



Zenoss Core Installation Guide

Release 5.0.x

Zenoss, Inc.

www.zenoss.com

Zenoss Core Installation Guide

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Contents

Preface.....	4
Chapter 1: Planning your deployment.....	5
Introduction to Control Center.....	5
Deployment considerations.....	5
Hardware requirements.....	6
Operating system requirements.....	9
Security considerations.....	10
Packaging considerations.....	12
Supported clients and browsers.....	12
Chapter 2: Installing on RHEL or CentOS hosts.....	13
Installing a master host.....	13
Installing a resource pool host.....	17
Chapter 3: Installing on Ubuntu hosts.....	22
Installing a master host.....	22
Installing a resource pool host.....	26
Chapter 4: Starting and tuning Zenoss Core.....	31
Enabling access to the Control Center web interface.....	31
Deploying the Zenoss Core application.....	32
Changing default passwords.....	35
Enabling access to application-level services.....	36
Configuring OpenTSDB compaction.....	38
Installing the Quilt package.....	39
Installing the Percona Toolkit.....	40
Starting the Zenoss Core application.....	40
Deleting the RabbitMQ guest user account.....	41
Stopping Control Center and applications.....	41

Preface

Zenoss Core Installation Guide provides detailed instructions for installing Zenoss Core (Zenoss Core).

Related publications

Title	Description
<i>Zenoss Core Administration Guide</i>	Provides an overview of Zenoss Core architecture and features, as well as procedures and examples to help use the system.
<i>Zenoss Core Release Notes</i>	Describes known issues, fixed issues, and late-breaking information not already provided in the published documentation set.
<i>Zenoss Core Upgrade Guide</i>	Provides procedures for upgrading to the current release of Control Center and Zenoss Core.

Additional information and comments

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1

Planning your deployment

This release features Control Center, the open-source, application service orchestrator based on [Docker](#) and built by Zenoss. Control Center greatly simplifies the installation, deployment, and management of Zenoss Core.

This chapter describes the platform considerations and requirements of Control Center and Zenoss Core, for planning purposes.

Introduction to Control Center

A Control Center cluster contains one or more resource pools. A resource pool is a collection of compute, network, and storage resources (real or virtual hosts). The default resource pool includes the Control Center master host. The master host assigns a service to a resource pool and then that service is distributed to one of the hosts contained in the resource pool. Also, the master host maintains the local Docker repository and a distributed file system for application data. This separate volume enables Control Center to start new instances of services on another host in the resource pool if a host fails. Volume drivers create and manage snapshots, and perform rollbacks, so that Docker images and application data stay in sync.

Deployment considerations

The features of Control Center in this release affect deployments of Zenoss Core in the following ways.

- This release supports Docker version 1.5.0 only. If a more recent version of Docker is installed on a host, the installation process reverts it to 1.5.0. To prevent unnecessary downtime, please ensure that any security or maintenance tools in your environment do not upgrade Docker automatically.
- All hosts in a resource pool should have identical hardware resources (real or virtual).
- Docker supports running identical containers under a variety of Linux operating systems. Control Center supports the Ubuntu, RHEL, and CentOS distributions, but combining hosts that are running different operating systems in the same resource pool is currently untested and unsupported.
- Resource pools other than the default pool are known as distributed resource pools. You may create any number of distributed resource pools, and assign specific services to them. A common choice is to create distributed resource pools in different subnets or security zones to deploy Zenoss Core collector instances closer to the monitored devices on the subnets. Currently, the procedures for creating distributed resource pools are identical to the procedures for creating any other resource pool.
- To assign a service to a specific host, create a separate resource pool, add only the desired host to the pool, and then assign the service to the separate pool.
- Zenoss Core collector services are stateless, so their storage requirements are very lightweight compared to stateful services like MariaDB.

- The default volume type for application data is `rsync`, which is sufficient for development deployments only. For all other uses, Zenoss supports Btrfs. The installation procedures include example steps for creating Btrfs file systems.
- Copy-on-write file systems like Btrfs can experience unrecoverable errors when the underlying disk space reaches capacity. Zenoss recommends allocating very large reserves of disk space to Btrfs file systems.
- The amount of disk space that a Btrfs file system is using may not be reported accurately by standard file system utilities such as `df`. To retrieve accurate statistics, use a Btrfs-specific command, such as `sudo btrfs filesystem show /dev/sdb2`.
- By default, Control Center deletes snapshots after 12 hours. You may increase the value by setting the `SERVICED_SNAPSHOT_TTL` variable in the defaults file, `/etc/default/serviced`.
- By default, Logstash logs are retained for 14 days and may consume up to 10 Gigabytes of disk space. Once they go beyond these limits, the logs are removed. Use the Control Center or `serviced` to modify the default values for `SERVICED_LOGSTASH_MAX_DAYS` and `SERVICED_LOGSTASH_MAX_SIZE`.
- Control Center Internal Services includes Logstash, a Docker repository, and OpenTSDB. If these services are already established in your environment, you may replace their default endpoints with the endpoints of your existing services. However, the performance and availability of the services affects the performance and availability of Control Center (and Zenoss Core).
- Using virtual machines for Control Center and Zenoss Core is supported. However, pausing a virtual machine is not supported because Control Center relies on timestamps and clocks to keep services in sync. Shut down all services cleanly before pausing or stopping a virtual machine.
- The software upgrade process for this release uses *Docker images*. Each upgrade installs a new Zenoss Core image, and removes all layers that are not part of the new image. This ensures that each upgrade brings Zenoss Core to a tested and supported state. However, any customizations of Zenoss Core are lost, unless those customizations are managed with a combination of Control Center scripts and a patch system like *Quilt*. Zenoss recommends Quilt. The installation procedures, provided later in this document, include an option to install it.

Hardware requirements

Control Center and Zenoss Core require real or virtual hosts that implement the 64-bit version of the x86 instruction set, and support one of the required operating systems. Hardware requirements vary by role (master or resource pool host) and by the services assigned to a host's pool.

Master host requirements

The default resource pool contains the Control Center master host and, in the default configuration, hosts for all of the services of Zenoss Core. The hosts in the default resource pool should meet the following, minimum requirements:

- 4 CPU cores (64-bit only; real or virtual)
- 20GB RAM
- 1 network interface controller (must support TCP/IP)
- The network latency among all hosts in a resource pool should be less than 5 milliseconds
- Local storage is recommended, and SAN storage is supported

Master host storage requirements vary by collection rate, frequency of backups, and the type of data stored in specific locations. For example, a Zenoss Core collection rate of 25,000 metrics per second can require 1TB of storage in 60 days, depending on OpenTSDB compaction settings.

The Control Center master host requires adequate storage for backup files. The Control Center web interface stores backup files in `/opt/serviced/var/backups`, and uses a subdirectory, `/opt/serviced/var/backups/restore`, for temporary files created during restorations. A typical backup is several gigabytes, and the restore directory uses an equivalent amount. Currently, using a symbolic link for `/opt/serviced/var/backups` is not supported.

Note Copy-on-write file systems like Btrfs can experience unrecoverable errors when the underlying disk space reaches capacity. Zenoss recommends allocating very large reserves of disk space to Btrfs file systems.

The following table associates specific paths on the Control Center master host with the file system types required to support them.

Path	Description	File system type	
		RHEL	Ubuntu
/	Linux (including /tmp, excluding swap)	xfs	ext4
/var/lib/docker	Docker data	xfs	ext4
/opt/serviced/var	Control Center internal services data	xfs	ext4
/opt/serviced/var/volumes	Application data (DFS volumes, NFS monitoring)	btrfs	btrfs
/opt/serviced/var/backups	Application data backup and restore files	xfs	ext4

For XFS and Ext4 file systems, no special creation or mount options are required.

For Btrfs file systems, Zenoss strongly recommends the following options:

- To create a Btrfs file system on a solid-state drive, specify `--nodiscard`, to disable whole-device TRIM operations.
- To mount a Btrfs file system or subvolume, specify the following options:
 - `rw`, read-write (the default)
 - `noatime`, do not update inode access times
 - `nodatacow`, do not copy-on-write data for newly created files
 - `skip_balance`, do not perform balance operations

SAN performance and configuration affects Control Center performance and stability. For example, the ZooKeeper service is sensitive to disk latency greater than 1000 milliseconds. Zenoss recommends using only high-performance SAN subsystems, and assigning separate LUNs for each mounted path. Likewise, solid-state drives are recommended for local storage.

The following table shows the order in which specific paths must be mounted, their minimum sizes, and the recommended locations for their underlying storage.

Note The following table shows all of the paths that may be mounted separately. Other than the root file system (/), the only paths that require separate mount points are `/opt/serviced/var/volumes` (RHEL/Centos and Ubuntu) and `/var/lib/docker` (RHEL/Centos only).

Order	Path	Minimum Size		Recommended location
		RHEL	Ubuntu	
1	/	30GB	60GB	Local
2	/var/lib/docker	30GB, (60GB recommended)	n/a	Local
3	/opt/serviced/var	30GB	30GB	Local
4	/opt/serviced/var/volumes	Varies	Varies	Local if small, remote if large
5	/opt/serviced/var/backups	Varies	Varies	Local if small, remote if large

Note An under-resourced master host does not function properly. Please do not deploy Control Center and Zenoss Core on a master host that does not meet the minimum requirements.

The Docker, Control Center, and Zenoss Core packages require approximately 5GB of disk space.

Master host configuration examples

The following table shows an example RHEL/CentOS master host with a local xfs file system and remote btrfs file system.

Mount Point	Type	Size	Description
/	xfs	90GB	Local disk. Includes space for internal services data and some backups.
(none)	swap	15GB	Local disk.
/var/lib/docker	xfs	60GB	Local disk.
/opt/serviced/var/volumes	btrfs	1TB	Remote SAN.

The following table shows an example Ubuntu master host with a remote btrfs file system. The root file system includes the required minimum space for all other paths.

Mount Point	Type	Size	Description
/	ext4	120GB	Local disk. Includes space for Docker, internal services, and some backups.
(none)	swap	15GB	Local disk.
/opt/serviced/var/volumes	btrfs	1TB	Remote SAN.

