



# **Zenoss Resource Manager Installation Guide**

Release 5.2.3

Zenoss, Inc.

[www.zenoss.com](http://www.zenoss.com)

# Zenoss Resource Manager Installation Guide

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Part Number: 1052.17.100

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# About this guide

*Zenoss Resource Manager Installation Guide* provides detailed procedures for installing Zenoss Resource Manager (Resource Manager).

## Related Resource Manager publications

| Title   | Description  |
|---|--|
| <i>Zenoss Resource Manager Administration Guide</i> | Provides an overview of Resource Manager architecture and features, as well as procedures and examples to help use the system.               |
| <i>Zenoss Resource Manager Configuration Guide</i>  | Provides required and optional configuration procedures for Resource Manager, to prepare your deployment for monitoring in your environment. |
| <i>Zenoss Resource Manager Installation Guide</i>   | Provides detailed information and procedures for creating deployments of Control Center and Resource Manager.                                |
| <i>Zenoss Resource Manager Planning Guide</i>       | Provides both general and specific information for preparing to deploy Resource Manager.   |
| <i>Zenoss Resource Manager Release Notes</i>        | Describes known issues, fixed issues, and late-breaking information not already provided in the published documentation set.                 |
| <i>Zenoss Resource Manager Upgrade Guide</i>        | Provides detailed information and procedures for upgrading deployments of Resource Manager.  |

## Additional information and comments

If you have technical questions about this product that are not answered in this guide, please visit the [Zenoss Support](#) site or contact Zenoss Support.

Zenoss welcomes your comments and suggestions regarding our documentation. To share your comments, please send an email to [docs@zenoss.com](mailto:docs@zenoss.com). In the email, include the document title and part number. The part number appears at the end of the list of trademarks, at the front of this guide.

## Change history

The following list associates document part numbers and the important changes to this guide since the previous release. Some of the changes involve features or content, but others do not. For information about new or changed features, refer to the *Zenoss Resource Manager Release Notes*.

### 1052.17.100 (5.2.3)

- Add a chapter for high-availability installations.
- New procedures for installing the appliance with Hyper-V.
- Update release numbers.

### 1052.17.58 (5.2.2)

- Remove procedure for adding storage for backups (no longer required for appliances).

### 1052.17.044 (5.2.1)

- Update release numbers.

### **1052.16.335 (5.2.0)**

Add a section detailing the supported operating environments.

Remove procedures for installing Control Center clusters. That information is now in the *Control Center Installation Guide*.

Remove the high-availability chapters. High-availability installations are now performed by Zenoss personnel.

Remove the appliance installation chapters. The chapters will be replaced when the appliances are available.

The instructions for downloading and installing the software artifacts for offline deployments are now in an appendix.

### **1052.16.316**

Update release numbers.

### **1052.16.291**

Update release numbers.

### **1052.16.277**

Update release numbers.

### **1052.16.264**

Update release numbers.

### **1052.16.257**

Added supported operating environments and updated release numbers.

### **1052.16.207**

Update release numbers.

### **1052.16.176**

Update release numbers.

### **1052.16.153**

Update release numbers.

### **1052.16.146**

Update release numbers.

### **1052.16.125**

Refine the procedure for creating the application data thin pool.

### **1052.16.118**

Add support for Resource Manager 5.1.2.

Add a substep to create the docker override directory.

### **1052.16.111**

Add this document change history.

Add chapters describing how to install the Resource Manager appliance.

Chapters are organized into parts.

Docker configuration steps now add the storage driver flag (`-s devicemapper`) to the `/etc/sysconfig/docker` file.

Docker needs a longer startup timeout value, to work around a known Docker issue with the devicemapper driver. Docker configuration steps now include adding `TimeoutSec=300`.

Rather than editing `/lib/systemd/system/docker.service`, Docker configuration steps now include adding a `systemd` override file.

Add a symlink to `/tmp` in `/var/lib/docker`.

Update the commands for starting and testing a ZooKeeper ensemble.

Add a procedure for updating the *SERVICED\_ZK* value on delegate hosts that are not members of a ZooKeeper ensemble.

Add a reference topic for the ZooKeeper variables required on hosts in a Control Center cluster.

Add procedures for configuring an NTP server and clients for offline deployments.

Add step to install the Nmap Ncat package, which is used to check ZooKeeper ensemble status.

#### **1052.16.060**

Planning information is now in the *Zenoss Resource Manager Planning Guide*.

Information about how to start and configure Resource Manager is now in the *Zenoss Resource Manager Configuration Guide*.

New procedures are included, for installing without internet access, and for installing high-availability deployments.

# Supported operating environments

The Resource Manager application is deployed in and managed by Control Center. The supported operating environments of Resource Manager are the environments that Control Center supports at a given release. The following sections identify the supported operating environments of Resource Manager.

## Resource Manager, Control Center, and operating systems

The following table identifies the supported combinations of Resource Manager, Control Center, and operating system releases.

| Resource Manager Release      | Control Center                           |                                       |
|-------------------------------|--|---------------------------------------|
|                               | Release                                  | Host OS                               |
| 5.2.0, 5.2.1, 5.2.2, 5.2.3    | 1.2.0, 1.2.1, 1.2.2, 1.2.3, 1.3.0, 1.3.1 | RHEL/CentOS 7.1, 7.2, or 7.3 (64-bit) |
| 5.1.9, 5.1.10                 | 1.1.9, 1.2.0                             | RHEL/CentOS 7.1 or 7.2 (64-bit)       |
| 5.1.8                         | 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9        | RHEL/CentOS 7.1 or 7.2 (64-bit)       |
| 5.1.7                         | 1.1.5, 1.1.6, 1.1.7, 1.1.8               | RHEL/CentOS 7.1 or 7.2 (64-bit)       |
| 5.1.6 (internal release only) | (none)                                   | (none)                                |
| 5.1.4, 5.1.5                  | 1.1.5, 1.1.6, 1.1.7                      | RHEL/CentOS 7.1 or 7.2 (64-bit)       |
| 5.1.3                         | 1.1.2, 1.1.3, 1.1.5                      | RHEL/CentOS 7.1 or 7.2 (64-bit)       |
| 5.1.2                         | 1.1.2, 1.1.3                             | RHEL/CentOS 7.1 or 7.2 (64-bit)       |
| 5.1.1                         | 1.1.1, 1.1.2                             | RHEL/CentOS 7.1 or 7.2 (64-bit)       |

## Hypervisors

| Hypervisor        | Versions   |
|-------------------|--|
| VMware vSphere    | 5.0, 5.1, 5.5, 6.0                               |
| Microsoft Hyper-V | Version 2.0 with Windows Server 2008 R2 SP1      |
|                   | Version 3.0 with Windows Server 2012 and 2012 R2 |

## Public cloud platforms

Amazon Web Services (AWS) is fully supported.

Microsoft Azure is supported only for collector pools. Deploying a full Control Center cluster to operate Resource Manager is NOT supported on Microsoft Azure.

## Supported clients and browsers

Resource Manager supports the same client operating systems and web browsers that Control Center supports. For more information, refer to Control Center documentation.



## 1

# Installing Resource Manager

---

This chapter describes how to install Resource Manager on a Control Center cluster. For more information about creating a Control Center cluster, refer to the following documents:

- *Control Center Planning Guide*
- *Zenoss Resource Manager Planning Guide*
- *Control Center Installation Guide*

If you are installing on a Control Center cluster that does not have internet access, perform the procedures in [Preparing to install without internet access](#) on page 49, and then perform the procedures in this chapter.

## Installing the Resource Manager template

---

Use this procedure to install the Resource Manager service definition template on the Control Center master host.

If you are installing on a Control Center cluster that does not have internet access, perform the procedures in [Preparing to install without internet access](#) on page 49 and then perform this procedure.

- 1 Log in to the Control Center master host as `root`, or as a user with superuser privileges.
- 2 Install the Resource Manager template file.

**With internet access:**

```
yum --enablerepo=zenoss-stable install -y zenoss-resmgr-service-5.2.3
```

**Without internet access:**

```
yum install -y /tmp/zenoss-resmgr-service-5.2.3.noarch.rpm
```

The template file is stored in `/opt/serviced/templates`.

- 3 Authenticate to the Docker Hub repository.

Replace *User* with the name of your Docker Hub account.

```
docker login -u User
```

The `docker` service prompts you for the password of the Docker Hub account, and saves a hash of the credentials in the `$HOME/.docker/config.json` file (root user account).

## Optional: Importing Resource Manager images

---

Use this procedure to import the Resource Manager images into the local registry. This procedure is only required on a Control Center cluster that does not have internet access. For more information, see [Preparing to install without internet access](#) on page 49.

- 1 Log in to the Control Center master host as `root`, or as a user with superuser privileges.
- 2 Change directory to `/root`.

```
cd /root
```

- 3 Import the images.

The images are contained in self-extracting archive files.

```
for image in install-*.run
do
  echo -n "$image: "
  ./$image
done
```

Importing begins when you press the `y` key. If you press `y` and then press **Enter**, the current image is imported, but the next one is not.

- 4 List the images in the registry.

```
docker images
```

The result should include one image for each archive file.

- 5 Optional: Delete the archive files.

```
rm -i ./install-*.run
```

## Deploying Resource Manager

---

Use this procedure to add the Resource Manager application to Control Center, and to pull application images into the local registry.

- 1 Log in to the Control Center master host as a user with `serviced` CLI privileges.
- 2 Add the Resource Manager application template to Control Center.

```
serviced template add /opt/serviced/templates/zenoss*.json
```

On success, the `serviced` command returns the template ID.

- 3 Identify the resource pool to which the host belongs.

```
serviced host list
```

- 4 Deploy the application.

- Replace *Template-ID* with the identifier Resource Manager template
- Replace *Pool* with the name of the resource pool to which the master host belongs (single-host system) or to which the delegate hosts belong (multi-host system)

- Replace *Deployment* with a name for this deployment (for example, *Test* or *Production*)

```
serviced template deploy Template-ID Pool Deployment
```

Control Center pulls Resource Manager images into the local registry, or just tags the images.

Resource Manager is ready to be configured for your environment. For more information, refer to the *Zenoss Resource Manager Configuration Guide*.

# Installing Resource Manager in a high-availability cluster

# 2

This chapter describes how to install Resource Manager on a high-availability Control Center cluster. For more information about creating a high-availability Control Center cluster, refer to the *Control Center Installation Guide for High-Availability Deployments*.

---

**Note** Perform the procedures in [Preparing to install without internet access](#) on page 49 and then start the procedures in this chapter.

