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# Amazon EC2 Container Service

## Developer Guide

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## **Amazon EC2 Container Service: Developer Guide**

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# What is Amazon EC2 Container Service?

Amazon EC2 Container Service (Amazon ECS) is a highly scalable, fast, container management service that makes it easy to run, stop, and manage Docker containers on a cluster of Amazon Elastic Compute Cloud (Amazon EC2) instances. Amazon ECS lets you launch and stop container-based applications with simple API calls, allows you to get the state of your cluster from a centralized service, and gives you access to many familiar Amazon EC2 features.

You can use Amazon ECS to schedule the placement of containers across your cluster based on your resource needs, isolation policies, and availability requirements. Amazon ECS eliminates the need for you to operate your own cluster management and configuration management systems or worry about scaling your management infrastructure.

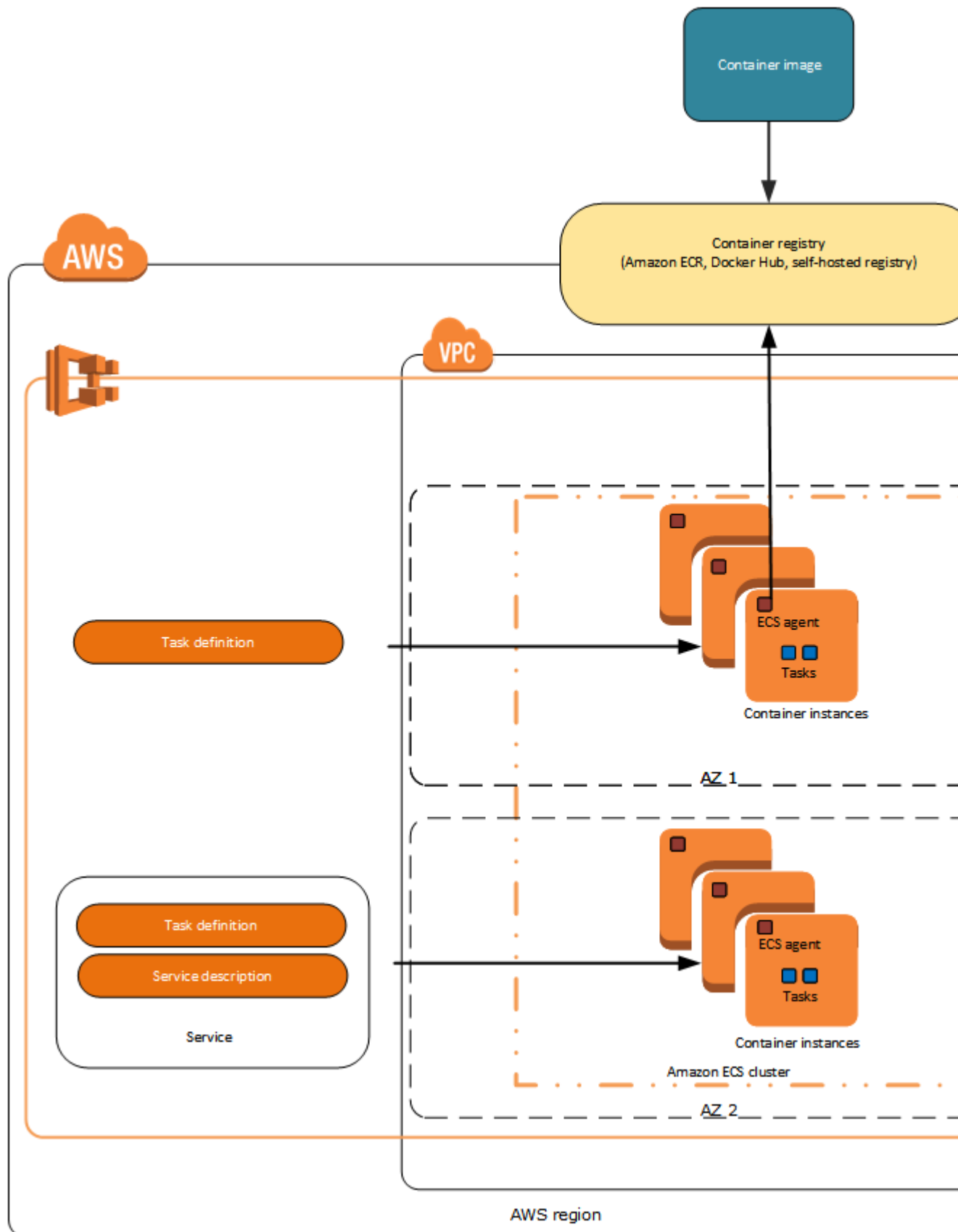
Amazon ECS can be used to create a consistent deployment and build experience, manage and scale batch and Extract-Transform-Load (ETL) workloads, and build sophisticated application architectures on a microservices model. For more information about Amazon ECS use cases and scenarios, see [Container Use Cases](#).

AWS Elastic Beanstalk can also be used to rapidly develop, test, and deploy Docker containers in conjunction with other components of your application infrastructure; however, using Amazon ECS directly provides more fine-grained control and access to a wider set of use cases. For more information, see the [AWS Elastic Beanstalk Developer Guide](#).

## Features of Amazon ECS

Amazon ECS is a regional service that simplifies running application containers in a highly available manner across multiple Availability Zones within a region. You can create Amazon ECS clusters within a new or existing VPC. After a cluster is up and running, you can define task definitions and services that specify which Docker container images to run across your clusters. Container images are stored in and pulled from container registries, which may exist within or outside of your AWS infrastructure.



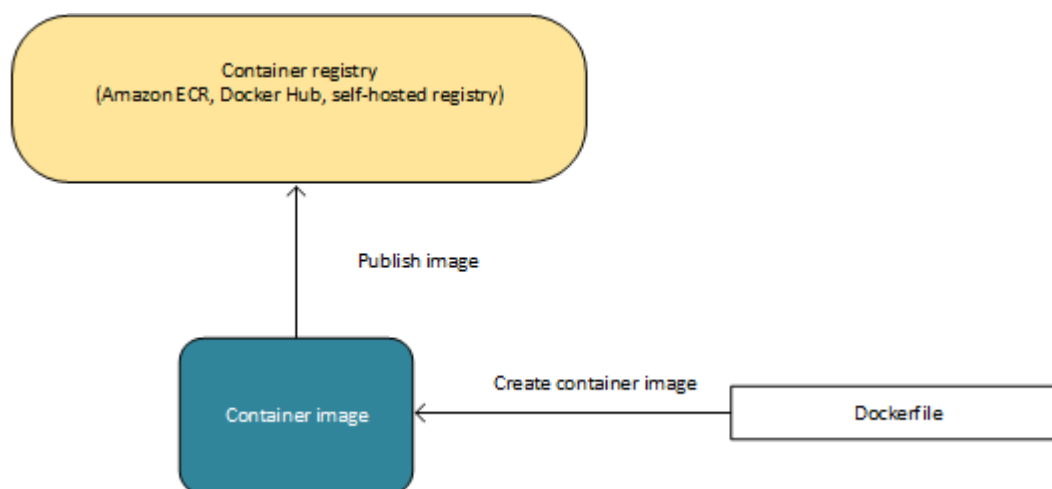


The following sections dive into these individual elements of the Amazon ECS architecture in more detail.

## Containers and Images

To deploy applications on Amazon ECS, your application components must be architected to run in *containers*. A Docker container is a standardized unit of software development, containing everything that your software application needs to run: code, runtime, system tools, system libraries, etc. Containers are created from a read-only template called an *image*.

Images are typically built from a Dockerfile, a plain text file that specifies all of the components that are included in the container. These images are then stored in a *registry* from which they can be downloaded and run on your container instances. For more information about container technology, see [Docker Basics \(p. 13\)](#).



## Task Definitions

To prepare your application to run on Amazon ECS, you create a *task definition*. The task definition is a text file in JSON format that describes one or more containers that form your application. It can be thought of as a blueprint for your application. Task definitions specify various parameters for your application, such as which containers to use and the repositories in which they are located, which ports should be opened on the container instance for your application, and what data volumes should be used with the containers in the task. For more information about creating task definitions, see [Amazon ECS Task Definitions \(p. 90\)](#).

The following is an example of a simple task definition containing a single container that runs an Nginx web server. For a more extended example demonstrating the use of multiple containers in a task definition, see [Example Task Definitions \(p. 119\)](#).

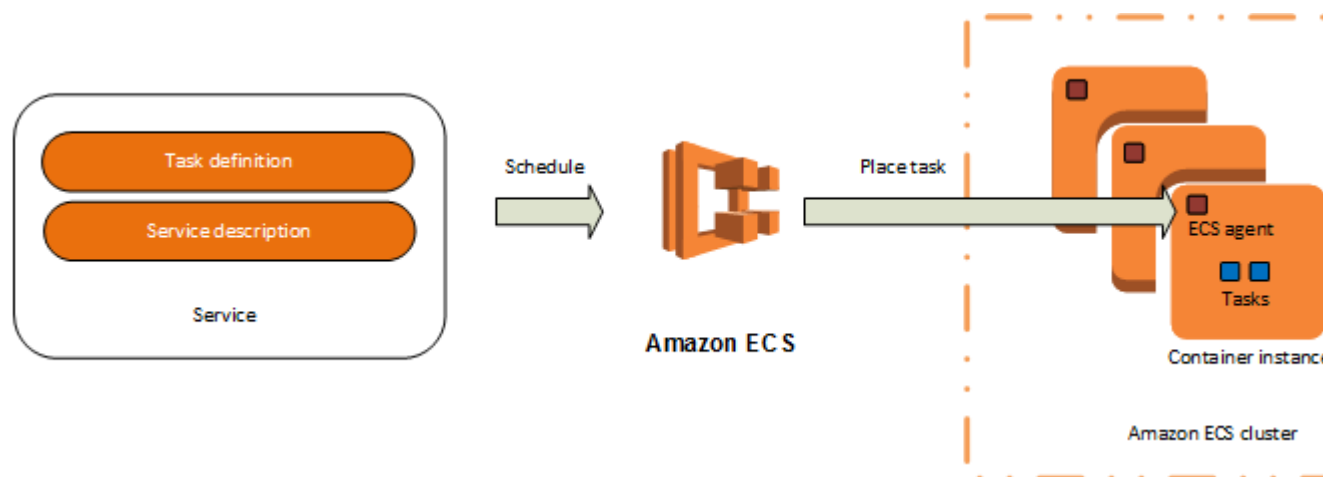
```
{
  "family": "webserver",
  "containerDefinitions": [
    {
      "name": "web",
      "image": "nginx",
      "cpu": 99,
      "memory": 100,
      "portMappings": [{
        "containerPort": 80,
        "hostPort": 80
      }]
    }
  ]
}
```

```
}  
    }  
}
```

## Tasks and Scheduling

A *task* is the instantiation of a task definition on a container instance within your cluster. After you have created a task definition for your application within Amazon ECS, you can specify the number of tasks that will run on your cluster.

The Amazon ECS task scheduler is responsible for placing tasks on container instances. There are several different scheduling options available. For example, you can define a *service* that runs and maintains a specified number of tasks simultaneously. For more information about the different scheduling options available, see [Scheduling Amazon ECS Tasks \(p. 123\)](#).



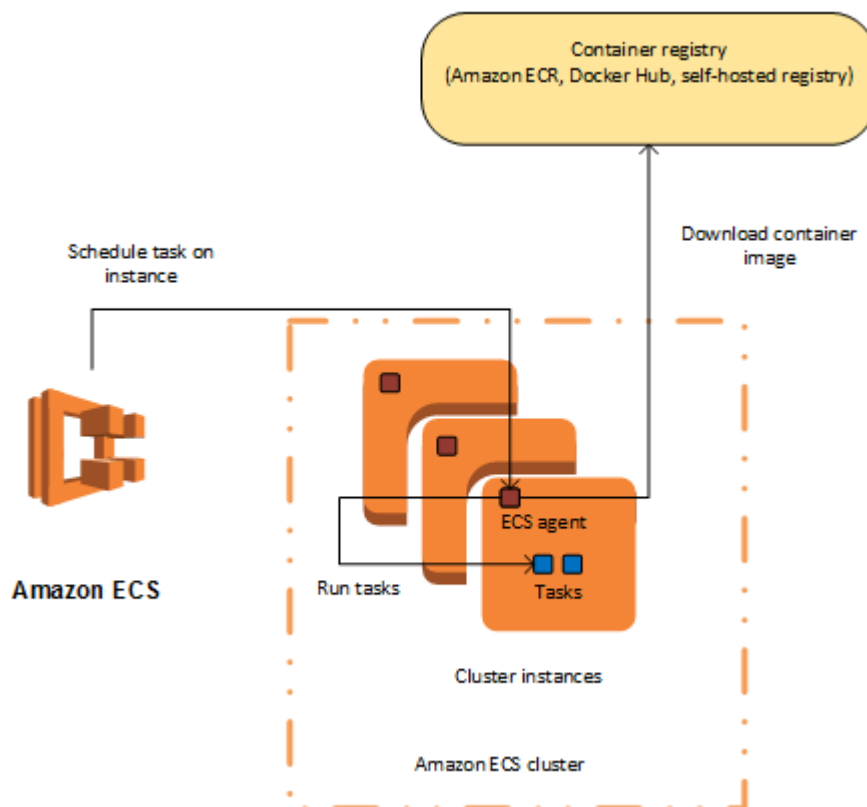
## Clusters

When you run tasks using Amazon ECS, you place them on a *cluster*, which is a logical grouping of EC2 instances. Amazon ECS downloads your container images from a registry that you specify, and runs those images on the container instances within your cluster.

For more information about creating clusters, see [Amazon ECS Clusters \(p. 27\)](#). For more information about creating container instances, see [Amazon ECS Container Instances \(p. 32\)](#).

## Container Agent

The *container agent* runs on each instance within an Amazon ECS cluster. It sends information about the instance's current running tasks and resource utilization to Amazon ECS, and starts and stops tasks whenever it receives a request from Amazon ECS. For more information, see [Amazon ECS Container Agent \(p. 65\)](#).



## How to Get Started with Amazon ECS

If you are using Amazon ECS for the first time, the AWS Management Console for Amazon ECS provides a first-run wizard that steps you through defining a task definition for a web server, configuring a service, and launching your first cluster. The first-run wizard is highly recommended for users who have no prior experience with Amazon ECS. For more information, see the [Getting Started with Amazon ECS \(p. 20\)](#) tutorial.

Alternatively, you can install the AWS Command Line Interface (AWS CLI) to use Amazon ECS. For more information, see [Setting Up with Amazon ECS \(p. 8\)](#).

## Related Services

Amazon ECS can be used in conjunction with the following AWS services:

### AWS Identity and Access Management

IAM is a web service that helps you securely control access to AWS resources for your users. Use IAM to control who can use your AWS resources (authentication) and what resources they can use in which ways (authorization). In Amazon ECS, IAM can be used to control access at the container instance level using IAM roles, and at the task level using IAM task roles. For more information, see [Amazon ECS IAM Policies, Roles, and Permissions \(p. 195\)](#).

### Auto Scaling

Auto Scaling is a web service that enables you to automatically launch or terminate EC2 instances based on user-defined policies, health status checks, and schedules. You can use Auto Scaling to

scale out and scale in the container instances within a cluster in response to a number of metrics. For more information, see [Tutorial: Scaling Container Instances with CloudWatch Alarms \(p. 179\)](#).

### **Elastic Load Balancing**

Elastic Load Balancing automatically distributes incoming application traffic across multiple EC2 instances in the cloud. It enables you to achieve greater levels of fault tolerance in your applications, seamlessly providing the required amount of load balancing capacity needed to distribute application traffic. You can use Elastic Load Balancing to create an endpoint that balances traffic across services in a cluster. For more information, see [Service Load Balancing \(p. 138\)](#).

### **Amazon EC2 Container Registry**

Amazon ECR is a managed AWS Docker registry service that is secure, scalable, and reliable. Amazon ECR supports private Docker repositories with resource-based permissions using IAM so that specific users or EC2 instances can access repositories and images. Developers can use the Docker CLI to push, pull, and manage images. For more information, see the [Amazon EC2 Container Registry User Guide](#).

### **AWS CloudFormation**

AWS CloudFormation gives developers and systems administrators an easy way to create and manage a collection of related AWS resources, provisioning and updating them in an orderly and predictable fashion. You can define clusters, task definitions, and services as entities in an AWS CloudFormation script. For more information, see [AWS CloudFormation Template Reference](#).

## Accessing Amazon ECS

You can work with Amazon ECS in any of the following ways:

### **AWS Management Console**

The console is a browser-based interface to manage Amazon ECS resources. For a tutorial that guides you through the console, see [Getting Started with Amazon ECS \(p. 20\)](#).

### **AWS command line tools**

You can use the AWS command line tools to issue commands at your system's command line to perform Amazon ECS and AWS tasks; this can be faster and more convenient than using the console. The command line tools are also useful for building scripts that perform AWS tasks.

AWS provides two sets of command line tools: the [AWS Command Line Interface \(AWS CLI\)](#) and the [AWS Tools for Windows PowerShell](#). For more information, see the [AWS Command Line Interface User Guide](#) and the [AWS Tools for Windows PowerShell User Guide](#).

### **Amazon ECS CLI**

In addition to using the AWS CLI to access Amazon ECS resources, you can use the Amazon ECS CLI, which provides high-level commands to simplify creating, updating, and monitoring clusters and tasks from a local development environment using Docker Compose. For more information, see [Using the Amazon ECS Command Line Interface \(p. 225\)](#).

### **AWS SDKs**

We also provide SDKs that enable you to access Amazon ECS from a variety of programming languages. The SDKs automatically take care of tasks such as:

- Cryptographically signing your service requests
- Retrying requests
- Handling error responses

For more information about available SDKs, see [Tools for Amazon Web Services](#).

## Pricing

There is no additional charge for using Amazon ECS beyond the underlying AWS resources used to host your applications. For more information, see [Amazon EC2 Container Service Pricing](#).

# Setting Up with Amazon ECS

If you've already signed up for Amazon Web Services (AWS) and have been using Amazon Elastic Compute Cloud (Amazon EC2), you are close to being able to use Amazon ECS. The set up process for the two services is very similar, as Amazon ECS uses EC2 instances in the clusters. The following guide prepares you for launching your first cluster using either the Amazon ECS first-run wizard or the Amazon ECS Command Line Interface (CLI).

## Note

Because Amazon ECS uses many components of Amazon EC2, you use the Amazon EC2 console for many of these steps.

Complete the following tasks to get set up for Amazon ECS. If you have already completed any of these steps, you may skip them and move on to installing the custom AWS CLI.

1. [Sign Up for AWS](#) (p. 8)
2. [Create an IAM User](#) (p. 9)
3. [Create an IAM Role for your Container Instances and Services](#) (p. 10)
4. [Create a Key Pair](#) (p. 10)
5. [\(Optional\) Install the Amazon ECS Command Line Interface \(CLI\)](#) (p. 12)

## Sign Up for AWS

When you sign up for AWS, your AWS account is automatically signed up for all services, including Amazon EC2 and Amazon ECS. You are charged only for the services that you use.

If you have an AWS account already, skip to the next task. If you don't have an AWS account, use the following procedure to create one.

### To create an AWS account

1. Open <https://aws.amazon.com/>, and then choose **Create an AWS Account**.
2. Follow the online instructions.

Part of the sign-up procedure involves receiving a phone call and entering a PIN using the phone keypad.

Note your AWS account number, because you'll need it for the next task.

## Create an IAM User

Services in AWS, such as Amazon EC2 and Amazon ECS, require that you provide credentials when you access them, so that the service can determine whether you have permission to access its resources. The console requires your password. You can create access keys for your AWS account to access the command line interface or API. However, we don't recommend that you access AWS using the credentials for your AWS account; we recommend that you use AWS Identity and Access Management (IAM) instead. Create an IAM user, and then add the user to an IAM group with administrative permissions or and grant this user administrative permissions. You can then access AWS using a special URL and the credentials for the IAM user.

If you signed up for AWS but have not created an IAM user for yourself, you can create one using the IAM console.

### To create an IAM user for yourself and add the user to an Administrators group

1. Sign in to the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Users**, and then choose **Add user**.
3. For **User name**, type a user name, such as `administrator`. The name can consist of letters, digits, and the following characters: plus (+), equal (=), comma (,), period (.), at (@), underscore (\_), and hyphen (-). The name is not case sensitive and can be a maximum of 64 characters in length.
4. Select the check box next to **AWS Management Console access**, select **Custom password**, and then type the new user's password in the text box. You can optionally select **Require password reset** to force the user to select a new password the next time the user signs in.
5. Choose **Next: Permissions**.
6. On the **Set permissions for user** page, choose **Add user to group**.
7. Choose **Create group**.
8. In the **Create group** dialog box, type the name for the new group. The name can consist of letters, digits, and the following characters: plus (+), equal (=), comma (,), period (.), at (@), underscore (\_), and hyphen (-). The name is not case sensitive and can be a maximum of 128 characters in length.
9. For **Filter**, choose **Job function**.
10. In the policy list, select the check box for **AdministratorAccess**. Then choose **Create group**.
11. Back in the list of groups, select the check box for your new group. Choose **Refresh** if necessary to see the group in the list.
12. Choose **Next: Review** to see the list of group memberships to be added to the new user. When you are ready to proceed, choose **Create user**.

You can use this same process to create more groups and users, and to give your users access to your AWS account resources. To learn about using policies to restrict users' permissions to specific AWS resources, go to [Access Management](#) and [Example Policies for Administering AWS Resources](#).

To sign in as this new IAM user, sign out of the AWS console, then use the following URL, where `your_aws_account_id` is your AWS account number without the hyphens (for example, if your AWS account number is 1234-5678-9012, your AWS account ID is 123456789012):

```
https://your_aws_account_id.signin.aws.amazon.com/console/
```

Enter the IAM user name and password that you just created. When you're signed in, the navigation bar displays "`your_user_name @ your_aws_account_id`".

If you don't want the URL for your sign-in page to contain your AWS account ID, you can create an account alias. From the IAM dashboard, choose **Create Account Alias** and enter an alias, such as your company name. To sign in after you create an account alias, use the following URL:



```
https://your_account_alias.signin.aws.amazon.com/console/
```

To verify the sign-in link for IAM users for your account, open the IAM console and check under **IAM users sign-in link** on the dashboard.

For more information about IAM, see the [AWS Identity and Access Management User Guide](#).

## Create an IAM Role for your Container Instances and Services

Before the Amazon ECS agent can register container instance into a cluster, the agent must know which account credentials to use. You can create an IAM role that allows the agent to know which account it should register the container instance with. When you launch an instance with the Amazon ECS-optimized AMI provided by Amazon using this role, the agent automatically registers the container instance into your default cluster.

The Amazon ECS container agent also makes calls to the Amazon EC2 and Elastic Load Balancing APIs on your behalf, so container instances can be registered and deregistered with load balancers. Before you can attach a load balancer to an Amazon ECS service, you must create an IAM role for your services to use before you start them. This requirement applies to any Amazon ECS service that you plan to use with a load balancer.

### Note

The Amazon ECS instance and service roles are automatically created for you in the console first run experience, so if you intend to use the Amazon ECS console, you can move ahead to [Create a Key Pair \(p. 10\)](#). If you do not intend to use the Amazon ECS console, and instead plan to use the AWS CLI, complete the procedures in [Amazon ECS Container Instance IAM Role \(p. 206\)](#) and [Amazon ECS Service Scheduler IAM Role \(p. 209\)](#) before launching container instances or using Elastic Load Balancing load balancers with services.

## Create a Key Pair

AWS uses public-key cryptography to secure the login information for your instance. A Linux instance, such as an Amazon ECS container instance, has no password to use for SSH access; you use a key pair to log in to your instance securely. You specify the name of the key pair when you launch your container instance, then provide the private key when you log in using SSH.

If you haven't created a key pair already, you can create one using the Amazon EC2 console. Note that if you plan to launch instances in multiple regions, you'll need to create a key pair in each region. For more information about regions, see [Regions and Availability Zones](#) in the *Amazon EC2 User Guide for Linux Instances*.

### To create a key pair

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. From the navigation bar, select a region for the key pair. You can select any region that's available to you, regardless of your location: however, key pairs are specific to a region. For example, if you plan to launch an instance in the US East (N. Virginia) region, you must create a key pair for the instance in the same region.

### Note

Amazon ECS is available in the following regions:

Region Name	Region
US East (N. Virginia)	us-east-1
US East (Ohio)	us-east-2
US West (N. California)	us-west-1
US West (Oregon)	us-west-2
EU (Ireland)	eu-west-1
EU (London)	eu-west-2
EU (Frankfurt)	eu-central-1
Asia Pacific (Tokyo)	ap-northeast-1
Asia Pacific (Singapore)	ap-southeast-1
Asia Pacific (Sydney)	ap-southeast-2
Canada (Central)	ca-central-1

3. Choose **Key Pairs** in the navigation pane.
4. Choose **Create Key Pair**.
5. Enter a name for the new key pair in the **Key pair name** field of the **Create Key Pair** dialog box, and then choose **Create**. Choose a name that is easy for you to remember, such as your IAM user name, followed by `-key-pair`, plus the region name. For example, `me-key-pair-useast1`.
6. The private key file is automatically downloaded by your browser. The base file name is the name you specified as the name of your key pair, and the file name extension is `.pem`. Save the private key file in a safe place.

#### Important

This is the only chance for you to save the private key file. You'll need to provide the name of your key pair when you launch an instance and the corresponding private key each time you connect to the instance.

7. If you will use an SSH client on a Mac or Linux computer to connect to your Linux instance, use the following command to set the permissions of your private key file so that only you can read it.

```
$ chmod 400 your_user_name-key-pair-region_name.pem
```

For more information, see [Amazon EC2 Key Pairs](#) in the *Amazon EC2 User Guide for Linux Instances*.

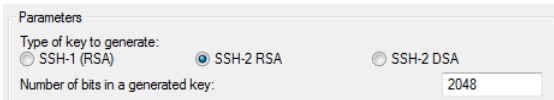
#### To connect to your instance using your key pair

To connect to your Linux instance from a computer running Mac or Linux, specify the `.pem` file to your SSH client with the `-i` option and the path to your private key. To connect to your Linux instance from a computer running Windows, you can use either MindTerm or PuTTY. If you plan to use PuTTY, you'll need to install it and use the following procedure to convert the `.pem` file to a `.ppk` file.

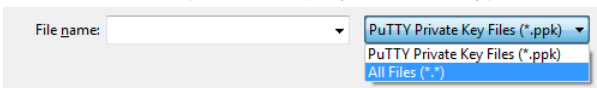
#### (Optional) To prepare to connect to a Linux instance from Windows using PuTTY

1. Download and install PuTTY from <http://www.chiark.greenend.org.uk/~sgtatham/putty/>. Be sure to install the entire suite.

2. Start PuTTYgen (for example, from the **Start** menu, choose **All Programs, PuTTY, and PuTTYgen**).
3. Under **Type of key to generate**, choose **SSH-2 RSA**.



4. Choose **Load**. By default, PuTTYgen displays only files with the extension `.ppk`. To locate your `.pem` file, choose the option to display files of all types.



5. Select the private key file that you created in the previous procedure and choose **Open**. Choose **OK** to dismiss the confirmation dialog box.
6. Choose **Save private key**. PuTTYgen displays a warning about saving the key without a passphrase. Choose **Yes**.
7. Specify the same name for the key that you used for the key pair. PuTTY automatically adds the `.ppk` file extension.

## (Optional) Install the Amazon ECS Command Line Interface (CLI)

### Note

This step is not required if you use the first-run wizard to create your cluster.

The Amazon EC2 Container Service (Amazon ECS) command line interface (CLI) provides high-level commands to simplify creating, updating, and monitoring clusters and tasks from a local development environment. The Amazon ECS CLI supports [Docker Compose](#), a popular open-source tool for defining and running multi-container applications. For more information about installing and using the Amazon ECS CLI, see [Using the Amazon ECS Command Line Interface \(p. 225\)](#).

You can also choose to use Amazon ECS through the AWS CLI. However, you will need to create your VPC and security groups separately, whereas both the Amazon ECS CLI and the first-run wizard will create this necessary infrastructure for you. For information about installing the AWS CLI or upgrading it to the latest version, see [Installing the AWS Command Line Interface](#) in the *AWS Command Line Interface User Guide*.

# Docker Basics

Docker is a technology that allows you to build, run, test, and deploy distributed applications that are based on Linux containers. Amazon ECS uses Docker images in task definitions to launch containers on EC2 instances in your clusters. For Amazon ECS product details, featured customer case studies, and FAQs, see the [Amazon EC2 Container Service product detail pages](#).

The documentation in this guide assumes that readers possess a basic understanding of what Docker is and how it works. For more information about Docker, see [What is Docker?](#) and the [Docker User Guide](#).

## Topics

- [Installing Docker \(p. 13\)](#)
- [\(Optional\) Sign up for a Docker Hub Account \(p. 14\)](#)
- [\(Optional\) Amazon EC2 Container Registry \(p. 15\)](#)
- [Create a Docker Image and Upload it to Docker Hub \(p. 15\)](#)
- [Next Steps \(p. 17\)](#)

## Installing Docker

Docker is available on many different operating systems, including most modern Linux distributions, like Ubuntu, and even Mac OSX and Windows. For more information about how to install Docker on your particular operating system, go to the [Docker installation guide](#).

You don't even need a local development system to use Docker. If you are using Amazon EC2 already, you can launch an Amazon Linux instance and install Docker to get started.

### To install Docker on an Amazon Linux instance

1. Launch an instance with the Amazon Linux AMI. For more information, see [Launching an Instance](#) in the *Amazon EC2 User Guide for Linux Instances*.
2. Connect to your instance. For more information, see [Connect to Your Linux Instance](#) in the *Amazon EC2 User Guide for Linux Instances*.
3. Update the installed packages and package cache on your instance.

```
[ec2-user ~]$ sudo yum update -y
```

4. Install Docker.

```
[ec2-user ~]$ sudo yum install -y docker
```

5. Start the Docker service.

```
[ec2-user ~]$ sudo service docker start
Starting cgconfig service: [ OK ]
Starting docker: [ OK ]
```

6. Add the `ec2-user` to the `docker` group so you can execute Docker commands without using `sudo`.

```
[ec2-user ~]$ sudo usermod -a -G docker ec2-user
```

7. Log out and log back in again to pick up the new `docker` group permissions.
8. Verify that the `ec2-user` can run Docker commands without `sudo`.

```
[ec2-user ~]$ docker info
Containers: 2
Images: 24
Storage Driver: devicemapper
 Pool Name: docker-202:1-263460-pool
 Pool Blocksize: 65.54 kB
 Data file: /var/lib/docker/devicemapper/devicemapper/data
 Metadata file: /var/lib/docker/devicemapper/devicemapper/metadata
 Data Space Used: 702.3 MB
 Data Space Total: 107.4 GB
 Metadata Space Used: 1.864 MB
 Metadata Space Total: 2.147 GB
 Library Version: 1.02.89-RHEL6 (2014-09-01)
Execution Driver: native-0.2
Kernel Version: 3.14.27-25.47.amzn1.x86_64
Operating System: Amazon Linux AMI 2014.09
```

#### Note

In some cases, you may need to reboot your instance to provide permissions for the `ec2-user` to access the Docker daemon. Try rebooting your instance if you see the following error:

```
Cannot connect to the Docker daemon. Is the docker daemon running on this host?
```

## (Optional) Sign up for a Docker Hub Account

Docker uses images that are stored in repositories to launch containers with. The most common Docker image repository (and the default repository for the Docker daemon) is Docker Hub. Although you don't need a Docker Hub account to use Amazon ECS or Docker, having a Docker Hub account gives you the freedom to store your modified Docker images so you can use them in your ECS task definitions.

For more information about Docker Hub, and to sign up for an account, go to <https://hub.docker.com>.

Docker Hub offers public and private registries. You can create a private registry on Docker Hub and configure [Private Registry Authentication \(p. 83\)](#) on your ECS container instances to use your private images in task definitions.

## (Optional) Amazon EC2 Container Registry

Another registry option is Amazon EC2 Container Registry (Amazon ECR). Amazon ECR is a managed AWS Docker registry service. Customers can use the familiar Docker CLI to push, pull, and manage images. For Amazon ECR product details, featured customer case studies, and FAQs, see the [Amazon EC2 Container Registry product detail pages](#). To finish this walkthrough using Amazon ECR, see [Create a Docker Image](#) in the *Amazon EC2 Container Registry User Guide*.

## Create a Docker Image and Upload it to Docker Hub

Amazon ECS task definitions use Docker images to launch containers on the container instances in your clusters. In this section, you create a Docker image of a simple PHP web application, and test it on your local system or EC2 instance, and then push the image to your Docker Hub registry so you can use it in an ECS task definition.

### To create a Docker image of a PHP web application

1. Install **git** and use it to clone the simple PHP application from your GitHub repository onto your system.
  - a. Install git.

```
[ec2-user ~]$ sudo yum install -y git
```

- b. Clone the simple PHP application onto your system.

```
[ec2-user ~]$ git clone https://github.com/aws-labs/ecs-demo-php-simple-app
```

2. Change directories to the `ecs-demo-php-simple-app` folder.

```
[ec2-user ~]$ cd ecs-demo-php-simple-app
```

3. Examine the Dockerfile in this folder. A Dockerfile is a manifest that describes the base image to use for your Docker image and what you want installed and running on it. For more information about Dockerfiles, go to the [Dockerfile Reference](#).

```
[ec2-user ecs-demo-php-simple-app]$ cat Dockerfile
FROM ubuntu:12.04

# Install dependencies
RUN apt-get update -y
RUN apt-get install -y git curl apache2 php5 libapache2-mod-php5 php5-mcrypt php5-mysql

# Install app
RUN rm -rf /var/www/*
ADD src /var/www

# Configure apache
RUN a2enmod rewrite
RUN chown -R www-data:www-data /var/www
ENV APACHE_RUN_USER www-data
ENV APACHE_RUN_GROUP www-data
ENV APACHE_LOG_DIR /var/log/apache2

EXPOSE 80
```

```
CMD [ "/usr/sbin/apache2", "-D", "FOREGROUND" ]
```

This Dockerfile uses the Ubuntu 12.04 image. The `RUN` instructions update the package caches, install some software packages for the web server and PHP support, and then add your PHP application to the web server's document root. The `EXPOSE` instruction exposes port 80 on the container, and the `CMD` instruction starts the web server.

4. Build the Docker image from your Dockerfile. Substitute `my-dockerhub-username` with your Docker Hub user name.

#### Note

Some versions of Docker may require the full path to your Dockerfile in the following command, instead of the relative path shown below.

```
[ec2-user ecs-demo-php-simple-app]$ docker build -t my-dockerhub-username/amazon-ecs-sample .
```

5. Run **docker images** to verify that the image was created correctly and that the image name contains a repository that you can push to (in this example, your Docker Hub user name).

```
[ec2-user ecs-demo-php-simple-app]$ docker images
```

REPOSITORY	TAG	IMAGE ID
CREATED	VIRTUAL SIZE	
my-dockerhub-username/amazon-ecs-sample	latest	43c52559a0a1
minutes ago	258.1 MB	12
ubuntu	12.04	78cef618c77e
weeks ago	133.7 MB	3

6. Run the newly built image. The `-p 80:80` option maps the exposed port 80 on the container to port 80 on the host system. For more information about **docker run**, go to the [Docker run reference](#).

```
[ec2-user ecs-demo-php-simple-app]$ docker run -p 80:80 my-dockerhub-username/amazon-ecs-sample
apache2: Could not reliably determine the server's fully qualified domain name, using
172.17.0.2 for ServerName
```

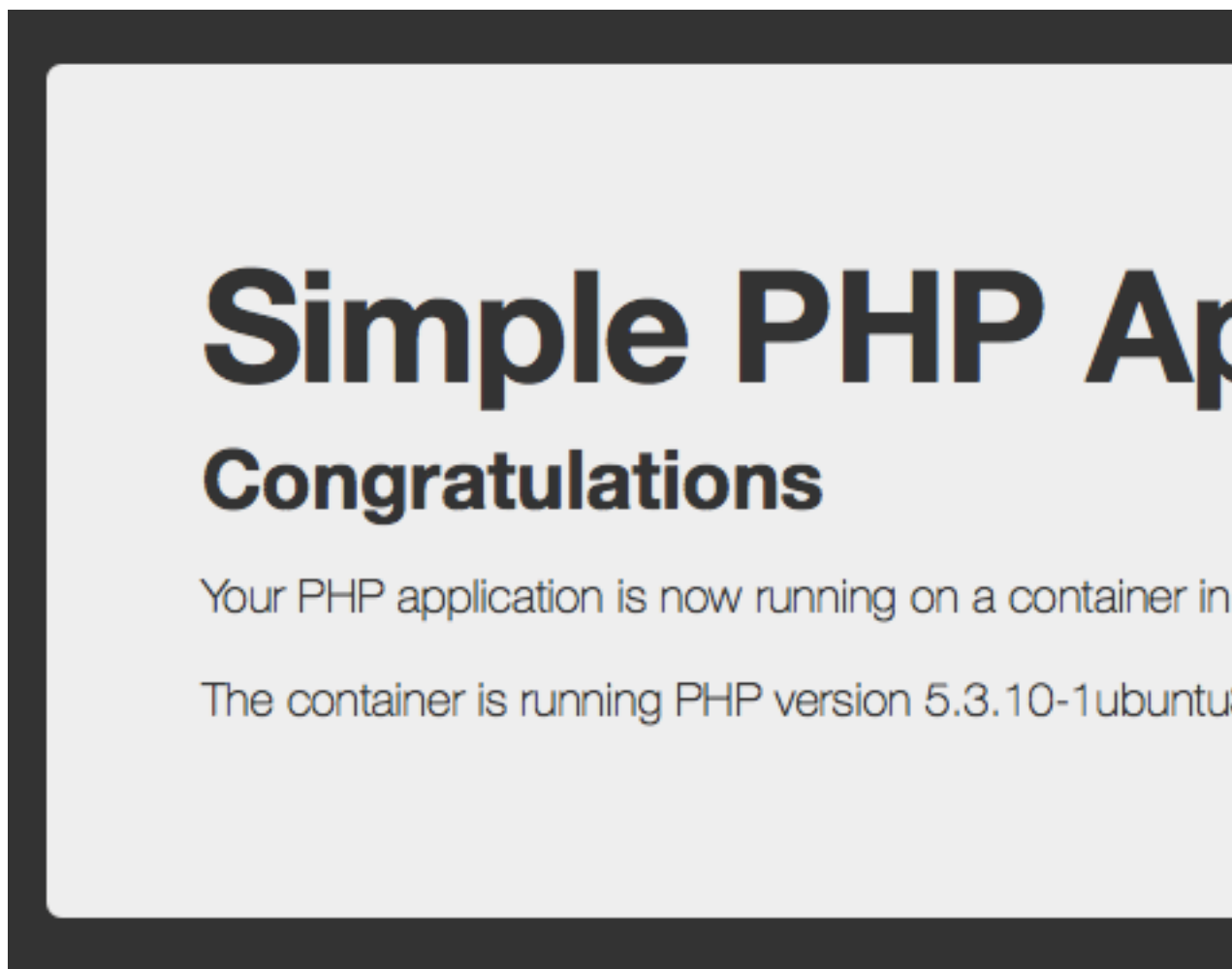
#### Note

Output from the Apache web server is displayed in the terminal window. You can ignore the "Could not reliably determine the server's fully qualified domain name" message.

7. Open a browser and point to the server that is running Docker and hosting your container.
  - If you are using an EC2 instance, this is the **Public DNS** value for the server, which is the same address you use to connect to the instance with SSH. Make sure that the security group for your instance allows inbound traffic on port 80.
  - If you are running Docker locally, point your browser to <http://localhost/>.
  - If you are using **docker-machine** on a Windows or Mac computer, find the IP address of the VirtualBox VM that is hosting Docker with the **docker-machine ip** command, substituting `machine-name` with the name of the docker machine you are using.

```
$ docker-machine ip machine-name
192.168.59.103
```

You should see a web page running the simple PHP app.



8. Stop the Docker container by typing **Ctrl+c**.
9. Authenticate your Docker client with your Docker Hub credentials.

```
[ec2-user ecs-demo-php-simple-app]$ docker login
```

10. Push the image to Docker Hub.

```
[ec2-user ecs-demo-php-simple-app]$ docker push my-dockerhub-username/amazon-ecs-sample
```

## Next Steps

After the image push is finished, you can use the `my-dockerhub-username/amazon-ecs-sample` image in your Amazon ECS task definitions, which you can use to run tasks with.

**To register a task definition with the `amazon-ecs-sample` image**

1. Examine the `simple-app-task-def.json` file in the `ecs-demo-php-simple-app` folder.

```
{  
  "family": "console-sample-app",
```



```

"volumes": [
  {
    "name": "my-vol",
    "host": {}
  }
],
"containerDefinitions": [
  {
    "environment": [],
    "name": "simple-app",
    "image": "amazon/amazon-ecs-sample",
    "cpu": 10,
    "memory": 500,
    "portMappings": [
      {
        "containerPort": 80,
        "hostPort": 80
      }
    ],
    "mountPoints": [
      {
        "sourceVolume": "my-vol",
        "containerPath": "/var/www/my-vol"
      }
    ],
    "entryPoint": [
      "/usr/sbin/apache2",
      "-D",
      "FOREGROUND"
    ],
    "essential": true
  },
  {
    "name": "busybox",
    "image": "busybox",
    "cpu": 10,
    "memory": 500,
    "volumesFrom": [
      {
        "sourceContainer": "simple-app"
      }
    ],
    "entryPoint": [
      "sh",
      "-c"
    ],
    "command": [
      "/bin/sh -c \"while true; do /bin/date > /var/www/my-vol/date; sleep 1;
done\""
    ],
    "essential": false
  }
]
}

```

This task definition JSON file specifies two containers, one of which uses the `amazon-ecs-sample` image. By default, this image is pulled from the Amazon Docker Hub repository, but you can change the `amazon` repository defined above to your own repository if you want to use the `my-dockerhub-username/amazon-ecs-sample` image you pushed earlier.

2. Register a task definition with the `simple-app-task-def.json` file.

```
[ec2-user ecs-demo-php-simple-app]$ aws ecs register-task-definition --cli-input-json
file://simple-app-task-def.json
```

The task definition is registered in the `console-sample-app` family as defined in the JSON file.

### To run a task with the `console-sample-app` task definition

#### Important

Before you can run tasks in Amazon ECS, you need to launch container instances into your cluster. For more information about how to set up and launch container instances, see [Setting Up with Amazon ECS \(p. 8\)](#) and [Getting Started with Amazon ECS \(p. 20\)](#).

- Use the following AWS CLI command to run a task with the `console-sample-app` task definition.

```
[ec2-user ecs-demo-php-simple-app]$ aws ecs run-task --task-definition console-sample-app
```

# Getting Started with Amazon ECS

Let's get started with Amazon EC2 Container Service (Amazon ECS) by creating a task definition, scheduling tasks, and configuring a cluster in the Amazon ECS console.

You can optionally create an Amazon EC2 Container Registry (Amazon ECR) image repository and push an image to it. For more information on Amazon ECR, see the [Amazon EC2 Container Registry User Guide](#).

The Amazon ECS first run wizard will guide you through the process to get started with Amazon ECS. The wizard gives you the option of creating a cluster and launching our sample web application, or if you already have a Docker image you would like to launch in Amazon ECS, you can create a task definition with that image and use that for your cluster instead.

## Important

Before you begin, be sure that you've completed the steps in [Setting Up with Amazon ECS \(p. 8\)](#) and that your AWS user has the required permissions specified in the [Amazon ECS First Run Wizard \(p. 217\)](#) IAM policy example.

## Choose your Amazon ECS first run wizard configuration options

1. Open the Amazon ECS console first run wizard at <https://console.aws.amazon.com/ecs/home#/firstRun>.
2. Select your Amazon ECS first run options.

**I want to**



**Deploy a sample application onto an Amazon ECS Cluster**

Amazon ECS will set up an autoscaling group and help you create a cluster. The cluster management.



**Store container images securely with Amazon ECR**

Create and manage a new private image repository and use the Docker CLI to push images to the repository. The repository is managed through AWS Identity and Access Management.

To create an Amazon ECS cluster and deploy a container application to it, check the top option. To create an Amazon ECR repository and push an image to it, which you can use in your Amazon ECS task definitions, check the bottom option. Choose **Continue** to proceed.

3. If you've chosen to create an Amazon ECR repository, then complete the next two sections of the first run wizard, **Configure repository** and **Build, tag, and push Docker image**. If you are not creating an Amazon ECR repository, skip ahead to [Create a task definition \(p. 21\)](#).

### Configure repository

A repository is where you store Docker images in Amazon ECR. Every time you push or pull an image from Amazon ECR, you specify the registry and repository location to tell Docker where to push the image to or where to pull it from.

- For **Repository name**, enter a unique name for your repository and choose **Next step**.

### Build, tag, and push Docker image

In this section of the wizard, you use the Docker CLI to tag an existing local image (that you have built from a Dockerfile or pulled from another registry, such as Docker Hub) and then push the tagged image to your Amazon ECR registry.

1. Retrieve the **docker login** command that you can use to authenticate your Docker client to your registry by pasting the **aws ecr get-login** command from the console into a terminal window.

#### Note

The **get-login** command is available in the AWS CLI starting with version 1.9.15. You can check your AWS CLI version with the **aws --version** command.

2. Run the **docker login** command that was returned in the previous step. This command provides an authorization token that is valid for 12 hours.

#### Important

When you execute this **docker login** command, the command string can be visible by other users on your system in a process list (**ps -e**) display. Because the **docker login** command contains authentication credentials, there is a risk that other users on your system could view them this way and use them to gain push and pull access to your repositories. If you are not on a secure system, you should consider this risk and log in interactively by omitting the **-p password** option, and then entering the password when prompted.

3. (Optional) If you have a Dockerfile for the image to push, build the image and tag it for your new repository by pasting the **docker build** command from the console into a terminal window. Make sure you are in the same directory as your Dockerfile.
4. Tag the image for your ECR registry and your new repository by pasting the **docker tag** command from the console into a terminal window. The console command assumes that your image was built from a Dockerfile in the previous step; if you did not build your image from a Dockerfile, replace the first instance of **repository:latest** with the image ID or image name of your local image to push.
5. Push the newly tagged image to your ECR repository by pasting the **docker push** command into a terminal window.
6. Choose **Done**.

### Create a task definition

A task definition is like a blue print for your application. Every time you launch a task in Amazon ECS, you specify a task definition so the service knows which Docker image to use for containers, how many containers to use in the task, and the resource allocation for each container.

1. Configure your task definition parameters.

The first run wizard comes preloaded with a task definition, and you can see the `simple-app` container defined in the console. You can optionally rename the task definition or review and edit the resources

used by the container (such as CPU units and memory limits) by choosing the container name and editing the values shown (CPU units are under the **Advanced container configuration** menu). Task definitions created in the first run wizard are limited to a single container for simplicity's sake. You can create multi-container task definitions later in the Amazon ECS console.

**Note**

If you are using an Amazon ECR image in your task definition, be sure to use the full `registry/repository:tag` naming for your Amazon ECR images. For example, `aws_account_id.dkr.ecr.region.amazonaws.com/my-web-app:latest`.

For more information on what each of these task definition parameters does, see [Task Definition Parameters](#) (p. 95).

2. Choose **Next step** to continue.

## Configure service

In this section of the wizard, you select how you would like to configure the Amazon ECS service that is created from your task definition. A service launches and maintains a specified number of copies of the task definition in your cluster. The **Amazon ECS sample** application is a web-based "Hello World" style application that is meant to run indefinitely, so by running it as a service, it will restart if the task becomes unhealthy or unexpectedly stops.

1. In the **Service Name** field, select a name for your service.
2. In the **Desired number of tasks** field, enter the number of tasks you would like to launch with your specified task definition.

**Note**

If your task definition contains static port mappings, the number of container instances you launch in the next section of the wizard must be greater than or equal to the number of tasks specified here.

3. (Optional) You can choose to use an Elastic Load Balancing load balancer with your service. When a task is launched from a service that is configured to use a load balancer, the container instance that the task is launched on is registered with the load balancer and traffic from the load balancer is distributed across the instances in the load balancer.

**Important**

Elastic Load Balancing load balancers do incur cost while they exist in your AWS resources. For more information on Elastic Load Balancing pricing, see [Elastic Load Balancing Pricing](#).

Complete the following steps to use a load balancer with your service.

- a. In the **Elastic load balancing** section, choose the **Container name: host port** menu, and then choose **simple-app:80**. The default values here are set up for the sample application, but you can configure different listener options for the load balancer. For more information, see [Service Load Balancing](#) (p. 138).
  - b. In the **Service IAM Role** section, choose the **Select IAM role for service** menu, and then choose an existing Amazon ECS service (`ecsServiceRole`) role that you have already created, or click **Create new role** to create the required IAM role for your service.
4. Review your load balancer settings and click **Next Step**.

## Configure cluster

In this section of the wizard, you name your cluster, and then configure the container instances that your tasks can be placed on, the address range that you can reach your instances and load balancer from, and the IAM roles to use with your container instances that let Amazon ECS take care of this configuration for you.

1. In the **Cluster name** field, choose a name for your cluster.

2. In the **EC2 instance type** field, choose the instance type to use for your container instances. Instance types with more CPU and memory resources can handle more tasks. For more information on the different instance types, see [Amazon EC2 Instances](#).
3. In the **Number of instances** field, type the number of Amazon EC2 instances you want to launch into your cluster for tasks to be placed on. The more instances you have in your cluster, the more tasks you can place on them. Amazon EC2 instances incur costs while they exist in your AWS resources. For more information, see [Amazon EC2 Pricing](#).

**Note**

If you created a service with more than one desired task in it that exposes container ports on to container instance ports, such as the **Amazon ECS sample** application, you need to specify at least that many instances here.

4. Select a key pair name to use with your container instances. This is required for you to log into your instances with SSH; if you do not specify a key pair here, you cannot connect to your container instances with SSH. If you do not have a key pair, you can create one in the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
5. (Optional) In the **Security Group** section, you can choose a CIDR block that restricts access to your instances. The default value (**Anywhere**) allows access from the entire Internet.
6. In the **Container instance IAM role** section, choose an existing Amazon ECS container instance (`ecsInstanceRole`) role that you have already created, or choose **Create new role** to create the required IAM role for your container instances.
7. Click **Review and Launch** to proceed.

**Review**

1. Review your task definition, task configuration, and cluster configurations and click **Launch Instance & Run Service** to finish. You are directed to a **Launch Status** page that shows the status of your launch and describes each step of the process (this can take a few minutes to complete while your Auto Scaling group is created and populated).
2. After the launch is complete, choose **View service** to view your service in the Amazon ECS console.

# Cleaning Up your Amazon ECS Resources

When you are finished experimenting with or using a particular Amazon ECS cluster, you should clean up the resources associated with it to avoid incurring charges for resources that you are not using.

Some Amazon ECS resources, such as tasks, services, clusters, and container instances, are cleaned up using the Amazon ECS console. Other resources, such as Amazon EC2 instances, Elastic Load Balancing load balancers, and Auto Scaling groups, must be cleaned up manually in the Amazon EC2 console or by deleting the AWS CloudFormation stack that created them.

## Topics

- [Scale Down Services \(p. 24\)](#)
- [Delete Services \(p. 25\)](#)
- [Deregister Container Instances \(p. 25\)](#)
- [Delete a Cluster \(p. 25\)](#)
- [Delete the AWS CloudFormation Stack \(p. 26\)](#)

## Scale Down Services

If your cluster contains any services, you should first scale down the desired count of tasks in these services to 0 so that Amazon ECS does not try to start new tasks on your container instances while you are cleaning up. Follow the procedure in [Updating a Service \(p. 162\)](#) and enter 0 in the **Number of tasks** field.

Alternatively, you can use the following AWS CLI command to scale down your service. Be sure to substitute the region name, cluster name, and service name for each service that you are scaling down.

```
aws ecs update-service --cluster default --service service_name --desired-count 0 --  
region us-west-2
```

## Delete Services

Before you can delete a cluster, you must delete the services inside that cluster. After your service has scaled down to 0 tasks, you can delete it. For each service inside your cluster, follow the procedures in [Deleting a Service \(p. 163\)](#) to delete it.

Alternatively, you can use the following AWS CLI command to delete your services. Be sure to substitute the region name, cluster name, and service name for each service that you are deleting.

```
aws ecs delete-service --cluster default --service service_name --region us-west-2
```

## Deregister Container Instances

Before you can delete a cluster, you must deregister the container instances inside that cluster. For each container instance inside your cluster, follow the procedures in [Deregister a Container Instance \(p. 63\)](#) to deregister it.

Alternatively, you can use the following AWS CLI command to deregister your container instances. Be sure to substitute the region name, cluster name, and container instance ID for each container instance that you are deregistering.

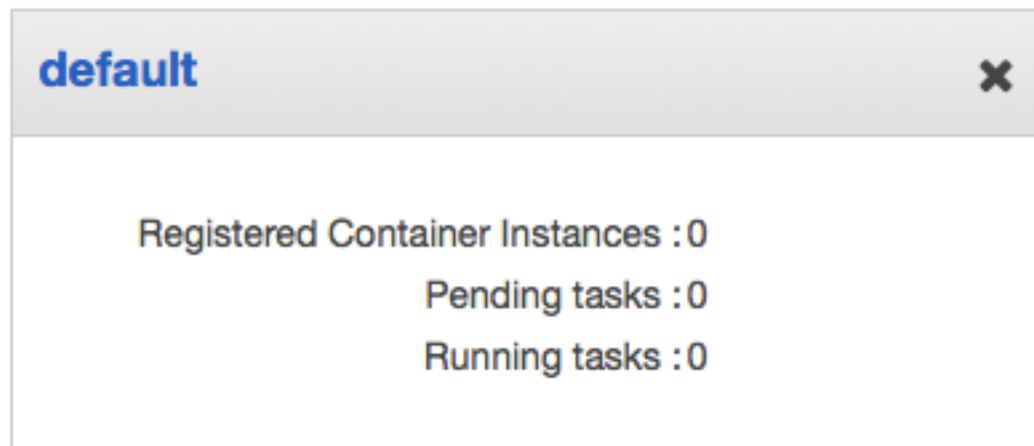
```
aws ecs deregister-container-instance --cluster default --container-  
instance container_instance_id --region us-west-2 --force
```

## Delete a Cluster

After you have removed the active resources from your Amazon ECS cluster, you can delete it. Use the following procedure to delete your cluster.

### To delete a cluster

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, select the region that your cluster is in.
3. In the navigation pane, select **Clusters**.
4. On the **Clusters** page, click the **x** in the upper-right-hand corner of the cluster you want to delete.





5. Choose **Yes, Delete** to delete the cluster.

Alternatively, you can use the following AWS CLI command to delete your cluster. Be sure to substitute the region name and cluster name for each cluster that you are deleting.

```
aws ecs delete-cluster --cluster default --region us-west-2
```

## Delete the AWS CloudFormation Stack

If you created your Amazon ECS resources by following the console first-run wizard, then your resources are contained in a AWS CloudFormation stack. You can completely clean up all of your remaining AWS resources that are associated with this stack by deleting it. Deleting the CloudFormation stack terminates the EC2 instances, removes the Auto Scaling group, deletes any Elastic Load Balancing load balancers, and removes the Amazon VPC subnets and Internet gateway associated with the cluster.

### To delete the AWS CloudFormation stack

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. From the navigation bar, select the region that your cluster was created in.
3. Select the stack that is associated with your Amazon ECS resources. The **Stack Name** value starts with `EC2ContainerService-default`.
4. Choose **Delete Stack** and then choose **Yes, Delete** to delete your stack resources.

# Amazon ECS Clusters

An Amazon EC2 Container Service (Amazon ECS) cluster is a logical grouping of container instances that you can place tasks on. When you first use the Amazon ECS service, a default cluster is created for you, but you can create multiple clusters in an account to keep your resources separate.

## Topics

- [Cluster Concepts \(p. 27\)](#)
- [Creating a Cluster \(p. 27\)](#)
- [Scaling a Cluster \(p. 29\)](#)
- [Deleting a Cluster \(p. 30\)](#)

## Cluster Concepts

- Clusters can contain multiple different container instance types.
- Clusters are region-specific.
- Container instances can only be a part of one cluster at a time.
- You can create custom IAM policies for your clusters to allow or restrict users' access to specific clusters. For more information, see the [Clusters \(p. 219\)](#) section in [Amazon ECS IAM Policy Examples \(p. 217\)](#).

## Creating a Cluster

You can create a Amazon ECS cluster using the AWS Management Console, as described in this topic. Before you begin, be sure that you've completed the steps in [Setting Up with Amazon ECS \(p. 8\)](#). After you've created your cluster, you can register container instances into it and run tasks and services.

### Note

This cluster creation wizard provides a simple way to create the resources that are needed by an ECS cluster, and it lets you customize several common cluster configuration options. However, this wizard does allow you to customize every resource option (for example, the container instance

AMI ID). If your requirements extend beyond what is supported in this wizard, consider using our reference architecture at <https://github.com/aws-labs/ecs-refarch-cloudformation>. Please do not attempt to modify the underlying resources directly once they are created by the wizard.

### To create a cluster

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, select the region to use.

#### Note

Amazon ECS is available in the following regions:

Region Name	Region
US East (N. Virginia)	us-east-1
US East (Ohio)	us-east-2
US West (N. California)	us-west-1
US West (Oregon)	us-west-2
EU (Ireland)	eu-west-1
EU (London)	eu-west-2
EU (Frankfurt)	eu-central-1
Asia Pacific (Tokyo)	ap-northeast-1
Asia Pacific (Singapore)	ap-southeast-1
Asia Pacific (Sydney)	ap-southeast-2
Canada (Central)	ca-central-1

3. In the navigation pane, choose **Clusters**.
4. On the **Clusters** page, select **Create Cluster**.
5. For **Cluster name**, enter a name for your cluster. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
6. (Optional) To create an empty cluster with no associated container instances, select **Create an empty cluster** and choose **Create** to create your cluster and finish.

#### Note

If you create an empty cluster, you need to manually launch container instances into it before you can run tasks in the cluster. For more information, see [Launching an Amazon ECS Container Instance \(p. 42\)](#).

7. For **EC2 instance type**, choose the Amazon EC2 instance type for your container instances. The instance type that you select determines the resources available for your tasks to run on.
8. For **Number of instances**, choose the number of Amazon EC2 instances to launch into your cluster. These instances are launched using the latest Amazon ECS-optimized AMI. For more information, see [Amazon ECS-Optimized AMI \(p. 34\)](#).
9. For **EBS storage (GiB)**, choose the size of the Amazon EBS volume to use for data storage on your container instances. By default, the Amazon ECS-optimized AMI launches with an 8 GiB root volume and a 22 GiB data volume. You can increase the size of the data volume to allow for greater image and container storage.

10. For **Key pair**, choose an Amazon EC2 key pair to use with your container instances for SSH access. If you do not specify a key pair, you cannot connect to your container instances with SSH. For more information, see [Amazon EC2 Key Pairs](#) in the *Amazon EC2 User Guide for Linux Instances*.
11. In the **Networking** section, configure the VPC to launch your container instances into. By default, the cluster creation wizard creates a new VPC with two subnets in different Availability Zones, and a security group open to the Internet on port 80. This is a basic setup that works well for an HTTP service. However, you can modify these settings by following the substeps below.
  - a. For **VPC**, choose to create a new VPC, or choose an existing VPC.
  - b. (Optional) If you chose to create a new VPC, for **CIDR Block**, choose a CIDR block for your VPC. For more information, see [Your VPC and Subnets](#) in the *Amazon VPC User Guide*.
  - c. For **Subnets**, choose the subnets to use for your VPC. If you chose to create a new VPC, you can keep the default settings or you can modify them to meet your needs. If you chose to use an existing VPC, select one or more subnets in that VPC to use for your cluster.
  - d. For **Security group**, choose the security group to attach to the container instances in your cluster. If you choose to create a new security group, you can specify a CIDR block to allow inbound traffic from (the default 0.0.0.0/0 is open to the Internet) and a single port or a range of contiguous ports to open on the container instance. For more complicated security group rules, you can choose an existing security group that you have already created.

**Note**

You can also choose to create a new security group and then modify the rules after the cluster is created. For more information, see [Amazon EC2 Security Groups for Linux Instances](#) in the *Amazon EC2 User Guide for Linux Instances*.

12. In the **Container instance IAM role** section, choose the IAM role to use with your container instances. If your account has the **ecsInstanceRole** that is created for you in the console first run wizard, that is selected by default. If you do not have this role in your account, you can choose to create the role, or you can choose another IAM role to use with your container instances.

**Important**

If you do not launch your container instance with the proper IAM permissions, your Amazon ECS agent will not connect to your cluster. For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).

13. Choose **Create** to create your cluster.

## Scaling a Cluster

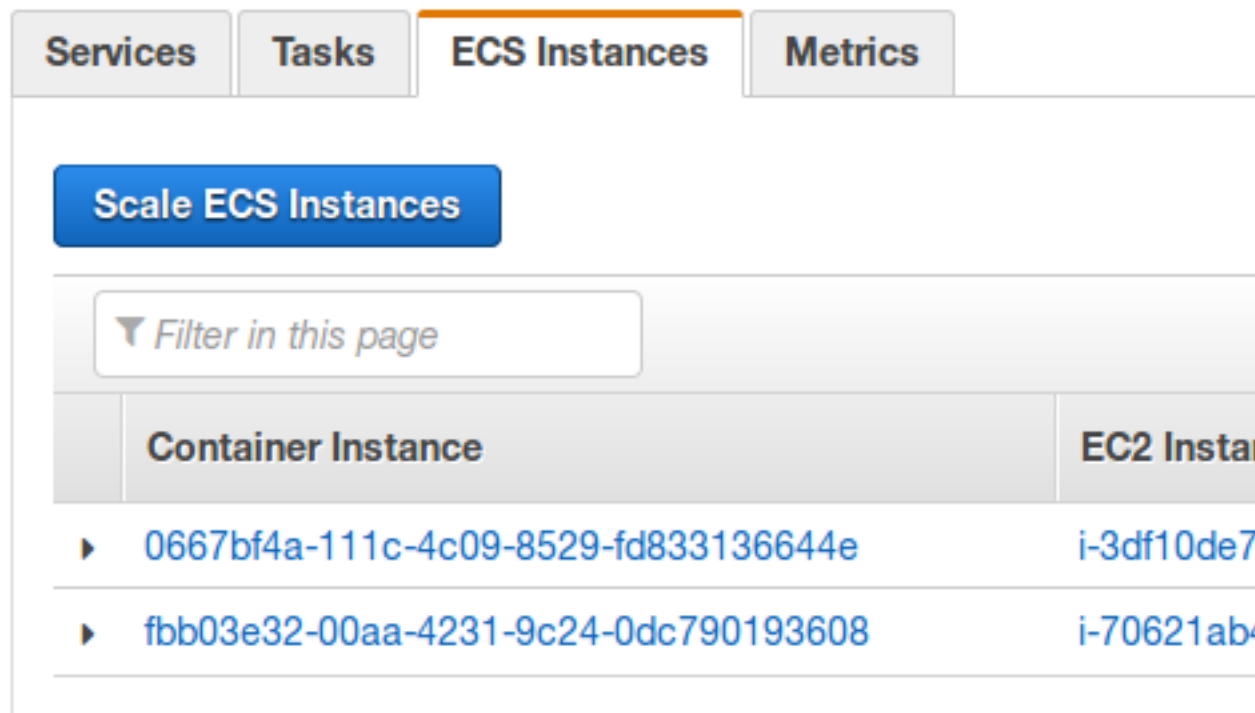
If your cluster was created with the console first-run experience described in [Getting Started with Amazon ECS \(p. 20\)](#) after November 24th, 2015, then the Auto Scaling group associated with the AWS CloudFormation stack created for your cluster can be scaled up or down to add or remove container instances. You can perform this scaling operation from within the Amazon ECS console.

