

# Docker Enterprise Edition on the AWS Cloud

## Quick Start Reference Deployment

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This Quick Start deployment guide was created by Amazon Web Services (AWS) in partnership with Docker, Inc.



## Overview

This Quick Start reference deployment guide provides step-by-step instructions for deploying Docker Enterprise Edition (Standard/Advanced) on the Amazon Web Services (AWS) Cloud. [Quick Starts](#) are automated reference deployments that use AWS CloudFormation templates to launch, configure, and run the AWS compute, network, storage, and other services required to deploy a specific workload on AWS.

Docker Enterprise Edition (EE) is an integrated solution that includes open source and commercial software, the integrations between them, full Docker API support, validated configurations, and commercial support for your Docker EE environment. A pluggable architecture allows flexibility in the compute, networking, and storage providers that are used in your containers as a service (CaaS) infrastructure. The open APIs allow Docker EE to easily integrate into your existing systems, such as LDAP/AD, monitoring, logging, and more.

Docker Enterprise Edition has two main components: Docker Universal Control Plane (UCP) and Docker Trusted Registry (DTR).

- [UCP](#) is an enterprise-grade cluster management solution from Docker that helps you manage your whole cluster from a single place. UCP includes the UCP controllers and UCP nodes.
- [DTR](#) is the enterprise-grade image storage solution from Docker that helps you securely store and manage the Docker images you use in your applications. DTR is deployed in a three-node configuration that includes one DTR master and two DTR replicas.

This Quick Start provides a reference architecture for Docker Enterprise Edition that you can deploy and use on AWS.

## Cost and Licenses

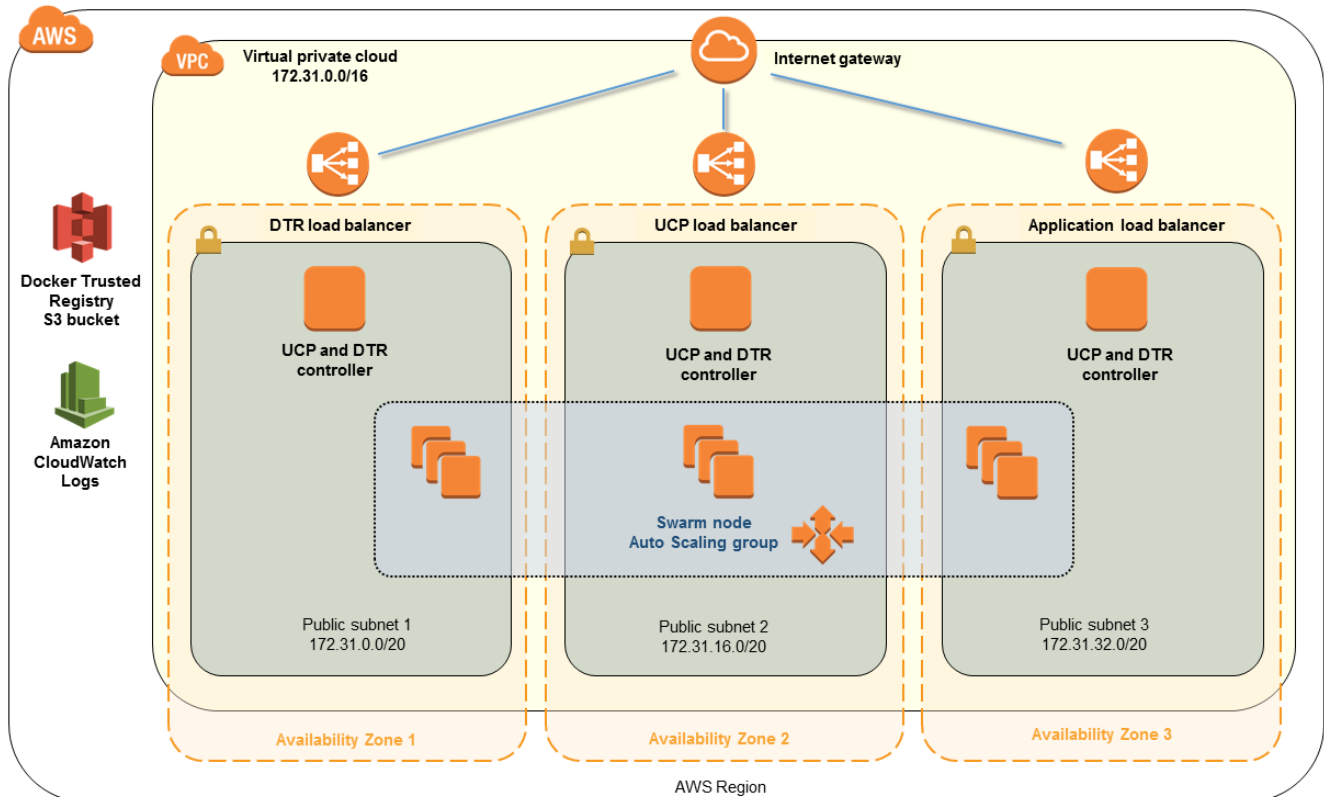
This Quick Start requires a trial license for Docker Enterprise Edition (Standard/Advanced), which is free for 30 days.