---

## Installing the Resource Manager template

---

Use this procedure to install the Resource Manager service definition template on a Control Center master host node. Perform this procedure on both master host nodes.

- 1 Log in to the Control Center master host as `root`, or as a user with superuser privileges.
- 2 Install the Resource Manager template file.

```
yum install -y /tmp/zenoss-resmgr-service-5.2.3.noarch.rpm
```

The template file is stored in `/opt/serviced/templates`.

## Importing Resource Manager images

---

Use this procedure to import the Resource Manager images into the local registry. Perform this procedure on both master host nodes.

- 1 Log in to the Control Center master host as `root`, or as a user with superuser privileges.
- 2 Change directory to `/root`.

```
cd /root
```

- 3 Import the images.

The images are contained in self-extracting archive files.

```
for image in install-*.run
do
    echo -n "$image: "
    ./$image
done
```

Importing begins when you press **y**. If you press **y** and then press **Enter**, the current image is imported, but the next one is not.

- 4 List the images in the registry.

```
docker images
```

The result should include one image for each archive file.

- 5 Optional: Delete the archive files.

```
rm -i ./install-*.run
```

## Deploying Resource Manager

---

Use this procedure to install the Resource Manager template and then deploy the application.

- 1 Use the virtual hostname (*HA-Virtual-Name*) or virtual IP address (*HA-Virtual-IP*) of the high-availability cluster to start a Bash shell on the Control Center master host as `root`, or as a user with superuser privileges.
- 2 Display the public hostname of the current node.

```
uname -n
```

The result is either *Primary-Public-Name* or *Secondary-Public-Name*.

- 3 Place the other node in standby mode.

This avoids potential conflicts and errors in the event of an unexpected `serviced` shutdown during the initial deployment.

Replace *Other-Node-Hostname* with the public hostname of the other node:

```
pcs cluster standby Other-Node-Hostname
```

- 4 Add the Resource Manager application template to Control Center.

```
serviced template add /opt/serviced/templates/zenoss*.json
```

On success, the `serviced` command returns the template ID.

- 5 Identify the resource pool to which the master host belongs.

```
serviced host list
```

- 6 Deploy the application.

- Replace *Template-ID* with the identifier Resource Manager template
- Replace *Pool* with the name of the resource pool to which the master host belongs (single-host system) or to which the delegate hosts belong (multi-host system)
- Replace *Deployment* with a name for this deployment (for example, `Test` or `Production`)

```
serviced template deploy Template-ID Pool Deployment
```

Control Center tags the Resource Manager images.

- 7 Restore the cluster.

Replace *Standby-Node-Hostname* with the public hostname of the node that is in standby mode:

```
pcs cluster unstandby Standby-Node-Hostname
```

Resource Manager is ready to be configured for your environment. For more information, refer to the *Zenoss Resource Manager Configuration Guide*.

---

**Note** In high-availability deployments, the **mariadb-events** and **mariadb-model** services must be in the same resource pool as the master host nodes. A procedure for moving the services from their default pool is provided in the *Zenoss Resource Manager Configuration Guide*.

---

# Part I: Appliance deployments

The chapters in this part describe how to install the Resource Manager appliance, a pre-configured virtual machine that is ready to deploy to your hypervisor. The instructions include a variety of options for customizing your deployment for your environment.

## 3

## Installing a Control Center master host

---

This chapter describes how to install a Resource Manager appliance package as a Control Center master host.

The procedures in this chapter configure a Control Center master host that functions as both master and delegate. Perform the procedures in this chapter whether you are configuring a single-host or a multi-host deployment. (For more information about configuring a multi-host deployment, see [Configuring a multi-host cluster](#).)

### Creating a virtual machine

---

You can create a virtual machine for the Resource Manager appliance with VMware vSphere or Microsoft Hyper-V. Choose one of the procedures in this section.

#### Creating a virtual machine with vSphere

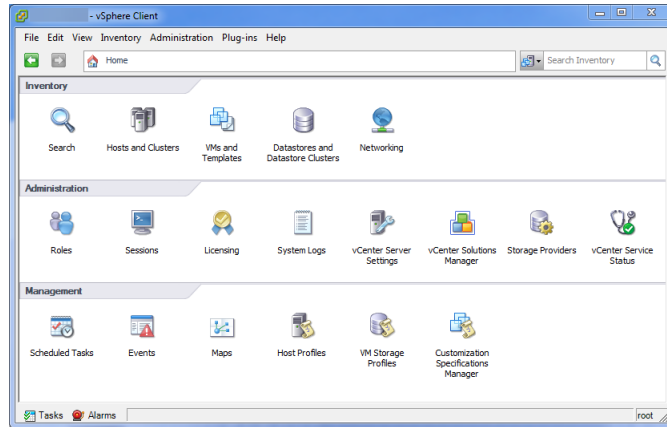
To perform this task, you need:

- A VMware vSphere client
- Permission to download Resource Manager software from the [Zenoss Support](#) site

This procedure installs Resource Manager master OVA packages as a virtual machine managed by vSphere Server version 5.5.0, using VMware vSphere Client 5.5.0. The procedure is slightly different with different versions of VMware vSphere Client. There are two separate OVA packages, one for the master host and one for delegates.

- 1 Download the Resource Manager master host OVA file from the [Zenoss Support](#) site to your workstation.
- 2 Use the VMware vSphere Client to log in to vCenter as `root`, or as a user with superuser privileges, and then display the **Home** view.



**Figure 1:** vSphere client Home view

- 3 From the **File** menu, select **Deploy OVF Template**.
- 4 In the **Source** panel, specify the path of the Resource Manager master package, and then click **Next**.
- 5 In the **OVF Template Details** panel, click **Next**.
- 6 In the **Name and Location** panel, provide a name and a location for the server.
  - a In the **Name** field, enter a new name or use the default.
  - b In the **Inventory Location** area, select a data center for the virtual machine.
  - c Click **Next**.
- 7 In the **Host / Cluster** panel, select a host system, and then click **Next**.
- 8 In the **Storage** panel, select a storage system with sufficient space for your deployment, and then click **Next**.
- 9 In the **Disk Format** panel, select **Thin Provision**, and then click **Next**.
- 10 In the **Ready to Complete** panel, review the deployment settings, and then click **Finish**.  
Do not check **Power on after deployment**.
- 11 Navigate to the new virtual machine's **Getting Started** or **Summary** tab, and then click **Edit virtual machine settings**.
- 12 Optional: Update the memory assigned to the machine.
  - a In the **Virtual Machine Properties** dialog box, select **Memory** in the **Hardware** table.
  - b In the **Memory Configuration** area, set the **Memory Size** field to 16GB (multi-host deployments) or 32GB (single-host deployments).  
For single-host deployments, you can assign a greater amount of RAM.
- 13 Optional: Update the number of CPU sockets assigned to the machine, if desired.  
Only 4 CPUs are needed for multi-host deployments.
  - a In the **Virtual Machine Properties** dialog box, select **CPUs** in the **Hardware** table.
  - b Set the **Number of virtual sockets** field to 4 (multi-host deployments), and set the **Number of cores per socket** field to 1.
- 14 At the bottom of the **Virtual Machine Properties** dialog box, click **OK**.
- 15 On the new virtual machine's **Getting Started** tab, click **Power on virtual machine**, and then click the **Console** tab.

## Creating a virtual machine with Hyper-V

To perform this task, you need:

- A Microsoft Remote Desktop Connection
- Administrator privileges on a Microsoft Hyper-V server
- Permission to download Resource Manager software from the [Zenoss Support](#) site

This procedure installs the Resource Manager appliance as a virtual machine managed by Microsoft Hyper-V. There are separate ISO files for the master host and delegates.

In this procedure, you download and install the master ISO file. A separate procedure provides instructions for installing delegates.

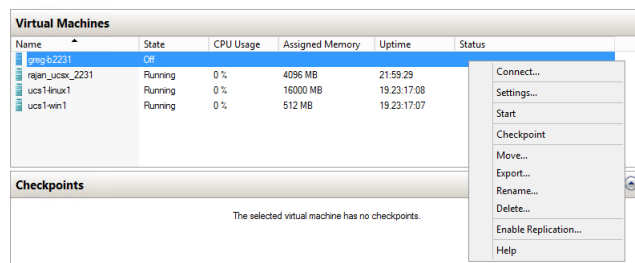
- 1 Use a Microsoft Remote Desktop Connection to log in to a Hyper-V host as Administrator, or as a user with Administrator privileges.
- 2 Download the Resource Manager ISO file from the [Zenoss Support](#) site to the Hyper-V host.  
Choose the master ISO file.
- 3 Open **Hyper-V Manager**.
- 4 In the left navigation pane, choose a server to host the virtual machine.
- 5 From the **Actions** pane, choose **New > Virtual Machine**.
- 6 In the **Specify Name and Location** panel, provide a name for the virtual machine, and then click **Next**.
- 7 In the **Specify Generation** panel, select **Generation 1**, and then click **Next**.
- 8 In the **Assign Memory** panel, specify memory information as follows:
  - a In **Startup memory**:
    - For multi-host deployments, enter 16384 (16GB).
    - For single-host deployments, enter 32768 (32GB).
  - b Check **Use Dynamic Memory for this virtual machine**.
  - c Click **Next**.
- 9 In the **Configure Networking** panel's **Connection** field, choose a virtual switch, and then click **Next**.
- 10 In the **Connect Virtual Hard Disk** panel, create a new disk on which to install the guest operating system, as follows:
  - a Choose **Create a virtual hard disk**.
  - b Specify a name.
  - c In the **Size** field, enter 30.
  - d Click **Next**.