Resource pool host requirements

The hosts in resource pools other than the default resource pool need enough RAM, CPU, and storage resources to support the services assigned to the pool. The network latency among all hosts in a resource pool should be less than 5 milliseconds. The hardware specifications of all hosts in a resource pool should be identical.

The storage requirements of hosts other than the master host do not include space for application data, which is stored exclusively on the master host and mounted everywhere else. Storage is needed only for Linux, swap, and Docker.

Resource pool host configuration examples

The following table shows an example RHEL/CentOS resource pool host.

Mount Point	Type	Size
/	xfs	30GB
(none)	swap	15GB
/var/lib/docker	xfs	30GB

The following table shows an example Ubuntu resource pool host.

Mount Point	Type	Size
/	ext4	60GB

Mount Point	Type	Size
(none)	swap	15GB
/var/lib/docker	ext4	30GB

Docker data storage

Internally, Docker uses an abstraction for data storage (volumes), and provides drivers that support specific file system types. For all supported operating systems, the preferred storage driver is *devicemapper*, which is supported in the mainline kernel. A separate primary or logical partition is required for Docker data storage.

Docker stores its data in `/var/lib/docker`.

Control Center data storage

Control Center uses the volumes abstraction for data storage, and provides `rsync` and `btrfs` drivers.

- For development deployments only, the `rsync` driver may be used.
- For all other deployment scenarios, Zenoss supports only the `btrfs` driver.

Control Center stores application data in `/opt/serviced/var/volumes`, and provides the `btrfs` driver.

Note A backup of data stored in a volume managed by one driver can not be restored into a volume managed by the other driver.

Operating system requirements

Control Center and Zenoss Core require the 64-bit version of the following Linux distributions.

- Red Hat Enterprise Linux (RHEL) 7.0 or 7.1
- CentOS 7.0 or 7.1
- Ubuntu 14.04 LTS or 14.04.1

All versions of the Linux kernel included in these releases, and all subsequent updates, are supported. However, Zenoss encourages you to keep the kernel up-to-date.

Control Center and Zenoss Core are tested on operating system platforms that are installed and configured with standard options.

- The Ubuntu Server distribution provides only one configuration. In addition to the packages included in that configuration, the `openssh-server` package is required.
- The RHEL/CentOS 7.x distributions provide a variety of server configurations. Docker and Control Center are tested and supported the Minimal Install configuration, when the NFS and NTP packages are installed as well.

Control Center relies on the system clock to synchronize its actions. The installation procedures include steps to add the Network Time Protocol (NTP) daemon to all hosts. By default, the NTP daemon synchronizes the system clock by communicating with standard time servers available on the internet. You may configure the daemon to use a timeserver in your environment, instead.

Note Because of the reliance on the system clock, pausing a virtual machine that belongs to a Control Center cluster is not supported.

Networking requirements

On startup, Docker creates the `docker0` virtual interface and selects an unused IP address and subnet (typically, 172.17.42.1/16) to assign to the interface. The virtual interface is used as a virtual Ethernet bridge, and automatically forwards packets among real and virtual interfaces attached to it. The host and all of its containers communicate among one another through this virtual bridge.

Docker can only check directly-connected routes, so the subnet it chooses for the virtual bridge may be inappropriate for your environment. To customize the virtual bridge subnet, refer to Docker's [advanced network configuration](#) article.

The default configurations of firewall utilities such as [Uncomplicated Firewall](#) (Ubuntu) and [Firewalld](#) (RHEL/CentOS) include rules that can conflict with Docker, and therefore, Control Center and Zenoss Core. The following interactions illustrate the conflicts:

- The `ufw` daemon drops all forwarding traffic.
- The `firewalld` daemon removes the `DOCKER` chain from `iptables` when it starts or restarts.
- Under `systemd`, `firewalld` is started before Docker. However, if you start or restart `firewalld` while Docker is running, you need to restart Docker.

If you are using a firewall utility, please ensure that it does not conflict with Docker.

If you are not using a firewall utility, your firewall settings may still prevent communications over the Docker virtual bridge. This occurs when `iptables` INPUT rules restrict most traffic. To ensure that the bridge works properly, append an INPUT rule to your `iptables` configuration that allows traffic on the bridge subnet. For example, if `docker0` is bound to 172.17.42.1/16, then the following, non-specific command ensures that the bridge works.

```
iptables -A INPUT -d 172.17.0.0/16 -j ACCEPT
```

Note The preceding command is only an example. Please consult your networking specialist before modifying your `iptables` configuration.

Additional requirements

Control Center requires a 16-bit, private IPv4 network for communications among hosts in its resource pools. The default network is 10.3/16. If this network is already in use in your environment, you may select any valid IPv4 16-bit address space during installation.

This release of Control Center relies on Network File System (NFS) for its distributed file system implementation. For this reason, hosts in a Control Center cluster may not run a general-purpose NFS server, and all hosts require NFS.

All hosts in Control Center resource pools must

- be able to resolve the hostnames of all other resource pool hosts to IPv4 addresses (for example, if the public IP address of your (master) host is 10.0.0.1, then the `hostname -i` command should return 10.0.0.1)
- respond with an IPv4 address other than `127.x.x.x` when `ping Hostname` is invoked
- return a unique result from the `hostid` command

Security considerations

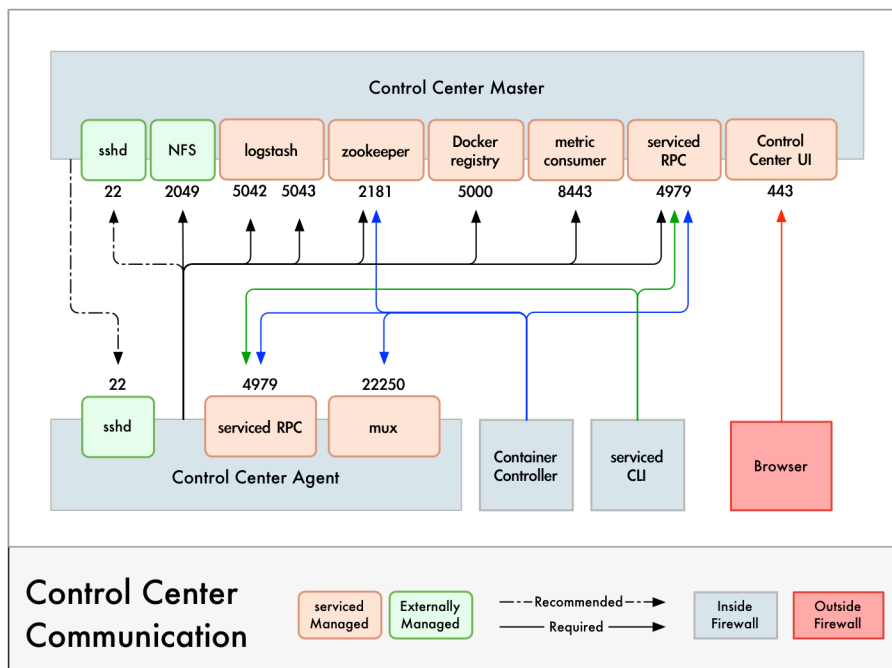
During installation, Control Center has no knowledge of the port requirements of the applications it is to manage, so the installation procedure includes disabling the firewall. After both Control Center and Zenoss Core are installed, you may close unused ports.

Control Center includes a virtual multiplexer (mux), to aggregate the UDP and TCP traffic among the services it manages. The aggregation is opaque to services, and mux traffic is encrypted when it travels among containers on remote hosts. (Traffic among containers on the same host is not encrypted.) The mux, along with the distributed file system, enables Control Center to deploy services to any pool host, rapidly. The mux also reduces the number of open ports required on a Control Center host to a predictable set.

The following illustration identifies the ports that Control Center requires for its operations. All of the ports except 4979 are configurable. All traffic is TCP.

Note Control Center relies on the system clock to synchronize its actions, and indirectly, NTP, to synchronize clocks among multiple hosts. In the default configuration of `ntpd`, the firewalls of master and resource pool hosts must support an incoming UDP connection on port 123.

Figure 1: Port requirements for Control Center hosts



Additional considerations

- To gain access to the Control Center web interface, users must have login accounts on the Control Center master host. (Pluggable Authentication Modules (PAM) is supported.) By default, the users must be members of the `sudo` group (Ubuntu hosts) or the `wheel` group (RHEL/CentOS hosts). The default group may be changed by setting the `SERVICED_ADMIN_GROUP` variable, and the replacement group does not need superuser privileges.
- The `serviced` startup script sets the hard and soft open files limit to 1048576, but does not modify the `/etc/sysconfig/limits.conf` file.
- Control Center does not support *Security Enhanced Linux* in enforcing mode. The installation procedures include steps to set the mode to disabled.
- On RHEL/CentOS systems, the `Firewalld` service can conflict with Docker, and therefore, Control Center and Zenoss Core. For more information, see [Networking requirements](#) on page 10.

Packaging considerations

Control Center is designed to support any application that includes one or more services that are built into Docker containers. A service definition template contains the specifications of application services, in JSON format. The definition of each service includes the IDs of the Docker images needed to run the service.

Control Center, and the service definition templates for Zenoss Core, are distributed as Debian (apt) and Redhat (yum/rpm) packages. The packages are available at public repositories maintained by Zenoss. The Docker images that Zenoss Core requires are available at the Zenoss [Docker Hub](#) repository. So, the default installation process requires internet access. However, all of the repositories may be mirrored, so offline installations are supported as well.

Note The Docker images for Zenoss Core are available in a public Zenoss repository at Docker Hub. No special permissions are required to pull the images.

Supported clients and browsers

The client operating systems and web browser combinations supported in this release.

- All browsers must have Adobe® Flash® Player 11 installed, or a more recent version.
- Compatibility mode is not supported in Internet Explorer.

