OK LED	Green	Indicates these conditions: • Off: Indicates that the system is not running in its normal state. • Steady on: Indicates that the system is powered on and is running in its normal operating state. • Fast blink: Indicates that the system is running on standby mode and can be quickly returned to full function. • Slow blink: Indicates that a normal but transitory activity is taking place.

Table 12: Replication Engine LED status and description (front panel) (continued)

No.	LED	LED color	Status
6	Service Action Required LED or Fault LED	Amber	• Details will be present in the Oracle Integrated Lights Out Manager (ILOM). • In some cases, individual component LEDs indicate faulty performance.
7	Locator LED and button	White	This LED can be turned on to identify a particular system. When on, the LED blinks rapidly. Pressing and holding the Locator button for 5 seconds initiates a test of all LEDs in the LED assembly.
8	Hard drive status LED	• Top LED—Blue • Middle LED—Amber • Bottom LED—Green	• Ready to Remove LED (top): Indicates that the driver can be removed during a hot-plug operation. • Service Required LED (middle): Indicates that the drive has experienced a fault condition. • OK/Activity LED (bottom): Indicates the driver's availabilty for use. On indicates that read or write activity is in progress. Off indicates that the drive is idle and available for use.

The following figure shows the LEDs at the back of the Replication Engine:

Figure 36: Replication Engine back LEDs



Legend		
	1 Power supply status LEDs	2 Chassis status LEDs
	3 Network management LED	4 Net0 to Net3 status LEDs

The following table provides information on the LEDS on the back of the Replication Engine:

Table 13: Replication Engine LED status and description (back panel)

No.	LED	LED color	Status
1	Power supply status LEDs	• (Top) Output Power OK LED—Green • (Middle) Service Action Required LED—Amber • (Bottom) AC or DC Input Power OK LED—Green	• Output Power OK LED: Indicates that output power is without fault. • Service Action Required LED: Indicates that service for the power supply is required. • AC or DC Input Power OK LED: Indicates that input power is without fault.

2	Chassis status LEDs	• (Left) Locator LED and button—White
		• (Center) Service Action Required LED—Amber
		• (Right) Main Power OK LED—Green
			• Locator LED and button: The Locator LED can be turned on to identify a particular system.
			• Service Action Required LED: Indicates that service is required. Under some fault conditions, individual component fault LEDs are turned on in addition to the Service Action Required LED.
			• Main Power OK LED: Indicates these conditions:
			  • Off: System is not running in its normal state. System power might be off. The SP might be running.
			  • Steady on: System is powered on and is running in its normal operating state. No service actions are required.

Table 13: Replication Engine LED status and description (back panel) (continued)

No.	LED	LED color	Status
			• Fast blink: System is running in standby mode and can be quickly returned to full function. • Slow blink: A normal but transitory activity is taking place. Slow blinking might indicate that system diagnostics are running or that the system is booting.

Table 13: Replication Engine LED status and description (back panel) (continued)

No.	LED	LED color	Status

3	Network management LED	• (Left) Link and Activity LED—Green
		• (Right) Speed LED—Green, amber, or off
			Indicates these conditions:
			• Link and Activity LED:
			  • On or blinking: A link is established.
			  • Off: No link is established.
			• Speed LED:
			  • On or blinking: The link is operating as a 100-Mbps connection.
			  • Off : The link is operating as a 10-Mbps connection.

4	Net0 to Net3 status LEDs	• (Left) Link and Activity LED—Green
		• (Right) Speed LED—Amber
			Indicates the state of the service processor:
			• Link and Activity LED:
			  • On or blinking: A link is established.
			  • Off: No link is established.
			• Speed LED:
			  • Amber: The link is operating as a Gigabit connection (1000-Mbps).
			  • Green: The link is operating as a 100-Mbps connection.
			  • Off: The link is operating as a 10-Mbps connection or there is no link.

Failed Components

A hardware component failure on an Oracle MaxRep Replication Engine can, in some instances, be detected directly on the hardware. Detailed information is communicated through the Call-Home feature of the Oracle Integrated Lights

Out Manager (ILOM) that is active on the Pillar Axiom or Oracle FS System associated with the Replication Engine.

Identify a Failed Hardware Component

Depending on the physical component you are viewing, the way in which you identify failed performance may be different.

1 To identify a failed power supply, observe the LEDs on the front panel of the system hardware.

Possible LED status:

Off No service or action is required.

On (Amber) The power supply has failed and needs attention.

Note: Proceed with the following steps only when the power supply LED is amber. The following steps determine whether the LED board has failed.

2 Press and hold the front panel Locator LED for 5 seconds.

3 Check whether all of the LEDs in the assembly are lit.

Yes The LED board is functional.

No The LED board has failed. View the ILOM for detailed information.

Identify a Failed Component in the ILOM

Access detailed information regarding the status of troubled components, and their specific location, in the configured Oracle Integrated Lights Out Manager (ILOM) user interface.

Prerequisite: Oracle Integrated Lights Out Manager

1 Log in to the Oracle ILOM GUI.

2 In the navigation pane, click Open Problems.

3 In the Open Problems list, identify Replication Engine components that require attention.

4 Click System Information and navigate to the system area that requires attention.

5 View the Health status and Health Details to obtain further information about the failed system components.

Note: View additional details about the hardware, including component locations, in the component Details column.

Successful Component Replacement

After replacing a failed hardware component, verify that the replacement installation procedure was successful. You can verify the status of the installation

by checking the LEDs on the Replication Engine or by logging in to the Oracle Integrated Lights Out Manager (ILOM).

Verify Component Replacement of the Hardware

Gain instant knowledge regarding successful installation of replacement hardware by viewing the LED assembly located on the front and back of the Replication Engine.

1. View the LED assembly on the front panel of the Replication Engine and verify that all LEDs are lit at their normal state.

   Note: If the LEDs in the assembly are not lit at their normal state, identify the faulted area by referencing the front panel LED indicators, or log in to the ILOM to view detailed information.

2. View the LED assembly on the back panel of the Replication Engine and verify that all LEDs are lit at their normal state.

   Note: If the LEDs in the assembly are not lit at their normal state, identify the faulted area by referencing the back panel LED indicators, or log in to the ILOM to view detailed information.

Verify Component Replacement in the ILOM

Verify that the replacement of failed hardware on the Replication Engine was successful by viewing information about the Replication Engine in the Oracle Integrated Lights Out Manager.

Prerequisite: Oracle Integrated Lights Out Manager

1. Log in to the Oracle ILOM GUI.
2. In the navigation pane, click Open Problems.
3. View items in the Open Problems list to identify Replication Engine components that require attention.

   Note: If no items are present in the Open Problems list, your components have been replaced and installed correctly.

Power Down the Replication Engine

Power down a Replication Engine prior to performing the required maintenance service on parts that are not hot-serviceable.

Prerequisites:

- Access to the Oracle MaxRep for SAN GUI
- Access to the Oracle Support User Interface (UI)

Note: Powering down should only be executed from a MaxRep 3 Replication Engine that is either running the control services, or that is part of a clustered high availability (HA) pair.

1. From an Internet browser, log in to the Oracle MaxRep for SAN GUI.
2. Navigate to Monitor > Protection Health to note the current status of the protection plans running on the system.
3. Navigate to Monitor > Control Service/Process Service Health to note the current status of the control service Engine and process service Engines running on the system.

   Note: Noting the status of the protection plan health and the health of the control service Engine and the process service Engines helps you to observe the current state of the operating systems prior to powering down the Replication Engine.
4. From a new tab in an Internet browser, log in to the Oracle Support UI of either the MaxRep Replication Engine that is running the control services, or that is part of the HA cluster IP.

   You can navigate to the appropriate Support UI by going to either http://*enginename* (where *enginename* is the name of the MaxRep Replication Engine that is running the control services), or to *engineIPaddress*/support (where *engineIPaddress* is the IP address of the engine that is part of the HA cluster).
5. Navigate to Management Tasks > Shutdown/Restart Services.
6. Click the Host drop-down menu, and select the Replication Engine that you want to power down.
7. From the Action options, select Shutdown.
8. Click Save Task.
   The UI screen will present a task list, and the Replication Engine shutdown status will show as Pending for about one minute. The UI screen will then update the Replication Engine status to In Progress. As the shutdown completes, the UI will shut down as well. Replication Engine service actions can now take place.

   Note: In the Oracle FS System Manager GUI, the Overall System Status will change to Warning to communicate that the MaxRep Engine is powering down.
9. If you need to remove the Replication Engine from the rack, power off the PDU circuit breakers to stop power, and disconnect power cables from the Replication Engine.
   You can now perform the service actions that are required.

You will regain access to the UI once the hardware service is complete, and the Replication Engine is powered back on.

Power Up the Replication Engine After Service

Power up a Replication Engine after the required maintenance service on parts is complete. Resync all replication protection plans from the Oracle MaxRep for SAN GUI.

Prerequisite: Access to the Oracle MaxRep for SAN GUI

1. Reattach the power cables to the Replication Engine, and plug the cables into a power source.
2. Power on the PDU circuit breakers to restore power to the Replication Engine.
   The LEDs will turn green, signaling that the Replication Engine is powered on. The Engine may take a few minutes to reboot.
3. Log in to the Oracle MaxRep for SAN GUI.
4. Navigate to Monitor > Protection Health > Plan Health to view replication protection plans.
5. Select the first replication protection plan to perform a resync.
6. Click Manage Protection Plan.
7. Locate the replication protection plan that you want to resync and navigate to Action > Modify.
8. From the Restart Resync option, select Click Here.
9. Click Restart Resync, then click OK.
10. Repeat Steps 4-9 for all remaining replication protection plans.
11. Navigate to Monitor > Protection Health > Plan Health to verify that all replication plans are in sync.
    Replication plans that have resynced successfully will show a green square next to the plan name.

Replication Engine Service Procedures

The Oracle MaxRep Replication Engine consists of several replaceable components. Many Replication Engine components are customer replaceable units (CRUs), while others are field replaceable units (FRUs) that require Oracle Customer Support to perform the replacement. Also, some components are hot-serviceable, meaning that they can be replaced while the Replication Engine is powered on. Some of the Replication Engine component replacement procedures require the Replication Engine to be powered off and/or removed from the rack.

When replacing a Replication Engine CRU or FRU, you must know its part number and whether it is hot serviceable. Having that information helps you to order the correct replacement component and to determine whether you can replace the component yourself.

To locate part numbers, open Oracle System Handbook (https://support.oracle.com/ handbook_partner/index.html) and go to Current Systems,

and select Oracle MaxRepReplication Engine under Disk Arrays. Part numbers are listed in the components list.

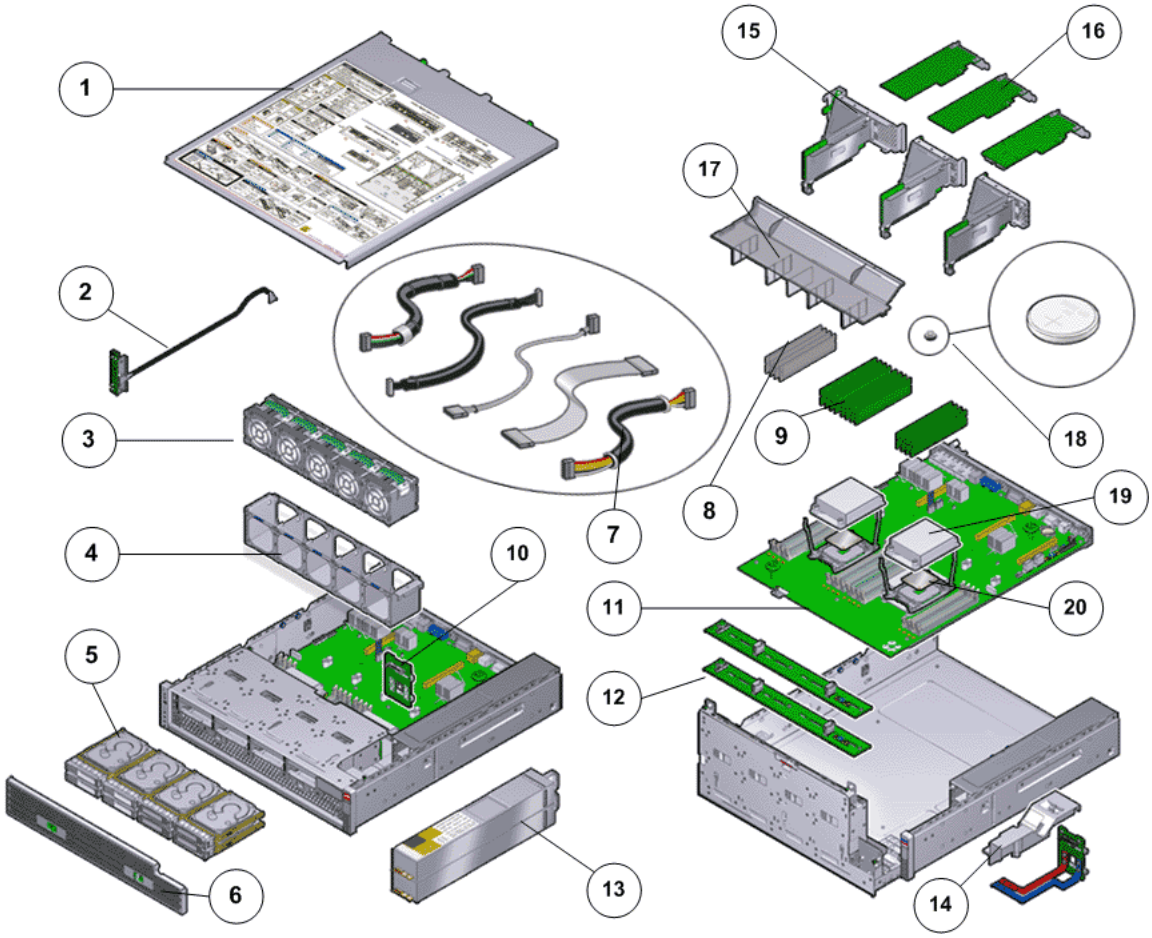
Some FRUs and CRUs can be accessed from the front or back of the Replication Engine. For replacing other FRUs and CRUs, you must open the top cover of the Replication Engine. The following table provides a summary of the Replication Engine FRUs and CRUs.

Table 14: Replication Engine replaceable components

Replication Engine component	Type	Hot serviceable	Access requirements
Air filter	CRU	Yes	Front access
Fan module	CRU	No	Remove top cover
Power supply	CRU	Yes	Rear access
Drives	CRU	Yes	Front access
Riser board assembly	CRU	No	Remove top cover
HBA	CRU	No	Remove top cover
DIMM	CRU	No	Remove top cover
Disk backplane	FRU	No	Remove top cover
Heat sink	FRU	No	Remove top cover
CPU	FRU	No	Remove top cover
LED alarm assembly	FRU	No	Remove top cover
Motherboard	FRU	No	Remove top cover
Motherboard cables	FRU	No	Remove top cover
Power distribution board (PDB)	FRU	No	Remove top cover

The following figure shows an exploded view of all the replaceable components of the Replication Engine:

Figure 37: Oracle MaxRep for SAN Replication Engine (front view)



Legend		
	1 Top cover	2 LED alarm assembly
	3 Fan modules	4 Fan compartment
	5 Drives	6 Air filter
	7 Motherboard cables	8 Fillers for DIMM slots
	9 DIMMs	10 Power Distribution Board (PDB)
	11 Motherboard	12 Disk backplane boards
	13 Power supply	14 PDB cover
	15 Riser board assemblies	16 Host bus dapters (HBAs)
	17 Air duct	18 Battery
	19 Heat sink	20 Central processing unit (CPU)

Related Links

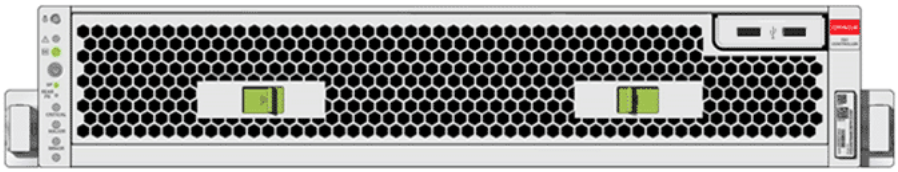
Replace a Replication Engine Air Filter
Replace a Replication Engine Fan Module
Replace a Replication Engine Power Supply
Replace a Replication Engine Drive
Replace a Replication Engine Riser
Replace a Replication Engine HBA
Replace a Replication Engine DIMM
Replace a Replication Engine Disk Backplane
Replace a Replication Engine CPU
Replace a Replication Engine LED Alarm Assembly
Replace a Replication Engine Motherboard
Replace Replication Engine Motherboard Cables
Replace a Replication Engine Power Distribution Board
Replace a Replication Engine Heat Sink

Replace a Replication Engine Air Filter

Air filters are designed to maintain proper airflow within the Replication Engine by keeping the air circulating inside the chassis clear and free of dust.

Each Replication Engine has an air filter covering the front of the chassis. Air filters are customer replaceable units (CRUs). Replacing the air filter does not require you to bring the Replication Engine offline. The following figure shows the Replication Engine air filter.

Figure 38: Replication Engine air filter



Procedure Overview

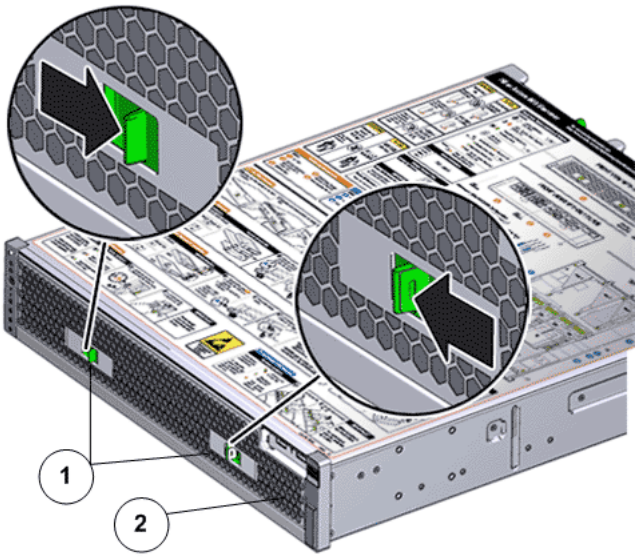
1. *Remove an Air Filter*
2. *Insert an Air Filter*

Remove an Air Filter

1 At the front of the Replication Engine chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 39: Air filter release tabs



Legend	1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

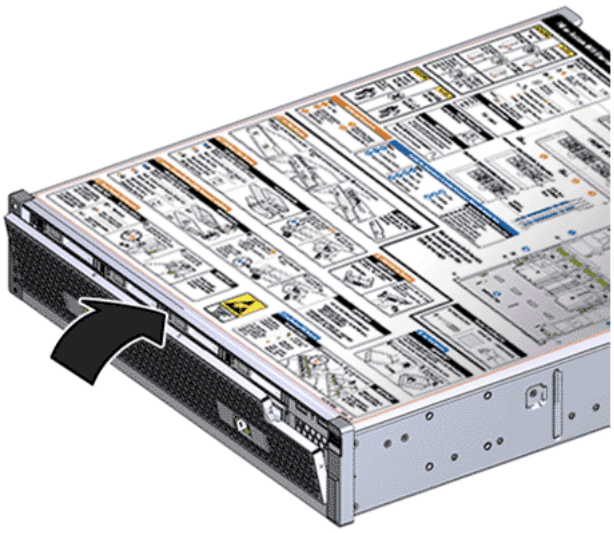
Figure 40: Remove air filter

4 Set the air filter aside.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 41: Insert air filter



Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Replace a Replication Engine Fan Module

If a fan module fails, the system issues critical alerts. Replace failed fan modules as soon as possible.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Each Replication Engine has five fan modules that are located side-by-side at the center inside the Replication Engine chassis. A fan module is a customer replaceable unit (CRU). Replacing a fan module requires you to bring the

Replication Engine offline. The following figure shows a Replication Engine fan module.

Figure 42: Fan module

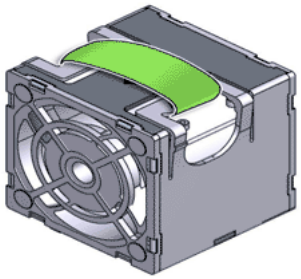
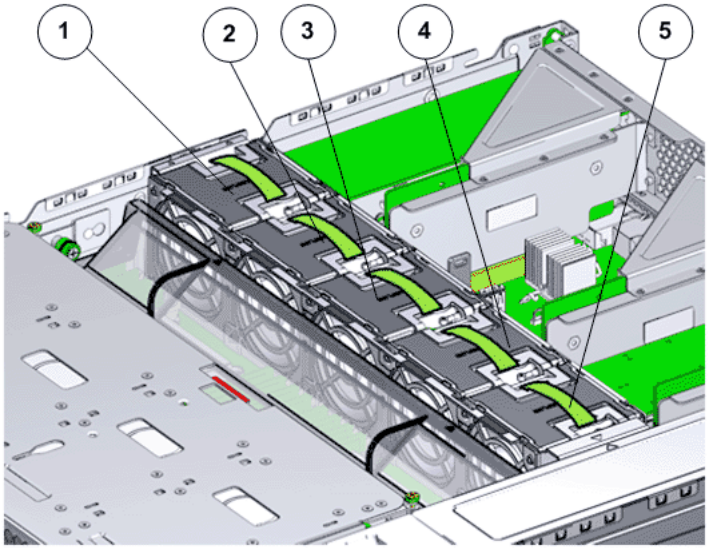


Figure 43: Fan module location



Legend		
	1 Fan module-0	2 Fan module-1
	3 Fan module-2	4 Fan module-3
	5 Fan module-4	

Note: The fan modules can be accessed only after removing the top cover over the Replication Engine chassis.

Note: To replace a fan module, you do not need to remove the Replication Engine from the rack but extend it along the Replication Engine rails using the cable management arm (CMA).

Note: Ensure that all power is removed from the Replication Engine before replacing the fan module. Disconnect the power cables before performing the fan module replacement procedure.

Note: For fan replacement, the Replaceable Unit list displays the names of each fan. Each power supply contains one fan, and each fan module contains two fans. If a fan fails in a power supply, replace the power supply. If a fan fails in a fan module, replace the fan module. The following list identifies the names of the fans and the corresponding customer replaceable unit (CRU).

If the following fan fails	Replace the following CRU
Fan 0	Power supply 0
Fan 1	Power supply 1
Fans 2, 3	Fan module 0
Fans 4, 5	Fan module 1
Fans 6, 7	Fan module 2
Fans 8, 9	Fan module 3
Fans 10, 11	Fan module 4

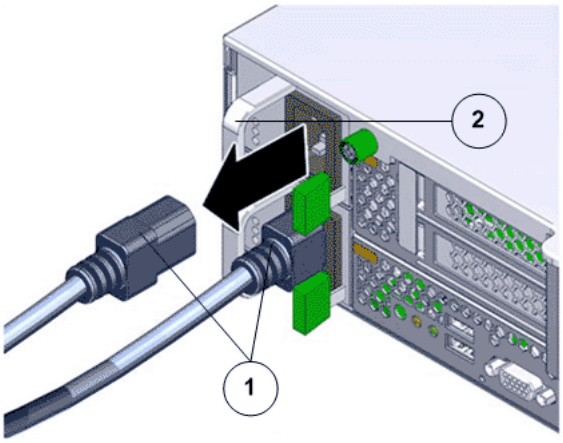
Procedure Overview

1 *Slide Replication Engine to Service Position*
2 *Remove the Replication Engine Power Supply Cords*
3 *Open the Replication Engine Top Cover*
4 *Remove a Fan Module*
5 *Insert a Fan Module*
6 *Close the Replication Engine Top Cover*
7 *Complete the Component Replacement*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 44: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

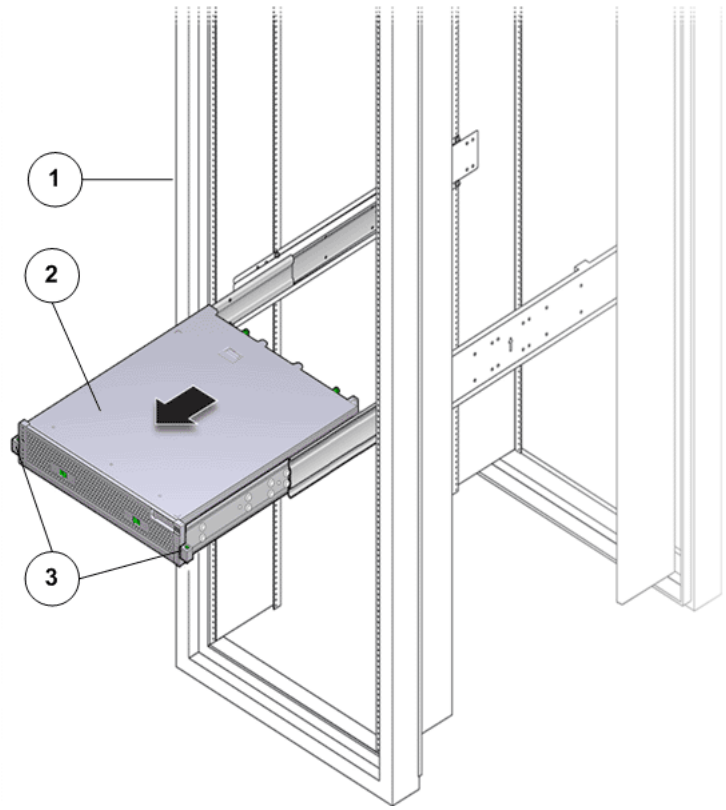
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 45: Slide the Replication Engine to service position



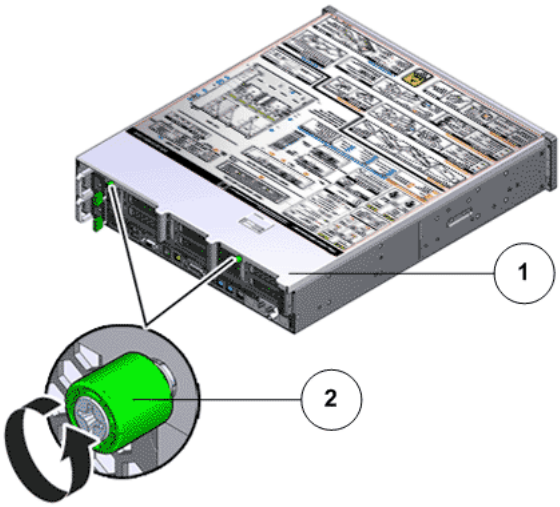
Legend	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 46: Captive thumb screws to remove the top cover



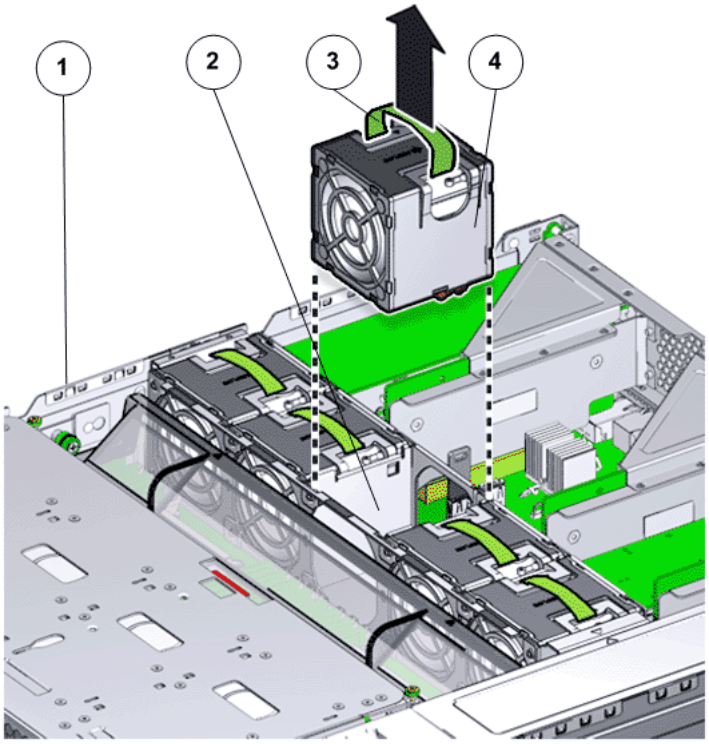
Legend	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove a Fan Module

1 Using your thumb and forefinger, grasp the removal tab and gently lift the fan module from the fan compartment.

Figure 47: Remove fan module



Legend	1 Replication Engine chassis
	2 Fan compartment
	3 Removal tab
	4 Fan module

Note: Pulling the green tab from the middle releases the locking tab for each individual fan.

Note: When removing a fan module, do not rock it back and forth. Rocking the fan module can cause damage to the motherboard connectors.

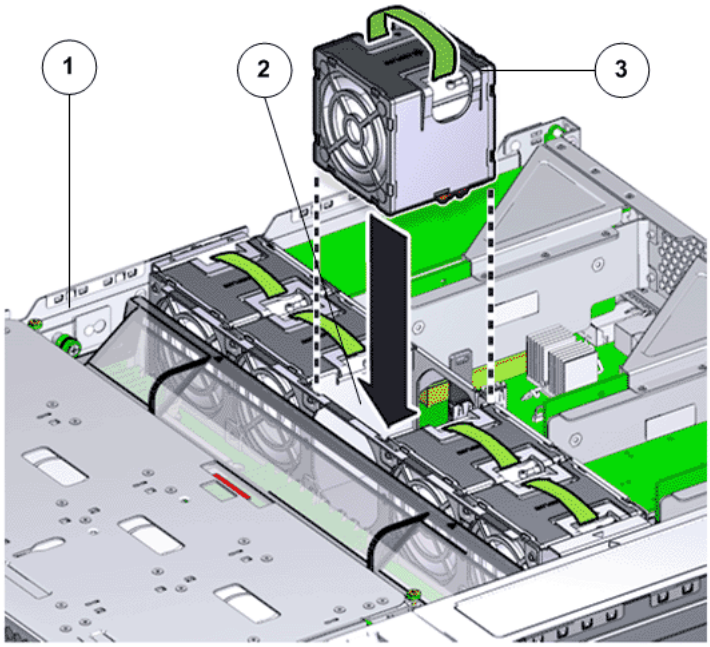
2 Set the fan module aside.

Note: The fan compartment might come out when the last fan module is removed.

Insert a Fan Module

Insert the replacement fan module into the Replication Engine.

Figure 48: Insert fan module



Legend	1 Replication Engine chassis
	2 Fan compartment
	3 Fan module

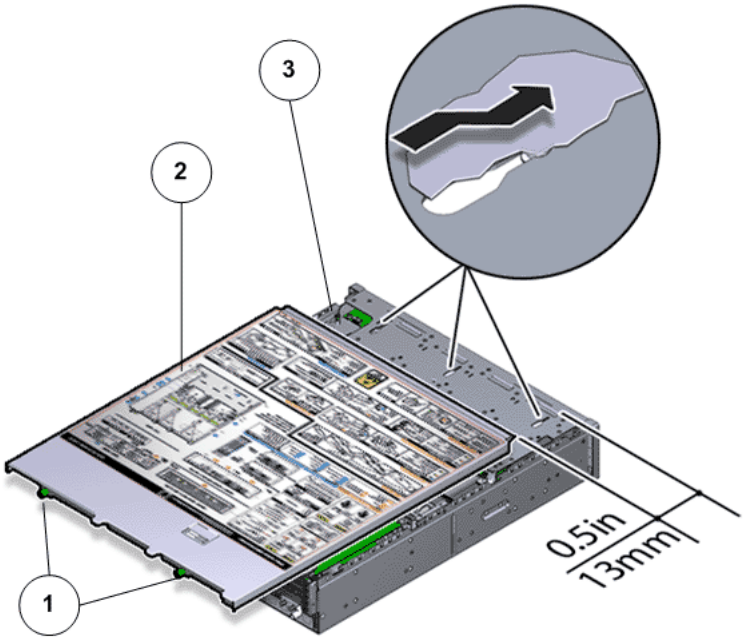
Note: Press down on the fan module and apply firm pressure to fully seat the fan module into the fan compartment. The fan modules are notched to ensure that they are installed in the correct orientation.

Note: Repeat for each additional fan module.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 49: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Complete the Component Replacement

1. Slide the Replication Engine back into rack position.
2. Re-connect the cables that were removed from the Replication Engine.

   Note: The BIOS is set to automatically power on the Replication Engine, when power is applied.

Replace a Replication Engine Power Supply

Power supplies, which exist in pairs, provide DC power to all of the Replication Engine components. If one power supply fails, the other supply carries the full

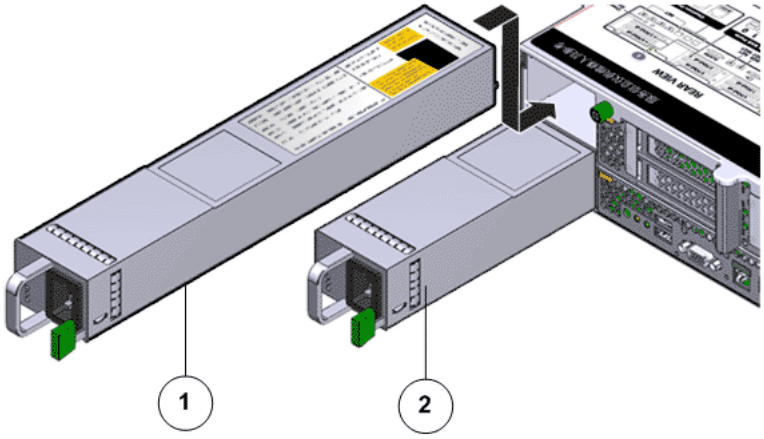
load. This situation creates a risk of Replication Engine failure should the other power supply also fail.

Prerequisites:

- Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Make sure you have a similar replacement power supply available before you start the replacement procedure.

Each Replication Engine has a pair of power supplies that are located at the back of the Replication Engine. Power supplies are customer replaceable units (CRUs). Replacing a power supply does not require you to bring the Replication Engine offline, provided that the other power supply is online and working. The following figure identifies the location of the Replication Engine power supplies.

Figure 50: Power supply location



Legend	
	1 Power supply-1 (PS-1)
	2 Power supply-0 (PS-0)

Note: To replace a power supply, you can access the faulted power supply from the back of the Replication Engine module. To access the power supply located in the bottom slot (PS-0), the CMA clip must be disconnected to enable the power supply to clear the support arm.

Note: Replacing the power supply does not require you to slide the Replication Engine into the extended rack position and can be performed while the Replication Engine is in the rack position.

Note: Ensure that the power strain relief strap on the power supply is positioned correctly such that there is proper clearance and the power supplies can be re-inserted into the power supply compartment without interference.

Note: Ensure that the power cable is routed correctly and there is no interference with the Replication Engine chassis.

Important: Do not remove the failed power supply until you have a replacement power supply to ensure proper airflow in the Replication Engine.

Note: For fan replacement, the Replaceable Unit list displays the names of each fan. Each power supply contains one fan, and each fan module contains two fans. If a fan fails in a power supply, replace the power supply. If a fan fails in a fan module, replace the fan module. The following list identifies the names of the fans and the corresponding customer replaceable unit (CRU).

If the following fan fails	Replace the following CRU
Fan 0	Power supply 0
Fan 1	Power supply 1
Fans 2, 3	Fan module 0
Fans 4, 5	Fan module 1
Fans 6, 7	Fan module 2
Fans 8, 9	Fan module 3
Fans 10, 11	Fan module 4

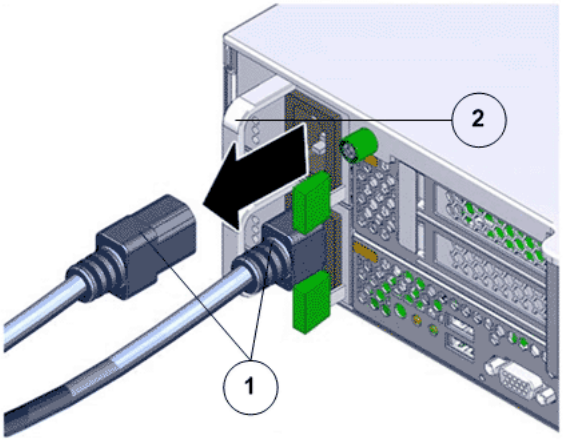
Procedure Overview

1 *Remove the Power Cord*
2 *Remove a Power Supply*
3 *Insert a Power Supply*
4 *Insert the Power Cord*

Remove the Power Cord

Disconnect the power cord from the power supply.

Figure 51: Disconnect the power cord

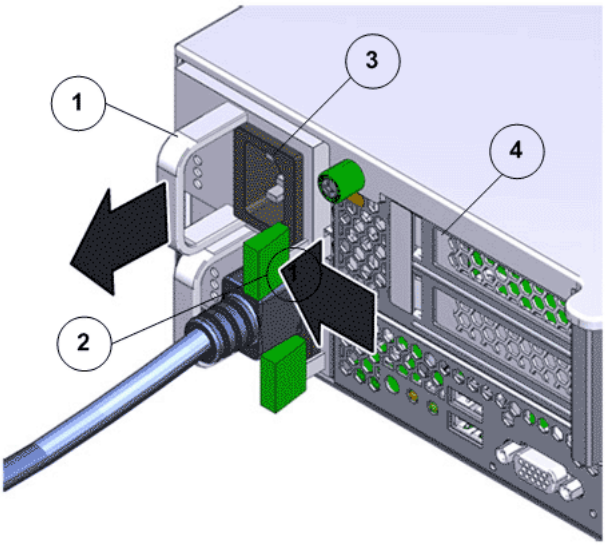


Legend	1 Power supply cord
	2 Power supply handle

Remove a Power Supply

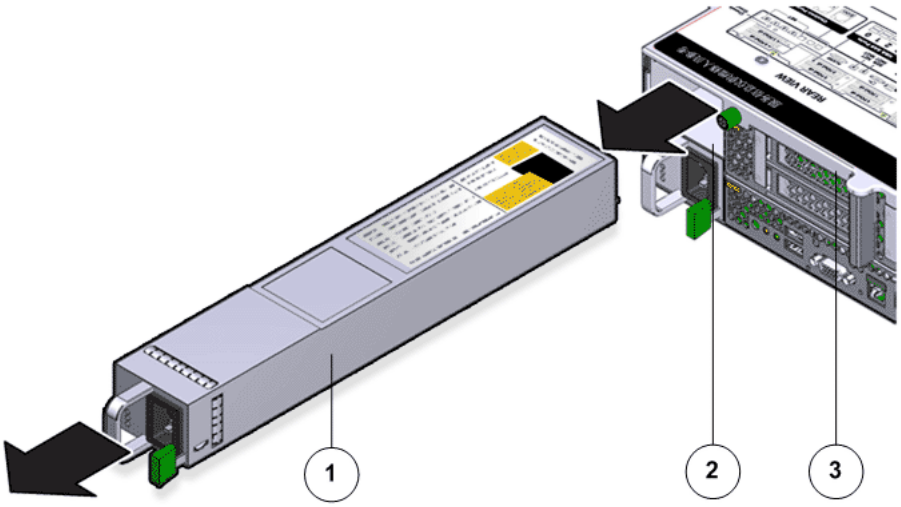
1 Remove the power supply by grasping the power supply handle and pushing the power supply latch to the left.

Figure 52: Replication Engine power supply latch



Legend	1 Power supply handle	3 Power supply
	2 Power supply latch	4 Replication Engine back

Figure 53: Remove power supply



Legend	
	1 Power supply
	2 Power supply compartment
	3 Replication Engine

2 If both power supplies must be removed, label the power supplies with the slot numbers from which they are removed.

Note: Removing both power supplies will result in the immediate powering off of the Replication Engine. Do not pull both power supplies from an active and running Replication Engine.

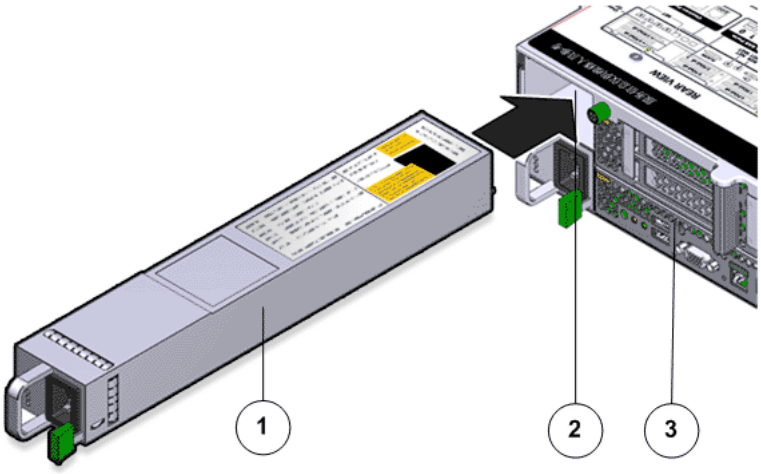
Note: The power supplies must be reinstalled into the same slots from which they were removed.

3 Pull the power supply out of the chassis and place it on an antistatic mat.

Insert a Power Supply

1 Slide the replacement power supply into the power supply compartment at the back of the Replication Engine until it is fully seated.

Figure 54: Insert power supply



Legend	
	1 Power supply
	2 Power supply compartment
	3 Replication Engine chassis

2 Listen for an audible click or feel the power supply engage to confirm that the power supply is properly seated.

Note: Repeat for each power supply. Also, replace the power supplies only into the slots from which they had been removed.

Insert the Power Cord

Connect the power cord to the power supply.

Replace a Replication Engine Drive

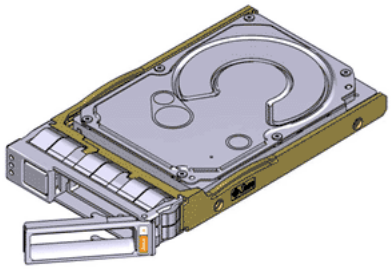
Each drive in a Replication Engine is RAID 1 mirror protected with an alternate drive. If a failed drive is not replaced, you run the risk of losing the data if the mirrored drive also fails. A failed drive must be replaced as soon as possible to avoid the risk of data loss and to restore system performance.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that a replacement drive or a filler panel available to replace the drive that you will be removing.

Drives are customer replaceable units (CRUs). The following figure shows the location of the drives.

Figure 55: Drive



Note: To replace an drive, you do not need to remove the Replication Engine from the rack or even extend it along the Replication Engine rails.

Note: Make a note of the drive slot where the failed drive was located so that the replacement drive can be placed in the same slot to avoid the risk of mis-configuration. Alternatively, replace the drives only one at a time, so that there is only one empty drive slot at any point in time. Replacing the incorrect drive when a drive is failed is likely to cause loss of data and an extended outage.

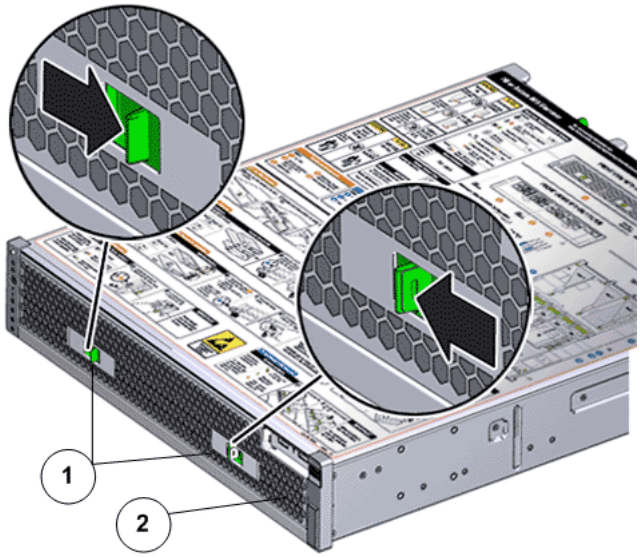
Procedure Overview

1. *Remove an Air Filter*
2. *Remove a Replication Engine Drive*
3. *Insert a Replication Engine Drive*
4. *Insert an Air Filter*

Remove an Air Filter

1. At the front of the Replication Engine chassis, locate the air filter release tabs.
2. Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 56: Air filter release tabs



Legend	1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

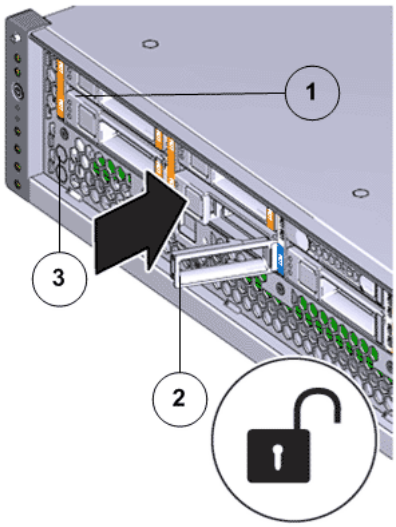
Figure 57: Remove air filter

4 Set the air filter aside.

Remove a Replication Engine Drive

1 Remove the Replication Engine drive from the drive compartment by pushing the latch release button to open the latch.

Figure 58: Open drive latch



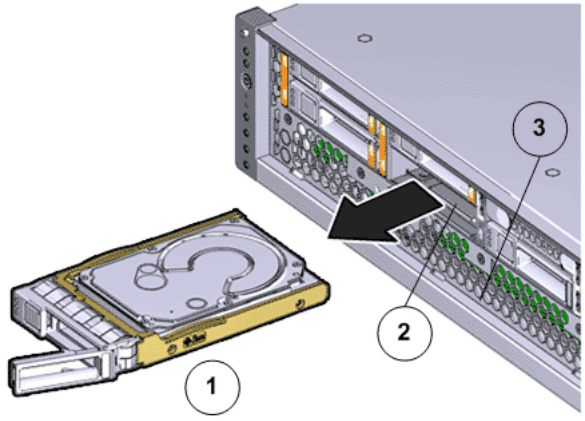
Legend	1 Drive	2 Latch release button
	3 Replication Engine front	

Important: Do not bend the latch too far to the right. Bending the latch can damage the latch.

Important: For drives that are removed but will be later reinserted, label the drive with the position that the drive occupies in the Replication Engine. Reinserting drives in the incorrect slot might result in data loss and a full recovery might be required to resume operation.