You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using the Quick Start.

The AWS CloudFormation template for this Quick Start includes configuration parameters that you can customize. Some of these settings, such as instance type, will affect the cost of deployment. See the pricing pages for each AWS service you will be using for cost estimates.

## Architecture

Deploying this Quick Start with the **default parameters** builds the following Docker Enterprise Edition environment in the AWS Cloud.



**Figure 1: Quick Start architecture for Docker EE on AWS**

The Quick Start sets up the following:

- A virtual private cloud (VPC) that spans three Availability Zones and includes three public subnets.
- Three Swarm controller nodes that run the DTR and UCP services.
- A cluster of Swarm nodes in an Auto Scaling group, so the cluster can grow dynamically as the load on the instances increases.
- Three Elastic Load Balancing (ELB) load balancers in the public subnets. Two of these load balancers provide inbound access to the management consoles for UCP and DTR, and the third provides inbound access to customer applications running on the Swarm nodes.
- Amazon Simple Storage Service (Amazon S3) for backing up the root certificate authorities (CAs).

The deployment is automated by an AWS CloudFormation template. The template starts the installation process by creating all the required AWS resources such as the VPC, security groups, public subnets, Internet gateway, and the S3 bucket.

It then launches the first Docker Swarm controller instances and goes through the installation process of the Docker Enterprise Edition and UCP containers. It backs up the root CAs created by the first UCP controllers to an S3 bucket.

Once the first UCP controller is up and running, the template creates the other UCP controllers, creates the Docker Swarm nodes, and installs DTR. As with the first UCP controller node, all nodes are started by installing Docker Enterprise Edition, followed by running the appropriate UCP or DTR containers to join the cluster. Two ELB load balancers, one for UCP and one for DTR, are launched and automatically configured to provide resilient load balancing across the three Availability Zones. A third ELB load balancer is added to route traffic to customer applications running across the Swarm cluster. Additionally, UCP controllers and Swarm nodes are launched in an Auto Scaling group to provide self-healing and scaling functionality if needed. This architecture ensures that both UCP and DTR instances are spread across all three Availability Zones to ensure resiliency and high availability.

## Prerequisites

Before you deploy this Quick Start, we recommend that you become familiar with the following AWS services. (If you are new to AWS, see [Getting Started with AWS](#).)

- [Amazon VPC](#)
- [Amazon EC2](#)

The Quick Start assumes general knowledge of CaaS concepts and Docker EE. For more information, see the [Docker website](#) and [blog](#).

## Deployment Steps

### Step 1. Register for a Docker EE Trial License

Before you deploy the Quick Start, you must obtain a trial license for Docker EE.

1. Create a Docker ID at <https://hub.docker.com/register/> if you don't already have one.
2. Open the Docker EE trial page at <https://store.docker.com/editions/enterprise/docker-ee-trial> and log in with your credentials.

