Docker Datacenter (DDC) on the AWS Cloud

Quick Start Reference Deployment

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Contents

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

amazon web services

Overview

This Quick Start reference deployment guide provides step-by-step instructions for deploying Docker Datacenter (DDC) 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 Datacenter 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 Datacenter 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 Datacenter to easily integrate into your existing systems, such as LDAP/AD, monitoring, logging, and more.

Docker Datacenter 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 Datacenter that you can deploy and use on AWS.

Architecture

Deploying this Quick Start with the **default parameters** builds the following Docker DDC environment in the AWS cloud:

- An Amazon Virtual Private Cloud (Amazon VPC) that spans two Availability Zones and includes four subnets (two private and two public).
- Controller clusters for Docker UCP and DTR in the private subnets.
- NAT gateways that provide outbound Internet access for the controller clusters.
- UCP-managed Docker Swarm cluster in the private subnets.

- Auto Scaling group for the Swarm cluster, so the cluster can grow dynamically as the load on the instances increases.
- Two Elastic Load Balancing (ELB) load balancers, one per cluster, in the public subnets. These load balancers provide inbound access to the management console for each cluster.
- Amazon Route 53 for DNS access to the cluster management consoles.
- Amazon Simple Storage Service (Amazon S3) for backing up the root certificate authorities (CAs).

Figure 1 shows the Quick Start architecture.

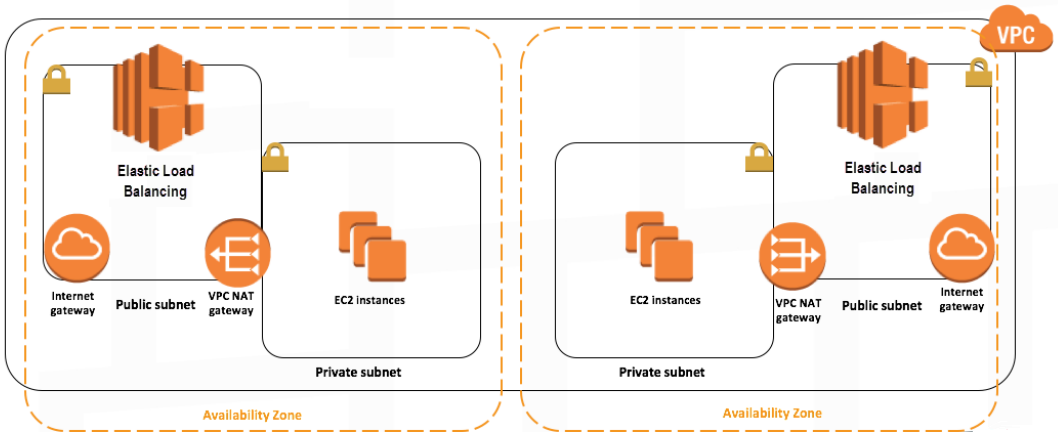

Figure 1: Quick Start architecture for Docker Datacenter on AWS

Figure 2 shows the private subnets with the Docker UCP and DTR controller clusters and Swarm nodes.

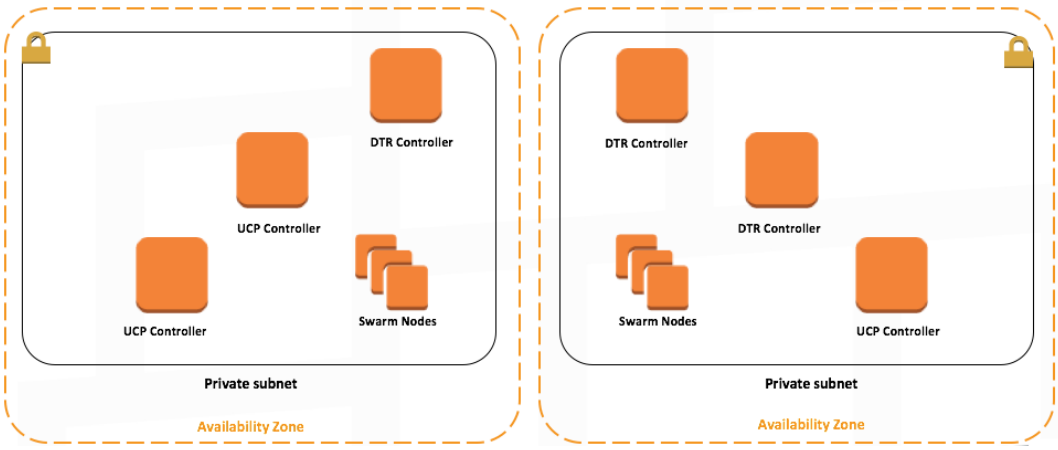

Figure 2: Private subnets with Docker UCP and DTR clusters

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 Amazon VPC, security groups, public and private subnets, Internet gateways, NAT gateways, and the Amazon S3 bucket.

It then launches the first UCP controller instances and goes through the installation process of the Commercially Supported Docker Engine (CS Docker Engine) and UCP containers. It backs 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, the Swarm cluster nodes, and the first DTR replica. As with the first UCP controller node, all nodes are started by installing the CS Docker Engine, 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 two Availability Zones. 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 both Availablity Zones to ensure resiliency and high availability. Amazon Route 53 is used to dynamically register and configure UCP and DTR in your private or public hosted zone.