2 Grasp the latch and pull the drive out of the Replication Engine drive compartment.

Figure 59: Remove drive



Legend	1 Drive	2 Replication Engine drive compartment
	3 Replication Engine front	

3 Repeat for each of the four drives of the Replication Engine that need to be replaced.

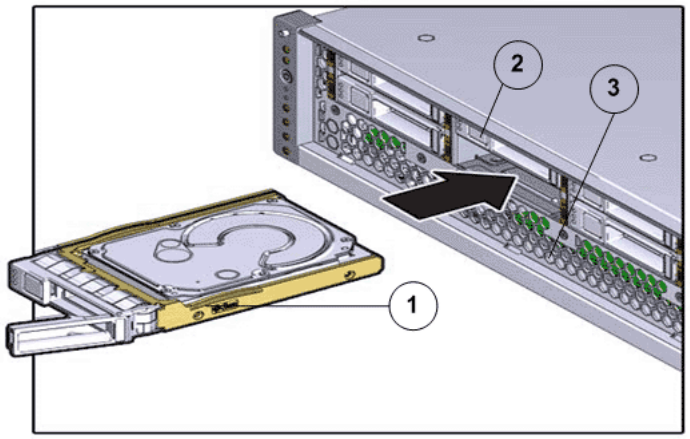
Insert a Replication Engine Drive

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Insert the drive into the correct slot.

Figure 60: Insert drive



Legend	1 Drive
	2 Replication Engine drive compartment
	3 front

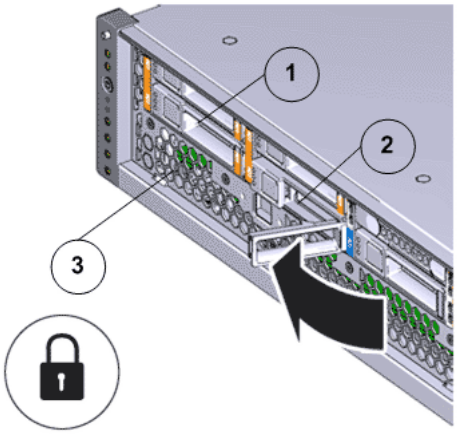
Note: The Replication Engine might have filler panels covering the empty slots in the drive compartment.

3 Slide the replacement drive into the drive compartment until the drive is fully seated into the slot.

Note: Be sure to install the replacement drive in the same slot from which the failed drive was removed.

4 Close the drive carrier latch to lock the drive in place.

Figure 61: Secure drive into drive slot



Legend	1 Drive
	2 Replication Engine drive compartment
	3 Replication Engine Front

Note: Do not force the drive carrier latch. You can damage the drive carrier latch if you apply too much force.

Note: After the drive powers up, the activity light begins flashing indicating that the drive mirror protection is rebuilding.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 62: Insert air filter

Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Replace a Replication Engine Riser

A riser board assembly provides network and data-path connections for network or read and write operations. If the assembly fails, read and write operations carried by the HBAs will fail as well.

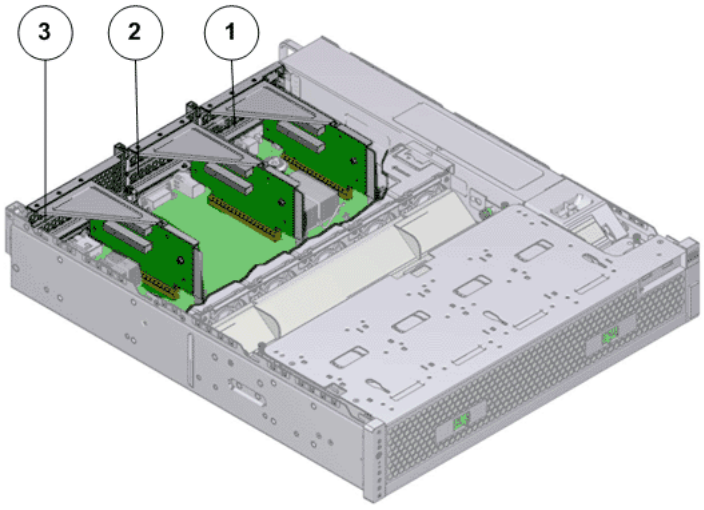
Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Disconnect any cables connected to the PCIe cards in the riser that must be replaced.

Each Replication Engine contains three PCI-express (PCIe) risers that are located side by side at the back of the Replication Engine. The three risers, though similar, are not interchangeable. Each riser hosts two PCIe3 slots and can accommodate two PCIe3 host bus adapters (HBAs). The risers are field replaceable units (FRUs). Replacing a riser assembly requires you to bring the Replication Engine offline. The following figure shows the location of the three risers.

Note: By design, the risers are mechanically dependent upon each other. Even if there are no PCIe3 HBAs installed, all risers must be installed.

Figure 63: Riser locations



Legend	1 Riser 1
	2 Riser 2
	3 Riser 3 with latch

Note: The risers can be accessed only after removing the top cover over the Replication Engine chassis.

Note: To replace a riser, you do not need to remove the Replication Engine from the rack but extend it along the Replication Engine rails using the cable management arm (CMA).

Note: Ensure that all power is removed from the Replication Engine before replacing the riser. Disconnect the power cords before performing the riser replacement procedure.

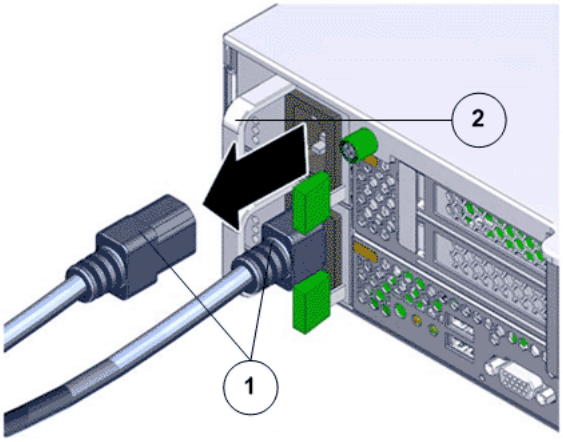
Procedure Overview

1 *Slide Replication Engine to Service Position*
2 *Remove the Replication Engine Power Supply Cords*
3 *Disconnect Replication Engine Cabling*
4 *Open the Replication Engine Top Cover*
5 *Remove a Riser*
6 *Insert a Riser*
7 *Close the Replication Engine Top Cover*
8 *Reconnect Replication Engine Cabling*
9 *Complete the Component Replacement*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 64: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

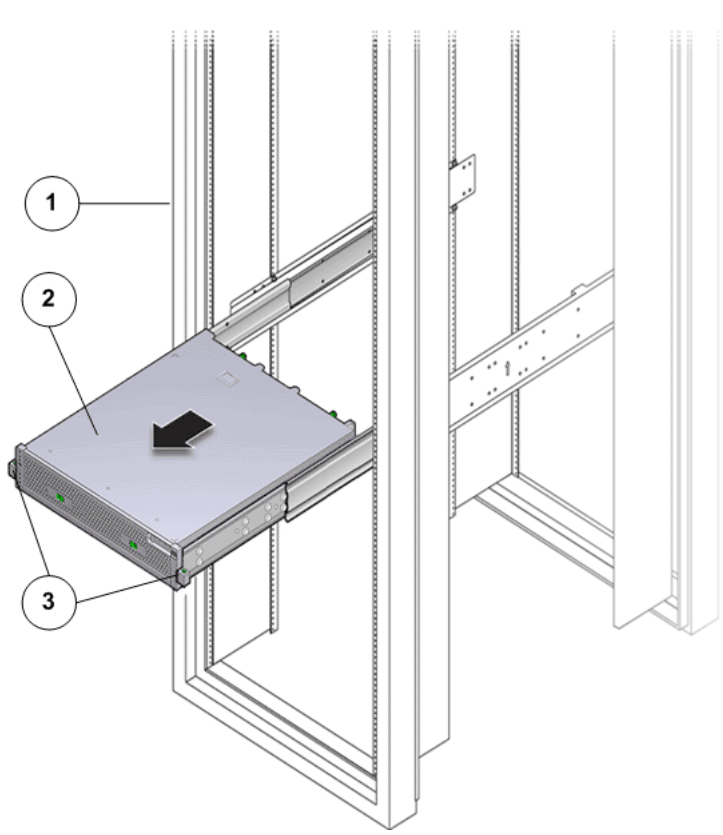
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 65: Slide the Replication Engine to service position



Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Disconnect Replication Engine Cabling

Disconnect all data cables from the Replication Engine.

Note: All cables must be disconnected from the Replication Engine and labeled such that they can be reconnected accurately to the Replication Engine after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Replication Engine or result in a complete loss of functionality.

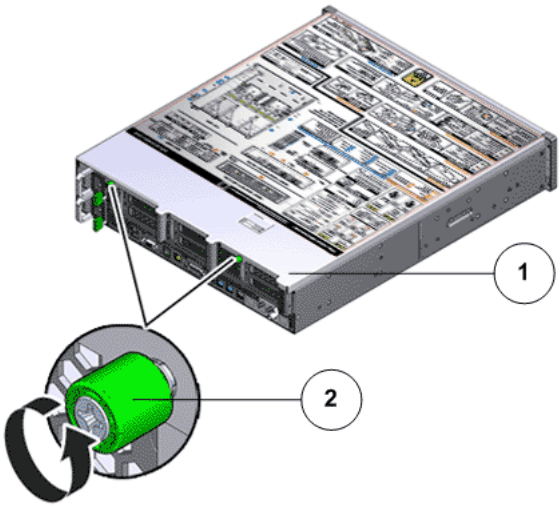
Note: Service the Replication Engine components from the front of the Replication Engine while the Replication Engine is in service position.

Note: Do not lean on or place any weight on the Replication Engine while the Replication Engine is in the service position.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 66: Captive thumb screws to remove the top cover



Legend	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove a Riser

1 Disconnect any external cables that remain connected to the HBAs in the risers.

Note: Also disconnect any internal cables attached to the HBAs, if that will ease removing the HBA.

Tip: Make a note of the positions of all existing cable connections before removing any cables. Replacing HBAs or their cables into the incorrect position in the riser may result in a loss of performance or functionality.

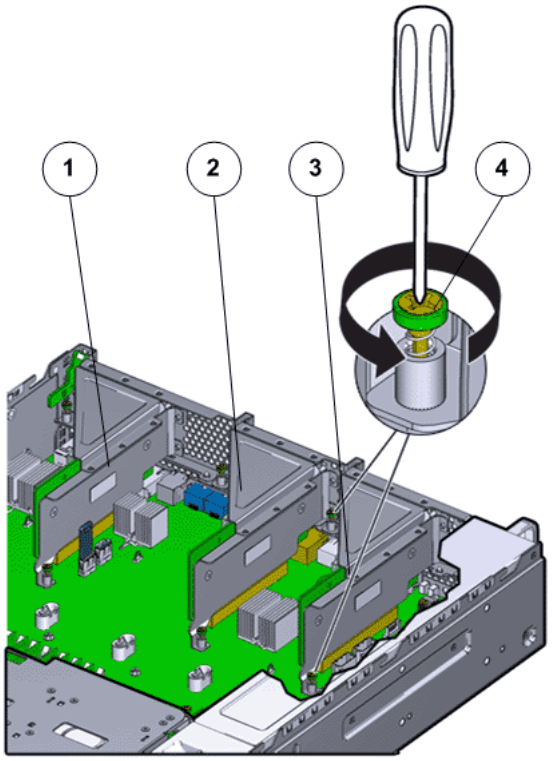
2 Note the position of the HBAs installed on the riser.

Tip: Make a note of the slot numbers of all existing HBAs before removing any HBAs.

3 Using a Phillips Number 2 screwdriver, loosen the two Phillips Number 2 captive screws on either side of the riser that hold the riser to the Replication Engine motherboard.

Note: The riser on the opposite end of the power supply has a latch that must be disengaged to remove the riser from the Replication Engine chassis

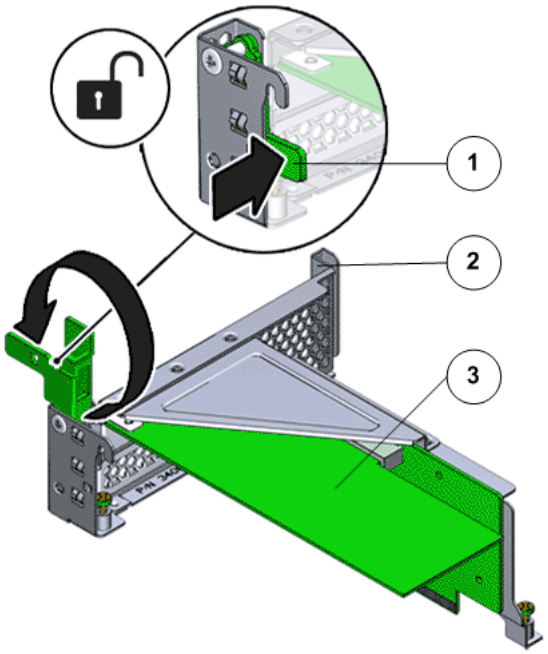
Figure 67: Captive screws to secure the risers



Legend		
	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws that secure riser

To remove riser 3, unlock the latch to release the riser from the Replication Engine motherboard.

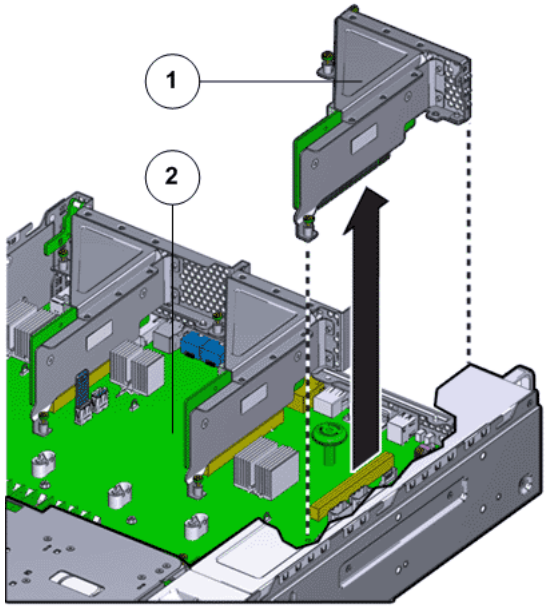
Figure 68: Unlock Riser 3 latch



Legend		
	1 Riser 3 latch	3 HBA
	2 Riser 3	

4 Carefully pull the riser straight up and place it aside.

Figure 69: Remove riser



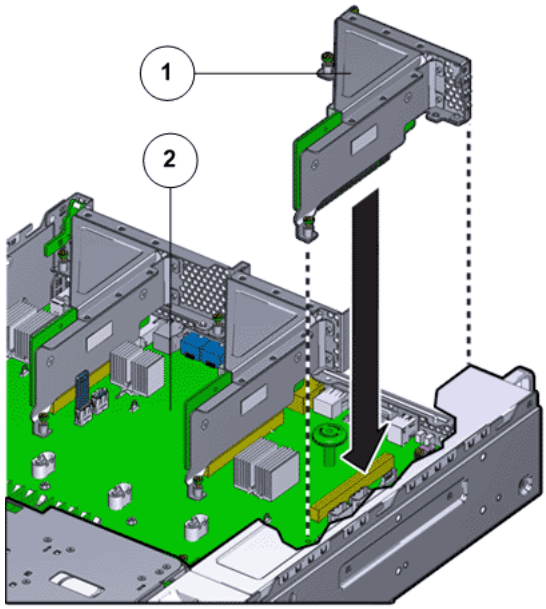
Legend	
	1 Riser
	2 Replication Engine motherboard

Insert a Riser

1 Lower the riser onto the Replication Engine motherboard and press the riser edge connector securely into the socket.

Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

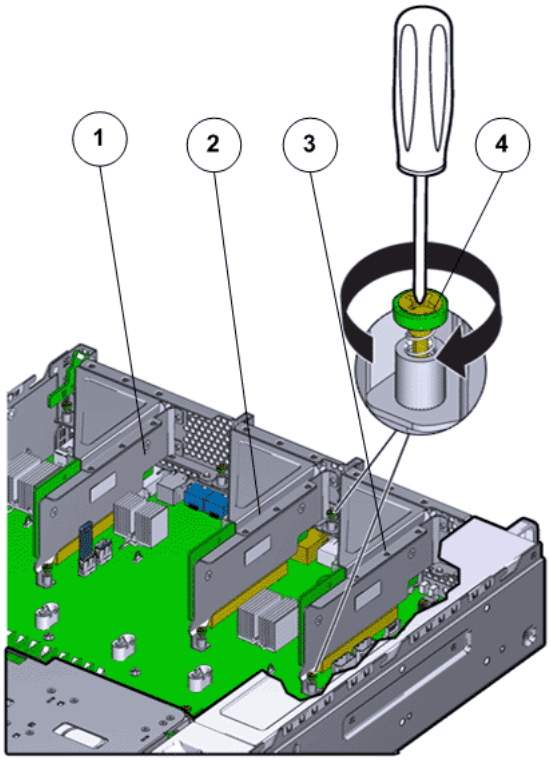
Figure 70: Insert riser



Legend	1 Riser
	2 Replication Engine motherboard

2 After the riser is seated properly inside the Replication Engine, tighten the two captive Phillips screws on both sides of the riser to secure the riser on the Replication Engine motherboard.

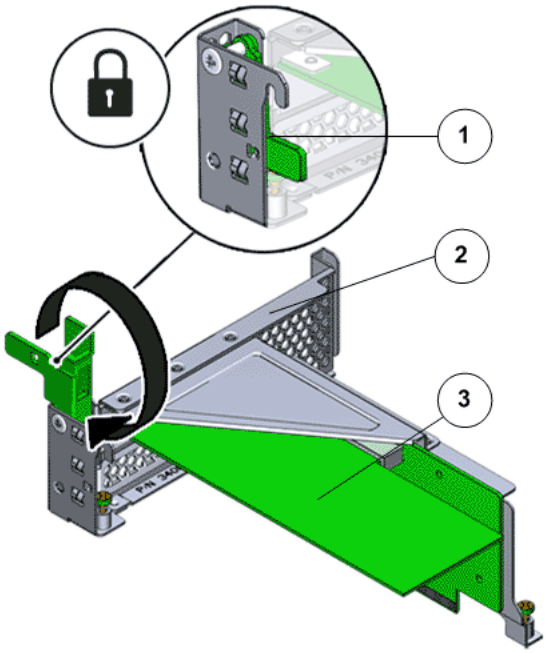
Figure 71: Captive screws to secure risers to the motherboard



Legend		
	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws

To install riser 3, lock the latch to secure the riser to the Replication Engine motherboard.

Figure 72: Riser 3 latch locked



Legend		
	1 Riser 3 latch	3 HBA
	2 Riser 3	

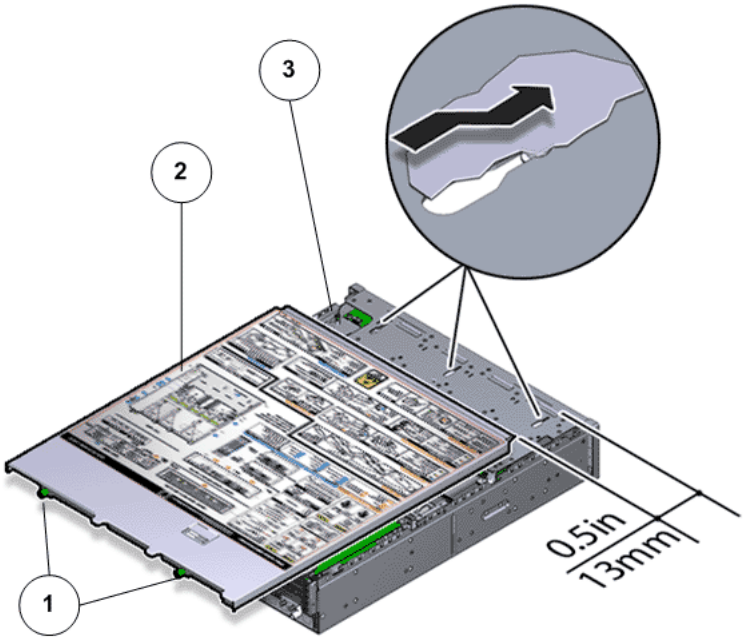
3 Reconnect any previously removed internal or external cables to any HBAs installed in the riser.

4 Repeat the above steps for any additional risers that you are installing.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 73: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Reconnect Replication Engine Cabling

1 Reconnect all the data cables on the Replication Engine.

Note: Oracle Customer Support recommends labeling all cables connected to the Replication Engine so that the cables can be reconnected accurately to the Replication Engine after the replacement procedure is complete.

2 Reconnect the CMA to the Replication Engine by attaching the release tab on the left and right side of the CMA.

Complete the Component Replacement

1 Slide the Replication Engine back into rack position.

2 Re-connect the cables that were removed from the Replication Engine.

Note: The BIOS is set to automatically power on the Replication Engine, when power is applied.

Replace a Replication Engine HBA

An HBA is a circuit board installed inside the Replication Engine riser board assembly.

HBAs are installed in pairs in a Replication Engine to ensure that multiple data paths are available to the source or target storage. In the event of a failed HBA, the alternate HBA receives additional load. If the second HBA fails, the result would be a loss of replication services. To avoid the loss of service, an HBA should be replaced as soon as possible if a failure has been identified.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Keep filler panels available in case you only remove the HBA and do not plan to replace the HBA immediately.

  Note: Filler panels ensure proper airflow inside the Replication Engine.
- Use only the filler panels provided with the Replication Engine to maintain proper airflow and EMI conformance for empty slots inside the Replication Engine.
- Label all cables connected to the Replication Engine so that they can be reconnected accurately to the

Replication Engine after the replacement procedure is complete.

Note: Replacing an HBA might require changes to the port's world wide name (WWN).

Each Oracle Flash Storage System supports two types of HBA connectivity SAN (FC or iSCSI HBA 16Gb, optical only) and NAS (10 GbE HBA). The placement of the HBA inside the riser slot is based on the Oracle FS System configuration option selected. All HBAs supported in the Oracle FS System are customer replaceable units (CRUs). Replacement of an HBA requires you to bring the Replication Engine offline. HBAs connecting to host servers must be placed into slots 1, 4, and 5 on the risers. HBAs connecting to Drive Enclosures must be placed into slots 2, 3, and 6 on the risers. You must install all HBAs according to the slot numbers listed in the following table.

The Oracle MaxRep Replication Engine supports the following HBA options:

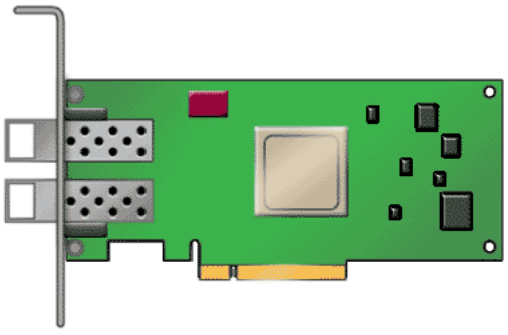
Table 15: Supported HBAs on the Replication Engine

HBA	Quantity and slot
8 Gb/s dual-port Fibre Channel (FC) QLogic	Two in slots 3 and 6
10 Gb/s dual-port Ethernet RJ45	Two in slots 2 and 5
10 Gb/s dual-port Ethernet copper or fibre SFP+	Three in slots 2, 4, and 5

Note: A Replication Engine can support either two 10 Gb/s dual-port Ethernet RJ45 HBAs or three 10 Gb/s dual-port Ethernet copper or fibre SFP+ HBAs.

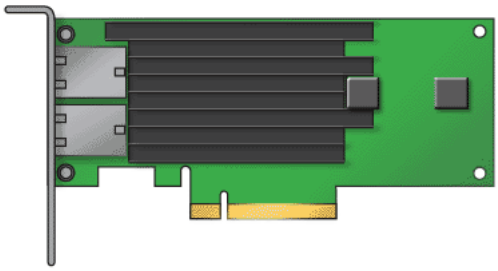
The following figure shows the 8 Gb/s dual-port Fibre Channel (FC) QLogic HBA.

Figure 74: 8 Gb/s dual-port Fibre Channel (FC) QLogic HBA



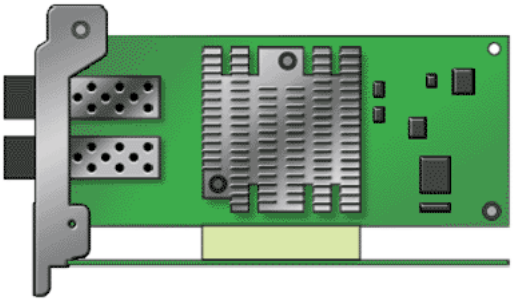
The following figure shows the 10 Gb/s dual-port Ethernet RJ45 HBA.

Figure 75: 10 Gb/s dual-port Ethernet RJ45 HBA



The following figure shows the 10 Gb/s dual-port Ethernet copper or fiber SFP+ HBA.

Figure 76: 10 Gb/s dual-port Ethernet copper or fiber SFP+ HBA



Note: The risers and HBAs can be accessed only after removing the top cover over the Replication Engine chassis.

Note: To replace an HBA, you do not need to remove the Replication Engine from the rack but extend it along the Replication Engine rails using the cable management arm (CMA).

Note: Ensure that all power is removed from the Replication Engine before replacing the riser. Disconnect the power cords before performing the fan module replacement procedure.

Note: For FC HBA replacements, Oracle Customer Support is required to enable the replacement HBA for use in the system. Oracle recommends scheduling this prior to replacing the HBA.

Procedure Overview

1. *Slide Replication Engine to Service Position*
2. *Remove the Replication Engine Power Supply Cords*
3. *Disconnect Replication Engine Cabling*
4. *Open the Replication Engine Top Cover*
5. *Remove a Riser*

6 *Remove an HBA*

7 *Insert an HBA*

8 *Insert a Riser*

9 *Close the Replication Engine Top Cover*

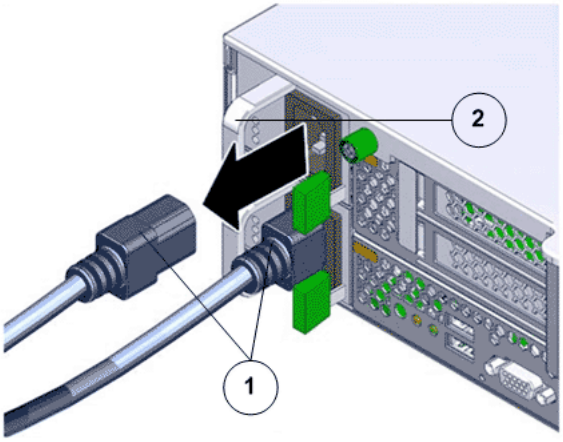
10 *Reconnect Replication Engine Cabling*

11 *Complete the Component Replacement*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 77: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

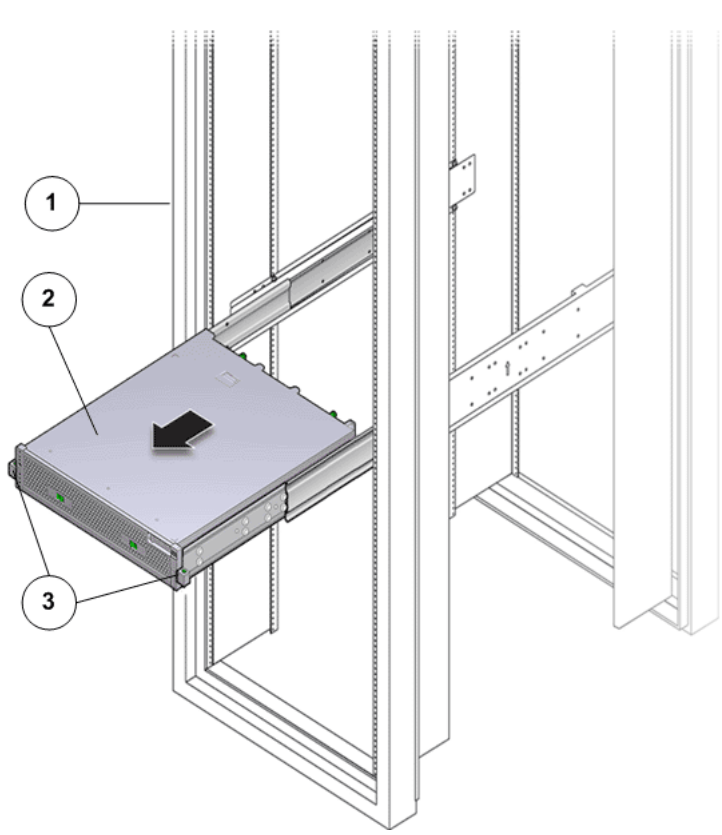
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 78: Slide the Replication Engine to service position



Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Disconnect Replication Engine Cabling

Disconnect all data cables from the Replication Engine.

Note: All cables must be disconnected from the Replication Engine and labeled such that they can be reconnected accurately to the Replication Engine after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Replication Engine or result in a complete loss of functionality.

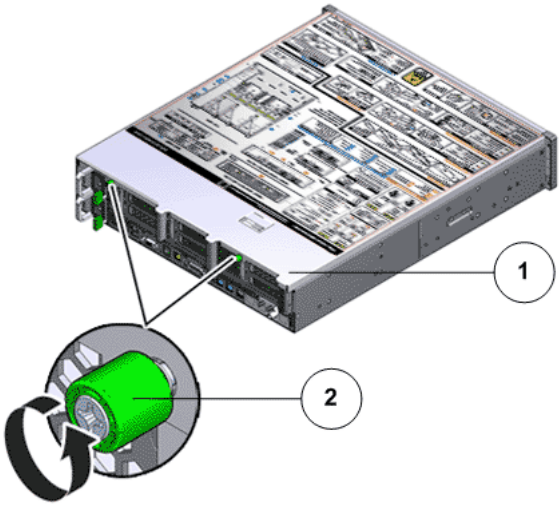
Note: Service the Replication Engine components from the front of the Replication Engine while the Replication Engine is in service position.

Note: Do not lean on or place any weight on the Replication Engine while the Replication Engine is in the service position.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 79: Captive thumb screws to remove the top cover



Legend	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove a Riser

1 Disconnect any external cables that remain connected to the HBAs in the risers.

Note: Also disconnect any internal cables attached to the HBAs, if that will ease removing the HBA.

Tip: Make a note of the positions of all existing cable connections before removing any cables. Replacing HBAs or their cables into the incorrect position in the riser may result in a loss of performance or functionality.

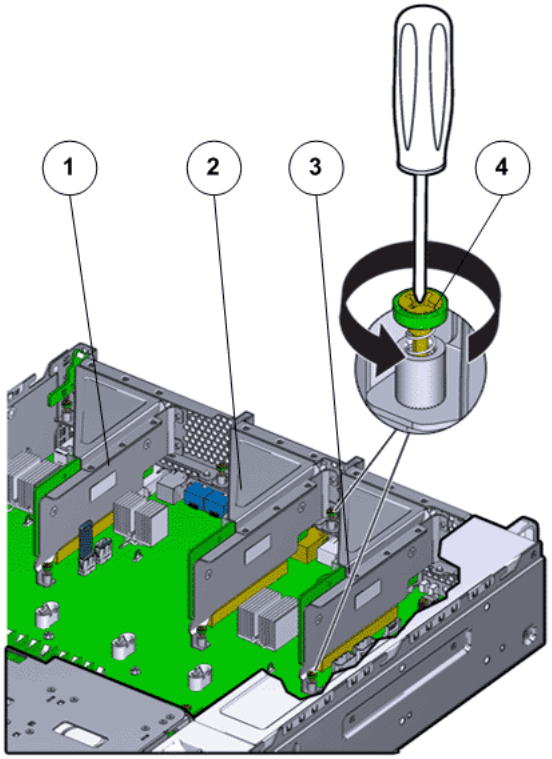
2 Note the position of the HBAs installed on the riser.

Tip: Make a note of the slot numbers of all existing HBAs before removing any HBAs.

3 Using a Phillips Number 2 screwdriver, loosen the two Phillips Number 2 captive screws on either side of the riser that hold the riser to the Replication Engine motherboard.

Note: The riser on the opposite end of the power supply has a latch that must be disengaged to remove the riser from the Replication Engine chassis

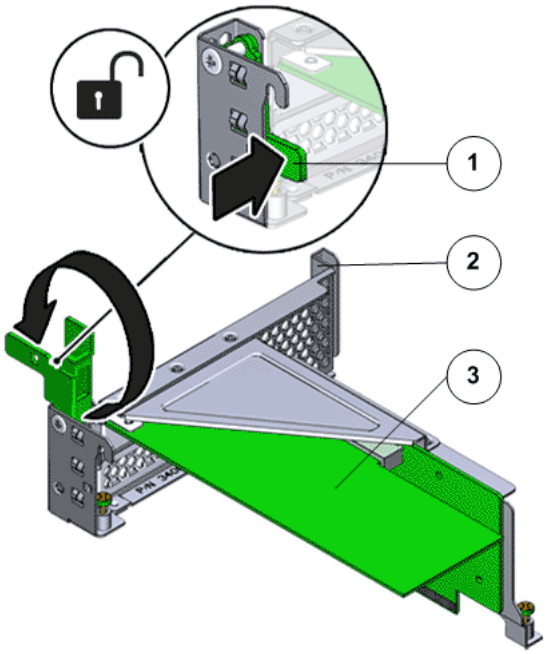
Figure 80: Captive screws to secure the risers



Legend		
	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws that secure riser

To remove riser 3, unlock the latch to release the riser from the Replication Engine motherboard.

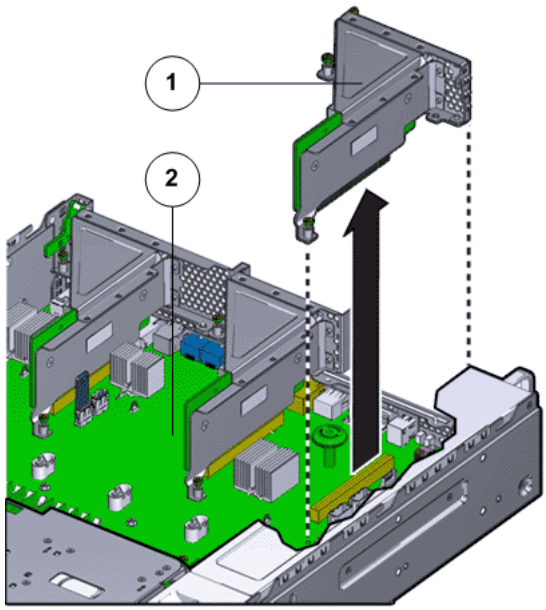
Figure 81: Unlock Riser 3 latch



Legend	1 Riser 3 latch	3 HBA
	2 Riser 3	

4 Carefully pull the riser straight up and place it aside.

Figure 82: Remove riser



Legend	1 Riser
	2 Replication Engine motherboard

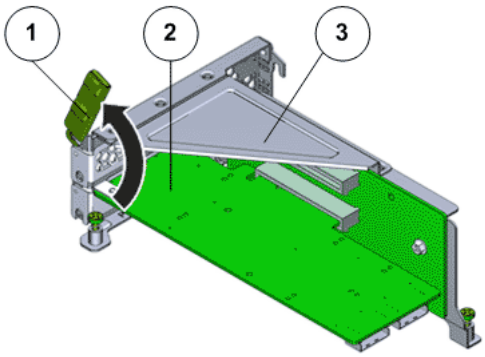
Remove an HBA

1 Disconnect any cables that are connected to the HBAs inside the riser.

If you have not done so already, note the ports from which the cables are disconnected in the HBA, so that the cables can be reconnected to their original ports when the HBA is replaced.

2 Swing the riser retainer latch (for riser 3) to its fully open (180 degrees) position.

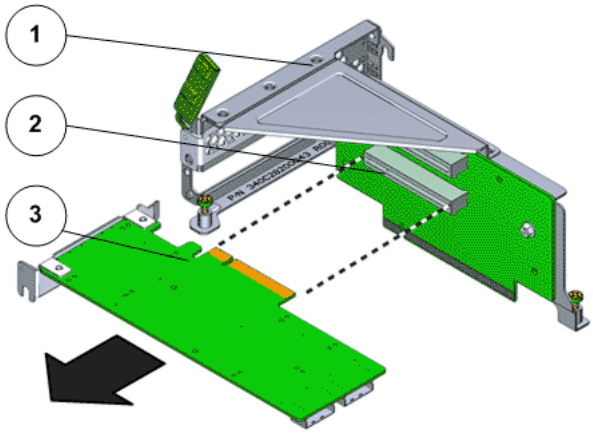
Figure 83: Unlock riser retainer latch to release HBA



Legend	1 Riser retainer latch
	2 HBA
	3 Riser

3 Lift the HBA off of the alignment pin of the riser slot.

Figure 84: Remove HBA from riser slots



Legend	1 Riser
	2 Riser slots
	3 HBA

Insert an HBA

1 Unscrew the filler panels on the riser (if any), so that the HBAs can be inserted into the PCIe slots of the replacement riser.

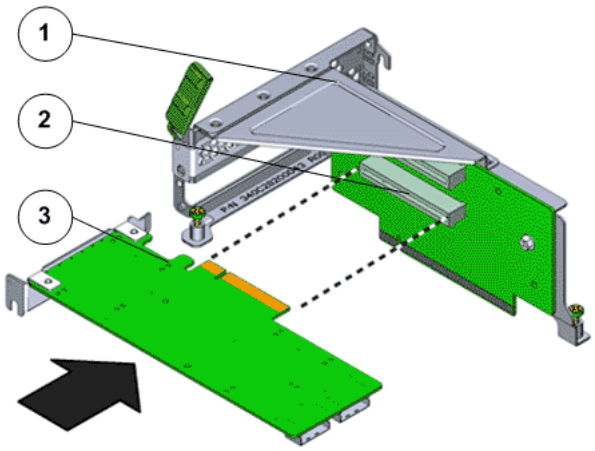
Note: If you are replacing an HBA from the riser with the retainer latch, swing the retainer latch to its fully open (180 degrees) position.

2 Orient the HBA so that the brackets of the HBA align with the alignment pin in the PCIe slot of the riser.

Important: Hold the HBA by the edges. Do not touch the metal contacts on the bottom of the card.

3 Push the connectors on the edge of the HBA into the PCIe slot by pushing firmly to seat the card.

Figure 85: Insert HBA into riser slot



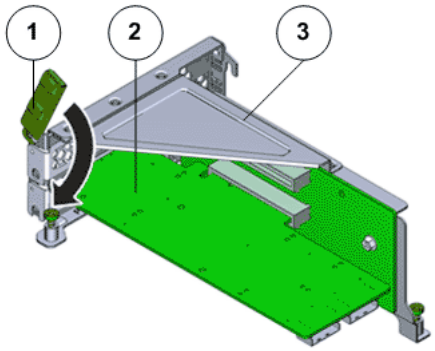
Legend	1 Riser
	2 Riser slots
	3 HBA

4 Apply firm pressure on each end of the HBA alternately until it clicks into place in the riser socket.

Caution: Support the HBA and the riser as necessary to prevent excessive flexure. Otherwise, the HBA or the riser card might be damaged.

5 When all HBAs have been installed in this riser, swing the retainer latch to its fully closed position. If there is resistance, check the alignment of the HBA and try again.

Figure 86: HBA retainer latch



Legend	1 Riser retainer latch
	2 HBA
	3 Riser

6 Repeat the procedure for any additional PCIe3 HBAs that might be installed in the other risers.

7 Reconnect any cables that had been disconnected from the HBAs.

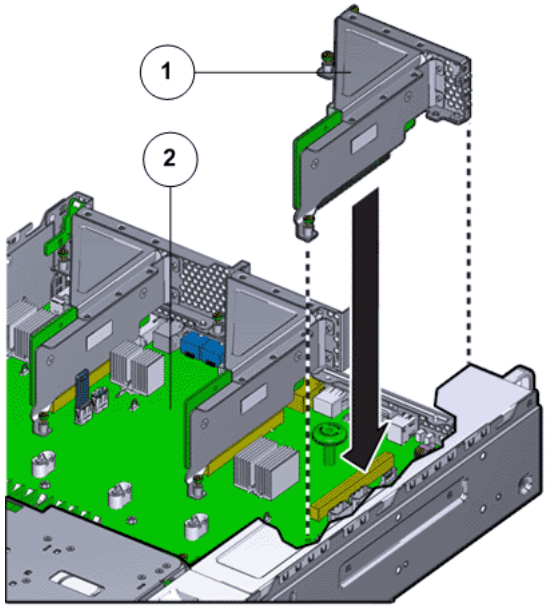
Note: Make sure that disconnected cables from the HBAs are connected to their original ports.

Insert a Riser

1 Lower the riser onto the Replication Engine motherboard and press the riser edge connector securely into the socket.

Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

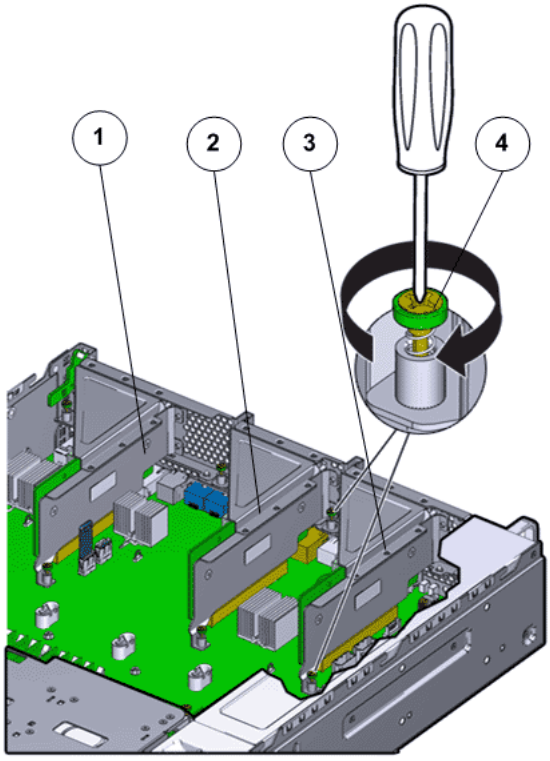
Figure 87: Insert riser



Legend	1 Riser
	2 Replication Engine motherboard

2 After the riser is seated properly inside the Replication Engine, tighten the two captive Phillips screws on both sides of the riser to secure the riser on the Replication Engine motherboard.

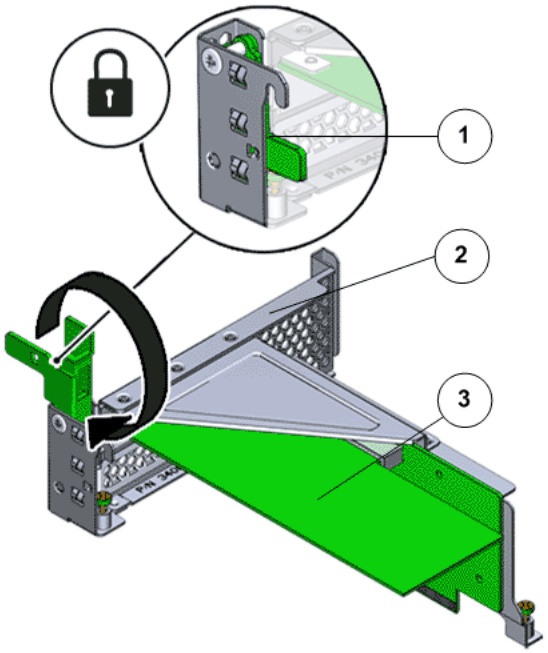
Figure 88: Captive screws to secure risers to the motherboard



Legend		
	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws

To install riser 3, lock the latch to secure the riser to the Replication Engine motherboard.

Figure 89: Riser 3 latch locked



Legend		
	1 Riser 3 latch	3 HBA
	2 Riser 3	

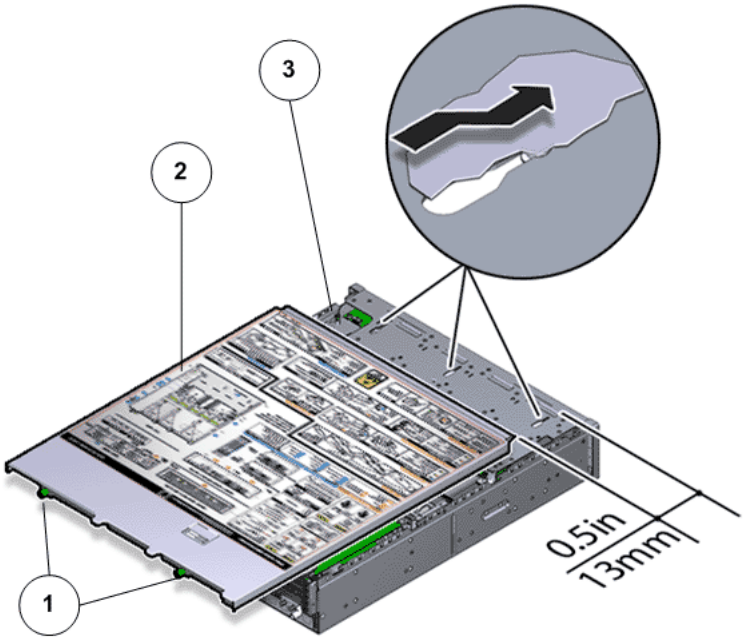
3 Reconnect any previously removed internal or external cables to any HBAs installed in the riser.

4 Repeat the above steps for any additional risers that you are installing.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 90: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Reconnect Replication Engine Cabling

1 Reconnect all the data cables on the Replication Engine.

Note: Oracle Customer Support recommends labeling all cables connected to the Replication Engine so that the cables can be reconnected accurately to the Replication Engine after the replacement procedure is complete.

2 Reconnect the CMA to the Replication Engine by attaching the release tab on the left and right side of the CMA.

Complete the Component Replacement

1 Slide the Replication Engine back into rack position.

2 Re-connect the cables that were removed from the Replication Engine.

Note: The BIOS is set to automatically power on the Replication Engine, when power is applied.

Replace a Replication Engine DIMM

Dual in-line memory modules (DIMMs) provide random access memory (RAM) for the central processing units (CPUs) configured in the Replication Engine. DIMMs are connected to the DIMM slots located on both sides of the central processing unit (CPUs) and heat sinks on the Replication Engine motherboard. A failed DIMM might cause the Replication Engine to be brought offline and must be replaced as soon as possible.

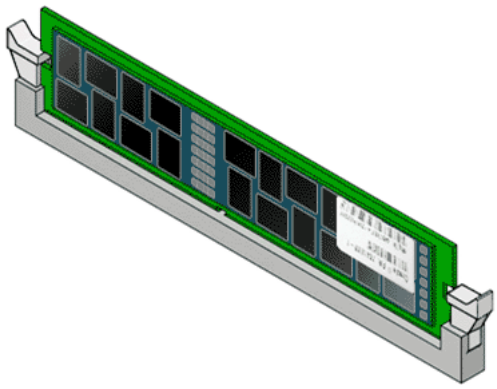
Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that all DIMM slots are filled with either filler panels or DIMMs to ensure proper airflow.

