

# **VMware vSphere Integrated Containers Installation**

Technical Preview

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# vSphere Integrated Containers Installation

*vSphere Integrated Containers Installation* provides information about how to install and configure VMware vSphere Integrated Containers.

**NOTE** This book is a work in progress.

- For an introduction to vSphere Integrated Containers, see *vSphere Integrated Containers Overview*.
- For information about how to perform day-to-day administration operations with vSphere Integrated Containers, see *vSphere Integrated Containers Administration*.

## Intended Audience

This information is intended for anyone who wants to install, configure, and get started with using vSphere Integrated Containers. The information is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and datacenter operations. Knowledge of container technology is assumed.

# Installing vSphere Integrated Containers

The installation process for vSphere Integrated Containers involves several steps. vSphere Integrated Containers requires you to configure your environment correctly before you begin the installation.

In this technical preview, there are two installation options.

- A command line installer, that deploys virtual container hosts to ESXi hosts or vCenter Server instances, for you to use with Docker. This is the default installation method.
- An OVA installer that graphically deploys a vSphere Integrated Containers management server. The management server allows you to install the vSphere Integrated Containers extension to the vSphere Web Client. The management server also allows you to deploy virtual container hosts directly from the vSphere Web Client.

**NOTE** In this technical preview, the OVA installer and the vSphere Web Client extension are experimental.

# Environment Prerequisites for vSphere Integrated Containers Installation

Before you install vSphere Integrated Containers, you must ensure that your vSphere infrastructure meets certain requirements.

## Supported vSphere Configurations

The required vSphere configurations are different depending on whether you use the command line installer or the OVA installer.

You can install vSphere Integrated Containers in the following vSphere setups:

- Command Line Installer (Default):
  - Standalone ESXi 6.0 host that is not managed by a vCenter Server instance.
  - vCenter Server 6.0, managing a single ESXi 6.0 or 5.5 host.
  - vCenter Server 6.0, managing a cluster of ESXi 6.0 or 5.5 hosts, with DRS enabled.
- OVA Installer (Experimental):
  - vCenter Server 6.0, managing a single ESXi 6.0 or 5.5 host.
  - vCenter Server 6.0, managing a cluster of ESXi 6.0 or 5.5 hosts, with DRS enabled.

In all cases, your ESXi hosts must have at least 8GB of memory.

## License Requirements

The type of license that vSphere Integrated Containers requires depends on the way in which you deploy the software.

Type of Installation	vSphere Feature Used	Required License
Standalone ESXi host vCenter Server managing a single ESXi host	Network Serial Port	vSphere Enterprise
vCenter Server managing a cluster	Distributed Virtual Switch	vSphere Enterprise Plus

All of the ESXi hosts in a cluster require an appropriate license. Installation fails if your environment includes one or more ESXi hosts that have inadequate licenses.

## Role and Permissions Requirements

You must use an account with the vSphere Administrator role when you install vSphere Integrated Containers.

## Network Requirements

- Use a trusted network for the deployment and use of vSphere Integrated Containers.
- Use a trusted network for connections between Docker clients and the virtual container hosts.
- Use a Gigabit connection between the machine on which you run the command line installer and the vCenter Server or ESXi hosts on which you are installing vSphere Integrated Containers. **(TO BE CONFIRMED)**

- Use a Gigabit connection between vCenter Server and the ESXi hosts, and between the ESXi hosts and the virtual container hosts. **(TO BE CONFIRMED)**
- Open outgoing port 2377 on all ESXi hosts, for communication between the hosts and virtual container hosts.
  - For an example of how to open port 2377 on an ESXi host, see [Open an Outgoing Port on ESXi Hosts](#).
  - In test environments, you can disable the firewalls on the ESXi hosts instead of opening port 2377. To disable the firewall, log into the ESXi hosts as `root`, and run the following command:

```
$ esxcli network firewall set --enabled false
```

- Deployment to a vCenter Server cluster requires a private port group for each virtual container host. For instructions about how to create a private port group, see [Create a Private Port Group for Virtual Container Hosts](#).

# Open an Outgoing Port on ESXi Hosts

ESXi hosts communicate with the virtual container hosts via port 2377. For installation to succeed, port 2377 must be open before you install vSphere Integrated Containers.

To open port 2377 on the ESXi hosts, log into each host via SSH and add the following rule after the last rule in the file `/etc/vmware/firewall/service.xml`.

```
<!--Port for VIC communication -->
<service id='*id_number*'>
  <id>vicoutgoing</id>
  <rule id='*id_number*'>
    <direction>outbound</direction>
    <protocol>tcp</protocol>
    <port type='dst'></port type>
    <port>2377</port>
  </rule>
  <enabled>true</enabled>
  <required>true</required>
</service>
```

In this example, *id\_number* is the number of the preceding rule in `service.xml`, incremented by 1.

For detailed instructions about how to add a rule to open a port on an ESXi host, see [VMware KB 2008226](#).