If your cluster was not created with the console first-run experience described in [Getting Started with Amazon ECS \(p. 20\)](#) after November 24th, 2015, then you cannot scale your cluster from the Amazon ECS console. However, you can still modify existing Auto Scaling groups associated with your cluster in the Auto Scaling console. If you do not have an Auto Scaling group associated with your cluster, you can create one from an existing container instance. For more information, see [Creating an Auto Scaling Group Using an EC2 Instance](#) in the *Auto Scaling User Guide*. You can also manually launch or terminate container instances from the Amazon EC2 console; for more information see [Launching an Amazon ECS Container Instance \(p. 42\)](#).

**To scale a cluster**

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, choose the region that your cluster exists in.

3. In the navigation pane, choose **Clusters**.
4. Choose the cluster that you want to scale.
5. On the **Cluster : *name*** page, choose the **ECS Instances** tab.



If a **Scale ECS Instances** button appears, then you can scale your cluster in the next step. If not, you must manually adjust your Auto Scaling group to scale up or down your instances, or you can manually launch or terminate your container instances in the Amazon EC2 console.

6. Choose **Scale ECS Instances**.
7. In the **Desired number of instances** field, enter the number of instances you wish to scale your cluster to and choose **Scale**.

**Note**

If you reduce the number of container instances in your cluster, any tasks that are running on terminated instances are stopped.

## Deleting a Cluster

If you are finished using a cluster, you can delete it. When you delete a cluster in the Amazon ECS console, the associated resources that are deleted with it vary depending on how the cluster was created. [Step 5 \(p. 31\)](#) of the following procedure changes based on that condition.

If your cluster was created with the console first-run experience described in [Getting Started with Amazon ECS \(p. 20\)](#) after November 24th, 2015, or the cluster creation wizard described in [Creating a Cluster \(p. 27\)](#), then the AWS CloudFormation stack that was created for your cluster is also deleted when you delete your cluster.

If your cluster was created manually (without the cluster creation wizard) or with the console first run experience prior to November 24th, 2015, then you must deregister (or terminate) any container instances associated with the cluster before you can delete it. For more information, see [Deregister a Container Instance \(p. 63\)](#). In this case, after the cluster is deleted, you should delete any remaining AWS

CloudFormation stack resources or Auto Scaling groups associated with the cluster to avoid incurring any future charges for those resources. For more information, see [Delete the AWS CloudFormation Stack \(p. 26\)](#).

### To delete a cluster

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, select the region to use.

#### Note

Amazon ECS is available in the following regions:

Region Name	Region
US East (N. Virginia)	us-east-1
US East (Ohio)	us-east-2
US West (N. California)	us-west-1
US West (Oregon)	us-west-2
EU (Ireland)	eu-west-1
EU (London)	eu-west-2
EU (Frankfurt)	eu-central-1
Asia Pacific (Tokyo)	ap-northeast-1
Asia Pacific (Singapore)	ap-southeast-1
Asia Pacific (Sydney)	ap-southeast-2
Canada (Central)	ca-central-1

3. In the navigation pane, choose **Clusters**.
4. On the **Clusters** page, choose the cluster you want to delete.

#### Note

If your cluster has registered container instances, you must deregister or terminate them. For more information, see [Deregister a Container Instance \(p. 63\)](#).

5. Choose **Delete Cluster** to delete the cluster. You will see one of two confirmation prompts:
  - **Deleting the cluster also deletes the CloudFormation stack**  
**EC2ContainerService-*cluster\_name***: Deleting this cluster cleans up the associated resources that were created with the cluster, including Auto Scaling groups, VPCs or load balancers.
  - **Deleting the cluster does not affect CloudFormation resources...**: Deleting this cluster does not clean up any resources that are associated with the cluster, including Auto Scaling groups, VPCs or load balancers. Also, any container instances that are registered with this cluster must be deregistered or terminated before you can delete the cluster; for more information, see [Deregister a Container Instance \(p. 63\)](#). You can visit the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/> to update or delete any of these resources; for more information, see [Delete the AWS CloudFormation Stack \(p. 26\)](#).

# Amazon ECS Container Instances

An Amazon ECS container instance is an Amazon EC2 instance that is running the Amazon ECS container agent and has been registered into a cluster. When you run tasks with Amazon ECS, your tasks are placed on your active container instances.

## Topics

- [Container Instance Concepts \(p. 32\)](#)
- [Container Instance Lifecycle \(p. 33\)](#)
- [Check the Instance Role for Your Account \(p. 34\)](#)
- [Container Instance AMIs \(p. 34\)](#)
- [Launching an Amazon ECS Container Instance \(p. 42\)](#)
- [Bootstrapping Container Instances with Amazon EC2 User Data \(p. 45\)](#)
- [Connect to Your Container Instance \(p. 48\)](#)
- [Using CloudWatch Logs with Container Instances \(p. 49\)](#)
- [Container Instance Draining \(p. 56\)](#)
- [Managing Container Instances Remotely \(p. 57\)](#)
- [Starting a Task at Container Instance Launch Time \(p. 60\)](#)
- [Deregister a Container Instance \(p. 63\)](#)

## Container Instance Concepts

- Your container instance must be running the Amazon ECS container agent to register into one of your clusters. If you are using the Amazon ECS-optimized AMI, the agent is already installed. To use a different operating system, install the agent. For more information, see [Amazon ECS Container Agent \(p. 65\)](#).
- Because the Amazon ECS container agent makes calls to Amazon ECS on your behalf, you must launch container instances with an IAM role that authenticates to your account and provides the required resource permissions. For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).
- If any of the containers associated with your tasks require external connectivity, you can map their network ports to ports on the host Amazon ECS container instance so they are reachable from the

Internet. Your container instance security group must allow inbound access to the ports you want to expose. For more information, see [Create a Security Group](#) in the *Amazon VPC Getting Started Guide*.

- We strongly recommend launching your container instances inside a VPC, because Amazon VPC delivers more control over your network and offers more extensive configuration capabilities. For more information, see [Amazon EC2 and Amazon Virtual Private Cloud](#) in the *Amazon EC2 User Guide for Linux Instances*.
- Container instances need external network access to communicate with the Amazon ECS service endpoint. If your container instances do not have public IP addresses, then they must use network address translation (NAT) or an HTTP proxy to provide this access. For more information, see [NAT Instances](#) in the *Amazon VPC User Guide* and [HTTP Proxy Configuration \(p. 88\)](#) in this guide.
- The type of EC2 instance that you choose for your container instances determines the resources available in your cluster. Amazon EC2 provides different instance types, each with different CPU, memory, storage, and networking capacity that you can use to run your tasks. For more information, see [Amazon EC2 Instances](#).
- Because each container instance has unique state information that is stored locally on the container instance and within Amazon ECS, they should not be deregistered from one cluster and re-registered into another. To relocate container instance resources, we recommend that you terminate container instances from one cluster and launch new container instances with the latest Amazon ECS-optimized AMI in the new cluster. For more information, see [Terminate Your Instance](#) in the *Amazon EC2 User Guide for Linux Instances* and [Launching an Amazon ECS Container Instance \(p. 42\)](#).
- Because each container instance has unique state information that is stored locally on the container instance and within Amazon ECS, you cannot stop a container instance and change its instance type. Instead, we recommend that you terminate the container instance and launch a new container instance with the desired instance size and the latest Amazon ECS-optimized AMI in your desired cluster. For more information, see [Terminate Your Instance](#) in the *Amazon EC2 User Guide for Linux Instances* and [Launching an Amazon ECS Container Instance \(p. 42\)](#) in this guide.

## Container Instance Lifecycle

When the Amazon ECS container agent registers an instance into your cluster, the container instance reports its status as `ACTIVE` and its agent connection status as `TRUE`. This container instance can accept run task requests.

If you stop (not terminate) an Amazon ECS container instance, the status remains `ACTIVE`, but the agent connection status transitions to `FALSE` within a few minutes. Any tasks that were running on the container instance stop. If you start the container instance again, the container agent reconnects with the Amazon ECS service, and you are able to run tasks on the instance again.

### Important

If you stop and start a container instance, or reboot that instance, some older versions of the Amazon ECS container agent register the instance again without deregistering the original container instance ID, so Amazon ECS lists more container instances in your cluster than you actually have. (If you have duplicate container instance IDs for the same Amazon EC2 instance ID, you can safely deregister the duplicates that are listed as `ACTIVE` with an agent connection status of `FALSE`.) This issue is fixed in the current version of the Amazon ECS container agent. To update to the current version, see [Updating the Amazon ECS Container Agent \(p. 70\)](#).

If you change the status of a container instance to `DRAINING`, new tasks are not placed on the container instance and any service tasks running on the container instance are removed if possible so that you can perform system updates. For more information, see [Container Instance Draining \(p. 56\)](#).

If you deregister or terminate a container instance, the container instance status changes to `INACTIVE` immediately, and the container instance is no longer reported when you list your container instances. However, you can still describe the container instance for one hour following termination. After one hour, the instance description is no longer available.



## Check the Instance Role for Your Account

The Amazon ECS container agent makes calls to the Amazon ECS APIs on your behalf. Container instances that run the agent require an IAM policy and role for the service to know that the agent belongs to you.

In most cases, the Amazon ECS instance role is automatically created for you in the console first-run experience. You can use the following procedure to check and see if your account already has an Amazon ECS service role.

### To check for the `ecsInstanceRole` in the IAM console

1. Sign in to the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.
3. Search the list of roles for `ecsInstanceRole`. If the role exists, you do not need to create it. If the role does not exist, follow the procedures in [Amazon ECS Container Instance IAM Role \(p. 206\)](#) to create the role.

## Container Instance AMIs

The basic Amazon EC2 Container Service (Amazon ECS) container instance specification consists of the following:

### Required

- A modern Linux distribution running at least version 3.10 of the Linux kernel.
- The Amazon ECS container agent (preferably the latest version). For more information, see [Amazon ECS Container Agent \(p. 65\)](#).
- A Docker daemon running at least version 1.5.0, and any Docker runtime dependencies. For more information, see [Check runtime dependencies](#) in the Docker documentation.

### Note

For the best experience, we recommend the Docker version that ships with and is tested with the corresponding Amazon ECS agent version that you are using. For more information, see [Amazon ECS-optimized AMI Container Agent Versions \(p. 68\)](#).

### Recommended

- An initialization and nanny process to run and monitor the Amazon ECS agent. The Amazon ECS-optimized AMI uses the `ecs-init` upstart process. For more information, see the [ecs-init project](#) on GitHub.

The Amazon ECS-optimized AMI is preconfigured with these requirements and recommendations. We recommend that you use the Amazon ECS-optimized AMI for your container instances unless your application requires a specific operating system or a Docker version that is not yet available in that AMI. For more information, see [Amazon ECS-Optimized AMI \(p. 34\)](#).

## Amazon ECS-Optimized AMI

The Amazon ECS-optimized AMI is the recommended AMI for you to use to launch your Amazon ECS container instances. Although you can create your own container instance AMI that meets the basic specifications outlined in [Container Instance AMIs \(p. 34\)](#), the Amazon ECS-optimized AMI is

preconfigured and tested on Amazon ECS by AWS engineers. It is the simplest AMI for you to get started and to get your containers running on AWS quickly.

The current Amazon ECS-optimized AMI (`amzn-ami-2016.09.g-amazon-ecs-optimized`) consists of:

- The latest minimal version of the Amazon Linux AMI
- The latest version of the Amazon ECS container agent (1.14.1)
- The recommended version of Docker for the latest Amazon ECS container agent (1.12.6)
- The latest version of the `ecs-init` package to run and monitor the Amazon ECS agent (1.14.1-1)

#### Topics

- [How to Launch the Latest Amazon ECS-Optimized AMI \(p. 35\)](#)
- [Storage Configuration \(p. 36\)](#)
- [Subscribing to Amazon ECS–Optimized AMI Update Notifications \(p. 40\)](#)

## How to Launch the Latest Amazon ECS-Optimized AMI

The following are several ways that you can launch the latest Amazon ECS-optimized AMI into your cluster:

- The Amazon ECS [console first-run wizard](#) launches your container instances with the latest Amazon ECS-optimized AMI. For more information, see [Getting Started with Amazon ECS \(p. 20\)](#).
- You can launch your container instances manually in the Amazon EC2 console by following the procedures in [Launching an Amazon ECS Container Instance \(p. 42\)](#). You could also choose the **EC2 console link** in the table below that corresponds to your cluster's region.
- Use an **AMI ID** from the table below that corresponds to your cluster's region with the AWS CLI, the AWS SDKs, or an AWS CloudFormation template to launch your instances.

The current Amazon ECS–optimized AMI IDs by region are listed below for reference.

Region	AMI Name	AMI ID	EC2 console link
us-east-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-275ffe31	<a href="#">Launch instance</a>
us-east-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-62745007	<a href="#">Launch instance</a>
us-west-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-689bc208	<a href="#">Launch instance</a>
us-west-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-62d35c02	<a href="#">Launch instance</a>
eu-west-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-95f8d2f3	<a href="#">Launch instance</a>
eu-west-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-bf9481db	<a href="#">Launch instance</a>
eu-central-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-085e8a67	<a href="#">Launch instance</a>
ap-northeast-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-f63f6f91	<a href="#">Launch instance</a>

Region	AMI Name	AMI ID	EC2 console link
ap-southeast-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-b4ae1dd7	<a href="#">Launch instance</a>
ap-southeast-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-fbe9eb98	<a href="#">Launch instance</a>
ca-central-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-ee58e58a	<a href="#">Launch instance</a>

For previous versions of the Amazon ECS-optimized AMI and its corresponding Docker and Amazon ECS container agent versions, see [Amazon ECS-optimized AMI Container Agent Versions \(p. 68\)](#).

## Storage Configuration

By default, the Amazon ECS-optimized AMI ships with 30 GiB of total storage. You can modify this value at launch time to increase or decrease the available storage on your container instance. This storage is used for the operating system and for Docker images and metadata. The sections below describe the storage configuration of the Amazon ECS-optimized AMI, based on the AMI version.

### Version 2015.09.d and Later

Amazon ECS-optimized AMIs from version 2015.09.d and later launch with an 8-GiB volume for the operating system that is attached at `/dev/xvda` and mounted as the root of the file system. There is an additional 22-GiB volume that is attached at `/dev/xvdcz` that Docker uses for image and metadata storage. The volume is configured as a Logical Volume Management (LVM) device and it is accessed directly by Docker via the `devicemapper` backend. Because the volume is not mounted, you cannot use standard storage information commands (such as **df -h**) to determine the available storage. However, you can use LVM commands and **docker info** to find the available storage by following the procedure below. For more information about LVM, see the [LVM HOWTO](#) in The Linux Documentation Project.

The **docker-storage-setup** utility configures the LVM volume group and logical volume for Docker when the instance launches. By default, **docker-storage-setup** creates a volume group called `docker`, adds `/dev/xvdcz` as a physical volume to that group. It then creates a logical volume called `docker-pool` that uses 99% of the available storage in the volume group. The remaining 1% of the available storage is reserved for metadata.

#### Note

Earlier Amazon ECS-optimized AMI versions (2015.09.d to 2016.03.a) create a logical volume that uses 40% of the available storage in the volume group. When the logical volume becomes 60% full, the logical volume is increased in size by 20%.

### To determine the available storage for Docker

- You can use the LVM commands, **vgs** and **lvs**, or the **docker info** command to view available storage for Docker.

#### Note

The LVM command output displays storage values in GiB ( $2^{30}$  bytes), and **docker info** displays storage values in GB ( $10^9$  bytes).

- You can view the available storage in the volume group with the **vgs** command. This command shows the total size of the volume group and the available space in the volume group that can be used to grow the logical volume. The example below shows a 22-GiB volume with 204 MiB of free space.

```
[ec2-user ~]$ sudo vgs
```

Output:

```
VG      #PV #LV #SN Attr   VSize  VFree
docker  1   1   0 wz--n- 22.00g 204.00m
```

- You can view the available space in the logical volume with the **lvs** command. The example below shows a logical volume that is 21.75 GiB in size, and it is 7.63% full. This logical volume can grow until there is no more free space in the volume group.

```
[ec2-user@ ~]$ sudo lvs
```

Output:

```
LV          VG      Attr      LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync
Convert
docker-pool docker twi-aot--- 21.75g                7.63   4.96
```

- The **docker info** command also provides information about how much data space it is using, and how much data space is available. However, its available space value is based on the logical volume size that it is using.

#### Note

Because **docker info** displays storage values as GB (10<sup>9</sup> bytes), instead of GiB (2<sup>30</sup> bytes), the values displayed here look larger for the same amount of storage displayed with **lvs**. However, the values are equal (23.35 GB = 21.75 GiB).

```
[ec2-user ~]$ docker info | grep "Data Space"
```

Output:

```
Data Space Used: 1.782 GB
Data Space Total: 23.35 GB
Data Space Available: 21.57 GB
```

## To extend the Docker logical volume

The easiest way to add storage to your container instances is to terminate the existing instances and launch new ones with larger data storage volumes. However, if you are unable to do this, you can add storage to the volume group that Docker uses and extend its logical volume by following these steps.

#### Note

If your container instance storage is filling up too quickly, there are a few actions that you can take to reduce this effect:

- (Amazon ECS container agent 1.8.0 and later) Reduce the amount of time that stopped or exited containers remain on your container instances. The `ECS_ENGINE_TASK_CLEANUP_WAIT_DURATION` agent configuration variable sets the time duration to wait from when a task is stopped until the Docker container is removed (by default, this value is 3 hours). This removes the Docker container data. If this value is set too low, you may not be able to inspect your stopped containers or view the logs before they are removed. For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).
- Remove non-running containers and unused images from your container instances. You can use the following example commands to manually remove stopped containers and unused images. Deleted containers cannot be inspected later, and deleted images must be pulled again before starting new containers from them.

To remove non-running containers, execute the following command on your container instance:

```
$ docker rm $(docker ps -aq)
```

To remove unused images, execute the following command on your container instance:

```
$ docker rmi $(docker images -q)
```

- Remove unused data blocks within containers. You can use the following command to run **fstrim** on any running container and discard any data blocks that are unused by the container file system.

```
$ sudo sh -c "docker ps -q | xargs docker inspect --format='{{ .State.Pid }}' |  
xargs -IZ fstrim /proc/Z/root/"
```

1. Create a new Amazon EBS volume in the same Availability Zone as your container instance. For more information, see [Creating an Amazon EBS Volume](#) in the *Amazon EC2 User Guide for Linux Instances*.
2. Attach the volume to your container instance. The default location for the Docker data volume is `/dev/xvdcz`. For consistency, attach additional volumes in reverse alphabetical order from that device name (for example, `/dev/xvdcy`). For more information, see [Attaching an Amazon EBS Volume to an Instance](#) in the *Amazon EC2 User Guide for Linux Instances*.
3. Connect to your container instance using SSH. For more information, see [Connect to Your Container Instance](#) (p. 48).
4. Check the size of your `docker-pool` logical volume. The example below shows a logical volume of 409.19 GiB.

```
[ec2-user ~]$ sudo lvs
```

Output:

LV	VG	Attr	LSize	Pool	Origin	Data%	Meta%	Move	Log	Cpy%	Sync
Convert											
docker-pool	docker	twi-aot---	409.19g			0.16	0.08				

5. Check the current available space in your volume group. The example below shows 612.75 GiB in the `VFree` column.

```
[ec2-user ~]$ sudo vgs
```

Output:

VG	#PV	#LV	#SN	Attr	VSize	VFree
docker	1	1	0	wz--n-	1024.00g	612.75g

6. Add the new volume to the `docker` volume group, substituting the device name to which you attached the new volume. In this example, a 1-TiB volume was previously added and attached to `/dev/xvdcy`.

```
[ec2-user ~]$ sudo vgextend docker /dev/xvdcy  
Physical volume "/dev/sdcy" successfully created  
Volume group "docker" successfully extended
```

- Verify that your volume group size has increased with the **vgs** command. The **vFree** column should show the increased storage size. The example below now has 1.6 TiB in the **vFree** column, which is 1 TiB larger than it was previously. Your **vFree** column should be the sum of the original **vFree** value and the size of the volume you attached.

```
[ec2-user ~]$ sudo vgs
```

Output:

```
VG      #PV #LV #SN Attr   VSize VFree
docker    2  1  0 wz--n- 2.00t 1.60t
```

- Extend the **docker-pool** logical volume with the size of the volume you added earlier. The command below adds 1024 GiB to the logical volume, which is entered as **1024G**.

```
[ec2-user ~]$ sudo lvextend -L+1024G /dev/docker/docker-pool
```

Output:

```
Size of logical volume docker/docker-pool_tdata changed from 409.19 GiB (104752
extents) to 1.40 TiB (366896 extents).
Logical volume docker-pool successfully resized
```

- Verify that your logical volume has increased in size.

```
[ec2-user ~]$ sudo lvs
```

Output:

```
LV          VG      Attr      LSize Pool Origin Data%  Meta%  Move Log Cpy%Sync
Convert
docker-pool docker twi-aot--- 1.40t          0.04   0.12
```

- (Optional) Verify that **docker info** also recognizes the added storage space.

#### Note

Because **docker info** displays storage values as GB (10<sup>9</sup> bytes), instead of GiB (2<sup>30</sup> bytes), the values displayed here look larger for the same amount of storage displayed with **lvs**. However, the values are equal (1.539 TB = 1.40 TiB).

```
[ec2-user ~]$ docker info | grep "Data Space"
```

Output:

```
Data Space Used: 109.6 MB
Data Space Total: 1.539 TB
Data Space Available: 1.539 TB
```

## Version 2015.09.c and Earlier

Amazon ECS-optimized AMIs from version 2015.09.c and earlier launch with a single 30-GiB volume that is attached at `/dev/xvda` and mounted as the root of the file system. This volume shares the operating system and all Docker images and metadata. You can determine the available storage on your container instance with standard storage information commands (such as **df -h**).

There is no practical way to add storage (that Docker can use) to instances launched from these AMIs without stopping them. If you find that your container instances need more storage than the default 30 GiB, you should terminate each instance and launch another in its place with the latest Amazon ECS-optimized AMI and a large enough data storage volume.

## Subscribing to Amazon ECS–Optimized AMI Update Notifications

The Amazon ECS-optimized AMI receives regular updates for agent changes, Docker version updates, and Linux kernel security updates. You can subscribe to the AMI update Amazon SNS topic to receive notifications when a new Amazon ECS–optimized AMI is available. Notifications are available in all formats that Amazon SNS supports.

### Note

Your user account must have `sns::subscribe` IAM permissions to subscribe to an SNS topic.

You can subscribe an Amazon SQS queue to this notification topic, but you must use a topic ARN that is in the same region. For more information, see [Tutorial: Subscribing an Amazon SQS Queue to an Amazon SNS Topic](#) in the *Amazon Simple Queue Service Developer Guide*.

You can also use an AWS Lambda function to trigger events when notifications are received. For more information, see [Invoking Lambda functions using Amazon SNS notifications](#) in the *Amazon Simple Notification Service Developer Guide*.

The Amazon SNS topic ARNs for each region are shown below.

AWS Region	Amazon SNS Topic ARN
us-east-1	arn:aws:sns:us-east-1:177427601217:ecs-optimized-amazon-ami-update
us-east-2	arn:aws:sns:us-east-2:177427601217:ecs-optimized-amazon-ami-update
us-west-1	arn:aws:sns:us-west-1:177427601217:ecs-optimized-amazon-ami-update
us-west-2	arn:aws:sns:us-west-2:177427601217:ecs-optimized-amazon-ami-update
eu-west-1	arn:aws:sns:eu-west-1:177427601217:ecs-optimized-amazon-ami-update
eu-west-2	arn:aws:sns:eu-west-2:177427601217:ecs-optimized-amazon-ami-update
eu-central-1	arn:aws:sns:eu-central-1:177427601217:ecs-optimized-amazon-ami-update
ap-northeast-1	arn:aws:sns:ap-northeast-1:177427601217:ecs-optimized-amazon-ami-update
ap-southeast-1	arn:aws:sns:ap-southeast-1:177427601217:ecs-optimized-amazon-ami-update
ap-southeast-2	arn:aws:sns:ap-southeast-2:177427601217:ecs-optimized-amazon-ami-update

AWS Region	Amazon SNS Topic ARN
ca-central-1	arn:aws:sns:ca-central-1:177427601217:ecs-optimized-amazon-ami-update

### To subscribe to AMI update notification emails in the AWS Management Console

1. Open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. In the region list, choose the same region as the topic ARN to which to subscribe. This example uses the `us-west-2` region.
3. Choose **Create subscription**.
4. In the **Create Subscription** dialog box, for **Topic ARN**, paste the Amazon ECS-optimized AMI update topic ARN: `arn:aws:sns:us-west-2:177427601217:ecs-optimized-amazon-ami-update`.
5. For **Protocol**, choose **Email**. For **Endpoint**, type an email address you can use to receive the notification.
6. Choose **Create subscription**.
7. In your email application, open the message from AWS Notifications and open the link to confirm your subscription.

Your web browser displays a confirmation response from Amazon SNS.

### To subscribe to AMI update notification emails with the AWS CLI

1. Run the following command with the AWS CLI:

```
aws sns --region us-west-2 subscribe --topic-arn arn:aws:sns:us-west-2:177427601217:ecs-optimized-amazon-ami-update --protocol email --notification-endpoint your_email@your_domain.com
```

2. In your email application, open the message from AWS Notifications and open the link to confirm your subscription.

Your web browser displays a confirmation response from Amazon SNS.

## Amazon SNS Message Format

An example AMI update notification message is shown below:

```
{
  "ECSAgent": {
    "ReleaseVersion": "1.14.1"
  },
  "ECSAmis": [
    {
      "ReleaseVersion": "2016.09.g",
      "AgentVersion": "1.14.1",
      "ReleaseNotes": "This AMI includes the latest ECS agent 2016.09.g",
      "OsType": "linux",
      "OperatingSystemName": "Amazon Linux",
      "Regions": {
        "ap-northeast-1": {
          "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
          "ImageId": "ami-f63f6f91"
        },
        "ap-southeast-1": {
          "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",

```



```
    "ImageId": "ami-b4ae1dd7"
  },
  "ap-southeast-2": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-fbe9eb98"
  },
  "ca-central-1": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-ee58e58a"
  },
  "eu-central-1": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-085e8a67"
  },
  "eu-west-1": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-95f8d2f3"
  },
  "eu-west-2": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-bf9481db"
  },
  "us-east-1": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-275ffe31"
  },
  "us-east-2": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-62745007"
  },
  "us-west-1": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-689bc208"
  },
  "us-west-2": {
    "Name": "amzn-ami-2016.09.g-amazon-ecs-optimized",
    "ImageId": "ami-62d35c02"
  }
}
]
```

## Launching an Amazon ECS Container Instance

You can launch an Amazon ECS container instance using the AWS Management Console, as described in this topic. Before you begin, be sure that you've completed the steps in [Setting Up with Amazon ECS \(p. 8\)](#). After you've launched your instance, you can use it to run tasks.

### To launch a container instance

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. From the navigation bar, select the region to use.

#### Note

Amazon ECS is available in the following regions:

Region Name	Region
US East (N. Virginia)	us-east-1

Region Name	Region
US East (Ohio)	us-east-2
US West (N. California)	us-west-1
US West (Oregon)	us-west-2
EU (Ireland)	eu-west-1
EU (London)	eu-west-2
EU (Frankfurt)	eu-central-1
Asia Pacific (Tokyo)	ap-northeast-1
Asia Pacific (Singapore)	ap-southeast-1
Asia Pacific (Sydney)	ap-southeast-2
Canada (Central)	ca-central-1

- From the console dashboard, choose **Launch Instance**.
- On the **Choose an Amazon Machine Image (AMI)** page, choose **Community AMIs**.
- Choose an AMI for your container instance. You can choose the Amazon ECS-optimized AMI, or another operating system, such as CoreOS or Ubuntu. If you do not choose the Amazon ECS-optimized AMI, you must follow the procedures in [Installing the Amazon ECS Container Agent](#) (p. 65).

**Note**

For Amazon ECS-specific CoreOS installation instructions, see <https://coreos.com/docs/running-coreos/cloud-providers/ecs/>.

To use the Amazon ECS-optimized AMI, type **amazon-ecs-optimized** in the **Search community AMIs** field and press the **Enter** key. Choose **Select** next to the **amzn-ami-2016.09.g-amazon-ecs-optimized** AMI. The current Amazon ECS-optimized AMI IDs by region are listed below for reference.

Region	AMI ID
us-east-1	ami-275ffe31
us-east-2	ami-62745007
us-west-1	ami-689bc208
us-west-2	ami-62d35c02
eu-west-1	ami-95f8d2f3
eu-west-2	ami-bf9481db
eu-central-1	ami-085e8a67
ap-northeast-1	ami-f63f6f91
ap-southeast-1	ami-b4ae1dd7
ap-southeast-2	ami-fbe9eb98

Region	AMI ID
ca-central-1	ami-ee58e58a

- On the **Choose an Instance Type** page, you can select the hardware configuration of your instance. The `t2.micro` instance type is selected by default. The instance type that you select determines the resources available for your tasks to run on.
- Choose **Next: Configure Instance Details**.
- On the **Configure Instance Details** page, set the **Auto-assign Public IP** field depending on whether you want your instance to be accessible from the public Internet. If your instance should be accessible from the Internet, verify that the **Auto-assign Public IP** field is set to **Enable**. If your instance should not be accessible from the Internet, set this field to **Disable**.

#### Note

Container instances need external network access to communicate with the Amazon ECS service endpoint. If your container instances do not have public IP addresses, then they must use network address translation (NAT) or an HTTP proxy to provide this access. For more information, see [NAT Instances](#) in the *Amazon VPC User Guide* and [HTTP Proxy Configuration](#) (p. 88) in this guide.

- On the **Configure Instance Details** page, select the `ecsInstanceRole` **IAM role** value that you created for your container instances in [Setting Up with Amazon ECS](#) (p. 8).

#### Important

If you do not launch your container instance with the proper IAM permissions, your Amazon ECS agent cannot connect to your cluster. For more information, see [Amazon ECS Container Instance IAM Role](#) (p. 206).

- (Optional) Configure your Amazon ECS container instance with user data, such as the agent environment variables from [Amazon ECS Container Agent Configuration](#) (p. 76). Amazon EC2 user data scripts are executed only one time, when the instance is first launched.

By default, your container instance launches into your default cluster. To launch into a non-default cluster, choose the **Advanced Details** list. Then, paste the following script into the **User data** field, replacing `your_cluster_name` with the name of your cluster.

```
#!/bin/bash
echo ECS_CLUSTER=your_cluster_name >> /etc/ecs/ecs.config
```

Or, if you have an `ecs.config` file in Amazon S3 and have enabled Amazon S3 read-only access to your container instance role, choose the **Advanced Details** list. Then, paste the following script into the **User data** field, replacing `your_bucket_name` with the name of your bucket to install the AWS CLI and write your configuration file at launch time.

#### Note

For more information about this configuration, see [Storing Container Instance Configuration in Amazon S3](#) (p. 81).

```
#!/bin/bash
yum install -y aws-cli
aws s3 cp s3://your_bucket_name/ecs.config /etc/ecs/ecs.config
```

For more information, see [Bootstrapping Container Instances with Amazon EC2 User Data](#) (p. 45).

- Choose **Next: Add Storage**.
- On the **Add Storage** page, configure the storage for your container instance.

If you are using an Amazon ECS-optimized AMI before the **2015.09.d** version, your instance has a single volume that is shared by the operating system and Docker.

If you are using the **2015.09.d** or later Amazon ECS-optimized AMI, your instance has two volumes configured. The **Root** volume is for the operating system's use, and the second Amazon EBS volume (attached to `/dev/xvdcz`) is for Docker's use.

You can optionally increase or decrease the volume sizes for your instance to meet your application needs.

13. Choose **Review and Launch**.
14. On the **Review Instance Launch** page, under **Security Groups**, you see that the wizard created and selected a security group for you. Instead, select the security group that you created in [Setting Up with Amazon ECS \(p. 8\)](#) using the following steps:
  - a. Choose **Edit security groups**.
  - b. On the **Configure Security Group** page, select the **Select an existing security group** option.
  - c. Select the security group you created for your container instance from the list of existing security groups, and choose **Review and Launch**.
15. On the **Review Instance Launch** page, choose **Launch**.
16. In the **Select an existing key pair or create a new key pair** dialog box, choose **Choose an existing key pair**, then select the key pair that you created when getting set up.

When you are ready, select the acknowledgment field, and then choose **Launch Instances**.

17. A confirmation page lets you know that your instance is launching. Choose **View Instances** to close the confirmation page and return to the console.
18. On the **Instances** screen, you can view the status of your instance. It takes a short time for an instance to launch. When you launch an instance, its initial state is `pending`. After the instance starts, its state changes to `running`, and it receives a public DNS name. If the **Public DNS** column is hidden, choose **Show/Hide, Public DNS**.

## Bootstrapping Container Instances with Amazon EC2 User Data

When you launch an Amazon ECS container instance, you have the option of passing user data to the instance. The data can be used to perform common automated configuration tasks and even run scripts when the instance boots. For Amazon ECS, the most common use cases for user data are to pass configuration information to the Docker daemon and the Amazon ECS container agent.

You can pass multiple types of user data to Amazon EC2, including cloud boothooks, shell scripts, and `cloud-init` directives. For more information about these and other format types, see the [Cloud-Init documentation](#).

You can pass this user data into the Amazon EC2 launch wizard in [Step 10 \(p. 44\)](#) of [Launching an Amazon ECS Container Instance \(p. 42\)](#).

### Topics

- [Amazon ECS Container Agent \(p. 46\)](#)
- [Docker Daemon \(p. 46\)](#)
- [cloud-init-per Utility \(p. 46\)](#)
- [MIME Multi Part Archive \(p. 47\)](#)

## Amazon ECS Container Agent

The Amazon ECS-optimized AMI looks for agent configuration data in the `/etc/ecs/ecs.config` file when the container agent starts. You can specify this configuration data at launch with Amazon EC2 user data. For a complete list of available Amazon ECS container agent configuration variables, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

To set only a single agent configuration variable, such as the cluster name, use **echo** to copy the variable to the configuration file:

```
#!/bin/bash
echo "ECS_CLUSTER=MyCluster" >> /etc/ecs/ecs.config
```

If you have multiple variables to write to `/etc/ecs/ecs.config`, use the following heredoc format. This format writes everything between the lines beginning with **cat** and **EOF** to the configuration file.

```
#!/bin/bash
cat <<'EOF' >> /etc/ecs/ecs.config
ECS_CLUSTER=MyCluster
ECS_ENGINE_AUTH_TYPE=docker
ECS_ENGINE_AUTH_DATA={"username":"my_name","password":"my_password","email":"email@example.com"}}
ECS_LOGLEVEL=debug
EOF
```

## Docker Daemon

You can specify Docker daemon configuration information with Amazon EC2 user data, but this configuration data must be written before the Docker daemon starts. The `cloud-boothook` user data format executes earlier in the boot process than a user data shell script. For a complete list of Docker daemon configuration options, see [the Docker daemon documentation](#).

By default, `cloud-boothook` user data is run at every instance boot, so you must create a mechanism to prevent the boothook from running multiple times. The **cloud-init-per** utility is provided to control boothook frequency in this manner. For more information, see [cloud-init-per Utility \(p. 46\)](#).

In the example below, the `--storage-opt dm.basesize=20G` option is appended to any existing options in the Docker daemon configuration file, `/etc/sysconfig/docker`.

```
#cloud-boothook
cloud-init-per once docker_options echo 'OPTIONS="{OPTIONS} --storage-opt
dm.basesize=20G"' >> /etc/sysconfig/docker
```

To write multiple lines to a file, use the following heredoc format to accomplish the same goal:

```
#cloud-boothook
cloud-init-per instance docker_options cat <<'EOF' >> /etc/sysconfig/docker
OPTIONS="{OPTIONS} --storage-opt dm.basesize=20G"
HTTP_PROXY=http://proxy.example.com:80/
EOF
```

## cloud-init-per Utility

The **cloud-init-per** utility is provided by the `cloud-init` package to help you create boothook commands for instances that run at a specified frequency.

The **cloud-init-per** utility syntax is as follows:

```
cloud-init-per frequency name cmd [ arg1 [ arg2 [ ... ] ]
```

*frequency*

How often the boothook should run.

- Specify *once* to never run again, even with a new instance ID.
- Specify *instance* to run on the first boot for each new instance launch (for example, if you create an AMI from the instance after the boothook has run, it will still run again on subsequent instances launched from that AMI).
- Specify *always* to run at every boot.

*name*

The name to include in the semaphore file path that is written when the boothook runs. The semaphore file is written to `/var/lib/cloud/instances/instance_id/sem/bootper.name.instance`.

*cmd*

The command and arguments which the boothook should execute.

In the example below, the command `echo 'OPTIONS="${OPTIONS}" --storage-opt dm.basesize=20G'` `>> /etc/sysconfig/docker` is executed only once. A semaphore file is written that contains its name.

```
#cloud-boothook
cloud-init-per once docker_options echo 'OPTIONS="${OPTIONS}" --storage-opt
dm.basesize=20G' >> /etc/sysconfig/docker
```

The semaphore file records the exit code of the command and a UNIX timestamp for when it was executed.

```
[ec2-user ~]$ cat /var/lib/cloud/instances/i-0c7f87d7611b2165e/sem/
bootper.docker_options.instance
```

Output:

```
0 1488410363
```

## MIME Multi Part Archive

You can combine multiple user data blocks together into a single user data block called a MIME multi-part file. For example, you might want to combine a cloud boothook that configures the Docker daemon with a user data shell script that writes configuration information for the Amazon ECS container agent.

A MIME multi-part file consists of the following components:

- The content type and part boundary declaration: `Content-Type: multipart/mixed; boundary="==BOUNDARY=="`
- The MIME version declaration: `MIME-Version: 1.0`
- One or more user data blocks, which contain the following components:
  - The opening boundary, which signals the beginning of a user data block: `===BOUNDARY==`
  - The content type declaration for the block (for the list of content types, see the [Cloud-Init documentation](#)): `Content-Type: text/cloud-boothook; charset="us-ascii"`
  - The content of the user data, for example, a list of shell commands or `cloud-init` directives
- The closing boundary, which signals the end of the MIME multi-part file: `===BOUNDARY===`

### Example Example MIME multi-part file

This example MIME multipart file configures the Docker base device size to 20 GiB and configures the Amazon ECS container agent to register the instance into the cluster named `my-ecs-cluster`.

```
Content-Type: multipart/mixed; boundary=="==BOUNDARY=="
MIME-Version: 1.0

--==BOUNDARY==
Content-Type: text/cloud-boothook; charset="us-ascii"

# Set Docker daemon options
cloud-init-per once docker_options echo 'OPTIONS="{OPTIONS}" --storage-opt
dm.basesize=20G' >> /etc/sysconfig/docker

--==BOUNDARY==
Content-Type: text/x-shellscript; charset="us-ascii"

#!/bin/bash
# Set any ECS agent configuration options
echo "ECS_CLUSTER=my-ecs-cluster" >> /etc/ecs/ecs.config

--==BOUNDARY==
```

## Connect to Your Container Instance

To perform basic administrative tasks on your instance, such as updating or installing software or accessing diagnostic logs, connect to the instance using SSH. To connect to your instance using SSH, your container instances must meet the following prerequisites:

- Your container instances need external network access to connect using SSH. If your container instances are running in a private VPC, they need an SSH bastion instance to provide this access. For more information, see the [Securely connect to Linux instances running in a private Amazon VPC](#) blog post.
- Your container instances must have been launched with a valid Amazon EC2 key pair. Amazon ECS container instances have no password, and you use a key pair to log in using SSH. If you did not specify a key pair when you launched your instance, there is no way to connect to the instance.
- SSH uses port 22 for communication. Port 22 must be open in your container instance security group for you to connect to your instance using SSH.

#### Note

The Amazon ECS console first-run experience creates a security group for your container instances without inbound access on port 22. If your container instances were launched from the console first-run experience, add inbound access to port 22 on the security group used for those instances. For more information, see [Authorizing Network Access to Your Instances](#) in the *Amazon EC2 User Guide for Linux Instances*.

### To connect to your container instance

1. Find the public IP or DNS address for your container instance.
  - a. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
  - b. Select the cluster that hosts your container instance.
  - c. On the **Cluster** page, choose **ECS Instances**.
  - d. On the **Container Instance** column, select the container instance to connect to.
  - e. On the **Container Instance** page, record the **Public IP** or **Public DNS** for your instance.

2. Find the default username for your container instance AMI. The user name for instances launched with the Amazon ECS-optimized AMI is `ec2-user`. For Ubuntu AMIs, the default user name is `ubuntu`. For CoreOS, the default user name is `core`.
3. If you are using a macOS or Linux computer, connect to your instance with the following command, substituting the path to your private key and the public address for your instance:

```
$ ssh -i /path/to/my-key-pair.pem ec2-user@ec2-198-51-100-1.compute-1.amazonaws.com
```

If you are using a Windows computer, see [Connecting to Your Linux Instance from Windows Using PuTTY](#) in the *Amazon EC2 User Guide for Linux Instances*.

### Important

If you experience any issues connecting to your instance, see [Troubleshooting Connecting to Your Instance](#) in the *Amazon EC2 User Guide for Linux Instances*.

## Using CloudWatch Logs with Container Instances

You can configure your container instances to send log information to CloudWatch Logs. This enables you to view different logs from your container instances in one convenient location. This topic helps you get started using CloudWatch Logs on your container instances that were launched with the Amazon ECS-optimized AMI.

To send container logs from your tasks to CloudWatch Logs, see [Using the awslogs Log Driver \(p. 114\)](#). For more information on CloudWatch Logs, see [Monitoring Log Files](#) in the *Amazon CloudWatch User Guide*.

### Topics

- [CloudWatch Logs IAM Policy \(p. 49\)](#)
- [Installing the CloudWatch Logs Agent \(p. 50\)](#)
- [Configuring and Starting the CloudWatch Logs Agent \(p. 50\)](#)
- [Viewing CloudWatch Logs \(p. 53\)](#)
- [Configuring CloudWatch Logs at Launch with User Data \(p. 54\)](#)

## CloudWatch Logs IAM Policy

Before your container instances can send log data to CloudWatch Logs, you must create an IAM policy to allow your container instances to use the CloudWatch Logs APIs, and then you must attach that policy to the `ecsInstanceRole`.

### To create the `ECS-CloudWatchLogs` IAM policy

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Policies**.
3. Choose **Create Policy**.
4. On the **Create Policy** page, choose **Create Your Own Policy**.
5. On the **Review Policy** page, enter the following information and choose **Create Policy**.
  - a. In the **Policy Name** field, enter `ECS-CloudWatchLogs`.
  - b. In the **Policy Document** field, paste the following policy.

```
{  
  "Version": "2012-10-17",
```



```
"Statement": [
  {
    "Effect": "Allow",
    "Action": [
      "logs:CreateLogGroup",
      "logs:CreateLogStream",
      "logs:PutLogEvents",
      "logs:DescribeLogStreams"
    ],
    "Resource": [
      "arn:aws:logs:*:*:*"
    ]
  }
]
```

#### To attach the `ECS-CloudWatchLogs` policy to your `ecsInstanceRole`

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.
3. Choose `ecsInstanceRole`. If the role does not exist, follow the procedures in [Amazon ECS Container Instance IAM Role \(p. 206\)](#) to create the role.
4. Choose the **Permissions** tab.
5. In the **Managed Policies** section, choose **Attach Policy**.
6. In the **Filter** box, type **ECS-CloudWatchLogs** to narrow the available policies to attach.
7. Check the box to the left of the **ECS-CloudWatchLogs** policy and choose **Attach Policy**.

## Installing the CloudWatch Logs Agent

After you have added the `ECS-CloudWatchLogs` policy to your `ecsInstanceRole`, you can install the CloudWatch Logs agent on your container instances.

#### Note

This procedure was written for the Amazon ECS-optimized AMI, and may not work on other operating systems. For information on installing the agent on other operating systems, see [Getting Started with CloudWatch Logs](#) in the *Amazon CloudWatch User Guide*.

#### To install the CloudWatch Logs agent

- Run the following command to install the CloudWatch Logs agent.

```
[ec2-user ~]$ sudo yum install -y awslogs
```

After you have installed the agent, proceed to the next section to configure the agent.

## Configuring and Starting the CloudWatch Logs Agent

The CloudWatch Logs agent configuration file (`/etc/awslogs/awslogs.conf`) describes the log files to send to CloudWatch Logs. The agent configuration file's `[general]` section defines common configurations that apply to all log streams, and you can add individual log stream sections for each file on your container instances that you want to monitor. For more information, see [CloudWatch Logs Agent Reference](#) in the *Amazon CloudWatch User Guide*.

The example configuration file below is configured for the Amazon ECS-optimized AMI, and it provides log streams for several common log files:

`/var/log/dmesg`

The message buffer of the Linux kernel.

`/var/log/messages`

Global system messages.

`/var/log/docker`

Docker daemon log messages.

`/var/log/ecs/ecs-init.log`

Log messages from the `ecs-init` upstart job.

`/var/log/ecs/ecs-agent.log`

Log messages from the Amazon ECS container agent.

`/var/log/ecs/audit.log`

Log messages from the IAM roles for tasks credential provider.

You can use the example file below for your Amazon ECS container instances, but you must substitute the `{cluster}` and `{container_instance_id}` entries with the cluster name and container instance ID for each container instance so that the log streams are grouped by cluster name and separate for each individual container instance. The procedure that follows the example configuration file has steps to replace the cluster name and container instance ID placeholders.

```
[general]
state_file = /var/lib/awslogs/agent-state

[/var/log/dmesg]
file = /var/log/dmesg
log_group_name = /var/log/dmesg
log_stream_name = {cluster}/{container_instance_id}

[/var/log/messages]
file = /var/log/messages
log_group_name = /var/log/messages
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %b %d %H:%M:%S

[/var/log/docker]
file = /var/log/docker
log_group_name = /var/log/docker
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%S.%f

[/var/log/ecs/ecs-init.log]
file = /var/log/ecs/ecs-init.log.*
log_group_name = /var/log/ecs/ecs-init.log
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%SZ

[/var/log/ecs/ecs-agent.log]
file = /var/log/ecs/ecs-agent.log.*
log_group_name = /var/log/ecs/ecs-agent.log
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%SZ

[/var/log/ecs/audit.log]
file = /var/log/ecs/audit.log.*
log_group_name = /var/log/ecs/audit.log
```

```
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%SZ
```

## To configure the CloudWatch Logs agent

1. Back up the existing CloudWatch Logs agent configuration file.

```
[ec2-user ~]$ sudo mv /etc/awslogs/awslogs.conf /etc/awslogs/awslogs.conf.bak
```

2. Create a blank configuration file.

```
[ec2-user ~]$ sudo touch /etc/awslogs/awslogs.conf
```

3. Open the `/etc/awslogs/awslogs.conf` file with a text editor, and copy the example file above into it.
4. Install the `jq` JSON query utility.

```
[ec2-user ~]$ sudo yum install -y jq
```

5. Query the Amazon ECS introspection API to find the cluster name and set it to an environment variable.

```
[ec2-user ~]$ cluster=$(curl -s http://localhost:51678/v1/metadata | jq -r '.  
| .Cluster')
```

6. Replace the `{cluster}` placeholders in the file with the value of the environment variable you set in the previous step.

```
[ec2-user ~]$ sudo sed -i -e "s/{cluster}/${cluster}/g" /etc/awslogs/awslogs.conf
```

7. Query the Amazon ECS introspection API to find the container instance ID and set it to an environment variable.

```
[ec2-user ~]$ container_instance_id=$(curl -s http://localhost:51678/v1/metadata | jq -  
r '. | .ContainerInstanceArn' | awk -F/ '{print $2}' )
```

8. Replace the `{container_instance_id}` placeholders in the file with the value of the environment variable you set in the previous step.

```
[ec2-user ~]$ sudo sed -i -e "s/{container_instance_id}/${container_instance_id}/g" /etc/  
awslogs/awslogs.conf
```

## To configure the CloudWatch Logs agent region

By default, the CloudWatch Logs agent sends data to the `us-east-1` region. If you would like to send your data to a different region, such as the region that your cluster is located in, you can set the region in the `/etc/awslogs/awscli.conf` file.

1. Open the `/etc/awslogs/awscli.conf` file with a text editor.
2. In the `[default]` section, replace `us-east-1` with the region where you want to view log data.
3. Save the file and exit your text editor.

## To start the CloudWatch Logs agent

1. Start the CloudWatch Logs agent with the following command.

```
[ec2-user ~]$ sudo service awslogs start
```

Output:

```
Starting awslogs: [ OK ]
```

2. Use the **chkconfig** command to ensure that the CloudWatch Logs agent starts at every system boot.

```
[ec2-user ~]$ sudo chkconfig awslogs on
```

## Viewing CloudWatch Logs

After you have given your container instance role the proper permissions to send logs to CloudWatch Logs, and you have configured and started the agent, your container instance should be sending its log data to CloudWatch Logs. You can view and search these logs in the AWS Management Console.

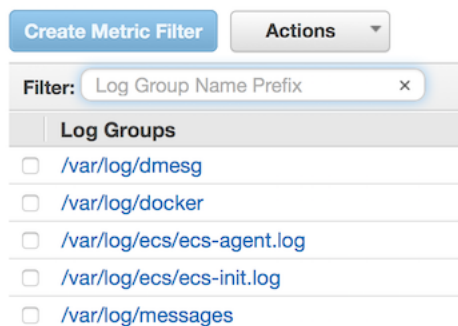
### Note

New instance launches may take a few minutes to send data to CloudWatch Logs.

### To view your CloudWatch Logs data

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. Choose **Logs** in the left navigation.
3. You should see the log groups you configured in [Configuring and Starting the CloudWatch Logs Agent](#) (p. 50).

#### Log Groups



4. Choose a log group that you would like to view.
5. Choose a log stream to view. The streams are identified by the cluster name and container instance ID that sent the logs.

Filter:	Search for events	x	Date/Ti
Event Data			
▼	2016-02-11T20:31:02Z	[INFO]	Starting Agent: Amazon EC
▼	2016-02-11T20:31:02Z	[INFO]	Loading configuration
▼	2016-02-11T20:31:02Z	[INFO]	Checkpointing is enabled.
▼	2016-02-11T20:31:02Z	[INFO]	Loading state! module="st
▼	2016-02-11T20:31:02Z	[INFO]	Detected Docker versions
▼	2016-02-11T20:31:02Z	[INFO]	Registering Instance with
▼	2016-02-11T20:31:02Z	[INFO]	Registered! module="api c
▼	2016-02-11T20:31:02Z	[INFO]	Registration completed su
	east-1:0123456789:container-instance/07dfaf0a-eded-42c9		
▼	2016-02-11T20:31:02Z	[INFO]	Saving state! module="sta

## Configuring CloudWatch Logs at Launch with User Data

When you launch an Amazon ECS container instance in Amazon EC2, you have the option of passing user data to the instance that can be used to perform common automated configuration tasks and even run scripts after the instance starts. You can pass several types of user data to instances, including shell scripts, `cloud-init` directives, and Upstart jobs. You can also pass this data into the launch wizard as plain text, as a file (this is useful for launching instances via the command line tools), or as base64-encoded text (for API calls).

The example user data block below performs the following tasks:

- Installs the `awslogs` package, which contains the CloudWatch Logs agent
- Installs the `jq` JSON query utility
- Writes the configuration file for the CloudWatch Logs agent and configures the region to send data to (the region that the container instance is located)
- Gets the cluster name and container instance ID after the Amazon ECS container agent starts and then writes those values to the CloudWatch Logs agent configuration file log streams
- Starts the CloudWatch Logs agent
- Configures the CloudWatch Logs agent to start at every system boot

```
Content-Type: multipart/mixed; boundary=="==BOUNDARY=="
MIME-Version: 1.0

--==BOUNDARY==
Content-Type: text/x-shellscript; charset="us-ascii"
#!/bin/bash
# Install awslogs and the jq JSON parser
yum install -y awslogs jq

# Inject the CloudWatch Logs configuration file contents
```

```
cat > /etc/awslogs/awslogs.conf <<- EOF
[general]
state_file = /var/lib/awslogs/agent-state

[/var/log/dmesg]
file = /var/log/dmesg
log_group_name = /var/log/dmesg
log_stream_name = {cluster}/{container_instance_id}

[/var/log/messages]
file = /var/log/messages
log_group_name = /var/log/messages
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %b %d %H:%M:%S

[/var/log/docker]
file = /var/log/docker
log_group_name = /var/log/docker
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%S.%f

[/var/log/ecs/ecs-init.log]
file = /var/log/ecs/ecs-init.log.*
log_group_name = /var/log/ecs/ecs-init.log
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%SZ

[/var/log/ecs/ecs-agent.log]
file = /var/log/ecs/ecs-agent.log.*
log_group_name = /var/log/ecs/ecs-agent.log
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%SZ

[/var/log/ecs/audit.log]
file = /var/log/ecs/audit.log.*
log_group_name = /var/log/ecs/audit.log
log_stream_name = {cluster}/{container_instance_id}
datetime_format = %Y-%m-%dT%H:%M:%SZ

EOF

====BOUNDARY==
Content-Type: text/x-shellscript; charset="us-ascii"
#!/bin/bash
# Set the region to send CloudWatch Logs data to (the region where the container instance
# is located)
region=$(curl 169.254.169.254/latest/meta-data/placement/availability-zone | sed s'/.$//')
sed -i -e "s/region = us-east-1/region = $region/g" /etc/awslogs/awscli.conf

====BOUNDARY==
Content-Type: text/upstart-job; charset="us-ascii"

#upstart-job
description "Configure and start CloudWatch Logs agent on Amazon ECS container instance"
author "Amazon Web Services"
start on started ecs

script
  exec 2>>/var/log/ecs/cloudwatch-logs-start.log
  set -x

  until curl -s http://localhost:51678/v1/metadata
  do
    sleep 1
  done
```

```
# Grab the cluster and container instance ARN from instance metadata
cluster=$(curl -s http://localhost:51678/v1/metadata | jq -r '. | .Cluster')
container_instance_id=$(curl -s http://localhost:51678/v1/metadata | jq -r '.
| .ContainerInstanceArn' | awk -F/ '{print $2}' )

# Replace the cluster name and container instance ID placeholders with the actual values
sed -i -e "s/{cluster}/$cluster/g" /etc/awslogs/awslogs.conf
sed -i -e "s/{container_instance_id}/$container_instance_id/g" /etc/awslogs/awslogs.conf

service awslogs start
chkconfig awslogs on
end script
---==BOUNDARY===---
```

If you have created the `ECS-CloudWatchLogs` policy and attached it to your `ecsInstanceRole` as described in [CloudWatch Logs IAM Policy \(p. 49\)](#), then you can add the above user data block to any container instances that you launch manually, or you can add it to an Auto Scaling launch configuration, and your container instances that are launched with this user data will begin sending their log data to CloudWatch Logs as soon as they launch. For more information, see [Launching an Amazon ECS Container Instance \(p. 42\)](#).

## Container Instance Draining

There are times when you might need to remove an instance from a cluster; for example, to perform system updates, update the Docker daemon, or scale down the cluster size. Container instance draining enables you to remove a container instance from a cluster without impacting tasks in your cluster.

When you set a container instance to `DRAINING`, Amazon ECS prevents new tasks from being scheduled for placement on the container instance. If the resources are available, replacement service tasks are started on other container instances in the cluster. Service tasks on the container instance that are in the `PENDING` state are stopped immediately.

Service tasks on the container instance that are in the `RUNNING` state are stopped and replaced according to the service's deployment configuration parameters, `minimumHealthyPercent` and `maximumPercent`.

- If `minimumHealthyPercent` is below 100%, the scheduler can ignore `desiredCount` temporarily during task replacement. For example, `desiredCount` is four tasks, a minimum of 50% allows the scheduler to stop two existing tasks before starting two new tasks. If the minimum is 100%, the service scheduler can't remove existing tasks until the replacement tasks are considered healthy. If tasks for services that do not use a load balancer are in the `RUNNING` state, they are considered healthy. Tasks for services that use a load balancer are considered healthy if they are in the `RUNNING` state and the container instance they are hosted on is reported as healthy by the load balancer.
- The `maximumPercent` parameter represents an upper limit on the number of running tasks during task replacement, which enables you to define the replacement batch size. For example, if `desiredCount` of four tasks, a maximum of 200% starts four new tasks before stopping the four tasks to be drained (provided that the cluster resources required to do this are available). If the maximum is 100%, then replacement tasks can't start until the draining tasks have stopped.

For more information, see [Service Definition Parameters \(p. 136\)](#).

Any `PENDING` or `RUNNING` tasks that do not belong to a service are not affected; you must wait for them to finish or stop them manually.

A container instance has completed draining when there are no more `RUNNING` tasks (although the state remains as `DRAINING`). You can verify this using the [ListTasks](#) operation with the `containerInstance` parameter.

When you change the status of a container instance from `DRAINING` to `ACTIVE`, the Amazon ECS scheduler can schedule tasks on the instance again.

## Draining Instances

You can use the [UpdateContainerInstancesState](#) API action or the `update-container-instances-state` command to change the status of a container instance to `DRAINING`.

The following procedure demonstrates how to set your instance to `DRAINING` using the AWS Management Console.

### To set your instance to `DRAINING` using the console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. In the navigation pane, choose **Clusters** and select the cluster.
3. Choose **ECS Instances** and select the check box for the container instances.
4. Choose **Actions, Drain instances**.
5. After the instances are processed, choose **Done**.

## Managing Container Instances Remotely

You can use the Amazon EC2 Run Command feature to securely and remotely manage the configuration of your Amazon ECS container instances. Run Command provides a simple way of performing common administrative tasks without having to log on locally to the instance. You can manage configuration changes across your clusters by simultaneously executing commands on multiple container instances. Run Command reports the status and results of each command.

Here are some examples of the types of tasks you can perform with Run Command:

- Install or uninstall packages
- Perform security updates
- Clean up Docker images
- Stop or start services
- View system resources
- View log files
- Perform file operations

This topic covers basic installation of Run Command on the Amazon ECS-optimized AMI and a few simple use cases, but it is by no means exhaustive. For more information about Run Command, see [Manage Amazon EC2 Instances Remotely](#) in the *Amazon EC2 User Guide for Linux Instances*.

### Topics

- [Run Command IAM Policy](#) (p. 57)
- [Installing the SSM Agent on the Amazon ECS-optimized AMI](#) (p. 58)
- [Using Run Command](#) (p. 59)

## Run Command IAM Policy

Before you can send commands to your container instances with Run Command, you must attach an IAM policy that allows access to the Amazon EC2 Systems Manager (SSM) APIs to the `ecsInstanceRole`. The



procedure below describes how to attach the `AmazonEC2RoleforSSM` managed policy to your container instance role so that instances launched with this role can use Run Command.

**To attach the `AmazonEC2RoleforSSM` policy to your `ecsInstanceRole`**

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.
3. Choose `ecsInstanceRole`. If the role does not exist, follow the procedures in [Amazon ECS Container Instance IAM Role \(p. 206\)](#) to create the role.
4. Choose the **Permissions** tab.
5. In the **Managed Policies** section, choose **Attach Policy**.
6. For **Filter**, type `AmazonEC2RoleforSSM` to narrow the available policies to attach.
7. Select the check box for `AmazonEC2RoleforSSM` policy and choose **Attach Policy**.

## Installing the SSM Agent on the Amazon ECS-optimized AMI

After you have attached the `AmazonEC2RoleforSSM` policy to your `ecsInstanceRole`, you can install the SSM agent on your container instances. The SSM agent processes Run Command requests and configures the instances that are specified in the request. Use the following procedures to install the SSM agent on your Amazon ECS-optimized AMI container instances.

**To manually install the SSM agent on existing Amazon ECS-optimized AMI container instances**

1. [Connect to your container instance. \(p. 48\)](#)
2. Install the SSM agent RPM. The SSM agent is available in all regions that Amazon ECS is available in, and each region has its own region-specific download URL; the example command below works for all regions that Amazon ECS supports, but you can avoid cross-region data transfer costs for the RPM download by substituting the region of your container instance.

```
[ec2-user ~]$ sudo yum install -y https://amazon-ssm-us-east-1.s3.amazonaws.com/latest/linux_amd64/amazon-ssm-agent.rpm
```

**To install the SSM agent on new instance launches with Amazon EC2 user data**

- Launch one or more container instances by following the procedure in [Launching an Amazon ECS Container Instance \(p. 42\)](#), but in [Step 10 \(p. 44\)](#), copy and paste the user data script below into the **User data** field. You can also add the commands from this user data script to another existing script that you may have to perform other tasks, such as setting the cluster name for the instance to register into.

**Note**

The user data script below installs the `jq` JSON parser and uses that to determine the region of the container instance. Then it downloads and installs the SSM agent.

```
#!/bin/bash
# Install JQ JSON parser
yum install -y jq

# Get the current region from the instance metadata
region=$(curl -s http://169.254.169.254/latest/dynamic/instance-identity/document | jq -r .region)
```

```
# Install the SSM agent RPM
yum install -y https://amazon-ssm-$region.s3.amazonaws.com/latest/linux_amd64/amazon-ssm-agent.rpm
```

## Using Run Command

After you have attached the `AmazonEC2RoleforSSM` policy to your `ecsInstanceRole`, and installed the SSM agent on your container instances, you can start using Run Command to send commands to your container instances. The following topic in the *Amazon EC2 User Guide for Linux Instances* explains how to run commands and shell scripts on your instances and view the resulting output:

- [Running Shell Scripts with Run Command](#)

For more information about Run Command, see [Manage Amazon EC2 Instances Remotely](#) in the *Amazon EC2 User Guide for Linux Instances*.

### Example: To update container instance software with Run Command

One of the most common use cases for Run Command on Amazon ECS container instances is to update the instance software on your entire fleet of container instances at once, simultaneously.

1. [Attach the `AmazonEC2RoleforSSM` policy to your `ecsInstanceRole`. \(p. 57\)](#)
2. Install the SSM agent on your container instances. For more information, see [Installing the SSM Agent on the Amazon ECS-optimized AMI](#) (p. 58).
3. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
4. In the left navigation, choose **Commands**.
5. Choose **Run a command**.
6. For **Command document**, choose **AWS-RunShellScript**.
7. In the **Target instances** section, choose **Select instances** and check the container instances to send the update command to.
8. In the **Commands** section, enter the command or commands to send to your container instances. In this example, the command below updates the instance software, but you can send any command that you want.

```
$ yum update -y
```

9. Choose **Run** to send the command to the specified instances.
10. (Optional) Choose **View result** to see the results of your command.
11. (Optional) Choose a command from the list of recent commands to view the command output.

Run a command

Actions ▾

Filter by attributes

<input type="checkbox"/>	Command ID	Instance ID	Document name
<input checked="" type="checkbox"/>	de144d84-931b-4f3...	i-324505b2	AWS-RunShellScript
<input type="checkbox"/>	de144d84-931b-4f3...	i-334505b3	AWS-RunShellScript
<input type="checkbox"/>	de144d84-931b-4f3...	i-f53d5d6d	AWS-RunShellScript
<input type="checkbox"/>	de144d84-931b-4f3...	i-e4400064	AWS-RunShellScript
<input type="checkbox"/>	de144d84-931b-4f3...	i-c33f5f5b	AWS-RunShellScript

12. (Optional) Choose the **Output** tab, and then choose **View Output**. The image below shows a snippet of the container instance output for the **yum update** command.

#### Note

Unless you configure a command to save the output to an Amazon S3 bucket, then the command output is truncated at 2500 characters.