Oracle MaxRep Replication Engine has four standard DIMMs

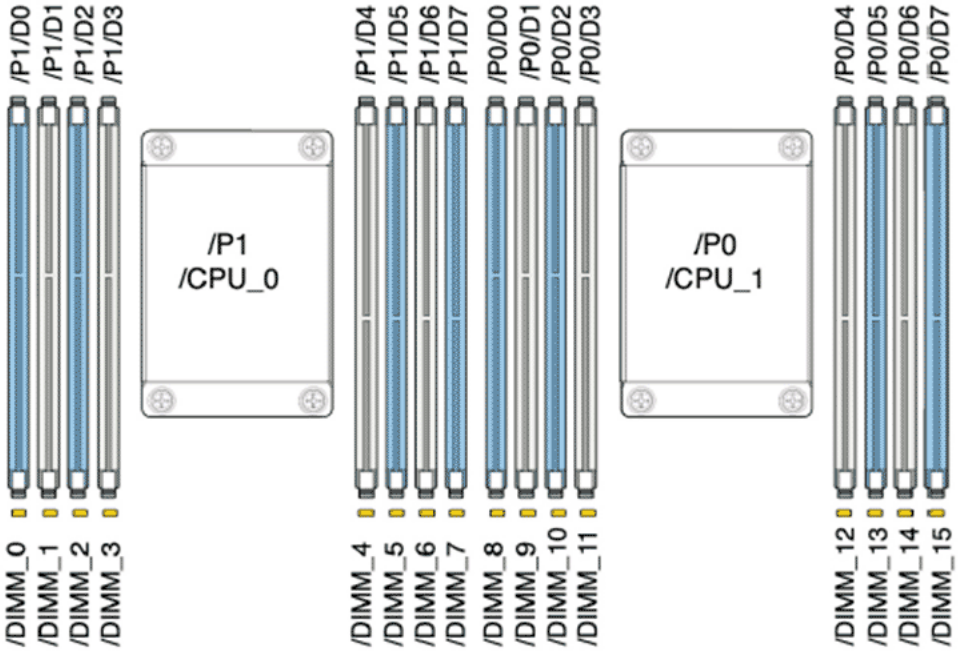
DIMMs are customer replaceable units (CRUs). Replacing a DIMM requires you to bring the Replication Engine offline. The following figure depicts a DIMM memory module.

Figure 91: DIMM memory module



The following diagram indicates the location of the DIMMs in the DIMM slots.

Figure 92: DIMMs in DIMM slots



Note: The DIMMs can be accessed only after removing the cover over the Replication Engine chassis.

Note: To replace a DIMM, you do not need to remove the Replication Engine from the rack but extend it along the Replication Engine rails using the cable management arm (CMA).

Note: All DIMM fault LEDs are located next to the DIMM slots along with the DIMM slot number.

Caution: Ensure that all power is removed from the Replication Engine before removing or installing the DIMM.

Procedure Overview

1 *Slide Replication Engine to Service Position*
2 *Remove the Replication Engine Power Supply Cords*
3 *Open the Replication Engine Top Cover*
4 *Remove an Air Filter*
5 *Raise the Drive Compartment to Service Position*
6 *Remove an Air Duct*
7 *Remove a DIMM*
8 *Insert a DIMM*
9 *Lower the Drive Compartment*
10 *Insert an Air Duct*

11 *Insert an Air Filter*

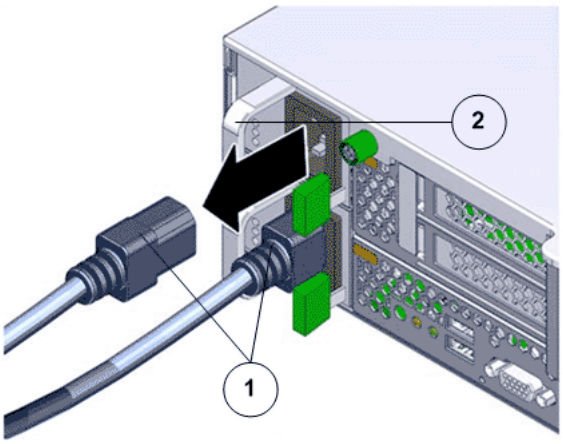
12 *Close the Replication Engine Top Cover*

13 *Complete the Component Replacement*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 93: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

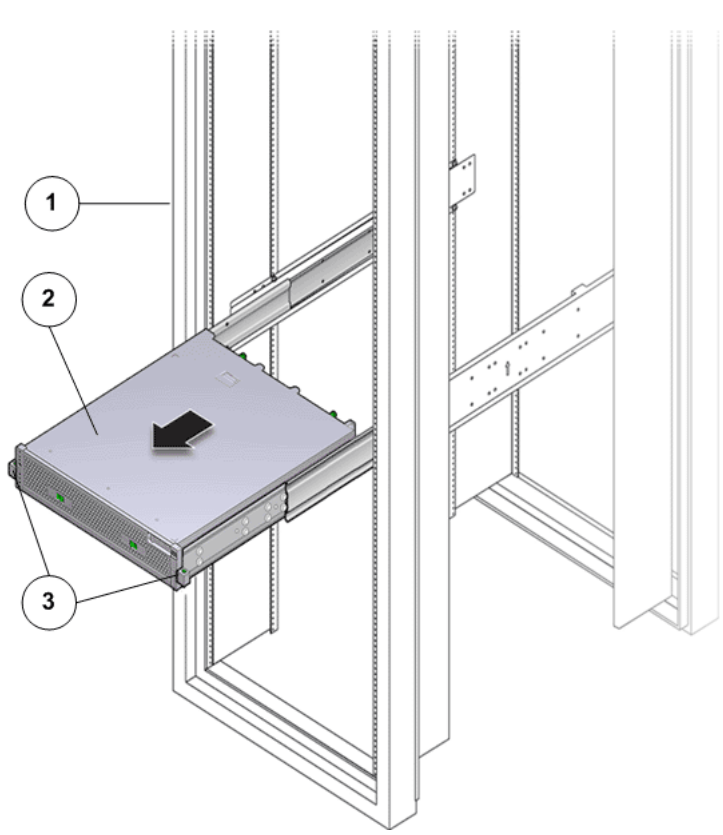
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 94: Slide the Replication Engine to service position



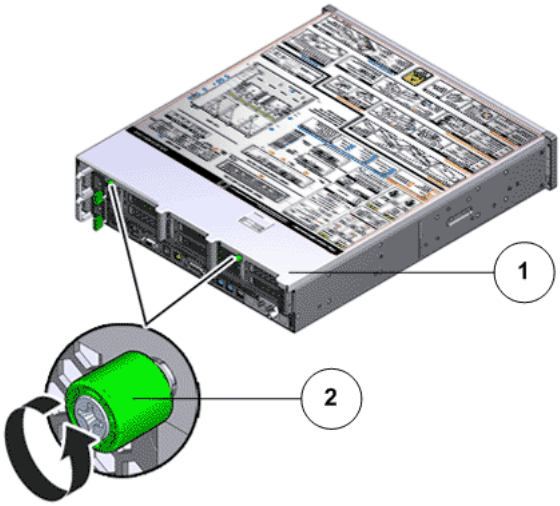
Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 95: Captive thumb screws to remove the top cover



Legend	1 Replication Engine top cover
	2 Captive screws

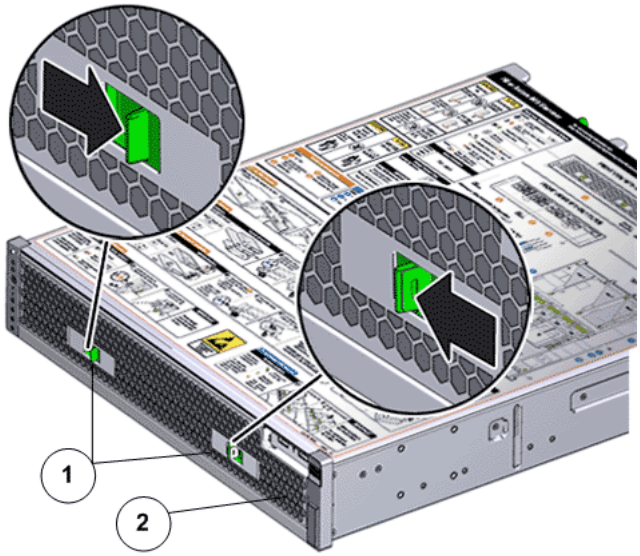
2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove an Air Filter

1 At the front of the Replication Engine chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 96: Air filter release tabs



Legend	1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

Figure 97: Remove air filter

4 Set the air filter aside.

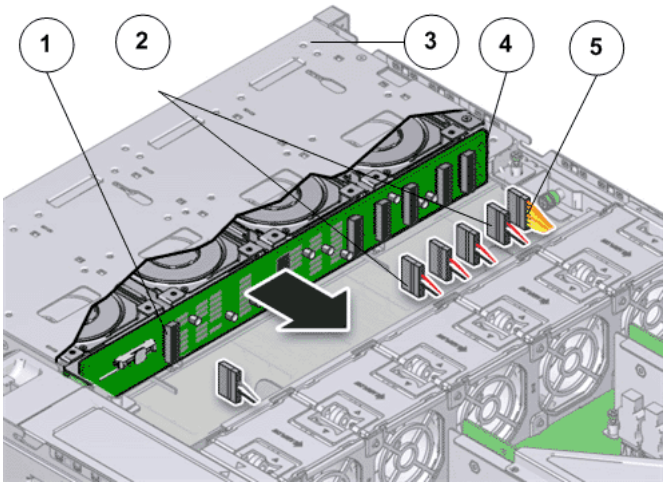
Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.

Cables that must be disconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 98: Cables connected to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cables
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Replication Engine display panel.

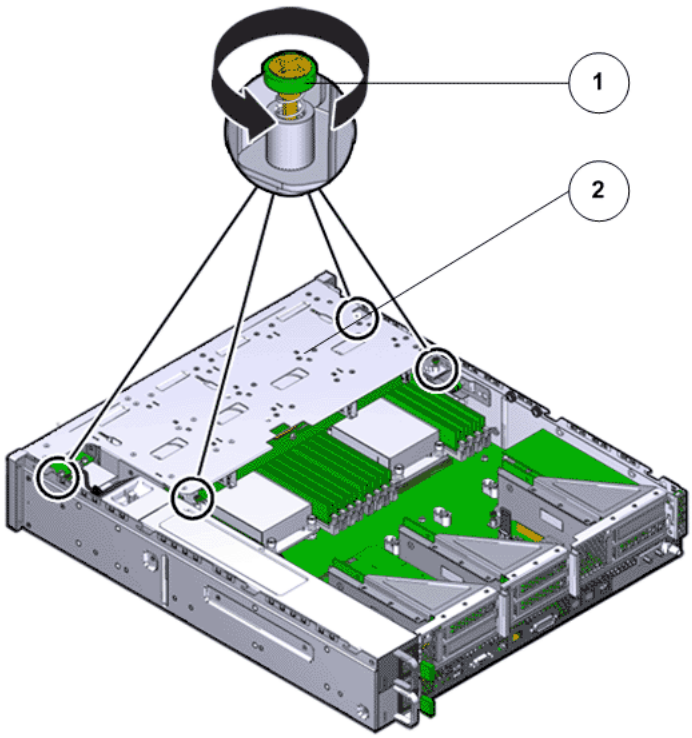
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 99: Disengaging the backplane

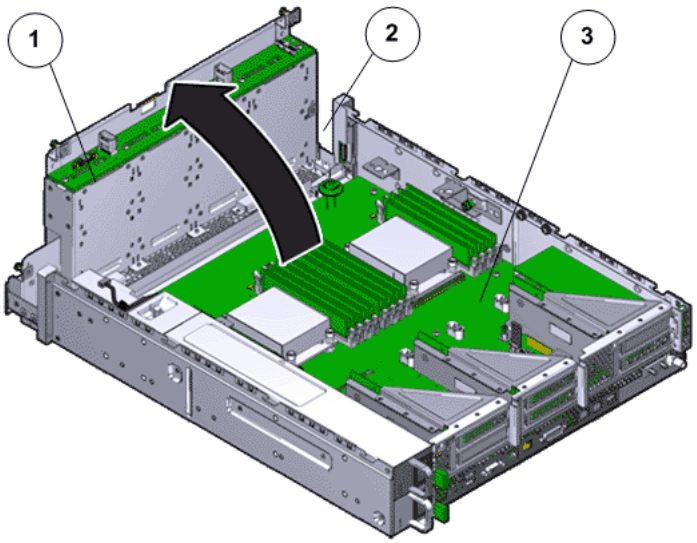


Legend	1 Thumb screws that secure the backplane
	2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Replication Engine.

3 Raise the backplane and drive compartment to the vertical position.

Figure 100: Drive compartment raised

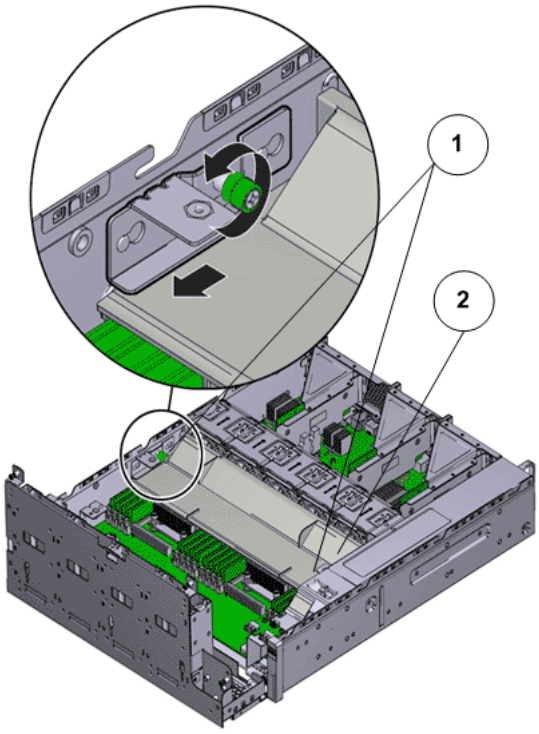


Legend	1 Backplane
	2 Drive compartment
	3 Replication Engine motherboard

Remove an Air Duct

1 Remove the air duct by loosening the two brackets and the Phillips Number 2 thumb screws on both sides of the air duct.

Figure 101: Remove air duct



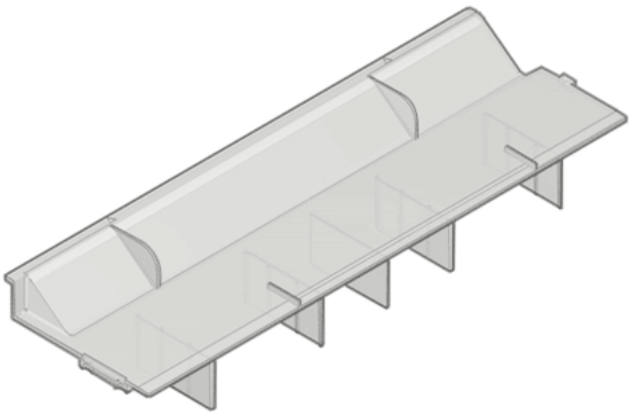
Legend	1 Screws that secure air duct
	2 Air duct

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward and the right bracket slides back when facing the Replication Engine in the service position.

2 Lift up the air duct from the Replication Engine chassis and set it aside.

The following figure shows a Replication Engine air duct:

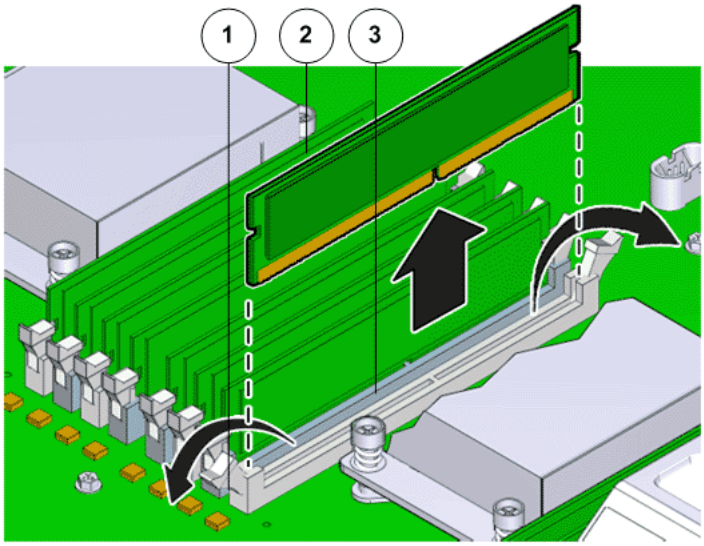
Figure 102: Air duct



Remove a DIMM

1 Remove the DIMMs by pressing down on the tabs on both sides of the DIMM to unlock it from the slot.

Figure 103: Remove DIMMs



Legend	1 Tabs to release DIMMs
	2 DIMM
	3 DIMM slot

Note: While inserting or removing DIMMs, ensure that there is no interference with the cables. Pulling or pressing down on the cables might cause damage to the cables during the replacement procedure.

2 Lift out the DIMM and set aside on an antistatic mat.

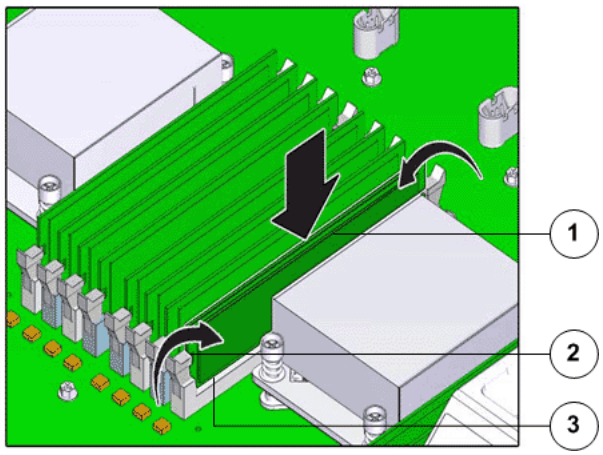
Note: Visually inspect the slots and the memory for physical damage by checking for cracked or broken plastic in the slot.

Note: Sometimes memory might fault because of dust or improper alignment or damaged slots. Use only compressed air to dust the memory.

Insert a DIMM

Press the DIMM fully into the DIMM slot and ensure that the tabs on both sides of the DIMM are locked.

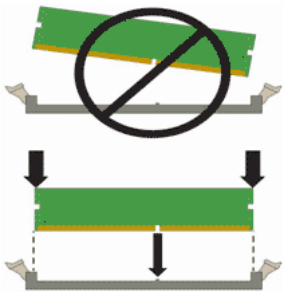
Figure 104: Insert Replication Engine DIMM



Legend	
	1 DIMM
	2 Tabs to secure DIMMs
	3 DIMM notch aligns with the DIMM slots

Note: While inserting DIMMs, ensure that there is no interference with the cables. Pulling or pressing down on the cables might cause damage to the cables during the replacement procedure.

Figure 105: DIMM alignment over DIMM slots



Important: Ensure that the notch in the DIMM lines up with the key in the slot.

Note: Replace only one DIMM at a time to make sure that they are inserted into the correct slots. Attempting to insert multiple DIMMs into the slots might damage the DIMMs due to excessive flexure.

Note: Never leave a DIMM slot unpopulated. Insert fillers into empty slots to ensure proper air flow inside the Replication Engine.

Lower the Drive Compartment

1 Rotate the drive compartment and backplane back into position inside the Replication Engine and ensure that the alignment pins engage.

Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Replication Engine.

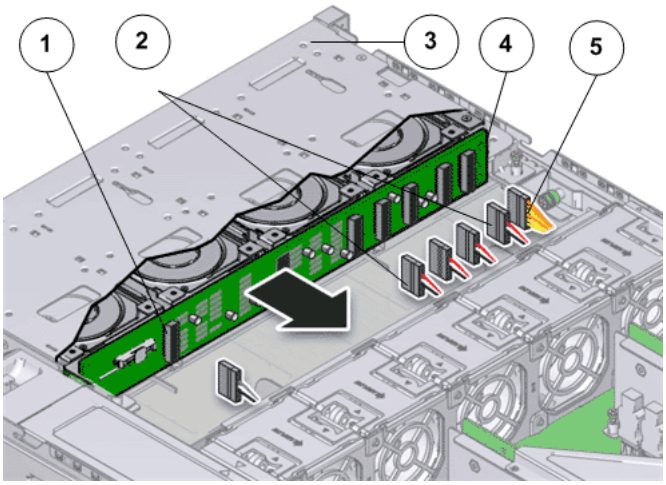
2 Secure the backplane inside the Replication Engine by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.

3 Reconnect all the cables that had been previously disconnected from the backplane.

Cables that must be reconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable

Figure 106: Reconnect cables to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cable
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Insert an Air Duct

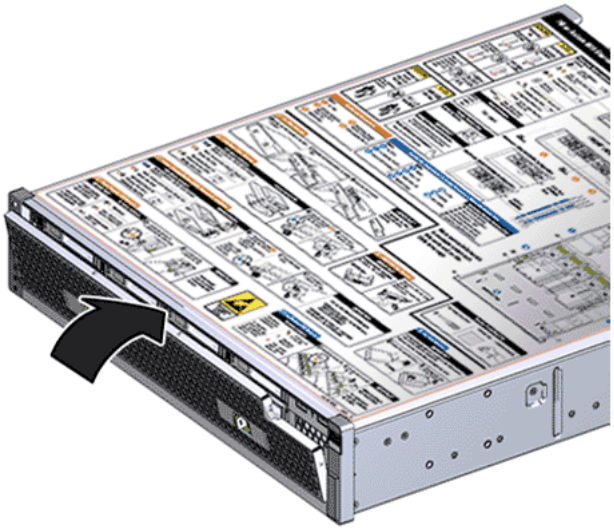
Secure the air duct inside the Replication Engine by tightening the two Phillips Number 2 screws into position.

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward, the right bracket slides back when facing the Replication Engine in the service position.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 107: Insert air filter



Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

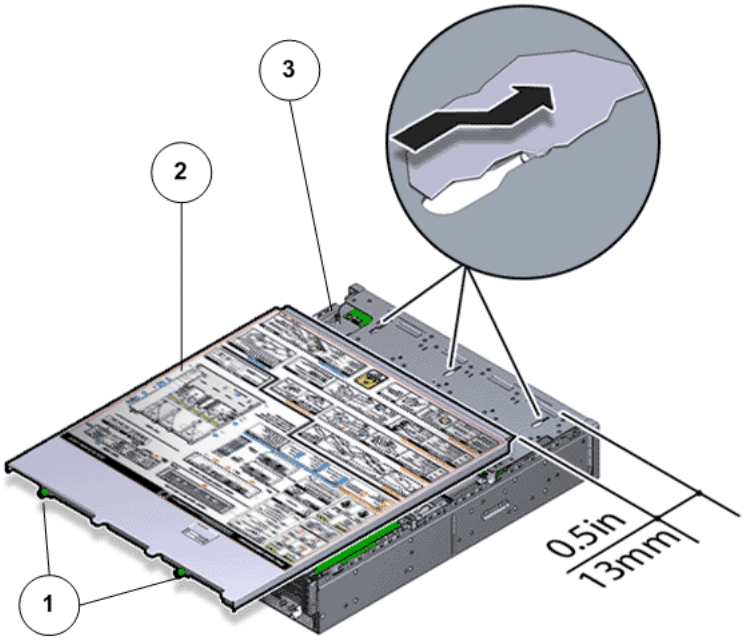
2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 108: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Complete the Component Replacement

1. Slide the Replication Engine back into rack position.
2. Re-connect the cables that were removed from the Replication Engine.

   Note: The BIOS is set to automatically power on the Replication Engine, when power is applied.

Replace a Replication Engine Disk Backplane

The disk backplane provides a physical interconnect for the drives. The disk backplane, if damaged, prevents the drives from seating properly. Improper seating prevents the modules from providing backup power to flash memory, which can lead to data loss.

Prerequisites:

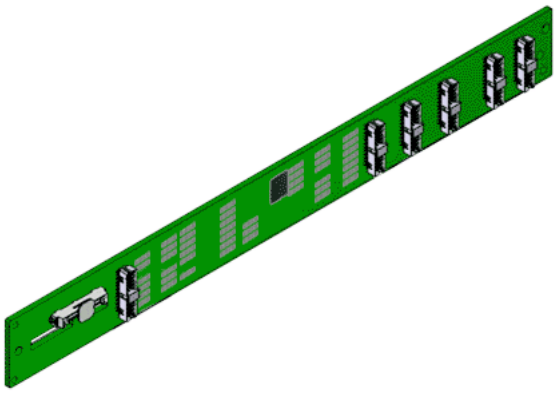
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.

- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Remove the drives from the drive compartment and make a note of the drive slots so that they can be re-inserted after the replacement procedure.

Caution: Ensure that all power is removed from the Replication Engine before removing or installing the disk backplane. Disconnect the power cables before performing the disk backplane replacement procedure.

Each Replication Engine has a disk backplane that is located at the back of the Replication Engine drive compartment. The disk backplane is a field replaceable unit (FRU). Replacing an disk backplane requires you to bring the Replication Engine offline. The following figure shows the disk backplane.

Figure 109: Disk backplane board



Note: The disk backplane can be accessed only after removing the cover over the Replication Engine chassis.

Note: To replace an disk backplane, you do not need to remove the Replication Engine from the rack but extend it along the Replication Engine rails using the cable management arm (CMA).

Note: The drive compartment must be disengaged and raised inside the Replication Engine chassis to perform many of the replacement procedures.

Caution: Replacement of the Replication Engine disk backplane requires assistance from Oracle Customer Support.

Procedure Overview

1 *Remove the Replication Engine Power Supply Cords*

2 *Slide Replication Engine to Service Position*

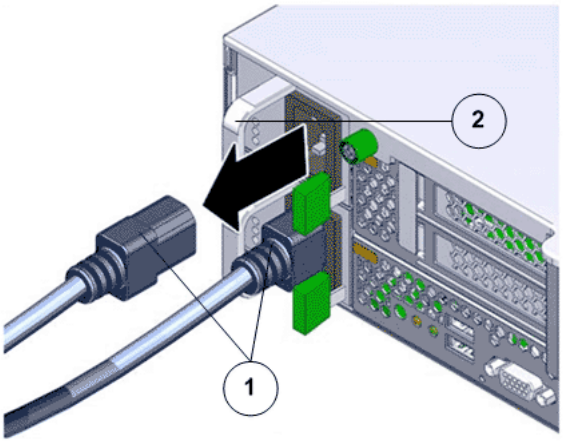
3 *Remove Components From the Replication Engine*

4 *Raise the Drive Compartment to Service Position*
5 *Remove a Backplane*
6 *Insert the Backplane*
7 *Insert Components on the Replication Engine*
8 *Complete the Component Replacement*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 110: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

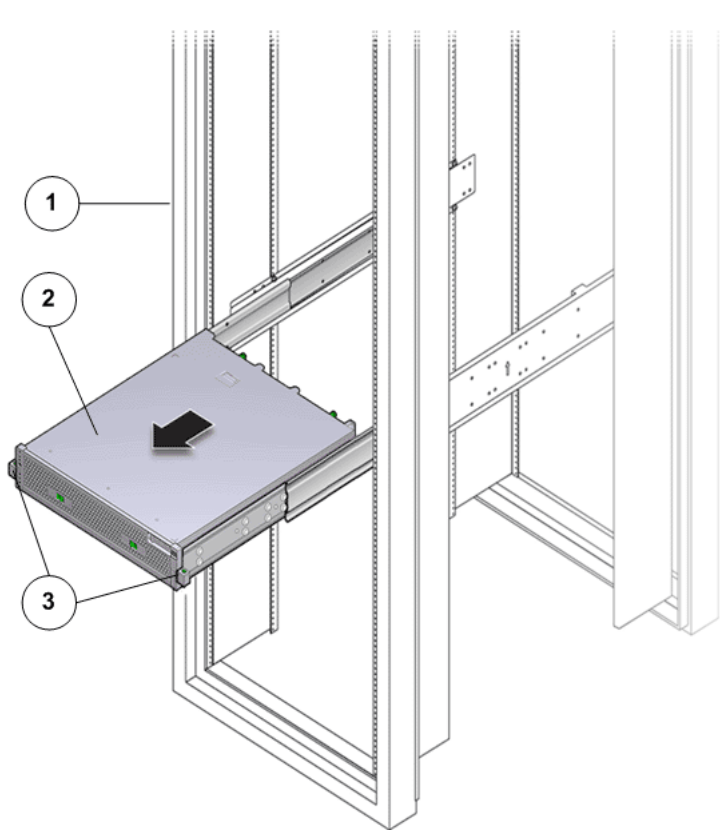
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 111: Slide the Replication Engine to service position



Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Remove Components From the Replication Engine

Note: Some components must be removed from the Replication Engine as a prerequisite for access while replacing the failed component.

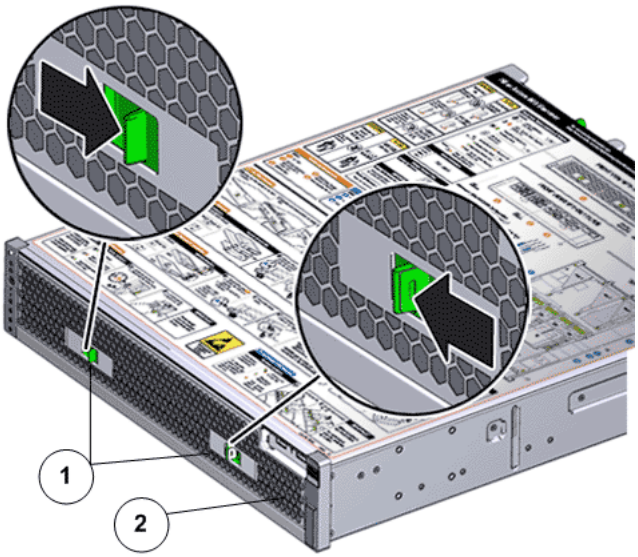
Note: All components that are removed from the Replication Engine must be placed on an antistatic surface or ESD qualified mat.

Remove an Air Filter

1 At the front of the Replication Engine chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 112: Air filter release tabs



Legend	1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

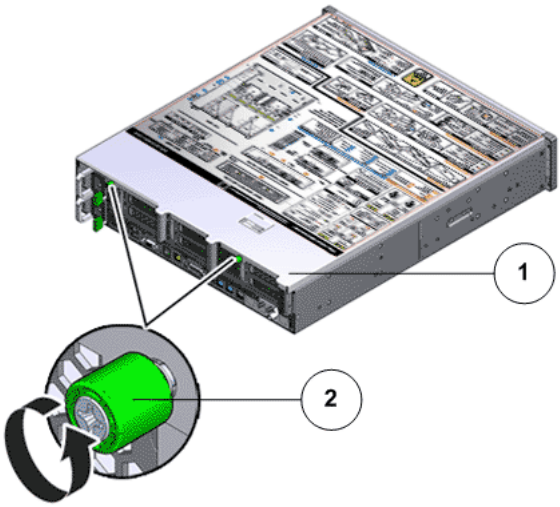
Figure 113: Remove air filter

4 Set the air filter aside.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 114: Captive thumb screws to remove the top cover



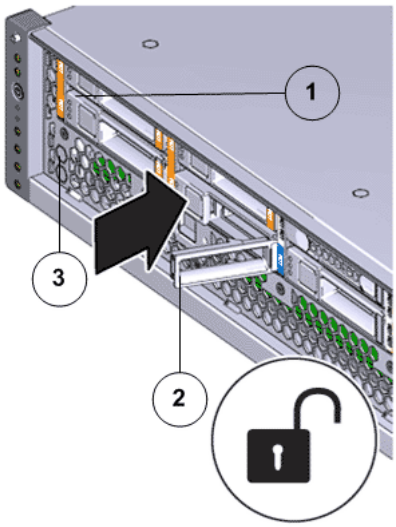
Legend	
	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove a Replication Engine Drive

1 Remove the Replication Engine drive from the drive compartment by pushing the latch release button to open the latch.

Figure 115: Open drive latch



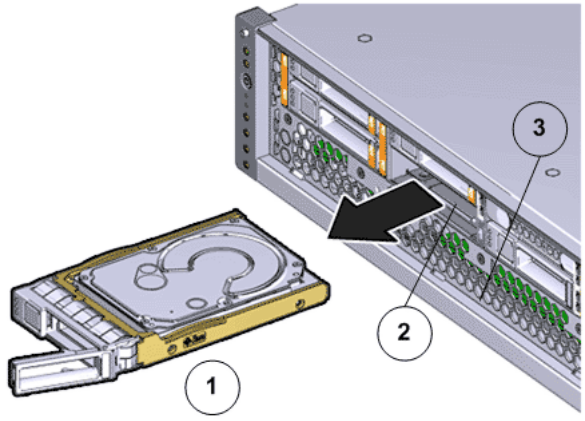
Legend	1 Drive	2 Latch release button
	3 Replication Engine front	

Important: Do not bend the latch too far to the right. Bending the latch can damage the latch.

Important: For drives that are removed but will be later reinserted, label the drive with the position that the drive occupies in the Replication Engine. Reinserting drives in the incorrect slot might result in data loss and a full recovery might be required to resume operation.

2 Grasp the latch and pull the drive out of the Replication Engine drive compartment.

Figure 116: Remove drive



Legend	1 Drive	2 Replication Engine drive compartment
	3 Replication Engine front	

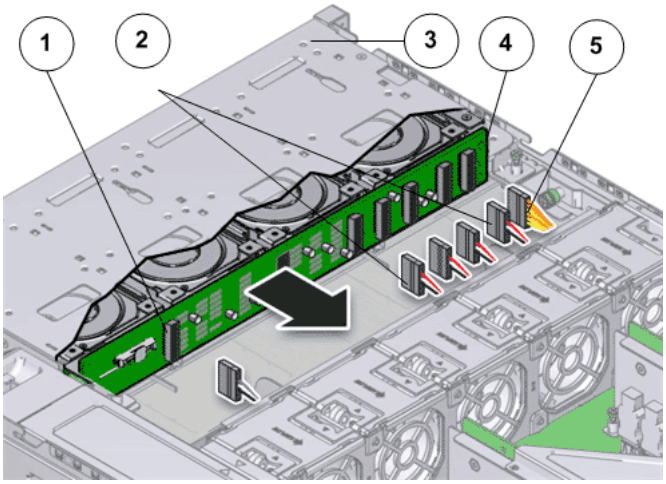
3 Repeat for each of the four drives of the Replication Engine that need to be replaced.

Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.
Cables that must be disconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 117: Cables connected to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cables
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Replication Engine display panel.

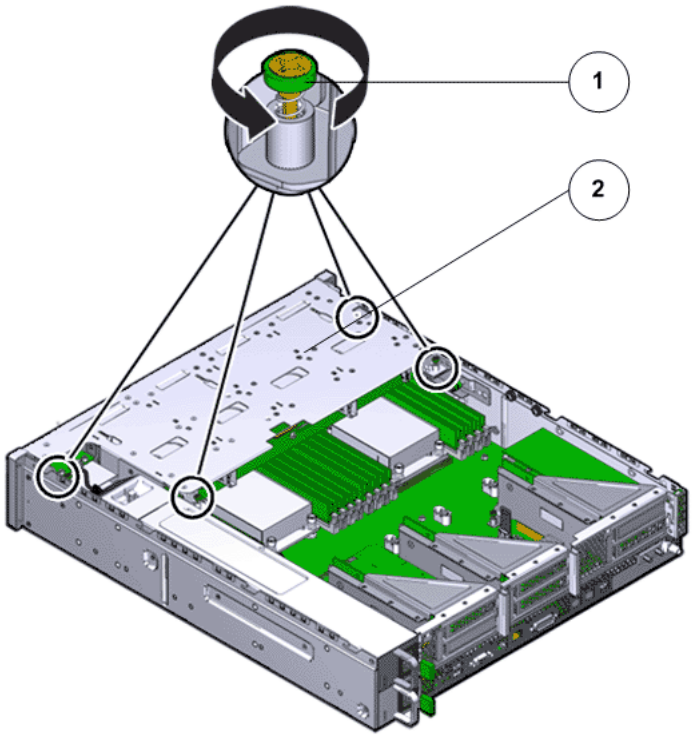
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 118: Disengaging the backplane

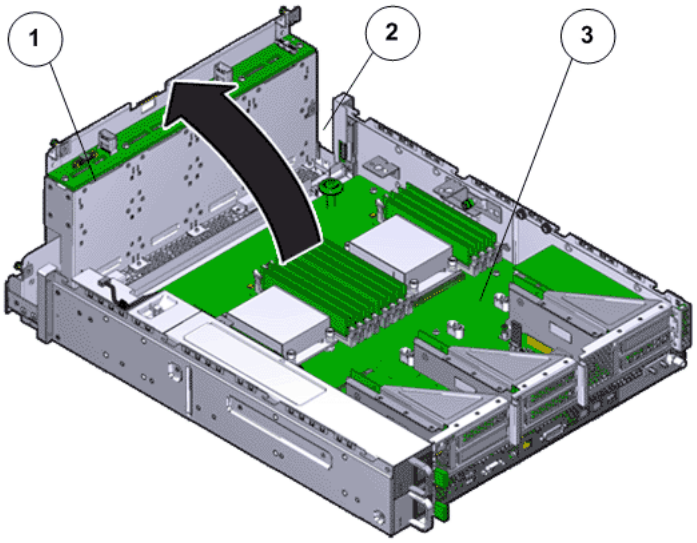


Legend	1 Thumb screws that secure the backplane
	2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Replication Engine.

3 Raise the backplane and drive compartment to the vertical position.

Figure 119: Drive compartment raised

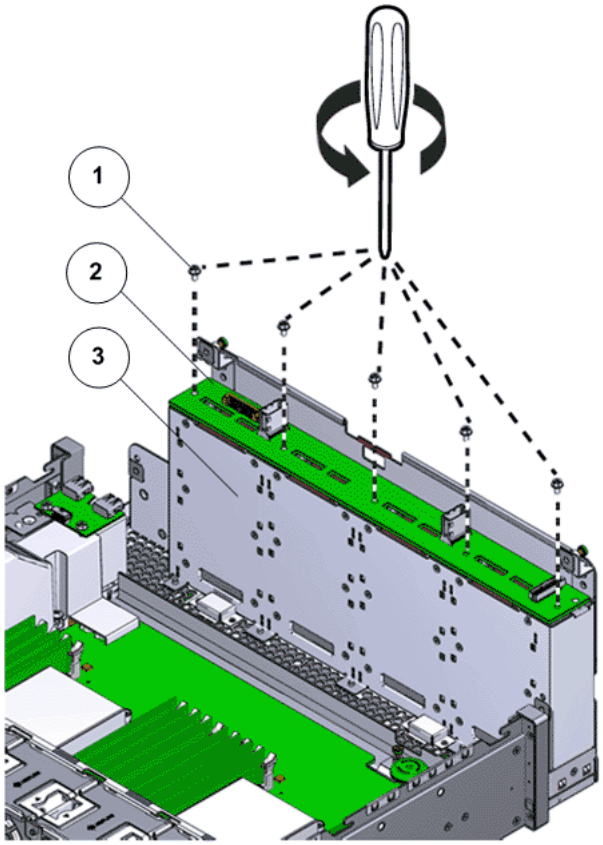


Legend	
	1 Backplane
	2 Drive compartment
	3 Replication Engine motherboard

Remove a Backplane

1 Remove the five screws that secure the backplane boards to the drive compartment.

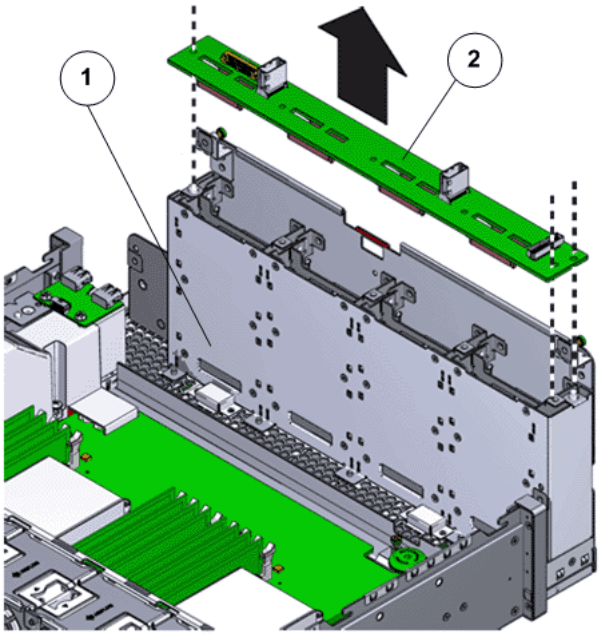
Figure 120: Unscrew the backplane boards



Legend	1 Screws securing the backplane boards
	2 Backplane board
	3 Drive compartment

2 Lift the backplane board off of the alignment pins and out of the Replication Engine chassis.

Figure 121: Remove the backplane boards



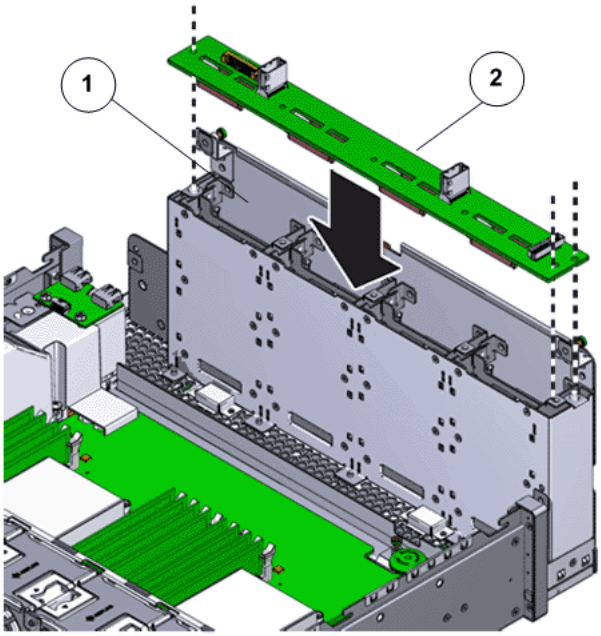
Legend	1 Drive compartment
	2 Backplane boards

3 Place the backplane on an antistatic mat.

Insert the Backplane

1 Position the backplane boards to where it will install into the Replication Engine chassis.

Figure 122: Backplane boards

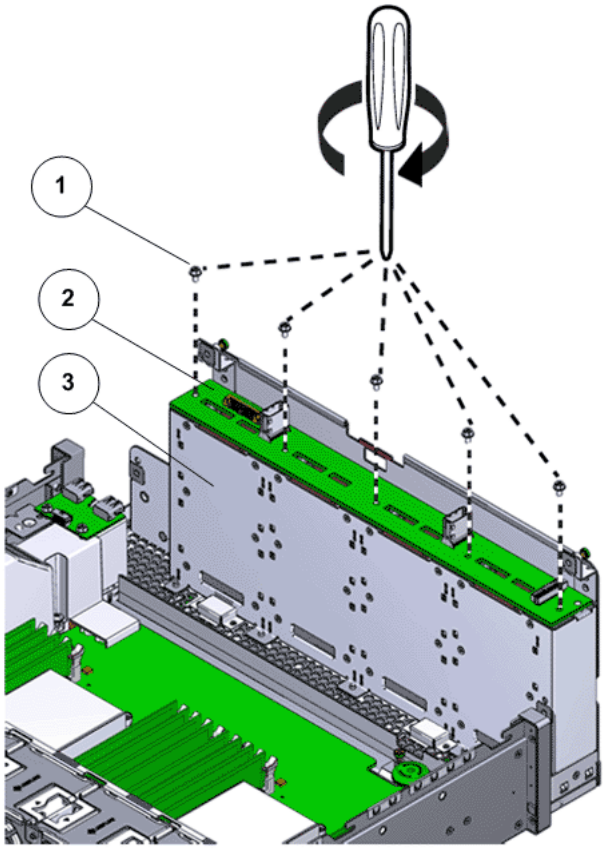


Legend	1 Drive compartment	2 Backplane boards

Note: The backplane boards align with the drive connectors. In the following diagram, the two alignment holes are on the left and the single alignment hole is on the right.

2 Install and tighten the five screws that secure the backplane boards onto the drive compartment.

Figure 123: Backplane boards secured



Legend		
	1 Screws securing the backplane boards	2 Backplane board
	3 Drive compartment	

3 Secure the backplane inside the Replication Engine by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.

4 Rotate the drive compartment and backplane back into position inside the Replication Engine and ensure that the alignment pins engage.

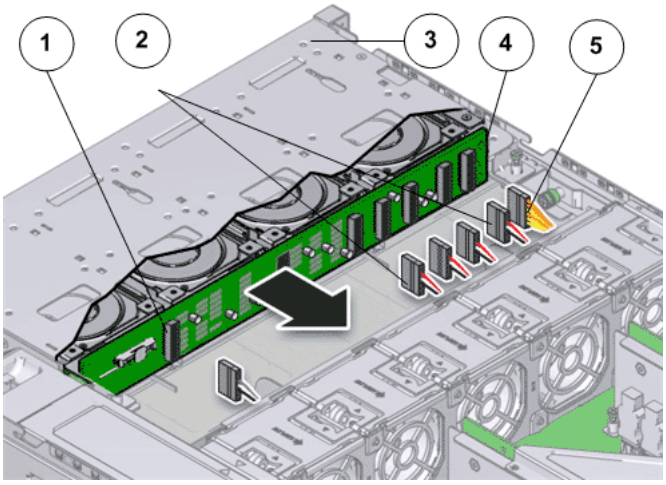
Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Replication Engine.

5 Reconnect all the cables that had been previously disconnected from the backplane.

Cables that must be reconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable

Figure 124: Reconnect cables to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cable
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

6 Reinstall the drives into the backplane in the appropriate locations.

Insert Components on the Replication Engine

Insert the necessary components on the Replication Engine following the procedures outlined below.