Client OS	Supported Browsers
Windows 7 and 8.1	Internet Explorer 11 (enterprise mode is supported)
	Internet Explorer 10
	Firefox 30 and above
	Chrome 30 and above
Windows Server 2012 R2	Firefox 30
	Chrome 36
Macintosh OS/X 10.9	Firefox 30 and above
	Chrome 36 and above
Ubuntu 14.04 LTS	Firefox 30 and above
	Chrome 37 and above
Red Hat Enterprise Linux 6.5, CentOS 6.5	Firefox 30 and above
	Chrome 37 and above

2

Installing on RHEL or CentOS hosts

The procedures in this chapter install Control Center and Zenoss Core on one or more Red Hat Enterprise Linux (RHEL) 7.x or CentOS 7.x hosts. Please review the information in *Planning your deployment* on page 5 before performing these procedures.

Note The procedures in this chapter include example steps to create a *Btrfs* file system. The steps may not be appropriate for your environment. If so, please refer to your operating system documentation to create a Btrfs file system using a different method.

Each deployment must have one master host, and may include one or more resource pool hosts. Install the master host first, and then install resource pool hosts.

Installing a master host

Perform the procedures in this section to install Control Center and Zenoss Core on a master host.

Preparing the master host operating system

Perform this procedure to prepare a Red Hat Enterprise Linux (RHEL) 7.x or CentOS 7.x host to function as the Control Center master host.

- 1 Log in to the target master host as `root`, or as a user with superuser privileges.
- 2 Verify that the host implements the 64-bit version of the x86 instruction set.

```
uname -m
```

- If the output is `x86_64`, the architecture is 64-bit. Proceed to the next step.
 - If the output is `i386/i486/i586/i686`, the architecture is 32-bit. Stop this procedure and select a different host.
- 3 Disable the firewall.

```
systemctl stop firewalld && systemctl disable firewalld
```

Note If `firewalld.service` is currently not running, this command returns "Failed to issue method call: Unit `firewalld.service` not loaded". This means the firewall is already disabled. Proceed to the next step.

- 4 Optional: Enable persistent storage for log files, if desired.

By default, RHEL/CentOS systems store log data only in memory or in a small ring-buffer in the `/run/log/journal` directory. By performing this step, log data persists, and can be saved indefinitely if you implement log file rotation practices. For more information, refer to your operating system documentation.

```
mkdir -p /var/log/journal && systemctl restart systemd-journald
```

- 5 Create an XFS file system for `/var/lib/docker`, and a Btrfs file system for `/opt/serviced/var/volumes`.

Note The following example procedure creates two file systems on two partitions, `/dev/sdb1` and `/dev/sdb2`. Modify the steps or values in this step as required for your environment.

- a Create mount points for the file systems.

```
mkdir -p /var/lib/docker /opt/serviced/var/volumes
```

- b Create the file systems.

Replace the values of the partition variables with device paths that are correct for your environment.

```
DOCKER_PART=/dev/sdb1
APP_PART=/dev/sdb2
mkfs -t xfs $DOCKER_PART
mkfs -t btrfs --nodiscard $APP_PART
```

- c Add the new file systems to the `/etc/fstab` file.

```
APP_PATH="/opt/serviced/var/volumes"
echo "$DOCKER_PART /var/lib/docker type xfs defaults 0 0" \
  >> /etc/fstab
echo "$APP_PART $APP_PATH type btrfs \
  rw,noatime,nodatasum,skip_balance 0 0" \
  >> /etc/fstab
```

- d Mount the file systems, and then verify they mounted correctly.

```
mount -a
mount | grep 'docker|serviced'
```

The output of the preceding command should be similar to the following example.

```
/dev/sdb1 on /var/lib/docker type xfs
(rw,relatime,seclabel,attr2,inode64,noquota)
/dev/sdb2 on /opt/serviced/var/volumes type btrfs
(rw,noatime,seclabel,nodatasum,nodatasum,skip_balance,ssd,space_cache)
```

- 6 Disable Security-Enhanced Linux (SELinux), if installed.

- a Determine whether SELinux is installed.

```
test -f /etc/selinux/config && grep '^SELINUX=' /etc/selinux/config
```

If the preceding commands return a result, SELinux is installed.

- b Set the operating mode to disabled, and confirm the setting.

```
EXT=$(date +%j-%H%M%S")
sed -i.${EXT} -e 's/^SELINUX=.*SELINUX=disabled/g' \
  /etc/selinux/config && \
```

```
grep '^SELINUX=' /etc/selinux/config
```

A reboot is required to complete the configuration change, and a reboot is the last step of this procedure.

- 7 Install and start the Dnsmasq package.

```
systemctl enable dnsmasq && systemctl start dnsmasq
```

- 8 Install and configure the NTP package.

- a Install the package.

```
yum install -y ntp && 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
```

- 9 Download and install the Zenoss repository package.

```
rpm -ivh http://get.zenoss.io/yum/zenoss-repo-1-1.x86_64.rpm
yum clean all
```

- 10 Reboot the host.

```
reboot
```

Installing Control Center and Zenoss Core

- 1 Log in to the master host as root, or as a user with superuser privileges.
- 2 Install Control Center, Zenoss Core, and Docker, and then start Docker.

```
yum --enablerepo=zenoss-stable install -y zenoss-core-service
systemctl start docker
```

- 3 **Note** This step is only required for RHEL/CentOS 7.1 systems.

Optional: Configure and restart the NFS server.

Currently, [an unresolved issue](#) prevents the NFS server from starting correctly. The following commands provide a workaround to ensure that it does.

- a In the `/usr/lib/systemd/system/nfs-server.service` file, change `rpcbind.target` to `rpcbind.service`.

```
EXT=$(date +%j-%H%M%S")
sed -i.${EXT} \
-e 's/\(Requires=.*\) rpcbind.target/\1rpcbind.service/' \
/usr/lib/systemd/system/nfs-server.service
```

- b Reload the NFS configuration.

```
systemctl daemon-reload
```

- 4 Configure and restart Docker.

- a Identify the IPv4 address and subnet Docker has selected for its virtual Ethernet bridge.

```
ip addr | grep -A 2 'docker0:' | grep inet
```

Note Typically, the address and subnet is 172.17.42.1/16. For more information about changing the selection, refer to Docker's [advanced network configuration](#) article.

- b Add the devicemapper and DNS flags to the Docker startup options.

If you change the virtual bridge subnet, replace the IP address in the following command.

```
echo 'DOCKER_OPTS="-s devicemapper --dns=172.17.42.1"' \
  >> /etc/sysconfig/docker
```

- c Stop and restart Docker.

```
systemctl stop docker && systemctl start docker
```

- 5 Change the volume type for application data.

The `/etc/default/serviced` file contains variables that define the character of an instance of Control Center. For more information about `serviced` configuration options, refer to the Control Center online documentation.

The following `sed` command changes the value of the `SERVICED_FS_TYPE` variable from the default, `rsync`, to `btrfs`.

```
EXT=$(date +"%j-%H%M%S")
sed -i.${EXT} \
  -e 's|^#[^S]*\ (SERVICED_FS_TYPE=) .*$|\btrfs|' \
  /etc/default/serviced
```

- 6 Optional: Configure the master host for a multi-host deployment, if desired.

The default values in `/etc/default/serviced` configure Control Center for a single-host deployment. To enable a multi-host deployment, change the following variables.

HOME

The path `docker` uses to locate the `.dockercfg` authentication file. Docker Hub credentials are stored in the file.

SERVICED_REGISTRY

Determines whether `serviced` uses a local registry to store Docker images. Set the value to 1, true.

SERVICED_AGENT

Determines whether a `serviced` instance acts as a resource pool host. A resource pool host runs application services scheduled for the resource pool to which it belongs. Set the value to 1, true.

SERVICED_MASTER

Determines whether a `serviced` instance acts as the Control Center master host. The master host runs the application services scheduler and other internal services, including the web server for the Control Center web interface. A `serviced` instance may be configured as both an agent and a master. Set the value to 1, true.

The following commands make the required edits to `/etc/default/serviced`.

```
EXT=$(date +"%j-%H%M%S")
sed -i.${EXT} -e 's|^#[^H]*\ (HOME=/root\)|\1|' \
-e 's|^#[^S]*\ (SERVICED_REGISTRY=)\ .|\1|' \
-e 's|^#[^S]*\ (SERVICED_AGENT=)\ .|\1|' \
-e 's|^#[^S]*\ (SERVICED_MASTER=)\ .|\1|' \
/etc/default/serviced
```

- 7 Optional: Specify an alternate private subnet for Control Center, if necessary.

By default, Control Center uses the 10.3/16 private subnet for virtual IP addresses. If your environment already uses 10.3/16 for other purposes, select an unused subnet for Control Center and add it to the `/etc/default/serviced` file.

Note [RFC 1918](#) restricts private networks to the 10/8, 172.16/12, and 192.168/16 address spaces. However, Control Center accepts any valid, 16-bit, IPv4 address space for its private network.

For example, to set the private subnet for Control Center to 10.20/16, uncomment the `SERVICED_VIRTUAL_ADDRESS_SUBNET` variable, and then set its value to 10.20.

The following commands make the required edits to `/etc/default/serviced`.

```
SUBNET=10.20
EXT=$(date +"%j-%H%M%S")
test ! -z "${SUBNET}" && \
sed -i.${EXT} -e \
's|^#[^S]*\ (SERVICED_VIRTUAL_ADDRESS_SUBNET=)\ .*|\1'${SUBNET}'|' \
/etc/default/serviced
```

- 8 Start the Control Center service (`serviced`).

```
systemctl start serviced
```

To monitor progress, enter the following command:

```
journalctl -u serviced -f
```

The `serviced` daemon invokes `docker` to pull its internal services image from Docker Hub. The Control Center web interface is unavailable until the image is installed and the services are started. The process takes approximately 5-10 minutes.

- To configure resource pool hosts, proceed to [Preparing a resource pool host](#) on page 17.
- To start Zenoss Core, proceed to [Starting and tuning Zenoss Core](#) on page 31.

Installing a resource pool host

Perform the procedures in this section to install Control Center on a resource pool host. Repeat the procedures for each host you wish to add to your Zenoss Core deployment.

Preparing a resource pool host

Perform this procedure to prepare a Red Hat Enterprise Linux (RHEL) 7.0 or CentOS 7.0 host as a Control Center resource pool host.