In a later step, you will create additional disks.
- 11 In the **Installation Options** panel, access the ISO file as follows:
  - a Choose **Install an operating system from a bootable CD/DVD-ROM**.
  - b Choose **Image file (.iso)**.
  - c Specify or browse to the location of the ISO image file.  
Choose the master ISO file.
  - d Click **Next**.
- 12 In the **Summary** panel, review the description, and then click **Finish**.  
Hyper-V Manager creates the new virtual machine, and then closes the **New Virtual Machine Wizard**.
- 13 In the Hyper-V Manager **Virtual Machines** area, choose the new virtual machine, right-click, and then choose **Settings**.
- 14 In the **Hardware** area of the **Settings** window, configure as follows:
  - a Ensure that the virtual hard disk that you created is attached to an IDE controller.  
A Hyper-V guest machine can only boot from an IDE drive.
  - b Choose **Processor**.
  - c In **Number of virtual processors**, enter the following value for your deployment type:
    - Multi-host deployment: 4
    - Single-host deployment: 8
  - d Click **Apply**.
- 15 Create additional virtual hard disks as follows:

- a In the **Hardware** area of the **Settings** window, choose any controller and location that will accommodate the disk.
  - b In the controller area on the right, choose **Hard Drive**, and then click **Add**.
  - c In the **Hard Drive** area, choose **Virtual hard disk**, and then click **New**.
  - d In the **New Virtual Hard Disk Wizard**:
    - 1 Navigate to the **Choose Disk Format** panel.
    - 2 Choose **VHDX**.
    - 3 Click **Next**.
  - e In the **Choose Disk Type** panel, choose **Dynamically expanding**, and then click **Next**.
  - f In the **Specify Name and Location** panel, enter the disk name, and then click **Next**.
  - g In the **Configure Disk** panel:
    - 1 Choose **Create a new blank virtual hard disk**.
    - 2 In the **Size** field, enter 50.
    - 3 Click **Next**.
  - h In the Summary panel, verify the description, and then click **Finish**.
  - i In the **Settings** window, click **Apply**.
  - j Repeat these substeps to create virtual hard disks sized as follows:
    - 150GB
    - 50GB
    - 200GB
    - 16GB
    - 16GB

When viewed from the Linux system, the disks might be reordered; however, the installation is not affected by disk order.
  - k In the **Settings** dialog box, click **Apply**, and then click **OK**.
- 16 In the Hyper-V Manager **Virtual Machines** area, choose the new virtual machine, right-click, and then choose **Start**.

**Figure 2:** Starting a virtual machine



- 17 In the Hyper-V Manager **Virtual Machines** area, choose the new virtual machine, and then right-click, and then choose **Connect**.
- 18 In the **Virtual Machine Connection** window, press **Enter**.
 

The appliance installation process takes about 15 minutes, and should complete with no additional input. Disregard the Fast TSC calibration failure message.

## Configuring the Control Center host

Perform this procedure immediately after creating and starting a Control Center host. All Control Center deployments must include one system configured as the master host.

- 1 Gain access to the console interface of the Control Center host through your hypervisor console interface.

**Figure 3:** Initial hypervisor console login prompt

```

Welcome to Zenoss Service Dynamics

After initial setup, the Control Center UI can be accessed by
browsing to:

https://zsd-master
(default username/password is ccuser/zsd)

Ensure that zsd-master is resolvable to 10.88.121.246, either through your
DNS system or through a HOSTS entry on the browser client. For more
information refer to the installation notes.

You can log in to this console to perform administrative tasks such
as setting up networking and safely rebooting this system. The
root password defaults to 'zsd'

Linux Kernel 3.10.0-514.2.2.el7.x86_64 on an x86_64
zsd-master login: _

```

- 2 Log in as the `root` user.  
The initial password is provided in the console.
- 3 The system prompts you to enter a new password for `root`.

---

**Note** Passwords must include a minimum of eight characters, with at least one character from three of the following character classes: uppercase letter, lowercase letter, digit, and special.

---

- 4 The system prompts you to enter a new password for `ccuser`.  
The `ccuser` account is the default account for gaining access to the Control Center browser interface.

## Edit a connection

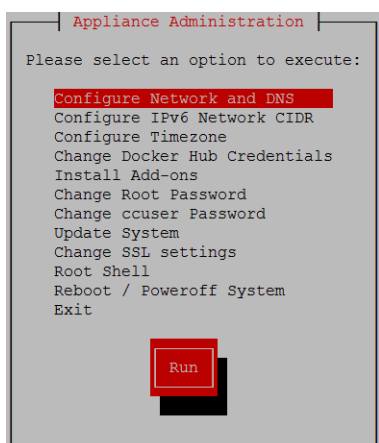
---

The default configuration for network connections is DHCP. To configure static IPv4 addressing, perform this procedure.

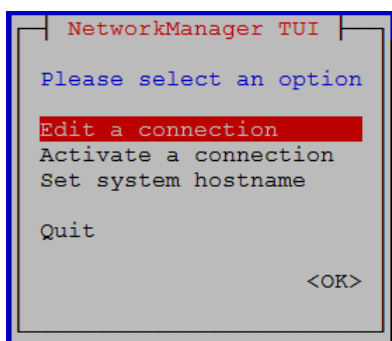
To navigate in the text user interface (TUI):

- To move forward or backward through options, press the arrow keys or press **Tab** or **Shift+Tab**.
- To display a menu or choose an option, press **Enter**.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Log in as the `root` user.

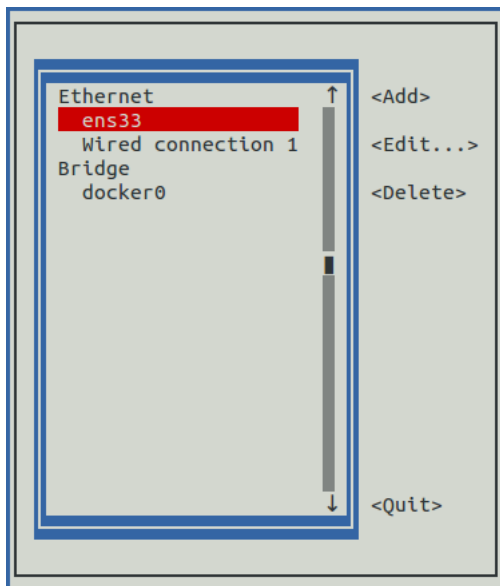


- 3 Select the **NetworkManager TUI** menu as follows:
  - a In the **Appliance Administration** menu, select **Configure Network and DNS**, and then press **Enter**.



- 4 On the **NetworkManager TUI** menu, select **Edit a connection**, and then press **Enter**. The TUI displays the connections that are available on this host.

**Figure 4:** Example: Available connections

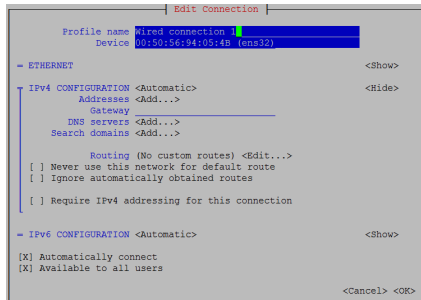



---

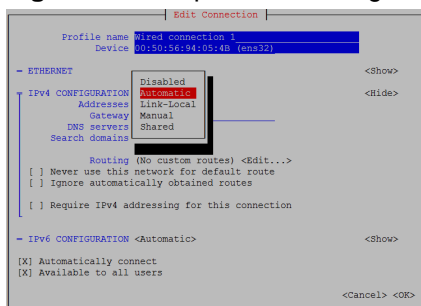
**Note** Do not modify the `docker0` connection.

---

- 5 Select the virtual connection, and then press **Enter**.

**Figure 5:** Example: Edit Connection screen

- 6 Optional: If the **IPv4 CONFIGURATION** area is not visible, select its display option (**<Show>**), and then press **Enter**.
- 7 In the **IPv4 CONFIGURATION** area, select **<Automatic>**, and then press **Enter**.

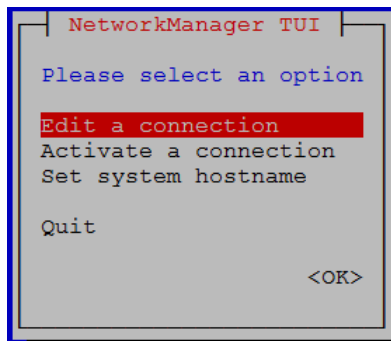
**Figure 6:** Example: IPv4 Configuration options

- 8 Configure static IPv4 networking as follows:
  - a Select **Manual**, and then press **Enter**.
  - b Select **<Add>** next to **Addresses**, and then press **Enter**.
  - c In the **Addresses** field, enter an IPv4 address for the virtual machine, and then press **Enter**.
  - d Repeat the preceding two steps for the **Gateway** and **DNS servers** fields.
- 9 Select **<OK>** at the bottom of the **Edit Connection** screen, and then press **Enter**.
- 10 On the **NetworkManager TUI** screen, use the **Tab** key to select the **<Quit>** option, and then press the **Return** key to go back to the **Appliance Administration** menu.
- 11 Reboot the operating system as follows:
  - a In the **Appliance Administration** menu, select **Reboot / Poweroff System**.
  - b Select **Reboot**.
  - c Select **OK**, and then press **Enter**.

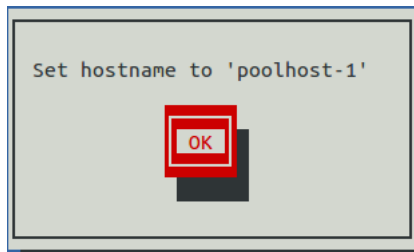
## Set system hostname

The default hostname is `zsd-master` for the Resource Manager master host and is `zsd-delegate` for the Resource Manager delegate host. To change the default hostname, perform this procedure.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Select the **NetworkManager TUI** menu as follows:
  - a In the **Appliance Administration** menu, select **Configure Network and DNS**, and then press **Enter**.



- 3 Display the hostname entry field.
  - a In the **NetworkManager TUI** menu, select **Set system hostname**.
  - b Press **Tab** to select **OK**, and then press **Enter**.
- 4 In the **Hostname** field, enter the hostname or a fully qualified domain name.
- 5 Press **Tab** twice to select **OK**, and then press **Enter**.



- 6 In the confirmation dialog box, press **Enter**.
- 7 Reboot the operating system as follows:
  - a In the **Appliance Administration** menu, select **Reboot / Poweroff System**.
  - b Select **Reboot**.
  - c Select **OK**, and then press **Enter**.

## Adding the master host to a resource pool

This procedure adds the Control Center master host to the `default` resource pool, or to a new resource pool, named `master`.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Start a command-line session as `root` as follows:
  - a In the **Appliance Administration** menu, select **Root Shell**.
  - b Select **Run**, and then press **Enter**.

The menu is replaced by a command prompt similar to the following example:

```
[root@hostname ~]#
```

- 3 Optional: Create a new resource pool, if necessary.
  - For single-host deployments, skip this step.
  - For multi-host deployments with at least two delegate hosts, perform this step.

```
serviced pool add master
```

- 4 Add the master host to a resource pool.

- For single-host deployments, add the master host to the `default` resource pool.
- For multi-host deployments with at least two delegate hosts, add the master host to the `master` resource pool.

Replace *Hostname-Or-IP* with the hostname or IP address of the Control Center master host, and replace *Resource-Pool* with `default` or `master`:

```
serviced host add Hostname-Or-IP:4979 Resource-Pool
```

If you enter a hostname, all hosts in your Control Center cluster must be able to resolve the name, either through an entry in `/etc/hosts`, or through a nameserver on your network.