AWS ▾ Services ▾ Edit ▾

Output for aws:runShellScript

```

Loaded plugins: priorities, update-motd, upgrade-helper
Resolving dependencies
--> Running transaction check
--> Package curl.x86_64 0:7.40.0-3.52.amzn1 will be updated
--> Package curl.x86_64 0:7.40.0-8.54.amzn1 will be an update
--> Package kernel.x86_64 0:4.1.17-22.30.amzn1 will be installed
--> Package libcurl.x86_64 0:7.40.0-3.52.amzn1 will be updated
--> Package libcurl.x86_64 0:7.40.0-8.54.amzn1 will be an update
--> Package nss.x86_64 0:3.19.1-7.74.amzn1 will be updated
--> Package nss.x86_64 0:3.19.1-19.75.amzn1 will be an update
--> Package nss-sysinit.x86_64 0:3.19.1-7.74.amzn1 will be updated
--> Package nss-sysinit.x86_64 0:3.19.1-19.75.amzn1 will be an update
--> Package nss-tools.x86_64 0:3.19.1-7.74.amzn1 will be updated
--> Package nss-tools.x86_64 0:3.19.1-19.75.amzn1 will be an update
--> Finished Dependency Resolution

```

## Starting a Task at Container Instance Launch Time

Depending on your application architecture design, you may need to run a specific container on every container instance to deal with operations or security concerns such as monitoring, security, metrics, service discovery, or logging.

To do this, you can configure your container instances to call the **docker run** command with the user data script at launch, or in some init system such as Upstart or **systemd**. While this method works, it has some disadvantages because Amazon ECS has no knowledge of the container and cannot monitor the CPU, memory, ports, or any other resources used. To ensure that Amazon ECS can properly account for all task resources, create a task definition for the container to run on your container instances, and use Amazon ECS to place the task at launch time with EC2 user data.

The EC2 user data script in the following procedure uses the Amazon ECS introspection API to identify the container instance. Then, it uses the AWS CLI and the **start-task** command to run a specified task on itself during startup.

### To start a task at container instance launch time

1. If you have not done so already, create a task definition with the container you want to run on your container instance at launch by following the procedures in [Creating a Task Definition \(p. 92\)](#).
2. Modify your `ecsInstanceRole` IAM role to add permissions for the `StartTask` API operation. For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).
  - a. Open the IAM console at <https://console.aws.amazon.com/iam/>.
  - b. In the navigation pane, choose **Roles**.
  - c. Choose the `ecsInstanceRole`. If the role does not exist, use the procedure in [Amazon ECS Container Instance IAM Role \(p. 206\)](#) to create the role and return to this procedure. If the role does exist, select the role to view the attached policies.
  - d. In the **Inline Policies** section, choose **Create Role Policy**.
  - e. On the **Set Permissions** page, choose **Custom Policy** and then choose **Select**.
  - f. In the **Policy Name** field, enter `StartTask`.
  - g. In the **Policy Document** field, copy and paste the following policy and choose **Apply Policy**.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:StartTask"
      ],
      "Resource": "*"
    }
  ]
}
```

3. Launch one or more container instances by following the procedure in [Launching an Amazon ECS Container Instance \(p. 42\)](#), but in [Step 10 \(p. 44\)](#). Then, copy and paste the MIME multipart user data script below into the **User data** field. Substitute *your\_cluster\_name* with the cluster for the container instance to register into and *my\_task\_def* with the task definition to run on the instance at launch.

#### Note

The MIME multipart content below uses a shell script to set configuration values and install packages. It also uses an Upstart job to start the task after the **ecs** service is running and the introspection API is available.

```
Content-Type: multipart/mixed; boundary=="==BOUNDARY=="
MIME-Version: 1.0

--==BOUNDARY==
Content-Type: text/text/x-shellscript; charset="us-ascii"

#!/bin/bash
# Specify the cluster that the container instance should register into
cluster=your_cluster_name

# Write the cluster configuration variable to the ecs.config file
# (add any other configuration variables here also)
echo ECS_CLUSTER=$cluster >> /etc/ecs/ecs.config
```

```
# Install the AWS CLI and the jq JSON parser
yum install -y aws-cli jq

====BOUNDARY==
Content-Type: text/text/upstart-job; charset="us-ascii"

#upstart-job
description "Amazon EC2 Container Service (start task on instance boot)"
author "Amazon Web Services"
start on started ecs

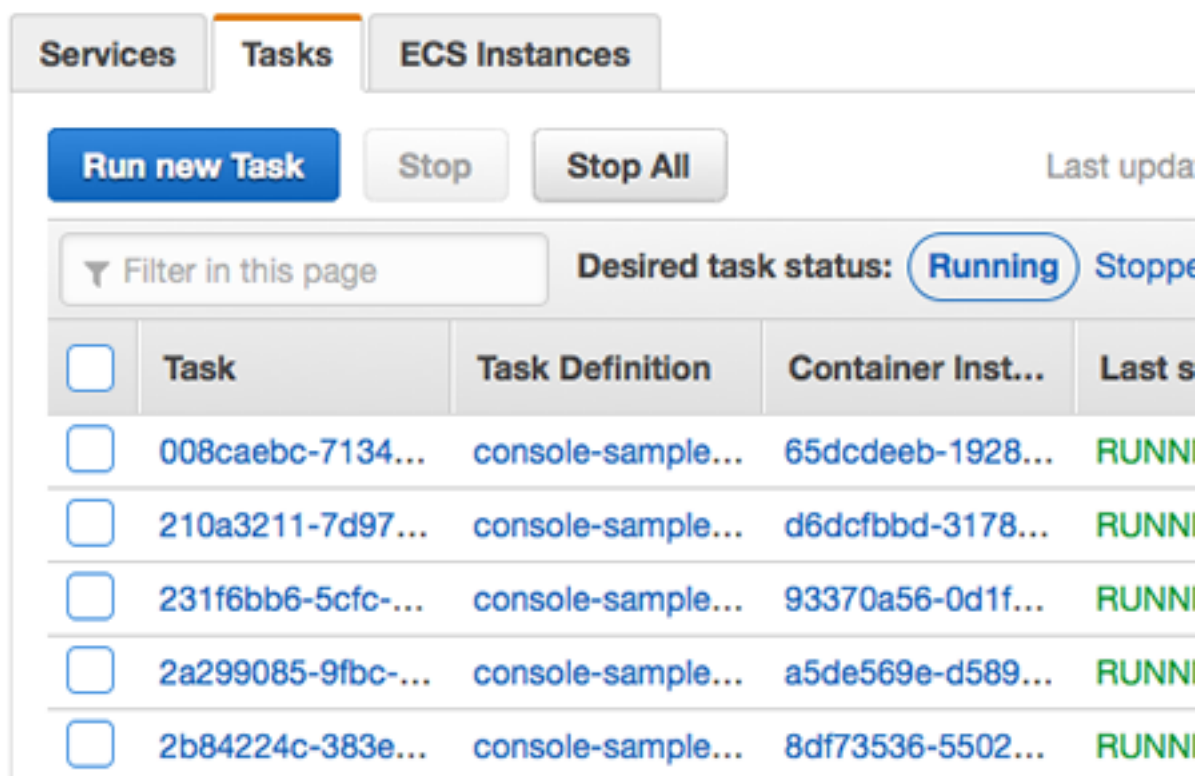
script
  exec 2>>/var/log/ecs/ecs-start-task.log
  set -x
  until curl -s http://localhost:51678/v1/metadata
  do
    sleep 1
  done

  # Grab the container instance ARN and AWS region from instance metadata
  instance_arn=$(curl -s http://localhost:51678/v1/metadata | jq -r '.
  | .ContainerInstanceArn' | awk -F/ '{print $NF}')
  cluster=$(curl -s http://localhost:51678/v1/metadata | jq -r '. | .Cluster' | awk -F/
  '{print $NF}')
  region=$(curl -s http://localhost:51678/v1/metadata | jq -r '.
  | .ContainerInstanceArn' | awk -F: '{print $4}')

  # Specify the task definition to run at launch
  task_definition=my_task_def

  # Run the AWS CLI start-task command to start your task on this container instance
  aws ecs start-task --cluster $cluster --task-definition $task_definition --container-
  instances $instance_arn --started-by $instance_arn --region $region
end script
====BOUNDARY====
```

4. Verify that your container instances launch into the correct cluster and that your tasks have started.
  - a. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
  - b. From the navigation bar, choose the region that your cluster is in.
  - c. In the navigation pane, choose **Clusters** and select the cluster that hosts your container instances.
  - d. On the **Cluster** page, choose **Tasks**.



Each container instance you launched should have your task running on it, and the container instance ARN should be in the **Started By** column.

If you do not see your tasks, you can log in to your container instances with SSH and check the `/var/log/ecs/ecs-start-task.log` file for debugging information.

## Deregister a Container Instance

When you are finished with a container instance, you can deregister it from your cluster.

Following deregistration, the container instance is no longer able to accept new tasks. If you have tasks running on the container instance when you deregister it, these tasks remain running until you terminate the instance or the tasks stop through some other means. However, these tasks are orphaned (no longer monitored or accounted for by Amazon ECS). If an orphaned task on your container instance is part of an Amazon ECS service, then the service scheduler starts another copy of that task, on a different container instance, if possible. Any containers in orphaned service tasks that are registered with a Classic Load Balancer or an Application Load Balancer target group are deregistered. They begin connection draining according to the settings on the load balancer or target group.

If you intend to use the container instance for some other purpose after deregistration, you should stop all of the tasks running on the container instance before deregistration. This stops any orphaned tasks from consuming resources.

### Important

Because each container instance has unique state information, they should not be deregistered from one cluster and re-registered into another. To relocate container instance resources, we recommend that you terminate container instances from one cluster and launch new container instances with the latest Amazon ECS-optimized AMI in the new cluster. For more information, see [Terminate Your Instance](#) in the *Amazon EC2 User Guide for Linux Instances* and [Launching an Amazon ECS Container Instance](#) (p. 42).

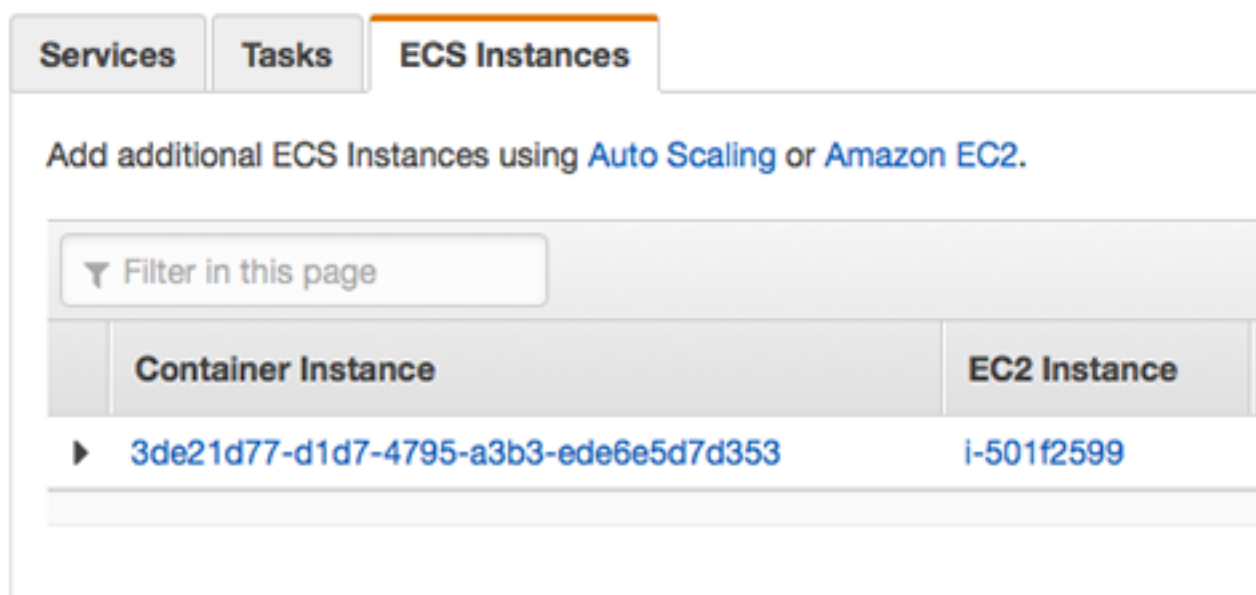
Deregistering a container instance removes the instance from a cluster, but it does not terminate the EC2 instance. If you are finished using the instance, be sure to terminate it in the Amazon EC2 console to stop billing. For more information, see [Terminate Your Instance](#) in the *Amazon EC2 User Guide for Linux Instances*.

**Note**

If you terminate a running container instance with a connected Amazon ECS container agent, the agent automatically deregisters the instance from your cluster. Stopped container instances or instances with disconnected agents are not automatically deregistered when terminated.

**To deregister a container instance**

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, choose the region that your container instance is registered in.
3. In the navigation pane, choose **Clusters** and select the cluster that hosts your container instance.
4. On the **Cluster : *name*** page, choose **ECS Instances**.



5. Choose the container instance ID that to deregister.
6. On the **Container Instance : *id*** page, choose **Deregister**.
7. Review the deregistration message, and choose **Yes, Deregister**.
8. If you are finished with the container instance, terminate the underlying Amazon EC2 instance. For more information, see [Terminate Your Instance](#) in the *Amazon EC2 User Guide for Linux Instances*.

**Note**

If your instance is maintained by an Auto Scaling group or AWS CloudFormation stack, terminate the instance by updating the Auto Scaling group or AWS CloudFormation stack. Otherwise, the Auto Scaling group re-creates the instance after you terminate it.

# Amazon ECS Container Agent

The Amazon ECS container agent allows container instances to connect to your cluster. The Amazon ECS container agent is included in the Amazon ECS-optimized AMI, but you can also install it on any EC2 instance that supports the Amazon ECS specification. The Amazon ECS container agent is only supported on EC2 instances.

## Note

The source code for the Amazon ECS container agent is [available on GitHub](#). We encourage you to submit pull requests for changes that you would like to have included. However, Amazon Web Services does not currently provide support for running modified copies of this software.

## Topics

- [Installing the Amazon ECS Container Agent \(p. 65\)](#)
- [Amazon ECS Container Agent Versions \(p. 68\)](#)
- [Updating the Amazon ECS Container Agent \(p. 70\)](#)
- [Amazon ECS Container Agent Configuration \(p. 76\)](#)
- [Automated Task and Image Cleanup \(p. 82\)](#)
- [Private Registry Authentication \(p. 83\)](#)
- [Amazon ECS Container Agent Introspection \(p. 87\)](#)
- [HTTP Proxy Configuration \(p. 88\)](#)

## Installing the Amazon ECS Container Agent

If your container instance was not launched from an AMI that includes the Amazon ECS container agent, you can install it using the following procedure.

## Note

The Amazon ECS container agent is included in the Amazon ECS-optimized AMI and does not require installation.

### To install the Amazon ECS container agent on an Amazon Linux EC2 Instance

1. Launch an Amazon Linux instance with an IAM role that allows access to Amazon ECS. For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).
2. Connect to your instance.
3. Install the `ecs-init` package. For more information on `ecs-init`, you can [view the source code on GitHub](#).



```
[ec2-user ~]$ sudo yum install -y ecs-init
```

4. Start the Docker daemon.

```
[ec2-user ~]$ sudo service docker start
```

Output:

```
Starting cgconfig service: [ OK ]  
Starting docker: [ OK ]
```

5. Start the `ecs-init` upstart job.

```
[ec2-user ~]$ sudo start ecs
```

Output:

```
ecs start/running, process 2804
```

6. (Optional) You can verify that the agent is running and see some information on your new container instance with the agent introspection API. For more information, see [the section called “Amazon ECS Container Agent Introspection” \(p. 87\)](#).

```
[ec2-user ~]$ curl http://localhost:51678/v1/metadata
```

Output:

```
{  
  "Cluster": "default",  
  "ContainerInstanceArn": "<container_instance_ARN>",  
  "Version": "Amazon ECS Agent - v1.14.1 (467c3d7)"  
}
```

## To install the Amazon ECS container agent on a non-Amazon Linux EC2 instance

1. Launch an EC2 instance with an IAM role that allows access to Amazon ECS. For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).
2. Connect to your instance.
3. Install Docker on your instance. Amazon ECS requires a minimum Docker version of 1.5.0 (version 1.12.6 is recommended), and the default Docker versions in many system package managers, such as **yum** or **apt-get** do not meet this minimum requirement. For information about installing the latest Docker version on your particular Linux distribution, see <https://docs.docker.com/engine/installation/>.

### Note

The Amazon Linux AMI always includes the recommended version of Docker for use with Amazon ECS. You can install Docker on Amazon Linux with the **sudo yum install docker -y** command.

4. Check your Docker version to verify that your system meets the minimum version requirement.

```
ubuntu:~$ sudo docker version
```

Output:

```
Client version: 1.4.1
Client API version: 1.16
Go version (client): go1.3.3
Git commit (client): 5bc2ff8
OS/Arch (client): linux/amd64
Server version: 1.4.1
Server API version: 1.16
Go version (server): go1.3.3
Git commit (server): 5bc2ff8
```

In this example, the Docker version is 1.4.1, which is below the minimum version of 1.5.0. This instance needs to upgrade its Docker version before proceeding. For information about installing the latest Docker version on your particular Linux distribution, go to <https://docs.docker.com/engine/installation/>.

5. Run the following commands on your container instance to enable IAM roles for tasks. For more information, see [IAM Roles for Tasks \(p. 212\)](#).

```
[ec2-user ~]$ sysctl -w net.ipv4.conf.all.route_localnet=1
[ec2-user ~]$ iptables -t nat -A PREROUTING -p tcp -d 169.254.170.2 --dport 80 -j DNAT
--to-destination 127.0.0.1:51679
[ec2-user ~]$ iptables -t nat -A OUTPUT -d 169.254.170.2 -p tcp -m tcp --dport 80 -j
REDIRECT --to-ports 51679
```

6. Pull and run the latest Amazon ECS container agent on your container instance.

#### Note

You should use Docker restart policies or a process manager (such as **upstart** or **systemd**) to treat the container agent as a service or a daemon and ensure that it is restarted if it exits. For more information, see [Automatically start containers](#) and [Restart policies](#) in the Docker documentation. The Amazon ECS-optimized AMI uses the `ecs-init` RPM for this purpose, and you can view the [source code for this RPM](#) on GitHub.

The following example agent run command is broken into separate lines to show each option.

- The `--env=ECS_CLUSTER=cluster_name` option is not required if you want to register into your default cluster.
- You can optionally store your agent environment variables in a file (which can be downloaded to your container instances from Amazon S3 at launch time using EC2 user data) and pass them all at one time with the `--env-file path_to_env_file` option. This is recommended for sensitive information such as authentication credentials for private repositories. For more information, see [Storing Container Instance Configuration in Amazon S3 \(p. 81\)](#) and [Private Registry Authentication \(p. 83\)](#).
- If your task definitions specify log configuration options for a particular log driver, the Amazon ECS container agent running on your container instances must register the specified log driver with the `ECS_AVAILABLE_LOGGING_DRIVERS` environment variable. For example, to register a container instance with the `json-file` and `awslogs` logging drivers, add the `--env=ECS_AVAILABLE_LOGGING_DRIVERS='["json-file", "awslogs"]'` option to the **docker run** command below. For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).
- Operating systems with SELinux enabled require the `--privileged` option in your **docker run** command. In addition, for SELinux-enabled container instances, we recommend that you add the `:z` option to the `/log` and `/data` volume mounts; however, the host mounts for these volumes must exist before you run the command or you will receive a `no such file or directory` error. Take the following action if you experience difficulty running the Amazon ECS agent on an SELinux-enabled container instance:
  - Create the host volume mount points on your container instance.

```
$ sudo mkdir -p /var/log/ecs
```

```
$ sudo mkdir -p /var/lib/ecs/data
```

- Add the `--privileged` option to the **docker run** command below.
- Append the `:z` option to the `/log` and `/data` container volume mounts (for example, `--volume=/var/log/ecs/:/log:z`) to the **docker run** command below.

For more information on these and other agent runtime options, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

```
ubuntu:~$ sudo docker run --name ecs-agent \
--detach=true \
--restart=on-failure:10 \
--volume=/var/run/docker.sock:/var/run/docker.sock \
--volume=/var/log/ecs:/log \
--volume=/var/lib/ecs/data:/data \
--net=host \
--env=ECS_LOGFILE=/log/ecs-agent.log \
--env=ECS_LOGLEVEL=info \
--env=ECS_DATADIR=/data \
--env=ECS_CLUSTER=cluster_name \
--env=ECS_ENABLE_TASK_IAM_ROLE=true \
--env=ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST=true \
amazon/amazon-ecs-agent:latest
```

### Note

If you receive an `Error response from daemon: Cannot start container` message, you can delete the failed container with the **sudo docker rm ecs-agent** command and try running the agent again.

## Amazon ECS Container Agent Versions

Each Amazon ECS container agent version supports a different feature set and provides bug fixes from previous versions. When possible, we always recommend using the latest version of the Amazon ECS container agent. To update your container agent to the latest version, see [Updating the Amazon ECS Container Agent \(p. 70\)](#).

Launching your container instances from the most recent Amazon ECS-optimized AMI ensures that you receive the current container agent version. To launch a container instance with the latest Amazon ECS-optimized AMI, see [Launching an Amazon ECS Container Instance \(p. 42\)](#).

To install the latest version of the Amazon ECS container agent on another operating system, see [Installing the Amazon ECS Container Agent \(p. 65\)](#). The table in [Amazon ECS-optimized AMI Container Agent Versions \(p. 68\)](#) shows the Docker version that is tested on Amazon Linux for each agent version.

To see which features and enhancements are included with each agent release, see <https://github.com/aws/amazon-ecs-agent/releases>.

## Amazon ECS-optimized AMI Container Agent Versions

The Amazon ECS-optimized AMI comes prepackaged with the Amazon ECS container agent, Docker, and the `ecs-init` service that controls the starting and stopping of the agent at boot and shutdown. The following table lists the container agent version, the `ecs-init` version, and the Docker version that is tested and packaged with each Amazon ECS-optimized AMI.

### Note

As new Amazon ECS-optimized AMIs and Amazon ECS agent versions are released, older versions are still available for launch in Amazon EC2; however, we encourage you to [update to the latest version \(p. 70\)](#) of the Amazon ECS agent and to keep your container instance software up to date. If you request support for an older version of the Amazon ECS agent through AWS Support, you may be asked to move to the latest version as a part of the support process.

Amazon ECS-optimized AMI	Amazon ECS container agent version	Docker version	ecs-init version
2016.09.g	1.14.1	1.12.6	1.14.1-1
2016.09.f	1.14.0	1.12.6	1.14.0-2
2016.09.e	1.14.0	1.12.6	1.14.0-1
2016.09.d	1.13.1	1.12.6	1.13.1-2
2016.09.c	1.13.1	1.11.2	1.13.1-1
2016.09.b	1.13.1	1.11.2	1.13.1-1
2016.09.a	1.13.0	1.11.2	1.13.0-1
2016.03.j	1.13.0	1.11.2	1.13.0-1
2016.03.i	1.12.2	1.11.2	1.12.2-1
2016.03.h	1.12.1	1.11.2	1.12.1-1
2016.03.g	1.12.0	1.11.2	1.12.0-1
2016.03.f	1.11.1	1.11.2	1.11.1-1
2016.03.e	1.11.0	1.11.2	1.11.0-1
2016.03.d	1.10.0	1.11.1	1.10.0-1
2016.03.c	1.10.0	1.11.1	1.10.0-1
2016.03.b	1.9.0	1.9.1	1.9.0-1
2016.03.a	1.8.2	1.9.1	1.8.2-1
2015.09.g	1.8.1	1.9.1	1.8.1-1
2015.09.f	1.8.0	1.9.1	1.8.0-1
2015.09.e	1.7.1	1.9.1	1.7.1-1
2015.09.d	1.7.1	1.9.1	1.7.1-1
2015.09.c	1.7.0	1.7.1	1.7.0-1
2015.09.b	1.6.0	1.7.1	1.6.0-1
2015.09.a	1.5.0	1.7.1	1.5.0-1
2015.03.g	1.4.0	1.7.1	1.4.0-2
2015.03.f	1.4.0	1.6.2	1.4.0-1

Amazon ECS-optimized AMI	Amazon ECS container agent version	Docker version	ecs-init version
2015.03.e	1.3.1	1.6.2	1.3.1-1
2015.03.d	1.2.1	1.6.2	1.2.0-2
2015.03.c	1.2.0	1.6.2	1.2.0-1
2015.03.b	1.1.0	1.6.0	1.0-3
2015.03.a	1.0.0	1.5.0	1.0-1

For more information about the Amazon ECS-optimized AMI, including AMI IDs for the latest version in each region, see [Amazon ECS-Optimized AMI](#) (p. 34).

## Updating the Amazon ECS Container Agent

Occasionally, you may need to update the Amazon ECS container agent to pick up bug fixes and new features. Updating the Amazon ECS container agent does not interrupt running tasks or services on the container instance. The process for updating the agent differs depending on whether your container instance was launched with the Amazon ECS-optimized AMI or another operating system.

### Topics

- [Checking your Amazon ECS Container Agent Version](#) (p. 70)
- [Updating the Amazon ECS Container Agent on the Amazon ECS-optimized AMI](#) (p. 72)
- [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\)](#) (p. 74)

## Checking your Amazon ECS Container Agent Version

You can check the version of the container agent that is running on your container instances to see if you need to update it. The container instance view in the Amazon ECS console provides the agent version. Use the following procedure to check your agent version.

### To check if your Amazon ECS container agent is running the latest version in the console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the **Clusters** page, select the cluster that hosts the container instance or instances to check.
3. On the **Cluster** : *cluster\_name* page, choose **ECS Instances**.
4. Note the **Agent version** column for your container instances. If you are using an outdated agent version on any of your container instances, the console alerts you with a message and flags the outdated agent version.

The screenshot shows the Amazon ECS console interface. At the top, there are four tabs: 'Services', 'Tasks', 'ECS Instances' (which is selected and highlighted with an orange border), and 'Metrics'. Below the tabs, a yellow warning banner with an orange triangle icon contains the text 'Outdated ECS Agent' and 'One or more container instances are not running the latest version'. Below the banner is a blue button labeled 'Scale ECS Instances'. Underneath the button is a search bar with a magnifying glass icon. Below the search bar is a table with three columns: 'Container Instance', 'EC2 Instance', and 'Agent Connected'. The table contains one row of data: 'f4ed6cb3-10c6-4add...' for the Container Instance, 'i-bccc56b2' for the EC2 Instance, and 'true' for the Agent Connected status.

If your agent version is 1.14.1, you are running the latest container agent. If your agent version is below 1.14.1, you can update your container agent with the following procedures:

- If your container instance is running the Amazon ECS-optimized AMI, see [Updating the Amazon ECS Container Agent on the Amazon ECS-optimized AMI \(p. 72\)](#).
- If your container instance is not running the Amazon ECS-optimized AMI, see [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\) \(p. 74\)](#).

### Important

To update the Amazon ECS agent version from versions prior to v1.0.0 on your Amazon ECS-optimized AMI we recommend that you terminate your current container instance and launch a new instance with the most recent Amazon ECS-Optimized AMI. Any container instances that use a preview version of the Amazon ECS-optimized AMI should be retired and replaced with the most recent AMI. For more information, see [Launching an Amazon ECS Container Instance \(p. 42\)](#).

You can also use the Amazon ECS container agent introspection API to check the agent version from the container instance itself. For more information, see [Amazon ECS Container Agent Introspection \(p. 87\)](#).

### To check if your Amazon ECS container agent is running the latest version with the introspection API

1. Log into your container instance via SSH.
2. Query the introspection API.

```
[ec2-user ~]$ curl -s 127.0.0.1:51678/v1/metadata | python -mjson.tool
```

Output:

```
{
  "Cluster": "default",
  "ContainerInstanceArn": "arn:aws:ecs:us-west-2:<aws_account_id>:container-
instance/4d3910c1-27c8-410c-b1df-f5d06fab4305",
  "Version": "Amazon ECS Agent - v1.14.1 (467c3d7)"
}
```

#### Note

The introspection API added `Version` information in the version v1.0.0 of the Amazon ECS container agent. If `Version` is not present when querying the introspection API, or the introspection API is not present in your agent at all, then the version you are running is v0.0.3 or earlier, and you should update it.

## Updating the Amazon ECS Container Agent on the Amazon ECS-optimized AMI

If you are using the Amazon ECS-optimized AMI, you have several options to get the latest version of the Amazon ECS container agent (shown in order of recommendation):

- Terminate your current container instances and launch the latest version of the Amazon ECS-optimized AMI (either manually or by updating your Auto Scaling launch configuration with the latest AMI). This provides a fresh container instance with the most current tested and validated versions of Amazon Linux, Docker, `ecs-init`, and the Amazon ECS container agent. For more information, see [Amazon ECS-Optimized AMI \(p. 34\)](#).
- Connect to the instance with SSH and update the `ecs-init` package (and its dependencies) to the latest version. This operation provides the most current tested and validated versions of Docker and `ecs-init` that are available in the Amazon Linux repositories and the latest version of the Amazon ECS container agent. For more information, see [To update the `ecs-init` package on the Amazon ECS-optimized AMI \(p. 72\)](#).
- Update the container agent with the `UpdateContainerAgent` API operation, either through the console or with the AWS CLI or AWS SDKs. For more information, see [Updating the Amazon ECS Container Agent with the `UpdateContainerAgent` API Operation \(p. 73\)](#).

### To update the `ecs-init` package on the Amazon ECS-optimized AMI

1. Log into your container instance via SSH. For more information, see [Connect to Your Container Instance \(p. 48\)](#).
2. Update the `ecs-init` package with the following command.

```
[ec2-user ~]$ sudo yum update -y ecs-init
```

#### Note

The `ecs-init` package and the Amazon ECS container agent are updated immediately; however, newer versions of Docker are not loaded until the Docker daemon is restarted (either by rebooting the instance, or by running **`sudo service docker restart`** to restart Docker and then **`sudo start ecs`** to restart the container agent).

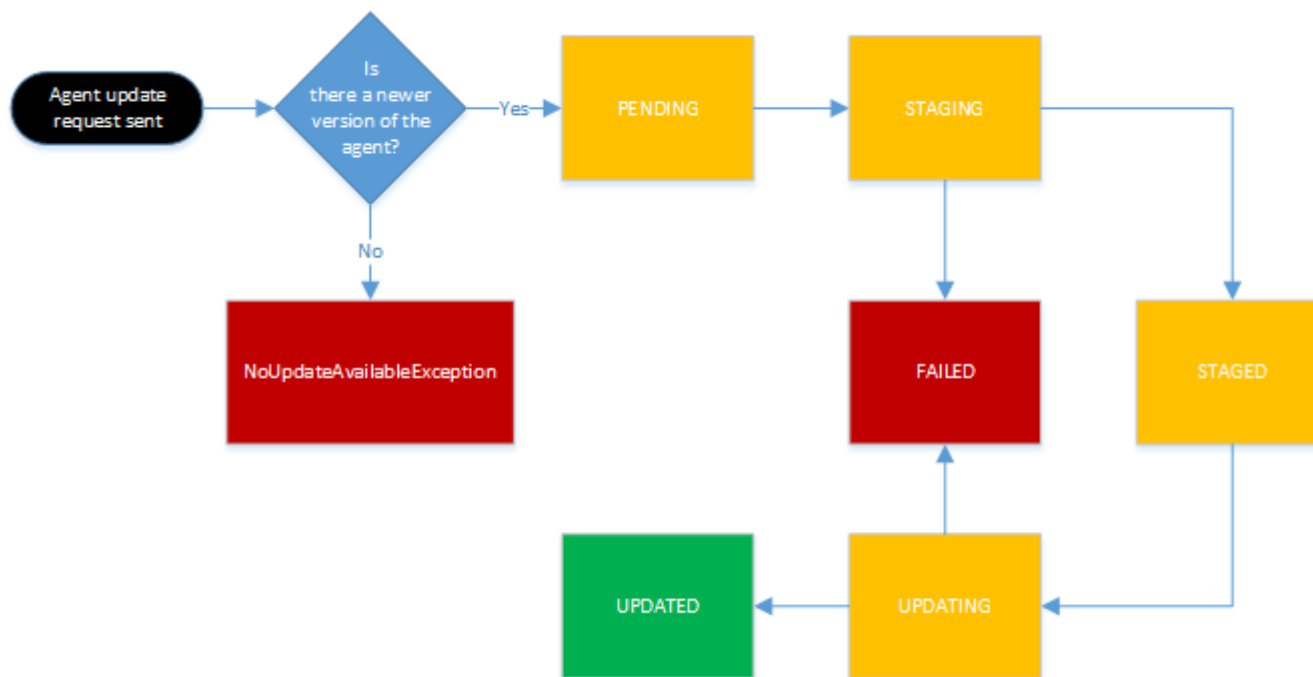
## Updating the Amazon ECS Container Agent with the `UpdateContainerAgent` API Operation

### Important

This update process is only supported on the Amazon ECS-optimized AMI. For container instances that are running other operating systems, see [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\)](#) (p. 74).

To update the Amazon ECS agent version from versions prior to v1.0.0 on your Amazon ECS-optimized AMI we recommend that you terminate your current container instance and launch a new instance with the most recent Amazon ECS-Optimized AMI. Any container instances that use a preview version of the Amazon ECS-optimized AMI should be retired and replaced with the most recent AMI. For more information, see [Launching an Amazon ECS Container Instance](#) (p. 42).

The update process begins when you request an agent update, either through the console or with the AWS CLI or AWS SDKs. Amazon ECS checks your current agent version against the latest available agent version, and if an update is possible, the update process progresses as shown in the flow chart below. If an update is not available, for example, if the agent is already running the most recent version, then a `NoUpdateAvailableException` is returned.



The stages in the update process shown above are as follows:

#### PENDING

An agent update is available, and the update process has started.

#### STAGING

The agent has begun downloading the agent update. If the agent cannot download the update, or if the contents of the update are incorrect or corrupted, then the agent sends a notification of the failure and the update transitions to the `FAILED` state.

#### STAGED

The agent download has completed and the agent contents have been verified.



## UPDATING

The `ecs-init` service is restarted and it picks up the new agent version. If the agent is for some reason unable to restart, the update transitions to the `FAILED` state; otherwise, the agent signals Amazon ECS that the update is complete.

### To update the Amazon ECS container agent on the Amazon ECS-optimized AMI in the console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the **Clusters** page, select the cluster that hosts the container instance or instances to check.
3. On the **Cluster** : *cluster\_name* page, choose **ECS Instances**.
4. Select the container instance to update.
5. On the **Container Instance** page, choose **Update agent**.

### To update the Amazon ECS container agent on the Amazon ECS-optimized AMI with the AWS CLI

- Use the following command to update the Amazon ECS container agent on your container instance:

```
aws ecs update-container-agent --cluster cluster_name --container-  
instance container_instance_id
```

## Manually Updating the Amazon ECS Container Agent (for Non-Amazon ECS-optimized AMIs)

### To manually update the Amazon ECS container agent (for non-Amazon ECS-optimized AMIs)

1. Log into your container instance via SSH.
2. Check to see if your agent uses the `ECS_DATADIR` environment variable to save its state.

```
[ec2-user ~]$ docker inspect ecs-agent | grep ECS_DATADIR
```

Output:

```
"ECS_DATADIR=/data",
```

#### Important

If the previous command does not return the `ECS_DATADIR` environment variable, you must stop any tasks running on this container instance before updating your agent. Newer agents with the `ECS_DATADIR` environment variable save their state and you can update them while tasks are running without issues.

3. Stop the Amazon ECS container agent.

```
[ec2-user ~]$ docker stop ecs-agent
```

4. Delete the agent container.

```
[ec2-user ~]$ docker rm ecs-agent
```

5. Run the following commands on your container instance to enable IAM roles for tasks. For more information, see [IAM Roles for Tasks](#) (p. 212).

```
[ec2-user ~]$ sysctl -w net.ipv4.conf.all.route_localnet=1
[ec2-user ~]$ iptables -t nat -A PREROUTING -p tcp -d 169.254.170.2 --dport 80 -j DNAT
--to-destination 127.0.0.1:51679
[ec2-user ~]$ iptables -t nat -A OUTPUT -d 169.254.170.2 -p tcp -m tcp --dport 80 -j
REDIRECT --to-ports 51679
```

6. Pull the latest Amazon ECS container agent image from Docker Hub.

```
[ec2-user ~]$ docker pull amazon/amazon-ecs-agent:latest
```

Output:

```
Pulling repository amazon/amazon-ecs-agent
a5a56a5e13dc: Download complete
511136ea3c5a: Download complete
9950b5d678a1: Download complete
c48ddcf21b63: Download complete
Status: Image is up to date for amazon/amazon-ecs-agent:latest
```

7. Run the latest Amazon ECS container agent on your container instance.

#### Note

You should use Docker restart policies or a process manager (such as **upstart** or **systemd**) to treat the container agent as a service or a daemon and ensure that it is restarted if it exits. For more information, see [Automatically start containers](#) and [Restart policies](#) in the Docker documentation. The Amazon ECS-optimized AMI uses the `ecs-init` RPM for this purpose, and you can view the [source code for this RPM](#) on GitHub.

The following example agent run command is broken into separate lines to show each option.

- The `--env=ECS_CLUSTER=cluster_name` option is not required if you want to register into your default cluster.
- You can optionally store your agent environment variables in a file (which can be downloaded to your container instances from Amazon S3 at launch time using EC2 user data) and pass them all at one time with the `--env-file path_to_env_file` option. This is recommended for sensitive information such as authentication credentials for private repositories. For more information, see [Storing Container Instance Configuration in Amazon S3](#) (p. 81) and [Private Registry Authentication](#) (p. 83).
- If your task definitions specify log configuration options for a particular log driver, the Amazon ECS container agent running on your container instances must register the specified log driver with the `ECS_AVAILABLE_LOGGING_DRIVERS` environment variable. For example, to register a container instance with the `json-file` and `awslogs` logging drivers, add the `--env=ECS_AVAILABLE_LOGGING_DRIVERS='["json-file","awslogs"]'` option to the **docker run** command below. For more information, see [Amazon ECS Container Agent Configuration](#) (p. 76).
- Operating systems with SELinux enabled require the `--privileged` option in your **docker run** command. In addition, for SELinux-enabled container instances, we recommend that you add the `:z` option to the `/log` and `/data` volume mounts; however, the host mounts for these volumes must exist before you run the command or you will receive a `no such file or directory` error. Take the following action if you experience difficulty running the Amazon ECS agent on an SELinux-enabled container instance:
  - Create the host volume mount points on your container instance.

```
$ sudo mkdir -p /var/log/ecs
$ sudo mkdir -p /var/lib/ecs/data
```

- Add the `--privileged` option to the **docker run** command below.
- Append the `:Z` option to the `/log` and `/data` container volume mounts (for example, `--volume=/var/log/ecs/:/log:Z`) to the **docker run** command below.

For more information about these and other agent runtime options, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

```
ubuntu:~$ sudo docker run --name ecs-agent \
--detach=true \
--restart=on-failure:10 \
--volume=/var/run/docker.sock:/var/run/docker.sock \
--volume=/var/log/ecs:/log \
--volume=/var/lib/ecs/data:/data \
--net=host \
--env=ECS_LOGFILE=/log/ecs-agent.log \
--env=ECS_LOGLEVEL=info \
--env=ECS_DATADIR=/data \
--env=ECS_CLUSTER=cluster_name \
--env=ECS_ENABLE_TASK_IAM_ROLE=true \
--env=ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST=true \
amazon/amazon-ecs-agent:latest
```

#### Note

If you receive an `Error` response from `daemon: Cannot start container message`, you can delete the failed container with the **sudo docker rm ecs-agent** command and try running the agent again.

## Amazon ECS Container Agent Configuration

The Amazon ECS container agent supports a number of configuration options, most of which should be set through environment variables. The following environment variables are available, and all of them are optional.

If your container instance was launched with the Amazon ECS-optimized AMI, you can set these environment variables in the `/etc/ecs/ecs.config` file and then restart the agent. You can also write these configuration variables to your container instances with Amazon EC2 user data at launch time. For more information, see [Bootstrapping Container Instances with Amazon EC2 User Data \(p. 45\)](#).

If you are manually starting the Amazon ECS container agent (for non-Amazon ECS-optimized AMIs), you can use these environment variables in the **docker run** command that you use to start the agent with the syntax `--env=VARIABLE_NAME=VARIABLE_VALUE`. For sensitive information, such as authentication credentials for private repositories, you should store your agent environment variables in a file and pass them all at one time with the `--env-file path_to_env_file` option.

#### Topics

- [Available Parameters \(p. 77\)](#)
- [Storing Container Instance Configuration in Amazon S3 \(p. 81\)](#)

## Available Parameters

Environment Key	Example Values	Description	Default Value
ECS_CLUSTER	MyCluster	The cluster that this agent should check into.	default
ECS_RESERVED_PORTS	[22, 80, 5000, 8080]	An array of ports that should be marked as unavailable for scheduling on this container instance.	[22, 2375, 2376, 51678]
ECS_RESERVED_PORTS_UDP	[53, 123]	An array of UDP ports that should be marked as unavailable for scheduling on this container instance.	[]
ECS_ENGINE_AUTH_TYPE	dockercfg   docker	Required for private registry authentication. This is the type of authentication data in ECS_ENGINE_AUTH_DATA. For more information, see <a href="#">Authentication Formats</a> (p. 84).	Null
ECS_ENGINE_AUTH_DATA	<p><b>Example</b> (ECS_ENGINE_AUTH_TYPE=dockercfg):</p> <pre>{ "https://index.docker.io/v1/": { "auth": "zq212MzEXAMPLE7o6T25Dk0i" } }</pre> <p><b>Example</b> (ECS_ENGINE_AUTH_TYPE=docker):</p> <pre>{ "https://index.docker.io/v1/": { "username": "my_name", "password": "my_password", "email": "email@example.com" } }</pre>	<p>Required for private registry authentication. If ECS_ENGINE_AUTH_TYPE=dockercfg, then the ECS_ENGINE_AUTH_DATA value should be the contents of a Docker configuration file (~/.dockercfg or ~/.docker/config.json) created by running <b>docker login</b>. If ECS_ENGINE_AUTH_TYPE=docker, then the ECS_ENGINE_AUTH_DATA value should be a JSON representation of the registry server to authenticate against, as well as the authentication parameters required by that registry (such as user name, password, and email address for that account). For more information, see <a href="#">Authentication Formats</a> (p. 84).</p>	Null
AWS_DEFAULT_REGION	us-east-1	The region to be used in API requests as well as to infer the correct back-end host.	Taken from EC2 instance metadata.
AWS_ACCESS_KEY_ID	AKIAIOSFODNN7EXAMPLE	The <a href="#">access key</a> used by the agent for all calls.	Taken from EC2 instance metadata.

Environment Key	Example Values	Description	Default Value
AWS_SECRET_ACCESS_KEY	AKIAIAD4FEMI/K7MDENG/bPxrFiCYEXAMPLEKEY	The <a href="#">secret key</a> used by the agent for all calls.	Taken from EC2 instance metadata.
DOCKER_HOST	unix:///var/run/docker.sock	Used to create a connection to the Docker daemon; behaves similarly to the environment variable as used by the Docker client.	unix:///var/run/docker.sock
ECS_LOGLEVEL	crit   error   warn   info   debug	The level to log at on stdout.	info
ECS_LOGFILE	/ecs-agent.log	The path to output full debugging information to. If blank, no logs are recorded. If this value is set, logs at the debug level (regardless of ECS_LOGLEVEL) are written to that file.	Null
ECS_CHECKPOINT	true   false	Whether or not to save the checkpoint state to the location specified with ECS_DATADIR.	If ECS_DATADIR is explicitly set to a non-empty value, then ECS_CHECKPOINT is set to true; otherwise, it is set to false.
ECS_DATADIR	/data	The name of the persistent data directory on the container that is running the Amazon ECS container agent. The directory is used to save information about the cluster and the agent state.	Null
ECS_UPDATES_ENABLED	true   false	Whether to exit for ECS agent updates when they are requested.	false
ECS_UPDATE_DOWNLOAD_DIR	/tmp	The filesystem location to place update tarballs within the container when they are downloaded.	
ECS_DISABLE_METRICS	true   false	Whether to disable CloudWatch metrics for Amazon ECS. If this value is set to true, CloudWatch metrics are not collected.	false

Environment Key	Example Values	Description	Default Value
ECS_DOCKER_GRAPHDRIVER	/var/lib/docker	Used to create the path to the state file of launched containers. The state file is used to read utilization metrics of containers.	/var/lib/docker
AWS_SESSION_TOKEN		The <a href="#">session token</a> used for temporary credentials.	Taken from EC2 instance metadata.
ECS_RESERVED_MEMORY	32	The amount of memory, in MiB, to reserve for processes that are not managed by ECS.	0
ECS_AVAILABLE_LOGGING_DRIVERS	["awslogs", "syslog"]  For information about how to use the <code>awslogs</code> log driver, see <a href="#">Using the awslogs Log Driver (p. 114)</a> .  For more information about the different log drivers available for your Docker version and how to configure them, see <a href="#">Configure logging drivers</a> in the Docker documentation.	The logging drivers available on the container instance. The Amazon ECS container agent running on a container instance must register the logging drivers available on that instance with the <code>ECS_AVAILABLE_LOGGING_DRIVERS</code> environment variable before containers placed on that instance can use log configuration options for those drivers in tasks.	[ "json-file" ]
ECS_DISABLE_PRIVILEGE	false	Whether launching privileged containers is disabled on the container instance. If this value is set to <code>true</code> , privileged containers are not permitted.	false
ECS_SELINUX_CAPABLE	false	Whether SELinux is available on the container instance.	false
ECS_APPARMOR_CAPABLE	false	Whether AppArmor is available on the container instance.	false
ECS_ENGINE_TASK_LOGGING	(Valid time units are "ns", "us", "ms", "s", "m", and "h".)	Time duration to wait from when a task is stopped until the docker container is removed. As this removes the docker container data, be aware that if this value is set too low, you may not be able to inspect your stopped containers or view the logs before they are removed. The minimum duration is 1m; any value shorter than 1 minute is ignored.	3h
ECS_CONTAINER_LOGGING_TIMEOUT	(Valid time units are "ns", "us", "ms", "s", "m", and "h".)	Time duration to wait from when a task is stopped before its containers are forcefully killed if they do not exit normally on their own.	30s

Environment Key	Example Values	Description	Default Value
HTTP_PROXY	10.0.0.131:3128	The hostname (or IP address) and port number of an HTTP proxy to use for the ECS agent to connect to the Internet (for example, if your container instances do not have external network access through an Amazon VPC Internet gateway or NAT gateway or instance). If this variable is set, you must also set the NO_PROXY variable to filter EC2 instance metadata and Docker daemon traffic from the proxy. For more information, see <a href="#">HTTP Proxy Configuration</a> (p. 88).	Null
NO_PROXY	169.254.169.254,/var/run/docker.sock	The HTTP traffic that should not be forwarded to the specified HTTP_PROXY. You must specify 169.254.169.254,/var/run/docker.sock to filter EC2 instance metadata and Docker daemon traffic from the proxy. For more information, see <a href="#">HTTP Proxy Configuration</a> (p. 88).	Null
ECS_ENABLE_TASK_IAM_ROLE	false	Whether IAM roles for tasks should be enabled on the container instance for task containers with the bridge or default network modes. For more information, see <a href="#">IAM Roles for Tasks</a> (p. 212).	false
ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST	false	Whether IAM roles for tasks should be enabled on the container instance for task containers with the host network mode. This variable is only supported on agent versions 1.12.0 and later. For more information, see <a href="#">IAM Roles for Tasks</a> (p. 212).	false
ECS_DISABLE_IMAGE_CLEANUP	false	Whether to disable automated image cleanup for the Amazon ECS agent. For more information, see <a href="#">Automated Task and Image Cleanup</a> (p. 82).	false
ECS_IMAGE_CLEANUP_INTERVAL	30m	The time interval between automated image cleanup cycles. If set to less than 10 minutes, the value is ignored.	30m

Environment Key	Example Values	Description	Default Value
ECS_IMAGE_MINIMUM_CLEANUP_AGE		The minimum time interval between when an image is pulled and when it can be considered for automated image cleanup.	1h
ECS_NUM_IMAGES_DELETE_PER_CYCLE		The maximum number of images to delete in a single automated image cleanup cycle. If set to less than 1, the value is ignored.	5
ECS_INSTANCE_ATTRIBUTES	<pre>{   "attribute": "custom_attribute_value" }</pre> <p>For information about custom attributes to use, see <a href="#">Attributes (p. 128)</a>.</p>	<p>A list of custom attributes, in JSON form, to apply to your container instances. Using this attribute at instance registration will add the custom attributes allowing you to skip the manual method of adding custom attributes via the AWS Management Console.</p> <p>An invalid JSON value for this variable will cause the agent to exit with a code of 5 and a message will appear in the agent logs. If the JSON value is valid but there is an issue detected when validating the attribute (for example if the value is too long or contains invalid characters) then the container instance registration will happen but the agent will exit with a code 5 and a message will be written to the agent logs. For information on how to locate the agent logs, see <a href="#">Amazon ECS Container Agent Log (p. 278)</a>.</p>	Null

## Storing Container Instance Configuration in Amazon S3

Amazon ECS container agent configuration is controlled with the environment variables described above. The Amazon ECS-optimized AMI checks for these variables in `/etc/ecs/ecs.config` when the container agent starts and configures the agent accordingly. Certain innocuous environment variables, such as `ECS_CLUSTER`, can be passed to the container instance at launch time through Amazon EC2 user data and written to this file without consequence. However, other sensitive information, such as your AWS credentials or the `ECS_ENGINE_AUTH_DATA` variable, should never be passed to an instance in user data or written to `/etc/ecs/ecs.config` in a way that they would show up in a `.bash_history` file.

Storing configuration information in a private bucket in Amazon S3 and granting read-only access to your container instance IAM role is a secure and convenient way to allow container instance configuration at launch time. You can store a copy of your `ecs.config` file in a private bucket, and then use Amazon EC2 user data to install the AWS CLI and copy your configuration information to `/etc/ecs/ecs.config` when the instance launches.



### To allow Amazon S3 read-only access for your container instance role

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.
3. Choose the IAM role you use for your container instances (this role is likely titled `ecsInstanceRole`). For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).
4. Under **Managed Policies**, choose **Attach Policy**.
5. On the **Attach Policy** page, type `s3` into the **Filter** field to narrow the policy results.
6. Check the box to the left of the **AmazonS3ReadOnlyAccess** policy and click **Attach Policy**.

### To store an `ecs.config` file in Amazon S3

1. Create an `ecs.config` file with valid environment variables and values from [Amazon ECS Container Agent Configuration \(p. 76\)](#) using the following format. This example configures private registry authentication. For more information, see [Private Registry Authentication \(p. 83\)](#).

```
ECS_ENGINE_AUTH_TYPE=dockercfg
ECS_ENGINE_AUTH_DATA={ "https://index.docker.io/v1/":
{ "auth":"zq212MzEXAMPLE7o6T25Dk0i", "email":"email@example.com" } }
```

2. Create a private bucket in Amazon S3 to store your configuration file. For more information, see [Create a Bucket](#) in the *Amazon Simple Storage Service Getting Started Guide*.
3. Upload the `ecs.config` file to your Amazon S3 bucket. For more information, see [Add an Object to a Bucket](#) in the *Amazon Simple Storage Service Getting Started Guide*.

### To load an `ecs.config` file from Amazon S3 at launch

1. Complete the above procedures in this section to allow read-only Amazon S3 access to your container instances and store an `ecs.config` file in a private Amazon S3 bucket.
2. Launch new container instances by following the steps in [Launching an Amazon ECS Container Instance \(p. 42\)](#). In [Step 10 \(p. 44\)](#), use the following example script that installs the AWS CLI and copies your configuration file to `/etc/ecs/ecs.config`.

```
#!/bin/bash
yum install -y aws-cli
aws s3 cp s3://your_bucket_name/ecs.config /etc/ecs/ecs.config
```

## Automated Task and Image Cleanup

Each time a task is placed on a container instance, the Amazon ECS container agent checks to see if the images referenced in the task are the most recent of the specified tag in the repository; if not, it pulls the images from their respective repositories. If you frequently update the images in your tasks and services (for example, if you are using a continuous integration and continuous deployment (CI/CD) pipeline), your container instance storage can quickly fill up with Docker images that you are no longer using and will likely never use again.

Likewise, containers that belong to stopped tasks can also consume container instance storage with log information, data volumes, and other artifacts. These artifacts are useful for debugging containers that have stopped unexpectedly, but most of this storage can be safely freed up after a period of time.

By default, the Amazon ECS container agent automatically cleans up stopped tasks and Docker images that are not being used by any tasks on your container instances.

### Note

The automated image cleanup feature requires at least version 1.13.0 of the Amazon ECS container agent. To update your agent to the latest version, see [Updating the Amazon ECS Container Agent \(p. 70\)](#).

## Tunable Parameters

The following agent configuration variables are available to tune your automated task and image cleanup experience. For more information about how to set these variables on your container instances, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

`ECS_ENGINE_TASK_CLEANUP_WAIT_DURATION`

This variable specifies the time to wait before removing any containers that belong to stopped tasks. The image cleanup process cannot delete an image as long as there is a container that references it. After images are not referenced by any containers (either stopped or running), then the image becomes a candidate for cleanup. By default, this parameter is set to 3 hours but you can reduce this period to as low as 1 minute, if you need to for your application.

`ECS_DISABLE_IMAGE_CLEANUP`

If you set this variable to `true`, then automated image cleanup is disabled on your container instance and no images are automatically removed.

`ECS_IMAGE_CLEANUP_INTERVAL`

This variable specifies how frequently the automated image cleanup process should check for images to delete. The default is every 30 minutes but you can reduce this period to as low as 10 minutes to remove images more frequently.

`ECS_IMAGE_MINIMUM_CLEANUP_AGE`

This variable specifies the minimum amount of time between when an image was pulled and when it may become a candidate for removal; this is used to prevent cleaning up images that have just been pulled. The default is 1 hour.

`ECS_NUM_IMAGES_DELETE_PER_CYCLE`

This variable specifies how many images may be removed during a single cleanup cycle. The default is 5 and the minimum is 1.

## Cleanup Workflow

When the Amazon ECS container agent is running and automated image cleanup is not disabled, the agent checks for Docker images that are not referenced by running or stopped containers at a frequency determined by the `ECS_IMAGE_CLEANUP_INTERVAL` variable. If unused images are found and they are older than the minimum cleanup time specified by the `ECS_IMAGE_MINIMUM_CLEANUP_AGE` variable, the agent removes up to the maximum number of images that are specified with the `ECS_NUM_IMAGES_DELETE_PER_CYCLE` variable, with the least-recently referenced images deleted first. After the images are removed, the agent waits until the next interval and repeats the process again.

## Private Registry Authentication

The Amazon ECS container agent can authenticate with private registries, including Docker Hub, using basic authentication. When you enable private registry authentication, you can use private Docker images in your task definitions.

The agent looks for two environment variables when it launches: `ECS_ENGINE_AUTH_TYPE`, which specifies the type of authentication data that is being sent, and `ECS_ENGINE_AUTH_DATA`, which contains the actual authentication credentials.

The Amazon ECS-optimized AMI scans the `/etc/ecs/ecs.config` file for these variables when the container instance launches, and each time the service is started (with the **sudo start ecs** command). AMIs that are not Amazon ECS-optimized should store these environment variables in a file and pass them with the `--env-file` *path\_to\_env\_file* option to the **docker run** command that starts the container agent.

### Important

We do not recommend that you inject these authentication environment variables at instance launch time with Amazon EC2 user data or pass them with the `--env` option to the **docker run** command. These methods are not appropriate for sensitive data like authentication credentials. To safely add authentication credentials to your container instances, see [Storing Container Instance Configuration in Amazon S3 \(p. 81\)](#).

## Authentication Formats

There are two available formats for private registry authentication, `dockercfg` and `docker`.

### `dockercfg` Authentication Format

The `dockercfg` format uses the authentication information stored in the configuration file that is created when you run the **docker login** command. You can create this file by running **docker login** on your local system (or by logging into a container instance and running the command there) and entering your registry user name, password, and email address. Depending on your Docker version, this file is saved as either `~/.dockercfg` or `~/.docker/config.json`.

```
$ cat ~/.docker/config.json
```

Output:

```
{
  "auths": {
    "https://index.docker.io/v1/": {
      "auth": "zq212MzEXAMPLE7o6T25Dk0i"
    }
  }
}
```

### Important

Newer versions of Docker create a configuration file as shown above with an outer `auths` object. The Amazon ECS agent only supports `dockercfg` authentication data that is in the below format, without the `auths` object. If you have the **jq** utility installed, you can extract this data with the following command: **cat ~/.docker/config.json | jq .auths**

```
$ cat ~/.docker/config.json
```

Output:

```
{
  "https://index.docker.io/v1/": {
    "auth": "zq212MzEXAMPLE7o6T25Dk0i",
    "email": "email@example.com"
  }
}
```

In the above example, the following environment variables should be added to the environment variable file (`/etc/ecs/ecs.config` for the Amazon ECS-optimized AMI) that the Amazon ECS container agent loads at run time. If you are not using the Amazon ECS-optimized AMI and you are starting the agent manually with **docker run**, specify the environment variable file with the `--env-file` *path\_to\_env\_file* option when you start the agent.

```
ECS_ENGINE_AUTH_TYPE=dockercfg
ECS_ENGINE_AUTH_DATA={"https://index.docker.io/v1/":
{"auth":"zq212MzEXAMPLE7o6T25Dk0i","email":"email@example.com"}}
```

You can configure multiple private registries with the following syntax.

```
ECS_ENGINE_AUTH_TYPE=dockercfg
ECS_ENGINE_AUTH_DATA={"repo.example-01.com":
{"auth":"zq212MzEXAMPLE7o6T25Dk0i","email":"email@example-01.com"}, "repo.example-02.com":
{"auth":"fQ172MzEXAMPLEoF7225DU0j","email":"email@example-02.com"}}
```

### docker Authentication Format

The `docker` format uses a JSON representation of the registry server that the agent should authenticate with, as well as the authentication parameters required by that registry (such as user name, password, and the email address for that account). For a Docker Hub account, the JSON representation looks like this:

```
{
  "https://index.docker.io/v1/": {
    "username": "my_name",
    "password": "my_password",
    "email": "email@example.com"
  }
}
```

In this example, the following environment variables should be added to the environment variable file (`/etc/ecs/ecs.config` for the Amazon ECS-optimized AMI) that the Amazon ECS container agent loads at run time. If you are not using the Amazon ECS-optimized AMI and you are starting the agent manually with **docker run**, specify the environment variable file with the `--env-file` *path\_to\_env\_file* option when you start the agent.

```
ECS_ENGINE_AUTH_TYPE=docker
ECS_ENGINE_AUTH_DATA={"https://index.docker.io/v1/":
{"username":"my_name","password":"my_password","email":"email@example.com"}}
```

You can configure multiple private registries with the following syntax.

```
ECS_ENGINE_AUTH_TYPE=docker
ECS_ENGINE_AUTH_DATA={"repo.example-01.com":
{"username":"my_name","password":"my_password","email":"email@example-01.com"}, "repo.example-02.com":
{"username":"another_name","password":"another_password","email":"email@example-02.com"}}
```

## Enabling Private Registries

Use the following procedure to enable private registries for your container instances.

### To enable private registries in the Amazon ECS-optimized AMI

1. Log into your container instance via SSH.

2. Open the `/etc/ecs/ecs.config` file and add the `ECS_ENGINE_AUTH_TYPE` and `ECS_ENGINE_AUTH_DATA` values for your registry and account.

```
[ec2-user ~]$ sudo vi /etc/ecs/ecs.config
```

This example authenticates a Docker Hub user account.

```
ECS_ENGINE_AUTH_TYPE=docker
ECS_ENGINE_AUTH_DATA={"https://index.docker.io/v1/":
{"username": "my_name", "password": "my_password", "email": "email@example.com"}}
```

3. Check to see if your agent uses the `ECS_DATADIR` environment variable to save its state.

```
[ec2-user ~]$ docker inspect ecs-agent | grep ECS_DATADIR
```

Output:

```
"ECS_DATADIR=/data",
```

### Important

If the previous command does not return the `ECS_DATADIR` environment variable, you must stop any tasks running on this container instance before stopping the agent. Newer agents with the `ECS_DATADIR` environment variable save their state and you can stop and start them while tasks are running without issues. For more information, see [Updating the Amazon ECS Container Agent](#) (p. 70).

4. Stop the `ecs` service.

```
[ec2-user ~]$ sudo stop ecs
```

Output:

```
ecs stop/waiting
```

5. Restart the `ecs` service.

```
[ec2-user ~]$ sudo start ecs
```

Output:

```
ecs start/running, process 2959
```

6. (Optional) You can verify that the agent is running and see some information about your new container instance by querying the agent introspection API. For more information, see [the section called "Amazon ECS Container Agent Introspection"](#) (p. 87).

```
[ec2-user ~]$ curl http://localhost:51678/v1/metadata
```

Output:

```
{
  "Cluster": "default",
  "API Version 2014-11-13
```

```
{
  "ContainerInstanceArn": "<container_instance_ARN>",
  "Version": "Amazon ECS Agent - v1.14.1 (467c3d7)"
}
```

## Amazon ECS Container Agent Introspection

The Amazon ECS container agent provides an API for gathering details about the container instance that the agent is running on and the associated tasks that are running on that instance. You can use the **curl** command from within the container instance to query the Amazon ECS container agent (port 51678) and return container instance metadata or task information.

To view container instance metadata, such as the container instance ID, the Amazon ECS cluster the container instance is registered into, and the Amazon ECS container agent version info, log into your container instance via SSH and run the following command:

```
[ec2-user ~]$ curl http://localhost:51678/v1/metadata
```

Output:

```
{
  "Cluster": "default",
  "ContainerInstanceArn": "<container_instance_ARN>",
  "Version": "Amazon ECS Agent - v1.14.1 (467c3d7)"
}
```

To view information about all of the tasks that are running on a container instance, log into your container instance via SSH and run the following command:

```
[ec2-user ~]$ curl http://localhost:51678/v1/tasks
```

Output:

```
{
  "Tasks": [
    {
      "Arn": "arn:aws:ecs:us-east-1:<aws_account_id>:task/example5-58ff-46c9-ae05-543f8example",
      "DesiredStatus": "RUNNING",
      "KnownStatus": "RUNNING",
      "Family": "hello_world",
      "Version": "8",
      "Containers": [
        {
          "DockerId": "9581a69a761a557fbfce1d0f6745e4af5b9dbfb86b6b2c5c4df156f1a5932ff1",
          "DockerName": "ecs-hello_world-8-mysql-fcae8ac8f9f1d89d8301",
          "Name": "mysql"
        },
        {
          "DockerId": "bf25c5c5b2d4dba68846c7236e75b6915e1e778d31611e3c6a06831e39814a15",
          "DockerName": "ecs-hello_world-8-wordpress-e8bfddf9b488dff36c00",
          "Name": "wordpress"
        }
      ]
    }
  ]
}
```

```
}
```

You can view information for a particular task that is running on a container instance by specifying a task ARN (append `?taskarn=task_arn` to the request) or the Docker ID (append `?dockerid=docker_id` to the request) for an individual container inside a task. To get task information with a Docker ID, log into your container instance via SSH and run the following command:

#### Note

The Amazon ECS container agent introspection API requires full Docker IDs, not the short version that is shown with **docker ps**. You can get the full Docker ID for a container by running the **docker ps --no-trunc** command on the container instance.