Some components had to be removed from the Replication Engine as a prerequisite for access while replacing the failed component. These components must be reinstalled after completing the replacement.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 125: Insert air filter

Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

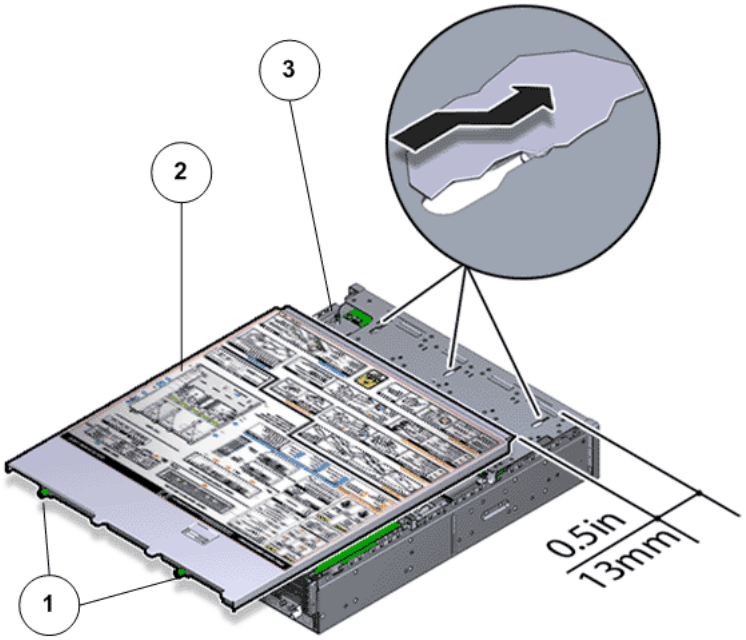
2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 126: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Complete the Component Replacement

1. Slide the Replication Engine back into rack position.
2. Re-connect the cables that were removed from the Replication Engine.

   Note: The BIOS is set to automatically power on the Replication Engine, when power is applied.

Replace a Replication Engine Heat Sink

The heat sink serves as a cooling device to prevent the CPU in the Replication Engine from overheating. A damaged heat sink can cause the Replication Engine CPU to overheat, which would cause the CPU to fail. You must replace a damaged heat sink as soon as possible.

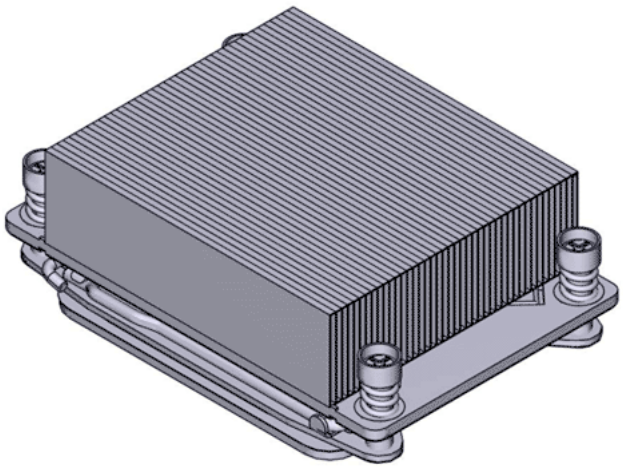
Caution: Ensure that all power is removed from the Replication Engine before replacing the heat sink. Disconnect the power cables before performing the heat sink replacement procedure.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.

Each Replication Engine has two heat sinks located above the CPUs on the Replication Engine motherboard. Heat sinks are usually durable and need not be replaced. Heat sinks are field replaceable units (FRUs). Replacing a heat sink requires you to bring the Replication Engine offline. The following figure displays the Replication Engine heat sink.

Figure 127: Heat sink



Note: The heat sinks can be accessed only after removing the cover over the Replication Engine chassis.

Note: To replace a heat sink, you do not need to remove the Replication Engine from the rack but extend it along the Replication Engine rails.

Procedure Overview

1 *Slide Replication Engine to Service Position*
2 *Remove the Replication Engine Power Supply Cords*
3 *Open the Replication Engine Top Cover*
4 *Remove an Air Duct*
5 *Raise the Drive Compartment to Service Position*
6 *Remove a Heat Sink*
7 *Insert a Heat Sink*
8 *Insert an Air Duct*

9 *Close the Replication Engine Top Cover*

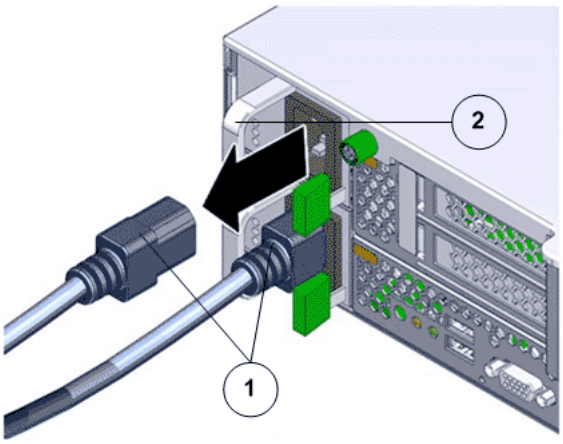
10 *Lower the Drive Compartment*

11 *Complete the Component Replacement*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 128: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

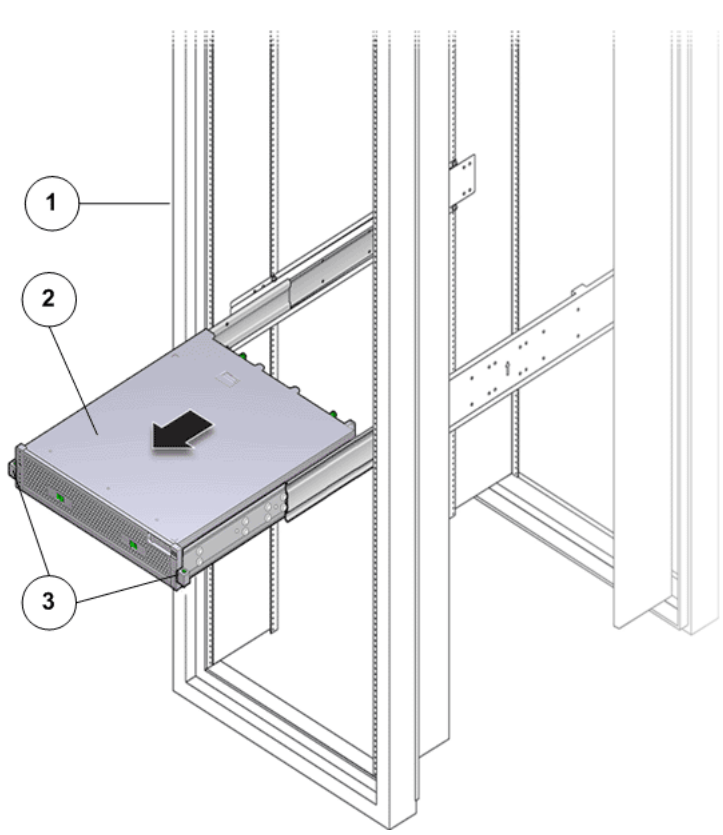
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 129: Slide the Replication Engine to service position



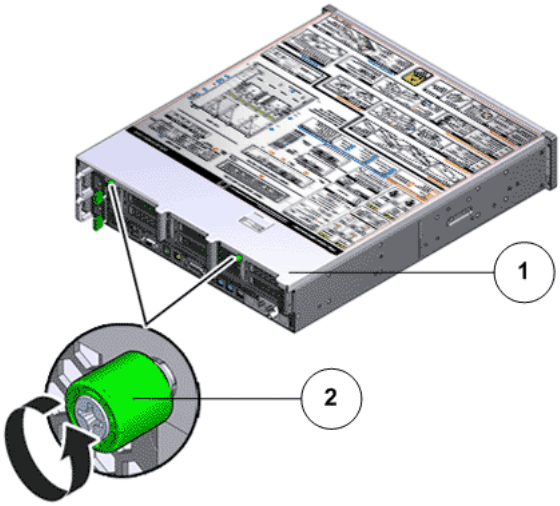
Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 130: Captive thumb screws to remove the top cover



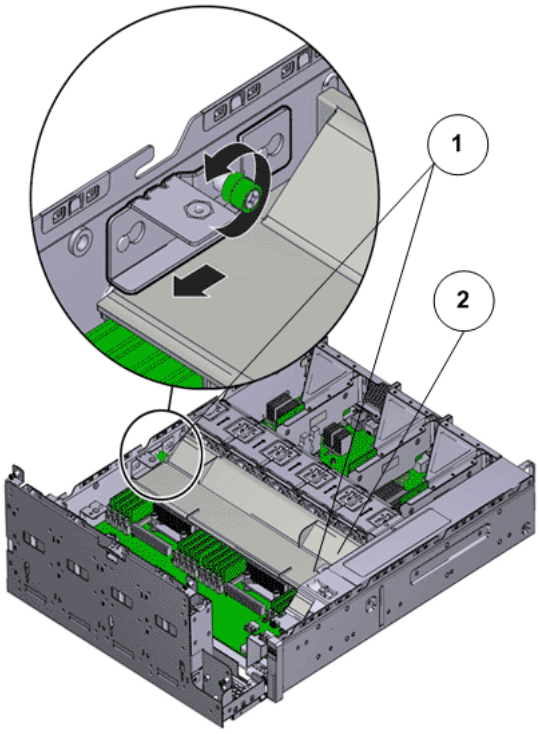
Legend	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove an Air Duct

1 Remove the air duct by loosening the two brackets and the Phillips Number 2 thumb screws on both sides of the air duct.

Figure 131: Remove air duct



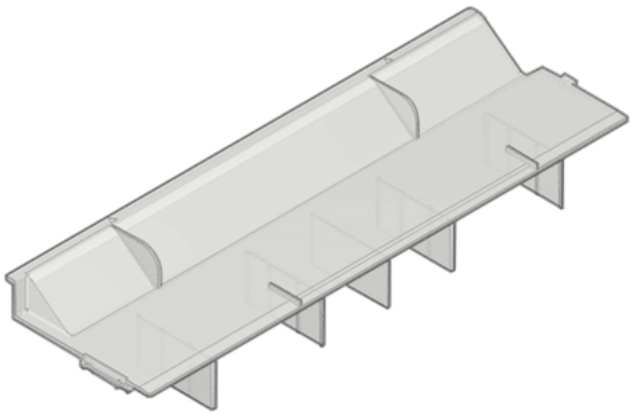
Legend	1 Screws that secure air duct
	2 Air duct

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward and the right bracket slides back when facing the Replication Engine in the service position.

2 Lift up the air duct from the Replication Engine chassis and set it aside.

The following figure shows a Replication Engine air duct:

Figure 132: Air duct

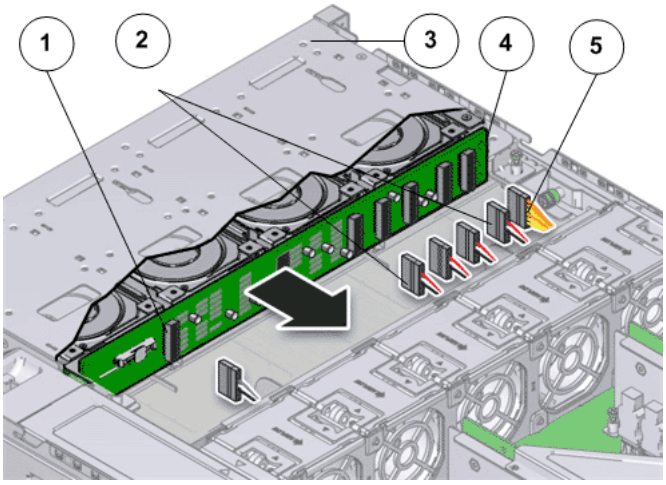


Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.
Cables that must be disconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 133: Cables connected to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cables
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Replication Engine display panel.

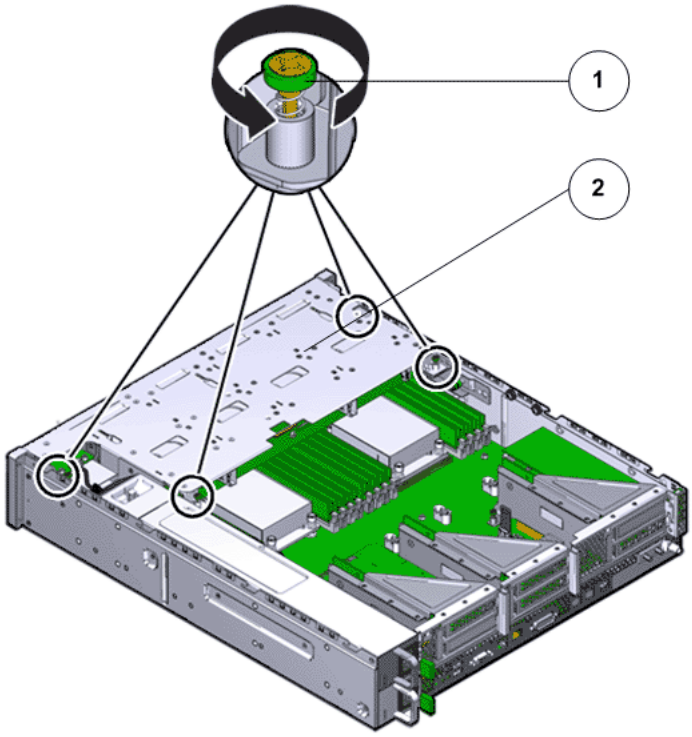
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 134: Disengaging the backplane

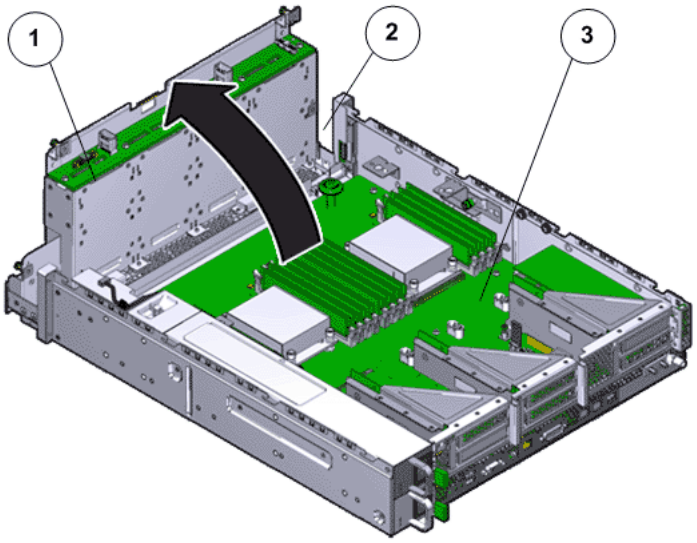


Legend	1 Thumb screws that secure the backplane
	2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Replication Engine.

3 Raise the backplane and drive compartment to the vertical position.

Figure 135: Drive compartment raised

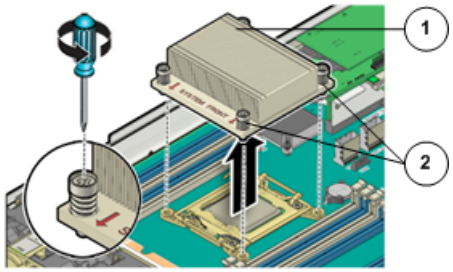


Legend	
	1 Backplane
	2 Drive compartment
	3 Replication Engine motherboard

Remove a Heat Sink

1. Remove the access window on the air duct to remove the heat sink and CPU.
2. Loosen the four Phillips screws on the four sides of the heat sink that secure the heat sink to the Replication Engine chassis a few turns at a time in a diametrically opposed pattern using a Phillips Number 2 screwdriver.

Figure 136: Loosen four screws to remove heat sink



Legend		
	1 Heat sink	2 Phillips screws that secure the heat sink

Note: Loosen one screw, then loosen the screw opposite that screw on the heat sink to prevent it from warping the motherboard on which it is mounted.

3 Gently twist the heat sink left and right, while pulling upward, to separate the heat sink from the top of the CPU.

Note: A thin layer of thermal grease separates the heat sink and the CPU. This thermal grease also acts as an adhesive.

Caution: Do not allow the thermal grease to contaminate the work space or other components.

4 Lift up the failed heat sink and set aside on an antistatic mat.

5 Visually inspect the failed heat sink to verify if the thermal grease has dried out and use an alcohol pad to clean the thermal grease from the underside of the heat sink.

Note: Be careful not to get the thermal grease on your fingers, as this could result in contamination of components.

Caution: Failure to clean the heat sink before removing the CPU can result in the accidental contamination of the CPU socket or other components.

Insert a Heat Sink

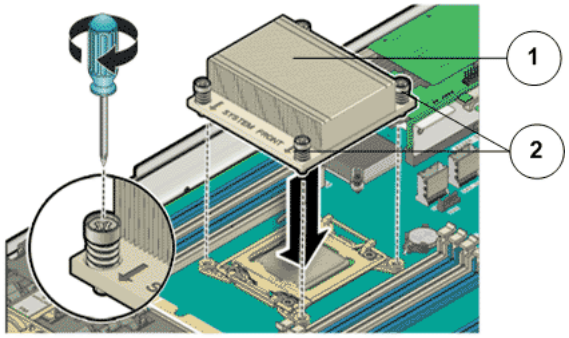
1 Secure the heat sink over the CPU to the Replication Engine motherboard by inserting the four screws on the four sides of the heat sink.

Note: Ensure that the CPU is cleaned with an alcohol pad and fresh thermal grease is applied, when installing a new heat sink, to prevent overheating and damage to the CPU.

Important: Ensure that the heat sink and the screws are aligned correctly and the screws on diagonal ends of the heat sink are tightened first. A slight force might need to be applied to push down the screwdriver while tightening the screws to overcome the tension generated.

2 Tighten the four Phillips screws on the heat sink a few turns at a time in a diametrically opposed pattern using a Phillips Number 2 screwdriver.

Figure 137: Insert heat sink



Legend	1 Heat sink
	2 Phillips screws that secure the heat sink

Insert an Air Duct

Secure the air duct inside the Replication Engine by tightening the two Phillips Number 2 screws into position.

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward, the right bracket slides back when facing the Replication Engine in the service position.

Lower the Drive Compartment

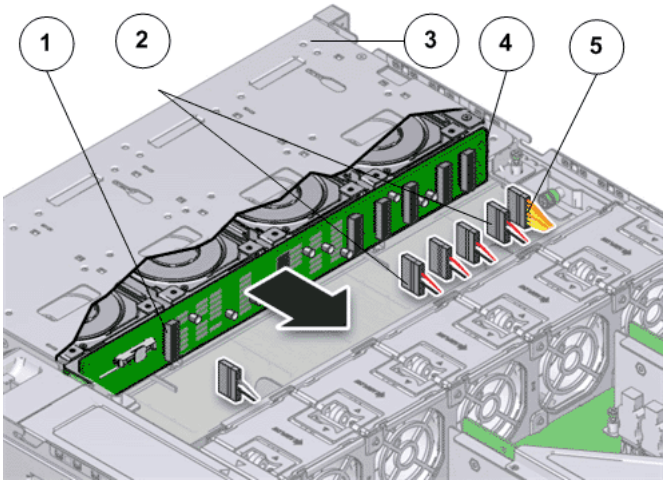
1. Rotate the drive compartment and backplane back into position inside the Replication Engine and ensure that the alignment pins engage.

   Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Replication Engine.
2. Secure the backplane inside the Replication Engine by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.
3. Reconnect all the cables that had been previously disconnected from the backplane.

   Cables that must be reconnected include:

   - SATA or drive cable
   - Motherboard to HDD backplane cable

Figure 138: Reconnect cables to the backplane

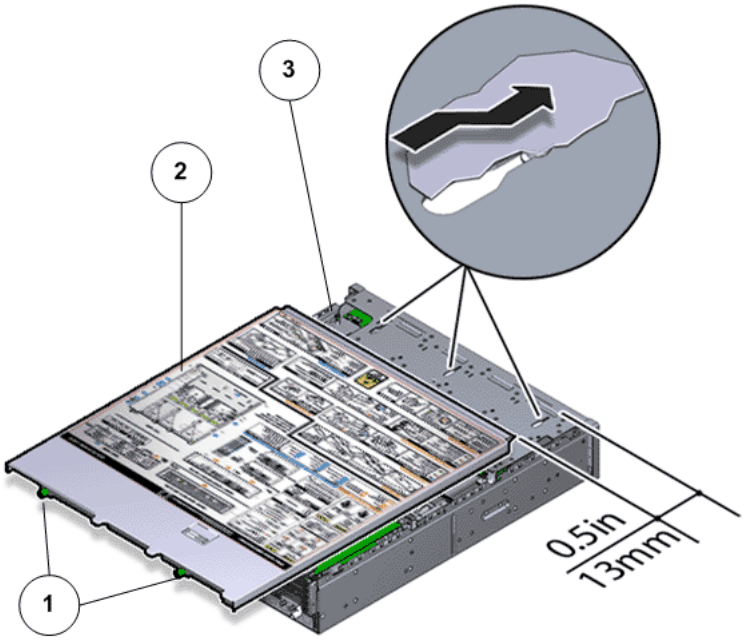


Legend	
	1 SATA or drive cable
	2 NV-DIMM cable
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 139: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Complete the Component Replacement

1. Slide the Replication Engine back into rack position.
2. Re-connect the cables that were removed from the Replication Engine.

Note: The BIOS is set to automatically power on the Replication Engine, when power is applied.

Replace a Replication Engine CPU

The CPU provides data computing and processing power to the Replication Engine. A failed CPU might impact the processing power of the Replication Engine and must be replaced as soon as possible.

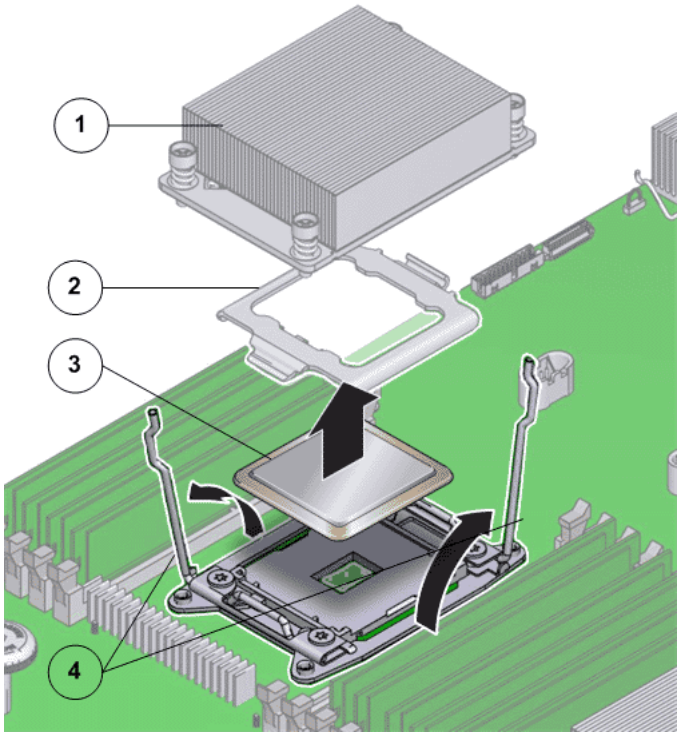
Caution: Ensure that all power is removed from the Replication Engine before replacing the CPU. Disconnect the power cables before performing the CPU replacement procedure.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that you have the thermal grease and syringe available to clean the CPU.

Each Replication Engine has two CPUs located under the two heat sinks inside the chassis. A CPU is a small square component that contains multiple pins or connectors on the underside and is inserted pin side down into the CPU socket located in the motherboard. The CPU is a field replaceable unit (FRU). Replacing a CPU requires you to power off the Replication Engine. The following figure shows the location of the CPU on the Replication Engine motherboard.

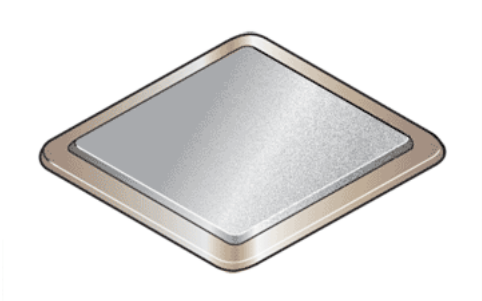
Figure 140: CPU location



Legend	
	1 Heat sink
	2 CPU socket
	3 CPU
	4 CPU socket levers

The following figure shows a Replication Engine CPU.

Figure 141: CPU



Caution: Replacement of the Replication Engine CPU requires assistance from Oracle Customer Support.

Note: The CPUs can be accessed only after removing the cover over the Replication Engine chassis.

Note: To replace a CPU, you do not need to remove the Replication Engine from the rack but extend it along the Replication Engine rails.

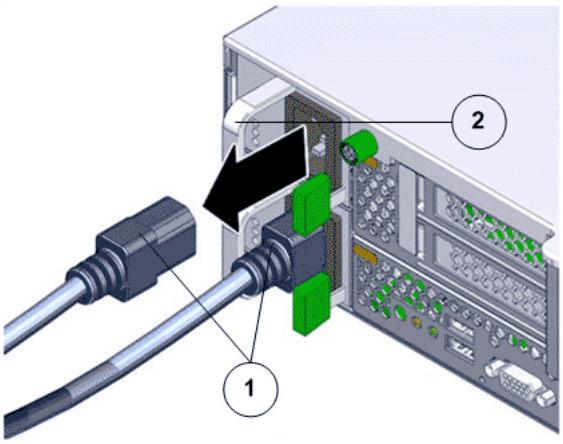
Procedure Overview

1 *Slide Replication Engine to Service Position*
2 *Remove the Replication Engine Power Supply Cords*
3 *Open the Replication Engine Top Cover*
4 *Remove an Air Duct*
5 *Raise the Drive Compartment to Service Position*
6 *Remove a Heat Sink*
7 *Remove a CPU*
8 *Insert a CPU*
9 *Insert a Heat Sink*
10 *Close the Replication Engine Top Cover*
11 *Lower the Drive Compartment*
12 *Complete the Component Replacement*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 142: Remove power supply cords



Legend	
	1 Power supply cords
	2 Power supply handle

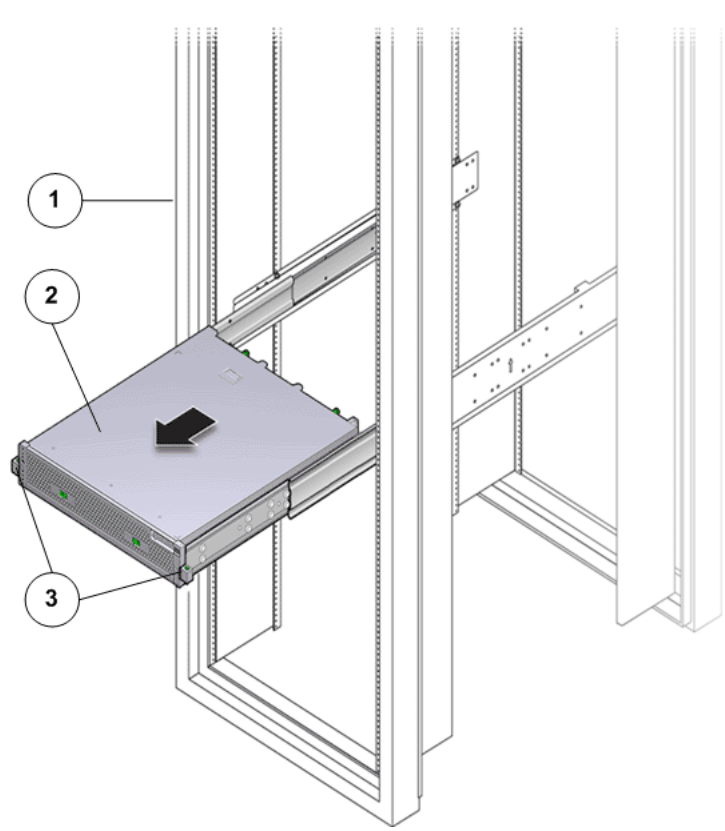
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 143: Slide the Replication Engine to service position



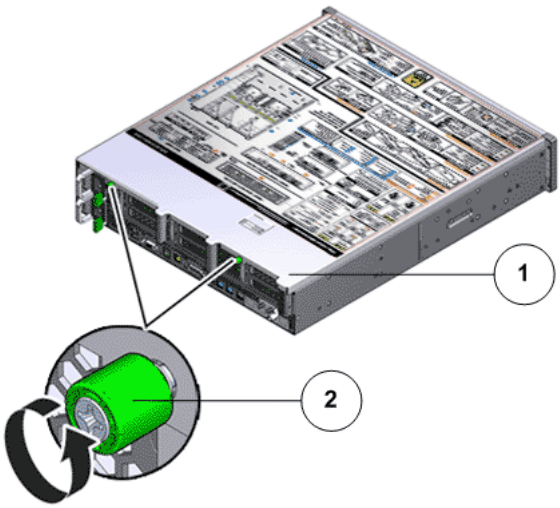
Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 144: Captive thumb screws to remove the top cover



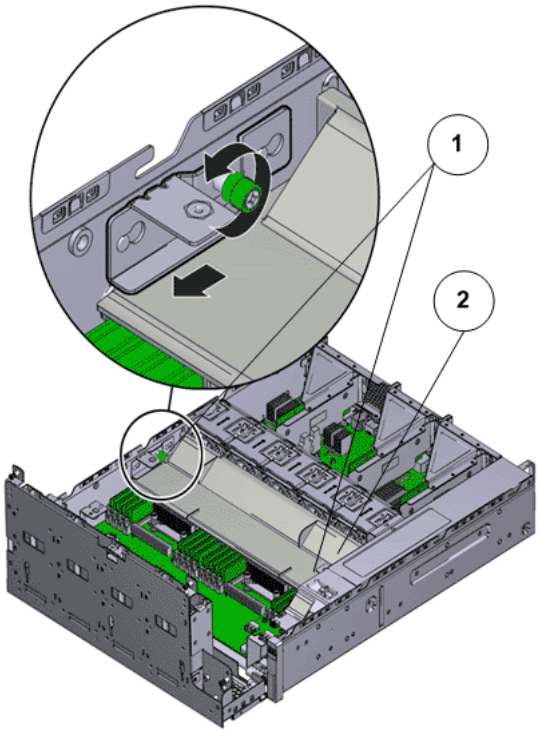
Legend	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove an Air Duct

1 Remove the air duct by loosening the two brackets and the Phillips Number 2 thumb screws on both sides of the air duct.

Figure 145: Remove air duct



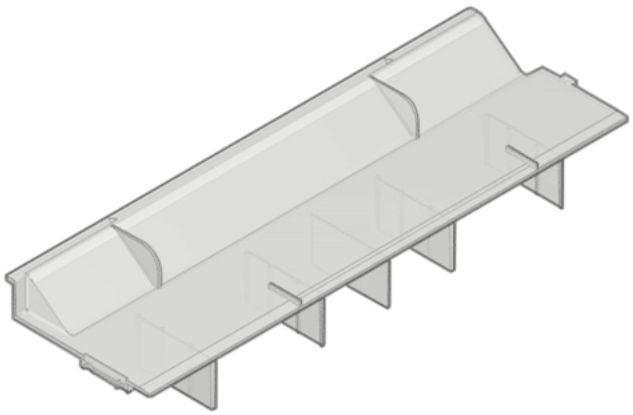
Legend	1 Screws that secure air duct
	2 Air duct

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward and the right bracket slides back when facing the Replication Engine in the service position.

2 Lift up the air duct from the Replication Engine chassis and set it aside.

The following figure shows a Replication Engine air duct:

Figure 146: Air duct

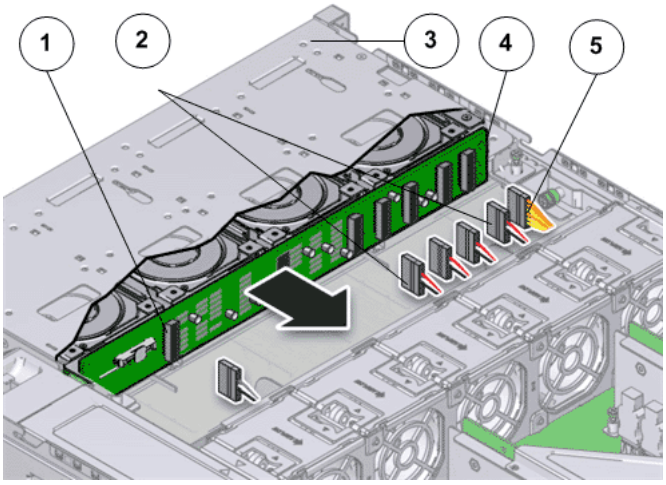


Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.
Cables that must be disconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 147: Cables connected to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cables
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Replication Engine display panel.

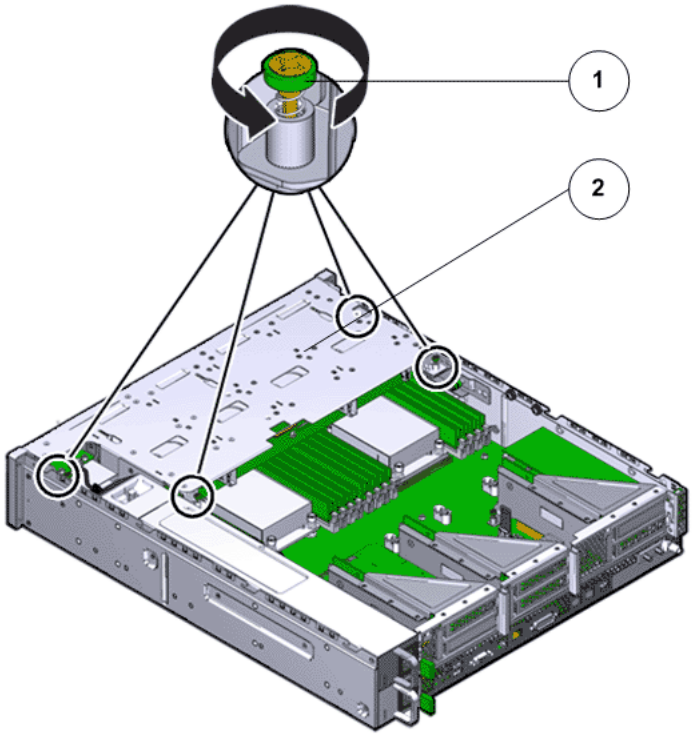
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 148: Disengaging the backplane

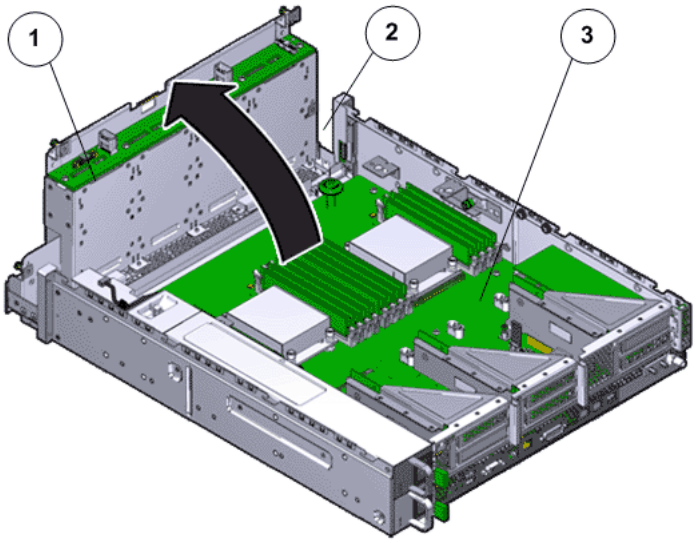


Legend	1 Thumb screws that secure the backplane
	2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Replication Engine.

3 Raise the backplane and drive compartment to the vertical position.

Figure 149: Drive compartment raised

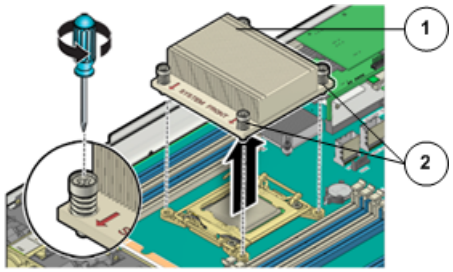


Legend	
	1 Backplane
	2 Drive compartment
	3 Replication Engine motherboard

Remove a Heat Sink

1. Remove the access window on the air duct to remove the heat sink and CPU.
2. Loosen the four Phillips screws on the four sides of the heat sink that secure the heat sink to the Replication Engine chassis a few turns at a time in a diametrically opposed pattern using a Phillips Number 2 screwdriver.

Figure 150: Loosen four screws to remove heat sink



Legend		
	1 Heat sink	2 Phillips screws that secure the heat sink

Note: Loosen one screw, then loosen the screw opposite that screw on the heat sink to prevent it from warping the motherboard on which it is mounted.

3 Gently twist the heat sink left and right, while pulling upward, to separate the heat sink from the top of the CPU.

Note: A thin layer of thermal grease separates the heat sink and the CPU. This thermal grease also acts as an adhesive.

Caution: Do not allow the thermal grease to contaminate the work space or other components.

4 Lift up the failed heat sink and set aside on an antistatic mat.

5 Visually inspect the failed heat sink to verify if the thermal grease has dried out and use an alcohol pad to clean the thermal grease from the underside of the heat sink.

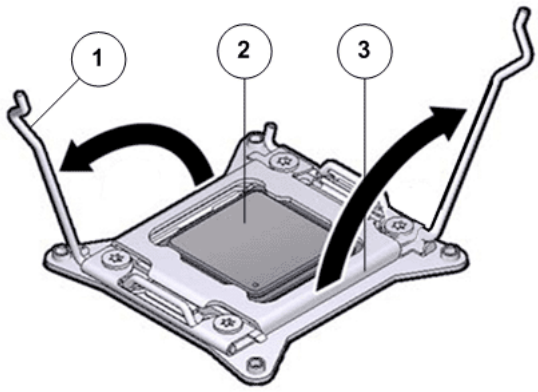
Note: Be careful not to get the thermal grease on your fingers, as this could result in contamination of components.

Caution: Failure to clean the heat sink before removing the CPU can result in the accidental contamination of the CPU socket or other components.

Remove a CPU

1 Disengage the CPU release lever on the right side of the CPU socket (viewing the Replication Engine from the front) by pushing down and moving it to the side away from the CPU, and then rotating the lever upward.

Figure 151: Disengage CPU release lever



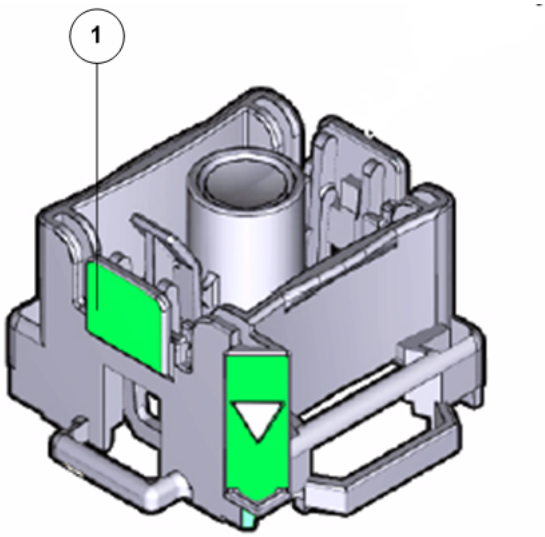
Legend	1 CPU release lever
	2 CPU
	3 CPU socket

Note: This exposes the CPU inside the CPU socket.

Caution: The correct CPU removal or replacement tool must be used to remove and replace a CPU. Otherwise, the CPU or the CPU socket might be damaged. The correct CPU removal/replacement tool is included in the box with the replacement CPU. Additionally, both removal or replacement tools ship with replacement motherboards.

The model for the CPUs in the Oracle FS System Replication Engine is E5-2620 V2 (8 core processor) and requires a CPU removal tool that is color coded green.

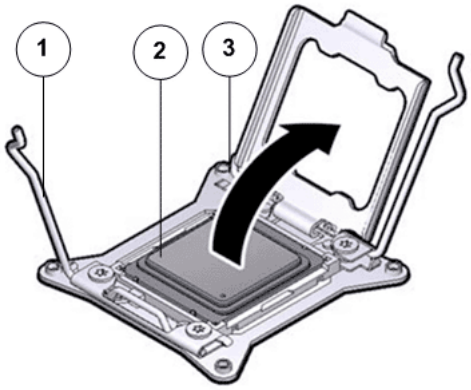
Figure 152: CPU removal tool



Legend	1 CPU removal tool color coded green

2 Disengage the CPU socket release lever on the left side of the CPU socket (viewing the Replication Engine from the front) by pushing down and moving it to the side away from the CPU, and then rotating the lever upward.

Figure 153: Disengage CPU socket release lever



Legend	1 CPU socket release lever
	2 CPU
	3 CPU pressure frame

3 Swing the CPU pressure frame to fully open position and gently disengage the CPU pins on the underside to lift up the CPU from the CPU socket.

Note: Handle the CPU socket pins with extreme care. CPU socket pins are very fragile. A light touch can bend the CPU socket pins and damage the board beyond repair.

4 Use the syringe to apply approximately 0.1 ml of thermal grease to the top center of the CPU.

5 Set aside the failed CPU on an antistatic mat.

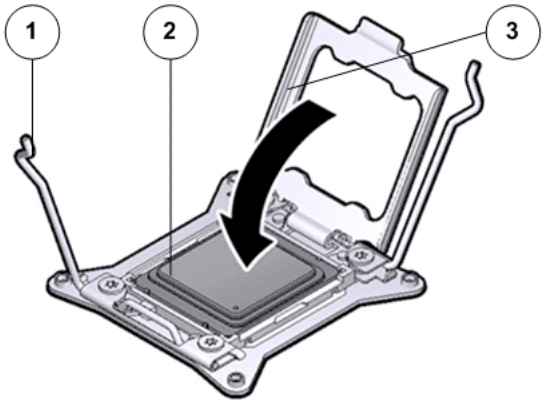
Insert a CPU

1 Gently align the underside of the CPU to the pins on the CPU socket and push down to secure the CPU in the socket.

Note: Handle the CPU socket pins with extreme care. CPU socket pins are very fragile. A light touch can bend the CPU socket pins and damage the board beyond repair.

2 Swing the CPU pressure frame to its fully closed position.

Figure 154: Close CPU pressure frame



Legend	1 CPU release lever
	2 CPU
	3 CPU pressure frame

3 Push down on the two socket release levers of the CPU socket to secure the CPU inside.

Insert a Heat Sink

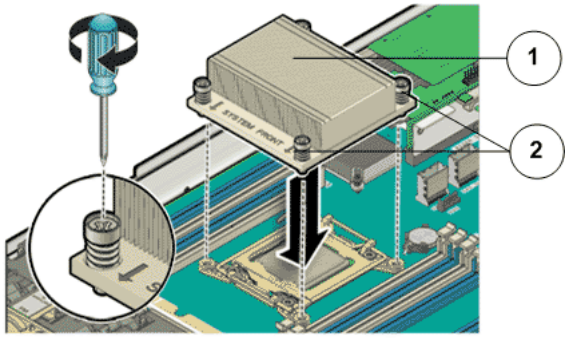
1 Secure the heat sink over the CPU to the Replication Engine motherboard by inserting the four screws on the four sides of the heat sink.

Note: Ensure that the CPU is cleaned with an alcohol pad and fresh thermal grease is applied, when installing a new heat sink, to prevent overheating and damage to the CPU.

Important: Ensure that the heat sink and the screws are aligned correctly and the screws on diagonal ends of the heat sink are tightened first. A slight force might need to be applied to push down the screwdriver while tightening the screws to overcome the tension generated.

2 Tighten the four Phillips screws on the heat sink a few turns at a time in a diametrically opposed pattern using a Phillips Number 2 screwdriver.

Figure 155: Insert heat sink



Legend	1 Heat sink
	2 Phillips screws that secure the heat sink

Lower the Drive Compartment

1 Rotate the drive compartment and backplane back into position inside the Replication Engine and ensure that the alignment pins engage.

Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Replication Engine.

2 Secure the backplane inside the Replication Engine by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.

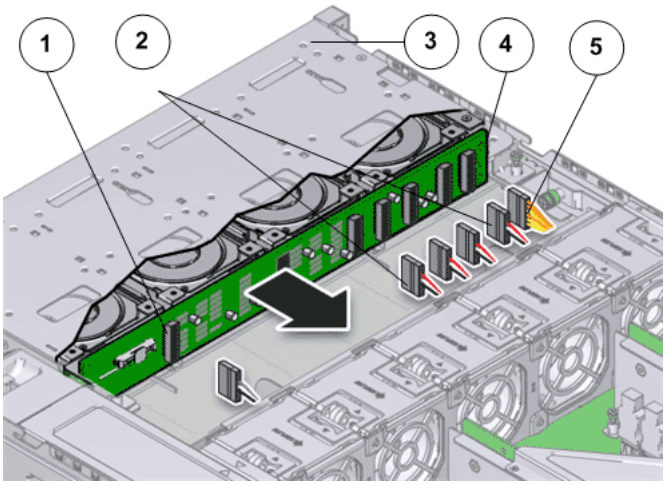
3 Reconnect all the cables that had been previously disconnected from the backplane.

Cables that must be reconnected include:

- SATA or drive cable

- Motherboard to HDD backplane cable

Figure 156: Reconnect cables to the backplane

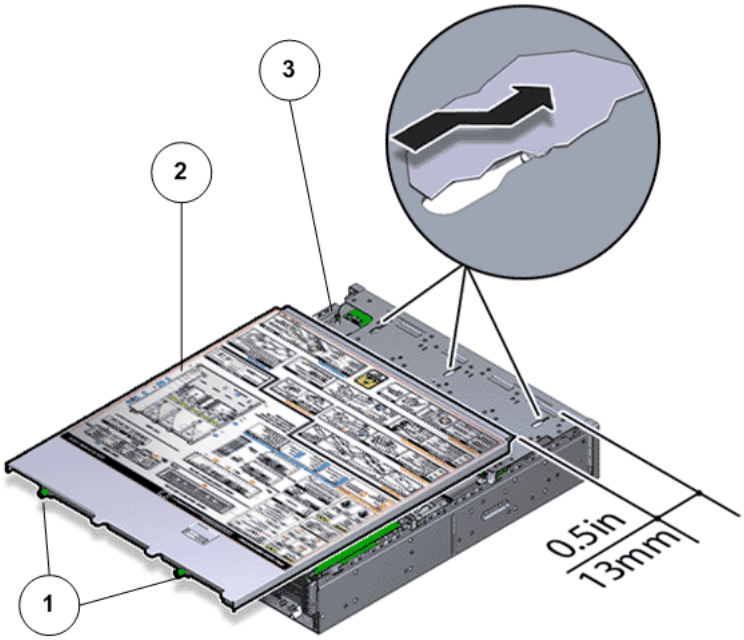


Legend	
	1 SATA or drive cable
	2 NV-DIMM cable
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 157: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Complete the Component Replacement

1. Slide the Replication Engine back into rack position.
2. Re-connect the cables that were removed from the Replication Engine.