## Deploying Resource Manager

---

This procedure adds the Resource Manager application to the list of applications that Control Center manages.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Start a command-line session as `root` as follows:
  - a In the **Appliance Administration** menu, select **Root Shell**.
  - b Select **Run**, and then press **Enter**.

The menu is replaced by a command prompt similar to the following example:

```
[root@hostname ~]#
```

- 3 Add the `zenoss.resmgr` application to Control Center.

```
myPath=/opt/serviced/templates
serviced template add $myPath/zenoss-resmgr-*.json
```

On success, the `serviced` command returns the template ID.

- 4 Deploy the application.

Replace *Template-ID* with the template identifier returned in the previous step, and replace *Deployment-ID* with a name for this deployment (for example, `Dev` or `Test`):

```
serviced template deploy Template-ID default Deployment-ID
```

Control Center tags Resource Manager images in the local registry.

If you are installing a single-host deployment, proceed to the *Zenoss Resource Manager Configuration Guide*.



## 4

# Installing delegate hosts

This chapter describes how to install appliance-based delegates. You can add as many delegates as you need to a Control Center cluster.

## Creating a virtual machine

You can create a virtual machine for the Resource Manager delegate appliance with VMware vSphere or Microsoft Hyper-V. Choose one of the procedures in this section.

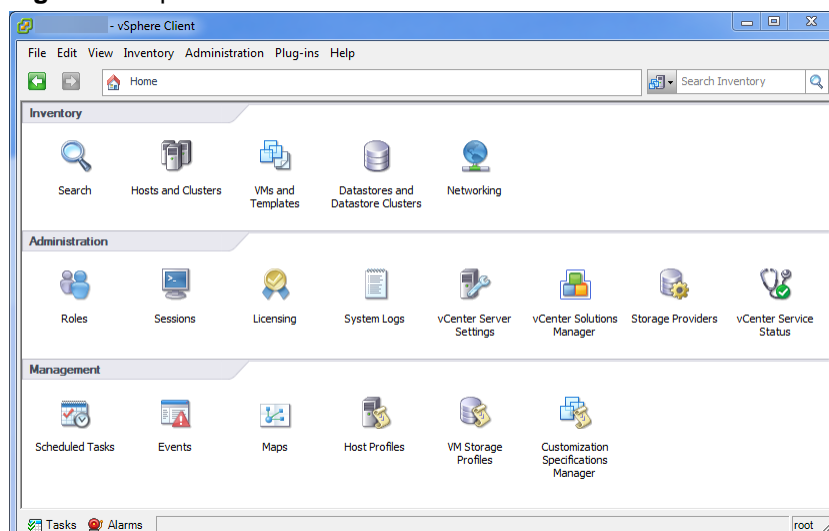
### Creating a virtual machine with vSphere

To perform this task, you need a VMware vSphere client.

This procedure installs the Resource Manager delegate OVA package as a virtual machine managed by vSphere Server version 5.5.0, using VMware vSphere Client 5.5.0. The procedure is slightly different with different versions of VMware vSphere Client.

- 1 Download the Resource Manager delegate OVA file from the [Zenoss Support](#) site to your workstation, if necessary.
- 2 Use the VMware vSphere Client to log in to vCenter as `root`, or as a user with superuser privileges, and then display the **Home** view.

**Figure 7:** vSphere client Home view



- 3 From the **File** menu, select **Deploy OVF Template**.
- 4 In the **Source** panel, specify the path of the Resource Manager package, and then click **Next**.
- 5 In the **OVF Template Details** panel, click **Next**.
- 6 In the **Name and Location** panel, provide a name and a location for the server. as follows, and then click **Next**.
  - a In the **Name** field, enter a new name.
  - b In the **Inventory Location** area, select a data center for the virtual machine.
- 7 In the **Host / Cluster** panel, select a host system, and then click **Next**.
- 8 In the **Storage** panel, select a storage system with sufficient space for the virtual machine, and then click **Next**.
- 9 In the **Disk Format** panel, select **Thin Provison**, and then click **Next**.
- 10 In the **Ready to Complete** panel, review the deployment settings, and then click **Finish**.  
Do not check **Power on after deployment**.
- 11 Navigate to the new virtual machine's **Getting Started** or **Summary** tab, and then click **Edit virtual machine settings**.
- 12 Update the memory assigned to the machine as follows:
  - a In the **Virtual Machine Properties** dialog box, select **Memory** in the **Hardware** table.
  - b In the **Memory Configuration** area, set the **Memory Size** field to 32GB.
  - c At the bottom of the **Virtual Machine Properties** dialog box, click **OK**.
- 13 On the new virtual machine's **Getting Started** tab, click **Power on virtual machine**.

## Creating a virtual machine with Hyper-V

To perform this task, you need:

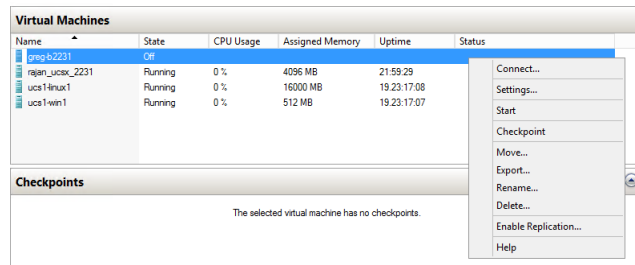
- A Microsoft Remote Desktop Connection
- Administrator privileges on a Microsoft Hyper-V server
- Permission to download Resource Manager software from the [Zenoss Support](#) site

This procedure installs the Resource Manager appliance as a virtual machine managed by Microsoft Hyper-V. There are separate ISO files for the master host and delegates.

In this procedure, you download and install the delegate ISO file. A separate procedure provides instructions for installing the master.

- 1 Use a Microsoft Remote Desktop Connection to log in to a Hyper-V host as Administrator, or as a user with Administrator privileges.
- 2 Download the Resource Manager ISO file from the [Zenoss Support](#) site to the Hyper-V host.  
Choose the delegate ISO file.
- 3 Open **Hyper-V Manager**.
- 4 In the left navigation pane, choose a server to host the virtual machine.
- 5 From the **Actions** pane, choose **New > Virtual Machine**.
- 6 In the **Specify Name and Location** panel, provide a name for the virtual machine, and then click **Next**.
- 7 In the **Specify Generation** panel, select **Generation 1**, and then click **Next**.
- 8 In the **Assign Memory** panel, specify memory information as follows:
  - a In **Startup memory**, enter 32768 (32GB).
  - b Check **Use Dynamic Memory for this virtual machine**.
  - c Click **Next**.
- 9 In the **Configure Networking** panel's **Connection** field, choose a virtual switch, and then click **Next**.
- 10 In the **Connect Virtual Hard Disk** panel, create a new disk on which to install the guest operating system, as follows:
  - a Choose **Create a virtual hard disk**.

- b Specify a name.
  - c In the **Size** field, enter 30.
- In a later step, you will create additional disks.
- 11 In the **Installation Options** panel, access the ISO file as follows:
    - a Choose **Install an operating system from a bootable CD/DVD-ROM**.
    - b Choose **Image file (.iso)**.
    - c Specify or browse to the location of the ISO image file.  
Choose the delegate ISO file.
    - d Click **Next**.
  - 12 In the **Summary** panel, review the description, and then click **Finish**.  
Hyper-V Manager creates the new virtual machine, and then closes the **New Virtual Machine Wizard**.
  - 13 In the Hyper-V Manager **Virtual Machines** area, choose the new virtual machine, right-click, and then choose **Settings**.
  - 14 In the **Hardware** area of the **Settings** window, configure as follows:
    - a Ensure that the virtual hard disk that you created is attached to an IDE controller.  
A Hyper-V guest machine can only boot from an IDE drive.
    - b Choose **Processor**.
    - c In **Number of virtual processors**, enter 8, and then click **Apply**.
  - 15 Create additional virtual hard disks as follows:
    - a In the **Hardware** area of the **Settings** window, choose any controller and location that will accommodate the disk.
    - b In the **Hard Drive** area, choose **Virtual hard disk**, and then click **New**.
    - c In the **New Virtual Hard Disk Wizard**:
      - 1 Navigate to the **Choose Disk Format** panel.
      - 2 Choose **VHDX**.
      - 3 Click **Next**.
    - d In the **Choose Disk Type** panel, choose **Dynamically expanding**, and then click **Next**.
    - e In the **Specify Name and Location** panel, enter the disk name, and then click **Next**.
    - f In the **Configure Disk** panel:
      - 1 Choose **Create a new blank virtual hard disk**.
      - 2 In the **Size** field, enter 50.
      - 3 Click **Next**.
    - g In the **Settings** window, click **Apply**.
    - h Repeat these substeps to create two more 16GB virtual hard disks.  
When viewed from the Linux system, the disks might be reordered; however, the installation is not affected by disk order.
    - i In the **Settings** dialog box, click **Apply**, and then click **OK**.
  - 16 In the Hyper-V Manager **Virtual Machines** area, choose the new virtual machine, right-click, and then choose **Start**.

**Figure 8:** Starting a virtual machine

17 In the Hyper-V Manager **Virtual Machines** area, choose the new virtual machine, and then right-click, and then choose **Connect**.

18 In the **Virtual Machine Connection** window, press **Enter**.

The appliance installation process takes about 15 minutes, and should complete with no additional input. Disregard the Fast TSC calibration failure message.

## Configuring the virtual machine

This procedure configures the new virtual machine as a delegate host.

- 1 Gain access to the console interface of the Control Center host through your hypervisor console interface.

**Figure 9:** Initial hypervisor console login prompt

```

Welcome to Zenoss Service Dynamics

After initial setup, the Control Center UI can be accessed by
browsing to:

  https://zsd-delegate
  (default username/password is ccuser/zsd)

Ensure that zsd-delegate is resolvable to 10.88.121.230, either through your
DNS system or through a HOSTS entry on the browser client. For more
information refer to the installation notes.

You can log in to this console to perform administrative tasks such
as setting up networking and safely rebooting this system. The
root password defaults to 'zsd'

Linux Kernel 3.10.0-514.2.2.el7.x86_64 on an x86_64
zsd-delegate login: _

```

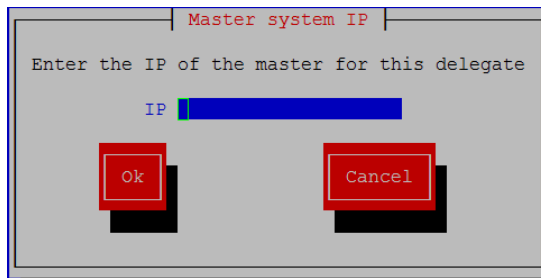
- 2 Log in as the `root` user.  
The initial password is provided in the console.
- 3 The system prompts you to enter a new password for `root`.