- 1 Log in to the master host as `root`, or as a user with superuser privileges.

- 2 Verify that the host implements the 64-bit version of the x86 instruction set.

```
uname -m
```

- If the output is `x86_64`, the architecture is 64-bit. Proceed to the next step.
 - If the output is `i386/i486/i586/i686`, the architecture is 32-bit. Stop this procedure and select a different host.
- 3 Disable the firewall.

```
systemctl stop firewalld && systemctl disable firewalld
```

Note If `firewalld.service` is currently not running, this command returns "Failed to issue method call: Unit `firewalld.service` not loaded". This means the firewall is already disabled. Proceed to the next step.

- 4 Optional: Enable persistent storage for log files, if desired.

By default, RHEL/CentOS systems store log data only in memory or in a small ring-buffer in the `/run/log/journal` directory. By performing this step, log data persists, and can be saved indefinitely if you implement log file rotation practices. For more information, refer to your operating system documentation.

```
mkdir -p /var/log/journal && systemctl restart systemd-journald
```

- 5 Create an XFS file system for Docker.

Note The following example procedure creates a file system on the `/dev/sdb1` partition. Modify the steps or values in this procedure as required for your environment.

- a Create a mount point for the XFS file system.

```
mkdir /var/lib/docker
```

- b Create the file system.

```
DOCKER_PART=/dev/sdb1
mkfs -t xfs $DOCKER_PART
```

- c Add the new file system to the `/etc/fstab` file.

```
echo "$DOCKER_PART /var/lib/docker xfs defaults 0 0" \
>> /etc/fstab
```

- d Mount the file system, and then verify it mounted correctly.

```
mount -a
mount | grep docker
```

The output of the preceding command should be similar to the following example.

```
/dev/sdb1 on /var/lib/docker type xfs
(rw,relatime,seclabel,attr2,inode64,noquota)
```

- 6 Disable Security-Enhanced Linux (SELinux), if installed.

- a Determine whether SELinux is installed.

```
test -f /etc/selinux/config && grep '^SELINUX=' /etc/selinux/config
```

If the preceding commands return a result, SELinux is installed.

- b Set the operating mode to disabled, and confirm the setting.

```
EXT=$(date +"%j-%H%M%S")
sed -i.${EXT} -e 's/^SELINUX=.*SELINUX=disabled/g' \
/etc/selinux/config && \
grep '^SELINUX=' /etc/selinux/config
```

A reboot is required to complete the configuration change, and a reboot is the last step of this procedure.

- 7 Install and start the Dnsmasq package.

```
systemctl enable dnsmasq && systemctl start dnsmasq
```

- 8 Install and configure the NTP package.

- a Install the package.

```
yum install -y ntp && 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
```

- 9 Download and install the Zenoss repository package.

```
rpm -ivh http://get.zenoss.io/yum/zenoss-repo-1-1.x86_64.rpm
yum clean all
```

- 10 Reboot the host.

```
reboot
```

Proceed to the next procedure, [Installing Control Center](#) on page 19.

Installing Control Center

- 1 Log in to the resource pool host as root, or as a user with superuser privileges.
- 2 Install Control Center and Docker, and then start Docker.

```
yum --enablerepo=zenoss-stable install -y serviced
systemctl start docker
```

- 3 Configure and restart Docker.

- a Identify the IPv4 address and subnet Docker has selected for its virtual Ethernet bridge.

```
ip addr | grep -A 2 'docker0:' | grep inet
```

Note Typically, the address and subnet is 172.17.42.1/16. For more information about changing the selection, refer to Docker's [advanced network configuration](#) article.

- b Add the devicemapper and DNS flags to the Docker startup options.
If you change the virtual bridge subnet, replace the IP address in the following command.

```
echo 'DOCKER_OPTS="-s devicemapper --dns=172.17.42.1"' \
>> /etc/sysconfig/docker
```

- c Stop and restart Docker.

```
systemctl stop docker && systemctl start docker
```

4 Configure the resource pool host for a multi-host deployment.

- a Create a variable for the IP address or hostname of the master host.

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

Note Replace `192.0.2.10` with the IP address of your Control Center master host.

```
MHOST=192.0.2.10
```

- b Change variables in the Control Center defaults file.

The default values in `/etc/default/serviced` configure Control Center for a single-host deployment. To enable a multi-host deployment, uncomment and change the following variables.

HOME

The path `docker` uses to locate the `.dockercfg` authentication file. Docker Hub credentials are stored in the file.

SERVICED_REGISTRY

Determines whether `serviced` uses a local registry to store Docker images. Set the value to 1, true.

SERVICED_AGENT

Determines whether a `serviced` instance acts as a resource pool host. Set the value to 1, true.

SERVICED_MASTER

Determines whether a `serviced` instance acts as the Control Center master host. Set the value to 0, false.

SERVICED_MASTER_IP

The IP address of the `serviced` instance configured as the master. Set the `SERVICED_MASTER_IP` variable to the IP address of the master host, then uncomment `SERVICED_MASTER_IP` and all other variables that reference it (`SERVICED_ZK`, `SERVICED_DOCKER_REGISTRY`, `SERVICED_ENDPOINT`, `SERVICED_LOG_ADDRESS`, `SERVICED_LOGSTASH_ES`, and `SERVICED_STATS_PORT`). Finally, replace the variable that reference `SERVICED_MASTER_IP` with the IP address of the master host.

The following commands make the required edits to `/etc/default/serviced`.

```
EXT=$(date +"%j-%H%M%S")
test ! -z "${MHOST}" && \
```

```
sed -i.${EXT} -e 's|^#[^H]*\ (HOME=/root\)|\1|' \
-e 's|^#[^S]*\ (SERVICED_REGISTRY=)\.|\11|' \
-e 's|^#[^S]*\ (SERVICED_AGENT=)\.|\11|' \
-e 's|^#[^S]*\ (SERVICED_MASTER=)\.|\10|' \
-e 's|^#[^S]*\ (SERVICED_MASTER_IP=)\.|\1'${MHOST}'|' \
-e '/=${SERVICED_MASTER_IP}/ s|^#[^S]*|' \
-e 's|\ ($SERVICED_MASTER_IP\)|'${MHOST}'|' \
/etc/default/serviced
```

- 5 Optional: Specify an alternate private subnet for Control Center, if necessary.

By default, Control Center uses the 10.3/16 private subnet for virtual IP addresses. If your environment already uses 10.3/16 for other purposes, select an unused subnet for Control Center and add it to the `/etc/default/serviced` file.

Note [RFC 1918](#) restricts private networks to the 10/8, 172.16/12, and 192.168/16 address spaces. However, Control Center accepts any valid, 16-bit, IPv4 address space for its private network.

For example, to set the private subnet for Control Center to 10.20/16, uncomment the `SERVICED_VIRTUAL_ADDRESS_SUBNET` variable, and then set its value to 10.20.

The following commands make the required edits to `/etc/default/serviced`.

```
SUBNET=10.20
EXT=$(date +"%j-%H%M%S")
test ! -z "${SUBNET}" && \
sed -i.${EXT} -e \
's|^#[^S]*\ (SERVICED_VIRTUAL_ADDRESS_SUBNET=)\.|\1'${SUBNET}'|' \
/etc/default/serviced
```

- 6 Start the Control Center service.

```
systemctl start serviced
```

To monitor progress, enter the following command.

```
journalctl -u serviced -f
```

- To configure additional hosts, return to [Preparing a resource pool host](#) on page 17.
- To start Zenoss Core, proceed to [Starting and tuning Zenoss Core](#) on page 31.

3

Installing on Ubuntu hosts

The procedures in this chapter install Control Center and Zenoss Core on one or more Ubuntu 14.04 LTS hosts. Please review the information in *Planning your deployment* on page 5 before performing these procedures.

In addition, the procedures in this chapter require access to public Zenoss repositories or local mirrors of Zenoss repositories.

These procedures include example steps to create a *Btrfs* partition on a separate disk, which may not be appropriate for your environment. To create a Btrfs partition in a different way, please refer to your operating system documentation.

Each deployment must have one master host, and may include one or more resource pool hosts. Install the master host first, and then install resource pool hosts.

Installing a master host

Perform the procedures in this section to install Control Center and Zenoss Core on a master host.

Preparing the master host

Follow this procedure to prepare an Ubuntu host for Control Center.

- 1 Log in to the target host as `root` or as a user with `sudo` privileges.
- 2 Verify that the host implements the 64-bit version of the x86 instruction set.

```
uname -m
```

- If the output is `x86_64`, the architecture is 64-bit. Proceed to the next step
 - If the output is `i386/i486/i586/i686`, the architecture is 32-bit. Stop this procedure and select a different host.
- 3 Create an Ext4 file system for `/var/lib/docker`, and a Btrfs file system for `/opt/serviced/var/volumes`.

Note The following example procedure creates two file systems on two partitions, `/dev/sdb1` and `/dev/sdb2`. Modify the steps or values in this procedure as required for your environment.

- a Create mount points for the file systems.

```
sudo mkdir -p /var/lib/docker /opt/serviced/var/volumes
```

b Create the file systems.

Replace the values of the partition variables with device paths that are correct for your environment.

```
sudo mkfs.ext4 /dev/sdb1
sudo mkfs.btrfs --nodiscard /dev/sdb2
```

c Add the new file systems to the `/etc/fstab` file.

```
sudo sh -c 'echo \
"/dev/sdb1 /var/lib/docker ext4 defaults 0 0" \
>> /etc/fstab'
sudo sh -c 'echo \
"/dev/sdb2 /opt/serviced/var/volumes btrfs \
rw,noatime,nodatacow,skip_balance 0 0" \
>> /etc/fstab'
```

d Mount the file systems, and then verify they mounted correctly.

```
sudo mount -a
sudo mount | egrep 'docker|serviced'
```

The output of the preceding command should be similar to the following example.

```
/dev/sdb1 on /var/lib/docker type ext4
(rw,relatime,seclabel,attr2,inode64,noquota)
/dev/sdb2 on /opt/serviced/var/volumes type btrfs
(rw,noatime,seclabel,nodatasum,nodatacow,skip_balance,ssd,space_cache)
```

4 Disable the firewall.

```
sudo ufw disable
```

5 Disable Security-Enhanced Linux (SELinux), if installed.**a** Determine whether SELinux is installed.

```
test -f /etc/selinux/config && grep '^SELINUX=' /etc/selinux/config
```

If the preceding commands return a result, SELinux is installed.

b Set the operating mode to disabled, and confirm the setting.

```
EXT=$(date +"%j-%H%M%S")
sudo sed -i.${EXT} -e 's/^SELINUX=.*SELINUX=disabled/g' \
/etc/selinux/config && \
grep '^SELINUX=' /etc/selinux/config
```

A reboot is required to complete the configuration change, and a reboot is the last step of this procedure.