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
- Amazon Route 53

The Quick Start assumes general knowledge of CaaS concepts and Docker Datacenter. For more information, see the the Docker website and blog.

The Quick Start also requires an Amazon Route 53 hosted zone that's already been configured. You'll be prompted for the hosted zone ID during the deployment process. For instructions, see the Amazon Route 53 documentation.

Deployment Steps

Step 1. Register for a Docker Datacenter Trial License

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

1. Create a Docker ID at https://hub.docker.com/register/ if you don't already have one.
2. Open the Docker Datacenter trial page at https://hub.docker.com/enterprise/trial/ and log in with your credentials.
3. Fill out the form shown in Figure 3 and choose **Start Your Free Trial**.

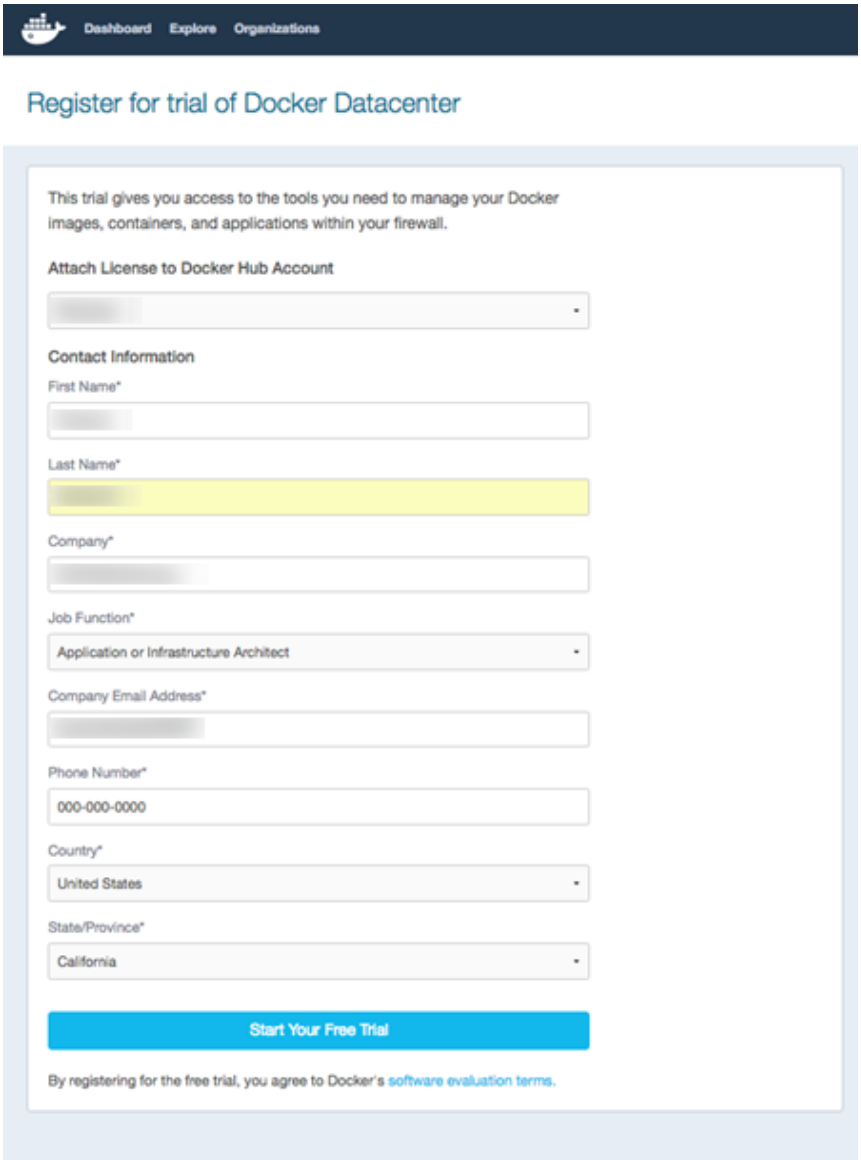

Figure 3: Docker trial registration form

4. On the next screen, download the license.

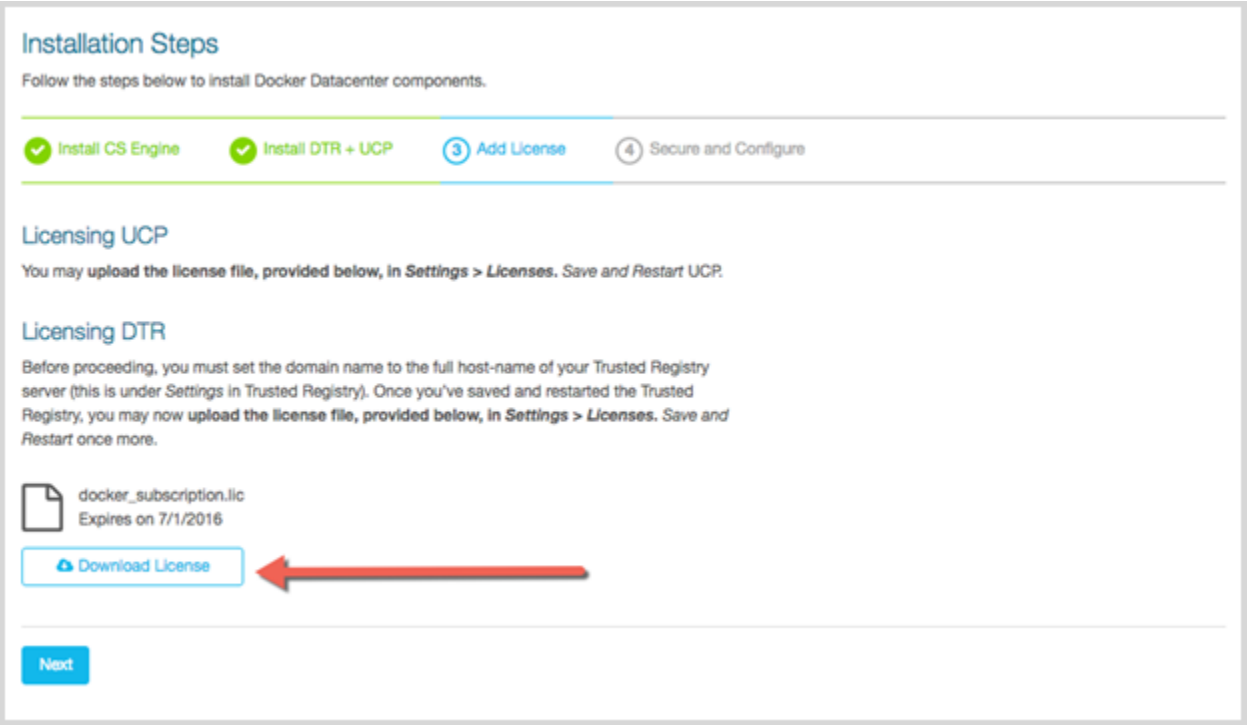

Figure 4: Downloading the Docker license

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 http://aws.amazon.com by following the on-screen instructions.
2. Use the region selector in the navigation bar to choose the Amazon EC2 region where you want to deploy Docker Datacenter 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.
5. Set up an Amazon Route 53 hosted zone. For instructions, see the Amazon Route 53 documentation.

Step 3. Launch the Quick Start

1. Deploy the AWS CloudFormation template into your AWS account.

   Launch

   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 or the AWS Simple Monthly Calculator 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.

Parameter	Default	Description
HostedZone	*Requires input*	A valid Amazon Route 53 hosted zone ID to use (e.g., Z2FDTNDATAQYW2).
DTRFQDN	*Requires input*	A fully qualified domain name, including subdomain, for DTR (e.g., dtr.example.com). This must be a subdomain of the selected Amazon Route 53 hosted zone.
UCPFQDN	*Requires input*	A fully qualified domain name, including subdomain, for UCP (e.g., ucp.example.com). This must be a subdomain of the selected Amazon Route 53 hosted zone.
ClusterSize	3	Number of UCP nodes (non-controller) in the cluster. You can choose 3-64 nodes.