---

**Note** Passwords must include a minimum of eight characters, with at least one character from three of the following character classes: uppercase letter, lowercase letter, digit, and special.

---

- 4 The system prompts you to enter a new password for `ccuser`.  
The `ccuser` account is the default account for gaining access to the Control Center browser interface.
- 5 In the **IP** field, enter the hostname, fully qualified domain name, or IPv4 address of the master host.



**Note** If you enter the hostname or fully qualified domain name of the master host, you need an entry in the `/etc/hosts` file of the delegate host, or a nameserver on your network, that resolves the name to its IPv4 address.

- a Press **Tab** to select **Ok**, and then press **Enter**.  
The system reboots.

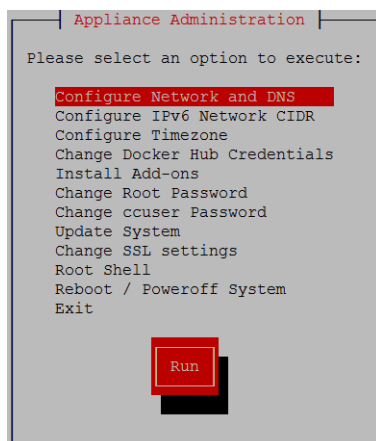
## Edit a connection

The default configuration for network connections is DHCP. To configure static IPv4 addressing, perform this procedure.

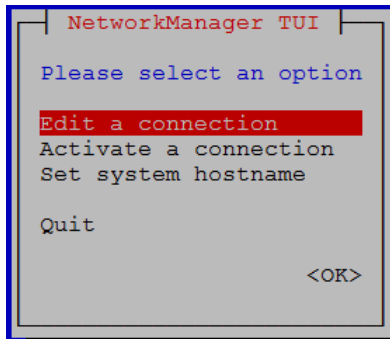
To navigate in the text user interface (TUI):

- To move forward or backward through options, press the arrow keys or press **Tab** or **Shift+Tab**.
- To display a menu or choose an option, press **Enter**.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Log in as the `root` user.

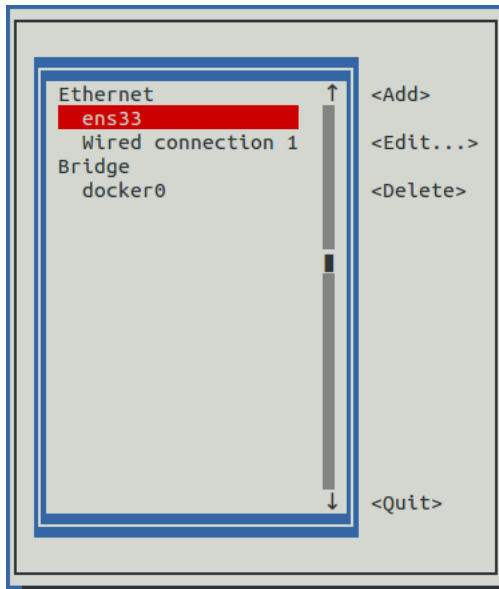


- 3 Select the **NetworkManager** TUI menu as follows:
  - a In the **Appliance Administration** menu, select **Configure Network and DNS**, and then press **Enter**.



- 4 On the **NetworkManager TUI** menu, select **Edit a connection**, and then press **Enter**. The TUI displays the connections that are available on this host.

**Figure 10:** Example: Available connections



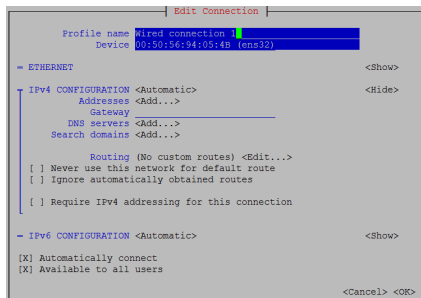

---

**Note** Do not modify the `docker0` connection.

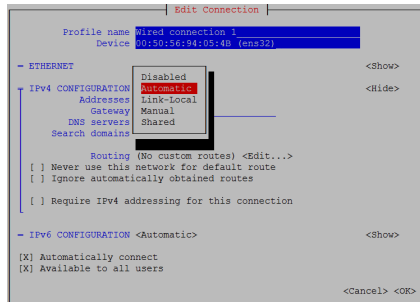
---

- 5 Select the virtual connection, and then press **Enter**.

**Figure 11:** Example: Edit Connection screen



- 6 Optional: If the **IPv4 CONFIGURATION** area is not visible, select its display option (**<Show>**), and then press **Enter**.
- 7 In the **IPv4 CONFIGURATION** area, select **<Automatic>**, and then press **Enter**.

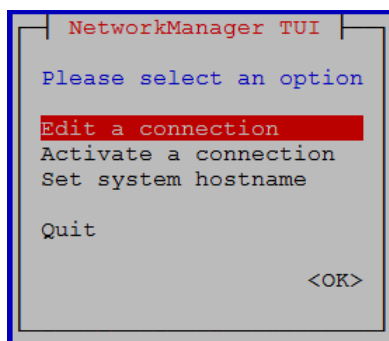
**Figure 12:** Example: IPv4 Configuration options

- 8 Configure static IPv4 networking as follows:
  - a Select **Manual**, and then press **Enter**.
  - b Select **<Add>** next to **Addresses**, and then press **Enter**.
  - c In the **Addresses** field, enter an IPv4 address for the virtual machine, and then press **Enter**.
  - d Repeat the preceding two steps for the **Gateway** and **DNS servers** fields.
- 9 Select **<OK>** at the bottom of the **Edit Connection** screen, and then press **Enter**.
- 10 On the **NetworkManager TUI** screen, use the **Tab** key to select the **<Quit>** option, and then press the **Return** key to go back to the **Appliance Administration** menu.
- 11 Reboot the operating system as follows:
  - a In the **Appliance Administration** menu, select **Reboot / Poweroff System**.
  - b Select **Reboot**.
  - c Select **OK**, and then press **Enter**.

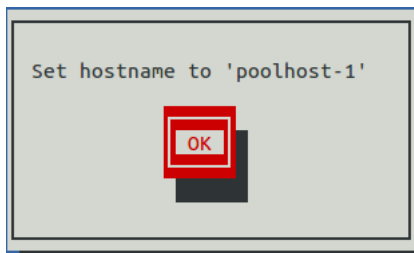
## Set system hostname

The default hostname is `zsd-master` for the Resource Manager master host and is `zsd-delegate` for the Resource Manager delegate host. To change the default hostname, perform this procedure.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Select the **NetworkManager TUI** menu as follows:
  - a In the **Appliance Administration** menu, select **Configure Network and DNS**, and then press **Enter**.



- 3 Display the hostname entry field.
  - a In the **NetworkManager TUI** menu, select **Set system hostname**.
  - b Press **Tab** to select **OK**, and then press **Enter**.
- 4 In the **Hostname** field, enter the hostname or a fully qualified domain name.
- 5 Press **Tab** twice to select **OK**, and then press **Enter**.



- 6 In the confirmation dialog box, press **Enter**.
- 7 Reboot the operating system as follows:
  - a In the **Appliance Administration** menu, select **Reboot / Poweroff System**.
  - b Select **Reboot**.
  - c Select **OK**, and then press **Enter**.

## Editing the `/etc/hosts` file

This procedure is optional. Perform this procedure only if you use hostnames or fully qualified domain names instead of IPv4 addresses, and only after all delegate hosts are installed and renamed. Perform this procedure on the Control Center master host and on each delegate host.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Start a command-line session as `root` as follows:
  - a In the **Appliance Administration** menu, select **Root Shell**.
  - b Select **Run**, and then press **Enter**.

The menu is replaced by a command prompt similar to the following example:

```
[root@hostname ~]#
```

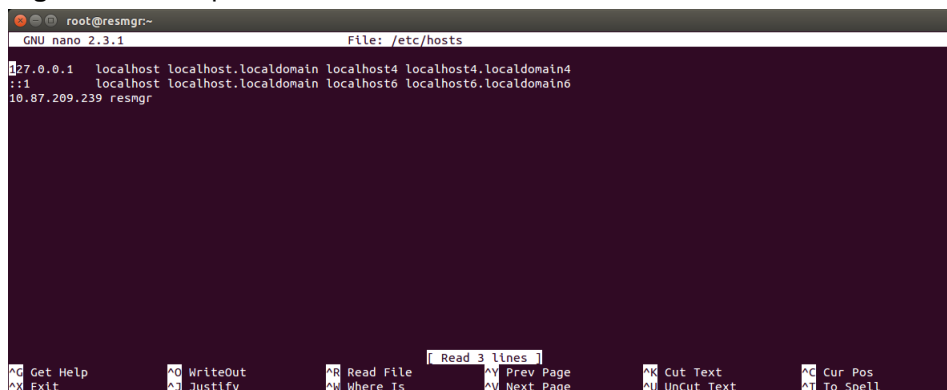
- 3 Open the `/etc/hosts` file in a text editor.

The following steps use the *nano* editor.

- a Start the editor.

```
nano /etc/hosts
```

**Figure 13:** Example nano session



Use the up-arrow and down-arrow keys to select lines, and the right-arrow and left-arrow keys to select characters on a line.



- b** Optional: On delegate hosts, the file might include two entries with the same IP address. Remove the first of the two entries, which maps the IP address to the `zsd-master` hostname.
- c** Add entries for the Control Center master host and for each delegate host.
- d** Save the file and exit the editor.

To save, press **Control-o**. To exit, press **Control-x**.

- 4** Return to the **Appliance Administration** menu.

```
exit
```

- 5** Exit the **Appliance Administration** menu.
  - a** Use the down-arrow key to select **Exit**.
  - b** Press **Tab**, and then press **Enter**.

# Configuring a multi-host Control Center cluster

# 5

This chapter describes how to configure an appliance-based multi-host Control Center cluster. A multi-host Resource Manager deployment includes one Control Center master host and one or more delegate hosts. Zenoss recommends deploying at least two delegate hosts, to enable creating a ZooKeeper ensemble.

| Task                                       | Procedure  |
|--|--|
| Install a master host                      | <a href="#">Installing a Control Center master host</a> on page 16   |
| Install delegate hosts                     | <a href="#">Installing delegate hosts</a> on page 25                 |
| Add delegate hosts to the cluster          | <a href="#">Adding hosts to the default resource pool</a> on page 38 |
| Create a ZooKeeper ensemble                | <a href="#">Configuring a ZooKeeper ensemble</a> on page 39          |
| Create a private NTP server (Hyper-V only) | <a href="#">Enabling NTP on Microsoft Hyper-V guests</a> on page 34  |
| Add delegate hosts to the cluster          | <a href="#">Adding hosts to the default resource pool</a> on page 38 |

## Enabling NTP on Microsoft Hyper-V guests

**Note** The procedures in this section are required only for multi-host deployments running as Microsoft Hyper-V guests. VMware vSphere guests use an hourly `cron` job to synchronize their system clocks with the host.