   Note: The BIOS is set to automatically power on the Replication Engine, when power is applied.

Replace a Replication Engine LED Alarm Assembly

The LED alarm assembly is a high-level status indicator of the Replication Engine and Replication Engine components. The LED alarm assembly also includes a power button to power on the Replication Engine. A failed LED alarm assembly with a malfunctioning power button can cause problems when the Replication Engine is brought online and can also provide inaccurate status readings.

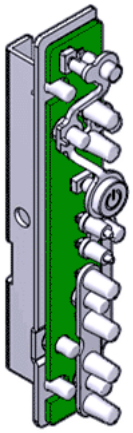
Note: Ensure that all power is removed from the Replication Engine before removing or installing the LED alarm assembly. Disconnect the power cords before performing the LED alarm assembly replacement procedure.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.

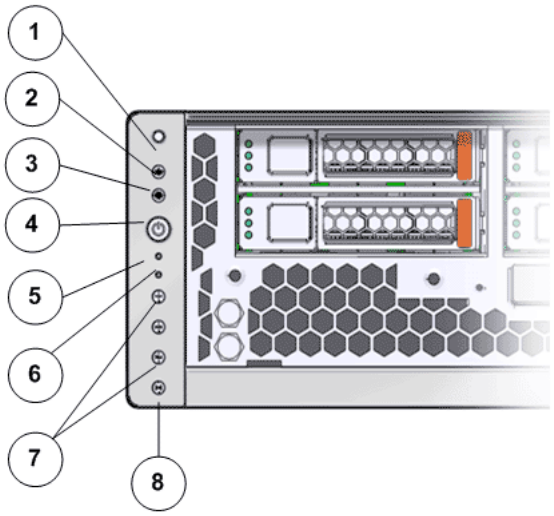
Each Replication Engine has an LED alarm assembly that is located at the front of the Replication Engine. An LED alarm assembly is a field replaceable unit (FRU). Replacing an LED alarm assembly requires you to bring the Replication Engine offline. The following figure shows Replication Engine LED board.

Figure 158: LED board



The following figure shows the front display panel of the LED alarm assembly:

Figure 159: LED assembly front display



Legend

1 Chassis identification LED or Locator LED	5 Service processor LEDs
2 Service Action Required LED or Caution or Fault LED	6 Rear power supply LED
3 Motherboard or Power or OK LED	7 Fault or Alarm LEDs (Critical, Major, Minor)
4 Power switch	8 User Alarm LED

Note: The LED alarm assembly can be accessed only after removing the cover over the Replication Engine chassis.

Note: Replacement of the Replication Engine LED alarm assembly requires assistance from Oracle Customer Support.

Note: To replace an LED alarm assembly, you must remove the Replication Engine from the rack and place it on a workbench because the rack rail blocks the screw to remove the LED alarm assembly.

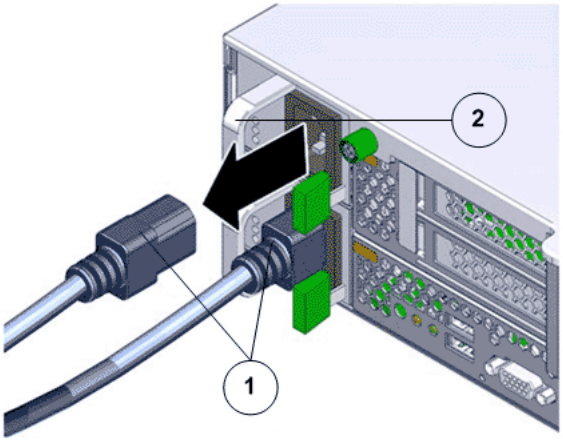
Procedure Overview

1 *Remove the Replication Engine Power Supply Cords*
2 *Slide Replication Engine to Service Position*
3 *Disconnect Replication Engine Cabling*
4 *Remove Replication Engine Chassis From Rack*
5 *Remove Components From the Replication Engine*
6 *Remove an LED Alarm Assembly*
7 *Insert an LED Alarm Assembly*
8 *Insert Components on the Replication Engine*
9 *Insert the Replication Engine Onto the Rack*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 160: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

Tip: Always notify affected users that the Replication Engine will be powered off.

Disconnect Replication Engine Cabling

Disconnect all data cables from the Replication Engine.

Note: All cables must be disconnected from the Replication Engine and labeled such that they can be reconnected accurately to the Replication Engine after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Replication Engine or result in a complete loss of functionality.

Note: Service the Replication Engine components from the front of the Replication Engine while the Replication Engine is in service position.

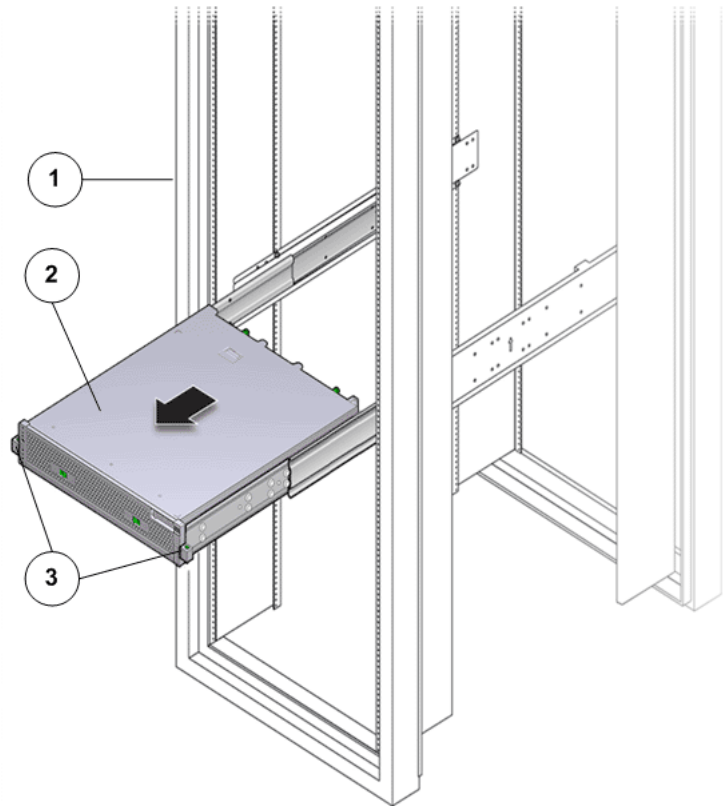
Note: Do not lean on or place any weight on the Replication Engine while the Replication Engine is in the service position.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 161: Slide the Replication Engine to service position



Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Remove Replication Engine Chassis From Rack

The following procedure is optional.

1. From the front of the Replication Engine, press on the slide-rail release tabs on both sides at the front of the Replication Engine, and pull the Replication Engine out of the rack until is free of the rack rails.

Important: Oracle recommends not removing the Replication Engine from the rails for servicing the components. All components are designed for replacement and servicing while the Replication Engine chassis is on the rails. However, if you must remove the Replication Engine from the rack, disconnect the rear panel Replication Engine cables from the front with the Replication Engine in service position.

Note: A slide-rail release tab is located on each slide-rail of the Replication Engine.

2 With the help of a partner or a mechanical lift, place the Replication Engine on an antistatic surface on a workbench.

Remove Components From the Replication Engine

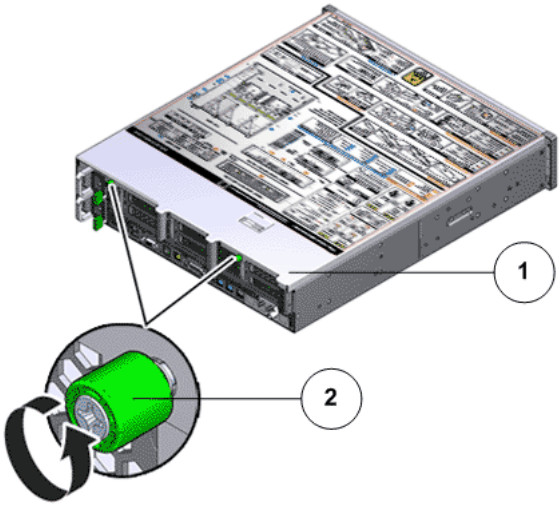
Note: Some components must be removed from the Replication Engine as a prerequisite for access while replacing the failed component.

Note: All components that are removed from the Replication Engine must be placed on an antistatic surface or ESD qualified mat.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 162: Captive thumb screws to remove the top cover



Legend	
	1 Replication Engine top cover
	2 Captive screws

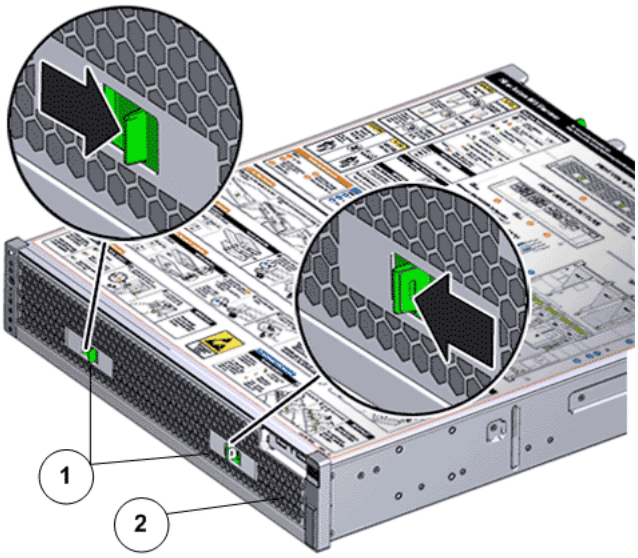
2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove an Air Filter

1 At the front of the Replication Engine chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 163: Air filter release tabs



Legend	1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

Figure 164: Remove air filter

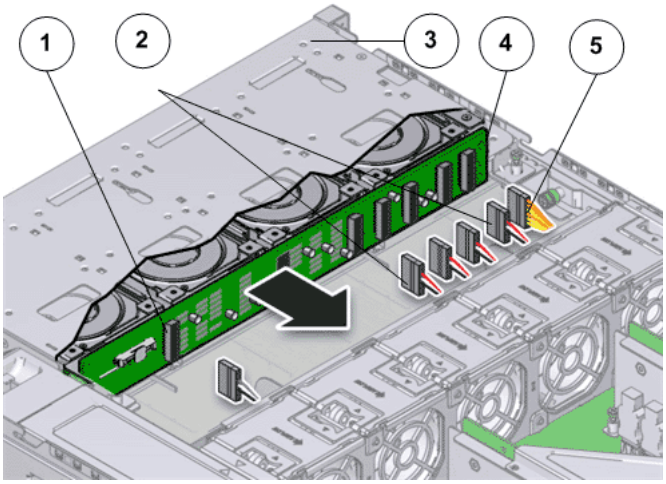
4 Set the air filter aside.

Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.
Cables that must be disconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 165: Cables connected to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cables
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Replication Engine display panel.

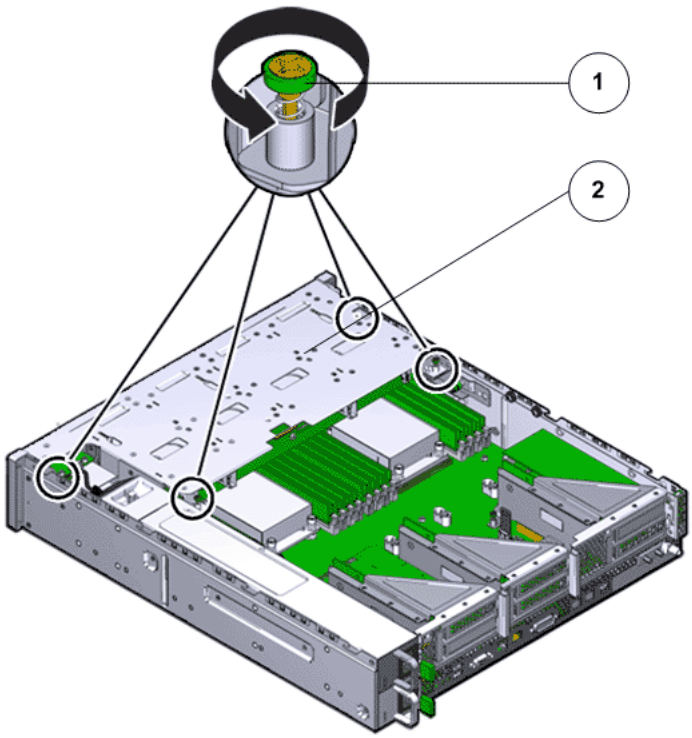
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 166: Disengaging the backplane

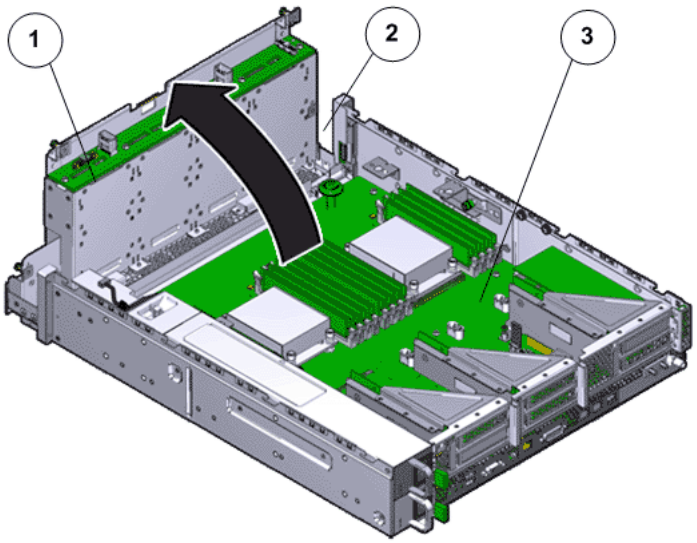


Legend	1 Thumb screws that secure the backplane
	2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Replication Engine.

3 Raise the backplane and drive compartment to the vertical position.

Figure 167: Drive compartment raised

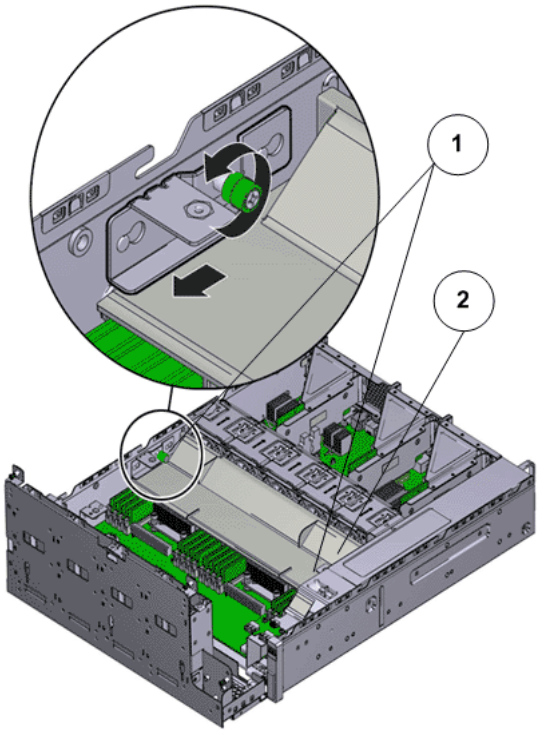


Legend	1 Backplane
	2 Drive compartment
	3 Replication Engine motherboard

Remove an Air Duct

1 Remove the air duct by loosening the two brackets and the Phillips Number 2 thumb screws on both sides of the air duct.

Figure 168: Remove air duct



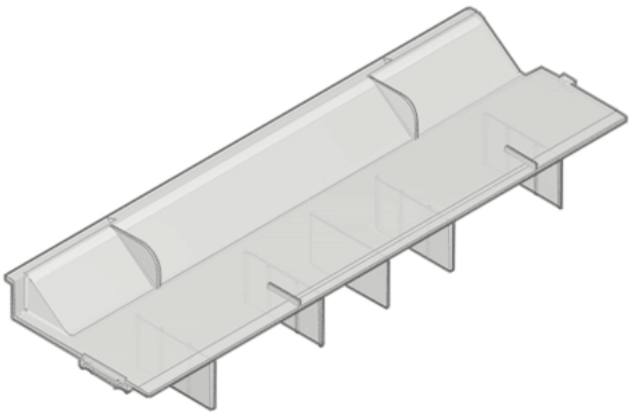
Legend	1 Screws that secure air duct
	2 Air duct

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward and the right bracket slides back when facing the Replication Engine in the service position.

2 Lift up the air duct from the Replication Engine chassis and set it aside.

The following figure shows a Replication Engine air duct:

Figure 169: Air duct

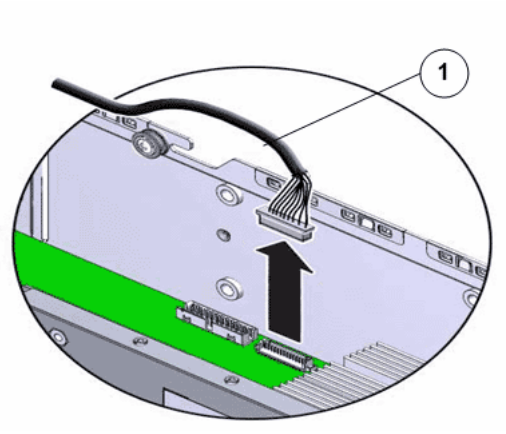


Remove an LED Alarm Assembly

1 Disconnect the cable from the cable clamp on the the side wall of the Replication Engine chassis.

2 Disconnect the cable from the motherboard.

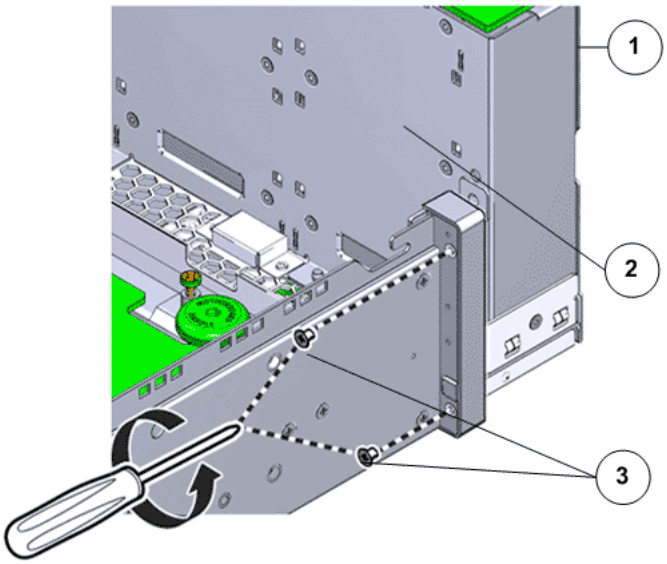
Figure 170: Disconnect the LED alarm assembly cable



Legend	1 LED alarm assembly cable

3 Unscrew the two Phillips Number 2 screws at the back of the LED alarm assembly that secure the LED assembly to the Replication Engine front panel.

Figure 171: Screws to secure the LED alarm assembly

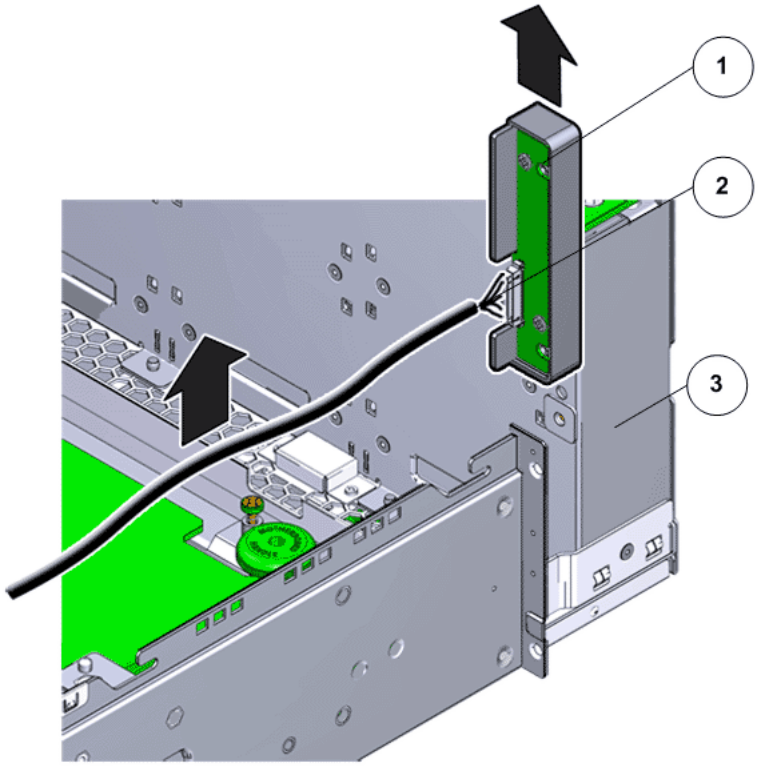


Legend	1 LED assembly
	2 Replication Engine chassis
	3 Screws that secure the LED assembly to chassis

Note: The bottom Phillips Number 2 screw is hidden under the slide rail and can be accessed by removing the two rail screws closest to the front of the Replication Engine. Gently pry the slide rail away from the Replication Engine chassis about 1/4 inch. Do not bend the rail while removing the bottom screw.

4 Gently pull the LED alarm assembly from the Replication Engine chassis.

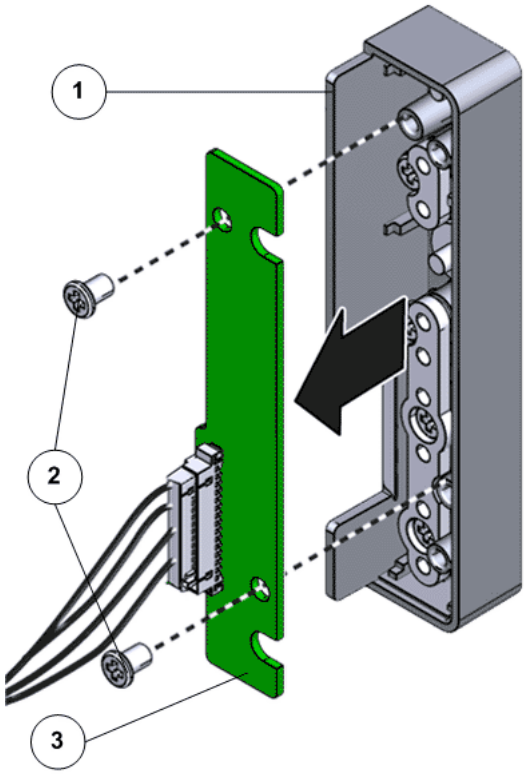
Figure 172: Remove the LED alarm assembly



Legend	1 LED board
	2 LED cable
	3 Replication Engine chassis

5 Remove the two screws securing the LED board to the LED assembly.

Figure 173: Detach LED board from the LED alarm assembly



Legend	
	1 LED alarm assembly
	2 Screws securing the LED board to the LED alarm assembly
	3 LED board

6 Lift the LED board from the LED assembly and set it aside.

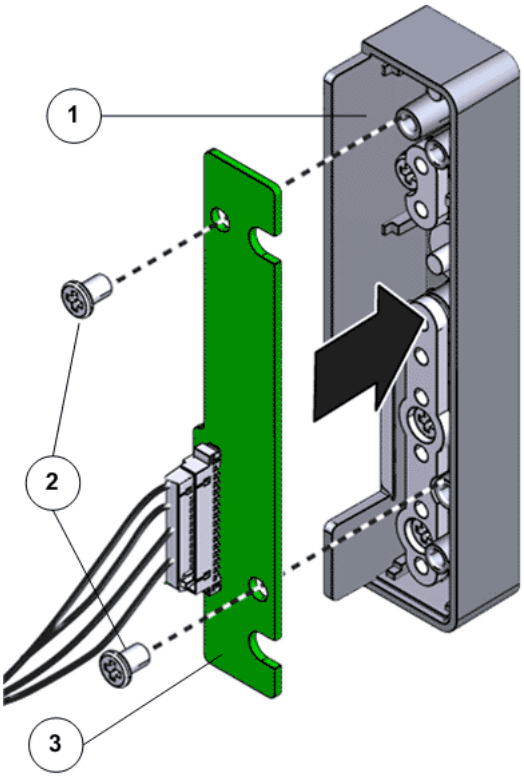
Insert an LED Alarm Assembly

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Set the LED board into the LED assembly.

Figure 174: Attach LED board from the LED alarm assembly

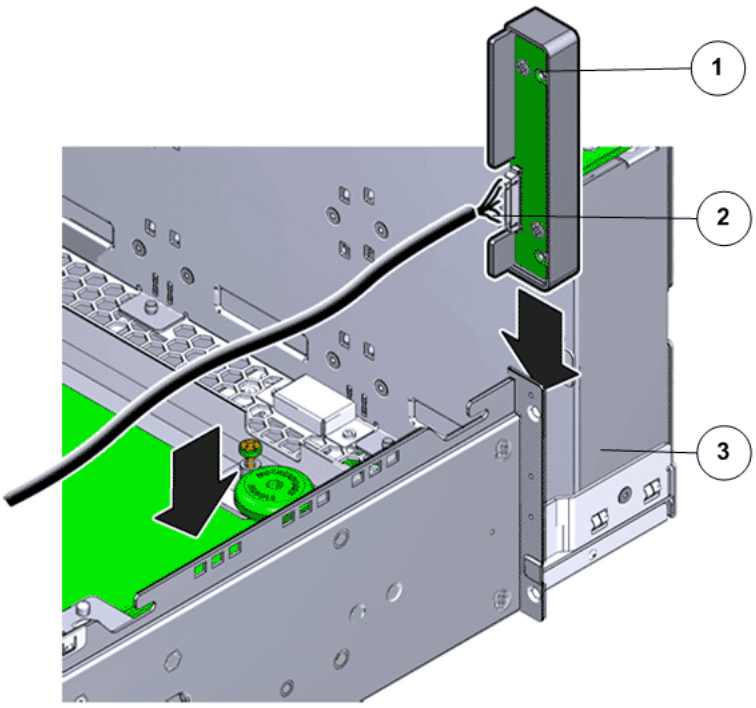


Legend	
	1 LED alarm assembly
	2 Screws securing the LED board to the LED alarm assembly
	3 LED board

3 Install and tighten the two screws.

4 Position the LED assembly over the flange on the left of the Replication Engine chassis.

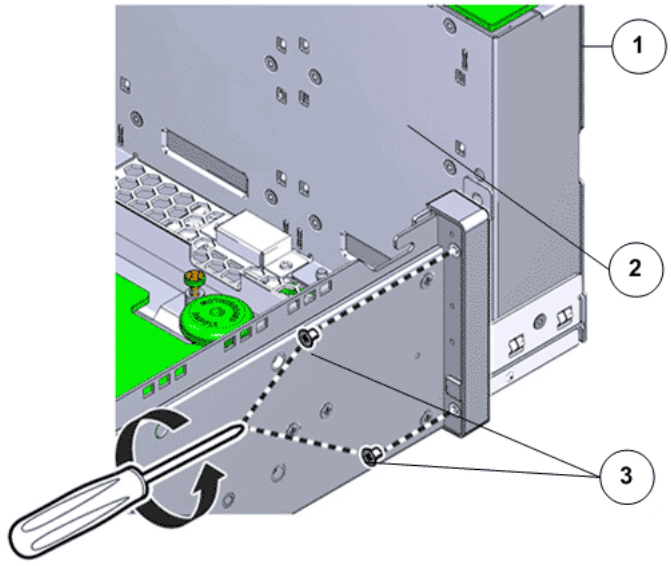
Figure 175: LED alarm assembly positioned over Replication Engine chassis



Legend	
	1 LED board
	2 LED cable
	3 Replication Engine chassis

5 Install and tighten the two screws to secure the LED alarm assembly onto the Replication Engine chassis.

Figure 176: Screws to secure the LED alarm assembly



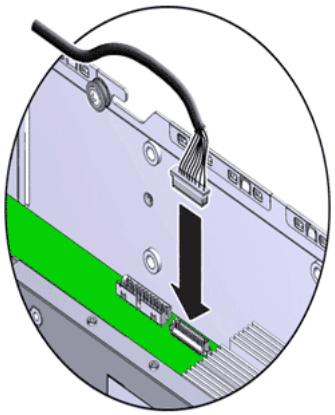
Legend	1 LED assembly
	2 Replication Engine chassis
	3 Screws that secure the LED assembly to chassis

Note: The bottom Phillips Number 2 screw is hidden under the slide rail and can be accessed by removing the two rail screws closest to the front of the Replication Engine. Gently pry the slide rail away from the Replication Engine chassis about 1/4 inch. Do not bend the rail while removing the bottom screw.

6 Route the cable into the cable clamp against the side wall and the midplane of the Replication Engine chassis.

7 Gently connect the cable to the motherboard.

Figure 177: Reconnect LED alarm assembly cable



8 Insert and tighten the two Phillips Number 2 screws at the back of the LED alarm assembly and secure the LED assembly to the Replication Engine front panel.

Insert Components on the Replication Engine

Insert the necessary components on the Replication Engine following the procedures outlined below.

Some components had to be removed from the Replication Engine as a prerequisite for access while replacing the failed component. These components must be reinstalled after completing the replacement.

Insert an Air Duct

Secure the air duct inside the Replication Engine by tightening the two Phillips Number 2 screws into position.

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward, the right bracket slides back when facing the Replication Engine in the service position.

Lower the Drive Compartment

1 Rotate the drive compartment and backplane back into position inside the Replication Engine and ensure that the alignment pins engage.

Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Replication Engine.

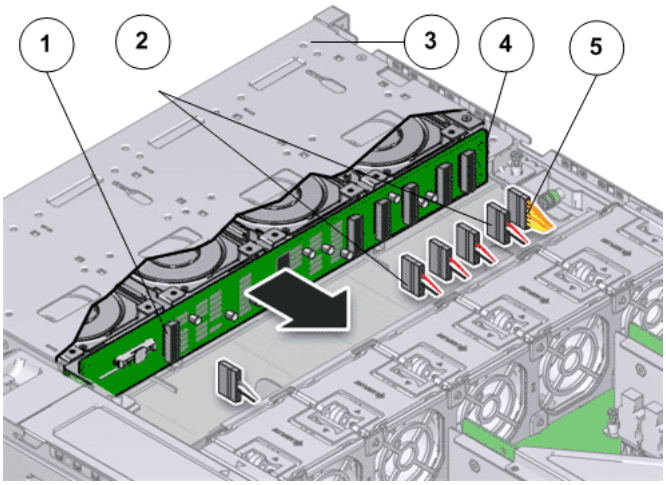
2 Secure the backplane inside the Replication Engine by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.

3 Reconnect all the cables that had been previously disconnected from the backplane.

Cables that must be reconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable

Figure 178: Reconnect cables to the backplane

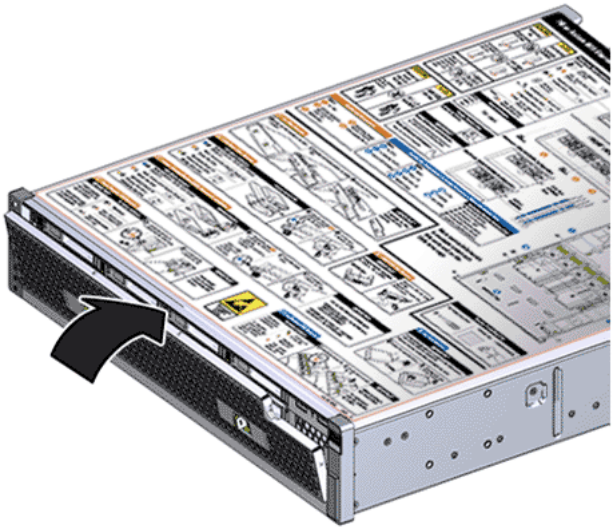


Legend	
	1 SATA or drive cable
	2 NV-DIMM cable
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 179: Insert air filter



Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

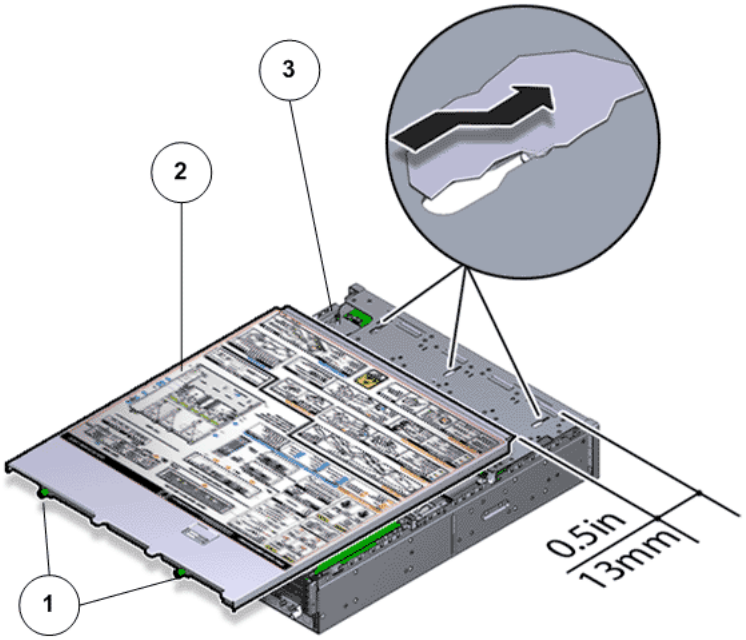
2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 180: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Insert the Replication Engine Onto the Rack

Insert the Replication Engine into the rack.

Inserting the Replication Engine onto the rack includes the following tasks:

1. Lift up the Replication Engine Onto the Rack
2. Slide the Replication Engine back into Rack position
3. Reconnect the Replication Engine cabling and the CMA
4. Power on the Replication Engine
5. Verify the Replication Engine component status

Insert Replication Engine Chassis Onto Rack

With the help of a partner or a mechanical lift, engage the Replication Engine with the rack rails.

Caution: Do not use the power supply handles to lift the Replication Engine. Using the power supply handles to lift the Replication Engine can damage the power supplies and disrupt electrical power to the Replication Engine.

Slide Replication Engine to Rack Position

Slide the Replication Engine back into the rack.

Note: You must release the rail locking mechanism to slide the Replication Engine chassis back into the rack.

Reconnect Replication Engine Cabling

1. Reconnect all the data cables on the Replication Engine.

   Note: Oracle Customer Support recommends labeling all cables connected to the Replication Engine so that the cables can be reconnected accurately to the Replication Engine after the replacement procedure is complete.
2. Reconnect the CMA to the Replication Engine by attaching the release tab on the left and right side of the CMA.

Power On the Replication Engine

Power on the Replication Engine using the power button.

Note: As soon as the power cords are connected to the Replication Engine, standby power is applied. In standby power mode, the Power/OK LED on the Replication Engine front panel blinks every five seconds or so. However, to apply main power to the Replication Engine, you must use the power button. When main power is applied to the Replication Engine, the green Power/OK LED on the front panel of the Replication Engine blinks steadily. When the Replication Engine BIOS has completed booting, the OK LED remains lit.

Replace a Replication Engine Motherboard

The motherboard is the primary circuit board of the Replication Engine. All Replication Engine components are connected to the motherboard using electrical circuits and communicate with the motherboard to ensure normal

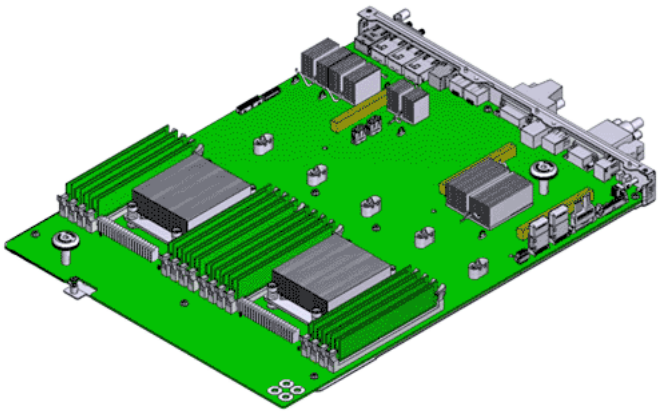
Replication Engine operation. A failed motherboard can cause the Replication Engine to fail and must be replaced as soon as possible.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that there is a workbench available to place the Replication Engine chassis if it is removed from the rack for servicing.
- Ensure that you have thermal grease and syringe available to clean the CPU and heat sink during the replacement procedure.
- Make sure that you have a Torx Number 10 screwdriver.
- Ensure that there is a static protected surface or workbench available to place the components temporarily when they are removed from the motherboard during the replacement process.

Each Replication Engine has a motherboard that is located on a tray at the bottom of the chassis. The Replication Engine motherboard is a field replaceable unit (FRU) on which the various Replication Engine components (FRUs and CRUs) are located. Replacing a motherboard requires you to bring the Replication Engine offline. The following figure shows the Replication Engine motherboard.

Figure 181: Replication Engine motherboard



Tip: Oracle Customer Support recommends not removing the Replication Engine chassis from the rack to minimize possible errors that might be caused during re-cabling. The motherboard replacement procedure can be completed while the Replication Engine chassis is in the service position inside the rack.

Note: The Replication Engine motherboard replacement can take approximately an hour to complete and requires assistance from Oracle Customer Support because it involves removing several CRUs and FRUs from the failed motherboard and installing them on the replacement motherboard.

Note: The motherboard can be accessed only after removing the cover over the Replication Engine chassis.

Caution: Ensure that all power is removed from the Replication Engine before removing or installing the motherboard. Power off the Replication Engine and disconnect the power cables before performing the motherboard replacement procedure.

Note: Remove the DIMMs, NV-DIMMs, CPUs, and heat sinks from the failed motherboard and secure it on the replacement motherboard only after the replacement motherboard has been inserted and secured into the chassis. Not removing these hardware components right away from the failed motherboard has the following advantages:

- Hardware CRUs or FRUs that can be easily damaged like DIMMs, NV-DIMMs, CPUs, and heat sinks are handled only once during the replacement procedure.
- The replacement motherboard that has been secured in the Replication Engine chassis provides the best support for installing the components.
- Moving the hardware components directly from the failed motherboard to the replacement motherboard ensures that they are installed in the correct locations.

Note: When the Replication Engine with the replacement motherboard is brought online, the old motherboard continues to be displayed as a missing Replication Engine in the GUI for a brief span of time (approximately 20 minutes) until the Replication Engine with the replacement motherboard is fully initialized.

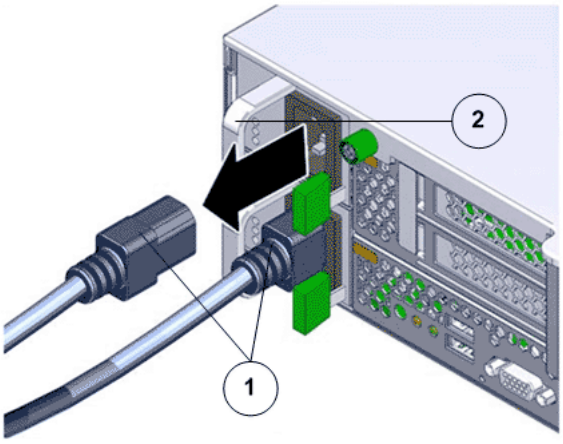
Procedure Overview

1 *Slide Replication Engine to Service Position*
2 *Remove the Replication Engine Power Supply Cords*
3 *Disconnect Replication Engine Cabling*
4 *Remove Replication Engine Chassis From Rack*
5 *Remove Components From the Replication Engine*
6 *Insert Components on the Replication Engine*
7 *Reconnect Replication Engine Cabling*
8 *Slide Replication Engine to Rack Position*
9 *Power On the Replication Engine*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 182: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

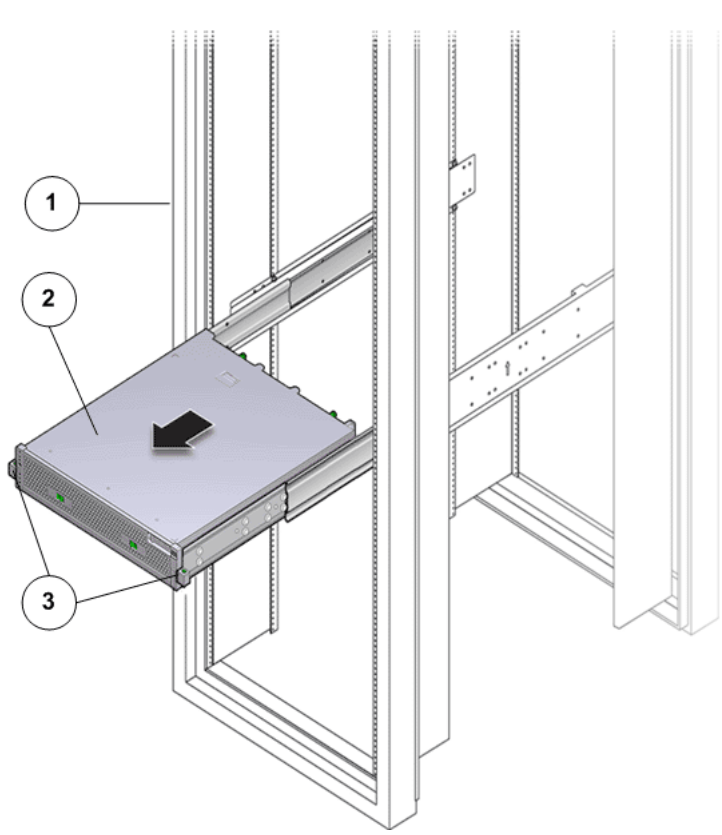
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 183: Slide the Replication Engine to service position



Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Disconnect Replication Engine Cabling

Disconnect all data cables from the Replication Engine.

Note: All cables must be disconnected from the Replication Engine and labeled such that they can be reconnected accurately to the Replication Engine after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Replication Engine or result in a complete loss of functionality.

Note: Service the Replication Engine components from the front of the Replication Engine while the Replication Engine is in service position.

Note: Do not lean on or place any weight on the Replication Engine while the Replication Engine is in the service position.

Remove Replication Engine Chassis From Rack

The following procedure is optional.

1. From the front of the Replication Engine, press on the slide-rail release tabs on both sides at the front of the Replication Engine, and pull the Replication Engine out of the rack until is free of the rack rails.

   Important: Oracle recommends not removing the Replication Engine from the rails for servicing the components. All components are designed for replacement and servicing while the Replication Engine chassis is on the rails. However, if you must remove the Replication Engine from the rack, disconnect the rear panel Replication Engine cables from the front with the Replication Engine in service position.

   Note: A slide-rail release tab is located on each slide-rail of the Replication Engine.

2. With the help of a partner or a mechanical lift, place the Replication Engine on an antistatic surface on a workbench.

Remove Components From the Replication Engine

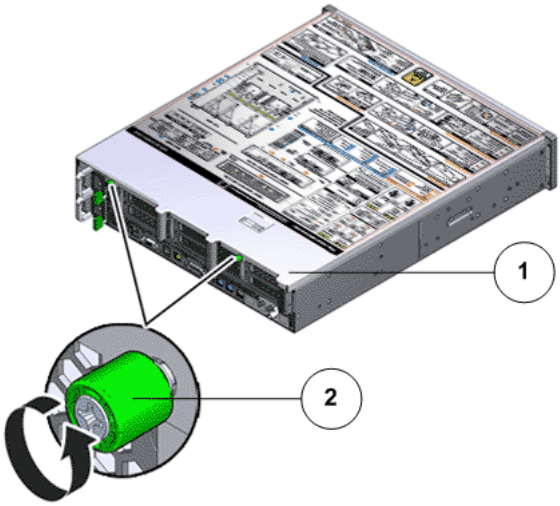
Note: Some components must be removed from the Replication Engine as a prerequisite for access while replacing the failed component.

Note: All components that are removed from the Replication Engine must be placed on an antistatic surface or ESD qualified mat.

Open the Replication Engine Top Cover

1. Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 184: Captive thumb screws to remove the top cover



Legend	1 Replication Engine top cover
	2 Captive screws

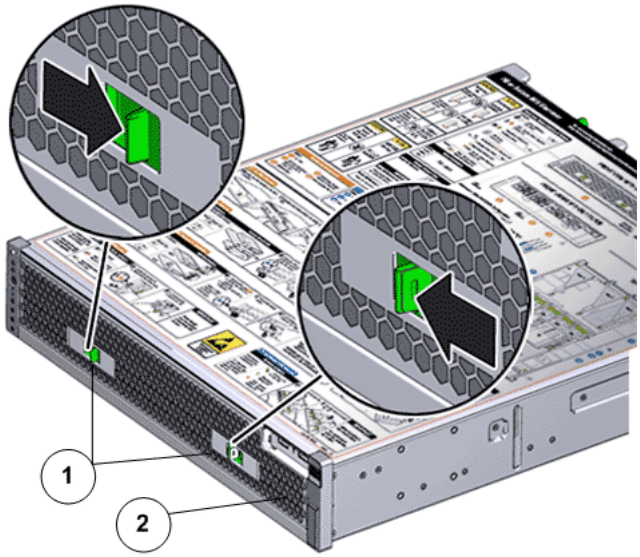
2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove an Air Filter

1 At the front of the Replication Engine chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 185: Air filter release tabs



Legend	1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

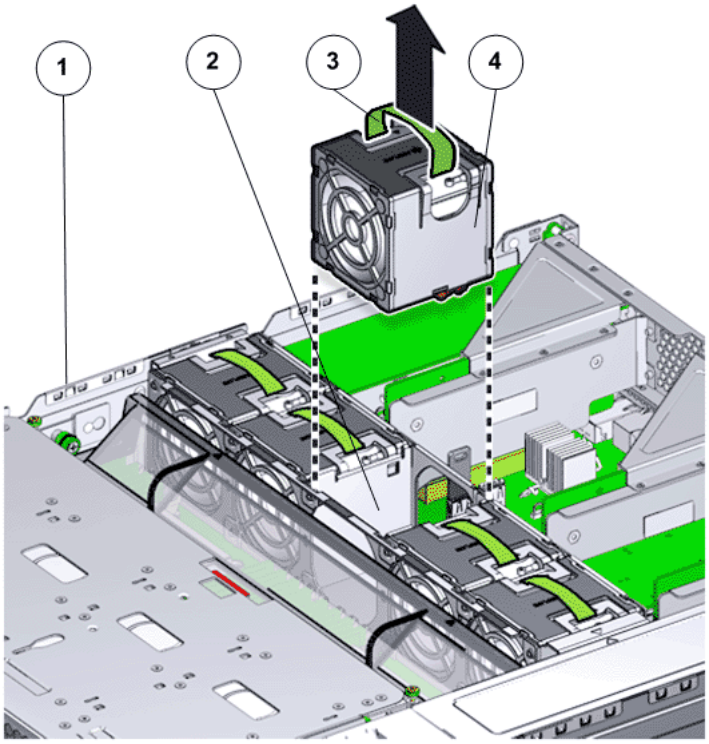
Figure 186: Remove air filter

4 Set the air filter aside.

Remove a Fan Module

1 Using your thumb and forefinger, grasp the removal tab and gently lift the fan module from the fan compartment.

Figure 187: Remove fan module



Legend	
	1 Replication Engine chassis
	2 Fan compartment
	3 Removal tab
	4 Fan module

Note: Pulling the green tab from the middle releases the locking tab for each individual fan.