6 Install *Docker*.

```
sudo sh -c 'echo "deb http://get.docker.com/ubuntu docker main" \
> /etc/apt/sources.list.d/docker.list'
sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 \
--recv-keys 36A1D7869245C8950F966E92D8576A8BA88D21E9
sudo apt-get update
sudo apt-get install -y lxc-docker-1.5.0
```

7 Configure and restart Docker.

- a Identify the IPv4 address and subnet Docker has selected for its virtual Ethernet bridge.

```
ifconfig | grep -A 1 'docker0' | grep inet
```

Note Typically, the address and subnet is 172.17.42.1/16. For more information about changing the selection, refer to Docker's [advanced network configuration](#) article.

- b Add the storage driver and DNS flags to the Docker startup options.
If you change the virtual bridge subnet, replace the IP address in the following command.

```
MYOPTS='\nDOCKER_OPTS="-s devicemapper --dns=172.17.42.1"'
sudo sed -i -e '/^#DOCKER_OPTS=/ s|${MYOPTS}|' /etc/default/docker
```

- c Add the current user to the Docker group.

```
sudo usermod -aG docker $USER
```

- d Stop and restart Docker.

```
sudo stop docker && sudo start docker
```

- 8 Install the Zenoss OpenPGP public key.

```
sudo apt-key adv --keyserver keys.gnupg.net --recv-keys AA5A1AD7
```

- 9 Add the Zenoss repository to the list of repositories.

If you are using a local mirror of the public Zenoss repository, replace the value of the REPO variable with your mirror's address in the following commands.

```
REPO=http://get.zenoss.io/apt/ubuntu
sudo sh -c 'echo "deb [ arch=amd64 ] '${REPO}' trusty universe" \
> /etc/apt/sources.list.d/zenoss.list'
```

- 10 Update the Ubuntu repository database.

```
sudo apt-get update
```

- 11 Install the NTP package and start ntpd.

```
sudo apt-get install -y ntp
```

- 12 Reboot the host.

```
sudo reboot
```

Installing on the master host

Perform this procedure to install Control Center and Zenoss Core on the master host.

- 1 Log in to the target host as a user with `sudo` and `docker` privileges.
- 2 Install the Zenoss Core service template.

```
sudo apt-get install -y zenoss-core-service
```


3 Change the volume type for application data.

The `/etc/default/serviced` file contains variables that define the character of an instance of Control Center. For more information about `serviced` configuration options, refer to the Control Center help.

The following `sed` command changes the value of the `SERVICED_FS_TYPE` variable from the default, `rsync`, to `btrfs`.

```
EXT=$(date +"%j-%H%M%S")
sudo sed -i.${EXT} \
  -e 's|^#[^S]*\ (SERVICED_FS_TYPE=) .*$|\btrfs|' \
  /etc/default/serviced
```

4 Optional: Configure the master host for multi-host deployment, if desired.

The default values in the Control Center defaults file, `/etc/default/serviced`, configure Control Center for a single-host deployment. To enable a multi-host deployment, uncomment and change the following variables.

HOME

The path `docker` uses to locate the `.dockercfg` authentication file. Docker Hub credentials are stored in the file.

SERVICED_REGISTRY

Determines whether `serviced` uses a local registry to store Docker images. Set the value to 1, true.

SERVICED_AGENT

Determines whether a `serviced` instance acts as a resource pool host. A resource pool host runs application services scheduled for the resource pool to which it belongs. Set the value to 1, true.

SERVICED_MASTER

Determines whether a `serviced` instance acts as the Control Center master host. The master host runs the application services scheduler and other internal services, including the web server for the Control Center web interface. A `serviced` instance may be configured as both an agent and a master. Set the value to 1, true.

The following commands make the required edits to `/etc/default/serviced`.

```
EXT=$(date +"%j-%H%M%S")
sudo sed -i.${EXT} -e 's|^#[^H]*\ (HOME=/root\)|\1|' \
  -e 's|^#[^S]*\ (SERVICED_REGISTRY=) .|\1|' \
  -e 's|^#[^S]*\ (SERVICED_AGENT=) .|\1|' \
  -e 's|^#[^S]*\ (SERVICED_MASTER=) .|\1|' \
  /etc/default/serviced
```

5 Optional: Specify an alternate private subnet for Control Center, if necessary.

By default, Control Center uses the 10.3/16 private subnet for virtual IP addresses. If your environment already uses 10.3/16 for other purposes, select an unused subnet for Control Center, and add it to the `/etc/default/serviced` file.

Note [RFC 1918](#) restricts private networks to the 10/8, 172.16/12, and 192.168/16 address spaces. However, Control Center accepts any valid, 16-bit, IPv4 address space for its private network.

For example, to set the private subnet for Control Center to 10.20/16, uncomment the `SERVICED_VIRTUAL_ADDRESS_SUBNET` variable, and then set its value to 10.20.

The following commands make the required edits to `/etc/default/serviced`.

```
SUBNET=10.20
EXT=$(date +"%j-%H%M%S")
test ! -z "${SUBNET}" && \
sudo sed -i.${EXT} -e \
's|^#[^S]*\ (SERVICED_VIRTUAL_ADDRESS_SUBNET=) .*|\1'${SUBNET}'|' \
/etc/default/serviced
```

- 6 Start the Control Center service.

```
sudo start serviced
```

The `serviced` daemon invokes `docker` to pull its internal services image from Docker Hub. The Control Center web interface is unavailable until the image is installed and the services are started. The process takes approximately 5-10 minutes.

- 7 Configure resource pool hosts or start Zenoss Core.
 - To configure resource pool hosts, proceed to [Preparing a resource pool host](#) on page 26.
 - To start Zenoss Core, proceed to [Starting and tuning Zenoss Core](#) on page 31.

Installing a resource pool host

Perform the procedures in this section to install Control Center on a resource pool host. Repeat the procedures for each host you wish to add to your Zenoss Core deployment.

Preparing a resource pool host

Follow this procedure to prepare an Ubuntu host for Control Center.

- 1 Log in to the target host as `root` or as a user with `sudo` privileges.
- 2 Verify that the host implements the 64-bit version of the x86 instruction set.

```
uname -m
```

- If the output is `x86_64`, the architecture is 64-bit. Proceed to the next step
 - If the output is `i386/i486/i586/i686`, the architecture is 32-bit. Stop this procedure and select a different host.
- 3 Disable the firewall.

```
sudo ufw disable
```

- 4 Create an Ext4 file system for `/var/lib/docker`.

Note The following example procedure creates one file system on one partition, `/dev/sdb1`. Modify the steps or values in this step as required for your environment.

- a Create a mount point for the file system.

```
sudo mkdir -p /var/lib/docker
```

- b Create the file system.

Replace the values of the partition variables with device paths that are correct for your environment.

```
sudo mkfs.ext4 /dev/sdb1
```

- c Add the new file system to the `/etc/fstab` file.

```
sudo sh -c 'echo \
"/dev/sdb1 /var/lib/docker ext4 defaults 0 0" \
>> /etc/fstab'
```

- d Mount the file system, and then verify it mounted correctly.

```
sudo mount -a && sudo mount | egrep docker
```

The output of the preceding command should be similar to the following example.

```
/dev/sdb1 on /var/lib/docker type ext4
(rw,relatime,seclabel,attr2,inode64,noquota)
```

- 5 Disable Security-Enhanced Linux (SELinux), if installed.

- a Determine whether SELinux is installed.

```
test -f /etc/selinux/config && grep '^SELINUX=' /etc/selinux/config
```

If the preceding commands return a result, SELinux is installed.

- b Set the operating mode to `disabled`, and confirm the setting.

```
EXT=$(date +"%j-%H%M%S")
sudo sed -i.${EXT} -e 's/^SELINUX=.*SELINUX=disabled/g' \
/etc/selinux/config && \
grep '^SELINUX=' /etc/selinux/config
```

A reboot is required to complete the configuration change, and a reboot is the last step of this procedure.

- 6 Install *Docker*.

```
sudo sh -c 'echo "deb http://get.docker.com/ubuntu docker main" \
> /etc/apt/sources.list.d/docker.list'
sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 \
--recv-keys 36A1D7869245C8950F966E92D8576A8BA88D21E9
sudo apt-get update
sudo apt-get install -y lxc-docker-1.5.0
```

- 7 Configure and restart Docker.

- a Identify the IPv4 address and subnet Docker has selected for its virtual Ethernet bridge.

```
ifconfig | grep -A 1 'docker0' | grep inet
```

Note Typically, the address and subnet is `172.17.42.1/16`. For more information about changing the selection, refer to Docker's [advanced network configuration](#) article.

- b Add the storage driver and DNS flags to the Docker startup options.

If you change the virtual bridge subnet, replace the IP address in the following command.

```
MYOPTS='\nDOCKER_OPTS="-s devicemapper --dns=172.17.42.1"'
sudo sed -i -e '/^#DOCKER_OPTS=/ s|$| "${MYOPTS}"|' \
```

```
/etc/default/docker
```

- c Add the current user to the Docker group.

```
sudo usermod -aG docker $USER
```

- d Stop and restart Docker.

```
sudo stop docker && sudo start docker
```

- 8 Install the Zenoss OpenPGP public key.

```
sudo apt-key adv --keyserver keys.gnupg.net --recv-keys AA5A1AD7
```

- 9 Add the Zenoss repository to the list of repositories.