```
[ec2-user ~]$ curl http://localhost:51678/v1/tasks?
dockerid=9581a69a761a557fbfce1d0f6745e4af5b9dbfb86b6b2c5c4df156f1a5932ff1
```

Output:

```
{
  "Arn": "arn:aws:ecs:us-east-1:<aws_account_id>:task/example5-58ff-46c9-
ae05-543f8example",
  "DesiredStatus": "RUNNING",
  "KnownStatus": "RUNNING",
  "Family": "hello_world",
  "Version": "8",
  "Containers": [
    {
      "DockerId": "9581a69a761a557fbfce1d0f6745e4af5b9dbfb86b6b2c5c4df156f1a5932ff1",
      "DockerName": "ecs-hello_world-8-mysql-fcae8ac8f9f1d89d8301",
      "Name": "mysql"
    },
    {
      "DockerId": "bf25c5c5b2d4dba68846c7236e75b6915e1e778d31611e3c6a06831e39814a15",
      "DockerName": "ecs-hello_world-8-wordpress-e8bfddf9b488dff36c00",
      "Name": "wordpress"
    }
  ]
}
```

## HTTP Proxy Configuration

If you need to configure your Amazon ECS container agent to use an HTTP proxy, you may do so by setting the following variables in the `/etc/ecs/ecs.config` file at launch time (with Amazon EC2 user data), or you can manually edit the configuration file and restart the agent afterwards:

`HTTP_PROXY=10.0.0.131:3128`

Set this value to the hostname (or IP address) and port number of an HTTP proxy to use for the ECS agent to connect to the Internet (for example, if your container instances do not have external network access through an Amazon VPC Internet gateway or NAT gateway or instance).

`NO_PROXY=169.254.169.254,169.254.170.2,/var/run/docker.sock`

Set this value to `169.254.169.254,169.254.170.2,/var/run/docker.sock` to filter EC2 instance metadata, IAM roles for tasks, and Docker daemon traffic from the proxy.

The above variable only affect the Amazon ECS container agent; they do not configure Docker or any other services (such as **yum**) to use the proxy.

### Example HTTP proxy user data script

The example user data `cloud-boothook` script below configures the Amazon ECS container agent, the Docker daemon, and **yum** to use an HTTP proxy that you specify. You can also specify a cluster name that the container instance will register itself into.

To use this script when you launch a container instance, follow the steps in [Launching an Amazon ECS Container Instance \(p. 42\)](#), and in [Step 10 \(p. 44\)](#), copy and paste the `cloud-boothook` script below into the **User data** field (be sure to substitute the red example values with your own proxy and cluster information).

```
#cloud-boothook
# Configure Yum, the Docker daemon, and the ECS agent to use an HTTP proxy

# Specify proxy host, port number, and ECS cluster name to use
PROXY_HOST=10.0.0.131
PROXY_PORT=3128
CLUSTER_NAME=proxy-test

# Set Yum HTTP proxy
if [ ! -f /var/lib/cloud/instance/sem/config_yum_http_proxy ]; then
    echo "proxy=http://$PROXY_HOST:$PROXY_PORT" >> /etc/yum.conf
    echo "$$: $(date +%s.%N | cut -b1-13)" > /var/lib/cloud/instance/sem/config_yum_http_proxy
fi

# Set Docker HTTP proxy
if [ ! -f /var/lib/cloud/instance/sem/config_docker_http_proxy ]; then
    echo "export HTTP_PROXY=http://$PROXY_HOST:$PROXY_PORT/" >> /etc/sysconfig/docker
    echo "$$: $(date +%s.%N | cut -b1-13)" > /var/lib/cloud/instance/sem/
config_docker_http_proxy
fi

# Set ECS agent HTTP proxy
if [ ! -f /var/lib/cloud/instance/sem/config_ecs-agent_http_proxy ]; then
    echo "ECS_CLUSTER=$CLUSTER_NAME" >> /etc/ecs/ecs.config
    echo "HTTP_PROXY=$PROXY_HOST:$PROXY_PORT" >> /etc/ecs/ecs.config
    echo "NO_PROXY=169.254.169.254,169.254.170.2,/var/run/docker.sock" >> /etc/ecs/ecs.config
    echo "$$: $(date +%s.%N | cut -b1-13)" > /var/lib/cloud/instance/sem/config_ecs-
agent_http_proxy
fi
```



# Amazon ECS Task Definitions

A task definition is required to run Docker containers in Amazon ECS. Some of the parameters you can specify in a task definition include:

- Which Docker images to use with the containers in your task
- How much CPU and memory to use with each container
- Whether containers are linked together in a task
- The Docker networking mode to use for the containers in your task
- What (if any) ports from the container are mapped to the host container instance
- Whether the task should continue to run if the container finishes or fails
- The command the container should run when it is started
- What (if any) environment variables should be passed to the container when it starts
- Any data volumes that should be used with the containers in the task
- What (if any) IAM role your tasks should use for permissions

You can define multiple containers and data volumes in a task definition. For a complete description of the parameters available in a task definition, see [Task Definition Parameters \(p. 95\)](#).

Your entire application stack does not need to exist on a single task definition, and in most cases it should not. Your application can span multiple task definitions by combining related containers into their own task definitions, each representing a single component. For more information, see [Application Architecture \(p. 91\)](#).

## Topics

- [Application Architecture \(p. 91\)](#)
- [Creating a Task Definition \(p. 92\)](#)
- [Task Definition Parameters \(p. 95\)](#)
- [Using Data Volumes in Tasks \(p. 109\)](#)
- [Using the awslogs Log Driver \(p. 114\)](#)
- [Example Task Definitions \(p. 119\)](#)
- [Updating a Task Definition \(p. 122\)](#)

- [Deregistering Task Definitions \(p. 122\)](#)

## Application Architecture

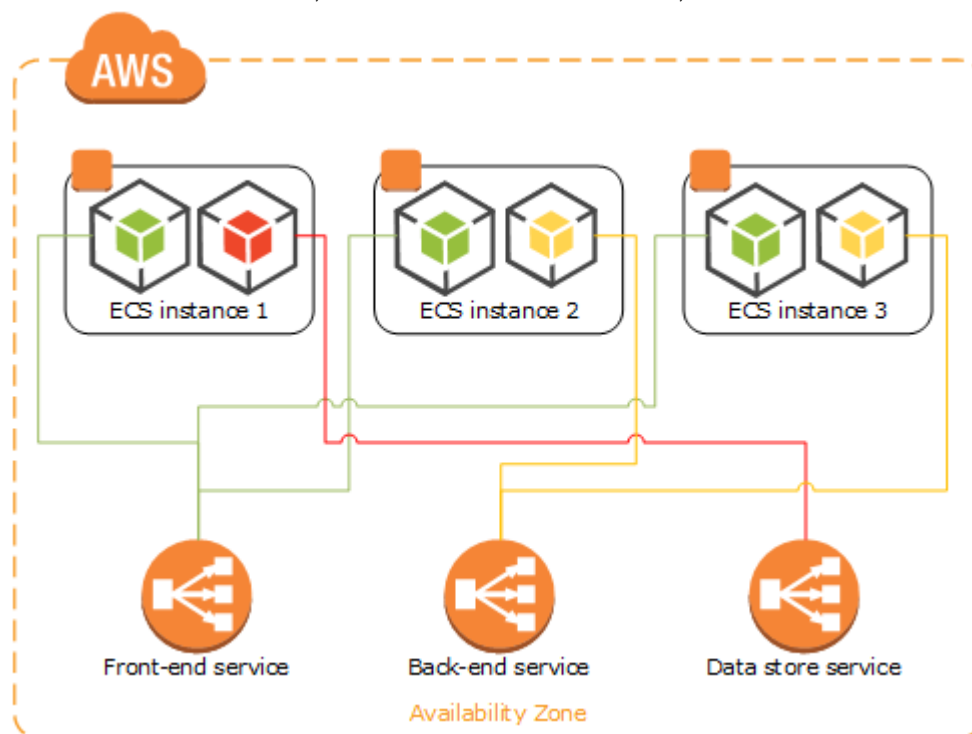
When you're considering how to model task definitions and services, it helps to think about what processes need to run together on the same instance and how you will scale each component. As an example, imagine an application that consists of the following components:

- A front-end service that displays information on a web page
- A back-end service that provides APIs for the front-end service
- A data store

In your development environment, you probably run all three containers together on your Docker host. You might be tempted to use the same approach for your production environment, but this approach has several drawbacks:

- Changes to one component can impact all three components, which may be a larger scope for the change than you want
- Each component is more difficult to scale because you have to scale every container proportionally
- Task definitions can only have 10 container definitions and your application stack might require more, either now or in the future
- Every container in a task definition must land on the same container instance, which may limit your instance choices to the largest sizes

Instead, you should create task definitions that group the containers that are used for a common purpose, and separate the different components into multiple task definitions. In this example, three task definitions each specify one container. The example cluster below has three container instances registered with three front-end service containers, two back-end service containers, and one data store service container.



You can group related containers in a task definition, such as linked containers that must be run together. For example, you could add a log streaming container to your front-end service and include that in the same task definition.

After you have your task definitions, you can create services from them to maintain the availability of your desired tasks. For more information, see [Creating a Service \(p. 157\)](#). In your services, you can associate containers with Elastic Load Balancing load balancers. For more information, see [Service Load Balancing \(p. 138\)](#). When your application requirements change, you can update your services to scale the number of desired tasks up or down, or to deploy newer versions of the containers in your tasks. For more information, see [Updating a Service \(p. 162\)](#).

## Creating a Task Definition

Before you can run Docker containers on Amazon ECS, you must create a task definition.

### To create a new task definition

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, select the region in which to register your task definition.
3. In the navigation pane, choose **Task Definitions**.
4. On the **Task Definitions** page, choose **Create new Task Definition**.
5. (Optional) If you have a JSON representation of your task definition, complete the following steps:
  - a. On the **Create a Task Definition** page, scroll to the bottom of the page and choose **Configure via JSON**.
  - b. Paste your task definition JSON into the text area and choose **Save**.
  - c. Verify your information and choose **Create**.
6. For **Task Definition Name**, type a name for your task definition. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
7. (Optional) For **Task Role**, choose an IAM role that provides permissions for containers in your task to make calls to AWS APIs on your behalf. For more information, see [IAM Roles for Tasks \(p. 212\)](#).

#### Note

Only roles that have the **Amazon EC2 Container Service Task Role** trust relationship are shown here. For help creating an IAM role for your tasks, see [Creating an IAM Role and Policy for your Tasks \(p. 214\)](#).

8. (Optional) For **Network Mode**, choose the Docker network mode to use for the containers in your task. The available network modes correspond to those described in [Network settings](#) in the Docker run reference.

The default Docker network mode is `bridge`. If the network mode is set to `none`, you cannot specify port mappings in your container definitions, and the task's containers do not have external connectivity. The `host` network mode offers the highest networking performance for containers because they use the host network stack instead of the virtualized network stack provided by the `bridge` mode; however, exposed container ports are mapped directly to the corresponding host port, so you cannot take advantage of dynamic host port mappings or run multiple instantiations of the same task on a single container instance if port mappings are used.

9. (Optional) For **Constraint**, define how tasks that are created from this task definition are placed in your cluster (for example, on container instances with a specific instance type or specific custom attributes). For more information, see [Amazon ECS Task Placement Constraints \(p. 128\)](#).
10. For each container in your task definition, complete the following steps.
  - a. Choose **Add container**.

- b. Fill out each required field and any optional fields to use in your container definitions (more container definition parameters are available in the **Advanced container configuration** menu). For more information, see [Task Definition Parameters \(p. 95\)](#).
  - c. Choose **Add** to add your container to the task definition.
11. (Optional) To define data volumes for your task, choose **Add volume**. For more information, see [Using Data Volumes in Tasks \(p. 109\)](#).
  - a. For **Name**, type a name for your volume. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
  - b. (Optional) For **Source Path**, type the path on the host container instance to present to the container. If you leave this field empty, the Docker daemon assigns a host path for you. If you specify a source path, the data volume persists at the specified location on the host container instance until you delete it manually. If the source path does not exist on the host container instance, the Docker daemon creates it. If the location does exist, the contents of the source path folder are exported to the container.
12. Choose **Create**.

## Task Definition Template

An empty task definition template is shown below. You can use this template to create your task definition which can then be pasted into the console JSON input area or saved to a file and used with the AWS CLI `--cli-input-json` option. For more information about these parameters, see [Task Definition Parameters \(p. 95\)](#).

```
{
  "family": "",
  "taskRoleArn": "",
  "networkMode": "",
  "containerDefinitions": [
    {
      "name": "",
      "image": "",
      "cpu": 0,
      "memory": 0,
      "memoryReservation": 0,
      "links": [
        ""
      ],
      "portMappings": [
        {
          "containerPort": 0,
          "hostPort": 0,
          "protocol": ""
        }
      ],
      "essential": true,
      "entryPoint": [
        ""
      ],
      "command": [
        ""
      ],
      "environment": [
        {
          "name": "",
          "value": ""
        }
      ],
      "mountPoints": [
```

```

        {
            "sourceVolume": "",
            "containerPath": "",
            "readOnly": true
        }
    ],
    "volumesFrom": [
        {
            "sourceContainer": "",
            "readOnly": true
        }
    ],
    "hostname": "",
    "user": "",
    "workingDirectory": "",
    "disableNetworking": true,
    "privileged": true,
    "readonlyRootFilesystem": true,
    "dnsServers": [
        ""
    ],
    "dnsSearchDomains": [
        ""
    ],
    "extraHosts": [
        {
            "hostname": "",
            "ipAddress": ""
        }
    ],
    "dockerSecurityOptions": [
        ""
    ],
    "dockerLabels": {
        "KeyName": ""
    },
    "ulimits": [
        {
            "name": "",
            "softLimit": 0,
            "hardLimit": 0
        }
    ],
    "logConfiguration": {
        "logDriver": "",
        "options": {
            "KeyName": ""
        }
    }
}
],
"placementConstraints": [
    {
        "expression": "",
        "type": "memberOf"
    }
],
"volumes": [
    {
        "name": "",
        "host": {
            "sourcePath": ""
        }
    }
]

```

```
}
```

Note that you can generate this task definition template using the following AWS CLI command.

```
aws ecs register-task-definition --generate-cli-skeleton
```

## Task Definition Parameters

Task definitions are split into four basic parts: the task family, the IAM task role, container definitions, and volumes. The family is the name of the task, and each family can have multiple revisions. The IAM task role specifies the permissions that containers in the task should have. Container definitions specify which image to use, how much CPU and memory the container are allocated, and many more options. Volumes allow you to share data between containers and even persist the data on the container instance when the containers are no longer running. The family and container definitions are required in a task definition, while task role, network mode, and volumes are optional.

### Parts

- [Family](#) (p. 95)
- [Task Role](#) (p. 95)
- [Network Mode](#) (p. 96)
- [Container Definitions](#) (p. 96)
- [Task Placement Constraints](#) (p. 108)
- [Volumes](#) (p. 108)

## Family

family

Type: string

Required: yes

When you register a task definition, you give it a family, which is similar to a name for multiple versions of the task definition, specified with a revision number. The first task definition that is registered into a particular family is given a revision of 1, and any task definitions registered after that are given a later sequential revision number.

## Task Role

taskRoleArn

Type: string

Required: no

When you register a task definition, you can provide a task role for an IAM role that allows the containers in the task permission to call the AWS APIs that are specified in its associated policies on your behalf. For more information, see [IAM Roles for Tasks](#) (p. 212).

## Network Mode

networkMode

Type: string

Required: no

When you register a task definition, you can specify the Docker networking mode to use with its containers. The default Docker network mode is `bridge`. If the network mode is set to `none`, you cannot specify port mappings in your container definitions, and the task's containers do not have external connectivity. The `host` network mode offers the highest networking performance for containers because they use the host network stack instead of the virtualized network stack provided by the `bridge` mode; however, exposed container ports are mapped directly to the corresponding host port, so you cannot take advantage of dynamic host port mappings or run multiple instantiations of the same task on a single container instance if port mappings are used.

## Container Definitions

When you register a task definition, you must specify a list of container definitions that are passed to the Docker daemon on a container instance. The following parameters are allowed in a container definition.

Topics

- [Standard Container Definition Parameters \(p. 96\)](#)
- [Advanced Container Definition Parameters \(p. 99\)](#)

## Standard Container Definition Parameters

The following task definition parameters are either required or used in most container definitions.

name

Type: string

Required: yes

The name of a container. If you are linking multiple containers together in a task definition, the `name` of one container can be entered in the `links` of another container to connect the containers. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed. This parameter maps to `name` in the [Create a container](#) section of the [Docker Remote API](#) and the `--name` option to [docker run](#).

image

Type: string

Required: yes

The image used to start a container. This string is passed directly to the Docker daemon. Images in the Docker Hub registry are available by default. You can also specify other repositories with `repository-url/image:tag`. Up to 255 letters (uppercase and lowercase), numbers, hyphens, underscores, colons, periods, forward slashes, and number signs are allowed. This parameter maps to `Image` in the [Create a container](#) section of the [Docker Remote API](#) and the `IMAGE` parameter of [docker run](#).

### Note

Amazon ECS task definitions currently only support tags as image identifiers within a specified repository (and not `sha256` digests).

- Images in Amazon ECR repositories use the full `registry/repository:tag` naming convention. For example, `aws_account_id.dkr.ecr.region.amazonaws.com/my-web-app:latest`
- Images in official repositories on Docker Hub use a single name (for example, `ubuntu` or `mongo`).
- Images in other repositories on Docker Hub are qualified with an organization name (for example, `amazon/amazon-ecs-agent`).
- Images in other online repositories are qualified further by a domain name (for example, `quay.io/assemblyline/ubuntu`).

#### `memory`

Type: integer

Required: no

The hard limit (in MiB) of memory to present to the container. If your container attempts to exceed the memory specified here, the container is killed. This parameter maps to `Memory` in the [Create a container](#) section of the [Docker Remote API](#) and the `--memory` option to **docker run**.

You must specify a non-zero integer for one or both of `memory` or `memoryReservation` in container definitions. If you specify both, `memory` must be greater than `memoryReservation`. If you specify `memoryReservation`, then that value is subtracted from the available memory resources for the container instance on which the container is placed; otherwise, the value of `memory` is used.

The Docker daemon reserves a minimum of 4 MiB of memory for a container, so you should not specify fewer than 4 MiB of memory for your containers.

#### `memoryReservation`

Type: integer

Required: no

The soft limit (in MiB) of memory to reserve for the container. When system memory is under contention, Docker attempts to keep the container memory to this soft limit; however, your container can consume more memory when it needs to, up to either the hard limit specified with the `memory` parameter (if applicable), or all of the available memory on the container instance, whichever comes first. This parameter maps to `MemoryReservation` in the [Create a container](#) section of the [Docker Remote API](#) and the `--memory-reservation` option to **docker run**.

You must specify a non-zero integer for one or both of `memory` or `memoryReservation` in container definitions. If you specify both, `memory` must be greater than `memoryReservation`. If you specify `memoryReservation`, then that value is subtracted from the available memory resources for the container instance on which the container is placed; otherwise, the value of `memory` is used.

For example, if your container normally uses 128 MiB of memory, but occasionally bursts to 256 MiB of memory for short periods of time, you can set a `memoryReservation` of 128 MiB, and a `memory` hard limit of 300 MiB. This configuration would allow the container to only reserve 128 MiB of memory from the remaining resources on the container instance, but also allow the container to consume more memory resources when needed.

#### `portMappings`

Type: object array

Required: no

Port mappings allow containers to access ports on the host container instance to send or receive traffic. This parameter maps to `PortBindings` in the [Create a container](#) section of the [Docker Remote API](#) and the `--publish` option to **docker run**. If the network mode of a task definition is set to `none`, then you cannot specify port mappings. If the network mode of a task definition is set to `host`, then host ports must either be undefined or they must match the container port in the port mapping.



### Note

After a task reaches the `RUNNING` status, manual and automatic host and container port assignments are visible in the **Network Bindings** section of a container description of a selected task in the Amazon ECS console, or the `networkBindings` section of **describe-tasks** AWS CLI command output or `DescribeTasks` API responses.

`hostPort`

Type: integer

Required: no

The port number on the container instance to reserve for your container. You can specify a non-reserved host port for your container port mapping (this is referred to as *static* host port mapping), or you can omit the `hostPort` (or set it to 0) while specifying a `containerPort` and your container will automatically receive a port (this is referred to as *dynamic* host port mapping) in the ephemeral port range for your container instance operating system and Docker version.

The default ephemeral port range is 49153 to 65535, and this range is used for Docker versions prior to 1.6.0. For Docker version 1.6.0 and later, the Docker daemon tries to read the ephemeral port range from `/proc/sys/net/ipv4/ip_local_port_range` (which is 32768 to 61000 on the latest Amazon ECS-optimized AMI); if this kernel parameter is unavailable, the default ephemeral port range is used. You should not attempt to specify a host port in the ephemeral port range, since these are reserved for automatic assignment. In general, ports below 32768 are outside of the ephemeral port range.

The default reserved ports are 22 for SSH, the Docker ports 2375 and 2376, and the Amazon ECS container agent port 51678. Any host port that was previously user-specified for a running task is also reserved while the task is running (after a task stops, the host port is released). The current reserved ports are displayed in the `remainingResources` of **describe-container-instances** output, and a container instance may have up to 100 reserved ports at a time, including the default reserved ports (automatically assigned ports do not count toward the 100 reserved ports limit).

`containerPort`

Type: integer

Required: yes, when `portMappings` are used

The port number on the container that is bound to the user-specified or automatically assigned host port. If you specify a container port and not a host port, your container automatically receives a host port in the ephemeral port range (for more information, see `hostPort`). Port mappings that are automatically assigned in this way do not count toward the 100 reserved ports limit of a container instance.

`protocol`

Type: string

Required: no

The protocol used for the port mapping. Valid values are `tcp` and `udp`. The default is `tcp`.

### Important

UDP support is only available on container instances that were launched with version 1.2.0 of the Amazon ECS container agent (such as the `amzn-ami-2015.03.c-amazon-ecs-optimized` AMI) or later, or with container agents that have been updated to version 1.3.0 or later. To update your container agent to the latest version, see [Updating the Amazon ECS Container Agent \(p. 70\)](#).

If you are specifying a host port, use the following syntax:

```
"portMappings": [
  {
    "containerPort": integer,
    "hostPort": integer
  }
  ...
]
```

If you want an automatically assigned host port, use the following syntax:

```
"portMappings": [
  {
    "containerPort": integer
  }
  ...
]
```

## Advanced Container Definition Parameters

The following advanced container definition parameters provide extended capabilities to the **docker run** command that is used to launch containers on your Amazon ECS container instances.

### Topics

- [Environment \(p. 99\)](#)
- [Network Settings \(p. 101\)](#)
- [Storage and Logging \(p. 103\)](#)
- [Security \(p. 106\)](#)
- [Resource Limits \(p. 106\)](#)
- [Docker Labels \(p. 107\)](#)

## Environment

`cpu`

Type: integer

Required: no

The number of `cpu` units to reserve for the container. A container instance has 1,024 `cpu` units for every CPU core. This parameter specifies the minimum amount of CPU to reserve for a container, and containers share unallocated CPU units with other containers on the instance with the same ratio as their allocated amount. This parameter maps to `CpuShares` in the [Create a container](#) section of the [Docker Remote API](#) and the `--cpu-shares` option to **docker run**.

### Note

You can determine the number of CPU units that are available per Amazon EC2 instance type by multiplying the vCPUs listed for that instance type on the [Amazon EC2 Instances](#) detail page by 1,024.

For example, if you run a single-container task on a single-core instance type with 512 CPU units specified for that container, and that is the only task running on the container instance, that container could use the full 1,024 CPU unit share at any given time. However, if you launched another copy of the same task on that container instance, each task would be guaranteed a minimum of 512 CPU units when needed, and each container could float to higher CPU usage if the other container was not using it, but if both tasks were 100% active all of the time, they would be limited to 512 CPU units.

The Docker daemon on the container instance uses the CPU value to calculate the relative CPU share ratios for running containers. For more information, see [CPU share constraint](#) in the Docker documentation. The minimum valid CPU share value that the Linux kernel will allow is 2; however, the CPU parameter is not required, and you can use CPU values below 2 in your container definitions. For CPU values below 2 (including null), the behavior varies based on your Amazon ECS container agent version:

- **Agent versions <= 1.1.0:** Null and zero CPU values are passed to Docker as 0, which Docker then converts to 1,024 CPU shares. CPU values of 1 are passed to Docker as 1, which the Linux kernel converts to 2 CPU shares.
- **Agent versions >= 1.2.0:** Null, zero, and CPU values of 1 are passed to Docker as 2.

`essential`

Type: Boolean

Required: no

If the `essential` parameter of a container is marked as `true`, and that container fails or stops for any reason, all other containers that are part of the task are stopped. If the `essential` parameter of a container is marked as `false`, then its failure does not affect the rest of the containers in a task. If this parameter is omitted, a container is assumed to be essential.

All tasks must have at least one essential container. If you have an application that is composed of multiple containers, you should group containers that are used for a common purpose into components, and separate the different components into multiple task definitions. For more information, see [Application Architecture](#) (p. 91).

```
"essential": true|false
```

`entryPoint`

### Important

Early versions of the Amazon ECS container agent do not properly handle `entryPoint` parameters. If you have problems using `entryPoint`, update your container agent or enter your commands and arguments as `command` array items instead.

Type: string array

Required: no

The entry point that is passed to the container. This parameter maps to `Entrypoint` in the [Create a container](#) section of the [Docker Remote API](#) and the `--entrypoint` option to **docker run**. For more information about the Docker `ENTRYPOINT` parameter, go to <https://docs.docker.com/engine/reference/builder/#entrypoint>.

```
"entryPoint": ["string", ...]
```

`command`

Type: string array

Required: no

The command that is passed to the container. This parameter maps to `Cmd` in the [Create a container](#) section of the [Docker Remote API](#) and the `COMMAND` parameter to **docker run**. For more information about the Docker `CMD` parameter, go to <https://docs.docker.com/engine/reference/builder/#cmd>.

```
"command": ["string", ...]
```

`workingDirectory`

Type: string

Required: no

The working directory in which to run commands inside the container. This parameter maps to `WorkingDir` in the [Create a container](#) section of the [Docker Remote API](#) and the `--workdir` option to [docker run](#).

```
"workingDirectory": "string"
```

`environment`

Type: object array

Required: no

The environment variables to pass to a container. This parameter maps to `Env` in the [Create a container](#) section of the [Docker Remote API](#) and the `--env` option to [docker run](#).

**Important**

We do not recommend using plain text environment variables for sensitive information, such as credential data.

`name`

Type: string

Required: yes, when `environment` is used

The name of the environment variable.

`value`

Type: string

Required: yes, when `environment` is used

The value of the environment variable.

```
"environment" : [
  { "name" : "string", "value" : "string" },
  { "name" : "string", "value" : "string" }
]
```

## Network Settings

`disableNetworking`

Type: Boolean

Required: no

When this parameter is true, networking is disabled within the container. This parameter maps to `NetworkDisabled` in the [Create a container](#) section of the [Docker Remote API](#).

```
"disableNetworking": true|false
```

`links`

Type: string array

Required: no

The `link` parameter allows containers to communicate with each other without the need for port mappings. The `name:internalName` construct is analogous to `name:alias` in Docker links. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed. For more information about linking Docker containers, go to [https://docs.docker.com/engine/userguide/networking/default\\_network/dockerlinks/](https://docs.docker.com/engine/userguide/networking/default_network/dockerlinks/). This parameter maps to `Links` in the [Create a container](#) section of the [Docker Remote API](#) and the `--link` option to **docker run**.

### Important

Containers that are collocated on a single container instance may be able to communicate with each other without requiring links or host port mappings. Network isolation is achieved on the container instance using security groups and VPC settings.

```
"links": ["name:internalName", ...]
```

hostname

Type: string

Required: no

The hostname to use for your container. This parameter maps to `Hostname` in the [Create a container](#) section of the [Docker Remote API](#) and the `--hostname` option to **docker run**.

```
"hostname": "string"
```

dnsServers

Type: string array

Required: no

A list of DNS servers that are presented to the container. This parameter maps to `Dns` in the [Create a container](#) section of the [Docker Remote API](#) and the `--dns` option to **docker run**.

```
"dnsServers": ["string", ...]
```

dnsSearchDomains

Type: string array

Required: no

A list of DNS search domains that are presented to the container. This parameter maps to `DnsSearch` in the [Create a container](#) section of the [Docker Remote API](#) and the `--dns-search` option to **docker run**.

```
"dnsSearchDomains": ["string", ...]
```

extraHosts

Type: object array

Required: no

A list of hostnames and IP address mappings to append to the `/etc/hosts` file on the container. This parameter maps to `ExtraHosts` in the [Create a container](#) section of the [Docker Remote API](#) and the `--add-host` option to **docker run**.

```
"extraHosts": [
  {
    "hostname": "string",
    "ipAddress": "string"
  }
  ...
]
```

hostname

Type: string

Required: yes, when `extraHosts` are used

The hostname to use in the `/etc/hosts` entry.

ipAddress

Type: string

Required: yes, when `extraHosts` are used

The IP address to use in the `/etc/hosts` entry.

## Storage and Logging

readonlyRootFilesystem

Type: Boolean

Required: no

When this parameter is true, the container is given read-only access to its root file system. This parameter maps to `ReadonlyRootfs` in the [Create a container](#) section of the [Docker Remote API](#) and the `--read-only` option to **docker run**.

```
"readonlyRootFilesystem": true|false
```

mountPoints

Type: object array

Required: no

The mount points for data volumes in your container. This parameter maps to `Volumes` in the [Create a container](#) section of the [Docker Remote API](#) and the `--volume` option to **docker run**.

sourceVolume

Type: string

Required: yes, when `mountPoints` are used

The name of the volume to mount.

containerPath

Type: string

Required: yes, when `mountPoints` are used

The path on the container to mount the host volume at.

readOnly

Type: boolean

Required: no

If this value is `true`, the container has read-only access to the volume. If this value is `false`, then the container can write to the volume. The default value is `false`.

```
"mountPoints": [
  {
    "sourceVolume": "string",
    "containerPath": "string",
    "readOnly": true|false
  }
]
```

volumesFrom

Type: object array

Required: no

Data volumes to mount from another container. This parameter maps to `VolumesFrom` in the [Create a container](#) section of the [Docker Remote API](#) and the `--volumes-from` option to [docker run](#).

sourceContainer

Type: string

Required: yes, when `volumesFrom` is used

The name of the container to mount volumes from.

readOnly

Type: Boolean

Required: no

If this value is `true`, the container has read-only access to the volume. If this value is `false`, then the container can write to the volume. The default value is `false`.

```
"volumesFrom": [
  {
    "sourceContainer": "string",
    "readOnly": true|false
  }
]
```

logConfiguration

Type: [LogConfiguration](#) object

Required: no

The log configuration specification for the container. This parameter maps to `LogConfig` in the [Create a container](#) section of the [Docker Remote API](#) and the `--log-driver` option to [docker run](#). By default, containers use the same logging driver that the Docker daemon uses; however the container may use a different logging driver than the Docker daemon by specifying a log driver with this parameter in the container definition. To use a different logging driver for a container, the log system must be configured properly on the container instance (or on a different log server for remote logging options). For more information on the options for different supported log drivers, see [Configure logging drivers](#) in the Docker documentation.

For more information on using the `awslogs` log driver in task definitions to send your container logs to CloudWatch Logs, see [Using the awslogs Log Driver \(p. 114\)](#).

**Note**

Amazon ECS currently supports a subset of the logging drivers available to the Docker daemon (shown in the valid values below). Additional log drivers may be available in future releases of the Amazon ECS container agent.

This parameter requires version 1.18 of the Docker Remote API or greater on your container instance. To check the Docker Remote API version on your container instance, log into your container instance, run the following command, and look for the server API version in the output:

```
$ sudo docker version
```

**Note**

The Amazon ECS container agent running on a container instance must register the logging drivers available on that instance with the `ECS_AVAILABLE_LOGGING_DRIVERS` environment variable before containers placed on that instance can use these log configuration options. For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

```
"logConfiguration": {  
  "logDriver": "json-file" | "syslog" | "journald" | "gelf" | "fluentd" | "awslogs" | "splunk",  
  "options": { "string": "string"  
    ...}
```

`logDriver`

Type: string

Valid values: "json-file" | "syslog" | "journald" | "gelf" | "fluentd" | "awslogs" | "splunk"

Required: yes, when `logConfiguration` is used

The log driver to use for the container. The valid values listed above are log drivers that the Amazon ECS container agent can communicate with by default.

**Note**

If you have a custom driver that is not listed above that you would like to work with the Amazon ECS container agent, you can fork the Amazon ECS container agent project that is [available on GitHub](#) and customize it to work with that driver. We encourage you to submit pull requests for changes that you would like to have included. However, Amazon Web Services does not currently provide support for running modified copies of this software.

This parameter requires version 1.18 of the Docker Remote API or greater on your container instance. To check the Docker Remote API version on your container instance, log into your container instance, run the following command, and look for the server API version in the output:

```
$ sudo docker version
```

`options`

Type: string to string map

Required: no

The configuration options to send to the log driver. This parameter requires version 1.19 of the Docker Remote API or greater on your container instance. To check the Docker Remote API version on your container instance, log into your container instance, run the following command, and look for the server API version in the output:



```
$ sudo docker version
```

## Security

privileged

Type: Boolean

Required: no

When this parameter is true, the container is given elevated privileges on the host container instance (similar to the `root` user). This parameter maps to `Privileged` in the [Create a container](#) section of the [Docker Remote API](#) and the `--privileged` option to **docker run**.

```
"privileged": true|false
```

user

Type: string

Required: no

The user name to use inside the container. This parameter maps to `User` in the [Create a container](#) section of the [Docker Remote API](#) and the `--user` option to **docker run**.

```
"user": "string"
```

dockerSecurityOptions

Type: string array

Required: no

A list of strings to provide custom labels for SELinux and AppArmor multi-level security systems. This parameter maps to `SecurityOpt` in the [Create a container](#) section of the [Docker Remote API](#) and the `--security-opt` option to **docker run**.

```
"dockerSecurityOptions": ["string", ...]
```

### Note

The Amazon ECS container agent running on a container instance must register with the `ECS_SELINUX_CAPABLE=true` or `ECS_APPARMOR_CAPABLE=true` environment variables before containers placed on that instance can use these security options. For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

## Resource Limits

ulimits

Type: object array

Required: no

A list of `ulimits` to set in the container. This parameter maps to `Ulimits` in the [Create a container](#) section of the [Docker Remote API](#) and the `--ulimit` option to **docker run**. This parameter requires version 1.18 of the Docker Remote API or greater on your container instance. To check the Docker

Remote API version on your container instance, log into your container instance, run the following command, and look for the server API version in the output:

```
$ sudo docker version
```

```
"ulimits": [
  {
    "name":
"core"|"cpu"|"data"|"fsize"|"locks"|"memlock"|"msgqueue"|"nice"|"nofile"|"nproc"|"rss"|"rtprio"|"r
    "softLimit": integer,
    "hardLimit": integer
  }
  ...
]
```

name

Type: string

Valid values: "core" | "cpu" | "data" | "fsize" | "locks" | "memlock" | "msgqueue" | "nice" | "nofile" | "nproc" | "rss" | "rtprio" | "rttime" | "sigpending" | "stack"

Required: yes, when `ulimits` are used

The type of the `ulimit`.

hardLimit

Type: integer

Required: yes, when `ulimits` are used

The hard limit for the `ulimit` type.

softLimit

Type: integer

Required: yes, when `ulimits` are used

The soft limit for the `ulimit` type.

## Docker Labels

dockerLabels

Type: string to string map

Required: no

A key/value map of labels to add to the container. This parameter maps to `Labels` in the [Create a container](#) section of the [Docker Remote API](#) and the `--label` option to [docker run](#). This parameter requires version 1.18 of the Docker Remote API or greater on your container instance. To check the Docker Remote API version on your container instance, log into your container instance, run the following command, and look for the server API version in the output:

```
$ sudo docker version
```

```
"dockerLabels": {"string": "string"
  ...}
```

## Task Placement Constraints

When you register a task definition, you can provide task placement constraints that customize how Amazon ECS places tasks. For example, you can use constraints to place tasks based on Availability Zone, instance type, or attributes. For more information, see [Amazon ECS Task Placement Constraints \(p. 128\)](#). The following parameters are allowed in a container definition:

expression

Type: string

Required: no

A cluster query language expression to apply to the constraint. Note you cannot specify an expression if the constraint type is `distinctInstance`. For more information, see [Cluster Query Language \(p. 131\)](#).

type

Type: string

Required: yes

The type of constraint. Use `memberOf` to restrict selection to a group of valid candidates. Note that `distinctInstance` is not supported in task definitions.

## Volumes

When you register a task definition, you can optionally specify a list of volumes that will be passed to the Docker daemon on a container instance and become available for other containers on the same container instance to access. For more information, see [Using Data Volumes in Tasks \(p. 109\)](#). The following parameters are allowed in a container definition:

name

Type: string

Required: yes

The name of the volume. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed. This name is referenced in the `sourceVolume` parameter of container definition `mountPoints`.

host

Type: object

Required: no

The contents of the `host` parameter determine whether your data volume persists on the host container instance and where it is stored. If the `host` parameter is empty, then the Docker daemon assigns a host path for your data volume, but the data is not guaranteed to persist after the containers associated with it stop running.

By default, Docker-managed volumes are created in `/var/lib/docker/vfs/dir/`. You can change this default location by writing `OPTIONS="-g=my/path/for/docker/volumes"` to `/etc/sysconfig/docker` on the container instance.

sourcePath

Type: string

Required: no

The path on the host container instance that is presented to the container. If this parameter is empty, then the Docker daemon assigns a host path for you.

If the `host` parameter contains a `sourcePath` file location, then the data volume persists at the specified location on the host container instance until you delete it manually. If the `sourcePath` value does not exist on the host container instance, the Docker daemon creates it. If the location does exist, the contents of the source path folder are exported.

```
[
  {
    "name": "string",
    "host": {
      "sourcePath": "string"
    }
  }
]
```

## Using Data Volumes in Tasks

There are several use cases for using data volumes in Amazon ECS task definitions. Some common examples are to provide persistent data volumes for use with containers, to define an empty, nonpersistent data volume and mount it on multiple containers on the same container instance, and to share defined data volumes at different locations on different containers on the same container instance.

### Note

For operating systems that use `devicemapper` (such as Amazon Linux and the Amazon ECS-optimized AMI), only file systems that are available when the Docker daemon is started will be available to Docker containers. You can use a [cloud boothook](#) to mount your file system before the Docker daemon starts, or you can restart the Docker daemon and the Amazon ECS container agent after the file system is mounted to make the file system available to your container volume mounts.

### To provide persistent data volumes for containers

When a volume is defined with a `sourcePath` value, the data volume persists even after all containers that referenced it have stopped. Any files that exist at the `sourcePath` are presented to the containers at the `containerPath` value, and any files that are written to the `containerPath` value by running containers that mount the data volume are written to the `sourcePath` value on the container instance.

### Important

Amazon ECS does not sync your data volumes across container instances. Tasks that use persistent data volumes can be placed on any container instance in your cluster that has available capacity. If your tasks require persistent data volumes after stopping and restarting, you should always specify the same container instance at task launch time with the AWS CLI [start-task](#) command.

1. In the task definition `volumes` section, define a data volume with `name` and `sourcePath` values.

```
"volumes": [
  {
    "name": "webdata",
    "host": {
      "sourcePath": "/ecs/webdata"
    }
  }
]
```

2. In the `containerDefinitions` section, define a container with `mountPoints` that reference the name of the defined volume and the `containerPath` value to mount the volume at on the container.

```
"containerDefinitions": [
  {
    "name": "web",
    "image": "nginx",
    "cpu": 99,
    "memory": 100,
    "portMappings": [
      {
        "containerPort": 80,
        "hostPort": 80
      }
    ],
    "essential": true,
    "mountPoints": [
      {
        "sourceVolume": "webdata",
        "containerPath": "/usr/share/nginx/html"
      }
    ]
  }
]
```

### To provide nonpersistent empty data volumes for containers

In some cases, you want containers to share the same empty data volume, but you aren't interested in keeping the data after the task has finished. For example, you may have two database containers that need to access the same scratch file storage location during a task.

1. In the task definition `volumes` section, define a data volume with the name `database_scratch`.

#### Note

Because the `database_scratch` volume does not specify a source path, the Docker daemon manages the volume for you. When no containers reference this volume, the Amazon ECS container agent task cleanup service eventually deletes it (by default, this happens 3 hours after the container exits, but you can configure this duration with the `ECS_ENGINE_TASK_CLEANUP_WAIT_DURATION` agent variable). For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#). If you need this data to persist, specify a `sourcePath` value for the volume.

```
"volumes": [
  {
    "name": "database_scratch",
    "host": {}
  }
]
```

2. In the `containerDefinitions` section, create the database container definitions so they mount the nonpersistent data volumes.

```
"containerDefinitions": [
  {
    "name": "database1",
    "image": "my-repo/database",
    "cpu": 100,
    "memory": 100,
    "essential": true,
    "mountPoints": [
      {
        "sourceVolume": "database_scratch",
        "containerPath": "/var/scratch"
      }
    ]
  }
]
```

```
    }  
  },  
  {  
    "name": "database2",  
    "image": "my-repo/database",  
    "cpu": 100,  
    "memory": 100,  
    "essential": true,  
    "mountPoints": [  
      {  
        "sourceVolume": "database_scratch",  
        "containerPath": "/var/scratch"  
      }  
    ]  
  }  
]
```

### To mount a defined volume on multiple containers

You can define a data volume in a task definition and mount that volume at different locations on different containers. For example, your host container has a website data folder at `/data/webroot`, and you may want to mount that data volume as read-only on two different web servers that have different document roots.

1. In the task definition `volumes` section, define a data volume with the name `webroot` and the source path `/data/webroot`.

```
"volumes": [  
  {  
    "name": "webroot",  
    "host": {  
      "sourcePath": "/data/webroot"  
    }  
  }  
]
```

2. In the `containerDefinitions` section, define a container for each web server with `mountPoints` values that associate the `webroot` volume with the `containerPath` value pointing to the document root for that container.

```
"containerDefinitions": [  
  {  
    "name": "web-server-1",  
    "image": "my-repo/ubuntu-apache",  
    "cpu": 100,  
    "memory": 100,  
    "portMappings": [  
      {  
        "containerPort": 80,  
        "hostPort": 80  
      }  
    ],  
    "essential": true,  
    "mountPoints": [  
      {  
        "sourceVolume": "webroot",  
        "containerPath": "/var/www/html",  
        "readOnly": true  
      }  
    ]  
  },  
]
```

```
{
  "name": "web-server-2",
  "image": "my-repo/sles11-apache",
  "cpu": 100,
  "memory": 100,
  "portMappings": [
    {
      "containerPort": 8080,
      "hostPort": 8080
    }
  ],
  "essential": true,
  "mountPoints": [
    {
      "sourceVolume": "webroot",
      "containerPath": "/srv/www/htdocs",
      "readOnly": true
    }
  ]
}
```

### To mount volumes from another container using `volumesFrom`

You can define one or more volumes on a container, and then use the `volumesFrom` parameter in a different container definition (within the same task) to mount all of the volumes from the `sourceContainer` at their originally defined mount points. The `volumesFrom` parameter applies to volumes defined in the task definition, and those that are built into the image with a Dockerfile.

1. (Optional) To share a volume that is built into an image, you need to build the image with the volume declared in a `VOLUME` instruction. The following example Dockerfile uses an `httpd` image and then adds a volume and mounts it at `dockerfile_volume` in the Apache document root (which is the folder used by the `httpd` web server):

```
FROM httpd
VOLUME [ "/usr/local/apache2/htdocs/dockerfile_volume" ]
```

You can build an image with this Dockerfile and push it to a repository, such as Docker Hub, and use it in your task definition. The example `my-repo/httpd_dockerfile_volume` image used in the following steps was built with the above Dockerfile.

2. Create a task definition that defines your other volumes and mount points for the containers. In this example `volumes` section, you create an empty volume called `empty`, which the Docker daemon will manage. There is also a host volume defined called `host_etc`, which exports the `/etc` folder on the host container instance.

```
{
  "family": "test-volumes-from",
  "volumes": [
    {
      "name": "empty",
      "host": {}
    },
    {
      "name": "host_etc",
      "host": {
        "sourcePath": "/etc"
      }
    }
  ]
}
```

In the container definitions section, create a container that mounts the volumes defined earlier. In this example, the `web` container (which uses the image built with a volume in the Dockerfile) mounts the `empty` and `host_etc` volumes.

```
"containerDefinitions": [
  {
    "name": "web",
    "image": "my-repo/httpd_dockerfile_volume",
    "cpu": 100,
    "memory": 500,
    "portMappings": [
      {
        "containerPort": 80,
        "hostPort": 80
      }
    ],
    "mountPoints": [
      {
        "sourceVolume": "empty",
        "containerPath": "/usr/local/apache2/htdocs/empty_volume"
      },
      {
        "sourceVolume": "host_etc",
        "containerPath": "/usr/local/apache2/htdocs/host_etc"
      }
    ],
    "essential": true
  },

```

Create another container that uses `volumesFrom` to mount all of the volumes that are associated with the `web` container. All of the volumes on the `web` container will likewise be mounted on the `busybox` container (including the volume specified in the Dockerfile that was used to build the `my-repo/httpd_dockerfile_volume` image).

```
{
  "name": "busybox",
  "image": "busybox",
  "volumesFrom": [
    {
      "sourceContainer": "web"
    }
  ],
  "cpu": 100,
  "memory": 500,
  "entryPoint": [
    "sh",
    "-c"
  ],
  "command": [
    "echo $(date) > /usr/local/apache2/htdocs/empty_volume/date && echo $(date) > /usr/local/apache2/htdocs/host_etc/date && echo $(date) > /usr/local/apache2/htdocs/dockerfile_volume/date"
  ],
  "essential": false
}
]
```

When this task is run, the two containers mount the volumes, and the `command` in the `busybox` container writes the date and time to a file called `date` in each of the volume folders, which are then visible at the web site displayed by the `web` container.



### Note

Because the `busybox` container runs a quick command and then exits, it needs to be set as `"essential": false` in the container definition to prevent it from stopping the entire task when it exits.

## Using the awslogs Log Driver

You can configure the containers in your tasks to send log information to CloudWatch Logs. This enables you to view different logs from your containers in one convenient location, and it prevents your container logs from taking up disk space on your container instances. This topic helps you get started using the `awslogs` log driver in your task definitions.

To send system logs from your Amazon ECS container instances to CloudWatch Logs, see [Using CloudWatch Logs with Container Instances](#) (p. 49). For more information about CloudWatch Logs, see [Monitoring Log Files](#) in the *Amazon CloudWatch User Guide*.

### Topics

- [Enabling the awslogs Log Driver on your Container Instances](#) (p. 114)
- [Creating Your Log Groups](#) (p. 114)
- [Available awslogs Log Driver Options](#) (p. 115)
- [Specifying a Log Configuration in your Task Definition](#) (p. 116)
- [Viewing awslogs Container Logs in CloudWatch Logs](#) (p. 117)

## Enabling the awslogs Log Driver on your Container Instances

Your Amazon ECS container instances require at least version 1.9.0 of the container agent to enable the `awslogs` log driver. For information about checking your agent version and updating to the latest version, see [Updating the Amazon ECS Container Agent](#) (p. 70).

### Note

If you are not using the Amazon ECS-optimized AMI (with at least version 1.9.0-1 of the `ecs-init` package) for your container instances, you also need to specify that the `awslogs` logging driver is available on the container instance when you start the agent by using the following environment variable in your **docker run** statement or environment variable file. For more information, see [Installing the Amazon ECS Container Agent](#) (p. 65).

```
ECS_AVAILABLE_LOGGING_DRIVERS='["json-file", "awslogs"]'
```

Your Amazon ECS container instances also require `logs:CreateLogStream` and `logs:PutLogEvents` permission on the IAM role with which you launch your container instances. If you created your Amazon ECS container instance role before `awslogs` log driver support was enabled in Amazon ECS, then you might need to add this permission. If your container instances use the managed IAM policy for container instances, then your container instances should have the correct permissions. For information about checking your Amazon ECS container instance role and attaching the managed IAM policy for container instances, see [To check for the ecsInstanceRole in the IAM console](#) (p. 207).

## Creating Your Log Groups

The `awslogs` log driver can send log streams to existing log groups in CloudWatch Logs, but it cannot create log groups. Before you launch any tasks that use the `awslogs` log driver, you must create the log groups that you intend your containers to use.

As an example, you could have a task with a WordPress container (which uses the `awslogs-wordpress` log group) that is linked to a MySQL container (which uses the `awslogs-mysql` log group). The sections below show how to create these log groups with the AWS CLI and with the CloudWatch console.

## Creating a Log Group with the AWS CLI

The AWS Command Line Interface (AWS CLI) is a unified tool to manage your AWS services. With just one tool to download and configure, you can control multiple AWS services from the command line and automate them through scripts. For more information, see the [AWS Command Line Interface User Guide](#).

If you have a working installation of the AWS CLI, you can use it to create your log groups. The command below creates a log group called `awslogs-wordpress` in the `ap-northeast-1` region. Run this command for each log group to create, replacing the log group name with your value and region name to the desired log destination.

```
aws logs create-log-group --log-group-name awslogs-wordpress --region ap-northeast-1
```

## Creating a Log Group with the CloudWatch Console

The following procedure creates a log group in the CloudWatch console.

### To create a log group in the CloudWatch console

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. In the left navigation pane, choose **Logs**.
3. Choose **Actions, Create log group**.
4. For **Log Group Name**, enter the name of the log group to create.
5. Choose **Create log group** to finish.

## Available awslogs Log Driver Options

The `awslogs` log driver supports the following options in Amazon ECS task definitions:

`awslogs-region`

Required: Yes

Specify the region to which the `awslogs` log driver should send your Docker logs. You can choose to send all of your logs from clusters in different regions to a single region in CloudWatch Logs so that they are all visible in one location, or you can separate them by region for more granularity. Be sure that the specified log group exists in the region that you specify with this option.

`awslogs-group`

Required: Yes

You must specify a log group to which the `awslogs` log driver will send its log streams. For more information, see [Creating Your Log Groups \(p. 114\)](#).

`awslogs-stream-prefix`

Required: No

The `awslogs-stream-prefix` option allows you to associate a log stream with the specified prefix, the container name, and the ID of the Amazon ECS task to which the container belongs. If you specify a prefix with this option, then the log stream takes the following format:

```
prefix-name/container-name/ecs-task-id
```

If you do not specify a prefix with this option, then the log stream is named after the container ID that is assigned by the Docker daemon on the container instance. Because it is difficult to trace logs back to the container that sent them with just the Docker container ID (which is only available on the container instance), we recommend that you specify a prefix with this option.

For Amazon ECS services, you could use the service name as the prefix, which would allow you to trace log streams to the service that the container belongs to, the name of the container that sent them, and the ID of the task to which the container belongs.

## Specifying a Log Configuration in your Task Definition

Before your containers can send logs to CloudWatch, you must specify the `awslogs` log driver for containers in your task definition. This section describes the log configuration for a container to use the `awslogs` log driver. For more information, see [Creating a Task Definition \(p. 92\)](#).

The task definition JSON shown below has a `logConfiguration` object specified for each container; one for the WordPress container that sends logs to a log group called `awslogs-wordpress`, and one for a MySQL container that sends logs to a log group called `awslogs-mysql`. Both containers use the `awslogs-example` log stream prefix.

```
{
  "containerDefinitions": [
    {
      "name": "wordpress",
      "links": [
        "mysql"
      ],
      "image": "wordpress",
      "essential": true,
      "portMappings": [
        {
          "containerPort": 80,
          "hostPort": 80
        }
      ],
      "logConfiguration": {
        "logDriver": "awslogs",
        "options": {
          "awslogs-group": "awslogs-wordpress",
          "awslogs-region": "ap-northeast-1",
          "awslogs-stream-prefix": "awslogs-example"
        }
      },
      "memory": 500,
      "cpu": 10
    },
    {
      "environment": [
        {
          "name": "MYSQL_ROOT_PASSWORD",
          "value": "password"
        }
      ],
      "name": "mysql",
      "image": "mysql",
      "cpu": 10,
      "memory": 500,
      "essential": true,
    }
  ]
}
```

```
    "logConfiguration": {  
      "logDriver": "awslogs",  
      "options": {  
        "awslogs-group": "awslogs-mysql",  
        "awslogs-region": "ap-northeast-1",  
        "awslogs-stream-prefix": "awslogs-example"  
      }  
    },  
    "family": "awslogs-example"  
  }  
}
```

In the Amazon ECS console, the log configuration for the `wordpress` container is specified as shown in the image below.

The screenshot shows the 'Log configuration' section in the Amazon ECS console. It includes a 'Log driver' dropdown menu set to 'awslogs'. Below it, the 'Log options' section displays three keys: 'awslogs-group', 'awslogs-region', and 'awslogs-stream-prefix'. Each key is in a separate input field. At the bottom of the 'Log options' section, there is an 'Add key' button.

After you have registered a task definition with the `awslogs` log driver in a container definition log configuration, you can run a task or create a service with that task definition to start sending logs to CloudWatch Logs. For more information, see [Running Tasks \(p. 124\)](#) and [Creating a Service \(p. 157\)](#).

## Viewing awslogs Container Logs in CloudWatch Logs

After your container instance role has the proper permissions to send logs to CloudWatch Logs, your container agents are updated to at least version 1.9.0, and you have configured and started a task with containers that use the `awslogs` log driver, your configured containers should be sending their log data to CloudWatch Logs. You can view and search these logs in the console.

### To view your CloudWatch Logs data for a container from the Amazon ECS console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the **Clusters** page, select the cluster that contains the task to view.
3. On the **Cluster: *cluster\_name*** page, choose **Tasks** and select the task to view.
4. On the **Task: *task\_id*** page, expand the container view by choosing the arrow to the left of the container name.
5. In the **Log Configuration** section, choose **View logs in CloudWatch**, which opens the associated log stream in the CloudWatch console.

Log Configuration	
Log driver: awslogs <a href="#">View logs in CloudWatch</a>	
Key	Value
awslogs-group	awslogs-wordpress
awslogs-region	ap-northeast-1
awslogs-stream-prefix	awslogs-example

**To view your CloudWatch Logs data in the CloudWatch console**

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. In the left navigation pane, choose **Logs**.
3. Select a log group to view. You should see the log groups that you created in [Creating Your Log Groups](#) (p. 114).

Create Metric Filter

Actions ▾

Filter: Log Group Name Prefix x

Log Groups

☐

awslogs-mysql

☐

awslogs-wordpress

4. Choose a log stream to view.

Filter events		
	Time (UTC -07:00)	Message
2016-09-09		
No older events found at the		
▶	12:56:47	WordPress not found in /var/www/html -
▶	12:56:47	Complete! WordPress has been success
▶	12:56:49	AH00558: apache2: Could not reliably d
▶	12:56:49	AH00558: apache2: Could not reliably d
▶	12:56:49	[Fri Sep 09 19:56:49.059245 2016] [mpm
▶	12:56:49	[Fri Sep 09 19:56:49.059273 2016] [core
▶	13:06:55	52.90.111.181 - - [09/Sep/2016:20:06:55
▶	13:06:56	52.90.111.181 - - [09/Sep/2016:20:06:55
▶	13:06:56	52.90.111.181 - - [09/Sep/2016:20:06:56
▶	13:06:57	54.210.246.190 - - [09/Sep/2016:20:06:5

## Example Task Definitions

Below are some task definition examples that you can use to start creating your own task definitions. For more information, see [Task Definition Parameters](#) (p. 95) and [Creating a Task Definition](#) (p. 92).

### Topics

- [WordPress and MySQL](#) (p. 119)
- [awslogs Log Driver](#) (p. 120)
- [Amazon ECR Image and Task Definition IAM Role](#) (p. 121)
- [Entrypoint with Command](#) (p. 121)

## WordPress and MySQL

The following task definition specifies a WordPress container and a MySQL container that are linked together. These WordPress container exposes the container port 80 on the host port 80. The security group on the container instance would need to open port 80 in order for this WordPress installation to be accessible from a web browser.

For more information about the WordPress container, go to the official WordPress Docker Hub repository at [https://registry.hub.docker.com/\\_/wordpress/](https://registry.hub.docker.com/_/wordpress/). For more information about the MySQL container, go to the official MySQL Docker Hub repository at [https://registry.hub.docker.com/\\_/mysql/](https://registry.hub.docker.com/_/mysql/).

### Important

If you use this task definition with a load balancer, you need to complete the WordPress setup installation through the web interface on the container instance immediately after the container starts. The load balancer health check ping expects a 200 response from the server, but WordPress returns a 301 until the installation is completed. If the load balancer health check fails, the load balancer deregisters the instance.

```
{
  "containerDefinitions": [
    {
      "name": "wordpress",
      "links": [
        "mysql"
      ],
      "image": "wordpress",
      "essential": true,
      "portMappings": [
        {
          "containerPort": 80,
          "hostPort": 80
        }
      ],
      "memory": 500,
      "cpu": 10
    },
    {
      "environment": [
        {
          "name": "MYSQL_ROOT_PASSWORD",
          "value": "password"
        }
      ],
      "name": "mysql",
      "image": "mysql",
      "cpu": 10,
      "memory": 500,
      "essential": true
    }
  ],
  "family": "hello_world"
}
```

## awslogs Log Driver

The following example demonstrates how to use the `awslogs` log driver in a task definition. The `nginx` container will send its logs to the `ecs-log-streaming` log group in the `us-west-2` region. For more information, see [Using the awslogs Log Driver \(p. 114\)](#).

```
{
  "containerDefinitions": [
    {
      "memory": 128,
      "portMappings": [
        {
          "hostPort": 80,
          "containerPort": 80,
          "protocol": "tcp"
        }
      ],
      "essential": true,
      "name": "nginx-container",
      "image": "nginx",
    }
  ]
}
```

```
    "logConfiguration": {
      "logDriver": "awslogs",
      "options": {
        "awslogs-group": "ecs-log-streaming",
        "awslogs-region": "us-west-2"
      }
    },
    "cpu": 0
  },
  "family": "example_task_1"
}
```

## Amazon ECR Image and Task Definition IAM Role

The following example uses an Amazon ECR image called `aws-nodejs-sample` with the `v1` tag from the `123456789012.dkr.ecr.us-west-2.amazonaws.com` registry. The container in this task will inherit IAM permissions from the `arn:aws:iam::123456789012:role/AmazonECSTaskS3BucketRole` role. For more information, see [IAM Roles for Tasks \(p. 212\)](#).

```
{
  "containerDefinitions": [
    {
      "name": "sample-app",
      "image": "123456789012.dkr.ecr.us-west-2.amazonaws.com/aws-nodejs-sample:v1",
      "memory": "200",
      "cpu": "10",
      "essential": true
    }
  ],
  "family": "example_task_3",
  "taskRoleArn": "arn:aws:iam::123456789012:role/AmazonECSTaskS3BucketRole"
}
```

## Entrypoint with Command

The following example demonstrates the syntax for a Docker container that uses an entry point and a command argument. This container will ping `google.com` 4 times and then exit.