Note: When removing a fan module, do not rock it back and forth. Rocking the fan module can cause damage to the motherboard connectors.

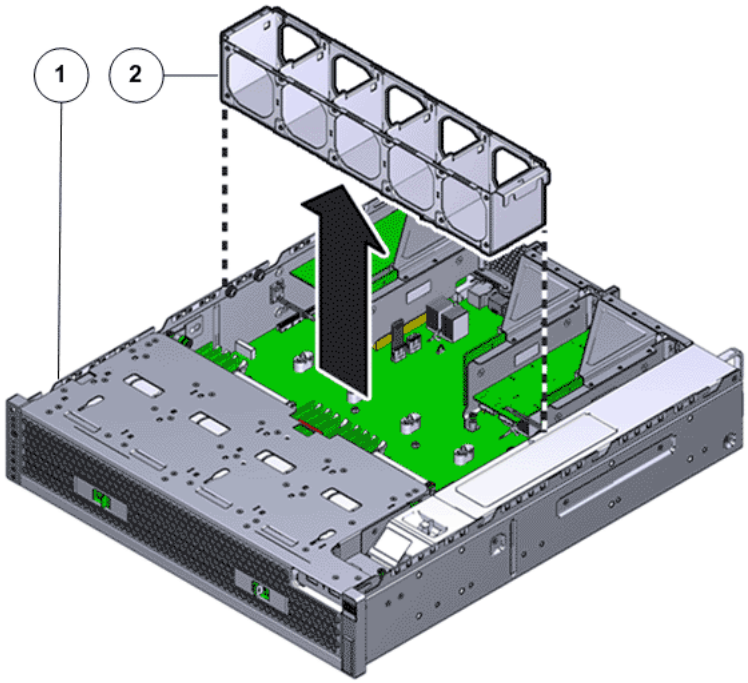
2 Set the fan module aside.

Note: The fan compartment might come out when the last fan module is removed.

Remove the Fan Compartment

1 Lift the fan compartment straight up and out of the Replication Engine chassis.

Figure 188: Remove fan compartment



Legend	1 Replication Engine chassis
	2 Fan compartment

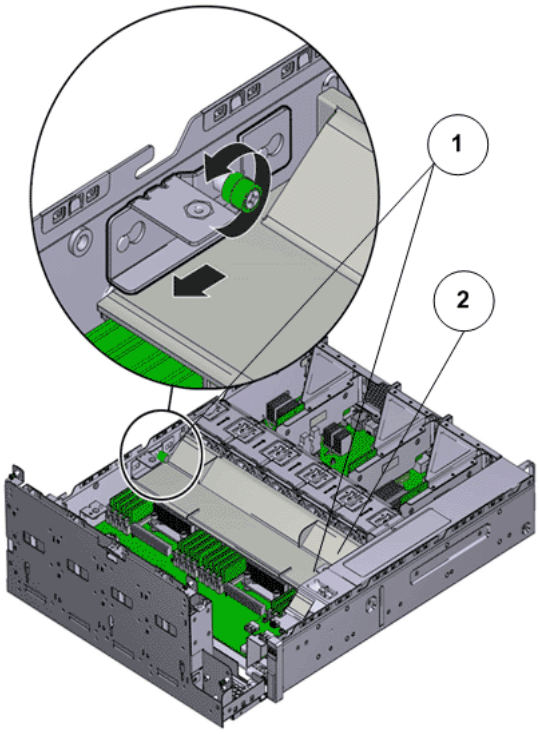
Note: All fan modules must be removed from the fan compartment before removing the fan compartment.

2 Set the component aside.

Remove an Air Duct

1 Remove the air duct by loosening the two brackets and the Phillips Number 2 thumb screws on both sides of the air duct.

Figure 189: Remove air duct



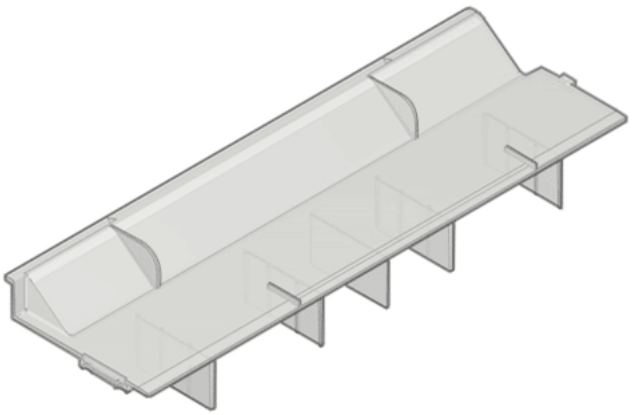
Legend	1 Screws that secure air duct
	2 Air duct

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward and the right bracket slides back when facing the Replication Engine in the service position.

2 Lift up the air duct from the Replication Engine chassis and set it aside.

The following figure shows a Replication Engine air duct:

Figure 190: Air duct

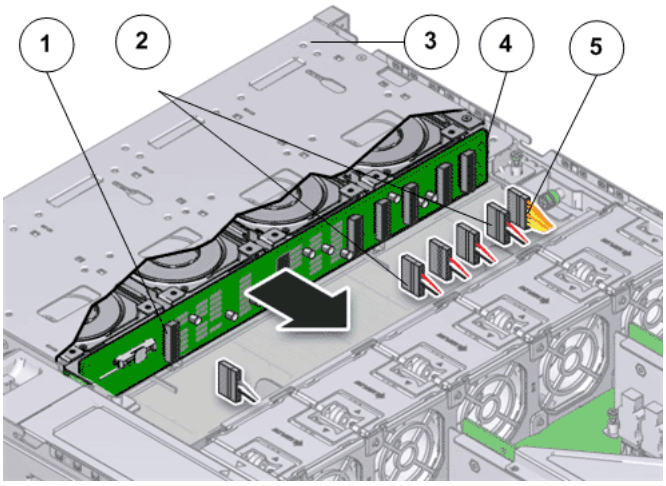


Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.
Cables that must be disconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 191: Cables connected to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cables
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Replication Engine display panel.

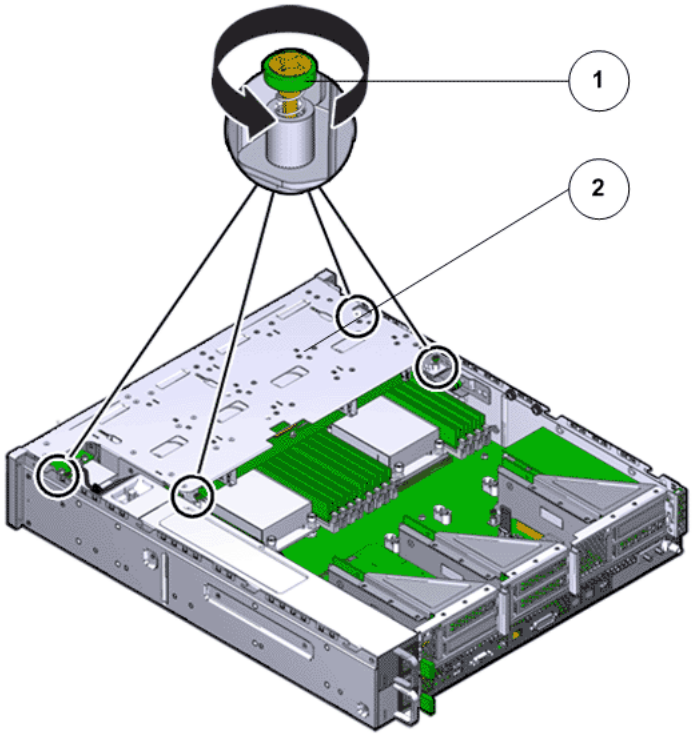
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 192: Disengaging the backplane

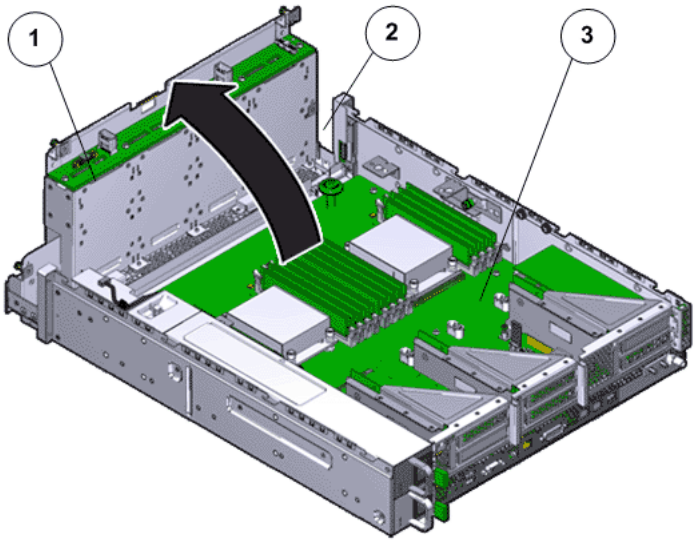


Legend	1 Thumb screws that secure the backplane
	2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Replication Engine.

3 Raise the backplane and drive compartment to the vertical position.

Figure 193: Drive compartment raised



Legend	
	1 Backplane
	2 Drive compartment
	3 Replication Engine motherboard

Remove a Riser

1 Disconnect any external cables that remain connected to the HBAs in the risers.

Note: Also disconnect any internal cables attached to the HBAs, if that will ease removing the HBA.

Tip: Make a note of the positions of all existing cable connections before removing any cables. Replacing HBAs or their cables into the incorrect position in the riser may result in a loss of performance or functionality.

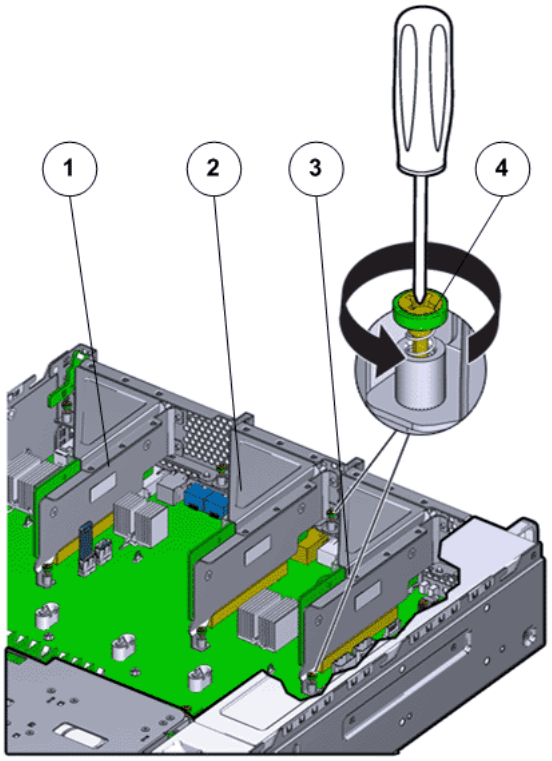
2 Note the position of the HBAs installed on the riser.

Tip: Make a note of the slot numbers of all existing HBAs before removing any HBAs.

3 Using a Phillips Number 2 screwdriver, loosen the two Phillips Number 2 captive screws on either side of the riser that hold the riser to the Replication Engine motherboard.

Note: The riser on the opposite end of the power supply has a latch that must be disengaged to remove the riser from the Replication Engine chassis

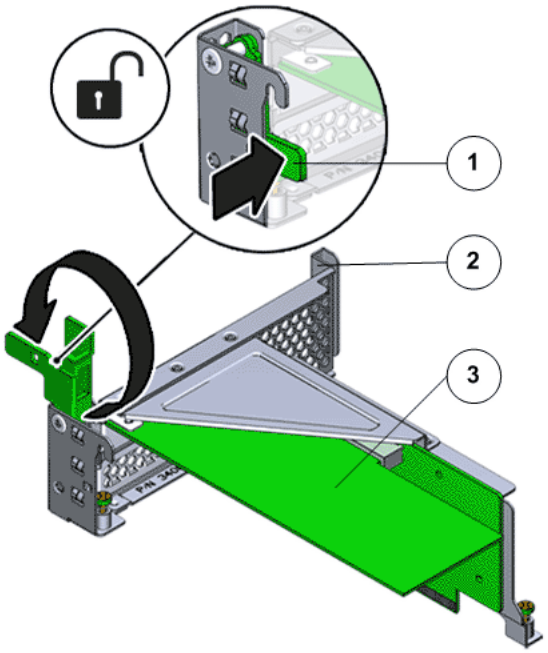
Figure 194: Captive screws to secure the risers



Legend		
	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws that secure riser

To remove riser 3, unlock the latch to release the riser from the Replication Engine motherboard.

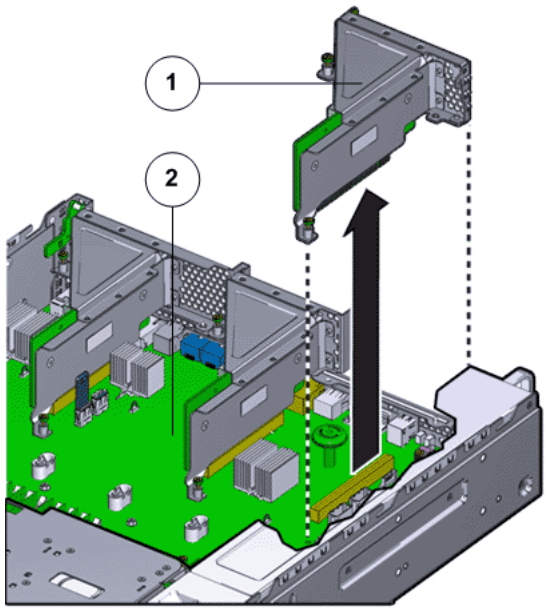
Figure 195: Unlock Riser 3 latch



Legend	1 Riser 3 latch	3 HBA
	2 Riser 3	

4 Carefully pull the riser straight up and place it aside.

Figure 196: Remove riser

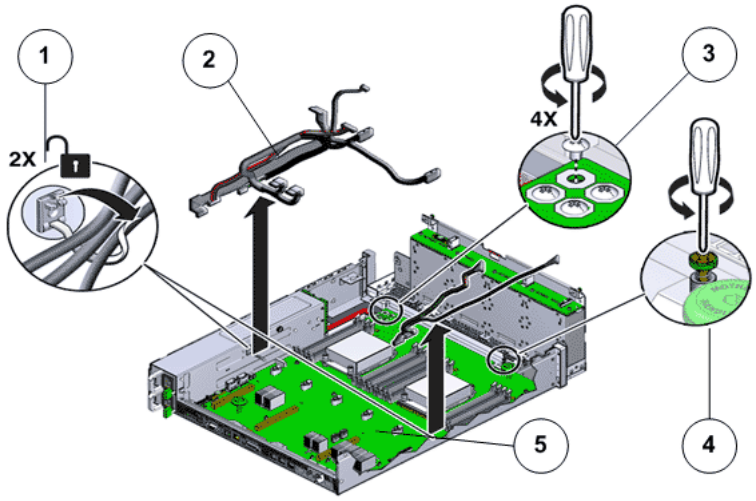


Legend	1 Riser
	2 Replication Engine motherboard

Remove a Motherboard

1 Using a Phillips Number 2 screwdriver, remove the four bus bar screws that secure the power distribution board (PDB) assembly onto the motherboard.

Figure 197: Phillips screwdriver to remove PDB screws



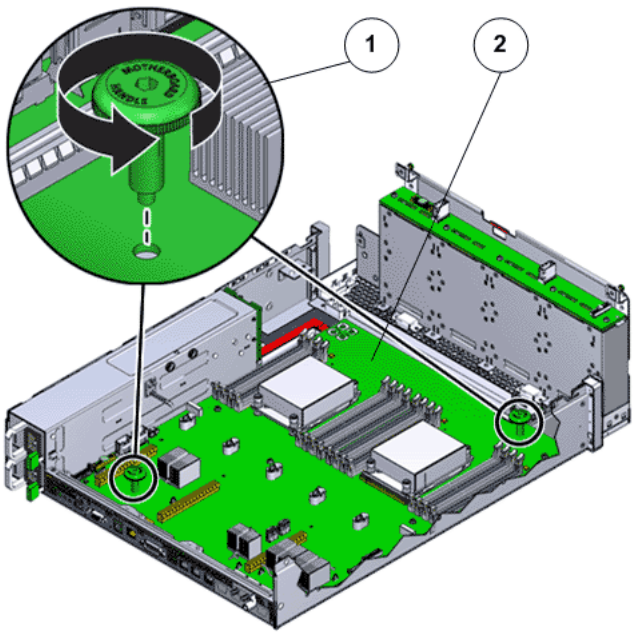
Legend	
	1 PDB cable bundle
	2 Motherboard cables
	3 Phillips screws that secure the PDB to motherboard
	4 Thumb screws that secure the motherboard to the chassis
	5 Replication Engine motherboard

Tip: Disconnect all remaining cables and move them out of the way.

2 Fully loosen the captive screw at the front of the motherboard.

3 Grasp the two motherboard handles or thumb screws and slide the motherboard backwards off of the alignment pins.

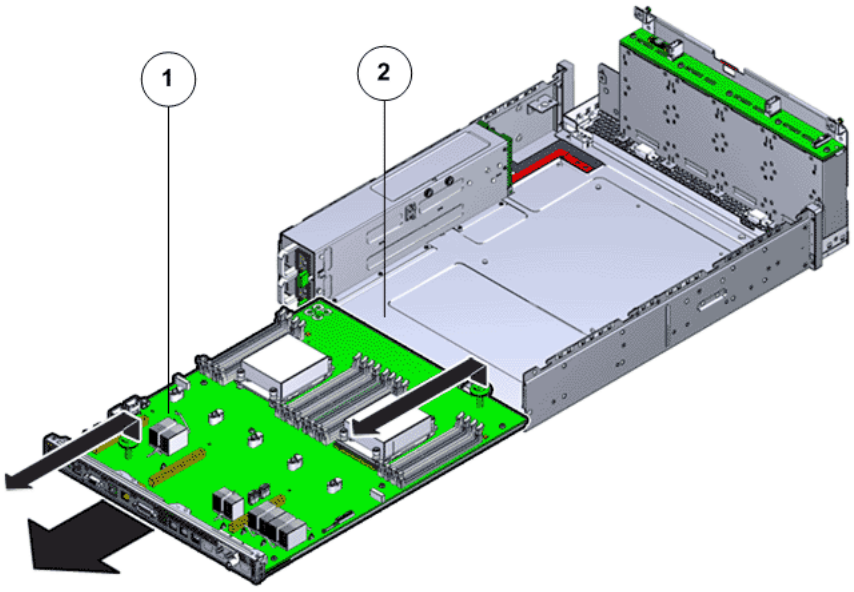
Figure 198: Handles to lift up the motherboard



Legend	1 Thumb screws (2)
	2 Replication Engine motherboard

4 Lift the motherboard 0.5 in. (13 mm) to clear the bottom alignment pins and slowly move the motherboard out the back of the chassis and set it aside.

Figure 199: Remove the motherboard



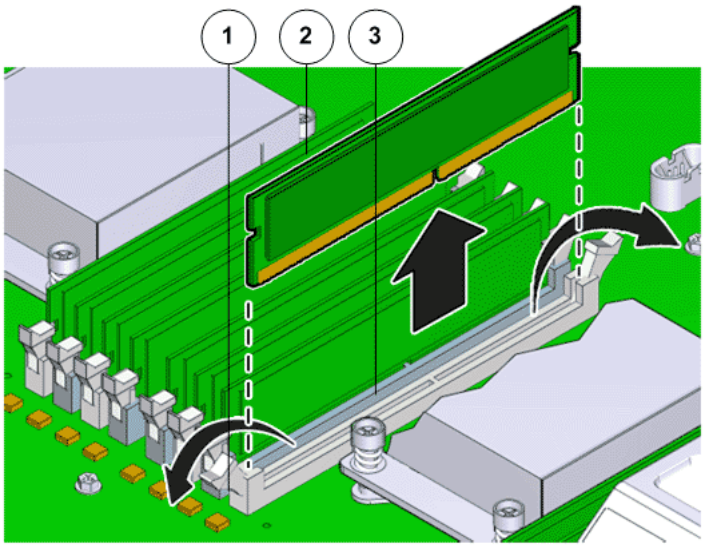
Legend	1 Motherboard
	2 Replication Engine chassis

5 Place the motherboard on an antistatic mat holding the motherboard handles or thumb screws.

Remove a DIMM

1 Remove the DIMMs by pressing down on the tabs on both sides of the DIMM to unlock it from the slot.

Figure 200: Remove DIMMs



Legend	1 Tabs to release DIMMs
	2 DIMM
	3 DIMM slot

Note: While inserting or removing DIMMs, ensure that there is no interference with the cables. Pulling or pressing down on the cables might cause damage to the cables during the replacement procedure.

2 Lift out the DIMM and set aside on an antistatic mat.

Note: Visually inspect the slots and the memory for physical damage by checking for cracked or broken plastic in the slot.

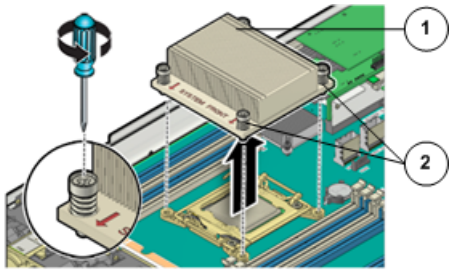
Note: Sometimes memory might fault because of dust or improper alignment or damaged slots. Use only compressed air to dust the memory.

Remove a Heat Sink

1 Remove the access window on the air duct to remove the heat sink and CPU.

2 Loosen the four Phillips screws on the four sides of the heat sink that secure the heat sink to the Replication Engine chassis a few turns at a time in a diametrically opposed pattern using a Phillips Number 2 screwdriver.

Figure 201: Loosen four screws to remove heat sink



Legend	1 Heat sink	2 Phillips screws that secure the heat sink

Note: Loosen one screw, then loosen the screw opposite that screw on the heat sink to prevent it from warping the motherboard on which it is mounted.

3 Gently twist the heat sink left and right, while pulling upward, to separate the heat sink from the top of the CPU.

Note: A thin layer of thermal grease separates the heat sink and the CPU. This thermal grease also acts as an adhesive.

Caution: Do not allow the thermal grease to contaminate the work space or other components.

4 Lift up the failed heat sink and set aside on an antistatic mat.

5 Visually inspect the failed heat sink to verify if the thermal grease has dried out and use an alcohol pad to clean the thermal grease from the underside of the heat sink.

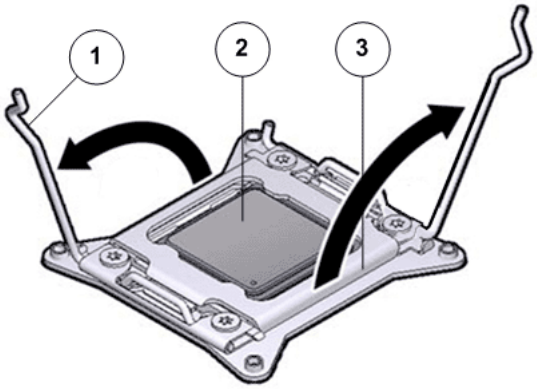
Note: Be careful not to get the thermal grease on your fingers, as this could result in contamination of components.

Caution: Failure to clean the heat sink before removing the CPU can result in the accidental contamination of the CPU socket or other components.

Remove a CPU

1 Disengage the CPU release lever on the right side of the CPU socket (viewing the Replication Engine from the front) by pushing down and moving it to the side away from the CPU, and then rotating the lever upward.

Figure 202: Disengage CPU release lever



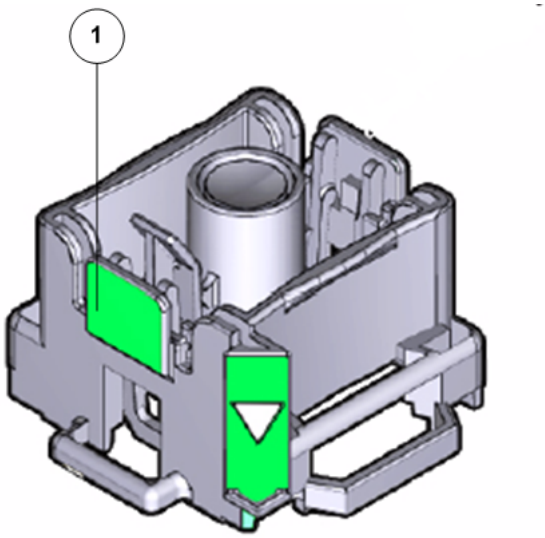
Legend	
	1 CPU release lever
	2 CPU
	3 CPU socket

Note: This exposes the CPU inside the CPU socket.

Caution: The correct CPU removal or replacement tool must be used to remove and replace a CPU. Otherwise, the CPU or the CPU socket might be damaged. The correct CPU removal/replacement tool is included in the box with the replacement CPU. Additionally, both removal or replacement tools ship with replacement motherboards.

The model for the CPUs in the Oracle FS System Replication Engine is E5-2620 V2 (8 core processor) and requires a CPU removal tool that is color coded green.

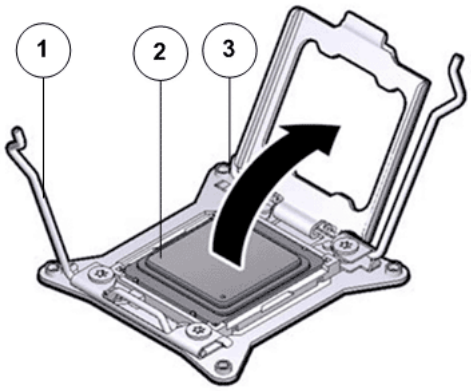
Figure 203: CPU removal tool



Legend	1 CPU removal tool color coded green

2 Disengage the CPU socket release lever on the left side of the CPU socket (viewing the Replication Engine from the front) by pushing down and moving it to the side away from the CPU, and then rotating the lever upward.

Figure 204: Disengage CPU socket release lever



Legend	1 CPU socket release lever
	2 CPU
	3 CPU pressure frame

3 Swing the CPU pressure frame to fully open position and gently disengage the CPU pins on the underside to lift up the CPU from the CPU socket.

Note: Handle the CPU socket pins with extreme care. CPU socket pins are very fragile. A light touch can bend the CPU socket pins and damage the board beyond repair.

4 Use the syringe to apply approximately 0.1 ml of thermal grease to the top center of the CPU.

5 Set aside the failed CPU on an antistatic mat.

Replication Engine Motherboard Cables

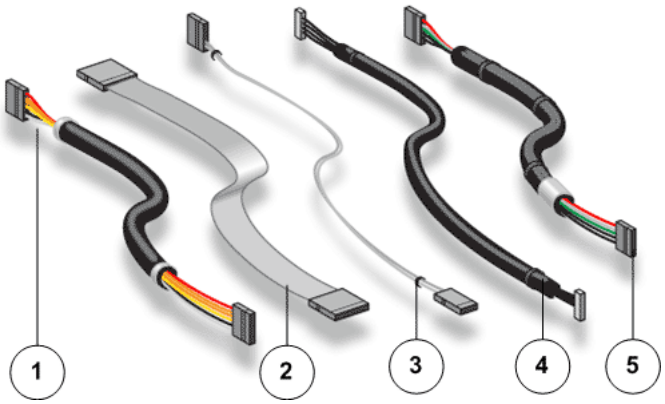
The motherboard cables provide power, switch, or signal connectivity to the various Replication Engine components. Damage to any of these cables might impact the normal operations of the Replication Engine and must be replaced as soon as possible.

Each Replication Engine has five cable bundles that are routed throughout the chassis. The motherboard cables bundles are field replaceable units (FRUs). Replacing motherboard cables requires you to bring the Replication Engine offline. The five cable bundles included in the motherboard cable kit are as follows:

- SAS cable: Cables connected to the Replication Engine backplane and a SAS connector on the motherboard.
- CUID cable: Cables that connect the Replication Engine identification display (CUID) to the motherboard and supplies power and signal to the CUID.
- LED board cable: Cables that connect the LED alarm assembly to the motherboard and supplies power and switch connectivity to the LED alarm assembly.
- Drive signal cable: Cables that connect the motherboard and the drive cage and supplies power to the hard drives in the drive cage.
- PDB signal cable: A flat cable that connects the power distribution board (PDB) to the motherboard and provides signal connectivity to the PDB.

The following figure identifies all the internal cables on the Replication Engine motherboard.

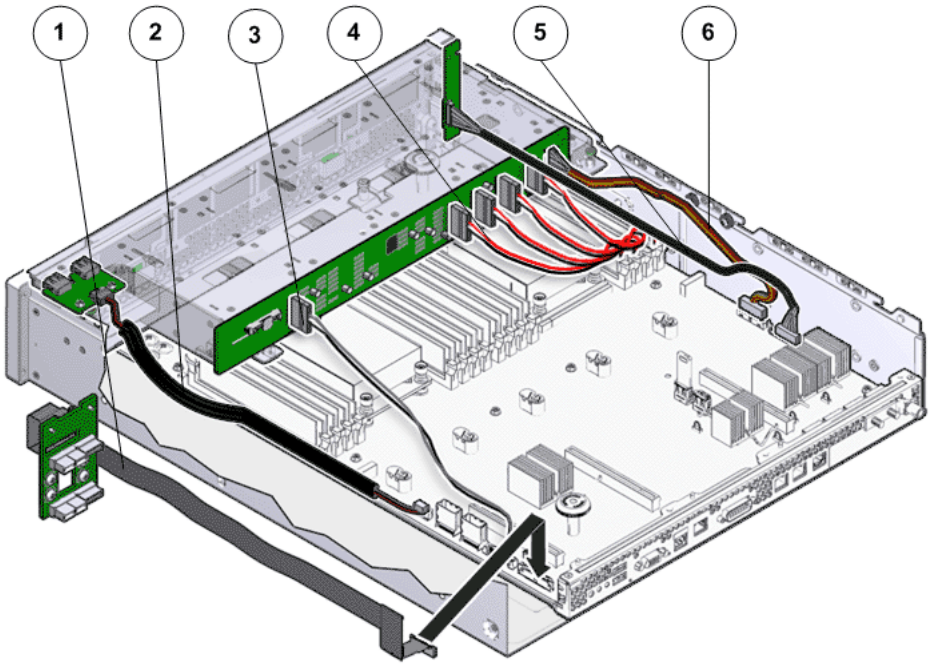
Figure 205: Replication Engine motherboard cables



Legend	
	1 LED board cable
	2 PDB signal cable
	3 Drive signal cable
	4 CUID cable
	5 SAS cables

The following figure identifies the location of the various motherboard cables:

Figure 206: Location of the motherboard cables



Legend	
	1 PDB signal cable
	2 CUID cable
	3 Drive signal cable
	4 SAS cables
	5 LED board cable
	6 Drive backplane power and monitoring cable

Remove Motherboard Cables

1 Gently disconnect the motherboard cable from its connector.

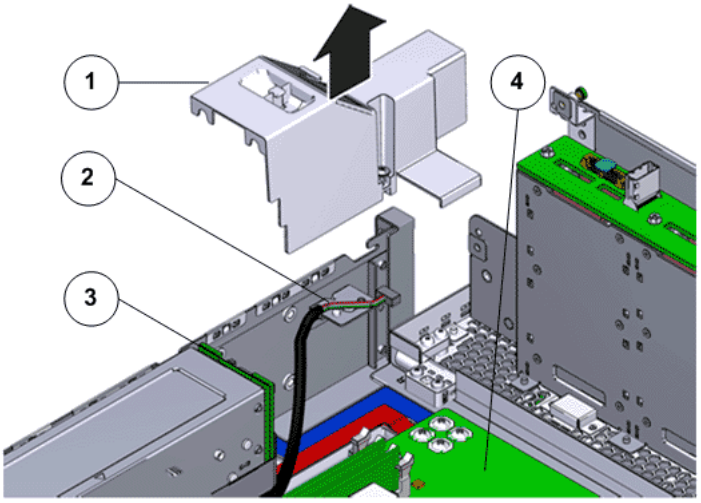
Note: Replacing a motherboard cable might require you to remove some components from the motherboard based on the location of the cable that you are replacing. Make sure that you have adequate access to the cable connectors while replacing the motherboard cable.

2 Set the cable aside on an antistatic mat.

Remove a Power Distribution Board (PDB) Cover

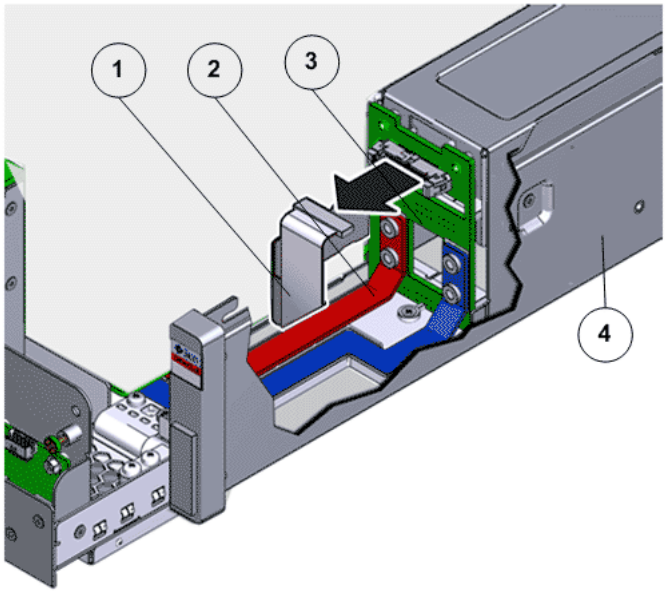
1 Fully loosen the captive screw and gently lift up the cover over the PDB by pressing the tabs on the cover and set the cover aside.

Figure 207: Remove PDB cover



2 Gently disconnect the PDB flat signal cable and the PSU duct when you lift up the PDB cover.

Figure 208: Disconnect PDB flat cable



Legend	
	1 PDB flat signal cable that connects the PDB to the motherboard
	2 PDB bus bars
	3 PDB
	4 PDB cage

Insert Components on the Replication Engine

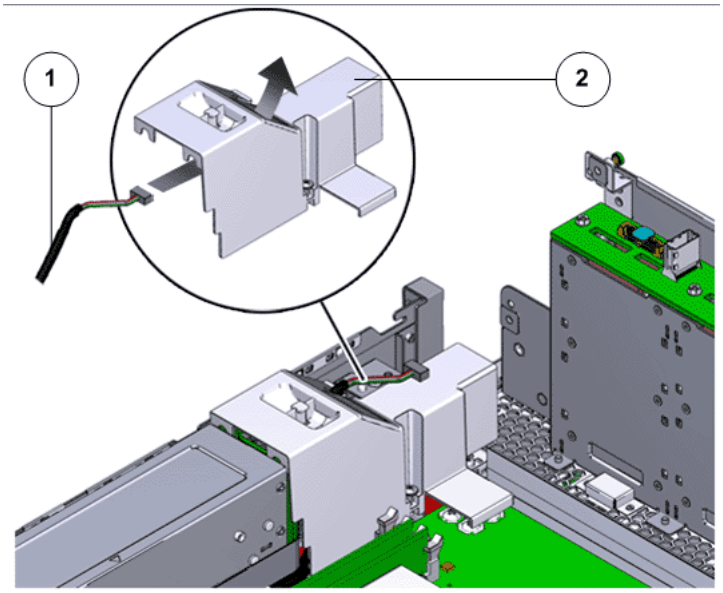
Insert the necessary components on the Replication Engine following the procedures outlined below.

Some components had to be removed from the Replication Engine as a prerequisite for access while replacing the failed component. These components must be reinstalled after completing the replacement.

Insert a Power Distribution Board (PDB) Cover

1 Reconnect the PDB flat signal cable and the PSU duct.

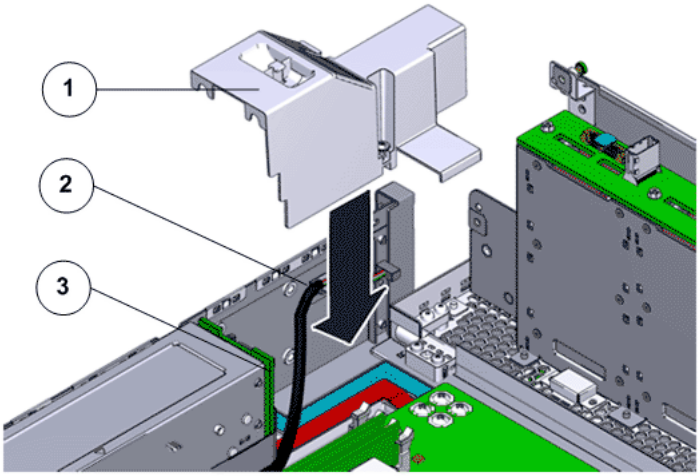
Figure 209: Reconnect PDB PSU duct



Legend	1 Power supply duct
	2 PDB cover

2 Lower the cover over the PDB and the bus bars.

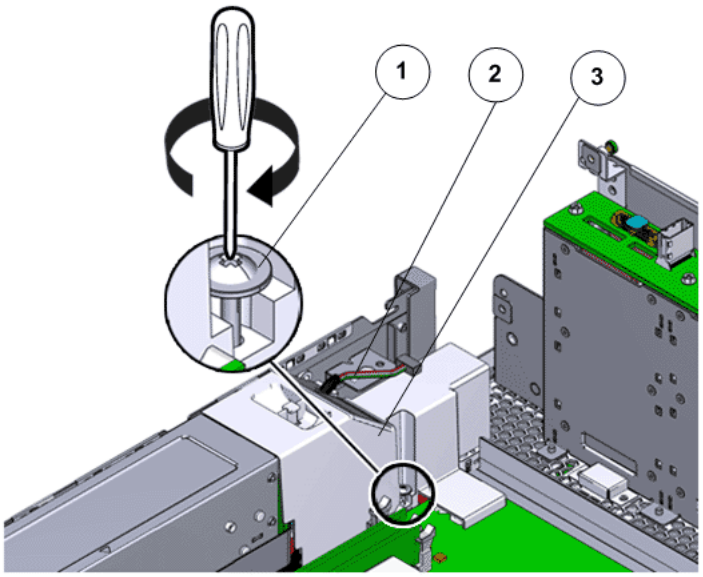
Figure 210: Install PDB cover



Legend	1 PDB cover
	2 Power supply duct
	3 PDB board

3 Tighten the captive screw to secure the cover to the motherboard and the chassis.

Figure 211: Secure PDB cover with captive screw



Legend	1 PDB captive screw
	2 Power supply duct
	3 PDB cover

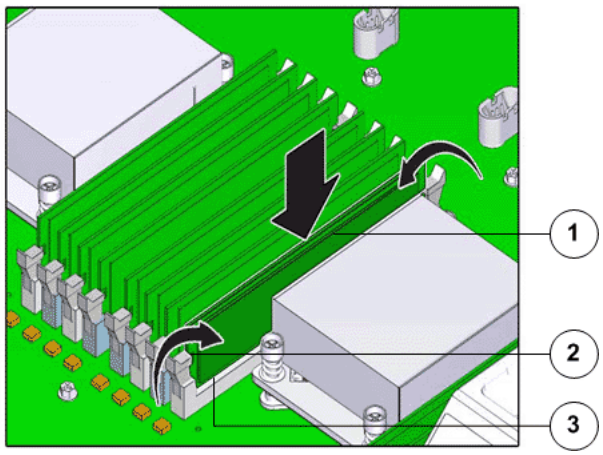
Insert Motherboard Cables

Gently reconnect the motherboard cable to its connectors at both ends.

Insert a DIMM

Press the DIMM fully into the DIMM slot and ensure that the tabs on both sides of the DIMM are locked.

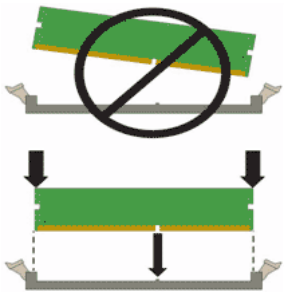
Figure 212: Insert Replication Engine DIMM



Legend	1 DIMM
	2 Tabs to secure DIMMs
	3 DIMM notch aligns with the DIMM slots

Note: While inserting DIMMs, ensure that there is no interference with the cables. Pulling or pressing down on the cables might cause damage to the cables during the replacement procedure.

Figure 213: DIMM alignment over DIMM slots



Important: Ensure that the notch in the DIMM lines up with the key in the slot.

Note: Replace only one DIMM at a time to make sure that they are inserted into the correct slots. Attempting to insert multiple DIMMs into the slots might damage the DIMMs due to excessive flexure.

Note: Never leave a DIMM slot unpopulated. Insert fillers into empty slots to ensure proper air flow inside the Replication Engine.

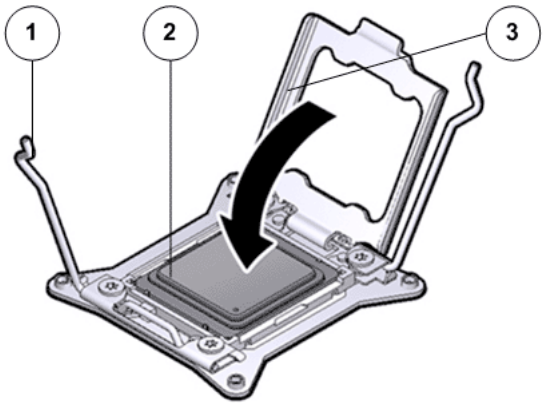
Insert a CPU

1 Gently align the underside of the CPU to the pins on the CPU socket and push down to secure the CPU in the socket.

Note: Handle the CPU socket pins with extreme care. CPU socket pins are very fragile. A light touch can bend the CPU socket pins and damage the board beyond repair.

2 Swing the CPU pressure frame to its fully closed position.

Figure 214: Close CPU pressure frame



Legend	1 CPU release lever
	2 CPU
	3 CPU pressure frame

3 Push down on the two socket release levers of the CPU socket to secure the CPU inside.

Insert a Heat Sink

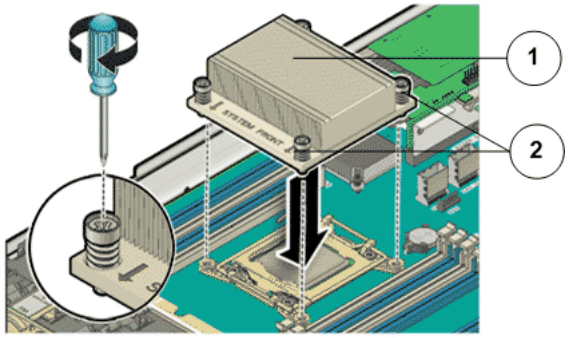
1 Secure the heat sink over the CPU to the Replication Engine motherboard by inserting the four screws on the four sides of the heat sink.

Note: Ensure that the CPU is cleaned with an alcohol pad and fresh thermal grease is applied, when installing a new heat sink, to prevent overheating and damage to the CPU.

Important: Ensure that the heat sink and the screws are aligned correctly and the screws on diagonal ends of the heat sink are tightened first. A slight force might need to be applied to push down the screwdriver while tightening the screws to overcome the tension generated.

2 Tighten the four Phillips screws on the heat sink a few turns at a time in a diametrically opposed pattern using a Phillips Number 2 screwdriver.

Figure 215: Insert heat sink



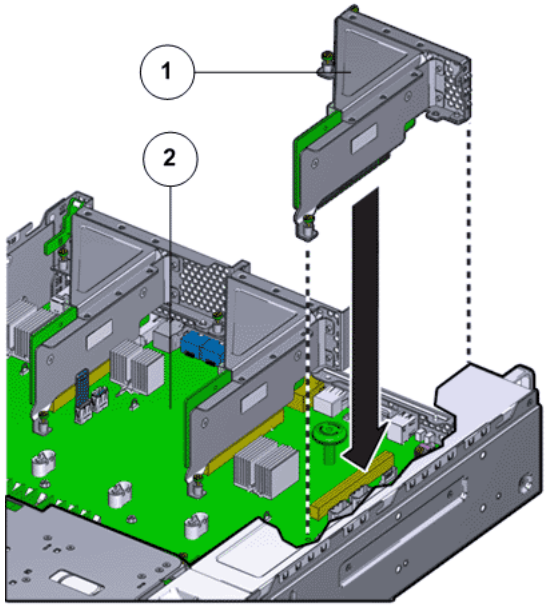
Legend	1 Heat sink
	2 Phillips screws that secure the heat sink

Insert a Riser

1 Lower the riser onto the Replication Engine motherboard and press the riser edge connector securely into the socket.

Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

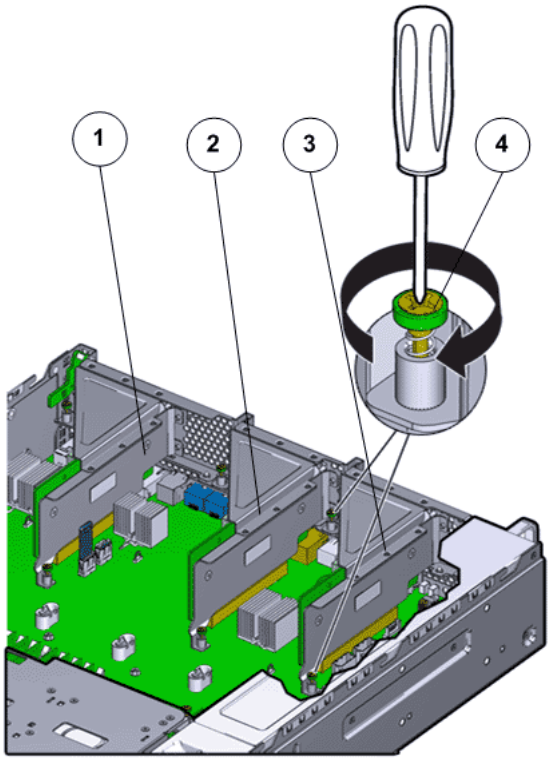
Figure 216: Insert riser



Legend	1 Riser
	2 Replication Engine motherboard

2 After the riser is seated properly inside the Replication Engine, tighten the two captive Phillips screws on both sides of the riser to secure the riser on the Replication Engine motherboard.