If you are using a local mirror of the public Zenoss repository, replace the value of the REPO variable with your mirror's address in the following commands.

```
REPO=http://get.zenoss.io/apt/ubuntu
sudo sh -c 'echo "deb [ arch=amd64 ] '${REPO}' trusty universe" \
> /etc/apt/sources.list.d/zenoss.list'
```

- 10 Update the Ubuntu repository database.

```
sudo apt-get update
```

- 11 Install the NTP package and start ntpd.

```
sudo apt-get install -y ntp
```

- 12 Reboot the host.

```
sudo reboot
```

Installing Control Center

- 1 Log in to the host as a user with sudo and docker privileges.
- 2 Install Control Center

```
sudo apt-get install -y serviced
```

- 3 Configure the resource pool host for a multi-host deployment.

- a Create a variable for the IP address or hostname of the master host.

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

Note Replace `192.0.2.10` with the IP address of your Control Center master host.

```
MHOST=192.0.2.10
```

- b Change variables in the Control Center defaults file.

The default values in `/etc/default/serviced` configure Control Center for a single-host deployment. To enable a multi-host deployment, uncomment and change the following variables.

HOME

The path `docker` uses to locate the `.dockercfg` authentication file. Docker Hub credentials are stored in the file.

SERVICED_REGISTRY

Determines whether `serviced` uses a local registry to store Docker images. Set the value to 1, true.

SERVICED_AGENT

Determines whether a `serviced` instance acts as a resource pool host. Set the value to 1, true.

SERVICED_MASTER

Determines whether a `serviced` instance acts as the Control Center master host. Set the value to 0, false.

SERVICED_MASTER_IP

The IP address of the `serviced` instance configured as the master. Set the `SERVICED_MASTER_IP` variable to the IP address of the master host, then uncomment `SERVICED_MASTER_IP` and all other variables that reference it (`SERVICED_ZK`, `SERVICED_DOCKER_REGISTRY`, `SERVICED_ENDPOINT`, `SERVICED_LOG_ADDRESS`, `SERVICED_LOGSTASH_ES`, and `SERVICED_STATS_PORT`).

The following commands make the required edits to `/etc/default/serviced`.

```
EXT=$(date +"%j-%H%M%S")
test ! -z "${MHOST}" && \
sudo sed -i.${EXT} -e 's|^#[^H]*\ (HOME=/root\)|\1|' \
-e 's|^#[^S]*\ (SERVICED_REGISTRY=)\.|\11|' \
-e 's|^#[^S]*\ (SERVICED_AGENT=)\.|\11|' \
-e 's|^#[^S]*\ (SERVICED_MASTER=)\.|\10|' \
-e 's|^#[^S]*\ (SERVICED_MASTER_IP=)\. *|\1'${MHOST}'|' \
-e '/=#SERVICED_MASTER_IP/ s|^#[^S]*|' \
/etc/default/serviced
```

- 4 Optional: Specify an alternate private subnet for Control Center, if necessary.

By default, Control Center uses the 10.3/16 private subnet for virtual IP addresses. If your environment already uses 10.3/16 for other purposes, select an unused subnet for Control Center, and add it to the `/etc/default/serviced` file.

Note [RFC 1918](#) restricts private networks to the 10/8, 172.16/12, and 192.168/16 address spaces. However, Control Center accepts any valid, 16-bit, IPv4 address space for its private network.

For example, to set the private subnet for Control Center to 10.20/16, uncomment the `SERVICED_VIRTUAL_ADDRESS_SUBNET` variable, and then set its value to 10.20.

The following commands make the required edits to `/etc/default/serviced`.

```
SUBNET=10.20
EXT=$(date +"%j-%H%M%S")
test ! -z "${SUBNET}" && \
sudo sed -i.${EXT} -e \
's|^#[^S]*\ (SERVICED_VIRTUAL_ADDRESS_SUBNET=)\. *|\1'${SUBNET}'|' \
/etc/default/serviced
```

- 5 Start the Control Center service.

```
sudo start serviced
```

- To configure additional hosts, return to *Preparing a resource pool host* on page 26.
- To start Zenoss Core, proceed to *Starting and tuning Zenoss Core* on page 31.

4

Starting and tuning Zenoss Core

The procedures in this chapter demonstrate how to start Zenoss Core for the first time, and how to install optional packages. Some of the procedures are optional, depending on whether your deployment is single-host or multi-host. For best results, perform the procedures in the order in which they appear in this chapter.

Enabling access to the Control Center web interface

To gain access to the Control Center web interface, users must be members of the Control Center administrative group on the master host. The default administrative group is the system group. (On Ubuntu hosts, the system group is `sudo`; on RHEL/CentOS hosts, it is `wheel`.) You may add users to the system group, or designate a regular group as the administrative group.

- 1 Log in to the master host as `root` or as a user with `sudo` privileges.
- 2 Add users to the administrative group.
 - To add users to the default administrative group (the system group) enter one of the following commands for each user to add.
 - Ubuntu hosts: `sudo usermod -aG sudo User`
 - RHEL/CentOS hosts: `sudo usermod -aG wheel User`
 - To designate a regular group as the administrative group, perform the remaining steps of this procedure.
- 3 Create a variable for the group to designate as the administrative group.
In this example, the name of group to create is `serviced`. You may choose any name, or use an existing group.

```
GROUP=serviced
```

- 4 Create a new group, if necessary.
 - Ubuntu hosts: `sudo addgroup ${GROUP}`
 - RHEL/CentOS hosts: `sudo groupadd ${GROUP}`
- 5 Add one or more existing users to the group to designate as the administrative group.
Repeat the following command for each user to add.

```
sudo usermod -aG ${GROUP} User
```

- 6 Change the value of the `SERVICED_ADMIN_GROUP` variable in `/etc/default/serviced`.

```
EXT=$(date +"%j-%H%M%S")
```

```
test ! -z "${GROUP}" && sudo sed -i.${EXT} -e \
's|^#[^S]*\ (SERVICED_ADMIN_GROUP=) .*$|\1'${GROUP}'|' \
/etc/default/serviced || \
echo "*** GROUP undefined; no edit performed"
```

- Optional: Prevent root users and members of the sudo or wheel groups from gaining access to the Control Center web interface.

```
EXT=$(date +"%j-%H%M%S")
sudo sed -i.${EXT} \
-e 's|^#[^S]*\ (SERVICED_ALLOW_ROOT_LOGIN=) .*$|\10'|' \
/etc/default/serviced
```

- Restart Control Center.
 - Ubuntu hosts: `sudo stop serviced && sudo start serviced`
 - RHEL/CentOS hosts: `systemctl stop serviced && systemctl start serviced`

Deploying the Zenoss Core application

Perform this procedure after enabling client access.

- Log in to the Control Center web interface.

For example, if the master host is `mypc`, then the address of the Control Center web interface is `https://mypc`.

Note Access to this interface is restricted to users with accounts on the Control Center master host.

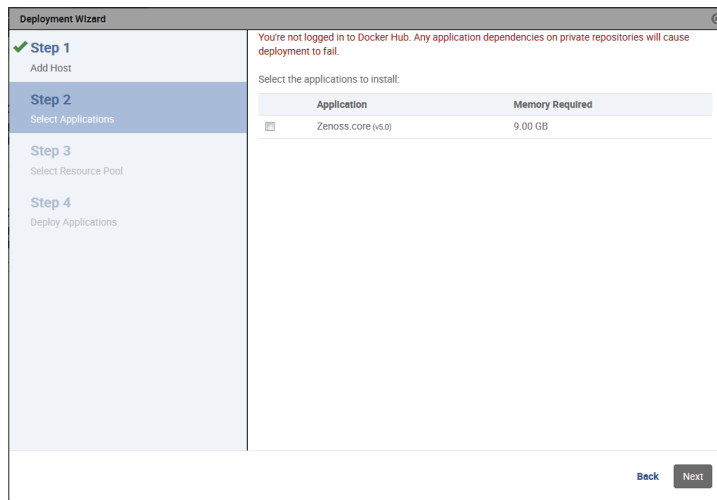
The **Deployment Wizard** displays on initial login.

- Add a host to the default resource pool.

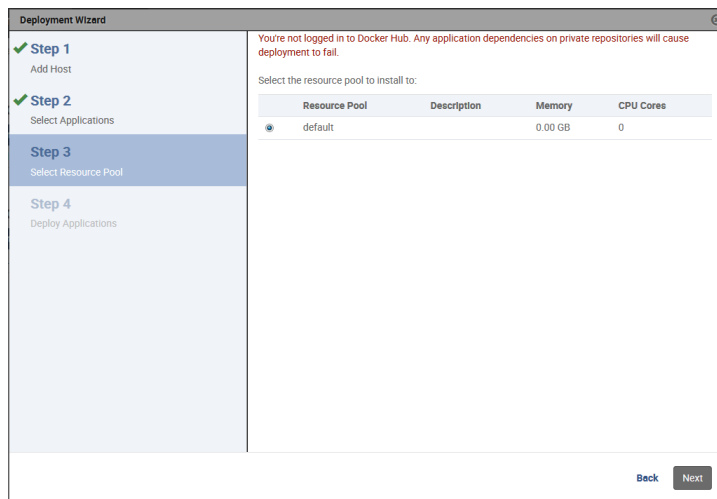
For this step, the host to add is the Control Center master host. Add resource pool hosts after completing the Deployment Wizard, if desired.

- In the **Host and Port** field, enter the hostname or IP address of the Control Center master host, followed by a colon character (:), and then 4979.
 - If you enter a hostname, all hosts in your Control Center deployment must be able to resolve the name, either through an entry in `/etc/hosts` or through a nameserver on your network.
 - Port 4979 is the default port Control Center uses to communicate among hosts in resource pools.