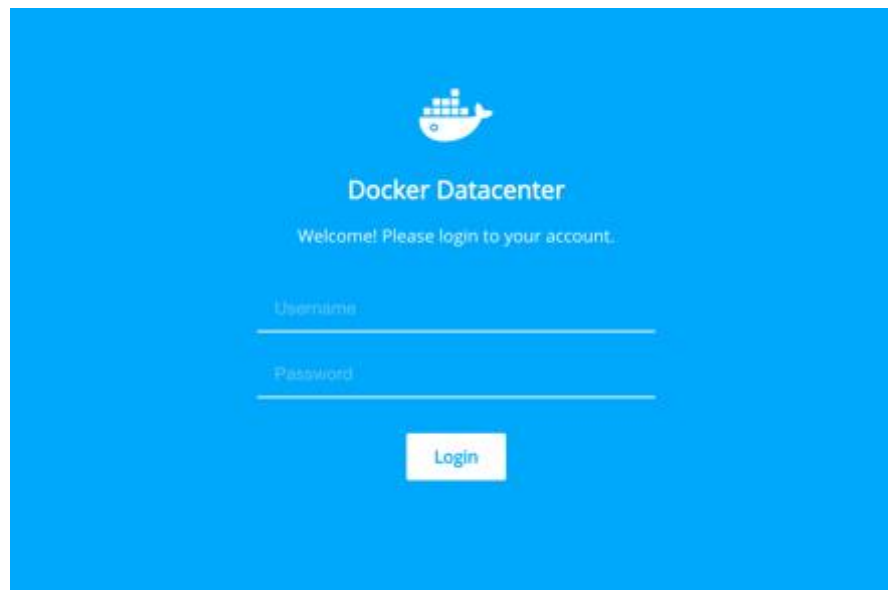


Figure 2: Docker login screen

3. Fill out the registration form and choose **Start Your Free Trial**.
4. On the next screen, download the license key.

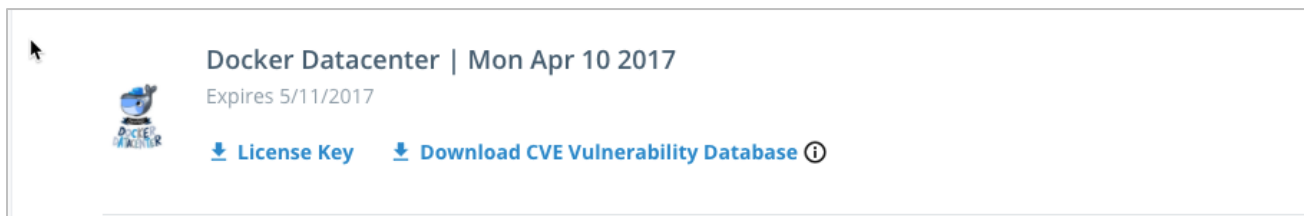


Figure 3: Downloading the Docker license

5. Open the license with a text editor. You'll need this license during the Quick Start deployment process.

## Step 2. Prepare an AWS Account

1. If you don't already have an AWS account, create one at <https://aws.amazon.com> by following the on-screen instructions.
2. Use the region selector in the navigation bar to choose the AWS Region where you want to deploy Docker EE on AWS.
3. Create a [key pair](#) in your preferred region.
4. If necessary, [request a service limit increase](#) for the Amazon EC2 **M3** instance type. You might need to do this if you already have an existing deployment that uses this instance type, and you think you might exceed the [default limit](#) with this reference deployment.

## Step 3. Launch the Quick Start

1. [Deploy the AWS CloudFormation template](#) into your AWS account.


 A blue rectangular button with the word "Launch" in white text.

The template is launched in the US West (Oregon) region by default. You can change the region by using the region selector in the navigation bar.

This stack takes 20-30 minutes to create.

**Note** You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using this Quick Start. See the pricing pages for each AWS service you will be using for full details.

You can also [download the template](#) to use it as a starting point for your own implementation.

2. On the **Select Template** page, keep the default setting for the template URL, and then choose **Next**.
3. On the **Specify Details** page, review the parameters for the template. Enter values for the parameters that require your input. For all other parameters, you can customize the default settings provided by the template.

*Swarm Size:*

Parameter label (name)	Default	Description
<b>Number of Swarm Managers</b> (ManagerSize)	3	Number of Swarm manager nodes. You can choose either 3 or 5 nodes.

Parameter label (name)	Default	Description
<b>Number of Swarm worker nodes</b> (ClusterSize)	5	Number of worker nodes in the Swarm. You can specify 0-1,000 nodes.

### Swarm Properties:

Parameter label (name)	Default	Description
<b>Which SSH key to use</b> (KeyName)	<i>Requires input</i>	Name of an existing EC2 public/private key pair to enable SSH access to the instances. This is the key pair you created in your preferred region in <a href="#">step 2</a> .
<b>Which IPs are allowed to SSH</b> (RemoteSSH)	<i>Requires input</i>	IP address range that can SSH to the EC2 instance. The value 0.0.0.0/0 will allow SSH from anywhere.
<b>Enable daily resource cleanup</b> (EnableSystemPrune)	no	Set to <b>yes</b> if you want to clean up unused images, containers, networks, and volumes on a daily basis. This will increase the cost of the deployment.
<b>Use CloudWatch for container logging</b> (EnableCloudWatchLogs)	no	Set to <b>yes</b> to send all Container logs to CloudWatch. This will increase the cost of the deployment.
<b>Create EFS prerequisites for CloudStor</b> (EnableCloudStorEfs)	no	Set to <b>yes</b> to create CloudStor EFS mount targets. This will increase the cost of the deployment.

### Swarm Manager Properties:

Parameter label (name)	Default	Description
<b>Swarm manager instance type</b> (ManagerInstanceType)	m4.large	EC2 HVM instance type for Swarm managers. Make sure that the instance type you select is supported in your current AWS Region.
<b>Manager ephemeral storage volume size</b> (ManagerDiskSize)	20	Size of the ephemeral storage volume for Swarm managers, in GiB. You can specify 20-1,024 GiB.
<b>Manager ephemeral storage volume type</b> (ManagerDiskType)	gp2	Ephemeral storage volume type for Swarm managers. You can choose standard or gp2.