# Create a Private Port Group for Virtual Container Hosts

If you deploy vSphere Integrated Containers to a vCenter Server cluster, you must create a private port group for each virtual container host.

You create private port groups in the vSphere Web Client.

1. Log into the vSphere Web Client for the vCenter Server instance that manages your host or cluster.
2. In the **Home** view, click **Hosts and Clusters**.
3. Select an ESXi host and click the **Manage** tab.
4. Select **Networking > Virtual switches**.
5. Click the icon to **Add host networking**.
6. Select **Virtual Machine Port Group for a Standard Switch** and click **Next**.
7. Select an existing standard switch and click **Next**.
8. Rename the network for ease identification, and click **Next**.

For example, rename the network to `VIC_Network` .

9. Click **Finish**.



# Install vSphere Integrated Containers by Using the Command Line Installer

The command line installer is the default means by which you install vSphere Integrated Containers.

The command line installer deploys a vSphere Integrated Containers virtual container host in one of the following setups:

- AvCenter Server with a cluster
- AvCenter Server with a single host
- A standalone ESXi host.

The virtual container host allows you to use an ESXi host or cluster as the Docker endpoint for a Docker client.

**NOTE** The command line installer does not deploy a vSphere Integrated Containers management server. It does not add an extension in the vSphere Web Client.

## Prerequisites

- Verify that your vSphere infrastructure meets the requirements in [Environment Prerequisites for vSphere Integrated Containers Installation](#).
- Download the latest build of the command line installer bundle, `bonneville.tgz`, from <http://bonneville.eng.vmware.com:8080/job/bonneville-package/lastSuccessfulBuild/artifact/binary/>.
- Unpack `bonneville.tgz` into an appropriate folder on your local machine.
- Familiarize yourself with the installer options described in [vSphere Integrated Containers Installer Options](#).
- Familiarize yourself with the contents of the vSphere Integrated Containers installer bundle, as described in [Contents of the vSphere Integrated Containers Command Line Installer Bundle](#).
- Install a Docker 1.9.1 client. Note that vSphere Integrated Containers is not compatible with Docker 1.10.

## Procedure

1. Open a command prompt and navigate to the folder in which you unpacked the `bonneville.tgz` bundle.
2. Run the installer executable for your operating system.

The following examples include the fewest possible options, for installation in a simple environment.

```
$ install-win.exe -target=<esx_host_or_vcenter_server_address> -user=<esx_host_vcenter_server_username> -passwd="
<password>" -name=<name_for_VIC_appliance> -ceip=<enable/disable>
```

```
$ install-linux -target=<esx_host_or_vcenter_server_address> -user=<esx_host_vcenter_server_username> -passwd="
<password>" -name=<name_for_VIC_appliance> -ceip=<enable/disable>
```

```
$ install-osx -target=10.153.199.227 -target=<esx_host_or_vcenter_server_address> -user=
<esx_host_vcenter_server_username> -passwd="<password>" -name=<name_for_VIC_appliance> -ceip=<enable/disable>
```

3. Verify that the vSphere Integrated Containers appliance has initiated correctly.

At the end of a successful installation, the installer displays a success message:

```
Initialization of appliance successful.
```

```
You can run docker commands via: set DOCKER_HOST=tcp://<virtual_container_host_address>:2376 docker
```

```
You can access logs via: https://<virtual_container_host_address>:2378
```

```
Installer completed successfully...
```

4. (Optional) If you installed onto a vCenter Server instance, log into the vSphere Web Client.
5. (Optional) In the Hosts and Clusters view, navigate to the cluster on which you installed the appliance.

vSphere Integrated Containers version 0.0.1 is displayed in the **Summary** tab for the appliance vApp. The vApp contains a virtual machine and a virtual machine template, both with the name that you provided during installation.

6. (Optional) Select the virtual machine running inside the vApp and click the **Summary** tab.

The **Notes** panel includes the address of the Docker endpoint to use to run Docker commands.

7. On the machine where you installed the Docker client, connect the Docker client to the virtual container host that is running in your vSphere infrastructure.

```
$ export DOCKER_HOST=tcp://<virtual_container_host_address>:2376 docker
```

8. Check that the Docker client is connected to the virtual container host.

```
$ docker info
```

You should see confirmation that the Storage Driver is `vmware-01`. If you installed onto a vCenter Server instance, you should see that the Operating System is `VMware vCenter Server/6.0.0`. The datastore for containers should be a datastore in your vSphere environment.

9. Pull a test Docker container image into the virtual container host.

For example, pull in the BusyBox container.

```
$ docker pull busybox:latest
```

10. In the vSphere Web Client, go to **Storage**, and navigate to the datastore that the virtual container host uses to store containers.
11. Select **Manage > Files**, and navigate to `datastore_name > name_of_VIC_appliance > images`.

You should see a VMDK file for every container image that you have pulled into the virtual container host.