```
{
  "containerDefinitions": [
    {
      "memory": 32,
      "essential": true,
      "entryPoint": [
        "ping"
      ],
      "name": "alpine_ping",
      "readonlyRootFilesystem": true,
      "image": "alpine:3.4",
      "command": [
        "-c",
        "4",
        "google.com"
      ],
      "cpu": 16
    }
  ],
  "family": "example_task_2"
}
```



## Updating a Task Definition

To update a task definition you create a task definition revision. Then if the task definition is used in a service, you can update that service to use it.

### To create a task definition revision

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, choose the Region that contains your task definition.
3. In the navigation pane, choose **Task Definitions**.
4. On the **Task Definitions** page, select the box to the left of the task definition you want to revise and then choose **Create new revision**.
5. On the **Create new revision of Task Definition** page, make the changes you want. For example, if you want to change the existing container definitions (such as the container image, memory limits, or port mappings), select the **Container Name** to make the changes and then choose **Update**.
6. Verify the information and then choose **Create**.
7. If your task definition is used in a service, update your service with the updated task definition. See [Updating a Service \(p. 162\)](#).

## Deregistering Task Definitions

If you decide that you no longer need a task definition in Amazon ECS, you can deregister the task definition so that it no longer displays in your `ListTaskDefinition` API calls or in the console when you want to run a task or update a service.

When you deregister a task definition, it is immediately marked as `INACTIVE`. Existing tasks and services that reference an `INACTIVE` task definition continue to run without disruption, and existing services that reference an `INACTIVE` task definition can still scale up or down by modifying the service's desired count.

You cannot use an `INACTIVE` task definition to run new tasks or create new services, and you cannot update an existing service to reference an `INACTIVE` task definition (although there may be up to a 10 minute window following deregistration where these restrictions have not yet taken effect).

### Note

At this time, `INACTIVE` task definitions remain discoverable in your account indefinitely; however, this behavior is subject to change in the future, so you should not rely on `INACTIVE` task definitions persisting beyond the life cycle of any associated tasks and services.

Use the following procedure to deregister a task definition.

### To deregister a task definition

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, choose the region that contains your task definition.
3. In the navigation pane, choose **Task Definitions**.
4. On the **Task Definitions** page, choose the task definition name that contains one or more revisions that you want to deregister.
5. On the **Task Definition name** page, select the box to the left of each task definition revision you want to deregister.
6. Choose **Actions**, and then choose **Deregister**.
7. Verify the information in the **Deregister Task Definition** window, and choose **Deregister** to finish.

# Scheduling Amazon ECS Tasks

Amazon EC2 Container Service (Amazon ECS) is a shared state, optimistic concurrency system that provides flexible scheduling capabilities for your tasks and containers. The Amazon ECS schedulers leverage the same cluster state information provided by the Amazon ECS API to make appropriate placement decisions.

Amazon ECS provides a service scheduler (for long-running tasks and applications), the ability to run tasks manually (for batch jobs or single run tasks), with Amazon ECS placing tasks on your cluster for you, and the ability to run tasks on the container instance that you specify, so that you can integrate with custom or third-party schedulers or place a task manually on a specific container instance.

## Service Scheduler

The service scheduler is ideally suited for long running stateless services and applications. The service scheduler ensures that the specified number of tasks are constantly running and reschedules tasks when a task fails (for example, if the underlying container instance fails for some reason). The service scheduler optionally also makes sure that tasks are registered against an Elastic Load Balancing load balancer. You can update your services that are maintained by the service scheduler, such as deploying a new task definition, or changing the running number of desired tasks. By default, the service scheduler spreads tasks across Availability Zones, but you can use task placement strategies and constraints to customize task placement decisions. For more information, see [Services](#) (p. 135).

## Manually Running Tasks

The `RunTask` action is ideally suited for processes such as batch jobs that perform work and then stop. For example, you could have a process call `RunTask` when work comes into a queue. The task pulls work from the queue, performs the work, and then exits. Using `RunTask`, you can allow the default task placement strategy to distribute tasks randomly across your cluster, which minimizes the chances that a single instance gets a disproportionate number of tasks. Alternatively, you can use `RunTask` to customize how the scheduler places tasks using task placement strategies and constraints. For more information, see [RunTask](#) in the *Amazon EC2 Container Service API Reference*.

## Custom Schedulers

Amazon ECS allows you to create your own schedulers that meet the needs of your business, or to leverage third party schedulers. [Blox](#) is an open source project that gives you more control over how your containerized applications run on Amazon ECS. It enables you to build schedulers and integrate third-party

schedulers with Amazon ECS while leveraging Amazon ECS to fully manage and scale your clusters. For more information, see [StartTask](#) in the *Amazon EC2 Container Service API Reference*.

### Task Placement

The `RunTask` and `CreateService` actions enable you to specify task placement constraints and task placement strategies to customize how Amazon ECS places your tasks. For more information, see [Amazon ECS Task Placement \(p. 125\)](#).

#### Contents

- [Running Tasks \(p. 124\)](#)
- [Amazon ECS Task Placement \(p. 125\)](#)
- [Task Life Cycle \(p. 133\)](#)

## Running Tasks

Running tasks manually is ideal in certain situations. For example, suppose that you are developing a task but you are not ready to deploy this task with the service scheduler. Perhaps your task is a one-time or periodic batch job that does not make sense to keep running or restart when it finishes.

To keep a specified number of tasks running or to place your tasks behind a load balancer, use the Amazon ECS service scheduler instead. For more information, see [Services \(p. 135\)](#).

### To run a task

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. From the navigation bar, select the region that your cluster is in.
3. In the navigation pane, choose **Task Definitions** and select the task definition to run.
  - To run the latest revision of a task definition shown here, select the box to the left of the task definition to run.
  - To run an earlier revision of a task definition shown here, select the task definition to view all active revisions, then select the revision to run.
4. Choose **Actions, Run Task**.
5. For **Cluster**, choose the cluster to use. For **Number of tasks**, type the number of tasks to launch with this task definition. For **Task Group**, type the name of the task group.
6. (Optional) For **Task Placement**, you can specify how tasks are placed using task placement strategies and constraints. Choose from the following options:
  - **AZ Balanced Spread** - distribute tasks across Availability Zones and across container instances in the Availability Zone.
  - **AZ Balanced BinPack** - distribute tasks across Availability Zones and across container instances with the least available memory.
  - **BinPack** - distribute tasks based on the least available amount of CPU or memory.
  - **One Task Per Host** - place, at most, one task from the service on each container instance.
  - **Custom** - define your own task placement strategy. See [Amazon ECS Task Placement \(p. 125\)](#) for examples.

For more information, see [Amazon ECS Task Placement \(p. 125\)](#).

7. (Optional) To send command or environment variable overrides to one or more containers in your task definition, or to specify an IAM role task override, choose **Advanced Options** and complete the following steps:

- a. For **Task Role Override**, choose an IAM role that provides permissions for containers in your task to make calls to AWS APIs on your behalf. For more information, see [IAM Roles for Tasks \(p. 212\)](#).

Note that only roles with the **Amazon EC2 Container Service Task Role** trust relationship are shown here. For more information about creating an IAM role for your tasks, see [Creating an IAM Role and Policy for your Tasks \(p. 214\)](#).

- b. For **Container Overrides**, choose a container to which to send a command or environment variable override.
  - **For a command override:** For **Command override**, type the command override to send. If your container definition does not specify an `ENTRYPOINT`, the format should be a comma-separated list of non-quoted strings. For example:

```
/bin/sh,-c,echo,$DATE
```

If your container definition does specify an `ENTRYPOINT` (such as `sh,-c`), the format should be an unquoted string, which is surrounded with double quotes and passed as an argument to the `ENTRYPOINT` command. For example:

```
while true; do echo $DATE > /var/www/html/index.html; sleep 1; done
```

- **For environment variable overrides:** Choose **Add Environment Variable**. For **Key**, type the name of your environment variable. For **Value**, type a string value for your environment value (without surrounding quotes).

Key	Value
MY_ENV_VAR	This variable contains a string.

[+ Add Environment Variable](#)

This environment variable override is sent to the container as:

```
MY_ENV_VAR="This variable contains a string."
```

8. Review your task information and choose **Run Task**.

#### Note

If your task moves from `PENDING` to `STOPPED`, or if it displays a `PENDING` status and then disappears from the listed tasks, your task may be stopping due to an error. For more information, see [Checking Stopped Tasks for Errors \(p. 270\)](#) in the troubleshooting section.

## Amazon ECS Task Placement

When you launch a task into a cluster, Amazon ECS must determine where to place the task based on the requirements specified in the task definition, such as CPU and memory. Similarly, when you scale down the task count, Amazon ECS must determine which tasks to terminate. You can apply task placement strategies and constraints to customize how Amazon ECS places and terminates tasks.

A *task placement strategy* is an algorithm for selecting instances for task placement or tasks for termination. For example, Amazon ECS can select instances at random or it can select instances such that tasks are distributed evenly across a group of instances. A *task placement constraint* is a rule that is considered during task placement. For example, you can use constraints to place tasks based on Availability Zone or instance type. You can associate *attributes*, which are name/value pairs, with your container instances and then use a constraint to place tasks based on attribute.

You can use strategies and constraints together. For example, you can distribute tasks across Availability Zones and bin pack tasks based on memory within each Availability Zone, but only for G2 instances.

When Amazon ECS places tasks, it uses the following process to select container instances:

1. Identify the instances that satisfy the CPU, memory, and port requirements in the task definition.
2. Identify the instances that satisfy the task placement constraints.
3. Identify the instances that satisfy the task placement strategies.
4. Select the instances for task placement.

#### Contents

- [Amazon ECS Task Placement Strategies \(p. 126\)](#)
- [Amazon ECS Task Placement Constraints \(p. 128\)](#)
- [Cluster Query Language \(p. 131\)](#)

## Amazon ECS Task Placement Strategies

A *task placement strategy* is an algorithm for selecting instances for task placement or tasks for termination. For more information, see [Amazon ECS Task Placement \(p. 125\)](#).

### Strategy Types

Amazon ECS supports the following task placement strategies:

#### `binpack`

Place tasks based on the least available amount of CPU or memory. This minimizes the number of instances in use.

#### `random`

Place tasks randomly.

#### `spread`

Place tasks evenly based on the specified value. Accepted values are attribute key:value pairs, `instanceId`, or `host`. Service tasks are spread based on the tasks from that service.

### Example Strategies

You can specify task placement strategies with the following actions: [CreateService](#) and [RunTask](#).

The following strategy distributes tasks evenly across Availability Zones.

```
"placementStrategy": [
```

```
{
  "field": "attribute:ecs.availability-zone",
  "type": "spread"
}
```

The following strategy distributes tasks evenly across all instances.

```
"placementStrategy": [
  {
    "field": "instanceId",
    "type": "spread"
  }
]
```

The following strategy bin packs tasks based on memory.

```
"placementStrategy": [
  {
    "field": "memory",
    "type": "binpack"
  }
]
```

The following strategy places tasks randomly.

```
"placementStrategy": [
  {
    "type": "random"
  }
]
```

The following strategy distributes tasks evenly across Availability Zones and then distributes tasks evenly across the instances within each Availability Zone.

```
"placementStrategy": [
  {
    "field": "attribute:ecs.availability-zone",
    "type": "spread"
  },
  {
    "field": "instanceId",
    "type": "spread"
  }
]
```

The following strategy distributes tasks evenly across Availability Zones and then bin packs tasks based on memory within each Availability Zone.

```
"placementStrategy": [
  {
    "field": "attribute:ecs.availability-zone",
    "type": "spread"
  },
  {
    "field": "memory",
    "type": "binpack"
  }
]
```

1

## Amazon ECS Task Placement Constraints

A *task placement constraint* is a rule that is considered during task placement. For more information, see [Amazon ECS Task Placement \(p. 125\)](#).

### Constraint Types

Amazon ECS supports the following types of task placement constraints:

`distinctInstance`

Place each task on a different container instance.

`memberOf`

Place tasks on container instances that satisfy an expression.

For more information about expression syntax, see [Cluster Query Language \(p. 131\)](#).

### Attributes

You can add custom metadata to your container instances, known as *attributes*. Each attribute has a name and an optional string value. You can use the built-in attributes provided by Amazon ECS or define custom attributes.

#### Built-in Attributes

Amazon ECS automatically applies the following attributes to your container instances.

`ecs.ami-id`

The ID of the AMI used to launch the instance. An example value for this attribute is "ami-eca289fb".

`ecs.availability-zone`

The Availability Zone for the instance. An example value for this attribute is "us-east-1a".

`ecs.instance-type`

The instance type for the instance. An example value for this attribute is "g2.2xlarge".

`ecs.os-type`

The operating system for the instance. The possible values for this attribute are "linux" and "windows".

#### Custom Attributes

You can apply custom attributes to your container instances. For example, you can define an attribute with the name "stack" and a value of "prod".

### Adding an Attribute

You can add custom attributes at instance registration time using the container agent or manually, using the AWS Management Console. For more information about using the container agent, see [Amazon ECS Container Agent Configuration Parameters \(p. 128\)](#).

### To add custom attributes using the console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. In the navigation pane, choose **Clusters** and select a cluster.
3. On the **ECS Instances** tab, select the check box for the container instance.
4. Choose **Actions**, **View/Edit Attributes**.
5. For each attribute, do the following:
  - a. Choose **Add attribute**.
  - b. Type a name and a value for the attribute.
  - c. Choose the checkmark icon to save the attribute.
6. When you are finished adding attributes, choose **Close**.

### Adding custom attributes using the AWS CLI

The following examples demonstrate how to add custom attributes using the [put-attributes](#) command.

#### Example: Single Attribute

The following example adds the custom attribute "stack=prod" to the specified container instance in the default cluster.

```
aws ecs put-attributes --attributes name=stack,value=prod,targetId=arn
```

#### Example: Multiple Attributes

The following example adds the custom attributes "stack=prod" and "project=a" to the specified container instance in the default cluster.

```
aws ecs put-attributes --attributes name=stack,value=prod,targetId=arn  
name=project,value=a,targetId=arn
```

## Filtering by Attribute

You can apply a filter for your container instances, allowing you to see custom attributes.

### Filter container instances by attribute using the console

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. Choose a cluster that has container instances.
3. Choose **ECS Instances**.
4. Set column visibility preferences by choosing the gear icon (⚙️) and selecting the attributes to display. This setting persists across all container clusters associated with your account.
5. Using the **Filter by attributes** text field, type or select the attributes you would like to filter by. The format must be *AttributeName:AttributeValue*.

For **Filter by attributes**, type or select the attributes by which to filter. After you select the attribute name, you are prompted for the attribute value.

6. Add additional attributes to the filter as needed. Remove an attribute by choosing the **X** next to it.

### Filter container instances by attribute using the AWS CLI



The following examples demonstrate how to filter container instances by attribute using the [list-container-instances](#) command. For more information about the filter syntax, see [Cluster Query Language \(p. 131\)](#).

#### Example: Built-in Attribute

The following example uses built-in attributes to list the g2.2xlarge instances.

```
aws ecs list-container-instances --filter "attribute:ecs.instance-type == g2.2xlarge"
```

#### Example: Custom Attribute

The following example lists the instances with the custom attribute "stack=prod".

```
aws ecs list-container-instances --filter "attribute:stack == prod"
```

#### Example: Exclude an Attribute Value

The following example lists the instances with the custom attribute "stack" unless the attribute value is "prod".

```
aws ecs list-container-instances --filter "attribute:stack != prod"
```

#### Example: Multiple Attribute Values

The following example uses built-in attributes to list the instances of type t2.small or t2.medium.

```
aws ecs list-container-instances --filter "attribute:ecs.instance-type in [t2.small, t2.medium]"
```

#### Example: Multiple Attributes

The following example uses built-in attributes to list the T2 instances in Availability Zone us-east-1a.

```
aws ecs list-container-instances --filter "attribute:ecs.instance-type =~ t2.* and attribute:ecs.availability-zone == us-east-1a"
```

## Task Groups

You can identify a set of related tasks as a *task group*. All tasks with the same task group name are considered as a set when performing spread placement. For example, suppose that you are running different applications in one cluster, such as databases and web servers. To ensure that your databases are balanced across Availability Zones, add them to a task group named "databases" and then use this task group as a constraint for task placement.

When you launch a task using the `RunTask` or `StartTask` action, you can specify the name of the task group for the task. If you don't specify a task group for the task, the default name is the family name of the task definition (for example, `family:my-task-definition`).

For tasks launched by the service scheduler, the task group name is the name of the service (for example, `service:my-service-name`).

#### Limits

- A task group name must be 255 characters or less.

- Each task can be in exactly one group.
- After launching a task, you cannot modify its task group.

## Example Constraints

You can specify task placement constraints with the following actions: [CreateService](#), [RegisterTaskDefinition](#), and [RunTask](#).

The following constraint places tasks on T2 instances.

```
"placementConstraints": [  
  {  
    "expression": "attribute:ecs.instance-type =~ t2.*",  
    "type": "memberOf"  
  }  
]
```

The following constraint places tasks on instances in the databases task group.

```
"placementConstraints": [  
  {  
    "expression": "task:group == databases",  
    "type": "memberOf"  
  }  
]
```

The following constraint places each task in the group on a different instance.

```
"placementConstraints": [  
  {  
    "type": "distinctInstance"  
  }  
]
```

## Cluster Query Language

Cluster queries are expressions that enable you to group objects. For example, you can group container instances by attributes such as Availability Zone, instance type, or custom metadata. For more information, see [Attributes](#) (p. 128).

After you have defined a group of container instances, you can customize Amazon ECS to place tasks on container instances based on group. For more information, see [Running Tasks](#) (p. 124) and [Creating a Service](#) (p. 157). You can also apply a group filter when listing container instances. For more information, see [Filtering by Attribute](#) (p. 129).

## Expression Syntax

Expressions have the following syntax:

```
subject operator [argument]
```

### Subject

The attribute or field to be evaluated.

You can select container instances by attribute. Specify attributes as follows:

```
attribute:attribute-name
```

You can also select container instances by task group. Specify task groups as follows:

```
task:group
```

## Operator

The comparison operator. The following operators are supported.

Operator	Description
==, equals	String equality
!=, not_equals	String inequality
>, greater_than	Greater than
>=, greater_than_equal	Greater than or equal to
<, less_than	Less than
<=, less_than_equal	Less than or equal to
exists	Subject exists
!exists, not_exists	Subject does not exist
in	Value in argument list
!in, not_in	Value not in argument list
=~, matches	Pattern match
!~, not_matches	Pattern mismatch

## Argument

For many operators, the argument is a literal value.

The in and not\_in operators expect an argument list as the argument. You specify an argument list as follows:

```
[argument1, argument2, ..., argumentN]
```

The matches and not\_matches operators expect an argument that conforms to the Java regular expression syntax. For more information, see [java.util.regex.Pattern](#).

## Compound Expressions

You can combine expressions using the following Boolean operators:

- &&, and
- ||, or

- `!`, not

You can specify precedence using parentheses:

```
(expression1 or expression2) and expression3
```

## Example Expressions

The following are example expressions.

### Example: String Equality

The following expression selects instances with the specified instance type.

```
attribute:ecs.instance-type == t2.small
```

### Example: Argument List

The following expression selects instances in the us-east-1a or us-east-1b Availability Zone.

```
attribute:ecs.availability-zone in [us-east-1a, us-east-1b]
```

### Example: Compound Expression

The following expression selects G2 instances that are not in the us-east-1d Availability Zone.

```
attribute:ecs.instance-type =~ g2.* and attribute:ecs.availability-zone != us-east-1d
```

### Example: Task Affinity

The following expression selects instances that are hosting tasks in the service:production group.

```
task:group == service:production
```

### Example: Task Anti-Affinity

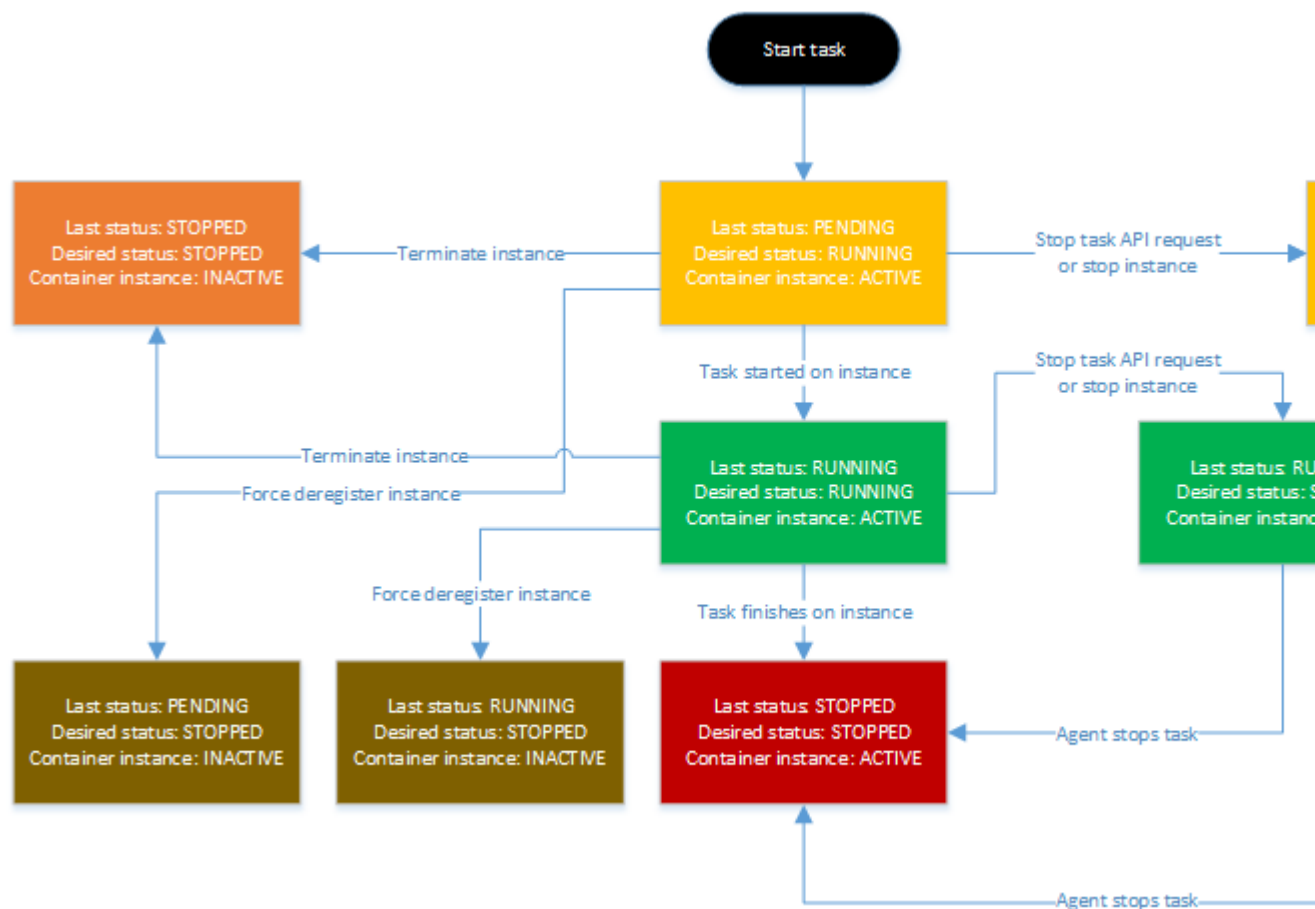
The following expression selects instances that are not hosting tasks in the database group.

```
not(task:group == database)
```

## Task Life Cycle

When a task is started on a container instance, either manually or as part of a service, it can pass through several states before it finishes on its own or is stopped manually. Some tasks are meant to run as batch jobs that naturally progress through from `PENDING` to `RUNNING` to `STOPPED`. Other tasks, which can be part of a service, are meant to continue running indefinitely, or to be scaled up and down as needed.

When task status changes are requested, such as stopping a task or updating the desired count of a service to scale it up or down, the Amazon ECS container agent tracks these changes as the last known status of the task and the desired status of the task. The flow chart below shows the different paths that task status can take, based on the action that causes the status change.



The center path shows the natural progression of a batch job that stops on its own. A persistent task that is not meant to finish would also be on the center path, but it would stop at the `RUNNING:RUNNING` stage. The paths to the right show what happens at a given state if an API call reaches the agent to stop the task or a container instance. The paths to the left show what happens if the container instance a task is running on is removed, whether by forcefully deregistering it or by terminating the instance.

# Services

Amazon ECS allows you to run and maintain a specified number (the "desired count") of instances of a task definition simultaneously in an ECS cluster. This is called a service. If any of your tasks should fail or stop for any reason, the Amazon ECS service scheduler launches another instance of your task definition to replace it and maintain the desired count of tasks in the service.

In addition to maintaining the desired count of tasks in your service, you can optionally run your service behind a load balancer. The load balancer distributes traffic across the tasks that are associated with the service.

## Topics

- [Service Concepts \(p. 135\)](#)
- [Service Definition Parameters \(p. 136\)](#)
- [Service Load Balancing \(p. 138\)](#)
- [Service Auto Scaling \(p. 149\)](#)
- [Creating a Service \(p. 157\)](#)
- [Updating a Service \(p. 162\)](#)
- [Deleting a Service \(p. 163\)](#)

## Service Concepts

- If a task in a service stops, the task is killed and restarted. This process continues until your service reaches the number of desired running tasks.
- You can optionally run your service behind a load balancer. For more information, see [Service Load Balancing \(p. 138\)](#).
- You can optionally specify a deployment configuration for your service. During a deployment (which is triggered by updating the task definition or desired count of a service), the service scheduler uses the minimum healthy percent and maximum percent parameters to determine the deployment strategy. For more information, see [Service Definition Parameters \(p. 136\)](#).
- When the service scheduler launches new tasks, it attempts to balance them across the Availability Zones in your cluster with the following logic:
  - Determine which of the container instances in your cluster can support your service's task definition (for example, they have the required CPU, memory, ports, and container instance attributes).
  - Sort the valid container instances by the fewest number of running tasks for this service in the same Availability Zone as the instance. For example, if zone A has one running service task and zones B and C each have zero, valid container instances in either zone B or C are considered optimal for placement.

- Place the new service task on a valid container instance in an optimal Availability Zone (based on the previous steps), favoring container instances with the fewest number of running tasks for this service.
- When the service scheduler stops running tasks, it attempts to maintain balance across the Availability Zones in your cluster with the following logic:
  - Sort the container instances by the largest number of running tasks for this service in the same Availability Zone as the instance. For example, if zone A has one running service task and zones B and C each have two, container instances in either zone B or C are considered optimal for termination.
- Stop the task on a container instance in an optimal Availability Zone (based on the previous steps), favoring container instances with the largest number of running tasks for this service.

## Service Definition Parameters

A service definition defines which task definition to use with your service, how many instantiations of that task to run, and which load balancers (if any) to associate with your tasks.

```
{
  "cluster": "",
  "serviceName": "",
  "taskDefinition": "",
  "loadBalancers": [
    {
      "targetGroupArn": "",
      "loadBalancerName": "",
      "containerName": "",
      "containerPort": 0
    }
  ],
  "desiredCount": 0,
  "clientToken": "",
  "role": "",
  "deploymentConfiguration": {
    "maximumPercent": 0,
    "minimumHealthyPercent": 0
  }
}
```

### Note

You can create the above service definition template with the following AWS CLI command.

```
aws ecs create-service --generate-cli-skeleton
```

You can specify the following parameters in a service definition.

#### cluster

The short name or full Amazon Resource Name (ARN) of the cluster on which to run your service. If you do not specify a cluster, the default cluster is assumed.

#### serviceName

The name of your service. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed. Service names must be unique within a cluster, but you can have similarly named services in multiple clusters within a region or across multiple regions.

#### taskDefinition

The `family` and `revision` (`family:revision`) or full ARN of the task definition to run in your service. If a revision is not specified, the latest `ACTIVE` revision is used.

#### `loadBalancers`

A load balancer object representing the load balancer to use with your service. Currently, you are limited to one load balancer or target group per service. After you create a service, the load balancer name or target group ARN, container name, and container port specified in the service definition are immutable.

For Elastic Load Balancing Classic Load Balancers, this object must contain the load balancer name, the container name (as it appears in a container definition), and the container port to access from the load balancer. When a task from this service is placed on a container instance, the container instance is registered with the load balancer specified here.

For Elastic Load Balancing Application Load Balancers, this object must contain the load balancer target group ARN, the container name (as it appears in a container definition), and the container port to access from the load balancer. When a task from this service is placed on a container instance, the container instance and port combination is registered as a target in the target group specified here.

#### `targetGroupArn`

The full Amazon Resource Name (ARN) of the Elastic Load Balancing target group associated with a service.

#### `loadBalancerName`

The name of the load balancer.

#### `containerName`

The name of the container (as it appears in a container definition) to associate with the load balancer.

#### `containerPort`

The port on the container to associate with the load balancer. This port must correspond to a `containerPort` in the service's task definition. Your container instances must allow ingress traffic on the `hostPort` of the port mapping.

#### `desiredCount`

The number of instantiations of the specified task definition to place and keep running on your cluster.

#### `clientToken`

Unique, case-sensitive identifier you provide to ensure the idempotency of the request. Up to 32 ASCII characters are allowed.

#### `role`

The name or full Amazon Resource Name (ARN) of the IAM role that allows Amazon ECS to make calls to your load balancer on your behalf. This parameter is required if you are using a load balancer with your service. If you specify the `role` parameter, you must also specify a load balancer object with the `loadBalancers` parameter.

If your specified role has a path other than `/`, then you must either specify the full role ARN (this is recommended) or prefix the role name with the path. For example, if a role with the name `bar` has a path of `/foo/` then you would specify `/foo/bar` as the role name. For more information, see [Friendly Names and Paths](#) in the *IAM User Guide*.

#### `deploymentConfiguration`

Optional deployment parameters that control how many tasks run during the deployment and the ordering of stopping and starting tasks.

#### `maximumPercent`

The `maximumPercent` parameter represents an upper limit on the number of your service's tasks that are allowed in the `RUNNING` or `PENDING` state during a deployment, as a percentage of the



`desiredCount` (rounded down to the nearest integer). This parameter enables you to define the deployment batch size. For example, if your service has a `desiredCount` of four tasks and a `maximumPercent` value of 200%, the scheduler may start four new tasks before stopping the four older tasks (provided that the cluster resources required to do this are available). The default value for `maximumPercent` is 200%.

The maximum number of tasks during a deployment is the `desiredCount` multiplied by the `maximumPercent`/100, rounded down to the nearest integer value.

`minimumHealthyPercent`

The `minimumHealthyPercent` represents a lower limit on the number of your service's tasks that must remain in the `RUNNING` state during a deployment, as a percentage of the `desiredCount` (rounded up to the nearest integer). This parameter enables you to deploy without using additional cluster capacity. For example, if your service has a `desiredCount` of four tasks and a `minimumHealthyPercent` of 50%, the scheduler may stop two existing tasks to free up cluster capacity before starting two new tasks. Tasks for services that *do not* use a load balancer are considered healthy if they are in the `RUNNING` state; tasks for services that *do* use a load balancer are considered healthy if they are in the `RUNNING` state and the container instance it is hosted on is reported as healthy by the load balancer. The default value for `minimumHealthyPercent` is 50% in the console and 100% for the AWS CLI, the AWS SDKs, and the APIs.

The minimum healthy tasks during a deployment is the `desiredCount` multiplied by the `minimumHealthyPercent`/100, rounded up to the nearest integer value.

`placementConstraints`

An array of placement constraint objects to use for tasks in your service. You can specify a maximum of 10 constraints per task (this limit includes constraints in the task definition and those specified at run time).

`placementStrategy`

The placement strategy objects to use for tasks in your service. You can specify a maximum of 5 strategy rules per service.

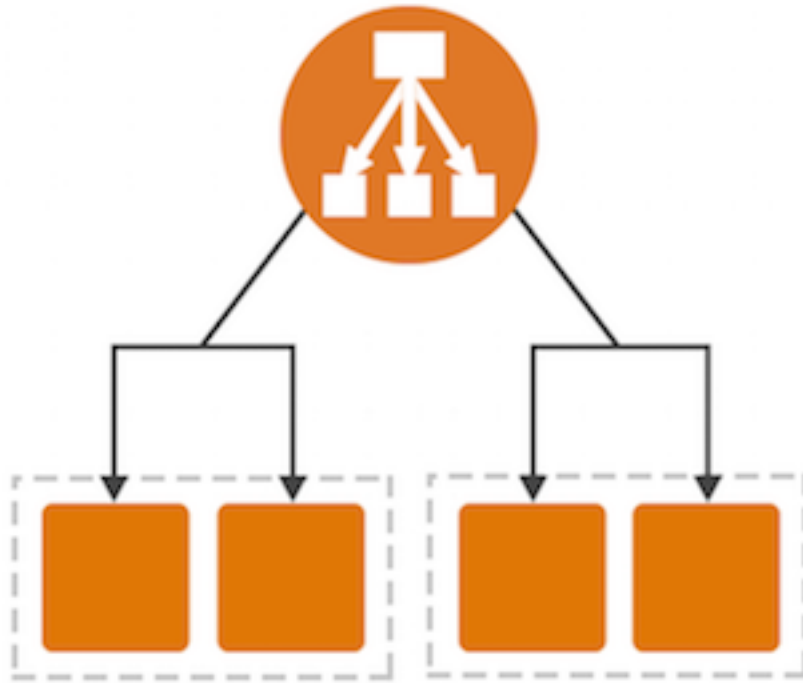
## Service Load Balancing

Your Amazon ECS service can optionally be configured to use Elastic Load Balancing to distribute traffic evenly across the tasks in your service.

Elastic Load Balancing provides two types of load balancers: Application Load Balancers and Classic Load Balancers.

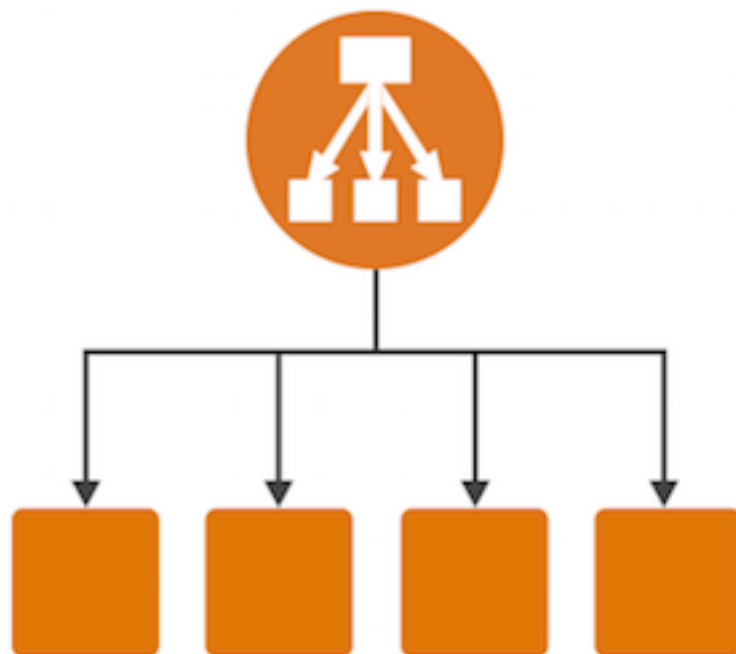
### Application Load Balancer

An Application Load Balancer makes routing decisions at the application layer (HTTP/HTTPS), supports path-based routing, and can route requests to one or more ports on each container instance in your cluster. Application Load Balancers support dynamic host port mapping. For example, if your task's container definition specifies port 80 for an NGINX container port, and port 0 for the host port, then the host port is dynamically chosen from the ephemeral port range of the container instance (such as 32768 to 61000 on the latest Amazon ECS-optimized AMI). When the task is launched, the NGINX container is registered with the Application Load Balancer as an instance ID and port combination, and traffic is distributed to the instance ID and port corresponding to that container. This dynamic mapping allows you to have multiple tasks from a single service on the same container instance. For more information, see the [Application Load Balancer Guide](#).



### Classic Load Balancer

A Classic Load Balancer makes routing decisions at either the transport layer (TCP/SSL) or the application layer (HTTP/HTTPS). Classic Load Balancers currently require a fixed relationship between the load balancer port and the container instance port. For example, it is possible to map the load balancer port 80 to the container instance port 3030 and the load balancer port 4040 to the container instance port 4040. However, it is not possible to map the load balancer port 80 to port 3030 on one container instance and port 4040 on another container instance. This static mapping requires that your cluster has at least as many container instances as the desired count of a single service that uses a Classic Load Balancer. For more information, see the [Classic Load Balancer Guide](#).



Amazon ECS services can use either type of load balancer. However, Application Load Balancers offer several new features that make them particularly attractive for use with Amazon ECS services:

- Application Load Balancers allow containers to use dynamic host port mapping (so that multiple tasks from the same service are allowed per container instance).
- Application Load Balancers support path-based routing and priority rules (so that multiple services can use the same listener port on a single Application Load Balancer).

We recommend using Application Load Balancers for your Amazon ECS services so that you can take advantage of these latest features. For more information about Elastic Load Balancing and the differences between the two load balancer types, see the [Elastic Load Balancing User Guide](#).

**Note**

Currently, Amazon ECS services can only specify a single load balancer or target group. If your service requires access to multiple load balanced ports (for example, port 80 and port 443 for an HTTP/HTTPS service), you must use a Classic Load Balancer with multiple listeners. To use an Application Load Balancer, separate the single HTTP/HTTPS service into two services, where each handles requests for different ports. Then, each service could use a different target group behind a single Application Load Balancer.

Topics

- [Load Balancing Concepts \(p. 141\)](#)
- [Check the Service Role for your Account \(p. 141\)](#)
- [Creating a Load Balancer \(p. 142\)](#)

## Load Balancing Concepts

- All of the containers that are launched in a single task definition are always placed on the same container instance. For Classic Load Balancers, you may choose to put multiple containers (in the same task definition) behind the same load balancer by defining multiple host ports in the service definition and adding those listener ports to the load balancer. For example, if a task definition consists of Elasticsearch using port 3030 on the container instance, with Logstash and Kibana using port 4040 on the container instance, the same load balancer can route traffic to Elasticsearch and Kibana through two listeners. For more information, see [Listeners for Your Classic Load Balancer](#) in the *Classic Load Balancer Guide*.

### Important

We do not recommend connecting multiple services to the same Classic Load Balancer. Because entire container instances are registered and deregistered with Classic Load Balancers (and not host and port combinations), this configuration can cause issues if a task from one service stops, causing the entire container instance to be deregistered from the Classic Load Balancer while another task from a different service on the same container instance is still using it. If you want to connect multiple services to a single load balancer (for example, to save costs), we recommend using an Application Load Balancer.

- There is a limit of one load balancer or target group per service.
- Your load balancer subnet configuration must include all subnets that your container instances reside in.
- After you create a service, the target group ARN or load balancer name, container name, and container port specified in the service definition are immutable. You cannot add, remove, or change the load balancer configuration of an existing service. If you update the task definition for the service, the container name and container port that were specified when the service was created must remain in the task definition.
- If a service's task fails the load balancer health check criteria, the task is killed and restarted. This process continues until your service reaches the number of desired running tasks.
- If you are experiencing problems with your load balancer-enabled services, see [Troubleshooting Service Load Balancers](#) (p. 275).

## Check the Service Role for your Account

Amazon ECS needs permission to register and deregister container instances with your load balancer when tasks are created and stopped.

In most cases, the Amazon ECS service role is automatically created for you in the Amazon ECS console first run experience. You can use the following procedure to check and see if your account already has an Amazon ECS service role.

### To check for the `ecsServiceRole` in the IAM console

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.
3. Search the list of roles for `ecsServiceRole`. If the role does not exist, see [Amazon ECS Service Scheduler IAM Role](#) (p. 209) to create the role. If the role does exist, select the role to view the attached policies.
4. Choose **Permissions**.
5. In the **Managed Policies** section, ensure that the **AmazonEC2ContainerServiceRole** managed policy is attached to the role. If the policy is attached, your Amazon ECS service role is properly configured. If not, follow the substeps below to attach the policy.
  - a. Choose **Attach Policy**.
  - b. For **Filter**, type `AmazonEC2ContainerServiceRole` to narrow the available policies to attach.

- c. Select the box to the left of the **AmazonEC2ContainerServiceRole** policy and choose **Attach Policy**.
6. Choose **Trust Relationships, Edit Trust Relationship**.
7. Verify that the trust relationship contains the following policy. If the trust relationship matches the policy below, choose **Cancel**. If the trust relationship does not match, copy the policy into the **Policy Document** window and choose **Update Trust Policy**.

```
{
  "Version": "2008-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "ecs.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

## Creating a Load Balancer

This section provides a hands-on introduction to using Elastic Load Balancing through the AWS Management Console to use with your Amazon ECS services. In this section, you create an external load balancer that receives public HTTP traffic and routes it to your Amazon ECS container instances.

Elastic Load Balancing provides two types of load balancers: Application Load Balancers and Classic Load Balancers, and Amazon ECS services can use either type of load balancer. However, Application Load Balancers offer several new features that make them particularly attractive for use with Amazon ECS services:

- Application Load Balancers allow containers to use dynamic host port mapping (so that multiple tasks from the same service are allowed per container instance).
- Application Load Balancers support path-based routing and priority rules (so that multiple services can use the same listener port on a single Application Load Balancer).

We recommend that you use Application Load Balancers for your Amazon ECS services so that you can take advantage of these latest features. For more information about Elastic Load Balancing and the differences between the two load balancer types, see the [Elastic Load Balancing User Guide](#).

### Note

Currently, Amazon ECS services can only specify a single load balancer or target group. If your service requires access to multiple load balanced ports (for example, port 80 and port 443 for an HTTP/HTTPS service), you must use a Classic Load Balancer with multiple listeners. To use an Application Load Balancer, separate the single HTTP/HTTPS service into two services, where each handles requests for different ports. Then, each service could use a different target group behind a single Application Load Balancer.

### Topics

- [Creating an Application Load Balancer \(p. 143\)](#)
- [Creating a Classic Load Balancer \(p. 146\)](#)

## Creating an Application Load Balancer

This section walks you through the process of creating an Application Load Balancer in the AWS Management Console.

### Define Your Load Balancer

First, provide some basic configuration information for your load balancer, such as a name, a network, and a listener.

A *listener* is a process that checks for connection requests. It is configured with a protocol and a port for front-end (client to load balancer) connections, and protocol and a port for back-end (load balancer to back-end instance) connections. In this example, you configure a listener that accepts HTTP requests on port 80 and sends them to the containers in your tasks on port 80 using HTTP.

#### To define your load balancer

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. From the navigation bar, select a region for your load balancer. Be sure to select the same region that you selected for your Amazon ECS container instances.
3. In the navigation pane, under **LOAD BALANCING**, choose **Load Balancers**.
4. Choose **Create Load Balancer**.
5. On the **Select load balancer type** page, choose **Application Load Balancer** and then choose **Continue**.
6. Complete the **Configure Load Balancer** page as follows:
  - a. For **Name**, type a name for your load balancer.
  - b. For **Scheme**, an Internet-facing load balancer routes requests from clients over the Internet to targets. An internal load balancer routes requests to targets using private IP addresses.
  - c. For **IP address type**, choose **ipv4** to support IPv4 addresses only or **dualstack** to support both IPv4 and IPv6 addresses.
  - d. For **Listeners**, the default is a listener that accepts HTTP traffic on port 80. You can keep the default listener settings, modify the protocol or port of the listener, or choose **Add** to add another listener.

**Note**

If you plan on routing traffic to more than one target group, see [ListenerRules](#) for details on how to add host or path-based rules.
  - e. For **VPC**, select the same VPC that you used for the container instances on which you intend to run your service.
  - f. For **Availability Zones**, select the check box for the Availability Zone(s) to enable for your load balancer. If there is one subnet for that Availability Zone, it is selected. If there is more than one subnet for that Availability Zone, select one of the subnets. Note that you can select only one subnet per Availability Zone. Your load balancer subnet configuration must include all subnets that your container instances reside in.
  - g. Choose **Next: Configure Security Settings**.

### (Optional) Configure Security Settings

If you created a secure listener in the previous step, complete the **Configure Security Settings** page as follows; otherwise, choose **Next: Configure Security Groups**.

## To configure security settings

1. If you have a certificate from AWS Certificate Manager, choose **Choose an existing certificate from AWS Certificate Manager (ACM)**, and then choose the certificate from **Certificate name**.
2. If you have already uploaded a certificate using IAM, choose **Choose an existing certificate from AWS Identity and Access Management (IAM)**, and then choose your certificate from **Certificate name**.
3. If you have a certificate ready to upload, choose **Upload a new SSL Certificate to AWS Identity and Access Management (IAM)**. For **Certificate name**, type a name for the certificate. For **Private Key**, copy and paste the contents of the private key file (PEM-encoded). In **Public Key Certificate**, copy and paste the contents of the public key certificate file (PEM-encoded). In **Certificate Chain**, copy and paste the contents of the certificate chain file (PEM-encoded), unless you are using a self-signed certificate and it's not important that browsers implicitly accept the certificate.
4. For **Select policy**, choose a predefined security policy. For details on the security policies, see [Security Policies](#).
5. Choose **Next: Configure Security Groups**.

## Configure Security Groups

You must assign a security group to your load balancer that allows inbound traffic to the ports that you specified for your listeners. Amazon ECS does not automatically update the security groups associated with Elastic Load Balancing load balancers or Amazon ECS container instances.

### To assign a security group to your load balancer

1. On the **Assign Security Groups** page, choose **Create a new security group**.
2. Enter a name and description for your security group, or leave the default name and description. This new security group contains a rule that allows traffic to the port that you configured your listener to use.

#### Note

Later in this topic, you will create a security group rule for your container instances that allows traffic on all ports coming from the security group created here, so that the Application Load Balancer can route traffic to dynamically assigned host ports on your container instances.

**Assign a security group:** ☒ Create a **new** security group  
☐ Select an **existing** security group

**Security group name:**

alb-example

**Description:**

Port 80 for HTTP ECS service

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ
HTTP ⌵	TCP	80	Anywhere ⌵ 0.0.0.0/0
<b>Add Rule</b>			

3. Choose **Next: Configure Routing** to go to the next page in the wizard.

## Configure Routing

In this section, you create a target group for your load balancer and the health check criteria for targets that are registered within that group.

### To create a target group and configure health checks

1. For **Target group**, keep the default, **New target group**.
2. For **Name**, type a name for the new target group.
3. Set **Protocol** and **Port** as needed.
4. For **Health checks**, keep the default health check settings.
5. Choose **Next: Register Targets**.

### Register Targets

Your load balancer distributes traffic between the targets that are registered to its target groups. When you associate a target group to an Amazon ECS service, Amazon ECS automatically registers and deregisters containers with your target group. Because Amazon ECS handles target registration, you do not add targets to your target group at this time.

### To skip target registration

1. In the **Registered instances** section, ensure that no instances are selected for registration.
2. Choose **Next: Review** to go to the next page in the wizard.

### Review and Create

Review your load balancer and target group configuration and choose **Create** to create your load balancer.

### Create a Security Group Rule for your Container Instances

After your Application Load Balancer has been created, you must add an inbound rule to your container instance security group that allows traffic from your load balancer to reach the containers.

### To allow inbound traffic from your load balancer to your container instances

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the left navigation, choose **Security Groups**.
3. Choose the security group that your container instances use. If you created your container instances by using the Amazon ECS first run wizard, this security group may have the description, **ECS Allowed Ports**.
4. Choose the **Inbound** tab, and then choose **Edit**.
5. For **Type**, choose **All traffic**.
6. For **Source**, choose **Custom**, and then type the name of your Application Load Balancer security group that you created in [Configure Security Groups \(p. 144\)](#). This rule allows all traffic from your Application Load Balancer to reach the containers in your tasks that are registered with your load balancer.



### Edit inbound rules

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ	
HTTP	TCP	80	Anywhere	0.0.0.0/0
All traffic	All	0 - 65535	Custom	alb-...

Add Rule

- Choose **Save** to finish.

## Create an Amazon ECS Service

After your load balancer and target group are created, you can specify the target group in a service definition when you create a service. When each task for your service is started, the container and port combination specified in the service definition is registered with your target group and traffic is routed from the load balancer to that container. For more information, see [Creating a Service \(p. 157\)](#).

## Creating a Classic Load Balancer

This section walks you through the process of creating a Classic Load Balancer in the AWS Management Console.

Note that you can create your Classic Load Balancer for use with EC2-Classic or a VPC. Some of the tasks described in these procedures apply only to load balancers in a VPC.

### Define Your Load Balancer

First, provide some basic configuration information for your load balancer, such as a name, a network, and a listener.

A *listener* is a process that checks for connection requests. It is configured with a protocol and a port for front-end (client to load balancer) connections and a protocol, and protocol and a port for back-end (load balancer to back-end instance) connections. In this example, you configure a listener that accepts HTTP requests on port 80 and sends them to the back-end instances on port 80 using HTTP.

#### To define your load balancer

- Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
- From the navigation bar, select a region for your load balancer. Be sure to select the same region that you selected for your Amazon ECS container instances.
- In the navigation pane, under **LOAD BALANCING**, choose **Load Balancers**.
- Choose **Create Load Balancer**.
- On the **Select load balancer type** page, choose **Classic Load Balancer**.
- For **Load Balancer name**, enter a unique name for your load balancer.

The load balancer name you choose must be unique within your set of load balancers, must have a maximum of 32 characters, and must only contain alphanumeric characters or hyphens.

7. For **Create LB inside**, select the same network that your container instances are located in: EC2-Classic or a specific VPC.
8. The default values configure an HTTP load balancer that forwards traffic from port 80 at the load balancer to port 80 of your container instances, but you can modify these values for your application. For more information, see [Listeners for Your Classic Load Balancer](#) in the *Classic Load Balancer Guide*.
9. [EC2-VPC] To improve the availability of your load balancer, select at least two subnets in different Availability Zones. Your load balancer subnet configuration must include all subnets that your container instances reside in. In the **Select Subnets** section, under **Available Subnets**, select the subnets. The subnets that you select are moved under **Selected Subnets**.

#### Note

If you selected EC2-Classic as your network, or you have a default VPC but did not choose **Enable advanced VPC configuration**, you do not see **Select Subnets**.

##### Available Subnets

Actions	Availability Zone	Subnet ID	Subnet CIDR	Name
	us-west-2c	subnet-cb663da2	10.0.1.0/24	
	us-west-2c	subnet-c9663da0	10.0.0.0/24	

##### Selected Subnets

Actions	Availability Zone	Subnet ID	Subnet CIDR	Name
	us-west-2a	subnet-e4f33493	10.0.2.0/24	
	us-west-2b	subnet-5264e837	10.0.3.0/24	

10. Choose **Next: Assign Security Groups** to go to the next page in the wizard.

## Assign a Security Group to Your Load Balancer in a VPC

If you created your load balancer in a VPC, you must assign it a security group that allows inbound traffic to the ports that you specified for your load balancer and the health checks for your load balancer. Amazon ECS does not automatically update the security groups associated with Elastic Load Balancing load balancers or Amazon ECS container instances.

#### Note

If you selected EC2-Classic as your network, you do not see this page in the wizard and you can go to the next step. Elastic Load Balancing provides a security group that is assigned to your load balancer for EC2-Classic automatically.

### To assign a security group to your load balancer

1. On the **Assign Security Groups** page, choose **Create a new security group**.
2. Enter a name and description for your security group, or leave the default name and description. This new security group contains a rule that allows traffic to the port that you configured your load balancer to use. If you specified a different port for the health checks, you must choose **Add Rule** to add a rule that allows inbound traffic to that port as well.

#### Note

You should also assign this security group to container instances in your service, or another security group with the same rules.

### Assign Security Groups

Assign a security group: ☒ Create a new security group  
☐ Select an existing security group

Security group name:

Description:

Type <small>i</small>	Protocol <small>i</small>	Port Range <small>i</small>	Source <small>i</small>
Custom TCP Rule ▾	TCP	80	Anywhere ▾ 0.0.0.0/0 ✕

3. Choose **Next: Configure Security Settings** to go to the next page in the wizard.

### (Optional) Configure Security Settings

For this tutorial, you can choose **Next: Configure Health Check** to continue to the next step. For more information about creating a HTTPS load balancer and using additional security features, see [HTTPS Load Balancers](#) in the *Classic Load Balancer Guide*.

### Configure Health Checks for Your EC2 Instances

Elastic Load Balancing automatically checks the health of the tasks in your service. If Elastic Load Balancing finds an unhealthy task, it stops sending traffic to the instance and reroutes traffic to healthy instances. Amazon ECS stops your unhealthy task and starts another instance of that task.

#### Note

The following procedure configures an HTTP (port 80) load balancer, but you can modify these values for your application.

#### To configure a health check for your instances

1. On the **Configure Health Check** page, do the following:
  - a. Leave **Ping Protocol** set to its default value of HTTP.
  - b. Leave **Ping Port** set to its default value of 80.
  - c. For **Ping Path**, replace the default value with a single forward slash ("/"). This tells Elastic Load Balancing to send health check queries to the default home page for your web server, such as `index.html` or `default.html`.
  - d. Leave the other fields at their default values.

#### Configure Health Check

Your load balancer will automatically perform health checks on your EC2 instances and only route traffic to instances that pass the health check. If an instance fails the health check, it is automatically removed from the load balancer. Customize the health check to meet your specific needs.

Ping Protocol

Ping Port

Ping Path

2. Choose **Next: Add EC2 Instances** to go to the next page in the wizard.

### Load Balancer Instance Registration

Your load balancer distributes traffic between the instances that are registered to it. When you assign your load balancer to an Amazon ECS service, Amazon ECS automatically registers and deregisters container

instances when tasks from your service are running on them. Because Amazon ECS handles container instance registration, you do not add container instances to your load balancer at this time.

#### To skip instance registration and tag the load balancer

1. On the **Add EC2 Instances** page, for **Add Instances to Load Balancer**, ensure that no instances are selected for registration.
2. Leave the other fields at their default values.
3. Choose **Next: Add Tags** to go to the next page in the wizard.

### Tag Your Load Balancer (Optional)

You can tag your load balancer, or continue to the next step. Note that you can tag your load balancer later on; for more information, see [Tag Your Classic Load Balancer](#) in the *Classic Load Balancer Guide*.

#### To add tags to your load balancer

1. On the **Add Tags** page, specify a key and a value for the tag.
2. To add another tag, choose **Create Tag** and specify a key and a value for the tag.
3. After you are finished adding tags, choose **Review and Create**.

### Create and Verify Your Load Balancer

Before you create the load balancer, review the settings that you selected. After creating the load balancer, you can create a service that uses it to verify that it's sending traffic to your container instances.

#### To finish creating your load balancer

1. On the **Review** page, check your settings. If you need to make changes to the initial settings, choose the corresponding edit link.
2. Choose **Create** to create your load balancer.
3. After you are notified that your load balancer was created, choose **Close**.

### Create an Amazon ECS Service

After your load balancer is created, you can specify it in a service definition when you create a service. For more information, see [Creating a Service](#) (p. 157).

## Service Auto Scaling

Your Amazon ECS service can optionally be configured to use Service Auto Scaling to adjust its desired count up or down in response to CloudWatch alarms. Service Auto Scaling is available in all regions that support Amazon ECS.

Amazon ECS publishes CloudWatch metrics with your service's average CPU and memory usage. You can use these service utilization metrics to scale your service up to deal with high demand at peak times, and to scale your service down to reduce costs during periods of low utilization. For more information, see [Service Utilization](#) (p. 174).

You can also use CloudWatch metrics published by other services, or custom metrics that are specific to your application. For example, a web service could increase the number of tasks based on Elastic Load Balancing metrics such as `SurgeQueueLength`, and a batch job could increase the number of tasks based on Amazon SQS metrics like `ApproximateNumberOfMessagesVisible`.

You can also use Service Auto Scaling in conjunction with Auto Scaling for Amazon EC2 on your ECS cluster to scale your cluster, and your service, as a result to the demand. For more information, see [Tutorial: Scaling Container Instances with CloudWatch Alarms \(p. 179\)](#).

## Service Auto Scaling Required IAM Permissions

Service Auto Scaling is made possible by a combination of the Amazon ECS, CloudWatch, and Application Auto Scaling APIs. Services are created and updated with Amazon ECS, alarms are created with CloudWatch, and scaling policies are created with Application Auto Scaling. IAM users must have the appropriate permissions for these services before they can use Service Auto Scaling in the AWS Management Console or with the AWS CLI or SDKs. In addition to the standard IAM permissions for creating and updating services, Service Auto Scaling requires the following permissions:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "application-autoscaling:*",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm"
      ],
      "Resource": [
        "*"
      ]
    }
  ]
}
```

The [Create Services \(p. 223\)](#) and [Update Services \(p. 224\)](#) IAM policy examples show the permissions that are required for IAM users to use Service Auto Scaling in the AWS Management Console.

The Application Auto Scaling service needs permission to describe your ECS services and CloudWatch alarms, as well as permissions to modify your service's desired count on your behalf. You must create an IAM role (`ecsAutoscaleRole`) for your ECS services to provide these permissions and then associate that role with your service before it can use Application Auto Scaling. If an IAM user has the required permissions to use Service Auto Scaling in the Amazon ECS console, create IAM roles, and attach IAM role policies to them, then that user can create this role automatically as part of the Amazon ECS console [create service \(p. 162\)](#) or [update service \(p. 162\)](#) workflows, and then use the role for any other service later (in the console or with the CLI/SDKs). You can also create the role by following the procedures in [Amazon ECS Service Auto Scaling IAM Role \(p. 210\)](#).

## Service Auto Scaling Concepts

- The ECS service scheduler respects the desired count at all times, but as long as you have active scaling policies and alarms on a service, Service Auto Scaling could change a desired count that was manually set by you.
- If a service's desired count is set below its minimum capacity value, and an alarm triggers a scale out activity, Application Auto Scaling scales the desired count up to the minimum capacity value and then continues to scale out as required, based on the scaling policy associated with the alarm. However, a scale in activity will not adjust the desired count, because it is already below the minimum capacity value.
- If a service's desired count is set above its maximum capacity value, and an alarm triggers a scale in activity, Application Auto Scaling scales the desired count down to the maximum capacity value and then continues to scale in as required, based on the scaling policy associated with the alarm. However, a scale out activity will not adjust the desired count, because it is already above the maximum capacity value.

- During scaling activities, the actual running task count in a service is the value that Service Auto Scaling uses as its starting point, as opposed to the desired count, which is what processing capacity is supposed to be. This prevents excessive (runaway) scaling that could not be satisfied, for example, if there are not enough container instance resources to place the additional tasks. If the container instance capacity is available later, the pending scaling activity may succeed, and then further scaling activities can continue after the cool down period.

## Amazon ECS Console Experience

The Amazon ECS console's service creation and service update workflows support Service Auto Scaling. The ECS console handles the `ecsAutoscaleRole` and policy creation, provided that the IAM user who is using the console has the permissions described in [Service Auto Scaling Required IAM Permissions](#) (p. 150), and that they can create IAM roles and attach policies to them.

When you configure a service to use Service Auto Scaling in the console, your service is automatically registered as a scalable target with Application Auto Scaling so that you can configure scaling policies that scale your service up and down. You can also create and update the scaling policies and CloudWatch alarms that trigger them in the Amazon ECS console.

To create a new ECS service that uses Service Auto Scaling, see [Creating a Service](#) (p. 157).

To update an existing service to use Service Auto Scaling, see [Updating a Service](#) (p. 162).

## AWS CLI and SDK Experience

You can configure Service Auto Scaling by using the AWS CLI or the AWS SDKs, but you must observe the following considerations.

- Service Auto Scaling is made possible by a combination of the Amazon ECS, CloudWatch, and Application Auto Scaling APIs. Services are created and updated with Amazon ECS, alarms are created with CloudWatch, and scaling policies are created with Application Auto Scaling. For more information about these specific API operations, see the [Amazon EC2 Container Service API Reference](#), the [Amazon CloudWatch API Reference](#), and the [Application Auto Scaling API Reference](#). For more information about the AWS CLI commands for these services, see the `ecs`, `cloudwatch`, and `application-autoscaling` sections of the [AWS Command Line Interface Reference](#).
- Before your service can use Service Auto Scaling, you must register it as a scalable target with the Application Auto Scaling [RegisterScalableTarget](#) API operation.
- After your ECS service is registered as a scalable target, you can create scaling policies with the Application Auto Scaling [PutScalingPolicy](#) API operation to specify what should happen when your CloudWatch alarms are triggered.
- After you create the scaling policies for your service, you can create the CloudWatch alarms that trigger the scaling events for your service with the CloudWatch [PutMetricAlarm](#) API operation.

## Tutorial: Service Auto Scaling with CloudWatch Service Utilization Metrics

The following procedures help you to create an Amazon ECS cluster and a service that uses Service Auto Scaling to scale up (and down) using CloudWatch alarms.

Amazon ECS publishes CloudWatch metrics with your service's average CPU and memory usage. You can use these service utilization metrics to scale your service up to deal with high demand at peak times, and to scale your service down to reduce costs during periods of low utilization. For more information, see [Service Utilization](#) (p. 174).

In this tutorial, you create a cluster and a service (that runs behind an Elastic Load Balancing load balancer) using the Amazon ECS first run wizard. Then you configure Service Auto Scaling on the service with CloudWatch alarms that use the `CPUUtilization` metric to scale your service up or down, depending on the current application load.

When the CPU utilization of your service rises above 75% (meaning that more than 75% of the CPU that is reserved for the service is being used), the scale out alarm triggers Service Auto Scaling to add another task to your service to help out with the increased load. Conversely, when the CPU utilization of your service drops below 25%, the scale in alarm triggers a decrease in the service's desired count to free up those cluster resources for other tasks and services.

## Prerequisites

This tutorial assumes that you have an AWS account and an IAM administrative user with permissions to perform all of the actions described within, and an Amazon EC2 key pair in the current region. If you do not have these resources, or you are not sure, you can create them by following the steps in [Setting Up with Amazon ECS](#) (p. 8).

Your Amazon ECS container instances also require `ecs:StartTelemetrySession` permission on the IAM role that you launch your container instances with. If you created your Amazon ECS container instance role before CloudWatch metrics were available for Amazon ECS, then you might need to add this permission. For information about checking your Amazon ECS container instance role and attaching the managed IAM policy for container instances, see [To check for the `ecsInstanceRole` in the IAM console](#) (p. 207).

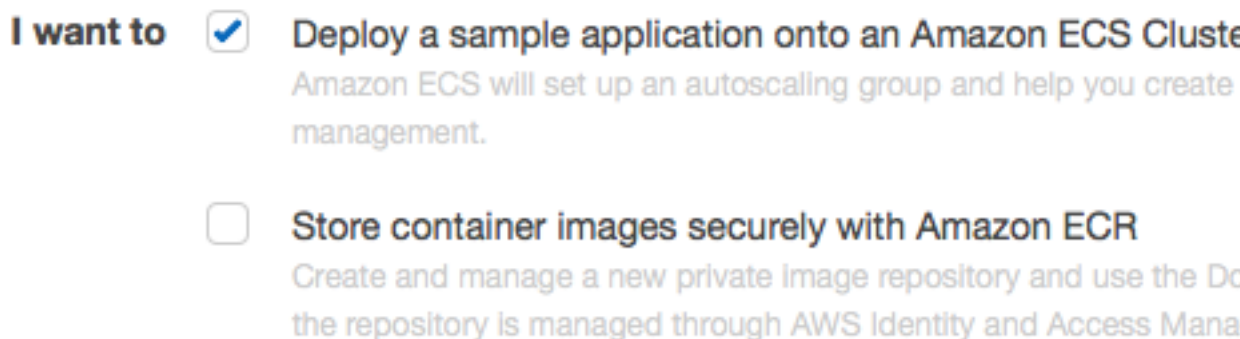
## Step 1: Create a Cluster and a Service

After you have enabled CloudWatch metrics for your clusters and services, you can create a cluster and service using the Amazon ECS first run wizard. The first run wizard takes care of creating the necessary IAM roles and policies for this tutorial, an Auto Scaling group for your container instances, and it creates a service that runs behind a load balancer. The wizard also makes the later clean up process much easier, because you can delete the entire AWS CloudFormation stack in one step.

For this tutorial, you create a cluster called `service-autoscaling` and a service called `sample-webapp`.

### To create your cluster and service

1. Open the Amazon ECS console first run wizard at <https://console.aws.amazon.com/ecs/home#/firstRun>.
2. By default, you are given the option to create an image repository and push an image to Amazon ECR.



For this tutorial, you will not use Amazon ECR, so be sure to clear the lower option. Choose **Continue** to proceed.

3. On the **Create a task definition** page, leave all of the default options and choose **Next step**.
4. On the **Configure service** page, for **Container name: host port**, choose **simple-app:80**.



### Important

Elastic Load Balancing load balancers do incur cost while they exist in your AWS resources. For more information, see [Elastic Load Balancing Pricing](#).

5. For **Select IAM role for service**, choose an existing Amazon ECS service (`ecsServiceRole`) role that you have already created, or choose **Create new role** to create the required IAM role for your service.
6. The remaining default values here are set up for the sample application, so leave them as they are and choose **Next step**.
7. On the **Configure cluster** page, enter the following information:
  - a. For **Cluster name**, type `service-autoscaling`.
  - b. For instance type, choose any available instance type. The default `t2.micro` works fine for this tutorial.
  - c. For **Number of instances**, enter the number of instances to launch into your cluster. For the purposes of this tutorial, two instances are sufficient.

### Important

Your AWS account incurs the standard Amazon EC2 usage fees for these instances from the time that you launch the instances until you terminate them (which is the final task of this tutorial), even if they remain idle.

- d. (Optional) For **Key pair**, choose a key pair to use for SSH access to your instances. This is not required, but it can be useful for diagnostic purposes if you need to troubleshoot your instances later.
- e. For **Container instance IAM role**, choose an existing Amazon ECS container instance (`ecsInstanceRole`) role that you have already created, or choose **Create new role** to create the required IAM role for your container instances.
- f. Choose **Review and Launch** to proceed. Review your configurations and choose **Launch instance & run service** to finish.

You are directed to a **Launch Status** page that shows the status of your launch and describes each step of the process (this can take a few minutes to complete while your Auto Scaling group is created and populated).

8. When your cluster and service are created, choose **View service** to view your new service.

## Step 2: Configure Service Auto Scaling

Now that you have launched a cluster and created a service in that cluster that is running behind a load balancer, you can configure Service Auto Scaling by creating scaling policies to scale your service up and down in response to CloudWatch alarms.

### To configure basic Service Auto Scaling parameters

1. On the **Service: sample-webapp** page, your service configuration should look similar to the image below (although the task definition revision and load balancer name will likely be different). Choose **Update** to update your new service.



## Details

<b>Cluster</b>	service-autoscaling
<b>Status</b>	ACTIVE
<b>Task Definition</b>	console-sample-app-static:6
<b>Desired count</b>	1
<b>Pending count</b>	0
<b>Running count</b>	1
<b>Service Role</b>	ecsServiceRole

## Load

Load

E

SMA

## Deploy

## Mini

2. On the **Update service** page, choose **Configure Service Auto Scaling**.
3. For **Service Auto Scaling**, choose **Configure Service Auto Scaling** to adjust your service's desired count.

**Service Auto Scaling**

- ☐ Do not adjust the service's desired count
- ☒ Configure Service Auto Scaling to adjust your service's desired count

4. For **Minimum number of tasks**, enter 1 for the lower limit of the number of tasks for Service Auto Scaling to use. Your service's desired count will not be automatically adjusted below this amount.
5. For **Desired number of tasks**, this field is pre-populated with the value you entered earlier. This value must be between the minimum and maximum number of tasks specified on this page. Leave this value at 1.
6. For **Maximum number of tasks**, enter 2 for the upper limit of the number of tasks for Service Auto Scaling to use. Your service's desired count will not be automatically adjusted above this amount.

7. For **IAM role for Service Auto Scaling**, choose an IAM role to authorize the Application Auto Scaling service to adjust your service's desired count on your behalf. If you have not previously created such a role, choose **Create new role** and the role is created for you. For future reference, the role that is created for you is called `ecsAutoscaleRole`. For more information, see [Amazon ECS Service Auto Scaling IAM Role \(p. 210\)](#).

### To configure scaling policies for your service

These steps will help you create scaling policies and CloudWatch alarms that can be used to trigger scaling activities for your service. You can create a scale out alarm to increase the desired count of your service, and a scale in alarm to decrease the desired count of your service.

1. On the **Service Auto Scaling (optional)** page, choose **Add scaling policy** to configure your `ScaleOutPolicy`.
2. For **Policy name**, enter `ScaleOutPolicy`
3. For **Execute policy when**, choose **Create new alarm**.
  - a. For **Alarm name**, enter `sample-webapp-cpu-gt-75`.
  - b. For **ECS service metric**, choose **CPUUtilization**.
  - c. For **Alarm threshold**, enter the following information to match the image below. This causes the CloudWatch alarm to trigger when the service's CPU utilization is greater than 75% for one minute.

Alarm threshold

Average of CPUUtilization > 75

for 1 consecutive periods of 1 minute

- d. Choose **Save** to save your alarm.
4. For **Scaling action**, enter the following information to match the image below. This causes your service's desired count to increase by 1 task when the alarm is triggered.

Scaling action

Add 1 tasks when 75

5. For **Cooldown period**, enter 60 for the number of seconds between scaling actions and choose **Save** to save your `ScaleOutPolicy`.
6. After you return to the **Service Auto Scaling (optional)** page, choose **Add scaling policy** to configure your `ScaleInPolicy`.
7. For **Policy name**, enter `ScaleInPolicy`
8. For **Execute policy when**, choose **Create new alarm**.
  - a. For **Alarm name**, enter `sample-webapp-cpu-lt-25`.
  - b. For **ECS service metric**, choose **CPUUtilization**.
  - c. For **Alarm threshold**, enter the following information to match the image below. This causes the CloudWatch alarm to trigger when the service's CPU utilization is less than 25% for one minute.

**Alarm threshold**  of CPUUtilization    
for  consecutive periods of

d. Choose **Save** to save your alarm.

9. For **Scaling action**, enter the following information to match the image below. This causes your service's desired count to decrease by 1 task when the alarm is triggered.

**Scaling action**    when

10. For **Cooldown period**, enter 60 for the number of seconds between scaling actions and choose **Save** to save your `ScaleInPolicy`.
11. After you return to the **Service Auto Scaling (optional)** page, choose **Save** to finish your Service Auto Scaling configuration.
12. On the **Update Service** page, choose **Update Service**.
13. When your service status is finished updating, choose **View Service**.

## Step 3: Trigger a Scaling Activity

After your service is configured with Service Auto Scaling, you can trigger a scaling activity by pushing your service's CPU utilization into the `ALARM` state. Because the example in this tutorial is a web application that is running behind a load balancer, you can send thousands of HTTP requests to your service (using the `ApacheBench` utility) to spike the service CPU utilization above our threshold amount. This spike should trigger the alarm, which in turn triggers a scaling activity to add one task to your service.

After the `ApacheBench` utility finishes the requests, the service CPU utilization should drop below your 25% threshold, triggering a scale in activity that returns the service's desired count to 1.

### To trigger a scaling activity for your service

- From your service's main view page in the console, choose the load balancer name to view its details in the Amazon EC2 console. You need the load balancer's DNS name, which should look something like this: `EC2Contai-EcsElast-SMAKV74U23PH-96652279.us-east-1.elb.amazonaws.com`.
- Use the `ApacheBench` (**ab**) utility to make thousands of HTTP requests to your load balancer in a short period of time.

#### Note

This command is installed by default on Mac OSX, and it is available for many Linux distributions, as well. For example, you can install **ab** on Amazon Linux with the following command:

```
$ sudo yum install -y httpd24-tools
```

Run the following command, substituting your load balancer's DNS name.