Like most distributed applications, Control Center requires a common time source. The procedures in this section enable [NTP](#) to synchronize the system clocks of all hosts in your Control Center cluster.

Configure NTP to rely on a time source as follows, depending on internet access of the hosts in your Control Center cluster:

- If all hosts can access the internet, configure NTP to rely on public time servers.
- If no host can access the internet, configure NTP to rely on a private master server.

### Configuring NTP for public time servers

(*Hyper-V only*) This procedure uses the default configuration of NTP to synchronize system clocks with public time servers. If all hosts in the Control Center cluster can access the internet, repeat this procedure on each host in the cluster, starting with the Control Center master host.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Start a command-line session as `root` as follows:
  - a In the **Appliance Administration** menu, select **Root Shell**.
  - b Select **Run**, and then press **Enter**.
 The menu is replaced by a command prompt similar to the following example:

```
[root@hostname ~]#
```

- 3 Stop Control Center.

```
systemctl stop serviced
```

- 4 Synchronize the system clock and enable the NTP daemon.

- a Set the system time.

```
ntpdate -gq
```

- b Enable the `ntpd` daemon.

```
systemctl enable ntpd
```

- c Configure `ntpd` to start when the system starts.

Currently, an unresolved issue associated with NTP prevents `ntpd` from restarting correctly after a reboot, and the following commands provide a workaround to ensure that it does.

```
echo "systemctl start ntpd" >> /etc/rc.d/rc.local
chmod +x /etc/rc.d/rc.local
```

- d Start `ntpd`.

```
systemctl start ntpd
```

- 5 Start Control Center.

```
systemctl start serviced
```

## Configuring an NTP master server

*(Hyper-V only)* This procedure configures an NTP master server on the Control Center master host. Perform this procedure only if the host does not have internet access.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Start a command-line session as `root` as follows:
  - a In the **Appliance Administration** menu, select **Root Shell**.
  - b Select **Run**, and then press **Enter**.
 The menu is replaced by a command prompt similar to the following example:

```
[root@hostname ~]#
```

- 3 Create a backup of the NTP configuration file.

```
cp -p /etc/ntp.conf /etc/ntp.conf.orig
```

- 4 Edit the NTP configuration file as follows:

- a Open `/etc/ntp.conf` with a text editor.  
b Replace all lines in the file with the following lines:

```
# Use the local clock
server 127.127.1.0 prefer
fudge 127.127.1.0 stratum 10
driftfile /var/lib/ntp/drift
broadcastdelay 0.008

# Give localhost full access rights
restrict 127.0.0.1

# Grant access to client hosts
restrict ADDRESS_RANGE mask NETMASK nomodify notrap
```

- c Replace `ADDRESS_RANGE` with the range of IPv4 network addresses that are allowed to query this NTP server.

For example, the following IP addresses are assigned to the hosts in a Control Center cluster:

```
203.0.113.10
203.0.113.11
203.0.113.12
203.0.113.13
```

For the preceding addresses, the value for `ADDRESS_RANGE` is `203.0.113.0`.

- d Replace `NETMASK` with the IPv4 network mask that corresponds with the address range.  
For example, the network mask for `203.0.113.0` is `255.255.255.0`.  
e Save the file and exit the editor.

- 5 Stop Control Center.

```
systemctl stop serviced
```

- 6 Enable and start the NTP daemon as follows:

- a Enable the `ntpd` daemon.

```
systemctl enable ntpd
```

- b Configure `ntpd` to start when the system starts.

Currently, an unresolved issue associated with NTP prevents `ntpd` from restarting correctly after a reboot, and the following commands provide a workaround to ensure that it does.

```
echo "systemctl start ntpd" >> /etc/rc.d/rc.local
chmod +x /etc/rc.d/rc.local
```

- c Start `ntpd`.

```
systemctl start ntpd
```

## 7 Start Control Center.

```
systemctl start serviced
```

## Configuring NTP clients

(*Hyper-V only*) This procedure configures delegates to synchronize their clocks with the NTP server on the Control Center master host. Perform this procedure only if the delegates do not have internet access. Repeat this procedure on each delegate in your Control Center cluster.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Start a command-line session as `root` as follows:

- a In the **Appliance Administration** menu, select **Root Shell**.
- b Select **Run**, and then press **Enter**.

The menu is replaced by a command prompt similar to the following example:

```
[root@hostname ~]#
```

- 3 Create a backup of the NTP configuration file.

```
cp -p /etc/ntp.conf /etc/ntp.conf.orig
```

- 4 Edit the NTP configuration file as follows:

- a Open `/etc/ntp.conf` with a text editor.
- b Replace all lines in the file with the following lines:

```
# Point to the master time server
server MASTER_ADDRESS

restrict default ignore
restrict 127.0.0.1
restrict MASTER_ADDRESS mask 255.255.255.255 nomodify notrap noquery

driftfile /var/lib/ntp/drift
```

- c Replace both instances of `MASTER_ADDRESS` with the IPv4 address of the host where the NTP server is running (the Control Center master host).
- d Save the file and exit the editor.
- 5 Stop Control Center.

```
systemctl stop serviced
```

- 6 Synchronize the clock with the master server.

```
ntpdate -gq
```

- 7 Enable and start the NTP daemon as follows:

- a Enable the `ntpd` daemon.

```
systemctl enable ntpd
```

- b Configure `ntpd` to start when the system starts.

Currently, an unresolved issue associated with NTP prevents `ntpd` from restarting correctly after a reboot, and the following commands provide a workaround to ensure that it does.

```
echo "systemctl start ntpd" >> /etc/rc.d/rc.local
chmod +x /etc/rc.d/rc.local
```

- c Start `ntpd`.

```
systemctl start ntpd
```

- 8 Start Control Center.

```
systemctl start serviced
```

## Adding hosts to the default resource pool

---

This procedure adds one or more hosts to the default resource pool.

- 1 Gain access to the Control Center host, through the console interface of your hypervisor, or through a remote shell utility such as *PuTTY*.
- 2 Start a command-line session as `root` as follows:
  - a In the **Appliance Administration** menu, select **Root Shell**.
  - b Select **Run**, and then press **Enter**.

The menu is replaced by a command prompt similar to the following example:

```
[root@hostname ~]#
```

- 3 Add and register a delegate host.

Replace *Hostname-Or-IP* with the hostname or IP address of the delegate host to add and include the register flag to authenticate the delegate host:

```
serviced host add Hostname-Or-IP:4979 default --register
```

If you enter a hostname, all hosts in your Control Center cluster must be able to resolve the name through an entry in `/etc/hosts` or through a nameserver on your network.

- 4 Repeat the preceding command for each delegate in your Control Center cluster.

## 6

## Configuring a ZooKeeper ensemble

---

This chapter describes how to create a ZooKeeper ensemble (cluster) for a multi-host Control Center deployment that includes a minimum of three hosts. If your deployment includes just one host or two hosts, skip this chapter.

### ZooKeeper and Control Center

---

Control Center relies on *Apache ZooKeeper* to distribute and manage application services. ZooKeeper maintains the definitions of each service and the list of services assigned to each host. The scheduler, which runs on the master host, determines assignments and sends them to the ZooKeeper node that is serving as the ensemble leader. The leader replicates the assignments to the other ensemble nodes, so that the other nodes can assume the role of leader if the leader node fails.

All of the hosts in a Control Center cluster retrieve assignments and service definitions from the ZooKeeper ensemble leader and then start services in Docker containers as required. So, the Control Center configuration files of all Control Center cluster hosts must include a definition for the `SERVICED_ZK` variable, which specifies the ZooKeeper endpoints of the ensemble nodes. Additional variables are required on ensemble nodes.

A ZooKeeper ensemble requires a minimum of three nodes, which is sufficient for most environments. An odd number of nodes is recommended and an even number of nodes is strongly discouraged. A five-node ensemble improves failover protection during maintenance windows but larger ensembles yield no benefits.

The Control Center master host is always an ensemble node. All ensemble nodes should be on the same subnet.

### Understanding the configuration process

---

The procedures in this chapter instruct you to create temporary variables that are used as building blocks, to construct Control Center configuration variables accurately. You append the Control Center variables to `/etc/default/serviced`, and then edit the file to move the variables to more appropriate locations.

The most important temporary variables specify the IP address or hostname of each host in the ZooKeeper ensemble. The following table identifies these important variables, the names and values of which must be identical on every Control Center cluster host.

| Variable name | Placeholder value | Actual value                                   |
|---------------|-------------------|--|
| node1         | <i>Master</i>     | The IP address or hostname of the master host. |
| node2         | <i>Delegate-A</i> | The IP address or hostname of delegate host A. |

| Variable name | Placeholder value | Actual value                                   |
|---------------|-------------------|--|
| node3         | <i>Delegate-B</i> | The IP address or hostname of delegate host B. |

**Note** All ensemble hosts should be on the same subnet.

## ZooKeeper variables

The variables in the following table are set only on ZooKeeper ensemble nodes, except *SERVICED\_ZK*, which must be identical on all Control Center cluster hosts.

| Variable                               | Where to set                     |
|--|----------------------------------|
| <i>SERVICED_ISVCS_START</i>            | ZooKeeper ensemble nodes         |
| <i>SERVICED_ISVCS_ZOOKEEPER_ID</i>     | ZooKeeper ensemble nodes         |
| <i>SERVICED_ISVCS_ZOOKEEPER_QUORUM</i> | ZooKeeper ensemble nodes         |
| <i>SERVICED_ZK</i>                     | All Control Center cluster hosts |
| <i>SERVICED_ZK_SESSION_TIMEOUT</i>     | ZooKeeper ensemble nodes         |

## Example multi-host ZooKeeper configuration

This example shows the ZooKeeper variables in the `/etc/defaults/serviced` configuration file of each host in a 4-node Control Center cluster. For convenience, the relevant settings for each node or host are also included in subsequent procedures.

**Note** The value of the *SERVICED\_ISVCS\_ZOOKEEPER\_QUORUM* variable is formatted to fit the available space. In the configuration file, the variable and value are on the same line.