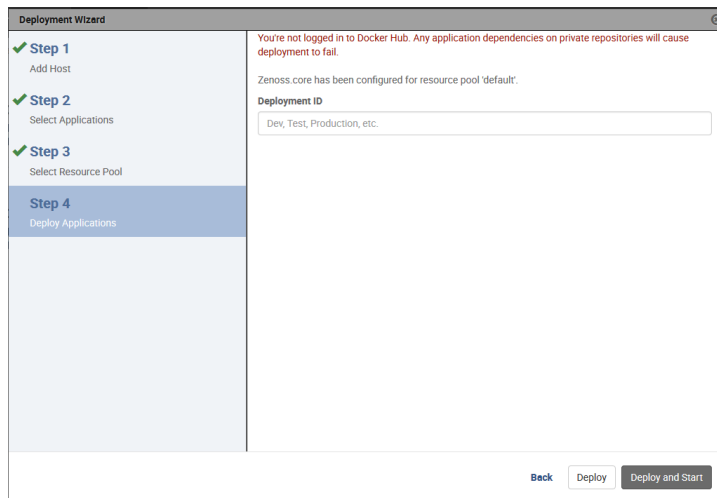
- b In the **Resource Pool ID** field, select `default` from the list, and then click **Next**.
- 3 Select an application to deploy.
 - a Mark the `zenoss.core (v5.0)` checkbox.



- b Click **Next**.
- 4 Select a resource pool for the application.
 - a Select the radio button of the `default` pool.



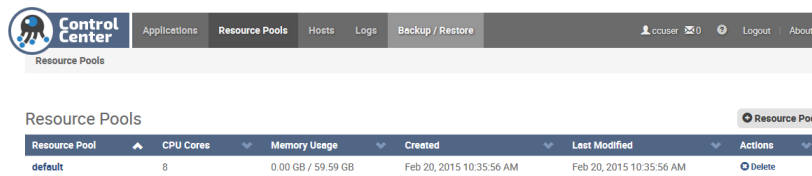
- b Click **Next**.
- 5 Deploy the application to the resource pool.
 - a In the **Deployment ID** field, enter an identifier for this deployment of the application.



- b Click **Deploy**.
Control Center pulls the application's images from the Zenoss repository at Docker Hub, which takes 20-30 minutes.
 - c When the **Deployment Wizard** completes, refresh the browser window to update the **Applications** table.
- 6 Optional: Add hosts to the default resource pool or other resource pools, if desired.
- To add hosts to the default resource pool, see [Adding a host to a resource pool](#) on page 35.
 - To add hosts to other resource pools, see [Creating a resource pool](#) on page 34.

Creating a resource pool

- 1 Log in to the Control Center web interface.
- 2 In the Control Center menu bar, click **Resource Pools**.



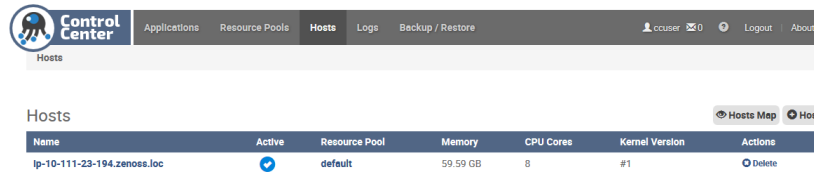
- 3 On the **Resource Pools** page, click the **+Resource Pool** button, located at the right side of the page.

- 4 In the **Resource Pool** field of the **Add Resource Pool** dialog, enter a name for the new resource pool.
- 5 Optional: In the **Description** field, enter a brief description of the purpose of the new resource pool, and then click **Add Resource Pool**.

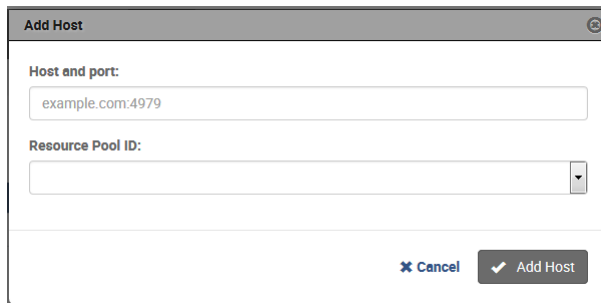
To add hosts to the new resource pool, see [Adding a host to a resource pool](#) on page 35.

Adding a host to a resource pool

- 1 Log in to the Control Center web interface.
- 2 In the Control Center menu bar, click **Hosts**.



- 3 On the **Hosts** page, click the **+Host** button, located at the right side of the page.



- 4 In the **Host and Port** field of the **Add Host** dialog, enter the hostname or IP address of a Control Center resource pool host, followed by a colon character (:), and then 4979.
- 5 In the **Resource Pool ID** field, select a resource pool from the list, and then click **Add Host**.

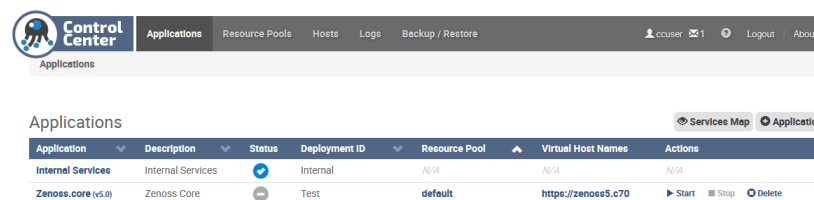
When you add a host to a remote resource pool, the master host's `serviced` will restart NFS after some delay before the remote host can mount the `serviced` volume to start services. The default wait time before starting the NFS server is 3 minutes; however, you also manually restart NFS on the remote master host.

Changing default passwords

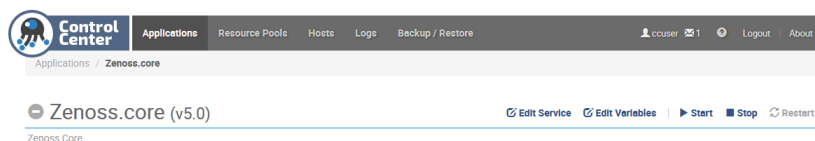
Zenoss Core includes several services with independent authentication systems, each of which have default passwords defined by Zenoss. This procedure describes how to gain access to passwords and other global application variables.

Note You may change any default password. However, Zenoss recommends not changing account names.

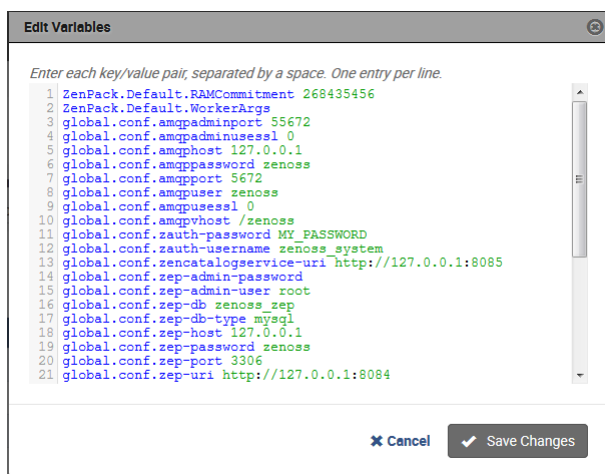
- 1 Log in to the Control Center web interface.



- 2 In the **Application** column of the **Applications** table, click the application name (**Zenoss.core**).



- In the application title line, click **Edit Variables**.



- Change the default password of the RabbitMQ service.
 - In the **Edit Variables** dialog, locate the `global.conf.amqppassword` variable.
 - Replace the default value, `zenoss`, with a new password.
- Change the default password of the Zenoss authentication proxy.
 - In the **Edit Variables** dialog, locate the `global.conf.zauth-password` variable.
 - Replace the default value, `MY_PASSWORD`, with a new password.
- Edit other passwords as desired, and then click **Save Changes**.

Enabling access to application-level services

Control Center proxies the IP addresses of the services it manages, and the addresses can change during normal operations. To facilitate access, Control Center provides virtual host aliases for Zenoss Core, HBase, OpenTSDB, and RabbitMQ.

Note For each virtual host alias in the following table, substitute the hostname of your Control Center master host for *Master*.

Virtual host alias	Application	Description
<code>https://zenoss5.Master</code>	Zenoss Core	The browser interface of Zenoss Core.
<code>https://hbase.Master</code>	Apache HBase	The browser interface of the Apache HBase instance in which OpenTSDB stores device monitoring data.
<code>https://opentsdb.Master</code>	OpenTSDB	The browser interface of the OpenTSDB database which Zenoss Core uses to manage and manipulate device monitoring data.
<code>https://rabbitmq.Master</code>	RabbitMQ	The administrative interface of the RabbitMQ service.

To enable access to application-level services, configure network-wide access, or configure client systems individually.

- To configure network-wide access, ask your network administrator to add the virtual host aliases to a DNS server.
- To configure client systems individually, add the virtual host aliases to the `C:\Windows\System32\drivers\etc\hosts` file (Windows systems) or the `/etc/hosts` file (Linux and OS/X systems).

Note You may create additional virtual host aliases for each of the services identified in the preceding table. For more information, see [Creating virtual host aliases](#) on page 38.

Virtual host alias name resolution

The following line shows the syntax of the entry to add to a DNS server or to a client system's name resolution file.

```
IP-Address Host.Domain Host zenoss5.Host hbase.Host opentsdb.Host
rabbitmq.Host
```

The following entry is for a master host at IP address `192.0.2.12`, named `cc`, in the `big.io` domain.

```
192.0.2.12 cc.big.io cc zenoss5.cc hbase.cc opentsdb.cc rabbitmq.cc
```

Configuring name resolution on a Windows 7 system

To perform this procedure, you need Windows Administrator privileges.

- 1 Log in to the Windows 7 system as a user with Administrator privileges.
- 2 From the **Start** menu, highlight **All Programs > Accessories > Notepad**.
- 3 Right click, and then select **Run as administrator**.
- 4 From the Notepad **File** menu, select **Open**.
- 5 In the **File name** field of the **Open** window, enter `C:\Windows\System32\drivers\etc\hosts`.
- 6 Add the name resolution entry for your Control Center master host to the end of the file.
For example, the following entry is for a master host at IP address `192.0.2.12`, named `cc`, in the `big.io` domain.

```
192.0.2.12 cc.big.io cc zenoss5.cc hbase.cc opentsdb.cc rabbitmq.cc
```

- 7 Save the file, and then exit Notepad.