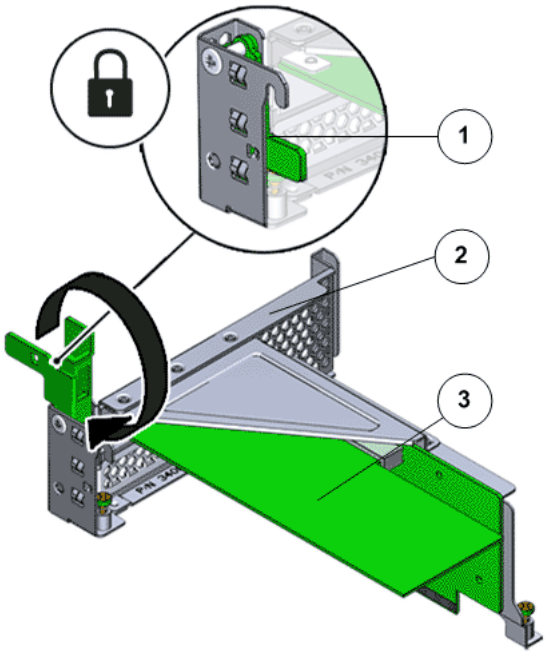
Figure 217: Captive screws to secure risers to the motherboard



Legend	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws

To install riser 3, lock the latch to secure the riser to the Replication Engine motherboard.

Figure 218: Riser 3 latch locked



Legend		
	1 Riser 3 latch	3 HBA
	2 Riser 3	

3 Reconnect any previously removed internal or external cables to any HBAs installed in the riser.

4 Repeat the above steps for any additional risers that you are installing.

Insert a Motherboard

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Use the two thumb screws or handles to place the motherboard onto the Replication Engine chassis gently.

Note: Due to the tight fit inside the Replication Engine chassis, care must be taken while inserting the motherboard into the chassis. Do not flex the PDB board and ensure that the screw holes on the chassis align correctly with the motherboard while inserting the motherboard into the Replication Engine chassis.

3 Lift the motherboard gently by the handles to a height of about 0.5 in. (13 mm) and slowly move the motherboard forward into the chassis from the rear.

4 When there is about 1.5 inches (36 millimeters) to go, lower the motherboard onto the bottom alignment pins.

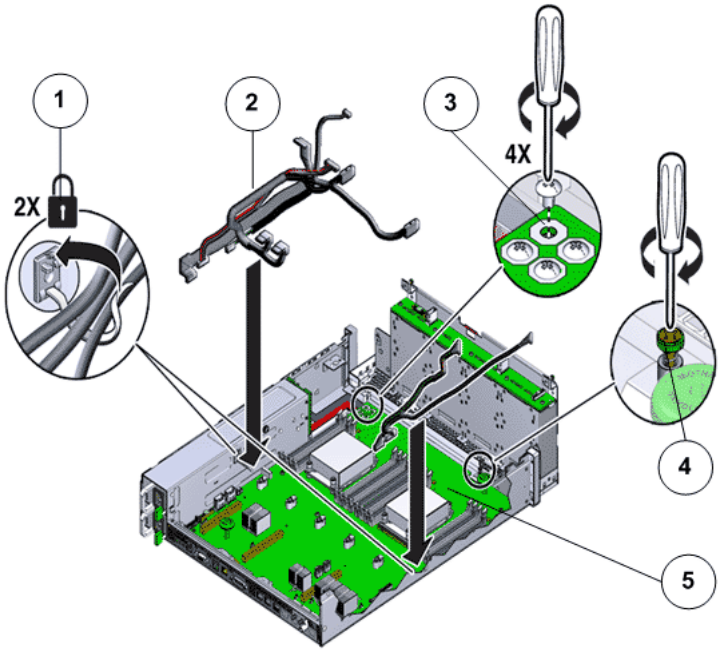
5 Slowly slide the motherboard forward until it drops, engaging the bottom alignment pins.

6 Continue to slide the motherboard forward until it seats.

Note: The back of the motherboard must be flush with the back of the chassis. Additionally, the four holes in the motherboard must align with the four holes in the bus bars.

7 Tighten the captive screws, the four bus bar screws, and reconnect the cables that you previously disconnected.

Figure 219: Secure the motherboard



Legend	
	1 PDB cable bundle
	2 Motherboard cables
	3 Bus bar screws that secure the PDB to motherboard
	4 Thumb screws or handles to remove and insert the motherboard to the chassis
	5 Replication Engine motherboard

Lower the Drive Compartment

1 Rotate the drive compartment and backplane back into position inside the Replication Engine and ensure that the alignment pins engage.

Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Replication Engine.

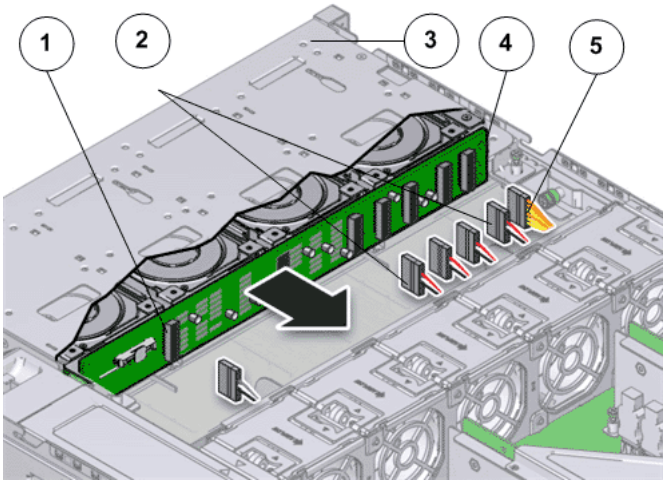
2 Secure the backplane inside the Replication Engine by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.

3 Reconnect all the cables that had been previously disconnected from the backplane.

Cables that must be reconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable

Figure 220: Reconnect cables to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cable
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Insert an Air Duct

Secure the air duct inside the Replication Engine by tightening the two Phillips Number 2 screws into position.

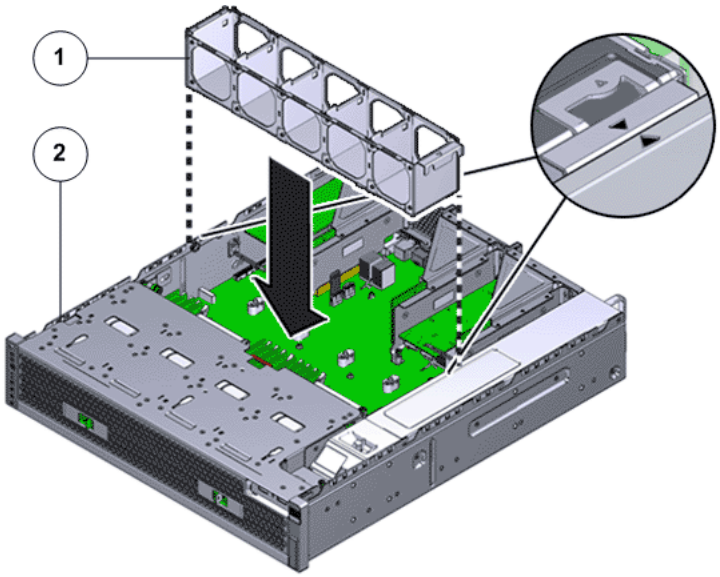
Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward, the right bracket slides back when facing the Replication Engine in the service position.

Insert the Fan Compartment

1 Move any loose cables so that they are against the Replication Engine chassis walls.

2 Align the fan compartment to where it installs into the Replication Engine chassis.

Figure 221: Insert the fan compartment



Legend	1 Fan compartment
	2 Replication Engine chassis

Note: The single arrow on the right end of the fan compartment aligns with the single arrow on the power supply bay.

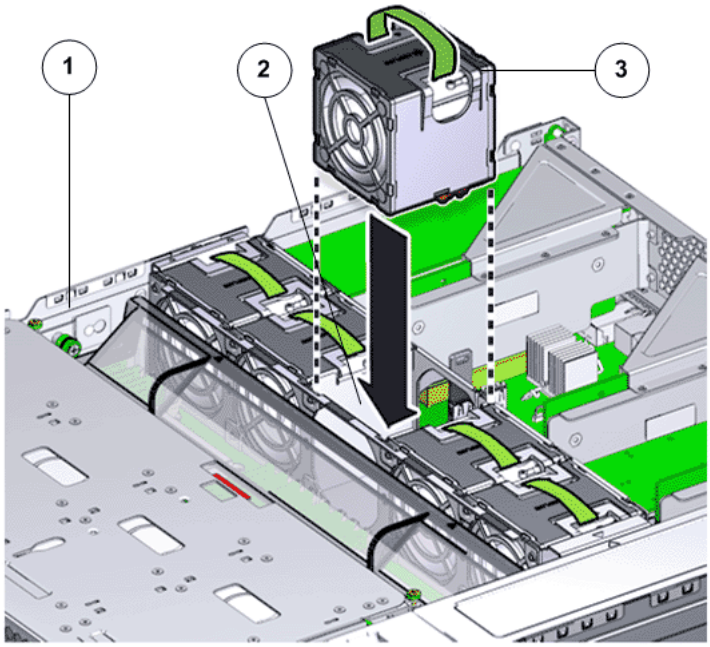
3 Slowly lower the fan compartment into the Replication Engine chassis, gently working the cables into the gaps between the fan compartment and the chassis walls.

4 Verify that the fan compartment is properly seated, no cables are pinched, and the top surfaces of the fan compartment are flush with the Replication Engine chassis.

Insert a Fan Module

Insert the replacement fan module into the Replication Engine.

Figure 222: Insert fan module



Legend	1 Replication Engine chassis
	2 Fan compartment
	3 Fan module

Note: Press down on the fan module and apply firm pressure to fully seat the fan module into the fan compartment. The fan modules are notched to ensure that they are installed in the correct orientation.

Note: Repeat for each additional fan module.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 223: Insert air filter

Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

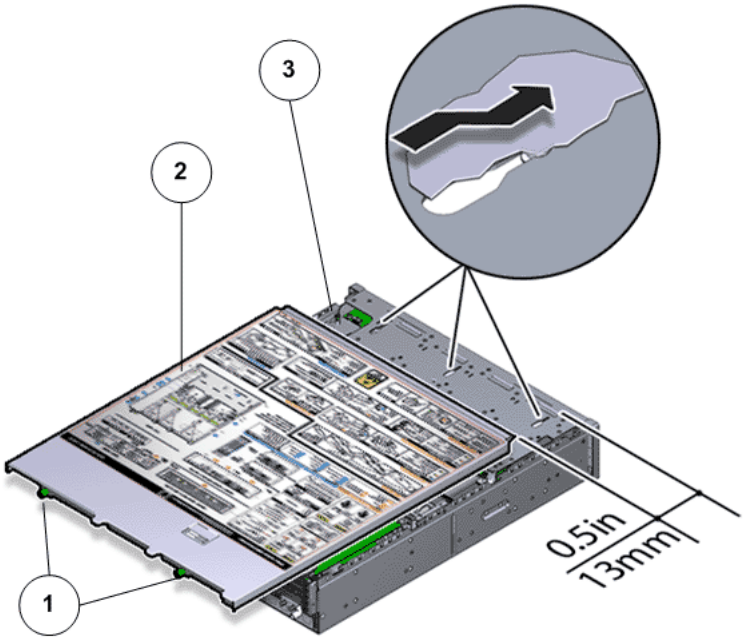
2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 224: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Reconnect Replication Engine Cabling

1. Reconnect all the data cables on the Replication Engine.

   Note: Oracle Customer Support recommends labeling all cables connected to the Replication Engine so that the cables can be reconnected accurately to the Replication Engine after the replacement procedure is complete.

2. Reconnect the CMA to the Replication Engine by attaching the release tab on the left and right side of the CMA.

Slide Replication Engine to Rack Position

Slide the Replication Engine back into the rack.

Note: You must release the rail locking mechanism to slide the Replication Engine chassis back into the rack.

Power On the Replication Engine

Power on the Replication Engine using the power button.

Note: As soon as the power cords are connected to the Replication Engine, standby power is applied. In standby power mode, the Power/OK LED on the Replication Engine front panel blinks every five seconds or so. However, to apply main power to the Replication Engine, you must use the power button. When main power is applied to the Replication Engine, the green Power/OK LED on the front panel of the Replication Engine blinks steadily. When the Replication Engine BIOS has completed booting, the OK LED remains lit.

Replace Replication Engine Motherboard Cables

The motherboard cables provide power, switch, or signal connectivity to the various Replication Engine components. Damage to any of these cables might impact the normal operations of the Replication Engine and must be replaced as soon as possible.

Prerequisites:

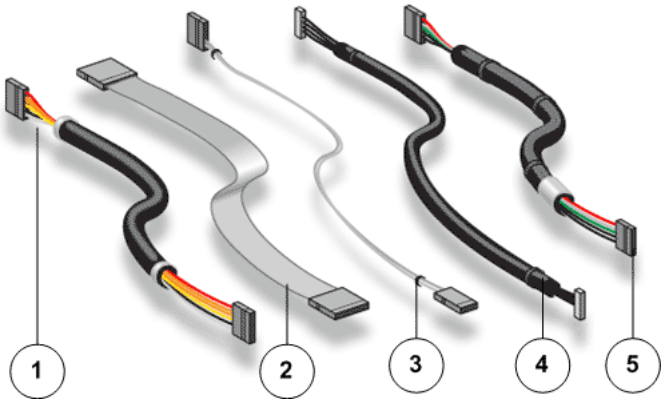
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.

Each Replication Engine has five cable bundles that are routed throughout the chassis. The motherboard cables bundles are field replaceable units (FRUs). Replacing motherboard cables requires you to bring the Replication Engine offline. The five cable bundles included in the motherboard cable kit are as follows:

- SAS cable: Cables connected to the Replication Engine backplane and a SAS connector on the motherboard.
- USB cable: Cables that connect the Replication Engine USB ports.
- LED board cable: Cables that connect the LED alarm assembly to the motherboard and supplies power and switch connectivity to the LED alarm assembly.
- Drive signal cable: Cables that connect the motherboard and the drive cage and supplies power to the hard drives in the drive cage.
- PDB signal cable: A flat cable that connects the power distribution board (PDB) to the motherboard and provides signal connectivity to the PDB.

The following figure identifies all the internal cables on the Replication Engine motherboard.

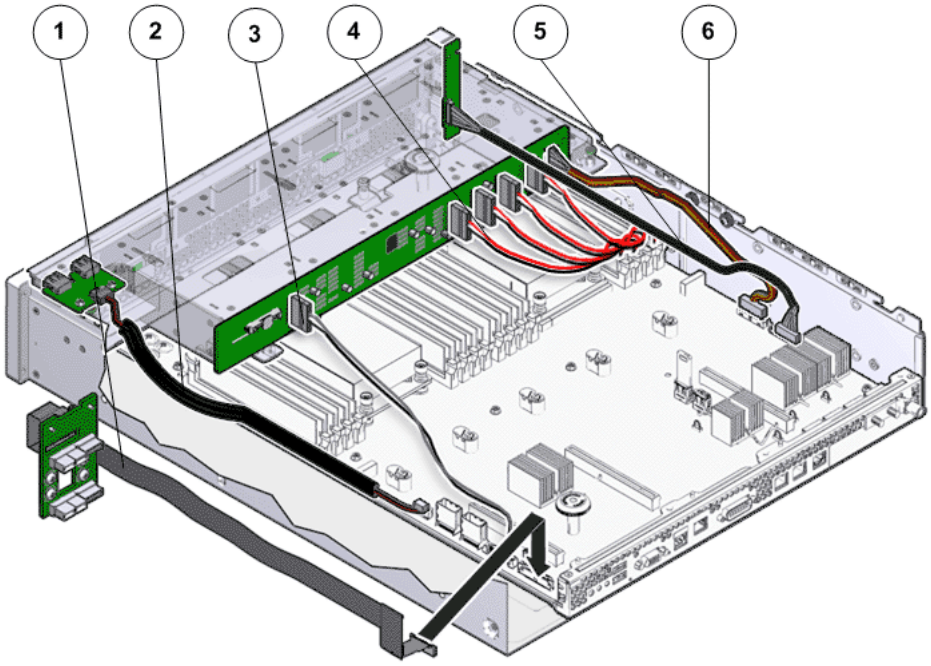
Figure 225: Replication Engine motherboard cables



Legend	
	1 LED board cable
	2 PDB signal cable
	3 Drive signal cable
	4 CUID cable USB cable
	5 SAS cables

The following figure identifies the location of the various motherboard cables:

Figure 226: Location of the motherboard cables



Legend	
	1 PDB signal cable
	2 CUID cable USB cable
	3 Drive signal cable
	4 SAS cables
	5 LED board cable
	6 Drive backplane power and monitoring cable

Note: The motherboard cables can be accessed only after removing the cover over the Replication Engine chassis.

Note: Because Replication Engine motherboard cable replacement can take some time to complete to identify the cables for replacement, the Replication Engine should be placed on a workbench for servicing rather than inside the rack for convenience.

Caution: Replacement of the Replication Engine motherboard cables requires assistance from Oracle Customer Support.

Caution: Ensure that all power is removed from the Replication Engine before removing or installing the motherboard. Disconnect the power cords before performing the motherboard replacement procedure.

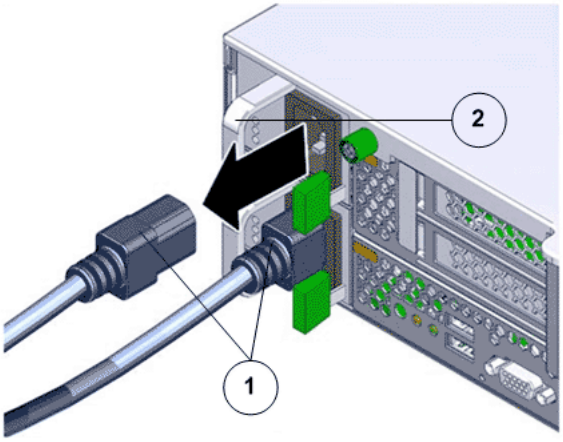
Procedure Overview

1. *Slide Replication Engine to Service Position*
2. *Remove the Replication Engine Power Supply Cords*
3. *Disconnect Replication Engine Cabling*
4. *Remove Replication Engine Chassis From Rack*
5. *Remove Components From the Replication Engine*
6. *Remove Motherboard Cables*
7. *Insert Motherboard Cables*
8. *Insert Components on the Replication Engine*
9. *Insert the Replication Engine Onto the Rack*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 227: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

Tip: Always notify affected users that the Replication Engine will be powered off.

Disconnect Replication Engine Cabling

Disconnect all data cables from the Replication Engine.

Note: All cables must be disconnected from the Replication Engine and labeled such that they can be reconnected accurately to the Replication Engine after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Replication Engine or result in a complete loss of functionality.

Note: Service the Replication Engine components from the front of the Replication Engine while the Replication Engine is in service position.

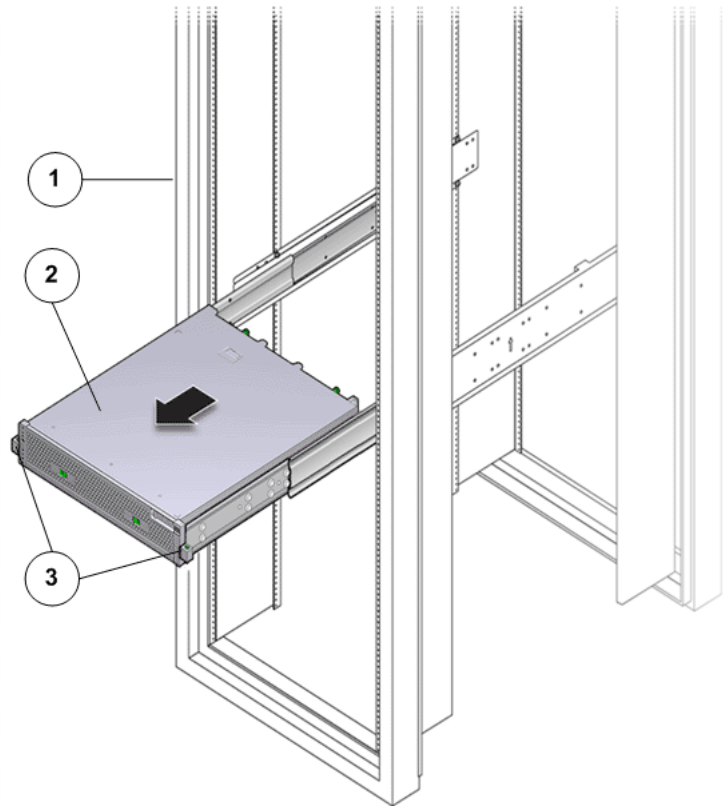
Note: Do not lean on or place any weight on the Replication Engine while the Replication Engine is in the service position.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 228: Slide the Replication Engine to service position



Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Remove Replication Engine Chassis From Rack

The following procedure is optional.

1. From the front of the Replication Engine, press on the slide-rail release tabs on both sides at the front of the Replication Engine, and pull the Replication Engine out of the rack until is free of the rack rails.

Important: Oracle recommends not removing the Replication Engine from the rails for servicing the components. All components are designed for replacement and servicing while the Replication Engine chassis is on the rails. However, if you must remove the Replication Engine from the rack, disconnect the rear panel Replication Engine cables from the front with the Replication Engine in service position.

Note: A slide-rail release tab is located on each slide-rail of the Replication Engine.

2 With the help of a partner or a mechanical lift, place the Replication Engine on an antistatic surface on a workbench.

Remove Components From the Replication Engine

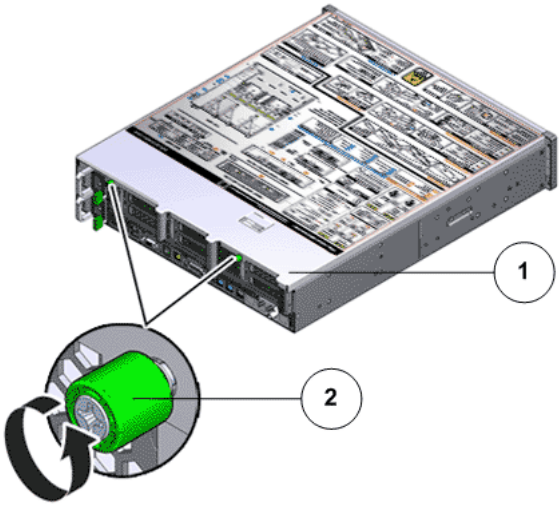
Note: Some components must be removed from the Replication Engine as a prerequisite for access while replacing the failed component.

Note: All components that are removed from the Replication Engine must be placed on an antistatic surface or ESD qualified mat.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 229: Captive thumb screws to remove the top cover



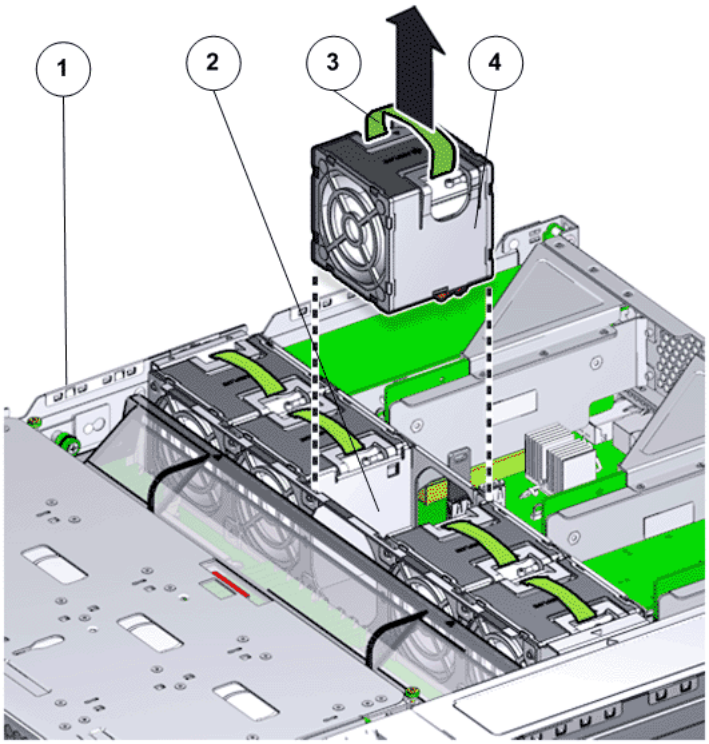
Legend	
	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove a Fan Module

1 Using your thumb and forefinger, grasp the removal tab and gently lift the fan module from the fan compartment.

Figure 230: Remove fan module



Legend	
	1 Replication Engine chassis
	2 Fan compartment
	3 Removal tab
	4 Fan module

Note: Pulling the green tab from the middle releases the locking tab for each individual fan.

Note: When removing a fan module, do not rock it back and forth. Rocking the fan module can cause damage to the motherboard connectors.

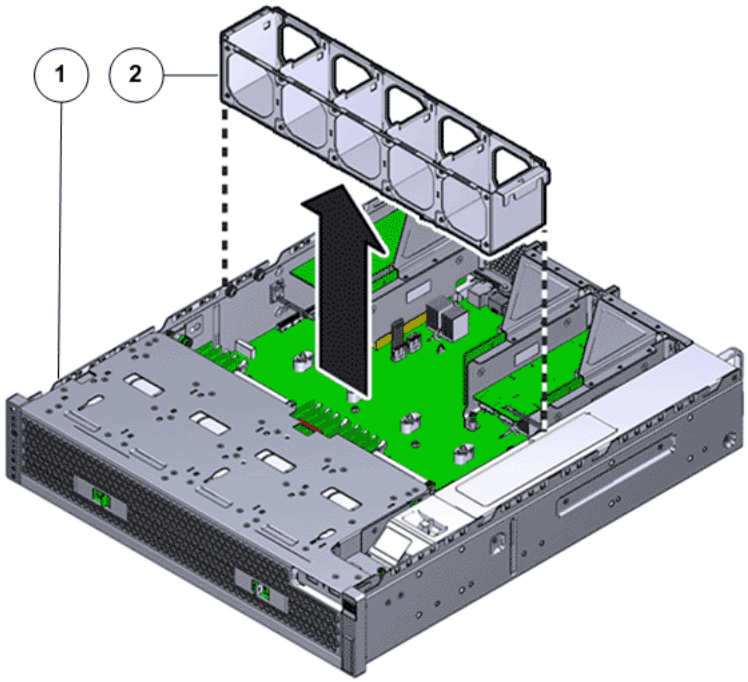
2 Set the fan module aside.

Note: The fan compartment might come out when the last fan module is removed.

Remove the Fan Compartment

1 Lift the fan compartment straight up and out of the Replication Engine chassis.

Figure 231: Remove fan compartment



Legend	1 Replication Engine chassis
	2 Fan compartment

Note: All fan modules must be removed from the fan compartment before removing the fan compartment.

2 Set the component aside.

Remove Motherboard Cables

1 Gently disconnect the motherboard cable from its connector.

Note: Replacing a motherboard cable might require you to remove some components from the motherboard based on the location of the cable that you are replacing. Make sure that you have adequate access to the cable connectors while replacing the motherboard cable.

2 Set the cable aside on an antistatic mat.

Insert Motherboard Cables

Gently reconnect the motherboard cable to its connectors at both ends.

Insert Components on the Replication Engine

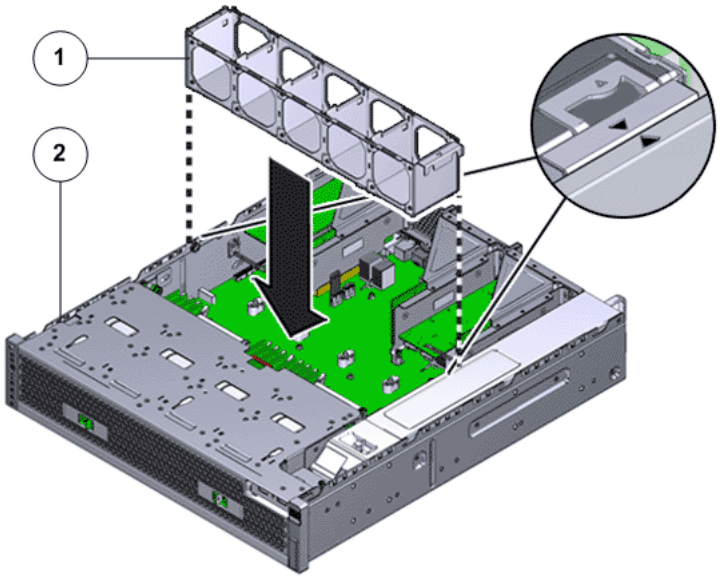
Insert the necessary components on the Replication Engine following the procedures outlined below.

Some components had to be removed from the Replication Engine as a prerequisite for access while replacing the failed component. These components must be reinstalled after completing the replacement.

Insert the Fan Compartment

1. Move any loose cables so that they are against the Replication Engine chassis walls.
2. Align the fan compartment to where it installs into the Replication Engine chassis.

Figure 232: Insert the fan compartment



Legend	1 Fan compartment
	2 Replication Engine chassis

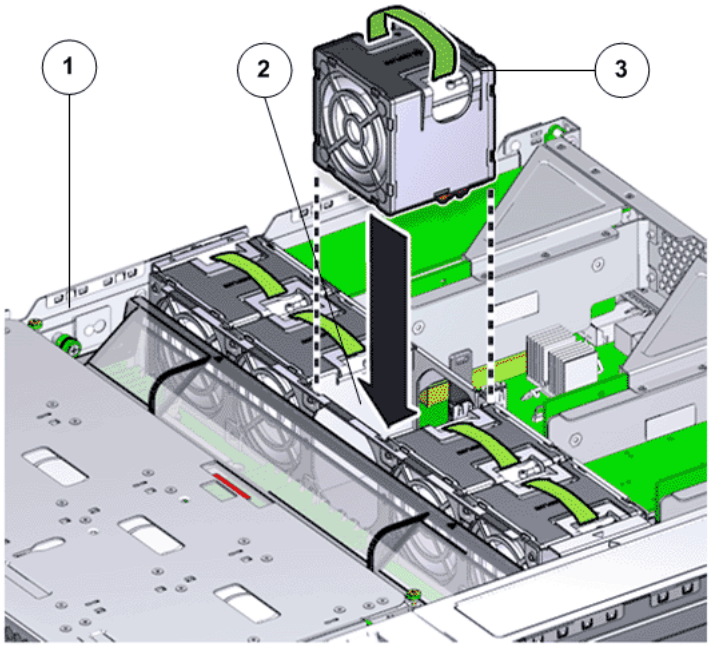
Note: The single arrow on the right end of the fan compartment aligns with the single arrow on the power supply bay.

3. Slowly lower the fan compartment into the Replication Engine chassis, gently working the cables into the gaps between the fan compartment and the chassis walls.
4. Verify that the fan compartment is properly seated, no cables are pinched, and the top surfaces of the fan compartment are flush with the Replication Engine chassis.

Insert a Fan Module

Insert the replacement fan module into the Replication Engine.

Figure 233: Insert fan module



Legend	1 Replication Engine chassis
	2 Fan compartment
	3 Fan module

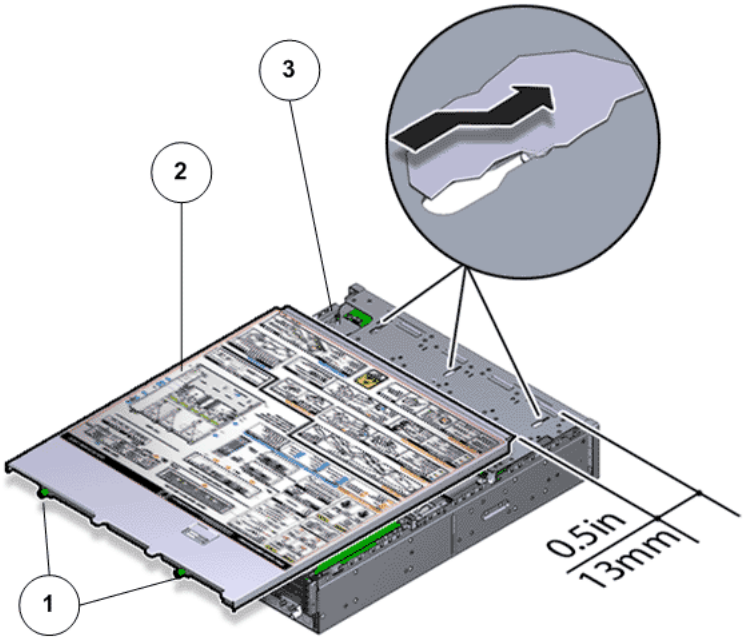
Note: Press down on the fan module and apply firm pressure to fully seat the fan module into the fan compartment. The fan modules are notched to ensure that they are installed in the correct orientation.

Note: Repeat for each additional fan module.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 234: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

Insert the Replication Engine Onto the Rack

Insert the Replication Engine into the rack.

Inserting the Replication Engine onto the rack includes the following tasks:

1. Lift up the Replication Engine Onto the Rack
2. Slide the Replication Engine back into Rack position
3. Reconnect the Replication Engine cabling and the CMA
4. Power on the Replication Engine
5. Verify the Replication Engine component status

Insert Replication Engine Chassis Onto Rack

With the help of a partner or a mechanical lift, engage the Replication Engine with the rack rails.

Caution: Do not use the power supply handles to lift the Replication Engine. Using the power supply handles to lift the Replication Engine can damage the power supplies and disrupt electrical power to the Replication Engine.

Slide Replication Engine to Rack Position

Slide the Replication Engine back into the rack.

Note: You must release the rail locking mechanism to slide the Replication Engine chassis back into the rack.

Reconnect Replication Engine Cabling

1. Reconnect all the data cables on the Replication Engine.

   Note: Oracle Customer Support recommends labeling all cables connected to the Replication Engine so that the cables can be reconnected accurately to the Replication Engine after the replacement procedure is complete.
2. Reconnect the CMA to the Replication Engine by attaching the release tab on the left and right side of the CMA.

Power On the Replication Engine

Power on the Replication Engine using the power button.

Note: As soon as the power cords are connected to the Replication Engine, standby power is applied. In standby power mode, the Power/OK LED on the Replication Engine front panel blinks every five seconds or so. However, to apply main power to the Replication Engine, you must use the power button. When main power is applied to the Replication Engine, the green Power/OK LED on the front panel of the Replication Engine blinks steadily. When the Replication Engine BIOS has completed booting, the OK LED remains lit.

Replace a Replication Engine Power Distribution Board

The power distribution board (PDB) connects the two power supplies and the motherboard and distributes power by acting like a circuit breaker. A failed PDB is a critical point of failure and can affect the normal operation of the power

supplies. Failed PDBs might bring down the Replication Engine and must be replaced as soon as possible.

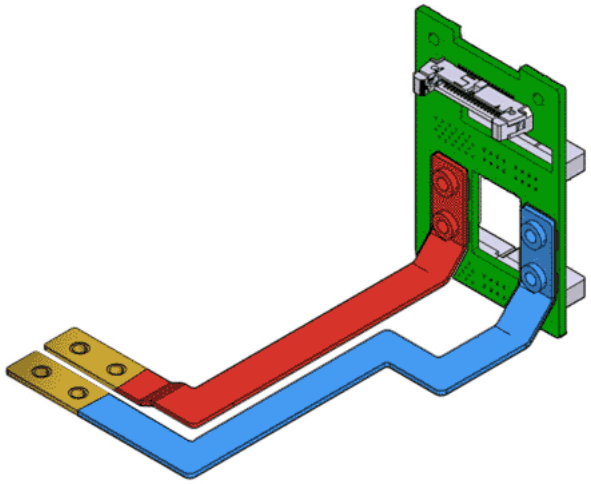
Caution: Ensure that all power is removed from the Replication Engine before removing or installing the PDB. Also, disconnect the power cables before performing the motherboard removal procedure during PDB replacement.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that there is a workbench available to place the Replication Engine chassis once it is removed from the rack for servicing.
- Make sure that you have a Torx Number 10 screwdriver.

Each Replication Engine has a PDB that is located behind the power supplies, under the PDB signal cable. The PDB assembly is a field replaceable unit (FRU). Replacing a PDB is not a hot-serviceable process and requires you to power off the Replication Engine. The following figure shows the PDB assembly inside the Replication Engine.

Figure 235: Power Distribution Board (PDB)



Note: The PDB can be accessed only after removing the cover over the Replication Engine chassis.

Note: Since Replication Engine PDB replacement can take approximately an hour to complete and involves removing all CRUs and FRUs, Oracle Customer

Support recommends that the Replication Engine be placed on a workbench for servicing rather than inside the rack for convenience.

Note: Replacement of the PDB requires assistance from Oracle Customer Support.

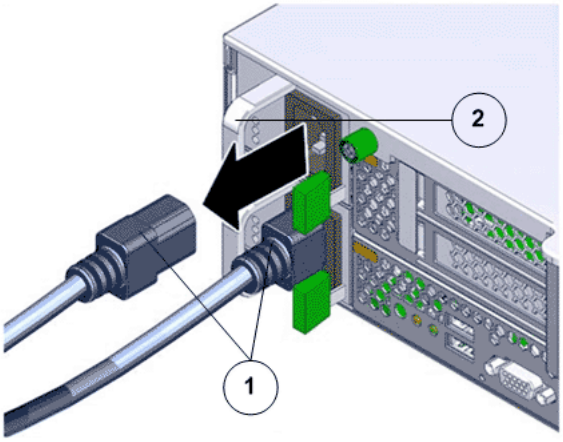
Procedure Overview

1 *Slide Replication Engine to Service Position*
2 *Remove the Replication Engine Power Supply Cords*
3 *Disconnect Replication Engine Cabling*
4 *Remove Replication Engine Chassis From Rack*
5 *Remove Components From the Replication Engine*
6 *Remove a Power Distribution Board (PDB)*
7 *Insert a Power Distribution Board (PDB)*
8 *Insert Components on the Replication Engine*
9 *Insert the Replication Engine Onto the Rack*

Remove the Replication Engine Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 236: Remove power supply cords



Legend	1 Power supply cords
	2 Power supply handle

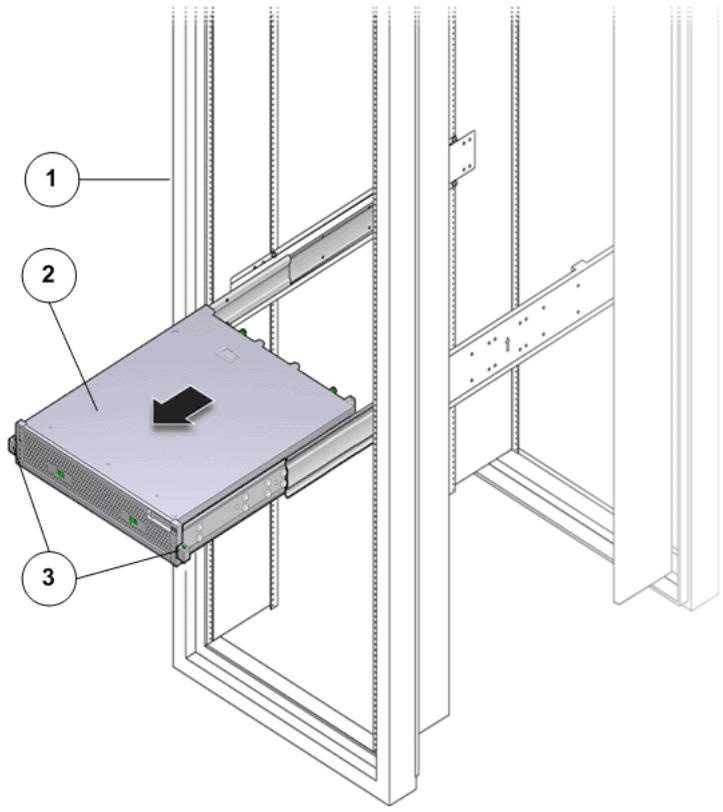
Tip: Always notify affected users that the Replication Engine will be powered off.

Slide Replication Engine to Service Position

Squeeze the release buttons on either side of the Replication Engine front panel at the same time and slide the Replication Engine chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Replication Engine slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Replication Engine chassis.

Figure 237: Slide the Replication Engine to service position



Legend	
	1 Rack
	2 Replication Engine chassis
	3 Release buttons

Important: Before you slide the Replication Engine chassis out, ensure that the cables do not interfere with the movement of the Replication Engine chassis. Although the cable management arm (CMA) is hinged so that you can extend the Replication Engine chassis, all cables and cords must be out of the way when you service the Replication Engine components.

Disconnect Replication Engine Cabling

Disconnect all data cables from the Replication Engine.

Note: All cables must be disconnected from the Replication Engine and labeled such that they can be reconnected accurately to the Replication Engine after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Replication Engine or result in a complete loss of functionality.

Note: Service the Replication Engine components from the front of the Replication Engine while the Replication Engine is in service position.

Note: Do not lean on or place any weight on the Replication Engine while the Replication Engine is in the service position.

Remove Replication Engine Chassis From Rack

The following procedure is optional.

1. From the front of the Replication Engine, press on the slide-rail release tabs on both sides at the front of the Replication Engine, and pull the Replication Engine out of the rack until is free of the rack rails.

   Important: Oracle recommends not removing the Replication Engine from the rails for servicing the components. All components are designed for replacement and servicing while the Replication Engine chassis is on the rails. However, if you must remove the Replication Engine from the rack, disconnect the rear panel Replication Engine cables from the front with the Replication Engine in service position.

   Note: A slide-rail release tab is located on each slide-rail of the Replication Engine.

2. With the help of a partner or a mechanical lift, place the Replication Engine on an antistatic surface on a workbench.

Remove Components From the Replication Engine

Note: Some components must be removed from the Replication Engine as a prerequisite for access while replacing the failed component.

Note: All components that are removed from the Replication Engine must be placed on an antistatic surface or ESD qualified mat.

Remove a Power Supply

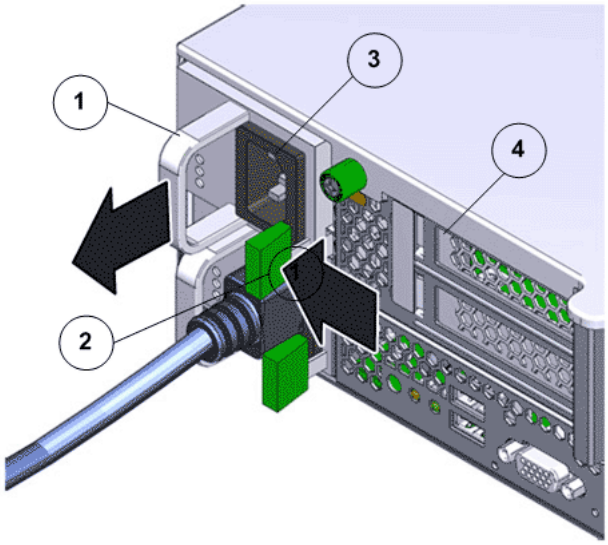
Note: To replace a power supply, you can access the faulted power supply from the back of the Replication Engine module. To access the power supply located in

the bottom slot (PS-1), the CMA clip must be disconnected to enable the power supply to clear the support arm.

Note: Replacing the power supply does not require you to slide the Replication Engine into the extended rack position and can be performed while the Replication Engine is in the rack position.

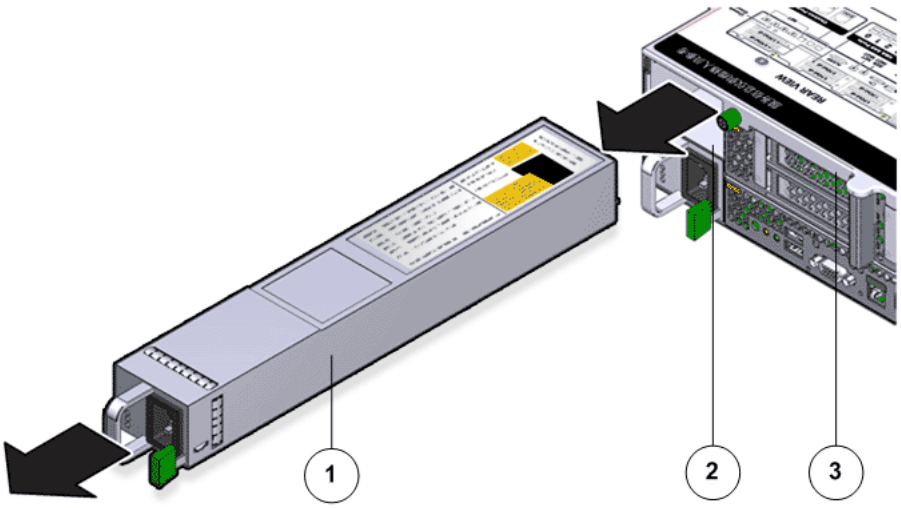
1 Remove the power supply by grasping the power supply handle and pushing the power supply latch to the left.

Figure 238: Replication Engine power supply latch



Legend		
	1 Power supply handle	3 Power supply
	2 Power supply latch	4 Replication Engine back

Figure 239: Remove power supply



Legend	1 Power supply
	2 Power supply compartment
	3 Replication Engine

2 If both power supplies must be removed, label the power supplies with the slot numbers from which they are removed.

Note: Removing both power supplies will result in the immediate powering off of the Replication Engine. Do not pull both power supplies from an active and running Replication Engine.

Note: The power supplies must be reinstalled into the same slots from which they were removed.