```
$ ab -n 100000 -c 1000 http://EC2Contai-EcsElast-SMAKV74U23PH-96652279.us-east-1.elb.amazonaws.com/
```

3. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
4. Choose **Alarms** in the left navigation pane.
5. Wait for your **ab** HTTP requests to trigger the scale out alarm in the CloudWatch console. You should see your Amazon ECS service scale out and add 1 task to your service's desired count.
6. Shortly after your **ab** HTTP requests complete (between 1 and 2 minutes), your scale in alarm should trigger and the scale in policy reduces your service's desired count back to 1.

## Step 4: Cleaning Up

When you have completed this tutorial, you may choose to keep your cluster, Auto Scaling group, load balancer, and EC2 instances. However, if you are not actively using these resources, you should consider cleaning them up so that your account does not incur unnecessary charges.

### To delete your cluster and CloudWatch alarms

1. In the Amazon ECS console, switch to **Clusters** in the left navigation pane.
2. On the **Clusters** page, choose the **x** in the upper right hand corner of the **service-autoscaling** cluster to delete the cluster.
3. Review and choose **Delete** to confirm your cluster deletion. It may take a few minutes for the cluster AWS CloudFormation stack to finish cleaning up.
4. In the CloudWatch console **Alarms** view, select the alarms that begin with **sample-webapp-cpu-** and then choose **Delete** to delete the alarms.
5. Choose **Yes, Delete** to confirm your alarm deletion.

## Creating a Service

When you create an Amazon ECS service, you specify the basic parameters that define what makes up your service and how it should behave. These parameters create a service definition.

You can optionally configure additional features, such as an Elastic Load Balancing load balancer to distribute traffic across the containers in your service. For more information, see [Service Load Balancing \(p. 138\)](#). You must verify that your container instances can receive traffic from your load balancers. You can allow traffic to all ports on your container instances from your load balancer's security group to ensure that traffic can reach any containers that use dynamically assigned ports.

## Configuring Basic Service Parameters

All services require some basic configuration parameters that define the service, such as the task definition to use, which cluster the service should run on, how many tasks should be placed for the service, and so on; this is called the service definition. For more information about the parameters defined in a service definition, see [Service Definition Parameters \(p. 136\)](#).

This procedure covers creating a service with the basic service definition parameters that are required. After you have configured these parameters, you can create your service or move on to the procedures for optional service definition configuration, such as configuring your service to use a load balancer.

### To configure the basic service definition parameters

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.

2. On the navigation bar, select the region that your cluster is in.
3. In the navigation pane, choose **Task Definitions** and select the task definition from which to create your service.
4. On the **Task Definition name** page, select the revision of the task definition from which to create your service.
5. Review the task definition, and choose **Create Service**.
6. On the **Create Service** page, for **Cluster**, select the cluster in which to create your service. For **Service name**, type a unique name for your service. For **Number of tasks**, type the number of tasks to launch and maintain on your cluster. If your task definition uses static host port mappings on your container instances, then you need at least one container instance with the specified port available in your cluster for each task in your service. This restriction does not apply if your task definition uses dynamic host port mappings. For more information, see [portMappings \(p. 97\)](#).
7. (Optional) You can specify deployment parameters that control how many tasks run during the deployment and the ordering of stopping and starting tasks.
  - **Minimum healthy percent:** Specify a lower limit on the number of your service's tasks that must remain in the `RUNNING` state during a deployment, as a percentage of the service's desired number of tasks (rounded up to the nearest integer). For example, if your service has a desired number of four tasks and a minimum healthy percent of 50%, the scheduler may stop two existing tasks to free up cluster capacity before starting two new tasks. Tasks for services that do not use a load balancer are considered healthy if they are in the `RUNNING` state; tasks for services that do use a load balancer are considered healthy if they are in the `RUNNING` state and the container instance it is hosted on is reported as healthy by the load balancer. The default value for minimum healthy percent is 50% in the console, and 100% with the AWS CLI or SDKs.
  - **Maximum percent:** Specify an upper limit on the number of your service's tasks that are allowed in the `RUNNING` or `PENDING` state during a deployment, as a percentage of the service's desired number of tasks (rounded down to the nearest integer). For example, if your service has a desired number of four tasks and a maximum percent value of 200%, the scheduler may start four new tasks before stopping the four older tasks (provided that the cluster resources required to do this are available). The default value for maximum percent is 200%.
8. (Optional) For **Task Placement**, you can specify how tasks are placed using task placement strategies and constraints. Choose from the following options:
  - **AZ Balanced Spread** - distribute tasks across Availability Zones and across container instances in the Availability Zone.
  - **AZ Balanced BinPack** - distribute tasks across Availability Zones and across container instances with the least available memory.
  - **BinPack** - distribute tasks based on the least available amount of CPU or memory.
  - **One Task Per Host** - place, at most, one task from the service on each container instance.
  - **Custom** - define your own task placement strategy. See [Amazon ECS Task Placement \(p. 125\)](#) for examples.

For more information, see [Amazon ECS Task Placement \(p. 125\)](#).

## (Optional) Configuring Your Service to Use a Load Balancer

If you have an available Elastic Load Balancing load balancer configured, you can attach it to your service with the following procedures, or you can configure a new load balancer. For more information see [Creating a Load Balancer \(p. 142\)](#).

### Note

You must create your Elastic Load Balancing load balancer resources prior to following these procedures.

First, you must choose the load balancer type to use with your service. Then you can configure your service to work with the load balancer.

### To choose a load balancer type

1. If you have not done so already, follow the basic service creation procedures in [Configuring Basic Service Parameters \(p. 157\)](#).
2. On the **Create Service** page, choose **Configure ELB**.
3. Choose the load balancer type to use with your service:

#### Application Load Balancer

Allows containers to use dynamic host port mapping (multiple tasks allowed per container instance). Multiple services can use the same listener port on a single load balancer with rule-based routing and paths.

#### Classic Load Balancer

Requires static host port mappings (only one task allowed per container instance); rule-based routing and paths are not supported.

We recommend that you use Application Load Balancers for your Amazon ECS services so that you can take advantage of the advanced features available to them.

4. For **Select IAM role for service**, choose **Create new role** to create a new role for your service, or select an existing IAM role to use for your service (by default, this is `ecsServiceRole`).

#### Important

If you choose to use an existing `ecsServiceRole` IAM role, you must verify that the role has the proper permissions to use Application Load Balancers and Classic Load Balancers, as shown in [Amazon ECS Service Scheduler IAM Role \(p. 209\)](#).

5. For **ELB Name**, choose the name of the load balancer to use with your service. Only load balancers that correspond to the load balancer type you selected earlier are visible here.
6. The following steps differ based on the load balancer type for your service. If you've chosen an Application Load Balancer, follow the steps in [To configure an Application Load Balancer \(p. 159\)](#). If you've chosen a Classic Load Balancer, follow the steps in [To configure a Classic Load Balancer \(p. 160\)](#).

### To configure an Application Load Balancer

1. For **Select a Container**, choose the container and port combination from your task definition that your load balancer should distribute traffic to, and choose **Add to ELB**.
2. For **Listener port**, choose the listener port and protocol of the listener that you created in [Creating an Application Load Balancer \(p. 143\)](#) (if applicable), or choose **create new** to create a new listener and then enter a port number and choose a port protocol in **Listener protocol**.
3. For **Target group name**, choose the target group that you created in [Creating an Application Load Balancer \(p. 143\)](#) (if applicable), or choose **create new** to create a new target group.
4. (Optional) If you chose to create a new target group, complete the following fields as follows:
  - For **Target group name**, enter a name for your target group.
  - For **Target group protocol**, enter the protocol to use for routing traffic to your tasks.
  - For **Path pattern**, if your listener does not have any existing rules, the default path pattern (/) is used. If your listener already has a default rule, then you must enter a path pattern that matches

traffic that you want to have sent to your service's target group. For example, if your service is a web application called `web-app`, and you want traffic that matches `http://my-elb-url/web-app` to route to your service, then you would enter `/web-app*` as your path pattern. For more information, see [ListenerRules](#) in the *Application Load Balancer Guide*.

- For **Health check path**, enter the path to which the load balancer should send health check pings.
5. When you are finished configuring your Application Load Balancer, choose **Save** to save your configuration and proceed to [Review and Create Your Service \(p. 162\)](#).

### To configure a Classic Load Balancer

1. The **Health check port**, **Health check protocol**, and **Health check path** fields are all pre-populated with the values you configured in [Creating a Classic Load Balancer \(p. 146\)](#) (if applicable). You can update these settings in the Amazon EC2 console.
2. For **Container for ELB health check**, choose the container to send health checks.
3. When you are finished configuring your Classic Load Balancer, choose **Save** to save your configuration and proceed to [Review and Create Your Service \(p. 162\)](#).

## (Optional) Configuring Your Service to Use Service Auto Scaling

Your Amazon ECS service can optionally be configured to use Auto Scaling to adjust its desired count up or down in response to CloudWatch alarms. For more information see [Service Auto Scaling \(p. 149\)](#).

### To configure basic Service Auto Scaling parameters

1. If you have not done so already, follow the basic service creation procedures in [Configuring Basic Service Parameters \(p. 157\)](#).
2. On the **Create Service** page, choose **Configure Service Auto Scaling**.
3. On the **Service Auto Scaling** page, select **Configure Service Auto Scaling to adjust your service's desired count**.
4. For **Minimum number of tasks**, enter the lower limit of the number of tasks for Service Auto Scaling to use. Your service's desired count will not be automatically adjusted below this amount.
5. For **Desired number of tasks**, this field is pre-populated with the value you entered earlier. You can change your service's desired count at this time, but this value must be between the minimum and maximum number of tasks specified on this page.
6. For **Maximum number of tasks**, enter the upper limit of the number of tasks for Service Auto Scaling to use. Your service's desired count will not be automatically adjusted above this amount.
7. For **IAM role for Service Auto Scaling**, choose an IAM role to authorize the Application Auto Scaling service to adjust your service's desired count on your behalf. If you have not previously created such a role, choose **Create new role** and the role will be created for you. For future reference, the role that is created for you is called `ecsAutoscaleRole`. For more information, see [Amazon ECS Service Auto Scaling IAM Role \(p. 210\)](#).

### To configure scaling policies for your service

These steps will help you create scaling policies and CloudWatch alarms that can be used to trigger scaling activities for your service. You can create a **Scale out** alarm to increase the desired count of your service, and a **Scale in** alarm to decrease the desired count of your service.

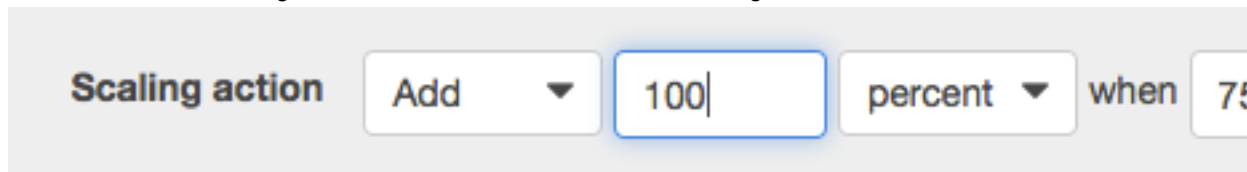
1. For **Policy name**, enter a descriptive name for your policy, or use the default policy name that is already entered.



2. For **Execute policy when**, select the CloudWatch alarm that you want to use to scale your service up or down.

You can use an existing CloudWatch alarm that you have previously created, or you can choose to create a new alarm. The **Create new alarm** workflow allows you to create CloudWatch alarms that are based on the `CPUUtilization` and `MemoryUtilization` of the service that you are creating. To use other metrics, you can create your alarm in the CloudWatch console and then return to this wizard to choose that alarm.

3. (Optional) If you've chosen to create a new alarm, complete the following steps.
  - a. For **Alarm name**, enter a descriptive name for your alarm. For example, if your alarm should trigger when your service CPU utilization exceeds 75%, you could call the alarm `service_name-cpu-gt-75`.
  - b. For **ECS service metric**, choose the service metric to use for your alarm. For more information about these service utilization metrics, see [Service Utilization \(p. 174\)](#).
  - c. For **Alarm threshold**, enter the following information to configure your alarm:
    - Choose the CloudWatch statistic for your alarm (the default value of **Average** works in many cases). For more information, see [Statistics](#) in the *Amazon CloudWatch User Guide*.
    - Choose the comparison operator for your alarm and enter the value that the comparison operator checks against (for example, `>` and `75`).
    - Enter the number of consecutive periods before the alarm is triggered and the period length. For example, a 2 consecutive periods of 5 minutes would take 10 minutes before the alarm triggered. Because your Amazon ECS tasks can scale up and down quickly, you should consider using a low number of consecutive periods and a short period duration to react to alarms as soon as possible.
  - d. Choose **Save** to save your alarm.
4. For **Scaling action**, enter the following information to configure how your service responds to the alarm:
  - Choose whether to add to, subtract from, or set a specific desired count for your service.
  - If you chose to add or subtract tasks, enter the number of tasks (or percent of existing tasks) to add or subtract when the scaling action is triggered. If you chose to set the desired count, enter the desired count that your service should be set to when the scaling action is triggered.
  - (Optional) If you chose to add or subtract tasks, choose whether the previous value is used as an integer or a percent value of the existing desired count.
  - Enter the lower boundary of your step scaling adjustment. By default, for your first scaling action, this value is the metric amount where your alarm is triggered. For example, the following scaling action adds 100% of the existing desired count when the CPU utilization is greater than 75%.



Scaling action   Add   100   percent   when   75%

5. (Optional) You can repeat [Step 4 \(p. 161\)](#) to configure multiple scaling actions for a single alarm (for example, to add 1 task if CPU utilization is between 75-85%, and to add 2 tasks if CPU utilization is greater than 85%).
6. (Optional) If you chose to add or subtract a percentage of the existing desired count, enter a minimum increment value for **Add tasks in increments of *n* task(s)**.
7. For **Cooldown period**, enter the number of seconds between scaling actions.
8. Repeat [Step 1 \(p. 160\)](#) through [Step 7 \(p. 161\)](#) for the **Scale in** policy and choose **Save** to save your Service Auto Scaling configuration.



## Review and Create Your Service

After you have configured your basic service definition parameters and optionally configured your service to use a load balancer, you can review your configuration and then choose **Create Service** to finish creating your service.

### Note

After you create a service, the target group ARN or load balancer name, container name, and container port specified in the service definition are immutable. You cannot add, remove, or change the load balancer configuration of an existing service. If you update the task definition for the service, the container name and container port that were specified when the service was created must remain in the task definition.

## Updating a Service

You can update a running service to change the number of tasks that are maintained by a service or which task definition is used by the tasks. If you have an application that needs more capacity, you can scale up your service to use more of your container instances (as long as they are available). If you have unused capacity that you would like to scale down, you can reduce the number of desired tasks in your service and free up resources.

If you have updated the Docker image of your application, you can create a new task definition with that image and deploy it to your service. The service scheduler uses the minimum healthy percent and maximum percent parameters (in the service's deployment configuration) to determine the deployment strategy.

The minimum healthy percent represents a lower limit on the number of your service's tasks that must remain in the `RUNNING` state during a deployment, as a percentage of the desired number of tasks (rounded up to the nearest integer). This parameter enables you to deploy without using additional cluster capacity. For example, if your service has a desired number of four tasks and a minimum healthy percent of 50%, the scheduler may stop two existing tasks to free up cluster capacity before starting two new tasks. Tasks for services that *do not* use a load balancer are considered healthy if they are in the `RUNNING` state; tasks for services that *do* use a load balancer are considered healthy if they are in the `RUNNING` state and the container instance it is hosted on is reported as healthy by the load balancer. The default value for minimum healthy percent is 50% in the console and 100% for the AWS CLI, the AWS SDKs, and the APIs.

The maximum percent parameter represents an upper limit on the number of your service's tasks that are allowed in the `RUNNING` or `PENDING` state during a deployment, as a percentage of the desired number of tasks (rounded down to the nearest integer). This parameter enables you to define the deployment batch size. For example, if your service has a desired number of four tasks and a maximum percent value of 200%, the scheduler may start four new tasks before stopping the four older tasks (provided that the cluster resources required to do this are available). The default value for maximum percent is 200%.

When the service scheduler replaces a task during an update, if a load balancer is used by the service, the service first removes the task from the load balancer and waits for the connections to drain. Then the equivalent of **docker stop** is issued to the containers running in the task. This results in a `SIGTERM` signal and a 30-second timeout, after which `SIGKILL` is sent and the containers are forcibly stopped. If the container handles the `SIGTERM` signal gracefully and exits within 30 seconds from receiving it, no `SIGKILL` signal is sent. The service scheduler starts and stops tasks as defined by your minimum healthy percent and maximum percent settings.

### Important

If you are changing the ports used by containers in a task definition, you may need to update your container instance security groups to work with the updated ports.

If your service uses a load balancer, the load balancer configuration defined for your service when it was created cannot be changed. If you update the task definition for the service, the container

name and container port that were specified when the service was created must remain in the task definition.

To change the load balancer name, the container name, or the container port associated with a service load balancer configuration, you must create a new service.

Amazon ECS does not automatically update the security groups associated with Elastic Load Balancing load balancers or Amazon ECS container instances.

### To update a running service

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the navigation bar, select the region that your cluster is in.
3. In the navigation pane, choose **Clusters**.
4. On the **Clusters** page, select the name of the cluster that your service resides in.
5. On the **Cluster: *name*** page, choose **Services**.
6. Check the box to the left of the service to update and choose **Update**.
7. On the **Update Service** page, your service information is pre-populated. Change the task definition, deployment configuration, or number of desired tasks (or any combination of these).
8. (Optional) You can use Service Auto Scaling to scale your service up and down automatically in response to CloudWatch alarms.
  - a. Under **Optional configurations**, choose **Configure Service Auto Scaling**.
  - b. Proceed to [Step 3 \(p. 160\)](#) of [\(Optional\) Configuring Your Service to Use Service Auto Scaling \(p. 160\)](#).
  - c. Complete the steps in that section and then return here.
9. Choose **Update Service** to finish and update your service.

## Deleting a Service

You can delete a service if you have no running tasks in it and the desired task count is zero. If the service is actively maintaining tasks, you cannot delete it, and you must update the service to a desired task count of zero. For more information, see [Updating a Service \(p. 162\)](#).

### Note

When you delete a service, if there are still running tasks that require cleanup, the service status moves from **ACTIVE** to **DRAINING**, and the service is no longer visible in the console or in `ListServices` API operations. After the tasks have stopped, then the service status moves from **DRAINING** to **INACTIVE**. Services in the **DRAINING** or **INACTIVE** status can still be viewed with `DescribeServices` API operations; however, in the future, **INACTIVE** services may be cleaned up and purged from Amazon ECS record keeping, and `DescribeServices` API operations on those services will return a `ServiceNotFoundException` error.

Use the following procedure to delete an empty service.

### To delete an empty service

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the navigation bar, select the region that your cluster is in.
3. In the navigation pane, choose **Clusters**.
4. On the **Clusters** page, select the name of the cluster that your service resides in.
5. On the **Cluster : *name*** page, choose **Services**.
6. Check the box to the left of the service to update and choose **Delete**.

**Note**

Your service must have zero desired or running tasks before it can be deleted.

7. Choose **Yes, Delete** to confirm your service deletion.

# Amazon ECR Repositories

Amazon ECR is a managed AWS Docker registry service. Customers can use the familiar Docker CLI to push, pull, and manage images. Amazon ECR provides a secure, scalable, and reliable registry. Amazon ECR supports private Docker repositories with resource-based permissions using AWS IAM so that specific users or Amazon EC2 instances can access repositories and images. Developers can use the Docker CLI to author and manage images.

**Note**

Amazon ECR is available in the following regions:

Region Name	Region
US East (N. Virginia)	us-east-1
US East (Ohio)	us-east-2
US West (N. California)	us-west-1
US West (Oregon)	us-west-2
EU (Ireland)	eu-west-1
EU (London)	eu-west-2
EU (Frankfurt)	eu-central-1
Asia Pacific (Tokyo)	ap-northeast-1
Asia Pacific (Singapore)	ap-southeast-1
Asia Pacific (Sydney)	ap-southeast-2
Canada (Central)	ca-central-1

For more information on how to create repositories, push and pull images from Amazon ECR, and set access controls on your repositories, see the [Amazon EC2 Container Registry User Guide](#).

## Using Amazon ECR Images with Amazon ECS

You can use your ECR images with Amazon ECS, but you need to satisfy some prerequisites:

- Your container instances must be using at least version 1.7.0 of the Amazon ECS container agent. The latest version of the Amazon ECS–optimized AMI supports ECR images in task definitions. For more information, including the latest Amazon ECS–optimized AMI IDs, see [Amazon ECS Container Agent Versions \(p. 68\)](#).
- The Amazon ECS container instance role (`ecsInstanceRole`) that you use with your container instances must possess the following IAM policy permissions for Amazon ECR.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecr:BatchCheckLayerAvailability",
        "ecr:BatchGetImage",
        "ecr:GetDownloadUrlForLayer",
        "ecr:GetAuthorizationToken"
      ],
      "Resource": "*"
    }
  ]
}
```

If you use the `AmazonEC2ContainerServiceforEC2Role` managed policy for your container instances, then your role has the proper permissions. To check that your role supports Amazon ECR, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).

- In your ECS task definitions, make sure that you are using the full `registry/repository:tag` naming for your ECR images. For example, `aws_account_id.dkr.ecr.region.amazonaws.com/my-web-app:latest`.

# Monitoring Amazon ECS

You can monitor your Amazon ECS resources using Amazon CloudWatch, which collects and processes raw data from Amazon ECS into readable, near real-time metrics. These statistics are recorded for a period of two weeks, so that you can access historical information and gain a better perspective on how your clusters or services are performing. Amazon ECS metric data is automatically sent to CloudWatch in 1-minute periods. For more information about CloudWatch, see the [Amazon CloudWatch User Guide](#).

Monitoring is an important part of maintaining the reliability, availability, and performance of Amazon ECS and your AWS solutions. You should collect monitoring data from all of the parts of your AWS solution so that you can more easily debug a multi-point failure if one occurs. Before you start monitoring Amazon ECS; however, you should create a monitoring plan that includes answers to the following questions:

- What are your monitoring goals?
- What resources will you monitor?
- How often will you monitor these resources?
- What monitoring tools will you use?
- Who will perform the monitoring tasks?
- Who should be notified when something goes wrong?

The next step is to establish a baseline for normal Amazon ECS performance in your environment, by measuring performance at various times and under different load conditions. As you monitor Amazon ECS, store historical monitoring data so that you can compare it with current performance data, identify normal performance patterns and performance anomalies, and devise methods to address issues.

To establish a baseline, you should, at a minimum, monitor the following items:

- The CPU and memory reservation and utilization metrics for your Amazon ECS clusters.
- The CPU and memory utilization metrics for your Amazon ECS services.

## Topics

- [Monitoring Tools \(p. 168\)](#)
- [Amazon ECS CloudWatch Metrics \(p. 169\)](#)
- [Amazon ECS Event Stream for CloudWatch Events \(p. 183\)](#)

## Monitoring Tools

AWS provides various tools that you can use to monitor Amazon ECS. You can configure some of these tools to do the monitoring for you, while some of the tools require manual intervention. We recommend that you automate monitoring tasks as much as possible.

### Automated Monitoring Tools

You can use the following automated monitoring tools to watch Amazon ECS and report when something is wrong:

- Amazon CloudWatch alarms – Watch a single metric over a time period that you specify, and perform one or more actions based on the value of the metric relative to a given threshold over a number of time periods. The action is a notification sent to an Amazon Simple Notification Service (Amazon SNS) topic or Auto Scaling policy. CloudWatch alarms do not invoke actions simply because they are in a particular state; the state must have changed and been maintained for a specified number of periods. For more information, see [Amazon ECS CloudWatch Metrics \(p. 169\)](#).

You can use CloudWatch alarms to scale in and scale out the container instances based on CloudWatch metrics, such as cluster memory reservation. For more information, see [Tutorial: Scaling Container Instances with CloudWatch Alarms \(p. 179\)](#)

- Amazon CloudWatch Logs – Monitor, store, and access the operating system and Amazon ECS container agent log files from your Amazon ECS container instances. For more information, see [Using CloudWatch Logs with Container Instances \(p. 49\)](#).

You can also monitor, store, and access the log files from the containers in your Amazon ECS tasks by specifying the `awslogs` log driver in your task definitions. For more information, see [Using the awslogs Log Driver \(p. 114\)](#).

- Amazon CloudWatch Events – Match events and route them to one or more target functions or streams to make changes, capture state information, and take corrective action. For more information, see [Amazon ECS Event Stream for CloudWatch Events \(p. 183\)](#) in this guide and [Using Events](#) in the *Amazon CloudWatch User Guide*.
- AWS CloudTrail log monitoring – Share log files between accounts, monitor CloudTrail log files in real time by sending them to CloudWatch Logs, write log processing applications in Java, and validate that your log files have not changed after delivery by CloudTrail. For more information, see [Logging Amazon ECS API Calls By Using AWS CloudTrail \(p. 268\)](#) in this guide, and [Working with CloudTrail Log Files](#) in the *AWS CloudTrail User Guide*.

### Manual Monitoring Tools

Another important part of monitoring Amazon ECS involves manually monitoring those items that the CloudWatch alarms don't cover. The CloudWatch, Trusted Advisor, and other AWS console dashboards provide an at-a-glance view of the state of your AWS environment. We recommend that you also check the log files on your container instances and the containers in your tasks.

- CloudWatch home page:
  - Current alarms and status
  - Graphs of alarms and resources
  - Service health status

In addition, you can use CloudWatch to do the following:

- Create [customized dashboards](#) to monitor the services you care about
- Graph metric data to troubleshoot issues and discover trends

- Search and browse all your AWS resource metrics
- Create and edit alarms to be notified of problems
- AWS Trusted Advisor can help you monitor your AWS resources to improve performance, reliability, security, and cost effectiveness. Four Trusted Advisor checks are available to all users; more than 50 checks are available to users with a Business or Enterprise support plan. For more information, see [AWS Trusted Advisor](#).

## Amazon ECS CloudWatch Metrics

You can monitor your Amazon ECS resources using Amazon CloudWatch, which collects and processes raw data from Amazon ECS into readable, near real-time metrics. These statistics are recorded for a period of two weeks, so that you can access historical information and gain a better perspective on how your clusters or services are performing. Amazon ECS metric data is automatically sent to CloudWatch in 1-minute periods. For more information about CloudWatch, see the [Amazon CloudWatch User Guide](#).

### Topics

- [Enabling CloudWatch Metrics \(p. 169\)](#)
- [Available Metrics and Dimensions \(p. 169\)](#)
- [Cluster Reservation \(p. 172\)](#)
- [Cluster Utilization \(p. 173\)](#)
- [Service Utilization \(p. 174\)](#)
- [Service RUNNING Task Count \(p. 174\)](#)
- [Viewing Amazon ECS Metrics \(p. 175\)](#)
- [Tutorial: Scaling Container Instances with CloudWatch Alarms \(p. 179\)](#)

## Enabling CloudWatch Metrics

Your Amazon ECS container instances require at least version 1.4.0 of the container agent to enable CloudWatch metrics; however, we recommend using the latest container agent version. For information about checking your agent version and updating to the latest version, see [Updating the Amazon ECS Container Agent \(p. 70\)](#).

If you are starting your agent manually (for example, if you are not using the Amazon ECS-optimized AMI for your container instances), be sure to add volume mounts for the `cgroup` virtual file system and the `execdriver` path. For more information about an example run command with these volume mounts, see [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\) \(p. 74\)](#).

Your Amazon ECS container instances also require `ecs:StartTelemetrySession` permission on the IAM role that you launch your container instances with. If you created your Amazon ECS container instance role before CloudWatch metrics were available for Amazon ECS, then you might need to add this permission. For information about checking your Amazon ECS container instance role and attaching the managed IAM policy for container instances, see [To check for the `ecsInstanceRole` in the IAM console \(p. 207\)](#).

### Note

You can disable CloudWatch metrics collection by setting `ECS_DISABLE_METRICS=true` in your Amazon ECS container agent configuration. For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

## Available Metrics and Dimensions

The metrics and dimensions that Amazon ECS sends to Amazon CloudWatch are listed below.



## Amazon ECS Metrics

Amazon ECS provides metrics for you to monitor the CPU and memory reservation and utilization across your cluster as a whole, and the CPU and memory utilization on the services in your clusters.

Amazon ECS sends the following metrics to CloudWatch every minute. When Amazon ECS collects metrics, it collects multiple data points per customer instance per minute. It then aggregates them to one data point before sending the data to CloudWatch. So in CloudWatch, one sample count is actually the aggregate of multiple data points per instance during one minute.

Metric	Description
CPUReservation	<p>The percentage of CPU units that are reserved by running tasks in the cluster.</p> <p>Cluster CPU reservation (this metric can only be filtered by <code>ClusterName</code>) is measured as the total CPU units that are reserved by Amazon ECS tasks on the cluster, divided by the total CPU units that were registered for all of the container instances in the cluster.</p> <p>Valid Dimensions: <code>ClusterName</code>, <code>ServiceName</code></p> <p>Valid Statistics: Average, Minimum, Maximum, Sum, Data Samples.</p> <p>Unit: Percent</p>
CPUUtilization	<p>The percentage of CPU units that are used in the cluster or service.</p> <p>Cluster CPU utilization (metrics that are filtered by <code>ClusterName</code> without <code>ServiceName</code>) is measured as the total CPU units in use by Amazon ECS tasks on the cluster, divided by the total CPU units that were registered for all of the container instances in the cluster.</p> <p>Service CPU utilization (metrics that are filtered by <code>ClusterName</code> and <code>ServiceName</code>) is measured as the total CPU units in use by the tasks that belong to the service, divided by the total number of CPU units that are reserved for the tasks that belong to the service.</p> <p>Valid Dimensions: <code>ClusterName</code>, <code>ServiceName</code></p> <p>Valid Statistics: Average, Minimum, Maximum, Sum, Data Samples.</p> <p>Unit: Percent</p>
MemoryReservation	<p>The percentage of memory that is reserved by running tasks in the cluster.</p> <p>Cluster memory reservation (this metric can only be filtered by <code>ClusterName</code>) is measured as the total memory that is reserved by Amazon ECS tasks on the cluster, divided by the total amount of memory that was registered for all of the container instances in the cluster.</p>

Metric	Description
	<p>Valid Dimensions: <code>ClusterName</code>, <code>ServiceName</code></p> <p>Valid Statistics: Average, Minimum, Maximum, Sum, Data Samples.</p> <p>Unit: Percent</p>
<code>MemoryUtilization</code>	<p>The percentage of memory that is used in the cluster or service.</p> <p>Cluster memory utilization (metrics that are filtered by <code>ClusterName</code> without <code>ServiceName</code>) is measured as the total memory in use by Amazon ECS tasks on the cluster, divided by the total amount of memory that was registered for all of the container instances in the cluster.</p> <p>Service memory utilization (metrics that are filtered by <code>ClusterName</code> and <code>ServiceName</code>) is measured as the total memory in use by the tasks that belong to the service, divided by the total memory that is reserved for the tasks that belong to the service.</p> <p>Valid Dimensions: <code>ClusterName</code>, <code>ServiceName</code></p> <p>Valid Statistics: Average, Minimum, Maximum, Sum, Data Samples.</p> <p>Unit: Percent</p>

#### Note

On Linux instances, the Amazon ECS container agent relies on Linux cgroup metrics to gather CPU and memory data for each container running on the instance. If you are using an Amazon ECS agent prior to version 1.14.0, ECS includes filesystem cache usage when reporting memory utilization to CloudWatch so your CloudWatch graphs show a higher than actual memory utilization for tasks. To remediate this, starting with Amazon ECS agent version 1.14.0, the Amazon ECS container agent excludes the filesystem cache usage from the memory utilization metric. This change does not impact the out-of-memory behavior of containers.

## Dimensions for Amazon ECS Metrics

Amazon ECS metrics use the `AWS/ECS` namespace and provide metrics for the following dimensions:

Dimension	Description
<code>ClusterName</code>	This dimension filters the data you request for all resources in a specified cluster. All Amazon ECS metrics are filtered by <code>ClusterName</code> .
<code>ServiceName</code>	This dimension filters the data you request for all resources in a specified service within a specified cluster.

## Cluster Reservation

Cluster reservation metrics are measured as the percentage of CPU and memory that is reserved by all Amazon ECS tasks on a cluster when compared to the aggregate CPU and memory that was registered for each active container instance in the cluster.

$$\text{Cluster CPU reservation} = \frac{(\text{Total CPU units reserved by tasks in cluster}) \times 100}{(\text{Total CPU units registered by container instances in cluster})}$$

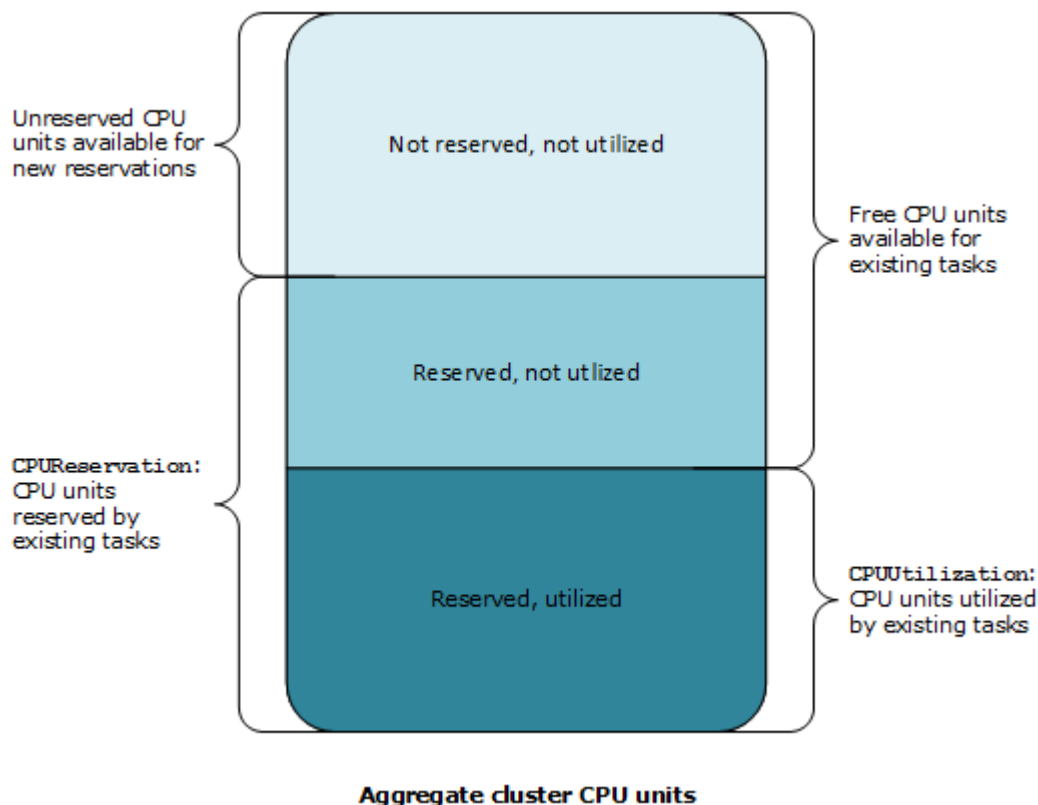
$$\text{Cluster memory reservation} = \frac{(\text{Total MiB of memory reserved by tasks in cluster} \times 100)}{(\text{Total MiB of memory registered by container instances in cluster})}$$

When you run a task in a cluster, Amazon ECS parses its task definition and reserves the aggregate CPU units and MiB of memory that is specified in its container definitions. Each minute, Amazon ECS calculates the number of CPU units and MiB of memory that are currently reserved for each task that is running in the cluster. The total amount of CPU and memory reserved for all tasks running on the cluster is calculated, and those numbers are reported to CloudWatch as a percentage of the total registered resources for the cluster.

For example, a cluster has two active container instances registered, a `c4.4xlarge` instance and a `c4.large` instance. The `c4.4xlarge` instance registers into the cluster with 16,384 CPU units and 30,158 MiB of memory. The `c4.large` instance registers with 2,048 CPU units and 3,768 MiB of memory. The aggregate resources of this cluster are 18,432 CPU units and 33,926 MiB of memory.

If a task definition reserves 1,024 CPU units and 2,048 MiB of memory, and ten tasks are started with this task definition on this cluster (and no other tasks are currently running), a total of 10,240 CPU units and 20,480 MiB of memory are reserved, which is reported to CloudWatch as 55% CPU reservation and 60% memory reservation for the cluster.

The illustration below shows the total registered CPU units in a cluster and what their reservation and utilization means to existing tasks and new task placement. The lower (Reserved, utilized) and center (Reserved, not utilized) blocks represent the total CPU units that are reserved for the existing tasks that are running on the cluster, or the `CPUReservation` CloudWatch metric. The lower block represents the reserved CPU units that the running tasks are actually using on the cluster, or the `CPUUtilization` CloudWatch metric. The upper block represents CPU units that are not reserved by existing tasks; these CPU units are available for new task placement. Existing tasks can utilize these unreserved CPU units as well, if their need for CPU resources increases. For more information, see the [cpu \(p. 99\)](#) task definition parameter documentation.



## Cluster Utilization

Cluster utilization is measured as the percentage of CPU and memory that is used by all Amazon ECS tasks on a cluster when compared to the aggregate CPU and memory that was registered for each active container instance in the cluster.

$$\text{Cluster CPU utilization} = \frac{(\text{Total CPU units used by tasks in cluster}) \times 100}{(\text{Total CPU units registered by container instances in cluster})}$$

$$\text{Cluster memory utilization} = \frac{(\text{Total MiB of memory used by tasks in cluster} \times 100)}{(\text{Total MiB of memory registered by container instances in cluster})}$$

Each minute, the Amazon ECS container agent on each container instance calculates the number of CPU units and MiB of memory that are currently being used for each task that is running on that container instance, and this information is reported back to Amazon ECS. The total amount of CPU and memory used for all tasks running on the cluster is calculated, and those numbers are reported to CloudWatch as a percentage of the total registered resources for the cluster.

For example, a cluster has two active container instances registered, a `c4.4xlarge` instance and a `c4.large` instance. The `c4.4xlarge` instance registers into the cluster with 16,384 CPU units and 30,158 MiB of memory. The `c4.large` instance registers with 2,048 CPU units and 3,768 MiB of memory. The aggregate resources of this cluster are 18,432 CPU units and 33,926 MiB of memory.

If ten tasks are running on this cluster that each consume 1,024 CPU units and 2,048 MiB of memory, a total of 10,240 CPU units and 20,480 MiB of memory are utilized on the cluster, which is reported to CloudWatch as 55% CPU utilization and 60% memory utilization for the cluster.

## Service Utilization

Service utilization is measured as the percentage of CPU and memory that is used by the Amazon ECS tasks that belong to a service on a cluster when compared to the CPU and memory that is defined in the service's task definition.

$$\text{Service CPU utilization} = \frac{(\text{Total CPU units used by tasks in service}) \times 100}{(\text{Total CPU units reserved in task definition}) \times (\text{number of tasks in service})}$$

$$\text{Service memory utilization} = \frac{100 \times (\text{Total MiB of memory used by tasks in service})}{(\text{Total MiB of memory reserved in task definition}) \times (\text{number of tasks in service})}$$

Each minute, the Amazon ECS container agent on each container instance calculates the number of CPU units and MiB of memory that are currently being used for each task owned by the service that is running on that container instance, and this information is reported back to Amazon ECS. The total amount of CPU and memory used for all tasks owned by the service that are running on the cluster is calculated, and those numbers are reported to CloudWatch as a percentage of the total resources that are reserved for the service in the service's task definition. If you specify a soft limit (`memoryReservation`), then it will be used to calculate the amount of reserved memory. Otherwise, the hard limit (`memory`) is used. For more information about hard and soft limits, see [Task Definition Parameters](#).

For example, the task definition for a service reserves a total of 512 CPU units and 1,024 MiB of memory for all of its containers. The service has a desired count of 1 running task, the service is running on a cluster with 1 `c4.large` container instance (with 2,048 CPU units and 3,768 MiB of memory), and there are no other tasks running on the cluster. Although the task has 512 CPU units reserved, because it is the only running task on a container instance with 2,048 CPU units, it has the ability to use up to four times the reserved amount (2,048 / 512); however, the memory reservation of 1,024 MiB is a hard limit and it cannot be exceeded, so service memory utilization cannot exceed 100%.

If this task is performing CPU-intensive work during a period and using all 2,048 of the available CPU units and 512 MiB of memory, then the service reports 400% CPU utilization and 50% memory utilization. If the task is idle and using 128 CPU units and 128 MiB of memory, then the service reports 25% CPU utilization and 12.5% memory utilization.

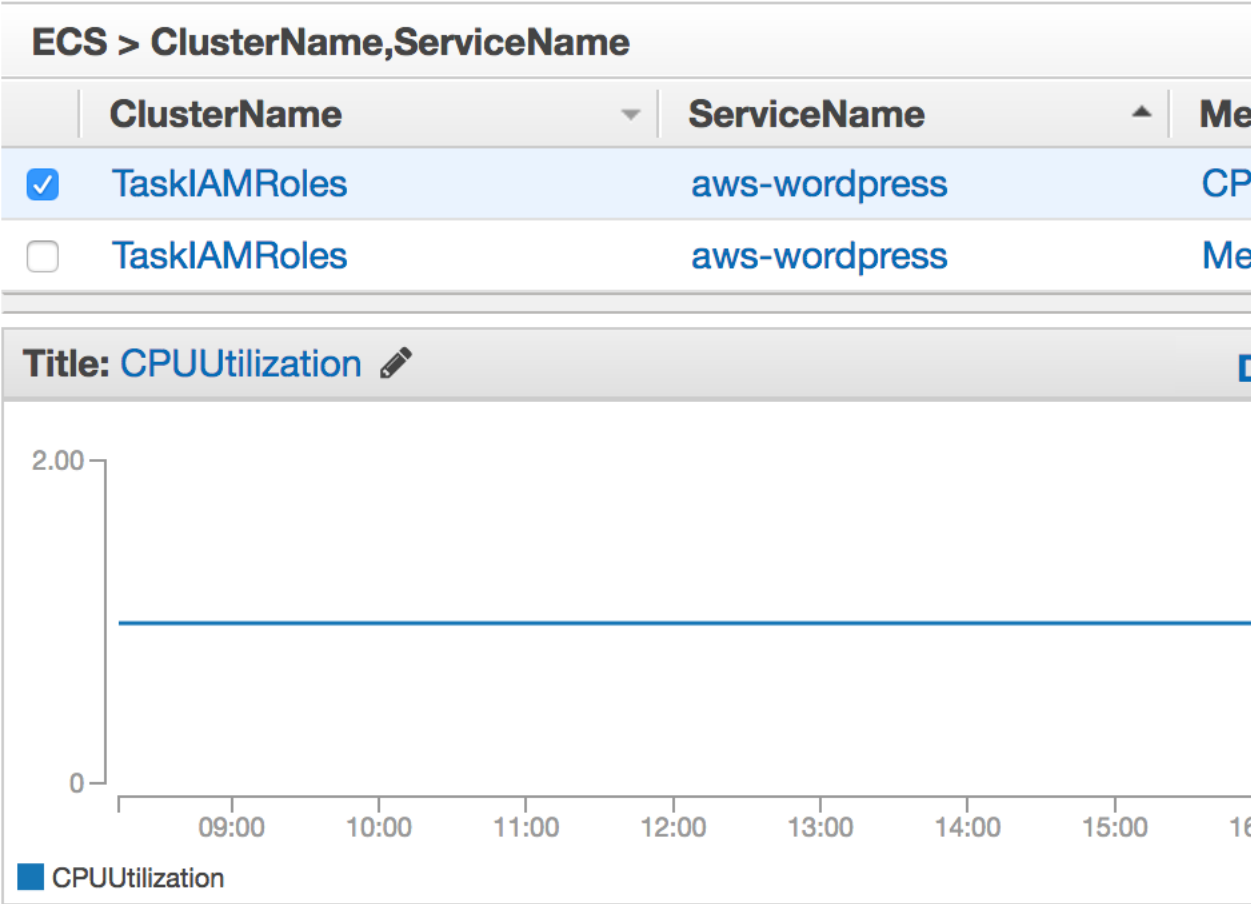
## Service RUNNING Task Count

You can use CloudWatch metrics to view the number of tasks in your services that are in the `RUNNING` state. For example, you can set a CloudWatch alarm for this metric to alert you if the number of running tasks in your service falls below a specified value.

### To view the number of running tasks in a service

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. Under the **Metrics** section of the navigation pane, choose **ECS**.
3. Scroll down to the **ECS > ClusterName,ServiceName** table and choose any metric (either `CPUUtilization` or `MemoryUtilization`) that corresponds to the service to view running tasks in.

4. Change the period to **1 Minute**.
5. Change the statistic to **Data Samples**. The value displayed indicates the number of `RUNNING` tasks in the service.



## Viewing Amazon ECS Metrics

After you have enabled CloudWatch metrics for Amazon ECS, you can view those metrics in both the Amazon ECS and CloudWatch consoles. The Amazon ECS console provides a 24-hour maximum, minimum, and average view of your cluster and service metrics, while the CloudWatch console provides a fine-grained and customizable display of your resources, as well as the number of running tasks in a service.

### Topics

- [Viewing Cluster Metrics in the Amazon ECS Console \(p. 175\)](#)
- [Viewing Service Metrics in the Amazon ECS Console \(p. 177\)](#)
- [Viewing Amazon ECS Metrics in the CloudWatch Console \(p. 178\)](#)

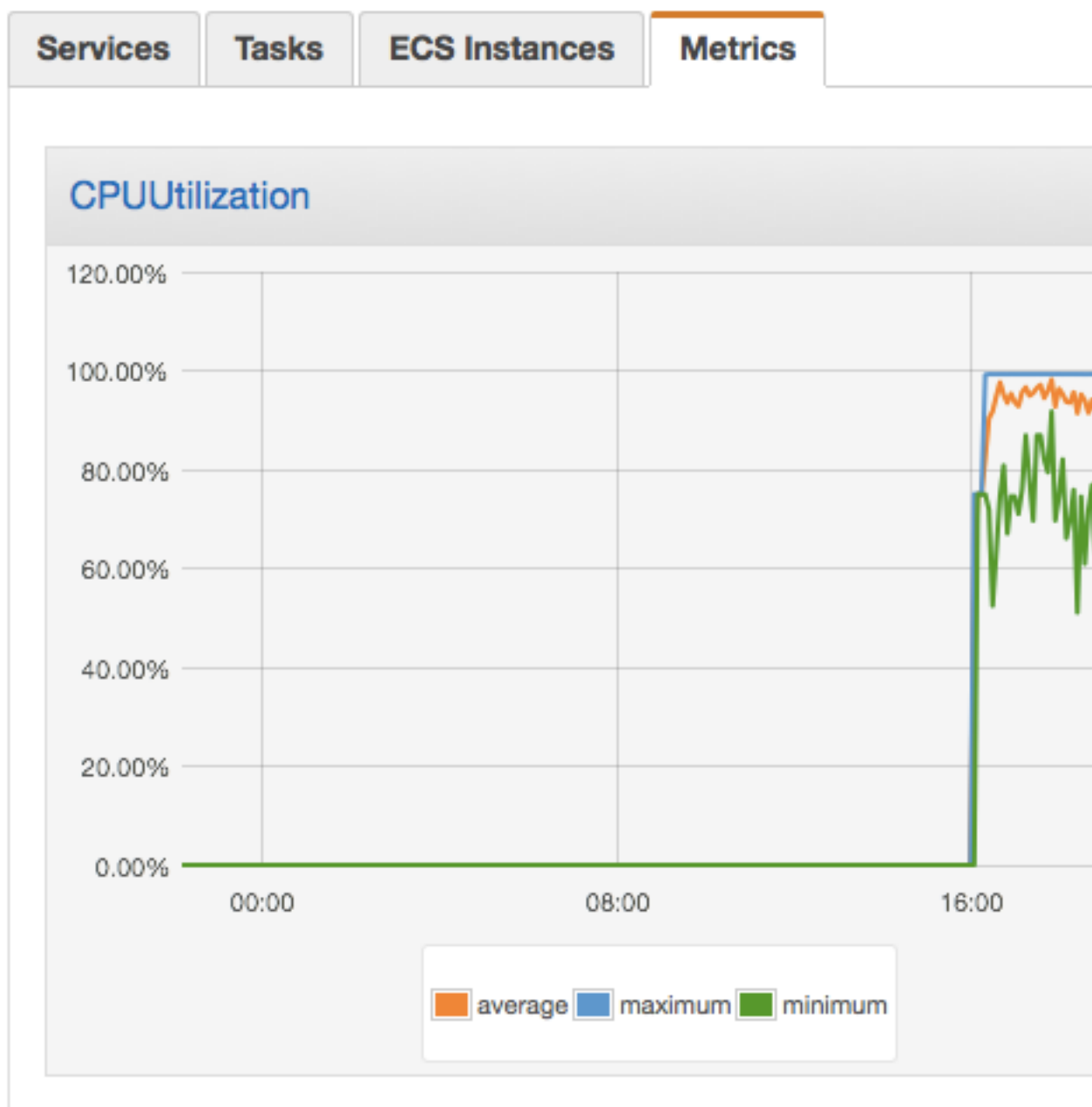
## Viewing Cluster Metrics in the Amazon ECS Console

Cluster and service metrics are available in the Amazon ECS console. The view provided for cluster metrics shows the average, minimum, and maximum values for the previous 24-hour period, with

data points available in 5-minute intervals. For more information about cluster metrics, see [Cluster Reservation](#) (p. 172) and [Cluster Utilization](#) (p. 173).

### To view cluster metrics in the console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. Choose the cluster to view metrics with.
3. On the **Cluster:** *cluster-name* page, choose the **Metrics** tab to view cluster metrics.



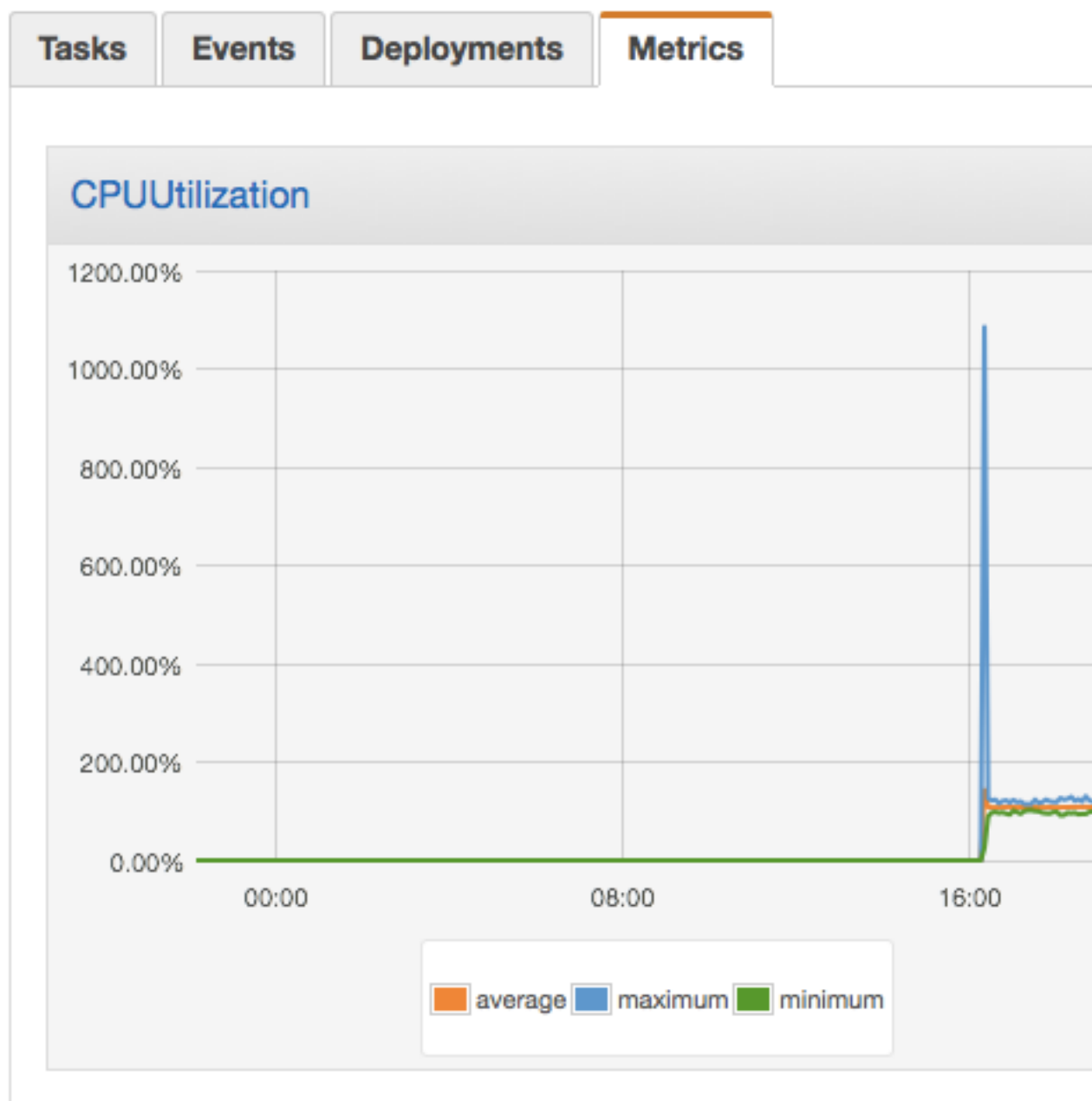
## Viewing Service Metrics in the Amazon ECS Console

Service CPU and memory utilization metrics are available in the Amazon ECS console. The view provided for service metrics shows the average, minimum, and maximum values for the previous 24-hour period, with data points available in 5-minute intervals. For more information about service utilization metrics, see [Service Utilization \(p. 174\)](#).

### To view service metrics in the console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. Choose the cluster that contains the service to view metrics with.
3. On the **Cluster:** *cluster-name* page, choose the **Services** tab to view the services in that cluster.
4. Choose the service to view metrics with.
5. On the **Service:** *service-name* page, choose the **Metrics** tab to view service metrics.





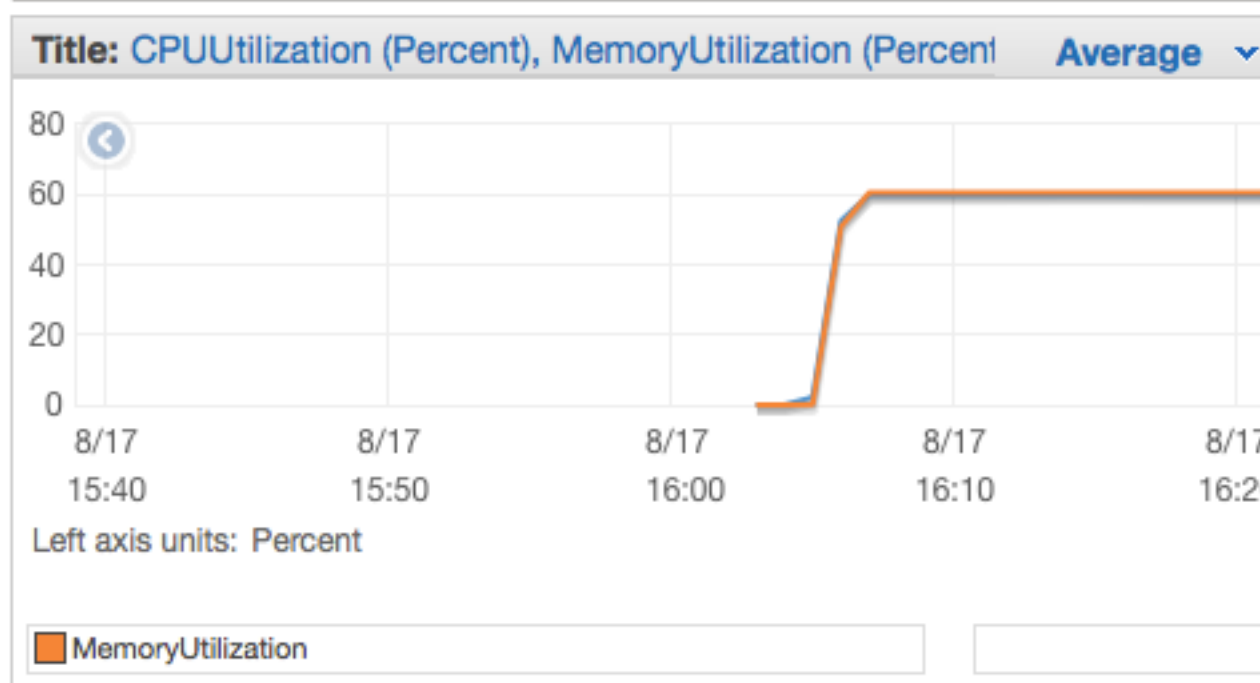
## Viewing Amazon ECS Metrics in the CloudWatch Console

Amazon ECS cluster and service metrics can also be viewed in the CloudWatch console. The CloudWatch console provides the most detailed view of Amazon ECS metrics, and you can tailor the views to suit your needs. You can view [Cluster Reservation](#) (p. 172), [Cluster Utilization](#) (p. 173), [Service Utilization](#) (p. 174), and the [Service RUNNING Task Count](#) (p. 174). For more information about CloudWatch, see the [Amazon CloudWatch User Guide](#).

### To view metrics in the CloudWatch console

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.

2. In the **Metrics** section in the left navigation, choose **ECS**.
3. Choose the metrics to view. Cluster metrics are scoped as **ECS > ClusterName** and service utilization metrics are scoped as **ECS > ClusterName, ServiceName**. The example below shows cluster CPU and memory utilization.



## Tutorial: Scaling Container Instances with CloudWatch Alarms

The following procedures help you to create an Auto Scaling group for an Amazon ECS cluster that you can scale up (and down) using CloudWatch alarms.

Depending on the Amazon EC2 instance types you use in your clusters, and quantity of container instances you have in a cluster, your tasks have a limited amount of resources that they can use when they are run. ECS monitors the resources available in the cluster to work with the schedulers to place tasks. If your cluster runs low on any of these resources, such as memory, you will eventually be unable to launch more tasks until you add more container instances, reduce the number of desired tasks in a service, or stop some of the running tasks in your cluster to free up the constrained resource.

In this tutorial, you create a CloudWatch alarm using the `MemoryReservation` metric for your cluster. When the memory reservation of your cluster rises above 75% (meaning that only 25% of the memory in your cluster is available to for new tasks to reserve), the alarm triggers the Auto Scaling group to add another instance and provide more resources for your tasks and services.

### Prerequisites

This tutorial assumes that you have enabled CloudWatch metrics for your clusters and services. Metrics are not available until the clusters and services send the metrics to CloudWatch, and you cannot create CloudWatch alarms for metrics that do not exist yet.

Your Amazon ECS container instances require at least version 1.4.0 of the container agent to enable CloudWatch metrics. For information about checking your agent version and updating to the latest version, see [Updating the Amazon ECS Container Agent \(p. 70\)](#).

Your Amazon ECS container instances also require `ecs:StartTelemetrySession` permission on the IAM role that you launch your container instances with. If you created your Amazon ECS container instance role before CloudWatch metrics were available for Amazon ECS, then you might need to add this permission. For information about checking your Amazon ECS container instance role and attaching the managed IAM policy for container instances, see [To check for the `ecsInstanceRole` in the IAM console \(p. 207\)](#).

## Step 1: Create a CloudWatch Alarm for a Metric

After you have enabled CloudWatch metrics for your clusters and services, and the metrics for your cluster are visible in the CloudWatch console, you can set alarms on the metrics. For more information, see [Creating Amazon CloudWatch Alarms](#) in the *Amazon CloudWatch User Guide*.

For this tutorial, you create an alarm on the cluster `MemoryReservation` metric to alert when the cluster's memory reservation is above 75%.

### To create a CloudWatch alarm on a metric

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. On the left navigation, choose **Alarms**.
3. Choose **Create Alarm**.
4. In the **CloudWatch Metrics by Category** section, choose **ECS > ClusterName**.
5. On the **Modify Alarm** page, choose the `MemoryReservation` metric for the default cluster and choose **Next**.
6. In the **Alarm Threshold** section, enter a name and description for your alarm.
  - **Name:** `memory-above-75-pct`
  - **Description:** `Cluster memory reservation above 75%`
7. Set the threshold and time period requirement to `MemoryReservation` greater than 75% for 1 period.

#### Alarm Threshold

Provide the details and threshold for your alarm. Use the graph on the right to help set the appropriate threshold.

The screenshot shows the 'Alarm Threshold' configuration form in the AWS CloudWatch console. It includes fields for 'Name' (memory-above-75-pct) and 'Description' (Cluster memory reservation above 75%). Below these, the 'Whenever' section is set to 'MemoryReservation'. The 'is' dropdown is set to '>' and the threshold value is '75'. The 'for' dropdown is set to '1' consecutive period(s).