Master host and ZooKeeper ensemble node, 198.51.100.135:

```
SERVICED_ISVCS_ZOOKEEPER_ID=1
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
SERVICED_ISVCS_ZOOKEEPER_QUORUM=1@0.0.0.0:2888:3888,\
 2@198.51.100.136:2888:3888,3@198.51.100.137:2888:3888
SERVICED_ZK_SESSION_TIMEOUT=15
```

Delegate host and ZooKeeper ensemble node, 198.51.100.136:

```
SERVICED_ISVCS_START=zookeeper
SERVICED_ISVCS_ZOOKEEPER_ID=2
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
SERVICED_ISVCS_ZOOKEEPER_QUORUM=1@198.51.100.135:2888:3888,\
 2@0.0.0.0:2888:3888,3@198.51.100.137:2888:3888
SERVICED_ZK_SESSION_TIMEOUT=15
```

Delegate host and ZooKeeper ensemble node, 198.51.100.137:

```
SERVICED_ISVCS_START=zookeeper
SERVICED_ISVCS_ZOOKEEPER_ID=3
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
SERVICED_ISVCS_ZOOKEEPER_QUORUM=1@198.51.100.135:2888:3888,\
 2@198.51.100.136:2888:3888,3@0.0.0.0:2888:3888
```



```
SERVICED_ZK_SESSION_TIMEOUT=15
```

Delegate host, 198.51.100.138:

```
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
```

## Configuring the master host as a ZooKeeper node

This procedure configures the Control Center master host as a node in a ZooKeeper ensemble.

- 1 Log in to the master host as `root`, or as a user with superuser privileges.
- 2 Define the IP address variables for each node in the ZooKeeper ensemble.  
Replace *Master* with the IP address or hostname of the Control Center master host, and replace *Delegate-A* and *Delegate-B* with the IP addresses or hostnames of the delegate hosts to include in the ensemble:

```
node1=Master
node2=Delegate-A
node3=Delegate-B
```

For high-availability deployments, use the virtual IP address or hostname of the high-availability cluster as the value for `node1`.

- 3 Set the ZooKeeper node ID to 1.

```
echo "SERVICED_ISVCS_ZOOKEEPER_ID=1" >> /etc/default/serviced
```

- 4 Specify the nodes in the ZooKeeper ensemble.  
You can copy the following text and paste it in your console:

```
echo "SERVICED_ZK=${node1}:2181,${node2}:2181,${node3}:2181" \
>> /etc/default/serviced
```

- 5 Specify the nodes in the ZooKeeper quorum.

ZooKeeper requires a unique quorum definition for each node in its ensemble. To achieve this, replace the IP address or hostname of the master host with `0.0.0.0`.

You can copy the following text and paste it in your console:

```
q1="1@0.0.0.0:2888:3888"
q2="2@${node2}:2888:3888"
q3="3@${node3}:2888:3888"
echo "SERVICED_ISVCS_ZOOKEEPER_QUORUM=${q1},${q2},${q3}" \
>> /etc/default/serviced
```

- 6 Specify the timeout for inactive connections.  
You can copy the following text and paste it in your console:

```
echo "SERVICED_ZK_SESSION_TIMEOUT=15" >> /etc/default/serviced
```

- 7 Clean up the Control Center configuration file.
  - a Open `/etc/default/serviced` in a text editor.
  - b Navigate to the end of the file, and cut the line that contains the `SERVICED_ZK` variable declaration at that location.
  - c Locate the original `SERVICED_ZK` variable declaration, and then paste the cut line immediately below it.
  - d Navigate to the end of the file, and cut the line that contains the `SERVICED_ISVCS_ZOOKEEPER_ID` variable declaration at that location.

- e Locate the original `SERVICED_ISVCS_ZOOKEEPER_ID` variable declaration, and then paste the cut line immediately below it.
  - f Navigate to the end of the file, and cut the line that contains the `SERVICED_ISVCS_ZOOKEEPER_QUORUM` variable declaration at that location.
  - g Locate the original `SERVICED_ISVCS_ZOOKEEPER_QUORUM` variable declaration, and then paste the cut line immediately below it.
  - h Navigate to the end of the file, and cut the line that contains the `SERVICED_ZK_SESSION_TIMEOUT` variable declaration at that location.
  - i Locate the original `SERVICED_ZK_SESSION_TIMEOUT` variable declaration, and then paste the cut line immediately below it.
  - j Save the file, and then close the editor.
- 8 Verify the ZooKeeper environment variables.

```
grep -E '^\\b*SERVICED' /etc/default/serviced | grep -E '_Z(OO|K)'
```

The following example shows the environment variables for a master host with IP address 198.51.100.135.

---

**Note** The value of the `SERVICED_ISVCS_ZOOKEEPER_QUORUM` variable is formatted to fit the available space. The result of the `grep` command shows the variable and value on the same line.

---

```
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
SERVICED_ISVCS_ZOOKEEPER_ID=1
SERVICED_ISVCS_ZOOKEEPER_QUORUM=1@0.0.0.0:2888:3888, \
  2@198.51.100.136:2888:3888, 3@198.51.100.137:2888:3888
SERVICED_ZK_SESSION_TIMEOUT=15
```

## Configuring delegate host A as a ZooKeeper node

---

Use this procedure to configure the delegate host designated as *Delegate-A* as a ZooKeeper node.

- 1 Log in to the delegate host as `root`, or as a user with superuser privileges.
- 2 Define the IP address variables for each node in the ZooKeeper ensemble.  
Replace *Master* with the IP address or hostname of the Control Center master host, and replace *Delegate-A* and *Delegate-B* with the IP addresses or hostnames of the delegate hosts to include in the ensemble:

```
node1=Master
node2=Delegate-A
node3=Delegate-B
```

For high-availability deployments, use the virtual IP address or hostname of the high-availability cluster as the value for `node1`.

- 3 Set the ID of this node in the ZooKeeper ensemble.

```
echo "SERVICED_ISVCS_ZOOKEEPER_ID=2" >> /etc/default/serviced
```

- 4 Specify the nodes in the ZooKeeper ensemble.  
You can copy the following text and paste it in your console:

```
echo "SERVICED_ZK=${node1}:2181, ${node2}:2181, ${node3}:2181" \
  >> /etc/default/serviced
```

- 5 Specify the nodes in the ZooKeeper quorum.

ZooKeeper requires a unique quorum definition for each node in its ensemble. To achieve this, replace the IP address or hostname of delegate host A with `0.0.0.0`.

You can copy the following text and paste it in your console:

```
q1="1@${node1}:2888:3888"
q2="2@0.0.0.0:2888:3888"
q3="3@${node3}:2888:3888"
echo "SERVICED_ISVCS_ZOOKEEPER_QUORUM=${q1}, ${q2}, ${q3}" \
  >> /etc/default/serviced
```

**6** Specify the timeout for inactive connections.

You can copy the following text and paste it in your console:

```
echo "SERVICED_ZK_SESSION_TIMEOUT=15" >> /etc/default/serviced
```

**7** Set the *SERVICED\_ISVCS\_START* variable, and clean up the Control Center configuration file.

- a** Open `/etc/default/serviced` in a text editor.
  - b** Locate the line for the *SERVICED\_ISVCS\_START* variable, and then make a copy of the line, immediately below the original.
  - c** Remove the number sign character (#) from the beginning of the line.
  - d** Delete all but `zookeeper` from its list of values.
  - e** Navigate to the end of the file, and cut the line that contains the *SERVICED\_ZK* variable declaration at that location.
  - f** Locate the original *SERVICED\_ZK* variable declaration, and then paste the cut line immediately below it.
  - g** Comment the original *SERVICED\_ZK* declaration, which references only the master host.  
Insert the number sign character (#) immediately in front of the original *SERVICED\_ZK* variable.
  - h** Navigate to the end of the file, and cut the line that contains the *SERVICED\_ISVCS\_ZOOKEEPER\_ID* variable declaration at that location.
  - i** Locate the original *SERVICED\_ISVCS\_ZOOKEEPER\_ID* variable declaration, and then paste the cut line immediately below it.
  - j** Navigate to the end of the file, and cut the line that contains the *SERVICED\_ISVCS\_ZOOKEEPER\_QUORUM* variable declaration at that location.
  - k** Locate the original *SERVICED\_ISVCS\_ZOOKEEPER\_QUORUM* variable declaration, and then paste the cut line immediately below it.
  - l** Navigate to the end of the file, and cut the line that contains the *SERVICED\_ZK\_SESSION\_TIMEOUT* variable declaration at that location.
  - m** Locate the original *SERVICED\_ZK\_SESSION\_TIMEOUT* variable declaration, and then paste the cut line immediately below it.
  - n** Save the file, and then close the editor.
- 8** Verify the ZooKeeper environment variables.

```
grep -E '^\\b*SERVICED' /etc/default/serviced \
  | grep -E '(CS_ZO|_ZK|CS_ST)'
```

The following example shows the environment variables for a delegate host with IP address 198.51.100.136.

---

**Note** The value of the *SERVICED\_ISVCS\_ZOOKEEPER\_QUORUM* variable is formatted to fit the available space. The result of the `grep` command shows the variable and value on the same line.

---

```
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
SERVICED_ISVCS_START=zookeeper
SERVICED_ISVCS_ZOOKEEPER_ID=2
SERVICED_ISVCS_ZOOKEEPER_QUORUM=1@198.51.100.135:2888:3888, \
  2@0.0.0.0:2888:3888,3@198.51.100.137:2888:3888
SERVICED_ZK_SESSION_TIMEOUT=15
```

## Configuring delegate host B as a ZooKeeper node

Use this procedure to configure the delegate host designated as *Delegate-B* as a ZooKeeper node.

- 1 Log in to the delegate host as `root`, or as a user with superuser privileges.
- 2 Define the IP address variables for each node in the ZooKeeper ensemble.  
Replace *Master* with the IP address or hostname of the Control Center master host, and replace *Delegate-A* and *Delegate-B* with the IP addresses or hostnames of the delegate hosts to include in the ensemble:

```
node1=Master
node2=Delegate-A
node3=Delegate-B
```

For high-availability deployments, use the virtual IP address or hostname of the high-availability cluster as the value for `node1`.

- 3 Set the ID of this node in the ZooKeeper ensemble.

```
echo "SERVICED_ISVCS_ZOOKEEPER_ID=3" >> /etc/default/serviced
```

- 4 Specify the nodes in the ZooKeeper ensemble.  
You can copy the following text and paste it in your console:

```
echo "SERVICED_ZK=${node1}:2181,${node2}:2181,${node3}:2181" \
>> /etc/default/serviced
```

- 5 Specify the nodes in the ZooKeeper quorum.

ZooKeeper requires a unique quorum definition for each node in its ensemble. To achieve this, replace the IP address or hostname of delegate host B with `0.0.0.0`.