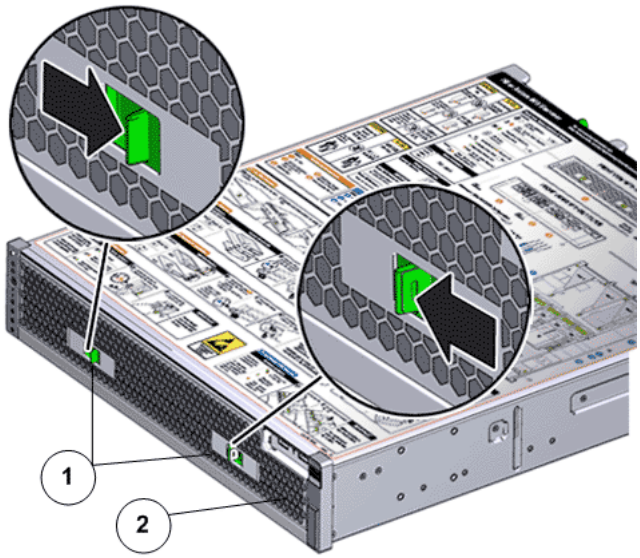
3 Pull the power supply out of the chassis and place it on an antistatic mat.

Remove an Air Filter

1 At the front of the Replication Engine chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 240: Air filter release tabs



Legend	1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

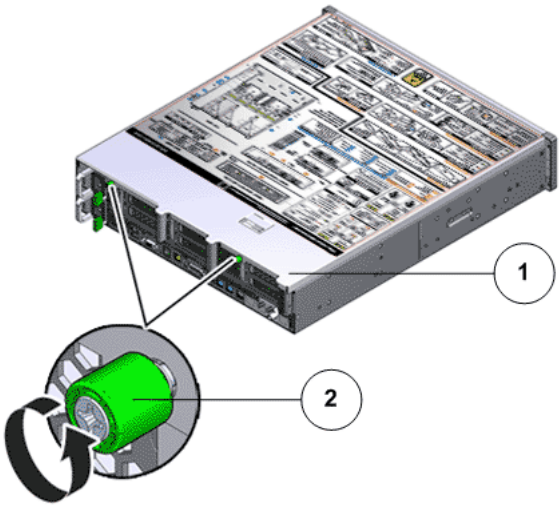
Figure 241: Remove air filter

4 Set the air filter aside.

Open the Replication Engine Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 242: Captive thumb screws to remove the top cover



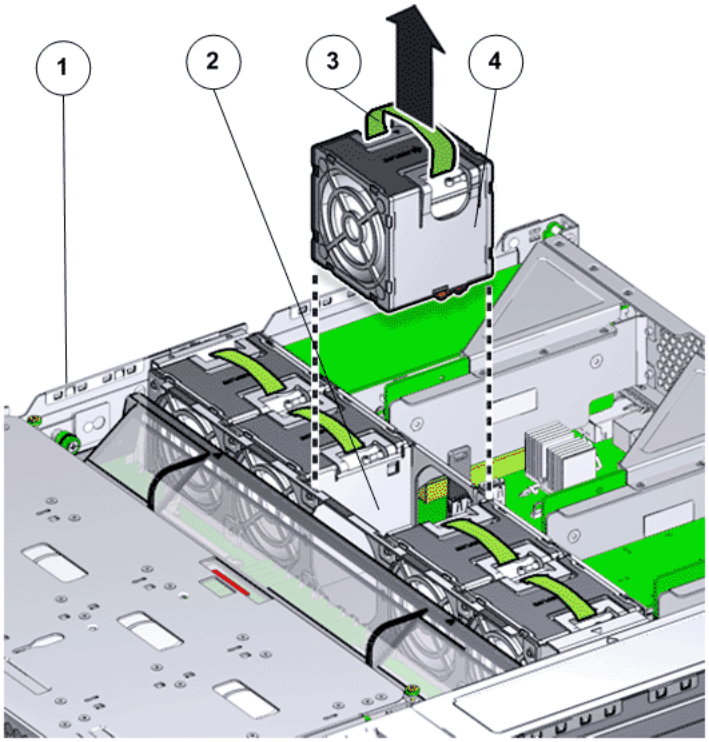
Legend	1 Replication Engine top cover
	2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Replication Engine chassis.

Remove a Fan Module

1 Using your thumb and forefinger, grasp the removal tab and gently lift the fan module from the fan compartment.

Figure 243: Remove fan module



Legend	1 Replication Engine chassis
	2 Fan compartment
	3 Removal tab
	4 Fan module

Note: Pulling the green tab from the middle releases the locking tab for each individual fan.

Note: When removing a fan module, do not rock it back and forth. Rocking the fan module can cause damage to the motherboard connectors.

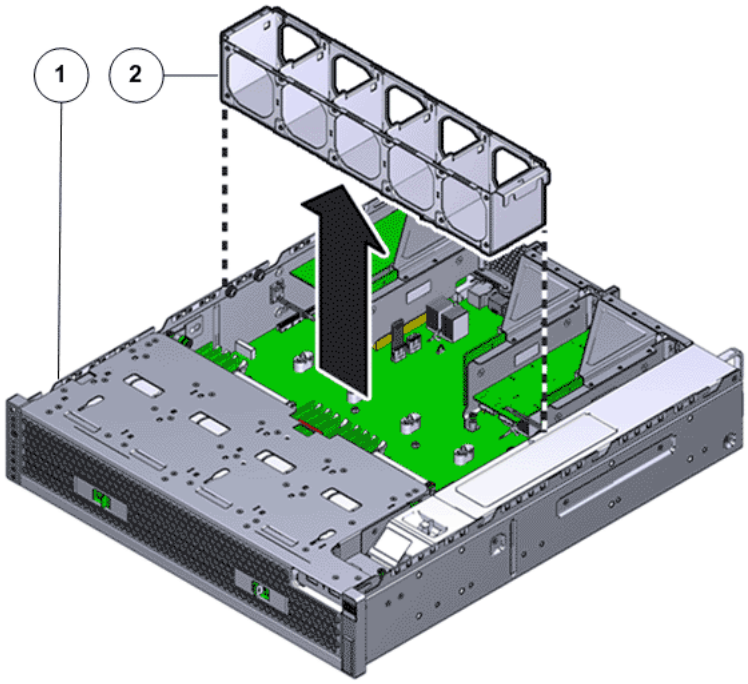
2 Set the fan module aside.

Note: The fan compartment might come out when the last fan module is removed.

Remove the Fan Compartment

1 Lift the fan compartment straight up and out of the Replication Engine chassis.

Figure 244: Remove fan compartment



Legend	1 Replication Engine chassis
	2 Fan compartment

Note: All fan modules must be removed from the fan compartment before removing the fan compartment.

2 Set the component aside.

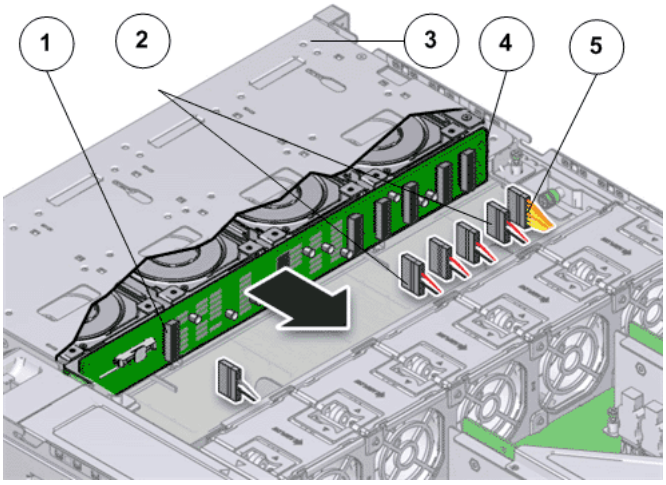
Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.

Cables that must be disconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 245: Cables connected to the backplane



Legend	
	1 SATA or drive cable
	2 NV-DIMM cables
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Replication Engine display panel.

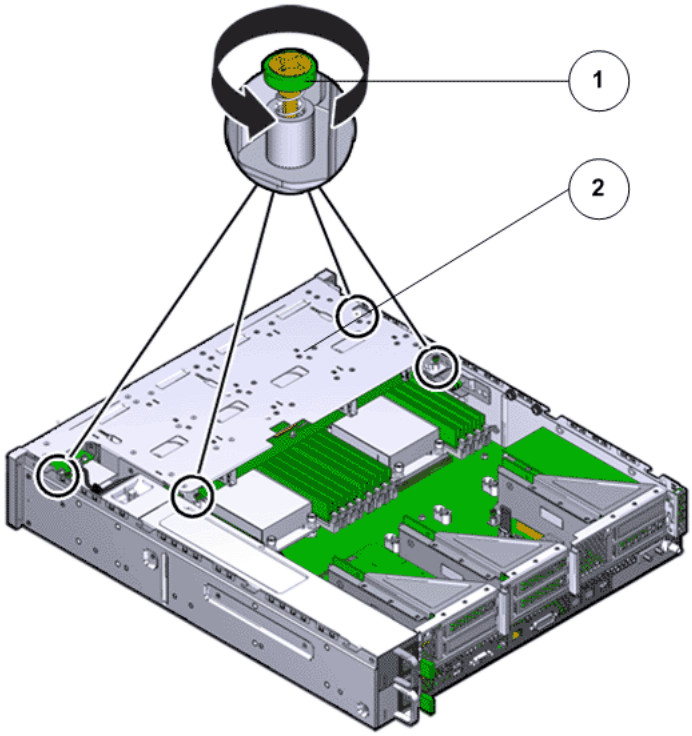
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 246: Disengaging the backplane

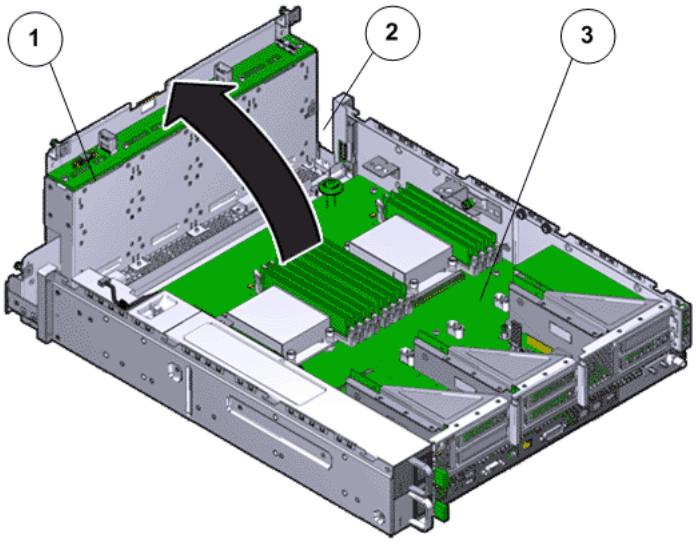


Legend	1 Thumb screws that secure the backplane
	2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Replication Engine.

3 Raise the backplane and drive compartment to the vertical position.

Figure 247: Drive compartment raised

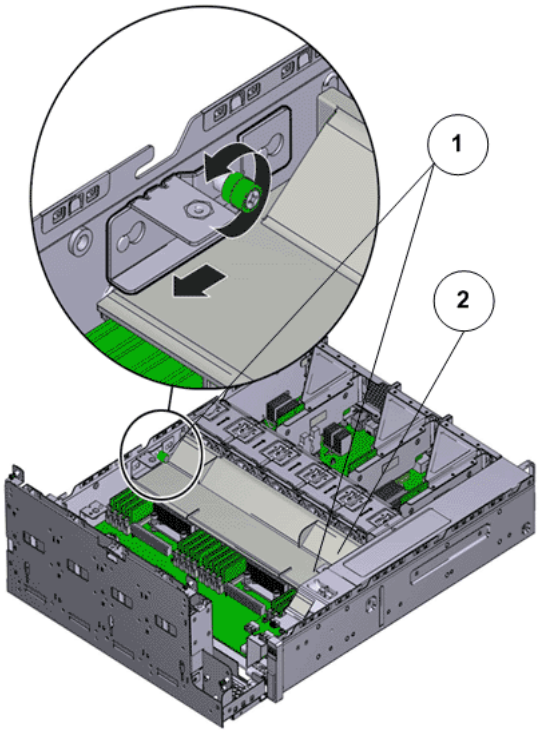


Legend	1 Backplane
	2 Drive compartment
	3 Replication Engine motherboard

Remove an Air Duct

1 Remove the air duct by loosening the two brackets and the Phillips Number 2 thumb screws on both sides of the air duct.

Figure 248: Remove air duct



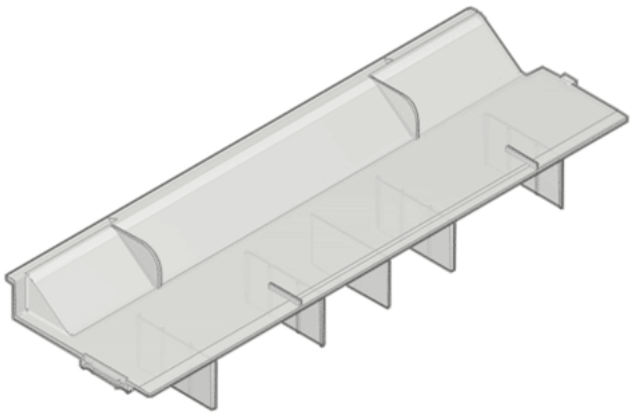
Legend	1 Screws that secure air duct
	2 Air duct

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward and the right bracket slides back when facing the Replication Engine in the service position.

2 Lift up the air duct from the Replication Engine chassis and set it aside.

The following figure shows a Replication Engine air duct:

Figure 249: Air duct



Remove a Riser

1 Disconnect any external cables that remain connected to the HBAs in the risers.

Note: Also disconnect any internal cables attached to the HBAs, if that will ease removing the HBA.

Tip: Make a note of the positions of all existing cable connections before removing any cables. Replacing HBAs or their cables into the incorrect position in the riser may result in a loss of performance or functionality.

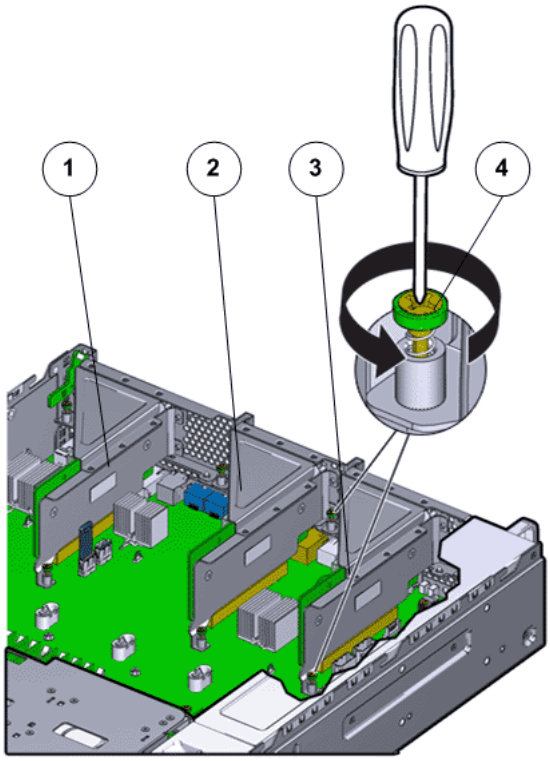
2 Note the position of the HBAs installed on the riser.

Tip: Make a note of the slot numbers of all existing HBAs before removing any HBAs.

3 Using a Phillips Number 2 screwdriver, loosen the two Phillips Number 2 captive screws on either side of the riser that hold the riser to the Replication Engine motherboard.

Note: The riser on the opposite end of the power supply has a latch that must be disengaged to remove the riser from the Replication Engine chassis

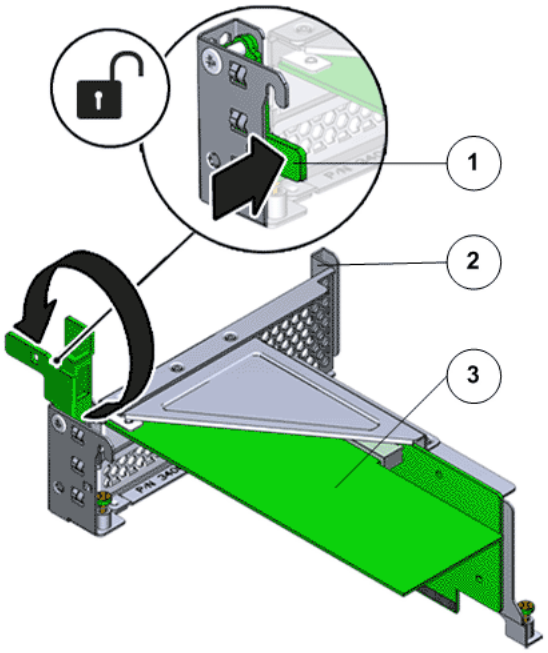
Figure 250: Captive screws to secure the risers



Legend		
	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws that secure riser

To remove riser 3, unlock the latch to release the riser from the Replication Engine motherboard.

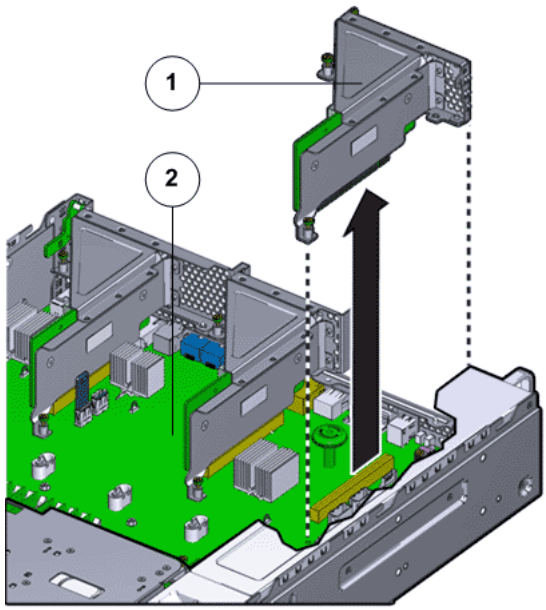
Figure 251: Unlock Riser 3 latch



Legend	1 Riser 3 latch	3 HBA
	2 Riser 3	

4 Carefully pull the riser straight up and place it aside.

Figure 252: Remove riser



Legend	1 Riser
	2 Replication Engine motherboard

Remove Motherboard Cables

1 Gently disconnect the motherboard cable from its connector.

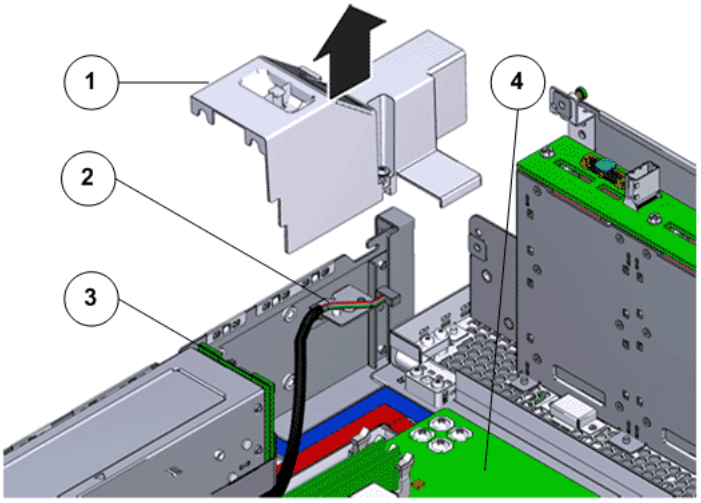
Note: Replacing a motherboard cable might require you to remove some components from the motherboard based on the location of the cable that you are replacing. Make sure that you have adequate access to the cable connectors while replacing the motherboard cable.

2 Set the cable aside on an antistatic mat.

Remove a Power Distribution Board (PDB)

1 Lift up the cover over the PDB by pressing the tabs on the cover and set the cover aside.

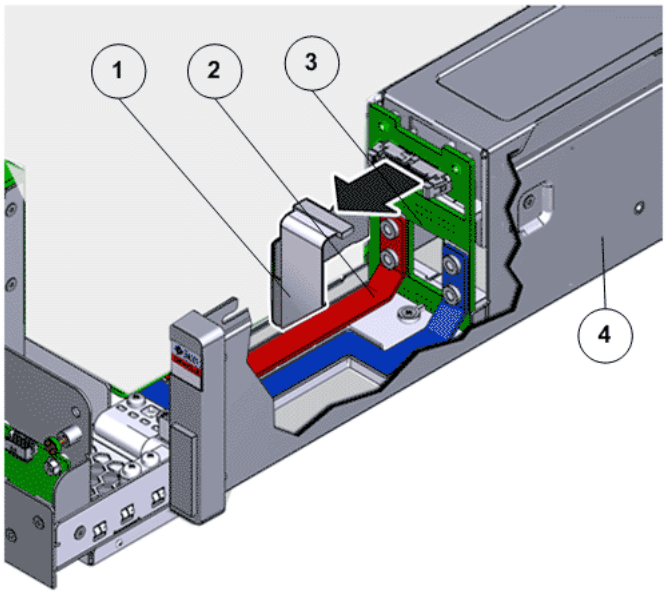
Figure 253: Remove PDB cover



Legend	
	1 PDB cover
	2 Power supply duct
	3 PDB board
	4 Replication Engine motherboard

Note: You must disconnect the PDB flat signal cable and the PSU duct when you lift up the PDB cover. The PDB signal cable might look slightly different from the one shown in the graphic.

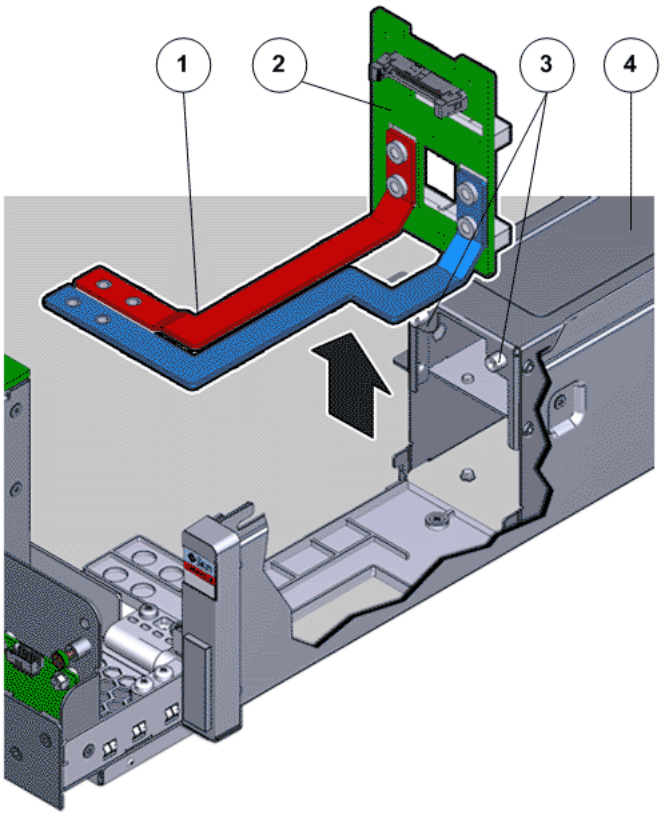
Figure 254: Disconnect PDB flat cable



Legend	1 PDB flat signal cable that connects the PDB to the motherboard
	2 PDB bus bars
	3 PDB
	4 PDB cage

2 Remove the two Phillips screws that secure the PDB to the PDB cage using a Phillips Number 2 screwdriver.

Figure 255: Remove PDB circuit board



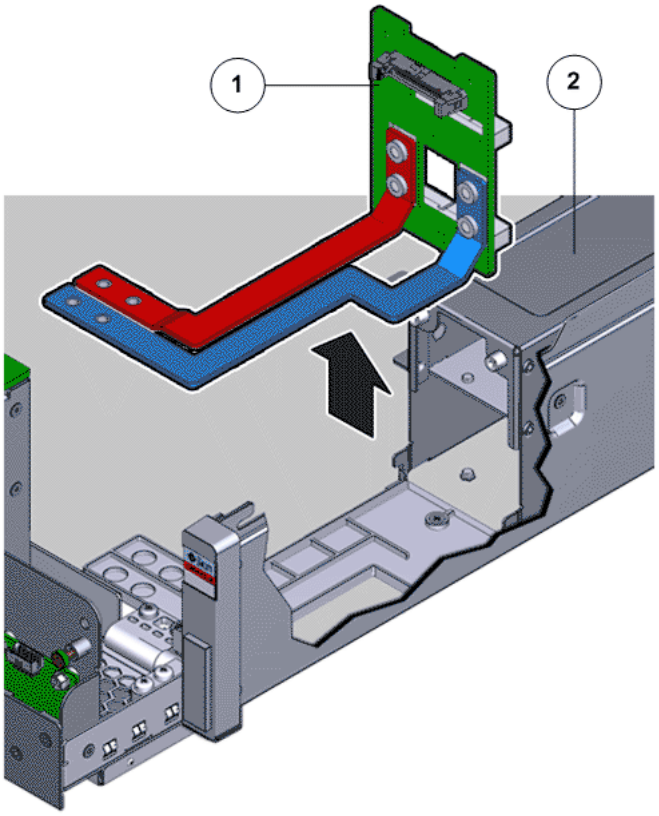
Legend	1 PDB bus bars
	2 PDB circuit board
	3 Phillips screws that secure the PDB to the PDB cage
	4 PDB cage

3 Lift the PDB assembly up and forward off of the alignment pins gently.

Note: Lifting or bending the motherboard while removing the PDB assembly can permanently damage the motherboard by breaking the CRUs or FRUs on the motherboard and the circuit traces on the motherboard.

4 Remove the PDB assembly and place the PDB assembly on an antistatic mat.

Figure 256: Remove PDB assembly



Legend	1 PDB circuit board
	2 PDB cage

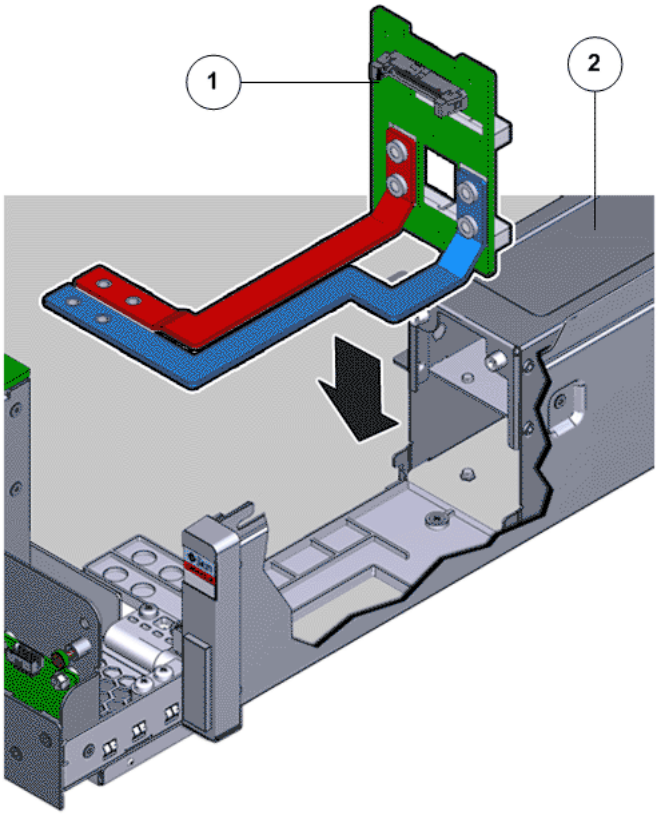
Insert a Power Distribution Board (PDB)

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Position the PDB to where it installs into the chassis.

Figure 257: PDB alignment



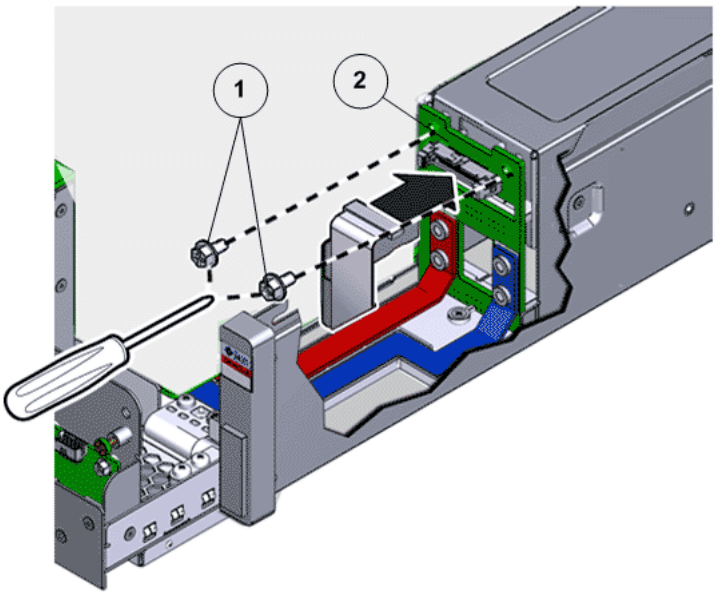
Legend	1 PDB circuit board
	2 PDB cage

Note: The bus bars are forward and down.

3 Place the bus bars into the channels, and move the PDB rearward and down onto the alignment pins.

4 Using a Phillips Number 2 screwdriver, loosely insert the four Phillips Number 2 screws that secure the PDB assembly onto the motherboard.

Figure 258: Insert PDB



Legend	1 Phillips screws that secure the PDB to the chassis
	2 PDB

5 Using a Torx Number 10 screwdriver, loosely insert the 10 Torx Number 10 screws that secure the motherboard to the Replication Engine chassis starting from one side.

6 Tighten all 10 Torx Number 10 screws and the four Phillips Number 2 screws in a diagonal pattern.

7 Insert and tighten the two finger screws on the motherboard to lock the motherboard inside the Replication Engine chassis.

Note: The two thumb screws on the motherboard secure the motherboard to the Replication Engine chassis along with ten Torx Number 10 screws.

Insert Components on the Replication Engine

Insert the necessary components on the Replication Engine following the procedures outlined below.

Some components had to be removed from the Replication Engine as a prerequisite for access while replacing the failed component. These components must be reinstalled after completing the replacement.

Insert Motherboard Cables

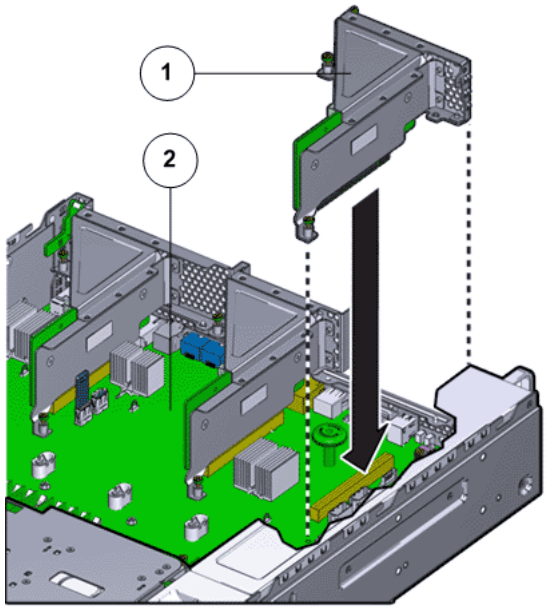
Gently reconnect the motherboard cable to its connectors at both ends.

Insert a Riser

1 Lower the riser onto the Replication Engine motherboard and press the riser edge connector securely into the socket.

Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

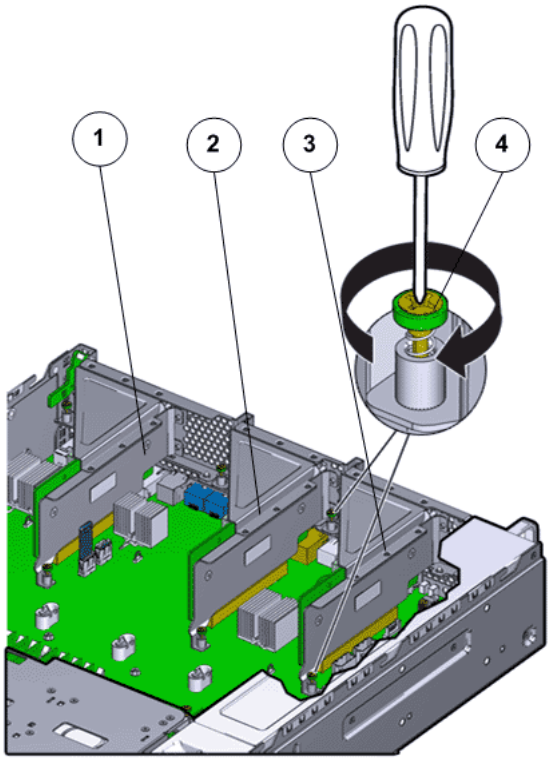
Figure 259: Insert riser



Legend	1 Riser
	2 Replication Engine motherboard

2 After the riser is seated properly inside the Replication Engine, tighten the two captive Phillips screws on both sides of the riser to secure the riser on the Replication Engine motherboard.

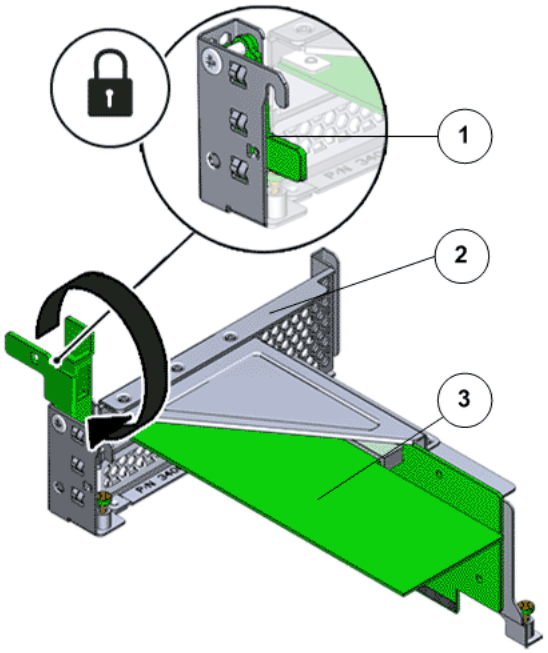
Figure 260: Captive screws to secure risers to the motherboard



Legend		
	1 Riser 3 with latch	3 Riser 1
	2 Riser 2	4 Captive screws

To install riser 3, lock the latch to secure the riser to the Replication Engine motherboard.

Figure 261: Riser 3 latch locked



Legend		
	1 Riser 3 latch	3 HBA
	2 Riser 3	

3 Reconnect any previously removed internal or external cables to any HBAs installed in the riser.

4 Repeat the above steps for any additional risers that you are installing.

Insert an Air Duct

Secure the air duct inside the Replication Engine by tightening the two Phillips Number 2 screws into position.

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward, the right bracket slides back when facing the Replication Engine in the service position.

Lower the Drive Compartment

1 Rotate the drive compartment and backplane back into position inside the Replication Engine and ensure that the alignment pins engage.

Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Replication Engine.

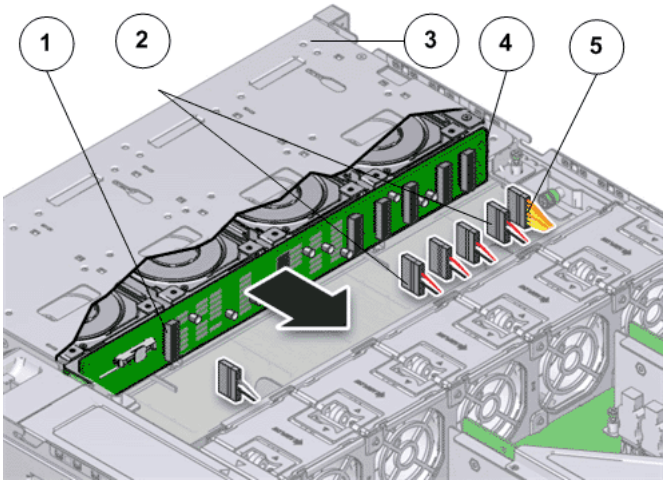
2 Secure the backplane inside the Replication Engine by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.

3 Reconnect all the cables that had been previously disconnected from the backplane.

Cables that must be reconnected include:

- SATA or drive cable
- Motherboard to HDD backplane cable

Figure 262: Reconnect cables to the backplane

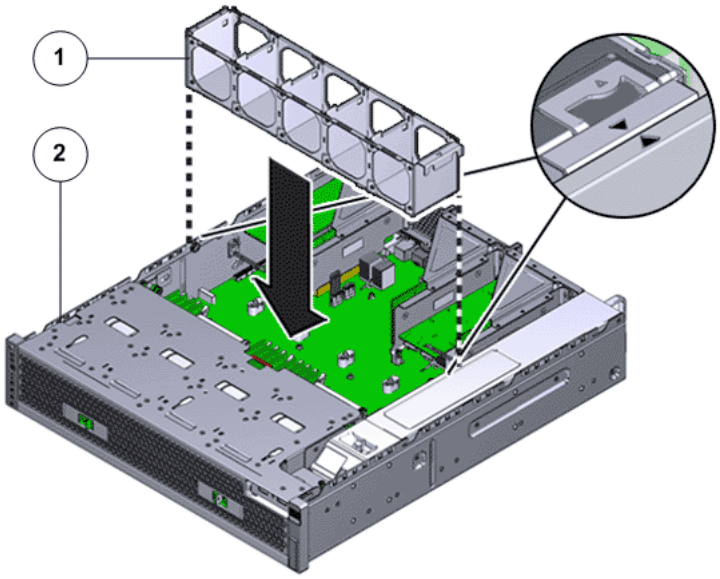


Legend	
	1 SATA or drive cable
	2 NV-DIMM cable
	3 Drive compartment
	4 Backplane boards
	5 Motherboard to HDD backplane cable

Insert the Fan Compartment

1. Move any loose cables so that they are against the Replication Engine chassis walls.
2. Align the fan compartment to where it installs into the Replication Engine chassis.

Figure 263: Insert the fan compartment



Legend	1 Fan compartment
	2 Replication Engine chassis

Note: The single arrow on the right end of the fan compartment aligns with the single arrow on the power supply bay.

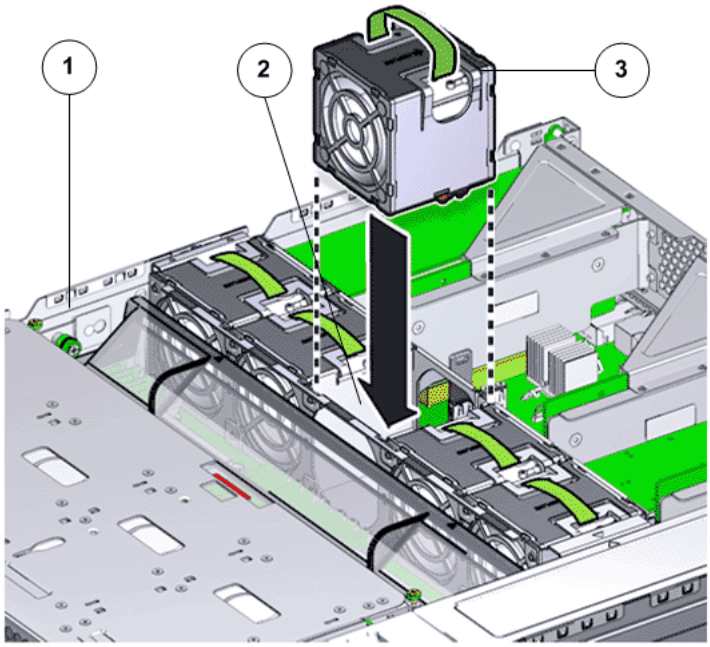
3 Slowly lower the fan compartment into the Replication Engine chassis, gently working the cables into the gaps between the fan compartment and the chassis walls.

4 Verify that the fan compartment is properly seated, no cables are pinched, and the top surfaces of the fan compartment are flush with the Replication Engine chassis.

Insert a Fan Module

Insert the replacement fan module into the Replication Engine.

Figure 264: Insert fan module



Legend	
	1 Replication Engine chassis
	2 Fan compartment
	3 Fan module

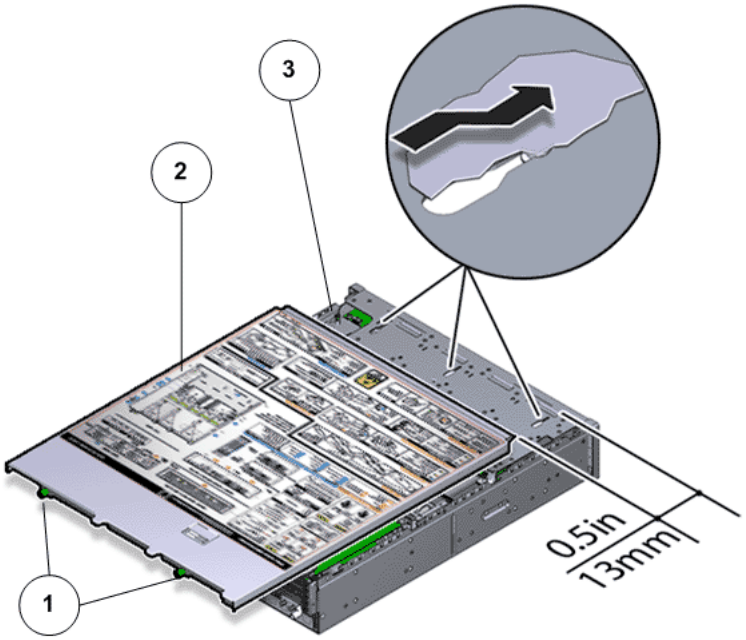
Note: Press down on the fan module and apply firm pressure to fully seat the fan module into the fan compartment. The fan modules are notched to ensure that they are installed in the correct orientation.

Note: Repeat for each additional fan module.

Close the Replication Engine Top Cover

Place the top cover of the Replication Engine and tighten the two thumb screws at the back of the Replication Engine that secure the top cover.

Figure 265: Close Replication Engine top cover



Legend	
	1 Thumb screws
	2 Replication Engine top cover
	3 Replication Engine

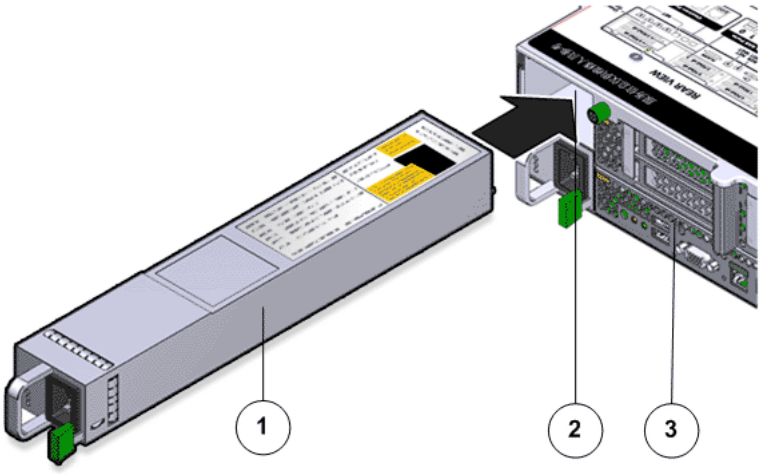
Insert a Power Supply

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Slide the replacement power supply into the power supply compartment at the back of the Replication Engine until it is fully seated.

Figure 266: Insert power supply



Legend	
	1 Power supply
	2 Power supply compartment
	3 Replication Engine chassis

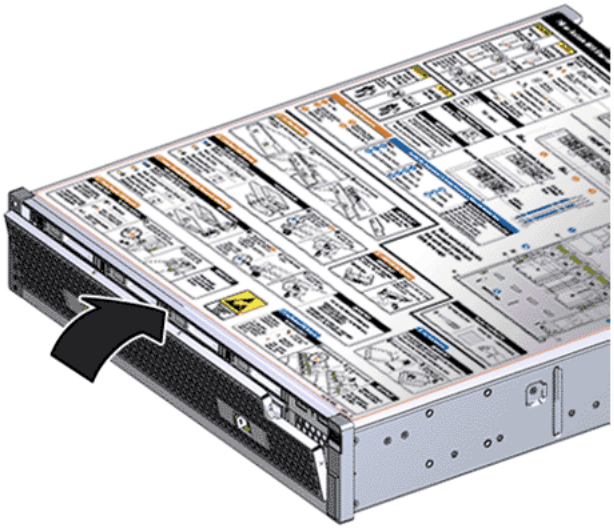
3 Listen for an audible click or feel the power supply engage to confirm that the power supply is properly seated.

Note: Repeat for each power supply. Also, replace the power supplies only into the slots from which they had been removed.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 267: Insert air filter



Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Insert the Replication Engine Onto the Rack

Insert the Replication Engine into the rack.

Inserting the Replication Engine onto the rack includes the following tasks:

1 Lift up the Replication Engine Onto the Rack

2 Slide the Replication Engine back into Rack position

3 Reconnect the Replication Engine cabling and the CMA

4 Power on the Replication Engine

5 Verify the Replication Engine component status

Insert Replication Engine Chassis Onto Rack

With the help of a partner or a mechanical lift, engage the Replication Engine with the rack rails.

Caution: Do not use the power supply handles to lift the Replication Engine. Using the power supply handles to lift the Replication Engine can damage the power supplies and disrupt electrical power to the Replication Engine.

Reconnect Replication Engine Cabling

1 Reconnect all the data cables on the Replication Engine.

Note: Oracle Customer Support recommends labeling all cables connected to the Replication Engine so that the cables can be reconnected accurately to the Replication Engine after the replacement procedure is complete.

2 Reconnect the CMA to the Replication Engine by attaching the release tab on the left and right side of the CMA.

Slide Replication Engine to Rack Position

Slide the Replication Engine back into the rack.

Note: You must release the rail locking mechanism to slide the Replication Engine chassis back into the rack.

APPENDIX A

Replication Engine Hardware Specifications

Replication Engine Hardware Specifications

The following tables provide information on the hardware specifications and the power characteristics of the Replication Engine.

Dimensions and Weight

Table 16: Replication Engine dimensions and weight

Attribute	Value
Height	3.43 in (8.71 cm)
Width	17.52 in (44.55 cm)
Depth	20.25 in (51.435 cm)
Weight	41 lb (18.59 kg)

Power Characteristics

Table 17: Replication Engine power characteristics

Power characteristic	Value
Frequency (nominal)	50–60 Hz (47–63 Hz range)
Voltage (nominal)	100 to 127/200 to 240 VAC
Input current (maximum)	6.8 A at 110 VAC (approximately) 3.4 A at 220 VAC (approximately)
Maximum power consumption	816 VAC
Maximum heat dissipation	2784 BTU/hr
AC receptacle type	IEC 60320 C14 Inlet

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