**Name:**

**Description:**

**Whenever:** MemoryReservation

**is:**  (dropdown menu shows '>')

**for:**  consecutive period(s)

8. (Optional) Configure a notification to send when the alarm is triggered. You can also choose to delete the notification if you don't want to configure one now.
9. Choose **Create Alarm**. Now you can use this alarm to trigger your Auto Scaling group to add a container instance when the memory reservation is above 75%.
10. (Optional) You can also create another alarm that triggers when the memory reservation is below 25%, which you can use to remove a container instance from your Auto Scaling group.

## Step 2: Create a Launch Configuration for an Auto Scaling Group

Now that you have enabled CloudWatch metrics and created an alarm based on one of those metrics, you can create a launch configuration and an Auto Scaling group for your cluster. For more information and other configuration options, see the [Auto Scaling User Guide](#).

### To create an Auto Scaling launch configuration

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. On the left navigation, choose **Auto Scaling Groups**.
3. On the **Welcome to Auto Scaling** page, choose **Create Auto Scaling Group**.
4. On the **Create Auto Scaling Group** page, choose **Create launch configuration**.
5. On the **Choose AMI** step of the **Create Auto Scaling Group** wizard, choose **Community AMIs**.
6. Choose the ECS-optimized AMI for your Auto Scaling group.

To use the Amazon ECS-optimized AMI, type **amazon-ecs-optimized** in the **Search community AMIs** field and press the **Enter** key. Choose **Select** next to the **amzn-ami-2016.09.g-amazon-ecs-optimized** AMI. The current Amazon ECS-optimized AMI IDs by region are listed below for reference.

Region	AMI Name	AMI ID	EC2 console link
us-east-1	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-275ffe31	<a href="#">Launch instance</a>
us-east-2	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-62745007	<a href="#">Launch instance</a>
us-west-1	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-689bc208	<a href="#">Launch instance</a>
us-west-2	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-62d35c02	<a href="#">Launch instance</a>
eu-west-1	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-95f8d2f3	<a href="#">Launch instance</a>
eu-west-2	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-bf9481db	<a href="#">Launch instance</a>
eu-central-1	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-085e8a67	<a href="#">Launch instance</a>
ap-northeast-1	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-f63f6f91	<a href="#">Launch instance</a>
ap-southeast-1	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-b4ae1dd7	<a href="#">Launch instance</a>

Region	AMI Name	AMI ID	EC2 console link
ap-southeast-2	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-fbe9eb98	<a href="#">Launch instance</a>
ca-central-1	amzn-ami-2016.09.g-amazon-ecs-optimized	ami-ee58e58a	<a href="#">Launch instance</a>

- On the **Choose Instance Type** step of the **Create Auto Scaling Group** wizard, choose an instance type for your Auto Scaling group and choose **Next: Configure details**.
- On the **Configure details** step of the **Create Auto Scaling Group** wizard, enter the following information. The other fields are optional. For more information, see [Creating Launch Configurations](#) in the *Auto Scaling User Guide*.
  - Name:** Enter a name for your launch configuration.
  - IAM role:** Select the `ecsInstanceRole` for your container instances. If you do not have this role configured, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).
  - IP Address Type:** Choose the IP address type option that you want for your container instances. If you want external traffic to be able to reach your containers, choose **Assign a public IP address to every instance**.
- (Optional) If you have configuration information that you want to pass to your container instances with EC2 user data, choose **Advanced Details** and enter your user data in the **User data** field. For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).
- Choose **Next: Add Storage**.
- On the **Add Storage** step of the **Create Auto Scaling Group** wizard, make any storage configuration changes you need for your instances and choose **Next: Configure Security Group**.
- On the **Configure Security Group** step of the **Create Auto Scaling Group** wizard, select an existing security group that meets the needs of your containers, or create a new security group and choose **Review**.
- Review your launch configuration and choose **Create launch configuration**.
- Select a private key to use for connecting to your instances with SSH and choose **Create launch configuration** to finish and move on to creating an Auto Scaling group with your new launch configuration.

## Step 3: Create an Auto Scaling Group for your Cluster

After the launch configuration is complete, continue with the following procedure to create an Auto Scaling group that uses your launch configuration.

### To create an Auto Scaling group

- On the **Configure Auto Scaling group details** step of the **Create Auto Scaling Group** wizard, enter the following information and choose **Next: Configure scaling policies**.
  - Group name:** Enter a name for your Auto Scaling group.
  - Group size:** Specify the number of container instances your Auto Scaling group should start with.
  - Network:** Choose a VPC to launch your container instances into.
  - Subnet:** Choose the subnets you would like to launch your container instances into. For a highly available cluster, we recommend that you enable all of the subnets in the region.
- On the **Configure scaling policies** step of the **Create Auto Scaling Group** wizard, choose **Use scaling policies to adjust the capacity of this group**.

3. Enter the minimum and maximum number of container instances for your Auto Scaling group.
4. In the **Increase Group Size** section, enter the following information.
  - **Execute policy when:** Choose the `memory-above-75-pct` CloudWatch alarm you configured earlier.
  - **Take the action:** Enter the number of instances you would like to add to your cluster when the alarm is triggered.
5. If you configured an alarm to trigger a group size reduction, set that alarm in the **Decrease Group Size** section and specify how many instances to remove if that alarm is triggered. Otherwise, collapse the **Decrease Group Size** section by clicking the **X** in the upper-right-hand corner of the section.

**Note**

If you configure your Auto Scaling group to remove container instances, any tasks running on the removed container instances are killed. If your tasks are running as part of a service, Amazon ECS restarts those tasks on another instance if the required resources are available (CPU, memory, ports); however, tasks that were started manually will not be restarted automatically.

6. Choose **Review** to review your Auto Scaling group and then choose **Create Auto Scaling Group** to finish.

## Step 4: Verify and Test your Auto Scaling Group

Now that you've created your Auto Scaling group, you should be able to see your instances launching in the Amazon EC2 console **Instances** page. These instances should register into your Amazon ECS cluster as well after they launch.

To test that your Auto Scaling group is configured properly, you can create some tasks that consume a considerable amount of memory and start launching them into your cluster. After your cluster exceeds the 75% memory reservation from the CloudWatch alarm for the specified number of periods, you should see a new instance launch in the EC2 console.

## Step 5: Cleaning Up

When you have completed this tutorial, you may choose to keep your Auto Scaling group and Amazon EC2 instances in service for your cluster. However, if you are not actively using these resources, you should consider cleaning them up so your account does not incur unnecessary charges. You can delete your Auto Scaling group to terminate the Amazon EC2 instances within it, but your launch configuration remains intact and you can create a new Auto Scaling group with it later if you choose.

### To delete your Auto Scaling group

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. On the left navigation, choose **Auto Scaling Groups**.
3. Choose the Auto Scaling group you created for this tutorial.
4. Choose **Actions** and then choose **Delete**.
5. Choose **Yes, Delete** to delete your Auto Scaling group.

# Amazon ECS Event Stream for CloudWatch Events

You can use Amazon ECS event stream for CloudWatch Events to receive near real-time notifications regarding the current state of both the container instances within an Amazon ECS cluster, and the current state of all tasks running on those container instances.

Using CloudWatch Events, you can build custom schedulers on top of Amazon ECS that are responsible for orchestrating tasks across clusters, and to monitor the state of clusters in near real time. With Amazon ECS CloudWatch events, you can eliminate scheduling and monitoring code that continuously polls the Amazon ECS service for status changes, and instead handle Amazon ECS state changes asynchronously using any CloudWatch Events target, such as AWS Lambda, Amazon Simple Queue Service, Amazon Simple Notification Service, and Amazon Kinesis Streams.

Events from Amazon ECS Event Stream are ensured to be delivered at least one time. In the event that duplicate events are sent, the event provides enough information to identify duplicates. For more information, see [Handling Events \(p. 189\)](#)

Events are relatively ordered, so that you can easily tell when an event occurred in relation to other events.

#### Topics

- [Amazon ECS Events \(p. 184\)](#)
- [Handling Events \(p. 189\)](#)
- [Tutorial: Listening for Amazon ECS CloudWatch Events \(p. 191\)](#)
- [Tutorial: Sending Amazon Simple Notification Service Alerts for Task Stopped Events \(p. 192\)](#)

## Amazon ECS Events

Amazon ECS sends two types of events following events to CloudWatch Events: container instance events and task events. Amazon ECS tracks the state of your container instances and tasks. If either of those resources changes, an event is triggered. These events are classified as either container instance state change events or task state change events. These events and their possible causes are described in greater detail in the following sections.

#### Note

Amazon ECS may add other event types, sources, and details in the future. If you are programmatically deserializing event JSON data, make sure that your application is prepared to handle unknown properties to avoid issues if and when these additional properties are added.

In some cases, multiple events are triggered for the same activity. For example, when a task is started on a container instance, a task state change event is triggered for the new task, and a container instance state change event is triggered to account for the change in available resources (such as CPU, memory, and available ports) on the container instance. Likewise, if a container instance is terminated, events are triggered for the container instance, the container agent connection status, and every task that was running on the container instance.

Events contain two `version` fields; one in the main body of the event, and one in the `detail` object of the event.

- The version in the main body of the event is set to 0 on all events. For more information about CloudWatch Events parameters, see [Events and Event Patterns](#) in the *Amazon CloudWatch Events User Guide*.
- The version in the `detail` object of the event describes the version of the associated resource. Each time a resource changes state, this version is incremented. Because events can be sent multiple times, this field allows you to identify duplicate events (they will have the same version in the `detail` object). If you are replicating your Amazon ECS container instance and task state with CloudWatch events, you can compare the version of a resource reported by the Amazon ECS APIs with the version reported in CloudWatch events for the resource (inside the `detail` object) to verify that the version in your event stream is current.

#### Topics

- [Container Instance State Change Events \(p. 185\)](#)

- [Task State Change Events](#) (p. 188)

## Container Instance State Change Events

The following scenarios trigger container instance state change events:

You call the `StartTask`, `RunTask`, or `StopTask` API operations (either directly, or with the AWS Management Console or SDKs)

Placing or stopping tasks on a container instance modifies the available resources on the container instance (such as CPU, memory, and available ports).

The Amazon ECS service scheduler starts or stops a task

Placing or stopping tasks on a container instance modifies the available resources on the container instance (such as CPU, memory, and available ports).

The Amazon ECS container agent calls the `SubmitTaskStateChange` API operation with a `STOPPED` status for a task with a desired status of `RUNNING`

The Amazon ECS container agent monitors the state of tasks on your container instances, and it reports any state changes. If a task that is supposed to be `RUNNING` is transitioned to `STOPPED`, the agent releases the resources that were allocated to the stopped task (such as CPU, memory, and available ports).

You deregister the container instance with the `DeregisterContainerInstance` API operation (either directly, or with the AWS Management Console or SDKs)

Deregistering a container instance changes the status of the container instance and the connection status of the Amazon ECS container agent.

A task was stopped when EC2 instance was stopped

When you stop a container instance, the tasks that are running on it are transitioned to the `STOPPED` status.

The Amazon ECS container agent registers a container instance for the first time

The first time the Amazon ECS container agent registers a container instance (at launch or when first run manually), this creates a state change event for the instance.

The Amazon ECS container agent connects or disconnects from Amazon ECS

When the Amazon ECS container agent connects or disconnects from the Amazon ECS back end, it changes the `agentConnected` status of the container instance.

### Note

The Amazon ECS container agent periodically disconnects and reconnects (several times per hour) as a part of its normal operation, so agent connection events should be expected and they are not an indication that there is an issue with the container agent or your container instance.

You upgrade the Amazon ECS container agent on an instance

The container instance detail contains an object for the container agent version. If you upgrade the agent, this version information changes and triggers an event.

## Example Example Container Instance State Change Event

Container instance state change events are delivered in the following format (the `detail` section below resembles the [ContainerInstance](#) object that is returned from a [DescribeContainerInstances](#) API operation



in the *Amazon EC2 Container Service API Reference*). For more information about CloudWatch Events parameters, see [Events and Event Patterns](#) in the *Amazon CloudWatch Events User Guide*.

### Note

Amazon ECS may add other event types, sources, and details in the future. If you are programmatically deserializing event JSON data, make sure that your application is prepared to handle unknown properties to avoid issues if and when these additional properties are added.

```
{
  "version": "0",
  "id": "8952ba83-7be2-4ab5-9c32-6687532d15a2",
  "detail-type": "ECS Container Instance State Change",
  "source": "aws.ecs",
  "account": "111122223333",
  "time": "2016-12-06T16:41:06Z",
  "region": "us-east-1",
  "resources": [
    "arn:aws:ecs:us-east-1:111122223333:container-instance/
b54a2a04-046f-4331-9d74-3f6d7f6ca315"
  ],
  "detail": {
    "agentConnected": true,
    "attributes": [
      {
        "name": "com.amazonaws.ecs.capability.logging-driver.syslog"
      },
      {
        "name": "com.amazonaws.ecs.capability.task-iam-role-network-host"
      },
      {
        "name": "com.amazonaws.ecs.capability.logging-driver.awslogs"
      },
      {
        "name": "com.amazonaws.ecs.capability.logging-driver.json-file"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.17"
      },
      {
        "name": "com.amazonaws.ecs.capability.privileged-container"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.18"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.19"
      },
      {
        "name": "com.amazonaws.ecs.capability.ecr-auth"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.20"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.21"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.22"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.23"
      },
      {
        "name": "com.amazonaws.ecs.capability.task-iam-role"
      }
    ]
  }
}
```

```

    ],
    "clusterArn": "arn:aws:ecs:us-east-1:111122223333:cluster/default",
    "containerInstanceArn": "arn:aws:ecs:us-east-1:111122223333:container-instance/
b54a2a04-046f-4331-9d74-3f6d7f6ca315",
    "ec2InstanceId": "i-f3a8506b",
    "registeredResources": [
      {
        "name": "CPU",
        "type": "INTEGER",
        "integerValue": 2048
      },
      {
        "name": "MEMORY",
        "type": "INTEGER",
        "integerValue": 3767
      },
      {
        "name": "PORTS",
        "type": "STRINGSET",
        "stringSetValue": [
          "22",
          "2376",
          "2375",
          "51678",
          "51679"
        ]
      }
    ],
    {
      "name": "PORTS_UDP",
      "type": "STRINGSET",
      "stringSetValue": []
    }
  ],
  "remainingResources": [
    {
      "name": "CPU",
      "type": "INTEGER",
      "integerValue": 1988
    },
    {
      "name": "MEMORY",
      "type": "INTEGER",
      "integerValue": 767
    },
    {
      "name": "PORTS",
      "type": "STRINGSET",
      "stringSetValue": [
        "22",
        "2376",
        "2375",
        "51678",
        "51679"
      ]
    }
  ],
    {
      "name": "PORTS_UDP",
      "type": "STRINGSET",
      "stringSetValue": []
    }
  ],
  "status": "ACTIVE",
  "version": 14801,
  "versionInfo": {
    "agentHash": "aebcbca",
    "agentVersion": "1.13.0",

```

```
    "dockerVersion": "DockerVersion: 1.11.2"
  },
  "updatedAt": "2016-12-06T16:41:06.991Z"
}
```

## Task State Change Events

The following scenarios trigger task state change events:

You call the `StartTask`, `RunTask`, or `StopTask` API operations (either directly, or with the AWS Management Console or SDKs)

Starting or stopping tasks creates new task resources or modifies the state of existing task resources. The Amazon ECS service scheduler starts or stops a task

Starting or stopping tasks creates new task resources or modifies the state of existing task resources. The Amazon ECS container agent calls the `SubmitTaskStateChange` API operation

The Amazon ECS container agent monitors the state of tasks on your container instances, and it reports any state changes (for example, from `PENDING` to `RUNNING`, or from `RUNNING` to `STOPPED`).

You force deregistration of the underlying container instance with the `DeregisterContainerInstance` API operation and the `force` flag (either directly, or with the AWS Management Console or SDKs)

Deregistering a container instance changes the status of the container instance and the connection status of the Amazon ECS container agent. If tasks are running on the container instance, the `force` flag must be set to allow deregistration. This stops all tasks on the instance.

The underlying container instance is stopped or terminated

When you stop or terminate a container instance, the tasks that are running on it are transitioned to the `STOPPED` status.

A container in the task changes state

The Amazon ECS container agent monitors the state of containers within tasks. For example, if a container that is running within a task stops, this container state change triggers an event.

### Example Example Task State Change Event

Task state change events are delivered in the following format (the `detail` section below resembles the [Task](#) object that is returned from a [DescribeTasks](#) API operation in the *Amazon EC2 Container Service API Reference*). For more information about CloudWatch Events parameters, see [Events and Event Patterns](#) in the *Amazon CloudWatch Events User Guide*.

#### Note

Amazon ECS may add other event types, sources, and details in the future. If you are programmatically deserializing event JSON data, make sure that your application is prepared to handle unknown properties to avoid issues if and when these additional properties are added.

```
{
  "version": "0",
  "id": "9bcdac79-b31f-4d3d-9410-fbd727c29fab",
  "detail-type": "ECS Task State Change",
  "source": "aws.ecs",
  "account": "111122223333",
  "time": "2016-12-06T16:41:06Z",
  "region": "us-east-1",
  "resources": [
    "arn:aws:ecs:us-east-1:111122223333:task/b99d40b3-5176-4f71-9a52-9dbd6f1cebef"
  ]
}
```

```

    ],
    "detail": {
      "clusterArn": "arn:aws:ecs:us-east-1:111122223333:cluster/default",
      "containerInstanceArn": "arn:aws:ecs:us-east-1:111122223333:container-instance/
b54a2a04-046f-4331-9d74-3f6d7f6ca315",
      "containers": [
        {
          "containerArn": "arn:aws:ecs:us-east-1:111122223333:container/3305beal-
bd16-4217-803d-3e0482170a17",
          "exitCode": 0,
          "lastStatus": "STOPPED",
          "name": "xray",
          "taskArn": "arn:aws:ecs:us-east-1:111122223333:task/
b99d40b3-5176-4f71-9a52-9dbd6f1cebef"
        }
      ],
      "createdAt": "2016-12-06T16:41:05.702Z",
      "desiredStatus": "RUNNING",
      "lastStatus": "RUNNING",
      "overrides": {
        "containerOverrides": [
          {
            "name": "xray"
          }
        ]
      },
      "startedAt": "2016-12-06T16:41:06.8Z",
      "startedBy": "ecs-svc/9223370556150183303",
      "updatedAt": "2016-12-06T16:41:06.975Z",
      "taskArn": "arn:aws:ecs:us-east-1:111122223333:task/
b99d40b3-5176-4f71-9a52-9dbd6f1cebef",
      "taskDefinitionArn": "arn:aws:ecs:us-east-1:111122223333:task-definition/xray:2",
      "version": 4
    }
  }
}

```

## Handling Events

Amazon ECS sends events on an "at least once" basis. This means you may receive more than a single copy of a given event. Additionally, events may not be delivered to your event listeners in the order in which the events occurred.

To enable proper ordering of events, the `detail` section of each event contains a `version` property. Events with a higher version property number should be treated as occurring later than events with lower version numbers. Events with matching version numbers can be treated as duplicates.

## Example: Handling Events in an AWS Lambda Function

The following example shows a Lambda function written in Python 2.7 that captures both task and container instance state change events, and saves them to one of two Amazon DynamoDB tables:

- **ECSCtrlInstanceState:** Stores the latest state for a container instance. The table ID is the `containerInstanceArn` value of the container instance.
- **ECSTaskState:** Stores the latest state for a task. The table ID is the `taskArn` value of the task.

```

import json
import boto3

def lambda_handler(event, context):
    id_name = ""

```

```

new_record = {}

# For debugging so you can see raw event format.
print('Here is the event:')
print(json.dumps(event))

if event["source"] != "aws.ecs":
    raise ValueError("Function only supports input from events with a source type of:
aws.ecs")

# Switch on task/container events.
table_name = ""
if event["detail-type"] == "ECS Task State Change":
    table_name = "ECSTaskState"
    id_name = "taskArn"
    event_id = event["detail"]["taskArn"]
elif event["detail-type"] == "ECS Container Instance State Change":
    table_name = "ECSCtrInstanceState"
    id_name = "containerInstanceArn"
    event_id = event["detail"]["containerInstanceArn"]
else:
    raise ValueError("detail-type for event is not a supported type. Exiting without
saving event.")

new_record["cw_version"] = event["version"]
new_record.update(event["detail"])

# "status" is a reserved word in DDB, but it appears in containerPort
# state change messages.
if "status" in event:
    new_record["current_status"] = event["status"]
    new_record.pop("status")

# Look first to see if you have received a newer version of an event ID.
# If the version is OLDER than what you have on file, do not process it.
# Otherwise, update the associated record with this latest information.
print("Looking for recent event with same ID...")
dynamodb = boto3.resource("dynamodb", region_name="us-east-1")
table = dynamodb.Table(table_name)
saved_event = table.get_item(
    Key={
        id_name : event_id
    }
)
if "Item" in saved_event:
    # Compare events and reconcile.
    print("EXISTING EVENT DETECTED: Id " + event_id + " - reconciling")
    if saved_event["Item"]["version"] < event["detail"]["version"]:
        print("Received event is more recent version than stored event - updating")
        table.put_item(
            Item=new_record
        )
    else:
        print("Received event is more recent version than stored event - ignoring")
else:
    print("Saving new event - ID " + event_id)

    table.put_item(
        Item=new_record
    )

```

## Tutorial: Listening for Amazon ECS CloudWatch Events

In this tutorial, you set up a simple AWS Lambda function that listens for Amazon ECS task events and writes them out to a CloudWatch Logs log stream.

### Step 1: Set Up a Test Cluster

If you do not have a running cluster to capture events from, follow the steps in [Getting Started with Amazon ECS \(p. 20\)](#) to create one. At the end of this tutorial, you run a task on this cluster to test that you have configured your Lambda function correctly.

### Step 2: Create the Lambda Function

In this procedure, you will create a simple Lambda function to serve as a target for Amazon ECS event stream messages.

1. Open the AWS Lambda console at <https://console.aws.amazon.com/lambda/>.
2. Choose **Create a Lambda function**.
3. On the **Select blueprint** screen, for **Select runtime**, choose **Python 2.7** and choose **hello-world-python**.
4. In the **Lambda function code** section, edit the sample code to match the following example:

```
import json

def lambda_handler(event, context):
    if event["source"] != "aws.ecs":
        raise ValueError("Function only supports input from events with a source type of: aws.ecs")

    print('Here is the event:')
    print(json.dumps(event))
```

This is a simple Python 2.7 function that prints the event sent by Amazon ECS. If everything is configured correctly, at the end of this tutorial, you see the event details appear in the CloudWatch Logs log stream associated with this Lambda function.

5. On the **Configure triggers** screen, choose **Next**. (You configure your event source later.)
6. On the **Configure function** screen, for **Name**, enter **eventstream-handler**.
7. In the **Lambda function handler and role** section, for **Role**, choose **Create a custom role**. A new window pops up enabling you to create a new role for your Lambda function.
8. On the **AWS Lambda requires access to your resources** screen, accept the defaults and choose **Allow**.
9. On the **Configure function** screen, choose **Next, Create function**.

### Step 3: Register Event Rule

Next, you create a CloudWatch Events event rule that captures task events coming from your Amazon ECS clusters. This rule captures all events coming from all clusters within the account where it is defined. The task messages themselves contain information about the event source, including the cluster on which it resides, that you can use to filter and sort events programmatically.

#### Note

When you use the AWS Management Console to create an event rule, the console automatically adds the IAM permissions necessary to grant CloudWatch Events permission to call your Lambda function. If you are creating an event rule using the AWS CLI, you need to grant this permission explicitly. For more information, see [Events and Event Patterns](#) in the *Amazon CloudWatch User Guide*.

#### To route events to your Lambda function

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. On the navigation pane, choose **Events**, **Create rule**.
3. For **Event selector**, choose **ECS** as the event source. By default, the rule applies to all Amazon ECS events for all of your Amazon ECS groups. Alternatively, you can select specific events or a specific Amazon ECS group.
4. For **Targets**, choose **Add target**, for **Target type**, choose **Lambda function**, and then select your Lambda function.
5. Choose **Configure details**.
6. For **Rule definition**, type a name and description for your rule and choose **Create rule**.

## Step 4: Test Your Rule

Finally, you create a CloudWatch Events event rule that captures task events coming from your Amazon ECS clusters. This rule captures all events coming from all clusters within the account where it is defined. The task messages themselves contain information about the event source, including the cluster on which it resides, that you can use to filter and sort events programmatically.

#### To test your rule

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. Choose **Clusters**, **default**.
3. On the **Cluster : default** screen, choose **Tasks**, **Run new Task**.
4. For **Task Definition**, select the latest version of **console-sample-app-static** and choose **Run Task**.
5. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
6. On the navigation pane, choose **Logs** and select the log group for your Lambda function (for example, `/aws/lambda/my-function`).
7. Select a log stream to view the event data.

## Tutorial: Sending Amazon Simple Notification Service Alerts for Task Stopped Events

In this tutorial, you configure a CloudWatch Events event rule that only captures task events where the task has stopped running because one of its essential containers has terminated. The event sends only task events with a specific `stoppedReason` property to the designated Amazon SNS topic.

## Step 1: Set Up a Test Cluster

If you do not have a running cluster to capture events from, follow the steps in [Getting Started with Amazon ECS \(p. 20\)](#) to create one. At the end of this tutorial, you run a task on this cluster to test that you have configured your Amazon SNS topic and CloudWatch Events event rule correctly.

## Step 2: Create and Subscribe to an Amazon SNS Topic

For this tutorial, you configure an Amazon SNS topic to serve as an event target for your new event rule.

### To create a Amazon SNS topic

1. Open the Amazon SNS console at <https://console.aws.amazon.com/sns/v2/home>.
2. Choose **Topics, Create new topic**.
3. On the **Create new topic** window, for **Topic name**, enter **TaskStoppedAlert** and choose **Create topic**.
4. On the **Topics** window, select the topic that you just created. On the **Topic details: TaskStoppedAlert** screen, choose **Create subscription**.
5. On the **Create Subscription** window, for **Protocol**, choose **Email**. For **Endpoint**, enter an email address to which you currently have access and choose **Create subscription**.
6. Check your email account, and wait to receive a subscription confirmation email message. When you receive it, choose **Confirm subscription**.

## Step 3: Register Event Rule

Next, you register an event rule that captures only task-stopped events for tasks with stopped containers.

### To create an event rule

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. On the navigation pane, choose **Events, Create rule**.
3. Choose **Show advanced options, edit**.
4. For **Build a pattern that selects events for processing by your targets**, replace the existing text with the following text:

```
{
  "source": [
    "aws.ecs"
  ],
  "detail-type": [
    "ECS Task State Change"
  ],
  "detail": {
    "lastStatus": [
      "STOPPED"
    ],
    "stoppedReason": [
      "Essential container in task exited"
    ]
  }
}
```

This code defines a CloudWatch Events event rule that matches any event where the `lastStatus` and `stoppedReason` fields match the indicated values. For more information about event patterns, see [Events and Event Patterns](#) in the *Amazon CloudWatch User Guide*.

5. For **Targets**, choose **Add target**. For **Target type**, choose **SNS topic**, and then choose **TaskStoppedAlert**.
6. Choose **Configure details**.
7. For **Rule definition**, type a name and description for your rule and then choose **Create rule**.



## Step 4: Test Your Rule

To test your rule, you attempt to run a task that exits shortly after it starts. If your event rule is configured correctly, you receive an email message within a few minutes with the event text.

### To test a rule

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. Choose **Task Definitions**, **Create new Task Definition**.
3. For **Task Definition Name**, type **WordPressFailure** and choose **Add Container**.
4. For **Container name**, type **Wordpress**, for **Image**, type **wordpress**, and for **Maximum memory (MB)**, type **128**.
5. Choose **Add**, **Create**.
6. On the **Task Definition** screen, choose **Actions**, **Run Task**.
7. For **Cluster**, choose **default** and then **Run Task**.
8. On the **Tasks** tab for your cluster, periodically choose the refresh icon until you no longer see your task running. For **Desired task status**, choose **Stopped** to verify that your task has stopped.
9. Check your email to confirm that you have received an email alert for the stopped notification.

# Amazon ECS IAM Policies, Roles, and Permissions

By default, IAM users don't have permission to create or modify Amazon ECS resources, or perform tasks using the Amazon ECS API. (This means that they also can't do so using the Amazon ECS console or the AWS CLI.) To allow IAM users to create or modify resources and perform tasks, you must create IAM policies that grant IAM users permission to use the specific resources and API actions they'll need, and then attach those policies to the IAM users or groups that require those permissions.

When you attach a policy to a user or group of users, it allows or denies the users permission to perform the specified tasks on the specified resources. For more general information about IAM policies, see [Permissions and Policies](#) in the *IAM User Guide*. For more information about managing and creating custom IAM policies, see [Managing IAM Policies](#).

Likewise, Amazon ECS container instances make calls to the Amazon ECS and Amazon EC2 APIs on your behalf, so they need to authenticate with your credentials. This authentication is accomplished by creating an IAM role for your container instances and associating that role with your container instances when you launch them. For more information, see [Amazon ECS Container Instance IAM Role](#) (p. 206). If you use an Elastic Load Balancing load balancer with your Amazon ECS services, calls to the Amazon EC2 and Elastic Load Balancing APIs are made on your behalf to register and deregister container instances with your load balancers. For more information, see [Amazon ECS Service Scheduler IAM Role](#) (p. 209). For more general information about IAM roles, see [IAM Roles](#) in the *IAM User Guide*.

## Getting Started

An IAM policy must grant or deny permission to use one or more Amazon ECS actions. It must also specify the resources that can be used with the action, which can be all resources, or in some cases, specific resources. The policy can also include conditions that you apply to the resource.

Amazon ECS partially supports resource-level permissions. This means that for some Amazon ECS API actions, you cannot specify which resource a user is allowed to work with for that action; instead, you have to allow users to work with all resources for that action.

### Topics

- [Policy Structure](#) (p. 196)
- [Supported Resource-Level Permissions for Amazon ECS API Actions](#) (p. 199)
- [Creating Amazon ECS IAM Policies](#) (p. 202)
- [Managed Policies](#) (p. 202)
- [Amazon ECS Container Instance IAM Role](#) (p. 206)
- [Amazon ECS Service Scheduler IAM Role](#) (p. 209)

- [Amazon ECS Service Auto Scaling IAM Role \(p. 210\)](#)
- [Amazon EC2 Container Service Task Role \(p. 212\)](#)
- [IAM Roles for Tasks \(p. 212\)](#)
- [Amazon ECS IAM Policy Examples \(p. 217\)](#)

## Policy Structure

The following topics explain the structure of an IAM policy.

### Topics

- [Policy Syntax \(p. 196\)](#)
- [Actions for Amazon ECS \(p. 197\)](#)
- [Amazon Resource Names for Amazon ECS \(p. 197\)](#)
- [Condition Keys for Amazon ECS \(p. 198\)](#)
- [Checking that Users Have the Required Permissions \(p. 199\)](#)

## Policy Syntax

An IAM policy is a JSON document that consists of one or more statements. Each statement is structured as follows:

```
{
  "Statement": [{
    "Effect": "effect",
    "Action": "action",
    "Resource": "arn",
    "Condition": {
      "condition": {
        "key": "value"
      }
    }
  }]
}
```

There are various elements that make up a statement:

- **Effect:** The *effect* can be `Allow` or `Deny`. By default, IAM users don't have permission to use resources and API actions, so all requests are denied. An explicit allow overrides the default. An explicit deny overrides any allows.
- **Action:** The *action* is the specific API action for which you are granting or denying permission. To learn about specifying *action*, see [Actions for Amazon ECS \(p. 197\)](#).
- **Resource:** The resource that's affected by the action. Some Amazon ECS API actions allow you to include specific resources in your policy that can be created or modified by the action. To specify a resource in the statement, you need to use its Amazon Resource Name (ARN). For more information about specifying the *arn* value, see [Amazon Resource Names for Amazon ECS \(p. 197\)](#). For more information about which API actions support which ARNs, see [Supported Resource-Level Permissions for Amazon ECS API Actions \(p. 199\)](#). If the API action does not support ARNs, use the `*` wildcard to specify that all resources can be affected by the action.
- **Condition:** Conditions are optional. They can be used to control when your policy will be in effect. For more information about specifying conditions for Amazon ECS, see [Condition Keys for Amazon ECS \(p. 198\)](#).

For more information about example IAM policy statements for Amazon ECS, see [Creating Amazon ECS IAM Policies \(p. 202\)](#).

## Actions for Amazon ECS

In an IAM policy statement, you can specify any API action from any service that supports IAM. For Amazon ECS, use the following prefix with the name of the API action: `ecs:`. For example: `ecs:RunTask` and `ecs:CreateCluster`.

To specify multiple actions in a single statement, separate them with commas as follows:

```
"Action": ["ecs:action1", "ecs:action2"]
```

You can also specify multiple actions using wildcards. For example, you can specify all actions whose name begins with the word "Describe" as follows:

```
"Action": "ecs:Describe*"
```

To specify all Amazon ECS API actions, use the `*` wildcard as follows:

```
"Action": "ecs:*"
```

For a list of Amazon ECS actions, see [Actions](#) in the *Amazon EC2 Container Service API Reference*.

## Amazon Resource Names for Amazon ECS

Each IAM policy statement applies to the resources that you specify using their ARNs.

### Important

Currently, not all API actions support individual ARNs; we'll add support for additional API actions and ARNs for additional Amazon ECS resources later. For information about which ARNs you can use with which Amazon ECS API actions, as well as supported condition keys for each ARN, see [Supported Resource-Level Permissions for Amazon ECS API Actions \(p. 199\)](#).

An ARN has the following general syntax:

```
arn:aws:[service]:[region]:[account]:resourceType/resourcePath
```

*service*

The service (for example, `ecs`).

*region*

The region for the resource (for example, `us-east-1`).

*account*

The AWS account ID, with no hyphens (for example, `123456789012`).

*resourceType*

The type of resource (for example, `instance`).

*resourcePath*

A path that identifies the resource. You can use the `*` wildcard in your paths.

For example, you can indicate a specific cluster (`default`) in your statement using its ARN as follows:

```
"Resource": "arn:aws:ecs:us-east-1:123456789012:cluster/default"
```

You can also specify all clusters that belong to a specific account by using the `*` wildcard as follows:

```
"Resource": "arn:aws:ecs:us-east-1:123456789012:cluster/*"
```

To specify all resources, or if a specific API action does not support ARNs, use the `*` wildcard in the `Resource` element as follows:

```
"Resource": "*" 
```

The following table describes the ARNs for each type of resource used by the Amazon ECS API actions.

Resource Type	ARN
All Amazon ECS resources	<code>arn:aws:ecs:*</code>
All Amazon ECS resources owned by the specified account in the specified region	<code>arn:aws:ecs:region:account:*</code>
Cluster	<code>arn:aws:ecs:region:account:cluster/cluster-name</code>
Container instance	<code>arn:aws:ecs:region:account:container-instance/container-instance-id</code>
Task definition	<code>arn:aws:ecs:region:account:task-definition/task-definition-family-name:task-definition-revision-number</code>
Service	<code>arn:aws:ecs:region:account:service/service-name</code>
Task	<code>arn:aws:ecs:region:account:task/task-id</code>
Container	<code>arn:aws:ecs:region:account:container/container-id</code>

Many Amazon ECS API actions accept multiple resources. To specify multiple resources in a single statement, separate their ARNs with commas, as follows:

```
"Resource": ["arn1", "arn2"]
```

For more general information about ARNs, see [Amazon Resource Names \(ARN\) and AWS Service Namespaces](#) in the *Amazon Web Services General Reference*.

## Condition Keys for Amazon ECS

In a policy statement, you can optionally specify conditions that control when it is in effect. Each condition contains one or more key-value pairs. Condition keys are not case-sensitive. We've defined AWS-wide condition keys, plus additional service-specific condition keys.

If you specify multiple conditions, or multiple keys in a single condition, we evaluate them using a logical AND operation. If you specify a single condition with multiple values for one key, we evaluate the condition using a logical OR operation. For permission to be granted, all conditions must be met.

You can also use placeholders when you specify conditions. For more information, see [Policy Variables](#) in the *IAM User Guide*.

Amazon ECS implements the AWS-wide condition keys (see [Available Keys](#)), plus the following service-specific condition keys. (We'll add support for additional service-specific condition keys for Amazon ECS later.)

Condition Key	Key/Value Pair	Evaluation Types
ecs:cluster	"ecs:cluster": " <i>cluster-arn</i> "  Where <i>cluster-arn</i> is the ARN for the Amazon ECS cluster	ARN, Null
ecs:container-instances	"ecs:container-instances": " <i>container-instance-arns</i> "  Where <i>container-instance-arns</i> is one or more container instance ARNs.	ARN, Null

For information about which condition keys you can use with which Amazon ECS resources, on an action-by-action basis, see [Supported Resource-Level Permissions for Amazon ECS API Actions](#) (p. 199). For example policy statements for Amazon ECS, see [Creating Amazon ECS IAM Policies](#) (p. 202).

## Checking that Users Have the Required Permissions

After you've created an IAM policy, we recommend that you check whether it grants users the permissions to use the particular API actions and resources they need before you put the policy into production.

First, create an IAM user for testing purposes, and then attach the IAM policy that you created to the test user. Then, make a request as the test user. You can make test requests in the console or with the AWS CLI.

### Note

You can also test your policies with the [IAM Policy Simulator](#). For more information on the policy simulator, see [Working with the IAM Policy Simulator](#) in the *IAM User Guide*.

If the action that you are testing creates or modifies a resource, you should make the request using the `DryRun` parameter (or run the AWS CLI command with the `--dry-run` option). In this case, the call completes the authorization check, but does not complete the operation. For example, you can check whether the user can terminate a particular instance without actually terminating it. If the test user has the required permissions, the request returns `DryRunOperation`; otherwise, it returns `UnauthorizedOperation`.

If the policy doesn't grant the user the permissions that you expected, or is overly permissive, you can adjust the policy as needed and retest until you get the desired results.

### Important

It can take several minutes for policy changes to propagate before they take effect. Therefore, we recommend that you allow five minutes to pass before you test your policy updates.

If an authorization check fails, the request returns an encoded message with diagnostic information. You can decode the message using the `DecodeAuthorizationMessage` action. For more information, see [DecodeAuthorizationMessage](#) in the *AWS Security Token Service API Reference*, and [decode-authorization-message](#) in the *AWS Command Line Interface Reference*.

## Supported Resource-Level Permissions for Amazon ECS API Actions

*Resource-level permissions* refers to the ability to specify which resources users are allowed to perform actions on. Amazon ECS has partial support for resource-level permissions. This means that for certain Amazon ECS actions, you can control when users are allowed to use those actions based on conditions

that have to be fulfilled, or specific resources that users are allowed to use. For example, you can grant users permission to launch instances, but only of a specific type, and only using a specific AMI.

The following table describes the Amazon ECS API actions that currently support resource-level permissions, as well as the supported resources, resource ARNs, and condition keys for each action.

**Important**

If an Amazon ECS API action is not listed in this table, then it does not support resource-level permissions. If an Amazon ECS API action does not support resource-level permissions, you can grant users permission to use the action, but you have to specify a \* for the resource element of your policy statement.

API action	Resource	Condition keys
DeleteAttributes	Container instance  <i>arn:aws:ecs:region:account:container-instance/container-instance-id</i>	ecs:cluster
DeleteCluster	Cluster  <i>arn:aws:ecs:region:account:cluster/my-cluster</i>	N/A
DeregisterContainerInstances	Cluster  <i>arn:aws:ecs:region:account:cluster/my-cluster</i>	N/A
DescribeClusters	Cluster  <i>arn:aws:ecs:region:account:cluster/my-cluster1,</i> <i>arn:aws:ecs:region:account:cluster/my-cluster2</i>	N/A
DescribeContainerInstances	Container instance  <i>arn:aws:ecs:region:account:container-instance/container-instance-id1,</i> <i>arn:aws:ecs:region:account:container-instance/container-instance-id2</i>	ecs:cluster
DescribeTasks	Task  <i>arn:aws:ecs:region:account:task/1abf0f6d-a411-4033-b8eb-a4eed3ad252a,</i> <i>arn:aws:ecs:region:account:task/1abf0f6d-a411-4033-b8eb-a4eed3ad252b</i>	ecs:cluster
ListAttributes	Cluster  <i>arn:aws:ecs:region:account:cluster/my-cluster</i>	N/A
ListContainerInstances	Cluster  <i>arn:aws:ecs:region:account:cluster/my-cluster</i>	N/A

API action	Resource	Condition keys
ListTasks	Container instance  arn:aws:ecs:region:account:container-instance/container-instance-id	ecs:cluster
Poll	Container instance  arn:aws:ecs:region:account:container-instance/container-instance-id	ecs:cluster
PutAttributes	Container instance  arn:aws:ecs:region:account:container-instance/container-instance-id	ecs:cluster
RegisterContainerInstance	Cluster  arn:aws:ecs:region:account:cluster/my-cluster	N/A
RunTask	Task definition  arn:aws:ecs:region:account:task-definition/hello_world:8	ecs:cluster
StartTask	Task definition  arn:aws:ecs:region:account:task-definition/hello_world:8	ecs:cluster ecs:container-instances
StartTelemetrySession	Container instance  arn:aws:ecs:region:account:container-instance/container-instance-id	ecs:cluster
StopTask	Task  arn:aws:ecs:region:account:task/1abf0f6d-a411-4033-b8eb-a4eed3ad252a	ecs:cluster
SubmitContainerStateChange	Cluster  arn:aws:ecs:region:account:cluster/my-cluster	N/A
SubmitTaskStateChange	Cluster  arn:aws:ecs:region:account:cluster/my-cluster	N/A
UpdateContainerAgent	Container instance  arn:aws:ecs:region:account:container-instance/container-instance-id	ecs:cluster
UpdateContainerInstancesState	Container instance  arn:aws:ecs:region:account:container-instance/container-instance-id	ecs:cluster



## Creating Amazon ECS IAM Policies

You can create specific IAM policies to restrict the calls and resources that users in your account have access to, and then attach those policies to IAM users.

When you attach a policy to a user or group of users, it allows or denies the users permission to perform the specified tasks on the specified resources. For more general information about IAM policies, see [Permissions and Policies](#) in the *IAM User Guide*. For more information about managing and creating custom IAM policies, see [Managing IAM Policies](#).

### To create an IAM policy for a user

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Policies** and then choose **Create Policy**.
3. In the **Create Policy** section, choose **Select** next to **Create Your Own Policy**.
4. In the **Policy Name** field, type your own unique name, such as `AmazonECSUserPolicy`.
5. In the **Policy Document** field, paste the policy to apply to the user. For example policies, see [Amazon ECS IAM Policy Examples \(p. 217\)](#).
6. Choose **Create Policy** to finish.

### To attach an IAM policy to a user

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Users** and then choose the user you would like to attach the policy to.
3. In the **Permissions** tab, choose **Attach Policy**.
4. In the **Attach Policy** section, select the custom policy you created in the previous procedure and then choose **Attach Policy**.

## Managed Policies

Amazon ECS and Amazon ECR provide several managed policies that you can attach to IAM users or EC2 instances that allow differing levels of control over resources and API operations. You can apply these policies directly, or you can use them as starting points for creating your own policies.

### Topics

- [Amazon ECS Managed Policies \(p. 202\)](#)
- [Amazon ECR Managed Policies \(p. 205\)](#)

## Amazon ECS Managed Policies

Amazon ECS provides several managed policies that you can attach to IAM users or EC2 instances that allow differing levels of control over Amazon ECS resources and API operations. You can apply these policies directly, or you can use them as starting points for creating your own policies. For more information about each API operation mentioned in these policies, see [Actions](#) in the *Amazon EC2 Container Service API Reference*.

### Topics

- [AmazonEC2ContainerServiceFullAccess \(p. 203\)](#)

- [AmazonEC2ContainerServiceforEC2Role](#) (p. 203)
- [AmazonEC2ContainerServiceRole](#) (p. 204)
- [AmazonEC2ContainerServiceAutoscaleRole](#) (p. 204)
- [AmazonEC2ContainerServiceTaskRole](#) (p. 205)

## AmazonEC2ContainerServiceFullAccess

This policy allows full administrator access to Amazon ECS.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "autoscaling:Describe*",
        "autoscaling:UpdateAutoScalingGroup",
        "cloudformation:CreateStack",
        "cloudformation:DeleteStack",
        "cloudformation:DescribeStack*",
        "cloudformation:UpdateStack",
        "cloudwatch:GetMetricStatistics",
        "ec2:Describe*",
        "elasticloadbalancing:*",
        "ecs:*",
        "iam:ListInstanceProfiles",
        "iam:ListRoles",
        "iam:PassRole"
      ],
      "Resource": "*"
    }
  ]
}
```

## AmazonEC2ContainerServiceforEC2Role

This policy allows Amazon ECS container instances to make calls to AWS on your behalf. For more information, see [Amazon ECS Container Instance IAM Role](#) (p. 206).

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:CreateCluster",
        "ecs:DeregisterContainerInstance",
        "ecs:DiscoverPollEndpoint",
        "ecs:Poll",
        "ecs:RegisterContainerInstance",
        "ecs:StartTelemetrySession",
        "ecs:Submit*",
        "ecr:GetAuthorizationToken",
        "ecr:BatchCheckLayerAvailability",
        "ecr:GetDownloadUrlForLayer",
        "ecr:BatchGetImage",
        "logs:CreateLogStream",
        "logs:PutLogEvents"
      ]
    }
  ]
}
```

```
    ],  
    "Resource": "*"br/>  }  
]  
}
```

## AmazonEC2ContainerServiceRole

This policy allows Elastic Load Balancing load balancers to register and deregister Amazon ECS container instances on your behalf. For more information, see [Amazon ECS Service Scheduler IAM Role \(p. 209\)](#).

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Effect": "Allow",  
      "Action": [  
        "ec2:AuthorizeSecurityGroupIngress",  
        "ec2:Describe*",  
        "elasticloadbalancing:DeregisterInstancesFromLoadBalancer",  
        "elasticloadbalancing:DeregisterTargets",  
        "elasticloadbalancing:Describe*",  
        "elasticloadbalancing:RegisterInstancesWithLoadBalancer",  
        "elasticloadbalancing:RegisterTargets"  
      ],  
      "Resource": "*"br/>    }  
  ]  
}
```

## AmazonEC2ContainerServiceAutoscaleRole

This policy allows Application Auto Scaling to scale your Amazon ECS service's desired count up and down in response to CloudWatch alarms on your behalf. For more information, see [Amazon ECS Service Auto Scaling IAM Role \(p. 210\)](#).

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Sid": "Stmt1456535218000",  
      "Effect": "Allow",  
      "Action": [  
        "ecs:DescribeServices",  
        "ecs:UpdateService"  
      ],  
      "Resource": [  
        "*"br/>      ]  
    },  
    {  
      "Sid": "Stmt1456535243000",  
      "Effect": "Allow",  
      "Action": [  
        "cloudwatch:DescribeAlarms"  
      ],  
      "Resource": [  
        "*"br/>      ]  
    }  
  ]  
}
```

```
}
```

## AmazonEC2ContainerServiceTaskRole

This policy allows containers in your Amazon ECS tasks to make calls to the AWS APIs on your behalf. For more information, see [Amazon EC2 Container Service Task Role](#) (p. 212).

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "ecs-tasks.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

## Amazon ECR Managed Policies

Amazon ECR provides several managed policies that you can attach to IAM users or EC2 instances that allow differing levels of control over Amazon ECR resources and API operations. You can apply these policies directly, or you can use them as starting points for creating your own policies. For more information about each API operation mentioned in these policies, see [Actions](#) in the *Amazon EC2 Container Registry API Reference*.

### Topics

- [AmazonEC2ContainerRegistryFullAccess](#) (p. 205)
- [AmazonEC2ContainerRegistryPowerUser](#) (p. 205)
- [AmazonEC2ContainerRegistryReadOnly](#) (p. 206)

## AmazonEC2ContainerRegistryFullAccess

This policy allows full administrator access to Amazon ECR.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecr:*"
      ],
      "Resource": "*"
    }
  ]
}
```

## AmazonEC2ContainerRegistryPowerUser

This policy allows power user access to Amazon ECR, which allows read and write access to repositories, but does not allow users to delete repositories or change the policy documents applied to them.

```
{
  "Version": "2012-10-17",
  "Statement": [{
    "Effect": "Allow",
    "Action": [
      "ecr:GetAuthorizationToken",
      "ecr:BatchCheckLayerAvailability",
      "ecr:GetDownloadUrlForLayer",
      "ecr:GetRepositoryPolicy",
      "ecr:DescribeRepositories",
      "ecr:ListImages",
      "ecr:DescribeImages",
      "ecr:BatchGetImage",
      "ecr:InitiateLayerUpload",
      "ecr:UploadLayerPart",
      "ecr:CompleteLayerUpload",
      "ecr:PutImage"
    ],
    "Resource": "*"
  }]
}
```

## AmazonEC2ContainerRegistryReadOnly

This policy allows read-only access to Amazon ECR, such as the ability to list repositories and the images within the repositories, and also to pull images from Amazon ECR with the Docker CLI.

```
{
  "Version": "2012-10-17",
  "Statement": [{
    "Effect": "Allow",
    "Action": [
      "ecr:GetAuthorizationToken",
      "ecr:BatchCheckLayerAvailability",
      "ecr:GetDownloadUrlForLayer",
      "ecr:GetRepositoryPolicy",
      "ecr:DescribeRepositories",
      "ecr:ListImages",
      "ecr:DescribeImages",
      "ecr:BatchGetImage"
    ],
    "Resource": "*"
  }]
}
```

## Amazon ECS Container Instance IAM Role

The Amazon ECS container agent makes calls to the Amazon ECS API actions on your behalf, so container instances that run the agent require an IAM policy and role for the service to know that the agent belongs to you. Before you can launch container instances and register them into a cluster, you must create an IAM role for those container instances to use when they are launched. This requirement applies to container instances launched with the Amazon ECS-optimized AMI provided by Amazon, or with any other instances that you intend to run the agent on.

### Important

Containers that are running on your container instances have access to all of the permissions that are supplied to the container instance role through [instance metadata](#). We recommend that you limit the permissions in your container instance role to the minimal list of permissions provided in the managed `AmazonEC2ContainerServiceforEC2Role` policy shown below. If the containers in

your tasks need extra permissions that are not listed here, we recommend providing those tasks with their own IAM roles. For more information, see [IAM Roles for Tasks \(p. 212\)](#).

You can prevent containers on the `docker0` bridge from accessing the permissions supplied to the container instance role (while still allowing the permissions that are provided by [IAM Roles for Tasks \(p. 212\)](#)) by running the following `iptables` command on your container instances; however, containers will not be able to query instance metadata with this rule in effect. Note that this command assumes the default Docker bridge configuration and it will not work for containers that use the `host` network mode. For more information, see [Network Mode \(p. 96\)](#).

```
$ iptables --insert FORWARD 1 --in-interface docker+ --destination
169.254.169.254/32 --jump DROP
```

The `AmazonEC2ContainerServiceforEC2Role` policy is shown below.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:CreateCluster",
        "ecs:DeregisterContainerInstance",
        "ecs:DiscoverPollEndpoint",
        "ecs:Poll",
        "ecs:RegisterContainerInstance",
        "ecs:StartTelemetrySession",
        "ecs:Submit*",
        "ecr:GetAuthorizationToken",
        "ecr:BatchCheckLayerAvailability",
        "ecr:GetDownloadUrlForLayer",
        "ecr:BatchGetImage",
        "logs:CreateLogStream",
        "logs:PutLogEvents"
      ],
      "Resource": "*"
    }
  ]
}
```

#### Note

The `ecs:CreateCluster` line in the above policy is optional, provided that the cluster you intend to register your container instance into already exists. If the cluster does not already exist, the agent must have permission to create it, or you can create the cluster with the **create-cluster** command prior to launching your container instance.

If you omit the `ecs:CreateCluster` line, the Amazon ECS container agent will not be able to create clusters, including the default cluster.

The `ecs:Poll` line in the above policy is used to grant the agent permission to connect with the Amazon ECS service to report status and get commands.

The Amazon ECS instance role is automatically created for you in the console first-run experience; however, you should manually attach the managed IAM policy for container instances to allow Amazon ECS to add permissions for future features and enhancements as they are introduced. You can use the following procedure to check and see if your account already has the Amazon ECS instance role and to attach the managed IAM policy if needed.

#### To check for the `ecsInstanceRole` in the IAM console

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.

3. Search the list of roles for `ecsInstanceRole`. If the role does not exist, use the procedure below to create the role. If the role does exist, select the role to view the attached policies.
4. Choose the **Permissions** tab.
5. In the **Managed Policies** section, ensure that the **AmazonEC2ContainerServiceforEC2Role** managed policy is attached to the role. If the policy is attached, your Amazon ECS instance role is properly configured. If not, follow the substeps below to attach the policy.
  - a. Choose **Attach Policy**.
  - b. In the **Filter** box, type **AmazonEC2ContainerServiceforEC2Role** to narrow the available policies to attach.
  - c. Check the box to the left of the **AmazonEC2ContainerServiceforEC2Role** policy and choose **Attach Policy**.
6. Choose the **Trust Relationships** tab, and **Edit Trust Relationship**.
7. Verify that the trust relationship contains the following policy. If the trust relationship matches the policy below, choose **Cancel**. If the trust relationship does not match, copy the policy into the **Policy Document** window and choose **Update Trust Policy**.

```
{
  "Version": "2008-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "ec2.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

### To create the `ecsInstanceRole` IAM role for your container instances

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles** and then choose **Create New Role**.
3. In the **Role Name** field, type `ecsInstanceRole` to name the role, and then choose **Next Step**.
4. In the **Select Role Type** section, choose **Select** next to the **Amazon EC2 Role for EC2 Container Service** role.
5. In the **Attach Policy** section, select the **AmazonEC2ContainerServiceforEC2Role** policy and then choose **Next Step**.
6. Review your role information and then choose **Create Role** to finish.

## Adding Amazon S3 Read-only Access to your Container Instance Role

Storing configuration information in a private bucket in Amazon S3 and granting read-only access to your container instance IAM role is a secure and convenient way to allow container instance configuration at launch time. You can store a copy of your `ecs.config` file in a private bucket, use Amazon EC2 user data to install the AWS CLI and then copy your configuration information to `/etc/ecs/ecs.config` when the instance launches.

For more information about creating an `ecs.config` file, storing it in Amazon S3, and launching instances with this configuration, see [Storing Container Instance Configuration in Amazon S3 \(p. 81\)](#).

### To allow Amazon S3 read-only access for your container instance role

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.
3. Choose the IAM role you use for your container instances (this role is likely titled `ecsInstanceRole`). For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).
4. Choose the **Permissions** tab.
5. Under **Managed Policies**, choose **Attach Policy**.
6. On the **Attach Policy** page, type `s3` into the **Filter** field to narrow the policy results.
7. Check the box to the left of the **AmazonS3ReadOnlyAccess** policy and click **Attach Policy**.

#### Note

This policy allows read-only access to all Amazon S3 resources. For more restrictive bucket policy examples, see [Bucket Policy Examples](#) in the Amazon Simple Storage Service Developer Guide.

## Amazon ECS Service Scheduler IAM Role

The Amazon ECS service scheduler makes calls to the Amazon EC2 and Elastic Load Balancing APIs on your behalf to register and deregister container instances with your load balancers. Before you can attach a load balancer to an Amazon ECS service, you must create an IAM role for your services to use before you start them. This requirement applies to any Amazon ECS service that you plan to use with a load balancer.

In most cases, the Amazon ECS service role is created for you automatically in the console first-run experience. You can use the following procedure to check if your account already has the Amazon ECS service role.

The `AmazonEC2ContainerServiceRole` policy is shown below.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ec2:AuthorizeSecurityGroupIngress",
        "ec2:Describe*",
        "elasticloadbalancing:DeregisterInstancesFromLoadBalancer",
        "elasticloadbalancing:DeregisterTargets",
        "elasticloadbalancing:Describe*",
        "elasticloadbalancing:RegisterInstancesWithLoadBalancer",
        "elasticloadbalancing:RegisterTargets"
      ],
      "Resource": "*"
    }
  ]
}
```

#### Note

The `ec2:AuthorizeSecurityGroupIngress` rule is reserved for future use. Amazon ECS does not automatically update the security groups associated with Elastic Load Balancing load balancers or Amazon ECS container instances.

### To check for the `ecsServiceRole` in the IAM console

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.



2. In the navigation pane, choose **Roles**.
3. Search the list of roles for `ecsServiceRole`. If the role does not exist, use the procedure below to create the role. If the role does exist, select the role to view the attached policies.
4. Choose the **Permissions** tab.
5. In the **Managed Policies** section, ensure that the **AmazonEC2ContainerServiceRole** managed policy is attached to the role. If the policy is attached, your Amazon ECS service role is properly configured. If not, follow the substeps below to attach the policy.
  - a. Choose **Attach Policy**.
  - b. In the **Filter** box, type **AmazonEC2ContainerServiceRole** to narrow the available policies to attach.
  - c. Check the box to the left of the **AmazonEC2ContainerServiceRole** policy and choose **Attach Policy**.
6. Choose the **Trust Relationships** tab, and **Edit Trust Relationship**.
7. Verify that the trust relationship contains the following policy. If the trust relationship matches the policy below, choose **Cancel**. If the trust relationship does not match, copy the policy into the **Policy Document** window and choose **Update Trust Policy**.

```
{
  "Version": "2008-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "ecs.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

### To create an IAM role for your service scheduler load balancers

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles** and then choose **Create New Role**.
3. In the **Role Name** field, type `ecsServiceRole` to name the role, and then choose **Next Step**.
4. In the **Select Role Type** section, scroll down and choose **Select** next to the **Amazon EC2 Container Service Role** service role.
5. In the **Attach Policy** section, select the **AmazonEC2ContainerServiceRole** policy and then choose **Next Step**.
6. Review your role information and then choose **Create Role** to finish.

## Amazon ECS Service Auto Scaling IAM Role

Before you can use Service Auto Scaling with Amazon ECS, the Application Auto Scaling service needs permission to describe your CloudWatch alarms and registered services, as well as permission to update your Amazon ECS service's desired count on your behalf. These permissions are provided by the Service Auto Scaling IAM role (`ecsAutoscaleRole`).

### Note

IAM users also require permissions to use Service Auto Scaling; these permissions are described in [Service Auto Scaling Required IAM Permissions](#) (p. 150). If an IAM user has the required

permissions to use Service Auto Scaling in the Amazon ECS console, create IAM roles, and attach IAM role policies to them, then that user can create this role automatically as part of the Amazon ECS console [create service](#) (p. ) or [update service](#) (p. 162) workflows, and then use the role for any other service later (in the console or with the CLI/SDKs).

You can use the following procedure to check and see if your account already has Service Auto Scaling.

The `AmazonEC2ContainerServiceAutoscaleRole` policy is shown below.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "Stmt1456535218000",
      "Effect": "Allow",
      "Action": [
        "ecs:DescribeServices",
        "ecs:UpdateService"
      ],
      "Resource": [
        "*"
      ]
    },
    {
      "Sid": "Stmt1456535243000",
      "Effect": "Allow",
      "Action": [
        "cloudwatch:DescribeAlarms"
      ],
      "Resource": [
        "*"
      ]
    }
  ]
}
```

### To check for the Service Auto Scaling role in the IAM console

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles**.
3. Search the list of roles for `ecsAutoscaleRole`. If the role does not exist, use the procedure below to create the role. If the role does exist, select the role to view the attached policies.
4. Choose the **Permissions** tab.
5. In the **Managed Policies** section, ensure that the **AmazonEC2ContainerServiceAutoscaleRole** managed policy is attached to the role. If the policy is attached, your Amazon ECS service role is properly configured. If not, follow the substeps below to attach the policy.
  - a. Choose **Attach Policy**.
  - b. For **Filter**, type `AmazonEC2ContainerServiceAutoscaleRole` to narrow the available policies to attach.
  - c. Select the box to the left of the **AmazonEC2ContainerAutoscaleRole** policy and choose **Attach Policy**.
6. Choose **Trust Relationships, Edit Trust Relationship**.
7. Verify that the trust relationship contains the following policy. If the trust relationship matches the policy below, choose **Cancel**. If the trust relationship does not match, copy the policy into the **Policy Document** window and choose **Update Trust Policy**.

```
{
```

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "application-autoscaling.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

### To create an IAM role for Service Auto Scaling

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles** and then choose **Create New Role**.
3. In the **Role Name** field, type `ecsAutoscaleRole` to name the role, and then choose **Next Step**.
4. In the **Select Role Type** section, scroll down and choose **Select** next to the **Amazon EC2 Container Service Autoscale Role** service role.
5. In the **Attach Policy** section, select the **AmazonEC2ContainerServiceAutoscaleRole** policy and then choose **Next Step**.
6. Review your role information and then choose **Create Role** to finish.

## Amazon EC2 Container Service Task Role

Before you can use IAM roles for tasks, Amazon ECS needs permission to make calls to the AWS APIs on your behalf. These permissions are provided by the Amazon EC2 Container Service Task Role.

You can create a task IAM role for each task definition that needs permission to call AWS APIs. You simply create an IAM policy that defines which permissions your task should have, and then attach that policy to a role that uses the Amazon EC2 Container Service Task Role managed policy. For more information, see [Creating an IAM Role and Policy for your Tasks \(p. 214\)](#).

The Amazon EC2 Container Service Task Role trust relationship is shown below.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "ecs-tasks.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

## IAM Roles for Tasks

With IAM roles for Amazon ECS tasks, you can specify an IAM role that can be used by the containers in a task. Applications must sign their AWS API requests with AWS credentials, and this feature provides a

strategy for managing credentials for your applications to use, similar to the way that Amazon EC2 instance profiles provide credentials to EC2 instances. Instead of creating and distributing your AWS credentials to the containers or using the EC2 instance's role, you can associate an IAM role with an ECS task definition or `RunTask` API operation. The applications in the task's containers can then use the AWS SDK or CLI to make API requests to authorized AWS services.

### Important

Containers that are running on your container instances have access to all of the permissions that are supplied to the container instance role. We recommend that you limit the permissions in your container instance role to the minimal list of permissions shown in [Amazon ECS Container Instance IAM Role \(p. 206\)](#).

You can prevent containers on the `docker0` bridge from accessing the permissions supplied to the container instance role (while still allowing the permissions that are provided by IAM roles for tasks) by running the following **iptables** command on your container instances; however, containers will not be able to query instance metadata with this rule in effect. Note that this command assumes the default Docker bridge configuration and it will not work for containers that use the `host` network mode. For more information, see [Network Mode \(p. 96\)](#).

```
$ iptables --insert FORWARD 1 --in-interface docker+ --destination  
169.254.169.254/32 --jump DROP
```

You define the IAM role to use in your task definitions, or you can use a `taskRoleArn` override when running a task manually with the `RunTask` API operation. The Amazon ECS agent receives a payload message for starting the task with additional fields that contain the role credentials. The Amazon ECS agent sets the task's UUID as an identification token and updates its internal credential cache so that the identification token for the task points to the role credentials that are received in the payload. The Amazon ECS agent populates the `AWS_CONTAINER_CREDENTIALS_RELATIVE_URI` environment variable in the `Env` object (available with the **docker inspect `container_id`** command) for all containers that belong to this task with the following relative URI: `/credential_provider_version/credentials?id=task_UUID`.