12. Run a Docker container.

For example, run the BusyBox container.

```
$ docker run busybox
```

13. In the **Hosts and Clusters** view of the vSphere Web Client, navigate to the vSphere Integrated Containers appliance, click **Related Objects > Virtual Machines**.

You should see a virtual machine for every container that you are running.

# Contents of the vSphere Integrated Containers Command Line Installer Bundle

The command line installer bundle contains the following files:

File	Description
appliance.iso	The vSphere Integrated Containers appliance that provisions Docker containers as virtual machines to ESXi hosts and manages containers and images.
container-linux.iso	ALinux kernel that bootstraps container virtual machines.
container-msdos.img	An example container image that runs MS DOS.
docker-linux	Docker client version 1.10 for Linux.
docker-osx	Docker client version 1.10 for Mac OS X.
docker-windows.exe	Docker client version 1.10 for Windows.
install-linux	The installation executable for Linux.
install-osx	The installation executable for Mac OS X.
install-windows.exe	The installation executable for Windows.

# vSphere Integrated Containers Command Line Installer Options

The command line installer for vSphere Integrated Containers provides options. The options allow you to customize the installation to match your vSphere environment.

Option	Description
ceip	<b>Mandatory.</b> Enable or disable participation in the VMware Customer Experience Improvement Program. Expected values are enable or disable.
cert	2:3
cidr	2:4
cluster	The path to the cluster on which to install vSphere Integrated Containers. Specify the path by using the vSphere govc CLI format. For example, <code>/my_datacenter/host/my_cluster/</code> . Specify this option if you are installing vSphere Integrated Containers on a vCenter Server instance that manages more than one cluster. Omit this option if vCenter Server only manages one cluster.
containerNetwork	2:6
datacenter	2:7
datastore	2:8
dns	The address of a DNS server, to allow you to assign static IP addresses by using the ip option. You can specify the dns option multiple times, to identify multiple DNS servers. If not specified, the installer assigns IP addresses by using DHCP.
dockerOpts	2:10
externalNetwork	2:11
force	2:12
host	The address of the ESXi host on which to install vSphere Integrated Containers. Specify this option if you are installing vSphere Integrated Containers on a vCenter Server instance that manages more than one host and the hosts are not included in a cluster. Omit this option if vCenter Server only manages one ESXi host.
ip	A static IPv4 address for the vSphere Integrated Containers appliance. Requires you to specify the dns option. If not specified, the installer assigns IP addresses by using DHCP.
key	2:15
logfile	2:16
memoryMB	The amount of RAM to assign to the virtual container host. Specify this option if you intend to run large numbers of containers in this virtual container host. If not specified, the installer assigns 2048 MB of RAM to the virtual container host.
name	A name for the vSphere Integrated Containers appliance. If not specified, the installer sets the name to docker-appliance.
numCPUs	The number of CPUs to assign to the virtual container host. Specify this option if you intend to run large numbers of containers in this virtual container host. If not specified, the installer creates the appliance with 2 CPUs.
os	2:20

passwd	The password for the vCenter Server user account that you are using to install vSphere Integrated Containers, or the password for the ESXi host. If not specified, the installer prompts you to enter the password during installation.
pool	The path to a resource pool in which to place the vSphere Integrated Containers appliance. Specify the path by using the vSphere govc CLI format. For example, <i>/&lt;my_datacenter&gt;/host/&lt;my_cluster&gt;/Resources/&lt;my_resource_pool&gt;</i> .
target	<b>Mandatory.</b> The address of the ESXi host or vCenter Server instance on which you are installing vSphere Integrated containers. If an ESXi host is managed by a vCenter Server instance, you must provide the address of vCenter Server rather than of the host. To facilitate IP address changes in your infrastructure, provide a fully qualified domain name (FQDN) whenever possible, rather than an IP address.
timeout	The timeout period for uploading images to the ESXi host and powering on virtual machines. Specify a value in the format XmYs if the default timeout of 3m0s is insufficient.
uninstall	Uninstalls vSphere Integrated Containers. Removes all virtual machines from the vCenter Server inventory and deletes all files from storage. <ul style="list-style-type: none"> <li>• Requires the target option.</li> <li>• If you installed vSphere Integrated Containers on a vCenter Server instance, you must specify the user option.</li> <li>• If you do not specify the passwd option, the installer prompts you to enter the password.</li> <li>• Specify the yes option to answer yes to all questions during the uninstallation process.</li> </ul>
user	The username for the ESXi host or vCenter Server instance on which you are installing vSphere Integrated containers. <ul style="list-style-type: none"> <li>• If you are installing vSphere Integrated Containers directly on an ESXi host and you do not specify this option, the installer uses the root account for installation.</li> <li>• This option is <b>mandatory</b> if you are installing vSphere Integrated Containers on a vCenter Server instance.</li> </ul>
verify	2:27
yes	Automatically answer yes to all questions during uninstallation.