UCPControllersInstanceType	m3.medium	The Amazon EC2 instance type for UCP controllers (minimum is m3.medium).
DTRInstanceType	m3.medium	The Amazon EC2 instance type for DTR replicas (minimum is m3.medium).
UCPNodesInstanceType	m3.medium	The Amazon EC2 instance type for UCP nodes.

Parameter	Default	Description
KeyName	*Requires input*	Public/private key pair, which allows you to connect securely to your instance after it launches. When you created an AWS account, this is the key pair you created in your preferred region.
License	*Requires input*	Docker Datacenter license in JSON format, from step 1(5).

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

4. 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**.
5. 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

1. The UCP and DTR default user name is `admin`, and the password is `ddconaws`. **Please change the password in the UCP management console.**
2. 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

If you encounter a CREATE_FAILED error when you launch the Quick Start, 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.

Additional Resources

AWS services

- AWS CloudFormation
  http://aws.amazon.com/documentation/cloudformation/
- Amazon EC2
  http://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/
- Amazon VPC
  http://aws.amazon.com/documentation/vpc/
- Amazon Route 53
  http://docs.aws.amazon.com/Route53/latest/DeveloperGuide/

Docker

- Docker Datacenter
  https://www.docker.com/products/docker-datacenter
- Docker Universal Control Plane
  https://docs.docker.com/ucp/overview/
- Docker Trusted Registry
  https://docs.docker.com/docker-trusted-registry/overview/
  https://docs.docker.com/docker-trusted-registry/configure/configuration/

Quick Start reference deployments

- AWS Quick Start home page
  https://aws.amazon.com/quickstart/
- Quick Start deployment guides
  https://aws.amazon.com/documentation/quickstart/

Send Us Feedback

We welcome your questions and comments. Please post your feedback on the AWS Quick Start Discussion Forum.

You can visit our GitHub repository to download the templates and scripts for this Quick Start, and to share your customizations with others.

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