Configuring name resolution on a Linux or OS/X system

To perform this procedure, you need superuser privileges on the client system.

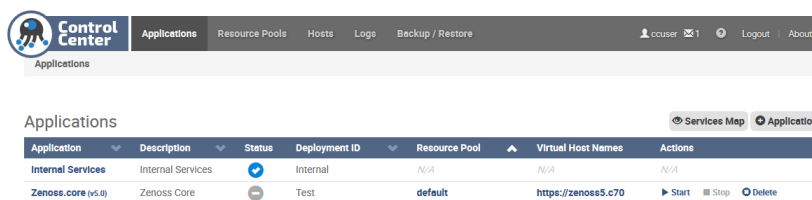
- 1 Log in to the client system as `root` or as a user with `sudo` privileges.
- 2 Add the name resolution entry for your Control Center master host to the end of the file.
For example, the following entry is for a master host at IP address `192.0.2.12`, named `cc`, in the `big.io` domain.

```
192.0.2.12 cc.big.io cc zenoss5.cc hbase.cc opentsdb.cc rabbitmq.cc
```

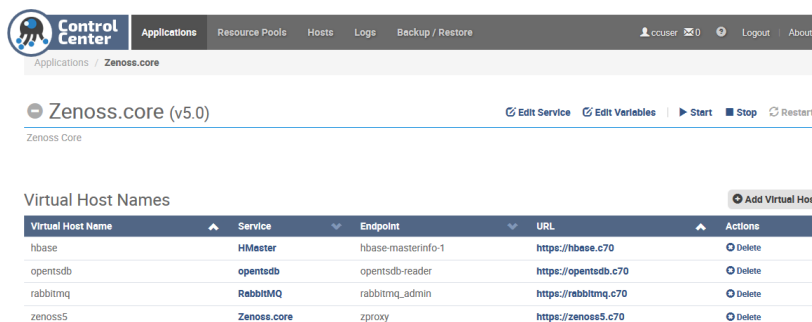
- 3 Save the file, and then close the editor.

Creating virtual host aliases

- 1 Log in to the Control Center web interface.



- 2 In the **Application** column of the **Applications** table, click the application name (**Zenoss.core**).



- 3 Click the **+ Add Virtual Host** button, located above the **Virtual Hosts** table, on the right side.

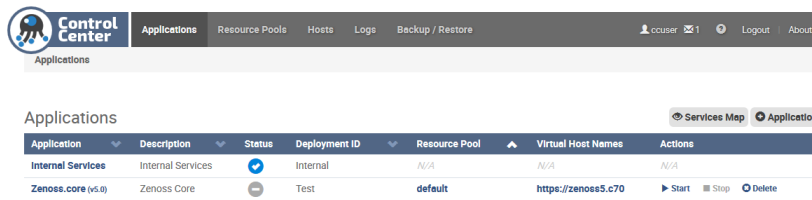
- 4 Define the new virtual host alias.
 - a In the **Name** field, enter a fully-qualified domain name for the new alias.
 - b From the **Service - Endpoint** list, select a service to associate with the new alias.
 - c Click **Add Virtual Host**.

Configuring OpenTSDB compaction

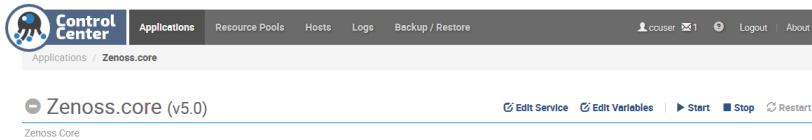
Zenoss Core uses an OpenTSDB database to store the monitoring data it collects. When OpenTSDB compaction is enabled, multiple columns in an HBase row are merged into a single column, to reduce disk space. In testing, Zenoss has observed that the merges result in duplicate data points, so by default, compaction is disabled. Duplicate data points do not affect the integrity of the data.

Perform this procedure to enable OpenTSDB compaction.

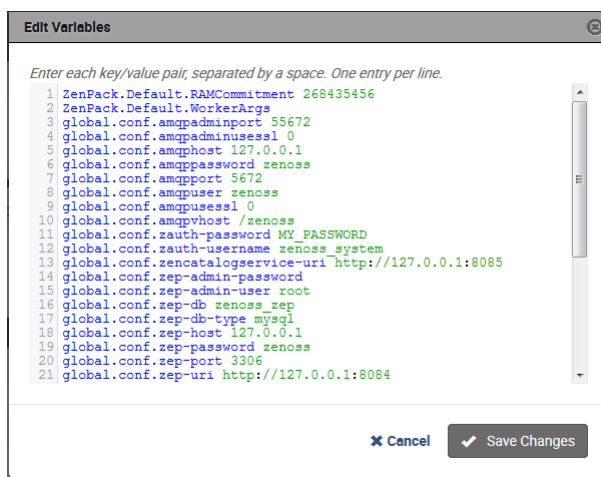
- 1 Log in to the Control Center web interface.



- In the **Application** column of the **Applications** table, click the application name (**Zenoss.core**).



- In the application title line, click **Edit Variables**.



- In the **Edit Variables** dialog, scroll to the bottom of the list.
- Change the value of the `tsd.storage.enable_compaction` variable from `False` to `True`.
- Click **Save Changes**.

Installing the Quilt package

Perform this procedure to install the Quilt patch management system into a Zenoss Core image.

- Log in to the Control Center master host as a user with `serviced` CLI privileges.
- Copy the following script and paste it into a file (in this example, `quilt.txt`) on the master host.

```

DESCRIPTION quilt.txt -- add Quilt to a Zenoss image
VERSION zenoss-quilt-1.0
REQUIRE SVC
SNAPSHOT

# Download the EPEL RPM
SVC_EXEC COMMIT Zenoss.resmgr yum install -y epel-release
# Download repository metadata
SVC_EXEC COMMIT Zenoss.resmgr yum makecache -y
# Install quilt
SVC_EXEC COMMIT Zenoss.resmgr yum install -y quilt
# Remove EPEL
  
```

```
SVC_EXEC COMMIT Zenoss.resmgr yum erase -y epel-release
# Clean up yum caches
SVC_EXEC COMMIT Zenoss.resmgr yum clean all
```

- 3 Verify the syntax of the script file.

```
serviced script parse quilt.txt
```

- If the preceding command returns no result, proceed to the next step.
 - If the preceding command returns an error, correct the error and parse the file again.
- 4 Install the Quilt package.

```
serviced script run quilt.txt --service Zenoss.core
```

Installing the Percona Toolkit

The *Percona Toolkit* is a collection of helpful utilities for MySQL and MariaDB databases. It uses the GNU GPL v2 license, so Zenoss can not distribute it. All installations of Zenoss Core should install this package.

- 1 Log in to the Control Center master host as a user with `serviced` CLI privileges.
- 2 Install the package.

```
serviced service run zope install-percona
```

At the end of the installation process, the message `Container not committed` is displayed. This is normal. The tools are installed in the distributed file system, not in an image.

Starting the Zenoss Core application

To perform this procedure, you need a user account that is a member of the Control Center administrative group on the master host.

- 1 Log in to the Control Center browser interface.
CLI equivalent: Log in to the Control Center master host as a user with `serviced` CLI privileges.

The screenshot shows the Zenoss Control Center web interface. The top navigation bar includes 'Control Center', 'Applications', 'Resource Pools', 'Hosts', 'Logs', 'Backup / Restore', and user information 'ccuser 2 Logout About'. The main content area is titled 'Applications' and contains a table with columns: Application, Description, Status, Deployment ID, Resource Pool, Virtual Host Names, and Actions. The table lists 'Internal Services' and 'Zenoss.core (v5.0)'. The 'Zenoss.core (v5.0)' row has a 'Start' button in the Actions column. Below the table is an 'Application Templates' section with a table listing 'Zenoss.core (v5.0)' and its ID.

Application	Description	Status	Deployment ID	Resource Pool	Virtual Host Names	Actions
Internal Services	Internal Services	✓	Internal	N/A	N/A	N/A
Zenoss.core (v5.0)	Zenoss Core	⊖	test	default	https://zenoss5x.gee-u14	▶ Start ⊞ Stop ⊞ Delete

Application Template	ID	Description	Actions
Zenoss.core (v5.0)	d299cfd5d22e62cb37a9f7ea3bea7e6	Zenoss Core	⊞ Delete

- 2 In the **Actions** column of the **Applications** table, click the **Start** control.

CLI equivalent:

```
serviced service start Zenoss.core
```

- 3 Optional: To monitor the startup process, click the application's name in the **Application** column, and then scroll down the page.

CLI equivalent:

```
serviced service status Zenoss.core
```

Deleting the RabbitMQ guest user account

By default, RabbitMQ distributions include the `guest` user account. To prevent security issues, Zenoss recommends deleting the account.

- 1 Log in to the Control Center master host as a user with `serviced` CLI privileges.
- 2 Attach to the RabbitMQ container.

```
serviced service attach rabbitmq
```

- 3 Delete the guest user account.

```
rabbitmqctl delete_user guest
```

- 4 Exit the container session.

```
exit
```

- 5 Restart the RabbitMQ service.

```
serviced service restart rabbitmq
```

Stopping Control Center and applications

To perform this procedure, you need a user account on the Control Center master host with `serviced` CLI privileges.

Control Center is a distributed system that relies on the system clock (and NTP) to coordinate application services. Consequently, pausing or stopping the Control Center master host operating system can leave Control Center in an unknown state, which requires manual intervention to undo. If your Control Center master host is managed by another application, Zenoss strongly recommends following the procedure in this section to stop Control Center, before pausing or stopping the master host.

- 1 Log in to the Control Center master host as a user with `serviced` CLI privileges.
- 2 Stop applications.
For example, to stop Zenoss Core, enter the following command:

```
sudo serviced service stop Zenoss.core
```

To monitor the stop, enter the following command:

```
sudo serviced service status Zenoss.core
```

- 3 Stop Control Center.
 - RHEL/CentOS hosts: `systemctl stop serviced`
 - Ubuntu hosts: `sudo stop serviced`

The Control Center master host operating system may be paused, stopped, or restarted.