### Swarm Worker Properties:

Parameter label (name)	Default	Description
<b>Agent worker instance type</b> (InstanceType)	t2.small	EC2 HVM instance type for Swarm workers. Make sure that the instance type you select is supported in your current AWS Region.

Parameter label (name)	Default	Description
<b>Worker ephemeral storage volume size</b> (WorkerDiskSize)	20	Size of the ephemeral storage volume for Swarm workers, in GiB. You can specify 20-1,024 GiB.
<b>Worker ephemeral storage volume type</b> (WorkerDiskType)	standard	Ephemeral storage volume type for Swarm workers. You can choose standard or gp2.

*HTTP Proxy:*

Parameter label (name)	Default	Description
<b>Value for HTTP_PROXY environment variable</b> (HTTPProxy)	<i>Requires input</i>	Value for HTTP_PROXY environment variable.
<b>Value for HTTPS_PROXY environment variable</b> (HTTPProxy)	<i>Requires input</i>	Value for HTTPS_PROXY environment variable.
<b>Value for NO_PROXY environment variable</b> (NoProxy)	<i>Requires input</i>	Value for NO_PROXY environment variable.

*Docker EE Properties:*

Parameter label (name)	Default	Description
<b>Enter the Username you want to use with Docker EE</b> (DDCUsernameSet)	admin	User name for Docker EE.
<b>Enter your Docker EE password</b> (DDCPasswordSet)	<i>Requires input</i>	Password for Docker EE. This string may contain 8-40 characters.
<b>Enter your Docker EE License</b> (License)	<i>Requires input</i>	Docker EE license in JSON format (from <a href="#">step 1</a> ), or URL to download it. You can get a trial license from <a href="https://store.docker.com/editions/enterprise/docker-ee-trial">https://store.docker.com/editions/enterprise/docker-ee-trial</a> .

When you finish reviewing and customizing the parameters, choose **Next**.

- On the **Options** page, you can [specify tags](#) (key-value pairs) for resources in your stack and [set advanced options](#). When you're done, choose **Next**.
- On the **Review** page, review and confirm the template settings. Under **Capabilities**, select the check box to acknowledge that the template will create IAM resources.



6. Choose **Create** to deploy the stack.
7. Monitor the status of the stack. When the status is **CREATE\_COMPLETE**, the deployment is complete.
8. Log in to the UCP and DTR management consoles by using the links in the **Outputs** tab.

## Step 4. Post-Deployment Tasks

Both UCP and DTR are installed with self-signed certificates. If you want to use your own certificates, follow the instructions in the [Docker Trusted Registry documentation](#).

## Troubleshooting

**Q.** I encountered a **CREATE\_FAILED** error when I launched the Quick Start. What should I do?

**A.** If AWS CloudFormation fails to create the stack, we recommend that you relaunch the template with **Rollback on failure** set to **No**. (This setting is under **Advanced** in the AWS CloudFormation console, **Options** page.) With this setting, the stack's state will be retained and the instance will be left running, so you can troubleshoot the issue. (You'll want to look at the log files in `%ProgramFiles%\Amazon\EC2ConfigService` and `C:\cfn\log`.)

**Important** When you set **Rollback on failure** to **No**, you'll continue to incur AWS charges for this stack. Please make sure to delete the stack when you've finished troubleshooting.

For additional information, see [Troubleshooting AWS CloudFormation](#) on the AWS website or contact us on the [AWS Quick Start Discussion Forum](#).

**Q.** I encountered a size limitation error when I deployed the AWS CloudFormation templates.

**A.** We recommend that you launch the Quick Start templates from the location we've provided or from another S3 bucket. If you deploy the templates from a local copy on your computer or from a non-S3 location, you might encounter template size limitations when you create the stack. For more information about AWS CloudFormation limits, see the [AWS documentation](#).

## Additional Resources

### AWS services

- AWS CloudFormation  
<https://aws.amazon.com/documentation/cloudformation/>
- Amazon EC2  
<https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/>
- Amazon VPC  
<https://aws.amazon.com/documentation/vpc/>

### Docker

- Docker Enterprise Edition  
<https://www.docker.com/enterprise-edition>
- Docker Universal Control Plane  
<https://docs.docker.com/datacenter/ucp/1.1/overview/>
- Docker Trusted Registry  
<https://docs.docker.com/datacenter/dtr/2.4/guides/>  
<https://docs.docker.com/datacenter/dtr/2.0/configure/configuration/>

### Quick Start reference deployments

- AWS Quick Start home page  
<https://aws.amazon.com/quickstart/>

## GitHub Repository

You can visit our [GitHub repository](#) to download the templates and scripts for this Quick Start, to post your comments, and to share your customizations with others.

## Document Revisions

Date	Change	In sections
April 2017	Updated for Docker Enterprise Edition (Standard/Advanced)	Changes in templates and throughout guide
June 2016	Initial publication	—

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