You can copy the following text and paste it in your console:

```
q1="1@${node1}:2888:3888"
q2="2@${node2}:2888:3888"
q3="3@0.0.0.0:2888:3888"
echo "SERVICED_ISVCS_ZOOKEEPER_QUORUM=${q1},${q2},${q3}" \
>> /etc/default/serviced
```

- 6 Specify the timeout for inactive connections.  
You can copy the following text and paste it in your console:

```
echo "SERVICED_ZK_SESSION_TIMEOUT=15" >> /etc/default/serviced
```

- 7 Set the `SERVICED_ISVCS_START` variable, and clean up the Control Center configuration file.

- a Open `/etc/default/serviced` in a text editor.
- b Locate the line for the `SERVICED_ISVCS_START` variable, and then make a copy of the line, immediately below the original.
- c Remove the number sign character (`#`) from the beginning of the line.
- d Delete all but `zookeeper` from its list of values.
- e Navigate to the end of the file, and cut the line that contains the `SERVICED_ZK` variable declaration at that location.
- f Locate the original `SERVICED_ZK` variable declaration, and then paste the cut line immediately below it.
- g Comment the original `SERVICED_ZK` declaration, which references only the master host.  
Insert the number sign character (`#`) immediately in front of the original `SERVICED_ZK` variable.
- h Navigate to the end of the file, and cut the line that contains the `SERVICED_ISVCS_ZOOKEEPER_ID` variable declaration at that location.

- i Locate the original `SERVICED_ISVCS_ZOOKEEPER_ID` variable declaration, and then paste the cut line immediately below it.
  - j Navigate to the end of the file, and cut the line that contains the `SERVICED_ISVCS_ZOOKEEPER_QUORUM` variable declaration at that location.
  - k Locate the original `SERVICED_ISVCS_ZOOKEEPER_QUORUM` variable declaration, and then paste the cut line immediately below it.
  - l Navigate to the end of the file, and cut the line that contains the `SERVICED_ZK_SESSION_TIMEOUT` variable declaration at that location.
  - m Locate the original `SERVICED_ZK_SESSION_TIMEOUT` variable declaration, and then paste the cut line immediately below it.
  - n Save the file, and then close the editor.
- 8 Verify the ZooKeeper environment variables.

```
grep -E '^\\b*SERVICED' /etc/default/serviced \
| grep -E '(CS_ZO|ZK|CS_ST)'
```

The following example shows the environment variables for a delegate host with IP address 198.51.100.137.

---

**Note** The value of the `SERVICED_ISVCS_ZOOKEEPER_QUORUM` variable is formatted to fit the available space. The result of the `grep` command shows the variable and value on the same line.

---

```
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
SERVICED_ISVCS_START=zookeeper
SERVICED_ISVCS_ZOOKEEPER_ID=3
SERVICED_ISVCS_ZOOKEEPER_QUORUM=1@198.51.100.135:2888:3888, \
2@198.51.100.136:2888:3888,3@0.0.0.0:2888:3888
SERVICED_ZK_SESSION_TIMEOUT=15
```

## Installing the ZooKeeper image for Docker Engine

---

Use one of the procedures in this section to pull or import the Docker Engine image for the ZooKeeper service on each ZooKeeper ensemble node.

### Pulling the ZooKeeper image for Docker Engine

To perform this procedure, ZooKeeper ensemble nodes must have internet access.

Use this procedure to pull the Docker Engine image for the ZooKeeper service from Docker Hub to a ZooKeeper ensemble node. Repeat this procedure on each node in the ZooKeeper ensemble.

- 1 Log in to the ZooKeeper ensemble node as `root`, or as a user with superuser privileges.
- 2 Identify the images associated with the installed version of `serviced`.

```
serviced version | grep Images
```

Example result:

```
IsvcsImages: [zenoss/serviced-isvcs:v54 zenoss/isvcs-zookeeper:v8]
```

In this example, the tag of the ZooKeeper image is `isvcs-zookeeper:v8`.

- 3 Pull the required image from Docker Hub to the local repository.

Replace *ZooKeeper-Tag* with the tag displayed in the previous step:

```
docker pull zenoss/ZooKeeper-Tag
```

## Importing the ZooKeeper image for Docker Engine

Use this procedure to import the Docker Engine image for the ZooKeeper service from a ZooKeeper image file. Repeat this procedure on each node in the ZooKeeper ensemble.

- 1 Log in to the ZooKeeper ensemble node as `root`, or as a user with superuser privileges.
- 2 Change directory to `/root`.

```
cd /root
```

- 3 Extract the ZooKeeper image.

```
./install-zenoss-isvcs-zookeeper:v*.run
```

Image extraction begins when you press the `y` key.

- 4 Optional: Delete the archive file, if desired.

```
rm -i ./install-zenoss-isvcs-zookeeper:v*.run
```

## Starting a ZooKeeper ensemble

---

Use this procedure to start a ZooKeeper ensemble.

This procedure uses the `nc` utility to query ensemble hosts. If `nc` is not available, you can use `telnet` with [interactive ZooKeeper commands](#).

The window of time for starting a ZooKeeper ensemble is relatively short. The goal of this procedure is to restart Control Center on each ensemble node at about the same time, so that each node can participate in electing the leader.

- 1 Log in to the Control Center master host as `root`, or as a user with superuser privileges.
- 2 In a separate window, log in to the second node of the ZooKeeper ensemble (*Delegate-A*) as `root`, or as a user with superuser privileges.
- 3 In a different window, log in to the third node of the ZooKeeper ensemble (*Delegate-B*) as `root`, or as a user with superuser privileges.
- 4 On all ensemble hosts, stop and start `serviced`.

```
systemctl stop serviced && systemctl start serviced
```

- 5 On the master host, check the status of the ZooKeeper ensemble.
  - a Attach to the container of the ZooKeeper service.

```
docker exec -it serviced-isvcs_zookeeper /bin/bash
```

- b Query the master host and identify its role in the ensemble.  
Replace *Master* with the hostname or IP address of the master host:

```
{ echo stats; sleep 1; } | nc Master 2181 | grep Mode
```

The result includes `leader` or `follower`.

- c Query delegate host A and identify its role in the ensemble.  
Replace *Delegate-A* with the hostname or IP address of delegate host A:

```
{ echo stats; sleep 1; } | nc Delegate-A 2181 | grep Mode
```

- d Query delegate host B and identify its role in the ensemble.  
Replace *Delegate-B* with the hostname or IP address of delegate host B:

```
{ echo stats; sleep 1; } | nc Delegate-B 2181 | grep Mode
```

- e Detach from the container of the ZooKeeper service.

```
exit
```

If none of the hosts reports that it is the ensemble leader within a few minutes of starting `serviced`, reboot the hosts.

## Updating delegate hosts

The default configuration of delegate hosts sets the value of the `SERVICED_ZK` variable to the master host only. Use this procedure to update the setting to include all of the hosts in the ZooKeeper ensemble. Perform this procedure on each delegate host in a Control Center cluster that is not an ensemble node.

- 1 Log in to the delegate host as `root`, or as a user with superuser privileges.
- 2 Define the IP address variables for each node in the ZooKeeper ensemble.  
Replace *Master* with the IP address or hostname of the Control Center master host, and replace *Delegate-A* and *Delegate-B* with the IP addresses or hostnames of the delegate hosts to include in the ensemble:

```
node1=Master
node2=Delegate-A
node3=Delegate-B
```

For high-availability deployments, use the virtual IP address or hostname of the high-availability cluster as the value for `node1`.

- 3 Specify the nodes in the ZooKeeper ensemble.  
You can copy the following text and paste it in your console:

```
echo "SERVICED_ZK=${node1}:2181,${node2}:2181,${node3}:2181" \
>> /etc/default/serviced
```

- 4 Update the variable.
  - a Open `/etc/default/serviced` in a text editor.
  - b Navigate to the end of the file, and cut the line that contains the `SERVICED_ZK` variable declaration at that location.  
The value of this declaration specifies three endpoints.
  - c Locate the `SERVICED_ZK` variable near the beginning of the file, and then delete the line it is on.  
The value is just the master host endpoint.
  - d Paste the `SERVICED_ZK` variable declaration from the end of the file in the location of the just-deleted declaration.
  - e Save the file, and then close the editor.
- 5 Verify the setting.

```
grep -E '^\b*SERVICED_ZK' /etc/default/serviced
```

The following example shows the environment variable for a delegate host that is not a node in the ZooKeeper ensemble:

```
SERVICED_ZK=198.51.100.135:2181,198.51.100.136:2181,198.51.100.137:2181
```

**6** Restart Control Center.

```
systemctl restart serviced
```



# Preparing to install without internet access

# A

This appendix includes procedures for downloading and installing or staging Resource Manager software.

## Downloading Resource Manager image files

To perform this procedure, you need:

- A workstation with internet access.
- Permission to download files from the [File Portal - Download Zenoss Enterprise Software](#) site. Zenoss customers may request permission by filing a ticket at the [Zenoss Support](#) site.
- A secure network copy program.

Use this procedure to download the required files to a workstation and then copy the files to a Control Center master host.

Perform these steps:

- 1 In a web browser, navigate to the [File Portal - Download Zenoss Enterprise Software](#) site.
- 2 Log in with the account provided by Zenoss Support.
- 3 Download the self-installing Docker Engine image files for Resource Manager. Select the files with the highest version number. The version number is represented as *Version* in the following file names:

- `install-zenoss-hbase:vVersion.run`
- `install-zenoss-opentsdb:vVersion.run`
- `install-zenoss-resmgr_Version.run`

- 4 Download the Resource Manager service definition, which is distributed as an RPM file. Choose the file with the highest version number. The version number is represented as *Version* in the following file name:

```
zenoss-resmgr-service-Version.noarch.rpm
```

- 5 Use a secure copy program to copy the files to a Control Center master host. For high-availability deployments, copy the files to the primary node and to the secondary node.

## Staging the Resource Manager service definition

Use this procedure to stage the Resource Manager service definition on a Control Center master host. The service definition is packaged as an RPM file.

- 1 Log in to the target host as `root`, or as a user with superuser privileges.
- 2 Copy or move the RPM file to `/tmp`.

## Staging Docker Engine image files

---

Before performing this procedure, verify that approximately 640MB of temporary space is available on the file system where `/root` is located.

Use this procedure to add Docker Engine image files to a Control Center master host. The files are used when Docker Engine is fully configured.

- 1 Log in to the master host as `root`, or as a user with superuser privileges.
- 2 Copy or move the archive files to `/root`.
- 3 Add execute permission to the files.

```
chmod +x /root/*.run
```