From inside the container, you can query the credentials with the following command:

```
[ec2-user ~]$ curl 169.254.170.2$AWS_CONTAINER_CREDENTIALS_RELATIVE_URI
```

Output:

```
{  
  "AccessKeyId": "ACCESS_KEY_ID",  
  "Expiration": "EXPIRATION_DATE",  
  "RoleArn": "TASK_ROLE_ARN",  
  "SecretAccessKey": "SECRET_ACCESS_KEY",  
  "Token": "SECURITY_TOKEN_STRING"  
}
```

If your container instance is using at least version 1.11.0 of the container agent and a supported version of the AWS CLI or SDKs, then the SDK client will see that the `AWS_CONTAINER_CREDENTIALS_RELATIVE_URI` variable is available, and it will use the provided credentials to make calls to the AWS APIs. For more information, see [Enabling Task IAM Roles on your Container Instances \(p. 214\)](#) and [Using a Supported AWS SDK \(p. 216\)](#).

Each time the credential provider is used, the request is logged locally on the host container instance at `/var/log/ecs/audit.log.YYYY-MM-DD-HH`. For more information, see [IAM Roles for Tasks Credential Audit Log \(p. 278\)](#).

### Topics

- [Benefits of Using IAM Roles for Tasks \(p. 214\)](#)
- [Enabling Task IAM Roles on your Container Instances \(p. 214\)](#)

- [Creating an IAM Role and Policy for your Tasks \(p. 214\)](#)
- [Using a Supported AWS SDK \(p. 216\)](#)
- [Specifying an IAM Role for your Tasks \(p. 216\)](#)

## Benefits of Using IAM Roles for Tasks

- **Credential Isolation:** A container can only retrieve credentials for the IAM role that is defined in the task definition to which it belongs; a container never has access to credentials that are intended for another container that belongs to another task.
- **Authorization:** Unauthorized containers cannot access IAM role credentials defined for other tasks.
- **Auditability:** Access and event logging is available through CloudTrail to ensure retrospective auditing. Task credentials have a context of `taskArn` that is attached to the session, so CloudTrail logs show which task is using which role.

## Enabling Task IAM Roles on your Container Instances

Your Amazon ECS container instances require at least version 1.11.0 of the container agent to enable task IAM roles; however, we recommend using the latest container agent version. For information about checking your agent version and updating to the latest version, see [Updating the Amazon ECS Container Agent \(p. 70\)](#). If you are using the Amazon ECS-optimized AMI, your instance needs at least 1.11.0-1 of the `ecs-init` package. If your container instances are launched from version 2016.03.e or later, then they contain the required versions of the container agent and `ecs-init`. For more information, see [Amazon ECS-Optimized AMI \(p. 34\)](#).

If you are not using the Amazon ECS-optimized AMI for your container instances, be sure to add the `--net=host` option to your **docker run** command that starts the agent and the appropriate agent configuration variables for your desired configuration (for more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#)):

```
ECS_ENABLE_TASK_IAM_ROLE=true
```

Enables IAM roles for tasks for containers with the `bridge` and `default` network modes.

```
ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST=true
```

Enables IAM roles for tasks for containers with the `host` network mode. This variable is only supported on agent versions 1.12.0 and later.

For an example run command, see [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\) \(p. 74\)](#). You will also need to set the following networking commands on your container instance so that the containers in your tasks can retrieve their AWS credentials:

```
[ec2-user ~]$ sysctl -w net.ipv4.conf.all.route_localnet=1
[ec2-user ~]$ iptables -t nat -A PREROUTING -p tcp -d 169.254.170.2 --dport 80 -j DNAT --to-destination 127.0.0.1:51679
[ec2-user ~]$ iptables -t nat -A OUTPUT -d 169.254.170.2 -p tcp -m tcp --dport 80 -j REDIRECT --to-ports 51679
```

## Creating an IAM Role and Policy for your Tasks

You must create an IAM policy for your tasks to use that specifies the permissions that you would like the containers in your tasks to have. You have several ways to create a new IAM permission policy. You

can copy a complete AWS managed policy that already does some of what you're looking for and then customize it to your specific requirements. For more information, see [Creating a New Policy](#) in the *IAM User Guide*.

You must also create a role for your tasks to use before you can specify it in your task definitions. You can create the role using the **Amazon EC2 Container Service Task Role** service role in the IAM console. Then you can attach your specific IAM policy to the role that gives the containers in your task the permissions you desire. The procedures below describe how to do this.

If you have multiple task definitions or services that require IAM permissions, you should consider creating a role for each specific task definition or service with the minimum required permissions for the tasks to operate so that you can minimize the access that you provide for each task.

### To create an IAM policy for your tasks

In this example, we create a policy to allow read-only access to an Amazon S3 bucket. You could store database credentials or other secrets in this bucket, and the containers in your task can read the credentials from the bucket and load them into your application.

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Policies** and then choose **Create Policy**.
3. In the **Create Policy** section, choose **Select** next to **Create Your Own Policy**.
4. In the **Policy Name** field, type your own unique name, such as `AmazonECSTaskS3BucketPolicy`.
5. In the **Policy Document** field, paste the policy to apply to your tasks. The example below allows permission to the `my-task-secrets-bucket` Amazon S3 bucket. You can modify the policy document to suit your specific needs.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "Stmt1465589882000",
      "Effect": "Allow",
      "Action": [
        "s3:GetObject"
      ],
      "Resource": [
        "arn:aws:s3:::my-task-secrets-bucket/*"
      ]
    }
  ]
}
```

6. Choose **Create Policy** to finish.

### To create an IAM role for your tasks

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles** and then choose **Create New Role**.
3. In the **Role Name** field, enter a name for your role. For this example, type `AmazonECSTaskS3BucketRole` to name the role, and then choose **Next Step**.
4. In the **Select Role Type** section, choose **Select** next to the **Amazon EC2 Container Service Task Role** service role.
5. In the **Attach Policy** section, select the policy you want to use for your tasks (in this example `AmazonECSTaskS3BucketPolicy`, and then choose **Next Step**.
6. Review your role information and then choose **Create Role** to finish.

## Using a Supported AWS SDK

Support for IAM roles for tasks was added to the AWS SDKs on July 13th, 2016, so the containers in your tasks must use an AWS SDK version that was created on or after that date. AWS SDKs that are included in Linux distribution package managers may not be new enough to support this feature.

To ensure that you are using a supported SDK, follow the installation instructions for your preferred SDK at [Tools for Amazon Web Services](#) when you are building your containers.

The following AWS SDK versions and above support IAM roles for tasks:

- AWS CLI: 1.10.47
- C++: 0.12.19
- CoreCLR: 3.2.6-beta
- Go: 1.2.5
- Java: 1.11.16
- .NET: 3.1.6
- Node.js: 2.4.7
- PHP: 3.18.28
- Python (botocore): 1.4.37
- Python (Boto3): 1.4.0

### Note

The `botocore` module provides the low-level core functionality for Boto3, and each version of Boto3 supports a range of `botocore` module versions. For Boto3 support of IAM roles for tasks, you must ensure that your underlying `botocore` module is at least the minimum version shown above.

- Ruby: 2.3.22

## Specifying an IAM Role for your Tasks

After you have created a role and attached a policy to that role, you can run tasks that assume the role. You have several options to do this:

- Specify an IAM role for your tasks in the task definition. You can create a new task definition or a new revision of an existing task definition and specify the role you created previously. If you use the console to create your task definition, choose your IAM role in the **Task Role** field. If you use the AWS CLI or SDKs, specify your task role ARN using the `taskRoleArn` parameter. For more information, see [Creating a Task Definition \(p. 92\)](#).

### Note

This option is required if you want to use IAM task roles in an Amazon ECS service.

- Specify an IAM task role override when running a task. You can specify an IAM task role override when running a task. If you use the console to run your task, choose **Advanced Options** and then choose your IAM role in the **Task Role** field. If you use the AWS CLI or SDKs, specify your task role ARN using the `taskRoleArn` parameter in the `overrides` JSON object. For more information, see [Running Tasks \(p. 124\)](#).

### Note

In addition to the standard Amazon ECS permissions required to run tasks and services, IAM users also require `iam:PassRole` permissions to use IAM roles for tasks.

# Amazon ECS IAM Policy Examples

The following examples show policy statements that you could use to control the permissions that IAM users have to Amazon ECS.

## Topics

- [Amazon ECS First Run Wizard \(p. 217\)](#)
- [Clusters \(p. 219\)](#)
- [Container Instances \(p. 220\)](#)
- [Task Definitions \(p. 221\)](#)
- [Run Tasks \(p. 221\)](#)
- [Start Tasks \(p. 222\)](#)
- [List and Describe Tasks \(p. 222\)](#)
- [Create Services \(p. 223\)](#)
- [Update Services \(p. 224\)](#)

## Amazon ECS First Run Wizard

The Amazon ECS first run wizard simplifies the process of creating a cluster and running your tasks and services. However, users require permissions to many API operations from multiple AWS services to complete the wizard. The policy below shows the required permissions to complete the Amazon ECS first run wizard.

### Note

If you want to create an Amazon ECR repository in the first run wizard, tag and push an image to that repository, and use that image in an Amazon ECS task definition, then your user also needs the permissions listed in the `AmazonEC2ContainerRegistryFullAccess` managed policy. For more information, see [Amazon ECR Managed Policies \(p. 205\)](#).

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "autoscaling:CreateAutoScalingGroup",
        "autoscaling:CreateLaunchConfiguration",
        "autoscaling:CreateOrUpdateTags",
        "autoscaling:DeleteAutoScalingGroup",
        "autoscaling:DeleteLaunchConfiguration",
        "autoscaling:DescribeAutoScalingGroups",
        "autoscaling:DescribeAutoScalingInstances",
        "autoscaling:DescribeAutoScalingNotificationTypes",
        "autoscaling:DescribeLaunchConfigurations",
        "autoscaling:DescribeScalingActivities",
        "autoscaling:DescribeTags",
        "autoscaling:DescribeTriggers",
        "autoscaling:UpdateAutoScalingGroup",
        "cloudformation:CreateStack",
        "cloudformation:DescribeStack*",
        "cloudformation:DeleteStack",
        "cloudformation:UpdateStack",
        "cloudwatch:GetMetricStatistics",
        "cloudwatch:ListMetrics",
        "ec2:AssociateRouteTable",
        "ec2:AttachInternetGateway",
```



```
"ec2:AuthorizeSecurityGroupIngress",
"ec2:CreateInternetGateway",
"ec2:CreateKeyPair",
"ec2:CreateNetworkInterface",
"ec2:CreateRoute",
"ec2:CreateRouteTable",
"ec2:CreateSecurityGroup",
"ec2:CreateSubnet",
"ec2:CreateTags",
"ec2:CreateVpc",
"ec2>DeleteInternetGateway",
"ec2>DeleteRoute",
"ec2>DeleteRouteTable",
"ec2>DeleteSecurityGroup",
"ec2>DeleteSubnet",
"ec2>DeleteTags",
"ec2>DeleteVpc",
"ec2:DescribeAccountAttributes",
"ec2:DescribeAvailabilityZones",
"ec2:DescribeInstances",
"ec2:DescribeInternetGateways",
"ec2:DescribeKeyPairs",
"ec2:DescribeNetworkInterface",
"ec2:DescribeRouteTables",
"ec2:DescribeSecurityGroups",
"ec2:DescribeSubnets",
"ec2:DescribeTags",
"ec2:DescribeVpcAttribute",
"ec2:DescribeVpcs",
"ec2:DetachInternetGateway",
"ec2:DisassociateRouteTable",
"ec2:ModifyVpcAttribute",
"ec2:RunInstances",
"ec2:TerminateInstances",
"ecr:*",
"ecs:*",
"elasticloadbalancing:ApplySecurityGroupsToLoadBalancer",
"elasticloadbalancing:AttachLoadBalancerToSubnets",
"elasticloadbalancing:ConfigureHealthCheck",
"elasticloadbalancing:CreateLoadBalancer",
"elasticloadbalancing>DeleteLoadBalancer",
"elasticloadbalancing>DeleteLoadBalancerListeners",
"elasticloadbalancing>DeleteLoadBalancerPolicy",
"elasticloadbalancing:DeregisterInstancesFromLoadBalancer",
"elasticloadbalancing:DescribeInstanceHealth",
"elasticloadbalancing:DescribeLoadBalancerAttributes",
"elasticloadbalancing:DescribeLoadBalancerPolicies",
"elasticloadbalancing:DescribeLoadBalancerPolicyTypes",
"elasticloadbalancing:DescribeLoadBalancers",
"elasticloadbalancing:ModifyLoadBalancerAttributes",
"elasticloadbalancing:SetLoadBalancerPoliciesOfListener",
"iam:AttachRolePolicy",
"iam:CreateRole",
"iam:GetPolicy",
"iam:GetPolicyVersion",
"iam:GetRole",
"iam:ListAttachedRolePolicies",
"iam:ListInstanceProfiles",
"iam:ListRoles",
"iam:ListGroups",
"iam:ListUsers",
"iam:CreateInstanceProfile",
"iam:AddRoleToInstanceProfile",
"iam:ListInstanceProfilesForRole"
],
"Resource": ""
```

```
}  
]  
}
```

## Clusters

The following IAM policy allows permission to create and list clusters. The `CreateCluster` and `ListClusters` actions do not accept any resources, so the resource definition is set to `*` for all resources.

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Effect": "Allow",  
      "Action": [  
        "ecs:CreateCluster",  
        "ecs:ListClusters"  
      ],  
      "Resource": [  
        "*"   
      ]  
    }  
  ]  
}
```

The following IAM policy allows permission to describe and delete a specific cluster. The `DescribeCluster` and `DeleteCluster` actions accept cluster ARNs as resources.

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Effect": "Allow",  
      "Action": [  
        "ecs:DescribeCluster",  
        "ecs>DeleteCluster"  
      ],  
      "Resource": [  
        "arn:aws:ecs:us-east-1:<aws_account_id>:cluster/<cluster_name>"  
      ]  
    }  
  ]  
}
```

The following IAM policy can be attached to a user or group that would only allow that user or group to perform operations on a specific cluster.

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Action": [  
        "ecs:Describe*",  
        "ecs:List*"   
      ],  
      "Effect": "Allow",  
      "Resource": "*"   
    },  
    {  
      "Action": [  

```

```

        "ecs:DeleteCluster",
        "ecs:DeregisterContainerInstance",
        "ecs:ListContainerInstances",
        "ecs:RegisterContainerInstance",
        "ecs:SubmitContainerStateChange",
        "ecs:SubmitTaskStateChange"
    ],
    "Effect": "Allow",
    "Resource": "arn:aws:ecs:us-east-1:<aws_account_id>:cluster/default"
  },
  {
    "Action": [
      "ecs:DescribeContainerInstances",
      "ecs:DescribeTasks",
      "ecs:ListTasks",
      "ecs:UpdateContainerAgent",
      "ecs:StartTask",
      "ecs:StopTask",
      "ecs:RunTask"
    ],
    "Effect": "Allow",
    "Resource": "*",
    "Condition": {
      "ArnEquals": {
        "ecs:cluster": "arn:aws:ecs:us-east-1:<aws_account_id>:cluster/default"
      }
    }
  }
]
}

```

## Container Instances

Container instance registration is handled by the Amazon ECS agent, but there may be times where you want to allow a user to deregister an instance manually from a cluster. Perhaps the container instance was accidentally registered to the wrong cluster, or the instance was terminated with tasks still running on it.

The following IAM policy allows a user to list and deregister container instances in a specified cluster:

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:DeregisterContainerInstance",
        "ecs:ListContainerInstances"
      ],
      "Resource": [
        "arn:aws:ecs:<region>:<aws_account_id>:cluster/<cluster_name>"
      ]
    }
  ]
}

```

The following IAM policy allows a user to describe a specified container instance in a specified cluster. To open this permission up to all container instances in a cluster, you can replace the container instance UUID with `*`.

```

{
  "Version": "2012-10-17",
  "Statement": [

```

```
{
  "Effect": "Allow",
  "Action": [
    "ecs:DescribeContainerInstance"
  ],
  "Condition": {
    "ArnEquals": {
      "ecs:cluster": "arn:aws:ecs:<region>:<aws_account_id>:cluster/<cluster_name>"
    }
  },
  "Resource": [
    "arn:aws:ecs:<region>:<aws_account_id>:container-instance/
    <container_instance_UUID>"
  ]
}
```

## Task Definitions

Task definition IAM policies do not support resource-level permissions, but the following IAM policy allows a user to register, list, and describe task definitions:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:RegisterTaskDefinition",
        "ecs:ListTaskDefinitions",
        "ecs:DescribeTaskDefinition"
      ],
      "Resource": [
        "*"
      ]
    }
  ]
}
```

## Run Tasks

The resources for `RunTask` are task definitions. To limit which clusters a user can run task definitions on, you can specify them in the `Condition` block. The advantage is that you don't have to list both task definitions and clusters in your resources to allow appropriate access. You can apply one, the other, or both.

The following IAM policy allows permission to run any revision of a specific task definition on a specific cluster:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:RunTask"
      ],
      "Condition": {
        "ArnEquals": {

```

```

        "ecs:cluster": "arn:aws:ecs:<region>:<aws_account_id>:cluster/<cluster_name>"
    },
    "Resource": [
        "arn:aws:ecs:<region>:<aws_account_id>:task-definition/<task_family>:*"
    ]
}
]
}

```

## Start Tasks

The resources for `StartTask` are task definitions. To limit which clusters and container instances a user can start task definitions on, you can specify them in the `Condition` block. The advantage is that you don't have to list both task definitions and clusters in your resources to allow appropriate access. You can apply one, the other, or both.

The following IAM policy allows permission to start any revision of a specific task definition on a specific cluster and specific container instance:

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:StartTask"
      ],
      "Condition": {
        "ArnEquals": {
          "ecs:cluster": "arn:aws:ecs:<region>:<aws_account_id>:cluster/<cluster_name>",
          "ecs:container-instances" : [
            "arn:aws:ecs:<region>:<aws_account_id>:container-instance/
<container_instance_UUID>"
          ]
        }
      },
      "Resource": [
        "arn:aws:ecs:<region>:<aws_account_id>:task-definition/<task_family>:*"
      ]
    }
  ]
}

```

## List and Describe Tasks

The following IAM policy allows a user to list tasks for a specified cluster:

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:ListTasks"
      ],
      "Condition": {
        "ArnEquals": {
          "ecs:cluster": "arn:aws:ecs:<region>:<aws_account_id>:cluster/<cluster_name>"
        }
      }
    }
  ]
}

```

```
    },
    "Resource": [
        "*"
    ]
}
]
```

The following IAM policy allows a user to describe a specified task in a specified cluster:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ecs:DescribeTask"
      ],
      "Condition": {
        "ArnEquals": {
          "ecs:cluster": "arn:aws:ecs:<region>:<aws_account_id>:cluster/<cluster_name>"
        }
      },
      "Resource": [
        "arn:aws:ecs:<region>:<aws_account_id>:task/<task_UUID>"
      ]
    }
  ]
}
```

## Create Services

The following IAM policy allows a user to create Amazon ECS services in the AWS Management Console:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "application-autoscaling:Describe*",
        "application-autoscaling:PutScalingPolicy",
        "application-autoscaling:RegisterScalableTarget",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "ecs:List*",
        "ecs:Describe*",
        "ecs:CreateService",
        "elasticloadbalancing:Describe*",
        "iam:AttachRolePolicy",
        "iam:CreateRole",
        "iam:GetPolicy",
        "iam:GetPolicyVersion",
        "iam:GetRole",
        "iam:ListAttachedRolePolicies",
        "iam:ListRoles",
        "iam:ListGroups",
        "iam:ListUsers"
      ],
      "Resource": [
        "*"
      ]
    }
  ]
}
```

```
}  
]  
}
```

## Update Services

The following IAM policy allows a user to update Amazon ECS services in the AWS Management Console:

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Effect": "Allow",  
      "Action": [  
        "application-autoscaling:Describe*",  
        "application-autoscaling:PutScalingPolicy",  
        "application-autoscaling>DeleteScalingPolicy",  
        "application-autoscaling:RegisterScalableTarget",  
        "cloudwatch:DescribeAlarms",  
        "cloudwatch:PutMetricAlarm",  
        "ecs:List*",  
        "ecs:Describe*",  
        "ecs:UpdateService",  
        "iam:AttachRolePolicy",  
        "iam:CreateRole",  
        "iam:GetPolicy",  
        "iam:GetPolicyVersion",  
        "iam:GetRole",  
        "iam:ListAttachedRolePolicies",  
        "iam:ListRoles",  
        "iam:ListGroups",  
        "iam:ListUsers"  
      ],  
      "Resource": [  
        "*"   
      ]  
    }  
  ]  
}
```

# Using the Amazon ECS Command Line Interface

The Amazon EC2 Container Service (Amazon ECS) command line interface (CLI) provides high-level commands to simplify creating, updating, and monitoring clusters and tasks from a local development environment. The Amazon ECS CLI supports [Docker Compose](#), a popular open-source tool for defining and running multi-container applications. Use the CLI as part of your everyday development and testing cycle as an alternative to the AWS Management Console.

## Note

The source code for the Amazon ECS CLI is [available on GitHub](#). We encourage you to submit pull requests for changes that you would like to have included. However, Amazon Web Services does not currently provide support for running modified copies of this software.

## Topics

- [Installing the Amazon ECS CLI \(p. 225\)](#)
- [Configuring the Amazon ECS CLI \(p. 226\)](#)
- [Amazon ECS CLI Tutorial \(p. 227\)](#)
- [Amazon ECS Command Line Reference \(p. 232\)](#)

## Installing the Amazon ECS CLI

Follow these instructions to install the Amazon ECS CLI on your Mac OSX or Linux system.

## Note

The Amazon ECS CLI is not available for Windows systems at this time.

## To install the Amazon ECS CLI

1. Download the binary.

- For Mac OSX:

```
$ sudo curl -o /usr/local/bin/ecs-cli https://s3.amazonaws.com/amazon-ecs-cli/ecs-cli-darwin-amd64-latest
```

- For Linux systems:

```
$ sudo curl -o /usr/local/bin/ecs-cli https://s3.amazonaws.com/amazon-ecs-cli/ecs-cli-linux-amd64-latest
```



2. (Optional) Verify the downloaded binary with the MD5 sum provided.
  - For Mac OSX: <https://s3.amazonaws.com/amazon-ecs-cli/ecs-cli-darwin-amd64-latest.md5>
  - For Linux systems: <https://s3.amazonaws.com/amazon-ecs-cli/ecs-cli-linux-amd64-latest.md5>
3. Apply execute permissions to the binary.

```
$ sudo chmod +x /usr/local/bin/ecs-cli
```

4. Verify that the CLI is working properly.

```
ecs-cli --version
```

Output:

```
ecs-cli version 0.4.1 (e27df48)
```

After you have installed the CLI, proceed to [Configuring the Amazon ECS CLI \(p. 226\)](#).

## Configuring the Amazon ECS CLI

The Amazon ECS CLI requires some basic configuration information before you can use it, such as your AWS credentials, the AWS region in which to create your cluster, and the name of the Amazon ECS cluster to use with the **ecs-cli configure** command. These settings are stored in the `~/.ecs/config` file.

### AWS Credentials

The Amazon ECS CLI requires your AWS credentials to make calls to AWS APIs on your behalf (for more information, see [Managing Access Keys for your AWS Account](#) in the *Amazon Web Services General Reference*). You can configure your AWS credentials in several ways:

- You can set the `AWS_ACCESS_KEY_ID` and `AWS_SECRET_ACCESS_KEY` environment variables. When you run **ecs-cli configure**, the values of those variables are stored in the Amazon ECS CLI configuration file.
- You can use a named profile from the `~/.aws/credentials` file on your system, if you have previously configured your AWS credentials there for another tool, such as the AWS CLI. You can follow the [Quick Configuration](#) instructions in the *AWS Command Line Interface User Guide* to set up a default profile if you have not already done so. You can then pass this named profile as `--profile default` when you run the **ecs-cli configure** command.
- You can pass credentials directly on the command line with the `--access-key` and `--secret-key` options.

### To configure the Amazon ECS CLI

- Configure the CLI with the following command, substituting `us-west-2` with your desired AWS region, `ecs-cli-demo` with the name of an existing Amazon ECS cluster or a new cluster to use, and the `$AWS_ACCESS_KEY_ID` and `$AWS_SECRET_ACCESS_KEY` environment variables with your AWS credentials.

```
ecs-cli configure --region us-west-2 --access-key $AWS_ACCESS_KEY_ID --secret-key $AWS_SECRET_ACCESS_KEY --cluster ecs-cli-demo
```

Output:

```
INFO[0000] Saved ECS CLI configuration for cluster (ecs-cli-demo)
```

After you have installed and configured the CLI, you can try the [Amazon ECS CLI Tutorial \(p. 227\)](#). For more information, see the [Amazon ECS Command Line Reference \(p. 232\)](#).

## Amazon ECS CLI Tutorial

This simple tutorial shows a few of the different commands and capabilities of the Amazon ECS CLI. Before you can start this tutorial, you must install and configure the Amazon ECS CLI. For more information, see [Installing the Amazon ECS CLI \(p. 225\)](#).

### Topics

- [Step 1: Create your Cluster \(p. 227\)](#)
- [Step 2: Create a Compose File \(p. 227\)](#)
- [Step 3: Deploy the Compose File to a Cluster \(p. 229\)](#)
- [Step 4: View the Running Containers on a Cluster \(p. 229\)](#)
- [Step 5: Scale the Tasks on a Cluster \(p. 230\)](#)
- [Step 6: Create an ECS Service from a Compose File \(p. 230\)](#)
- [Step 7: Clean Up \(p. 231\)](#)

## Step 1: Create your Cluster

The first action you should take is to create a cluster of Amazon ECS container instances that you can launch your containers on with the **ecs-cli up** command. There are many options that you can choose to configure your cluster with this command, but most of them are optional. In this example, you create a simple cluster of two `t2.medium` container instances that use the `id_rsa` key pair for SSH access (substitute your own key pair here).

By default, the security group created for your container instances opens port 80 for inbound traffic. You can use the `--port` option to specify a different port to open, or if you have more complicated security group requirements, you can specify an existing security group to use with the `--security-group` option.

```
ecs-cli up --keypair id_rsa --capability-iam --size 2 --instance-type t2.medium
```

### Output:

```
INFO[0000] Created cluster                                cluster=ecs-cli-demo
INFO[0000] Waiting for your cluster resources to be created
INFO[0001] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
INFO[0061] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
INFO[0121] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
INFO[0182] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
```

This command may take a few minutes to complete as your resources are created. Now that you have a cluster, you can create a Docker compose file and deploy it.

## Step 2: Create a Compose File

For this step, create a simple Docker compose file that creates a WordPress application consisting of a web server and a MySQL database. At this time, the Amazon ECS CLI supports [Docker compose file syntax](#) versions 1 and 2.

The following parameters are supported in compose files for the Amazon ECS CLI:

- `command`
- `cpu_shares`
- `dns`
- `dns_search`
- `entrypoint`
- `environment`: If an environment variable value is not specified in the compose file, but it exists in the shell environment, the shell environment variable value is passed to the task definition that is created for any associated tasks or services.

**Important**

We do not recommend using plaintext environment variables for sensitive information, such as credential data.

- `env_file`

**Important**

We do not recommend using plaintext environment variables for sensitive information, such as credential data.

- `extra_hosts`
- `hostname`
- `image`
- `labels`
- `links`
- `log_driver`
- `log_opt`
- `mem_limit` (in bytes)
- `ports`
- `privileged`
- `read_only`
- `security_opt`
- `ulimits`
- `user`
- `volumes`
- `volumes_from`
- `working_dir`

**Important**

The `build` directive is not supported at this time.

For more information about Docker compose file syntax, see the [Compose file reference](#) in the Docker documentation.

Here is the compose file, which you can call `hello-world.yml`. Each container has 100 CPU units and 500 MiB of memory. The `wordpress` container exposes port 80 to the container instance for inbound traffic to the web server.

```
version: '2'
services:
  wordpress:
    image: wordpress
    cpu_shares: 100
    mem_limit: 524288000
    ports:
      - "80:80"
```

```
links:
  - mysql
mysql:
  image: mysql
  cpu_shares: 100
  mem_limit: 524288000
  environment:
    MYSQL_ROOT_PASSWORD: password
```

## Step 3: Deploy the Compose File to a Cluster

After you create the compose file, you can deploy it to your cluster with the **ecs-cli compose up** command. By default, the command looks for a file called `docker-compose.yml` in the current directory, but you can specify a different file with the `--file` option. By default, the resources created by this command have the current directory in the title, but you can override that with the `--project-name` *project\_name* option.

```
ecs-cli compose --file hello-world.yml up
```

Output:

```
INFO[0000] Using ECS task definition                TaskDefinition=ecscompose-docker-
compose:2
INFO[0000] Starting container...                   container=340488e0-a307-4322-
b41c-99f1b70e97f9/wordpress
INFO[0000] Starting container...                   container=340488e0-a307-4322-
b41c-99f1b70e97f9/mysql
INFO[0000] Describe ECS container status           container=340488e0-
a307-4322-b41c-99f1b70e97f9/wordpress desiredStatus=RUNNING lastStatus=PENDING
taskDefinition=ecscompose-docker-compose:2
INFO[0000] Describe ECS container status           container=340488e0-a307-4322-
b41c-99f1b70e97f9/mysql desiredStatus=RUNNING lastStatus=PENDING taskDefinition=ecscompose-
docker-compose:2
INFO[0054] Started container...                   container=340488e0-
a307-4322-b41c-99f1b70e97f9/wordpress desiredStatus=RUNNING lastStatus=RUNNING
taskDefinition=ecscompose-docker-compose:2
INFO[0054] Started container...                   container=340488e0-a307-4322-
b41c-99f1b70e97f9/mysql desiredStatus=RUNNING lastStatus=RUNNING taskDefinition=ecscompose-
docker-compose:2
```

## Step 4: View the Running Containers on a Cluster

After you deploy the compose file, you can view the containers that are running on your cluster with the **ecs-cli ps** command.

```
ecs-cli ps
```

Output:

Name	State	Ports
TaskDefinition		
340488e0-a307-4322-b41c-99f1b70e97f9/wordpress	RUNNING	52.89.204.137:80->80/tcp
ecscompose-docker-compose:2		
340488e0-a307-4322-b41c-99f1b70e97f9/mysql	RUNNING	
ecscompose-docker-compose:2		

In the above example, you can see the `wordpress` and `mysql` containers from your compose file, and also the IP address and port of the web server. If you point a web browser to that address, you should see the WordPress installation wizard.

## Step 5: Scale the Tasks on a Cluster

You can scale your task count up so you could have more instances of your application with the **ecs-cli compose scale** command. In this example, you can increase the count of your application to two.

```
ecs-cli compose --file hello-world.yml scale 2
```

Now you should see two more containers in your cluster.

```
ecs-cli ps
```

Output:

Name	State	Ports
TaskDefinition		
340488e0-a307-4322-b41c-99f1b70e97f9/wordpress	RUNNING	52.89.204.137:80->80/tcp
ecscompose-docker-compose:2		
340488e0-a307-4322-b41c-99f1b70e97f9/mysql	RUNNING	
ecscompose-docker-compose:2		
f80d82d5-3724-4f2f-86b1-5ee5891ce995/mysql	RUNNING	
ecscompose-docker-compose:2		
f80d82d5-3724-4f2f-86b1-5ee5891ce995/wordpress	RUNNING	52.89.205.89:80->80/tcp
ecscompose-docker-compose:2		

## Step 6: Create an ECS Service from a Compose File

Now that you know that your containers work properly, you can make sure that they are replaced if they fail or stop. You can do this by creating a service from your compose file with the **ecs-cli compose service up** command. This command creates a task definition from the latest compose file (if it does not already exist) and creates an ECS service with it, with a desired count of 1.

Before starting your service, stop the containers from your compose file with the **ecs-cli compose down** command so that you have an empty cluster to work with.

```
ecs-cli compose --file hello-world.yml down
```

Output:

```
INFO[0000] Stopping container... container=340488e0-a307-4322-b41c-99f1b70e97f9/wordpress
INFO[0000] Stopping container... container=340488e0-a307-4322-b41c-99f1b70e97f9/mysql
INFO[0000] Stopping container... container=f80d82d5-3724-4f2f-86b1-5ee5891ce995/mysql
INFO[0000] Stopping container... container=f80d82d5-3724-4f2f-86b1-5ee5891ce995/wordpress
INFO[0000] Describe ECS container status container=f80d82d5-3724-4f2f-86b1-5ee5891ce995/mysql desiredStatus=STOPPED lastStatus=RUNNING taskDefinition=ecsccompose-docker-compose:2
INFO[0000] Describe ECS container status container=f80d82d5-3724-4f2f-86b1-5ee5891ce995/wordpress desiredStatus=STOPPED lastStatus=RUNNING taskDefinition=ecsccompose-docker-compose:2
INFO[0000] Describe ECS container status container=340488e0-a307-4322-b41c-99f1b70e97f9/wordpress desiredStatus=STOPPED lastStatus=RUNNING taskDefinition=ecsccompose-docker-compose:2
INFO[0000] Describe ECS container status container=340488e0-a307-4322-b41c-99f1b70e97f9/mysql desiredStatus=STOPPED lastStatus=RUNNING taskDefinition=ecsccompose-docker-compose:2
```

```
INFO[0006] Stopped container... container=340488e0-a307-4322-b41c-99f1b70e97f9/wordpress desiredStatus=STOPPED lastStatus=STOPPED taskDefinition=ecscompose-docker-compose:2
INFO[0006] Stopped container... container=340488e0-a307-4322-b41c-99f1b70e97f9/mysql desiredStatus=STOPPED lastStatus=STOPPED taskDefinition=ecscompose-docker-compose:2
INFO[0006] Stopped container... container=f80d82d5-3724-4f2f-86b1-5ee5891ce995/mysql desiredStatus=STOPPED lastStatus=STOPPED taskDefinition=ecscompose-docker-compose:2
INFO[0006] Stopped container... container=f80d82d5-3724-4f2f-86b1-5ee5891ce995/wordpress desiredStatus=STOPPED lastStatus=STOPPED taskDefinition=ecscompose-docker-compose:2
```

Now you can create your service.

```
ecs-cli compose --file hello-world.yml service up
```

Output:

```
INFO[0000] Using ECS task definition TaskDefinition=ecscompose-docker-compose:2
INFO[0000] Created an ECS Service serviceName=ecscompose-service-docker-compose taskDefinition=ecscompose-docker-compose:2
INFO[0000] Updated ECS service successfully desiredCount=1
serviceName=ecscompose-service-docker-compose
INFO[0000] Describe ECS Service status desiredCount=1 runningCount=0
serviceName=ecscompose-service-docker-compose
INFO[0015] ECS Service has reached a stable state desiredCount=1 runningCount=1
serviceName=ecscompose-service-docker-compose
```

## Step 7: Clean Up

When you are done with this tutorial, you should clean up your resources so they do not incur any more charges. First, delete the service so that it stops the existing containers and does not try to run any more tasks.

```
ecs-cli compose --file hello-world.yml service rm
```

Output:

```
INFO[0000] Updated ECS service successfully desiredCount=0
serviceName=ecscompose-service-docker-compose
INFO[0000] Describe ECS Service status desiredCount=0 runningCount=1
serviceName=ecscompose-service-docker-compose
INFO[0015] ECS Service has reached a stable state desiredCount=0 runningCount=0
serviceName=ecscompose-service-docker-compose
INFO[0015] Deleted ECS service service=ecscompose-service-docker-compose
INFO[0015] ECS Service has reached a stable state desiredCount=0 runningCount=0
serviceName=ecscompose-service-docker-compose
```

Now, take down your cluster, which cleans up the resources that you created earlier with **ecs-cli up**.

```
ecs-cli down --force
```

Output:

```
INFO[0000] Waiting for your cluster resources to be deleted
INFO[0000] Cloudformation stack status stackStatus=DELETE_IN_PROGRESS
```

```
INFO[0061] Cloudformation stack status  
INFO[0121] Deleted cluster
```

```
stackStatus=DELETE_IN_PROGRESS  
cluster=ecs-cli-demo
```

## Amazon ECS Command Line Reference

The following commands are available in the Amazon ECS CLI. Help text for each command is available by appending the `--help` option to the final command argument; for example, help text for **ecs-cli compose service up** is displayed with the following command:

```
ecs-cli compose service up --help
```

### Available Commands

- [ecs-cli](#) (p. 232)
- [ecs-cli configure](#) (p. 233)
- [ecs-cli up](#) (p. 237)
- [ecs-cli down](#) (p. 240)
- [ecs-cli scale](#) (p. 241)
- [ecs-cli ps](#) (p. 241)
- [ecs-cli push](#) (p. 242)
- [ecs-cli pull](#) (p. 243)
- [ecs-cli images](#) (p. 244)
- [ecs-cli license](#) (p. 246)
- [ecs-cli compose](#) (p. 247)
- [ecs-cli compose service](#) (p. 250)

## ecs-cli

### Description

The Amazon ECS command line interface (CLI) provides high-level commands to simplify creating, updating, and monitoring clusters and tasks from a local development environment. The Amazon ECS CLI supports [Docker Compose](#), a popular open-source tool for defining and running multi-container applications.

For a quick walkthrough of the Amazon ECS CLI, see the [Amazon ECS CLI Tutorial](#) (p. 227).

Help text is available for each individual subcommand with **ecs-cli *subcommand* --help**.

### Syntax

```
ecs-cli [--version] [subcommand] [--help]
```

### Options

Name	Description
<code>--version, -v</code>	Prints the version information for the Amazon ECS CLI.  Required: No
<code>--help, -h</code>	Show the help text for the specified command.

Name	Description
	Required: No

## Available Subcommands

The **ecs-cli** command supports the following subcommands:

### **configure**

Configures your AWS credentials, the region to use, and the ECS cluster name to use with the Amazon ECS CLI. For more information, see [ecs-cli configure \(p. 233\)](#).

### **up**

Creates the ECS cluster (if it does not already exist) and the AWS resources required to set up the cluster. For more information, see [ecs-cli up \(p. 237\)](#).

### **down**

Deletes the AWS CloudFormation stack that was created by **ecs-cli up** and the associated resources. For more information, see [ecs-cli down \(p. 240\)](#).

### **scale**

Modifies the number of container instances in an ECS cluster. For more information, see [ecs-cli scale \(p. 241\)](#).

### **ps**

Lists all of the running containers in an ECS cluster. For more information, see [ecs-cli ps \(p. 241\)](#).

### **push**

Pushes an image to an Amazon ECR repository. For more information, see [ecs-cli push \(p. 242\)](#).

### **pull**

Pulls an image from an ECR repository. For more information, see [ecs-cli pull \(p. 243\)](#).

### **images**

Lists all of the running containers in an ECS cluster. For more information, see [ecs-cli images \(p. 244\)](#).

### **license**

Prints the `LICENSE` files for the Amazon ECS CLI and its dependencies. For more information, see [ecs-cli license \(p. 246\)](#).

### **compose**

Executes **docker-compose**–style commands on an ECS cluster. For more information, see [ecs-cli compose \(p. 247\)](#).

### **help**

Shows the help text for the specified command.

## ecs-cli configure

### Description

Configures your AWS credentials, the AWS region to use, resource creation prefixes, and the ECS cluster name to use with the Amazon ECS CLI. The resulting configuration is stored in the `~/.ecs/config` file.



Each time you run the **ecs-cli configure** command, the configuration values in `~/.ecs/config` are replaced with the values from the latest command (and if existing configuration parameters are not specified with their associated option flags or environment variables, they are removed or replaced with the default values).

## Syntax

```
ecs-cli configure [--region region] [--access-key aws_access_key_id] [--secret-key aws_secret_access_key] [--profile profile_name] --cluster cluster_name [--compose-project-name-prefix prefix] [--compose-service-name-prefix prefix] [--cfn-stack-name-prefix prefix] [--help]
```

## Options

Name	Description
<code>--region, -r <i>region</i></code>	Specifies the region to use. If the <code>AWS_REGION</code> environment variable is set when <b>ecs-cli configure</b> is run, then the region is set to the value of that environment variable.  Type: String Required: No
<code>--access-key <i>aws_access_key_id</i></code>	Specifies the AWS access key to use. If the <code>AWS_ACCESS_KEY_ID</code> environment variable is set when <b>ecs-cli configure</b> is run, then the AWS access key ID is set to the value of that environment variable.  Type: String Required: No
<code>--secret-key <i>aws_secret_access_key</i></code>	Specifies the AWS secret key to use. If the <code>AWS_SECRET_ACCESS_KEY</code> environment variable is set when <b>ecs-cli configure</b> is run, then the AWS secret access key is set to the value of that environment variable.  Type: String Required: No
<code>--profile, -p <i>profile_name</i></code>	Specifies your AWS credentials with an existing named profile from <code>~/.aws/credentials</code> . If the <code>AWS_PROFILE</code> environment variable is set when <b>ecs-cli configure</b> is run, then the AWS named profile is set to the value of that environment variable.  Type: String Required: No
<code>--cluster, -c <i>cluster_name</i></code>	Specifies the ECS cluster name to use. If the cluster does not exist, it is created when you try to add resources to it with the <b>ecs-cli up</b> command.  Type: String Required: Yes

Name	Description
<code>--compose-project-name-prefix</code> <i>prefix</i>	<p>Specifies the prefix to add to an ECS task definition that is registered from a compose file. You can specify an empty string (<code>--compose-project-name-prefix ""</code>) with this option to omit the default prefix.</p> <p><b>Important</b> This prefix is used to name and later manage resources created by the Amazon ECS CLI. Resources that are created with a prefix are only addressable from the Amazon ECS CLI if the configured prefix matches the prefix that was used when the resource was created. Before you change the prefix value, you should consider the effects on any active resources.</p> <p>Type: String</p> <p>Default: <code>ecscompose-</code></p> <p>Required: No</p>
<code>--compose-service-name-prefix</code> <i>prefix</i>	<p>Specifies the prefix to add to an ECS service that is created from a compose file. You can specify an empty string (<code>--compose-service-name-prefix ""</code>) with this option to omit the default prefix.</p> <p><b>Important</b> This prefix is used to name and later manage resources created by the Amazon ECS CLI. Resources that are created with a prefix are only addressable from the Amazon ECS CLI if the configured prefix matches the prefix that was used when the resource was created. Before you change the prefix value, you should consider the effects on any active resources.</p> <p>Type: String</p> <p>Default: <code>ecscompose-service-</code></p> <p>Required: No</p>

Name	Description
<code>--cfn-stack-name-prefix <i>prefix</i></code>	<p>Specifies the prefix to add to the AWS CloudFormation stack that is created on <b>ecs-cli up</b>. You can specify an empty string (<code>--cfn-stack-name-prefix ""</code>) with this option to omit the default prefix.</p> <p><b>Important</b> This prefix is used to name and later manage resources created by the Amazon ECS CLI. Resources that are created with a prefix are only addressable from the Amazon ECS CLI if the configured prefix matches the prefix that was used when the resource was created. Before you change the prefix value, you should consider the effects on any active resources.</p> <p>Type: String</p> <p>Default: <code>amazon-ecs-cli-setup-</code></p> <p>Required: No</p>
<code>--help, -h</code>	<p>Shows the help text for the specified command.</p> <p>Required: No</p>

## Examples

### Example

This example configures the Amazon ECS CLI to create and use a cluster called `ecs-cli` in the `us-west-2` region.

```
ecs-cli configure --region us-west-2 --access-key $AWS_ACCESS_KEY_ID --secret-key $AWS_SECRET_ACCESS_KEY --cluster ecs-cli
```

Output:

```
INFO[0000] Saved ECS CLI configuration for cluster (ecs-cli)
```

### Example

This example configures the Amazon ECS CLI to create and/or use a cluster called `ecs-cli` in the `us-west-2` region and omit the default Amazon ECS CLI prefixes on future resource creation.

#### Note

Any existing resources, such as task definitions, services, or AWS CloudFormation stacks, that were created with the default prefixes will not be addressable from the Amazon ECS CLI until the configured prefix matches the prefix that was used when the resource was created.

```
ecs-cli configure --region us-west-2 --access-key $AWS_ACCESS_KEY_ID --secret-key $AWS_SECRET_ACCESS_KEY --cluster ecs-cli --compose-project-name-prefix "" --compose-service-name-prefix "" --cfn-stack-name-prefix ""
```

Output:

```
INFO[0000] Saved ECS CLI configuration for cluster (ecs-cli)
```

## ecs-cli up

### Description

Create the ECS cluster (if it does not already exist) and the AWS resources required to set up the cluster.

This command creates a new AWS CloudFormation stack called `amazon-ecs-cli-setup-cluster_name`. You can view the progress of the stack creation in the AWS Management Console.

### Syntax

```
ecs-cli up --keypair keypair_name --capability-iam [--size n] [--azs
availability_zone_1,availability_zone_2] [--security-group security_group_id] [--cidr
ip_range] [--port port_number] [--subnets subnet_1,subnet_2] [--vpc vpc_id] [--instance-
type instance_type] [--image-id ami_id] [--help]
```

### Options

Name	Description
<code>--verbose, --debug</code>	Provides more verbose output for debugging purposes.  Required: No
<code>--keypair <i>keypair_name</i></code>	Specifies the name of an existing Amazon EC2 key pair to enable SSH access to the EC2 instances in your cluster.  For more information about creating a key pair, see <a href="#">Setting Up with Amazon EC2</a> in the <i>Amazon EC2 User Guide for Linux Instances</i> .  Type: String  Required: Yes
<code>--capability-iam</code>	Acknowledges that this command may create IAM resources.  Required: Yes
<code>--size <i>n</i></code>	Specifies the number of instances to launch and register to the cluster.  Type: Integer  Default: 1  Required: No
<code>--azs <i>availability_zone_1,availability_zone_2</i></code>	Specifies a comma-separated list of two VPC Availability Zones in which to create subnets (these zones must have the available status). We recommend this option if you do not specify a VPC ID with the <code>--vpc</code> option.

Name	Description
	<p><b>Warning</b></p> <p>Leaving this option blank can result in failure to launch container instances if an unavailable zone is chosen at random.</p> <p>Type: String</p> <p>Required: No</p>
<code>--security-group <i>security_group_id</i></code>	<p>Specifies an existing security group to associate with your container instances. If you do not specify a security group here, then a new one is created.</p> <p>For more information, see <a href="#">Security Groups</a> in the <i>Amazon EC2 User Guide for Linux Instances</i>.</p> <p>Required: No</p>
<code>--cidr <i>ip_range</i></code>	<p>Specifies a CIDR/IP range for the security group to use for container instances in your cluster.</p> <p><b>Note</b></p> <p>This parameter is ignored if an existing security group is specified with the <code>--security-group</code> option.</p> <p>Type: CIDR/IP range</p> <p>Default: 0.0.0.0/0</p> <p>Required: No</p>
<code>--port <i>port_number</i></code>	<p>Specifies a port to open on the security group to use for container instances in your cluster.</p> <p><b>Note</b></p> <p>This parameter is ignored if an existing security group is specified with the <code>--security-group</code> option.</p> <p>Type: Integer</p> <p>Default: 80</p> <p>Required: No</p>
<code>--subnets <i>subnet_1,subnet_2</i></code>	<p>Specifies a comma-separated list of existing VPC subnet IDs in which to launch your container instances.</p> <p>Type: String</p> <p>Required: This option is required if you specify a VPC with the <code>--vpc</code> option.</p>

Name	Description
<code>--vpc <i>vpc_id</i></code>	Specifies the ID of an existing VPC in which to launch your container instances. If you specify a VPC ID, you must specify a list of existing subnets in that VPC with the <code>--subnets</code> option. If you do not specify a VPC ID, a new VPC is created with two subnets.  Type: String  Required: No
<code>--instance-type <i>instance_type</i></code>	Specifies the EC2 instance type for your container instances.  For more information on EC2 instance types, see <a href="#">Amazon EC2 Instances</a> .  Type: String  Default: <code>t2.micro</code>  Required: No
<code>--image-id <i>ami_id</i></code>	Specifies the Amazon EC2 AMI ID to use for your container instances.  Type: String  Default: The latest Amazon ECS–optimized AMI for the specified region.  Required: No
<code>--help, -h</code>	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example brings up a cluster of 4 `c4.large` instances and configures them to use the EC2 key pair called `id_rsa`.

```
ecs-cli up --keypair id_rsa --capability-iam --size 4 --instance-type c4.large
```

Output:

```
INFO[0000] Created cluster                                cluster=ecs-cli
INFO[0000] Waiting for your cluster resources to be created
INFO[0001] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
INFO[0061] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
INFO[0121] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
INFO[0181] Cloudformation stack status                   stackStatus=CREATE_IN_PROGRESS
```

## ecs-cli down

### Description

Deletes the AWS CloudFormation stack that was created by **ecs-cli up** and the associated resources. The `--force` option is required.

#### Note

The Amazon ECS CLI can only manage tasks, services, and container instances that were created with the CLI. To manage tasks, services, and container instances that were not created by the Amazon ECS CLI, use the AWS Command Line Interface or the AWS Management Console.

The **ecs-cli down** command attempts to delete the cluster specified in `~/.ecs/config`. However, if there are any active services (even with a desired count of 0) or registered container instances in your cluster that were not created by **ecs-cli up**, the cluster is not deleted and the services and pre-existing container instances remain active. This might happen, for example, if you used an existing ECS cluster with registered container instances, such as the default cluster.

If you have remaining services or container instances in your cluster that you would like to remove, you can follow the procedures in [Cleaning Up your Amazon ECS Resources \(p. 24\)](#) to remove them and then delete your cluster.

### Syntax

```
ecs-cli down --force [--help]
```

### Options

Name	Description
<code>--force, -f</code>	Acknowledges that this command permanently deletes resources.  Required: Yes
<code>--help, -h</code>	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example deletes a cluster.

```
ecs-cli down --force
```

Output:

```
INFO[0001] Waiting for your cluster resources to be deleted
INFO[0001] Cloudformation stack status                stackStatus=DELETE_IN_PROGRESS
INFO[0062] Cloudformation stack status                stackStatus=DELETE_IN_PROGRESS
INFO[0123] Cloudformation stack status                stackStatus=DELETE_IN_PROGRESS
INFO[0154] Deleted cluster
```

## ecs-cli scale

### Description

Modifies the number of container instances in your cluster. This command changes the desired and maximum instance count in the Auto Scaling group created by the **ecs-cli up** command. You can use this command to scale out (increase the number of instances) or scale in (decrease the number of instances) your cluster.

#### Note

The Amazon ECS CLI can only manage tasks, services, and container instances that were created with the CLI. To manage tasks, services, and container instances that were not created by the Amazon ECS CLI, use the AWS Command Line Interface or the AWS Management Console.

### Syntax

```
ecs-cli scale --capability-iam --size n [--help]
```

### Options

Name	Description
<code>--capability-iam</code>	Acknowledges that this command may create IAM resources. Required: Yes
<code>--size <i>n</i></code>	Specifies the number of instances to maintain in your cluster. Type: Integer Required: Yes
<code>--help, -h</code>	Shows the help text for the specified command. Required: No

### Examples

#### Example

This example scales the current cluster to two container instances.

```
ecs-cli scale --capability-iam --size 2
```

Output:

```
INFO[0001] Waiting for your cluster resources to be updated
INFO[0001] Cloudformation stack status           stackStatus=UPDATE_IN_PROGRESS
```

## ecs-cli ps

### Description

Lists all running containers in your ECS cluster.



## Syntax

```
ecs-cli ps [--help]
```

## Options

Name	Description
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example shows the containers that are running in the cluster.

```
ecs-cli ps
```

Output:

Name	State	Ports
TaskDefinition		
595deba7-16a1-4aaf-9b27-e152eba03ccc/wordpress	RUNNING	52.33.62.24:80->80/tcp
ecscompose-hello-world:3		
595deba7-16a1-4aaf-9b27-e152eba03ccc/mysql	RUNNING	
ecscompose-hello-world:3		
7fc0a2a4-9202-47d2-8b06-4463286b63de/mysql	RUNNING	
ecscompose-hello-world:3		
7fc0a2a4-9202-47d2-8b06-4463286b63de/wordpress	RUNNING	52.32.232.166:80->80/tcp
ecscompose-hello-world:3		

## ecs-cli push

### Description

Pushes an image to an Amazon ECR repository.

### Syntax

```
ecs-cli push [--registry-id registry_id] ECR_REPOSITORY[:TAG] [--help]
```

### Options

Name	Description
--registry-id <i>registry_id</i>	Specifies the ECR registry ID to which to push the image. By default, images are pushed to the current AWS account.  Required: No
--help, -h	Shows the help text for the specified command.

Name	Description
	Required: No

## Examples

### Example 1

This example pushes a local image called `ubuntu` to an ECR repository with the same name.

```
ecs-cli push ubuntu
```

Output:

```
INFO[0000] Getting AWS account ID...
INFO[0000] Tagging image
  repository="aws_account_id.dkr.ecr.us-east-1.amazonaws.com/ubuntu" source-image=ubuntu
  tag=
INFO[0000] Image tagged
INFO[0001] Creating repository                repository=ubuntu
INFO[0001] Repository created
INFO[0001] Pushing image
  repository="aws_account_id.dkr.ecr.us-east-1.amazonaws.com/ubuntu" tag=
INFO[0079] Image pushed
```

## ecs-cli pull

### Description

Pull an image from an Amazon ECR repository.

### Syntax

```
ecs-cli pull [--registry-id registry_id] ECR_REPOSITORY[:TAG|@DIGEST] [--help]
```

### Options

Name	Description
--registry-id <i>registry_id</i>	Specifies the ECR registry ID from which to pull the image. By default, images are pulled from the current AWS account.  Required: No
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example 1

This example pulls a local image called `amazonlinux` from an ECR repository with the same name.

```
ecs-cli pull amazonlinux
```

Output:

```
INFO[0000] Getting AWS account ID...
INFO[0000] Pulling image
  repository="aws_account_id.dkr.ecr.us-east-1.amazonaws.com/amazonlinux" tag=
INFO[0129] Image pulled
```

## ecs-cli images

### Description

List images in an Amazon ECR registry or repository.

### Syntax

```
ecs-cli images [--registry-id registry_id] [--tagged|--untagged] [ECR_REPOSITORY] [--help]
```

### Options

Name	Description
--registry-id <i>registry_id</i>	Specifies the ECR registry with which to list images. By default, images are listed for the current AWS account.  Required: No
--tagged	Filters the result to show only tagged images.  Required: No
--untagged	Filters the result to show only untagged images.  Required: No
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example 1

This example lists all of the images in an ECR registry.

```
ecs-cli images
```

Output:

REPOSITORY	NAME	TAG	PUSHED AT	IMAGE DIGEST	SIZE
rkt		latest			
	sha256:404758ad8af94347fc8582fc8e30b6284f2b0751de29b2e755da212f80232fac				3 months ago
	203 MB				

foobuntu	latest	sha256:6b079ae764a6affcb632231349d4a5e1b084bece8c46883c099863ee2aeb5cf8	4 days ago
		51.7 MB	
ubuntu	xenial	sha256:6b079ae764a6affcb632231349d4a5e1b084bece8c46883c099863ee2aeb5cf8	4 days ago
		51.7 MB	
ubuntu	latest	sha256:6b079ae764a6affcb632231349d4a5e1b084bece8c46883c099863ee2aeb5cf8	4 days ago
		51.7 MB	
ubuntu	<none>	sha256:512e30a26d9fa3648dbccb9e78e9bab636e6022e2d80bd73c99177b21a0d3982	19 minutes ago
		268 MB	
ubuntu	trusty	sha256:bd6d24e8fa3f5822146b2c94247976b87e6564195c3c180b67833e6ea699f7c2	18 minutes ago
		67.2 MB	
ubuntu	precise	sha256:b38267a51fb4460699bc2bcd5b53d42fec697bb4e4f9a819df3e762cec393b2a	17 minutes ago
		40.1 MB	
amazon-ecs-sample	latest	sha256:bf04071a8edec309f4d109ae36f24a5c272a115b6f7e636f77940059024d71c	2 weeks ago
		105 MB	
golang	latest	sha256:137b22efee2df470b0cd28ebfclae583be0baf09334a5a882096193577d983ab	4 days ago
		266 MB	
amazonlinux	latest	sha256:a59d563b5139deee8cb108bfb97bf3e9021b8ccea6dec8ff49733230cb2f0eca	4 days ago
		98.8 MB	
awsbatch/fetch_and_run	latest	sha256:543800007416d0ccff4f63643bb18eeff4b874ea772128efcdc231ff456a37fc	6 weeks ago
		116 MB	

## Example 2

This example lists all of the images in a specific ECR repository.

```
ecs-cli images ubuntu
```

Output:

REPOSITORY NAME	TAG	IMAGE DIGEST	
	PUSHED AT	SIZE	
ubuntu	xenial	sha256:6b079ae764a6affcb632231349d4a5e1b084bece8c46883c099863ee2aeb5cf8	4 days ago
		51.7 MB	
ubuntu	latest	sha256:6b079ae764a6affcb632231349d4a5e1b084bece8c46883c099863ee2aeb5cf8	4 days ago
		51.7 MB	
ubuntu	<none>	sha256:512e30a26d9fa3648dbccb9e78e9bab636e6022e2d80bd73c99177b21a0d3982	20 minutes ago
		268 MB	
ubuntu	trusty	sha256:bd6d24e8fa3f5822146b2c94247976b87e6564195c3c180b67833e6ea699f7c2	19 minutes ago
		67.2 MB	
ubuntu	precise	sha256:b38267a51fb4460699bc2bcd5b53d42fec697bb4e4f9a819df3e762cec393b2a	18 minutes ago
		40.1 MB	

## Example 3

This example lists all of the untagged images in an ECR registry.

```
ecs-cli images --untagged
```

Output:

REPOSITORY NAME	TAG	PUSHED AT	IMAGE DIGEST	SIZE
ubuntu	<none>			
sha256:512e30a26d9fa3648dbccb9e78e9bab636e6022e2d80bd73c99177b21a0d3982			24 minutes ago	
268 MB				

## ecs-cli license

### Description

Prints the `LICENSE` files for the Amazon ECS CLI and its dependencies.

### Syntax

```
ecs-cli license [--help]
```

### Options

Name	Description
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example prints the license files.

```
ecs-cli license
```

Output:

```
Copyright 2015 Amazon.com, Inc. or its affiliates. All Rights Reserved.

Licensed under the Apache License, Version 2.0 (the "License"). You may not use this file
except in compliance with the
License. A copy of the License is located at

    http://aws.amazon.com/apache2.0/

or in the "license" file accompanying this file. This file is distributed on an "AS IS"
BASIS, WITHOUT WARRANTIES OR
CONDITIONS OF ANY KIND, either express or implied. See the License for the specific
language governing permissions
and limitations under the License.
...
```

## ecs-cli compose

### Description

Manage Amazon ECS tasks with **docker-compose**-style commands on an ECS cluster.

#### Note

To create Amazon ECS services with the Amazon ECS CLI, see [ecs-cli compose service](#) (p. 250).

The **ecs-cli compose** command works with a Docker compose file to create task definitions and manage tasks. At this time, the latest version of the Amazon ECS CLI supports [Docker compose file syntax](#) versions 1 and 2. By default, the command looks for a compose file in the current directory, called `docker-compose.yml`. However, you can also specify a different file name or path to a compose file with the `--file` option. This is especially useful for managing tasks and services from multiple compose files at a time with the Amazon ECS CLI.

The **ecs-cli compose** command uses a project name with the task definitions and services it creates. When the CLI creates a task definition from a compose file, the task definition is called `ecscompose-project-name`. When the CLI creates a service from a compose file, the service is called `ecscompose-service-project-name`. By default, the project name is the name of the current working directory. However, you can also specify your own project name with the `--project-name` option.

#### Note

The Amazon ECS CLI can only manage tasks, services, and container instances that were created with the CLI. To manage tasks, services, and container instances that were not created by the Amazon ECS CLI, use the AWS Command Line Interface or the AWS Management Console.

The following parameters are supported in compose files for the Amazon ECS CLI:

- `command`
- `cpu_shares`
- `dns`
- `dns_search`
- `entrypoint`
- `environment`: If an environment variable value is not specified in the compose file, but it exists in the shell environment, the shell environment variable value is passed to the task definition that is created for any associated tasks or services.

#### Important

We do not recommend using plaintext environment variables for sensitive information, such as credential data.

- `env_file`

#### Important

We do not recommend using plaintext environment variables for sensitive information, such as credential data.

- `extra_hosts`
- `hostname`
- `image`
- `labels`
- `links`
- `log_driver`
- `log_opt`

- `mem_limit` (in bytes)
- `ports`
- `privileged`
- `read_only`
- `security_opt`
- `ulimits`
- `user`
- `volumes`
- `volumes_from`
- `working_dir`

### Important

The `build` directive is not supported at this time.

For more information about Docker compose file syntax, see the [Compose file reference](#) in the Docker documentation.

## Syntax

```
ecs-cli compose [--verbose] [--file compose-file] [--project-name project-name]
[subcommand] [arguments] [--help]
```

## Options

Name	Description
<code>--verbose</code> , <code>--debug</code>	Increases the verbosity of command output to aid in diagnostics.  Required: No
<code>--file</code> , <code>-f</code> <i>compose-file</i>	Specifies the Docker compose file to use. At this time, the latest version of the Amazon ECS CLI supports <a href="#">Docker compose file syntax</a> versions 1 and 2. If the <code>COMPOSE_FILE</code> environment variable is set when <b>ecs-cli compose</b> is run, then the Docker compose file is set to the value of that environment variable.  Type: String  Default: <code>./docker-compose.yml</code>  Required: No
<code>--project-name</code> , <code>-p</code> <i>project-name</i>	Specifies the project name to use. If the <code>COMPOSE_PROJECT_NAME</code> environment variable is set when <b>ecs-cli compose</b> is run, then the project name is set to the value of that environment variable.  Type: String  Default: The current directory name.  Required: No

Name	Description
<code>--help, -h</code>	Shows the help text for the specified command.  Required: No

## Available Subcommands

The **ecs-cli compose** command supports the following subcommands:

### **create**

Creates an ECS task definition from your compose file.

### **start**

Starts a single task from the task definition created from your compose file.

### **up**

Creates an ECS task definition from your compose file (if it does not already exist) and runs one instance of that task on your cluster (a combination of **create** and **start**)

### **ps**

Lists all the containers in your cluster that were started by the compose project.

### **scale** *n*

Scales the number of running tasks to the specified count.

### **run** [*containerName*] [*command*] ...

Starts all containers overriding commands with the supplied one-off commands for the containers.

### **stop**

Stops all the running tasks created by the compose project.

### **service** [*subcommand*]

Creates an ECS service from your compose file. For more information, see [ecs-cli compose service](#) (p. 250).

### **help**

Shows the help text for the specified command.

## Examples

### Example 1

This example creates a task definition with the project name `hello-world` from the `hello-world.yml` compose file.

```
ecs-cli compose --project-name hello-world --file hello-world.yml create
```

Output:

```
INFO[0000] Using ECS task definition                    TaskDefinition=ecscompose-hello-  
world:5
```



## ecs-cli compose service

### Description

Manage Amazon ECS services with **docker-compose**-style commands on an ECS cluster.

#### Note

To run tasks with the Amazon ECS CLI instead of creating services, see [ecs-cli compose](#) (p. 247).

The **ecs-cli compose service** command works with a Docker compose file to create task definitions and manage services. At this time, the Amazon ECS CLI supports [Docker compose file syntax](#) versions 1 and 2. By default, the command looks for a compose file in the current directory, called `docker-compose.yml`. However, you can also specify a different file name or path to a compose file with the `--file` option. This is especially useful for managing tasks and services from multiple compose files at a time with the Amazon ECS CLI.

The **ecs-cli compose service** command uses a project name with the task definitions and services that it creates. When the CLI creates a task definition from a compose file, the task definition is called `ecscompose-project-name`. When the CLI creates a service from a compose file, the service is called `ecscompose-service-project-name`. By default, the project name is the name of the current working directory. However, you can also specify your own project name with the `--project-name` option.

#### Note

The Amazon ECS CLI can only manage tasks, services, and container instances that were created with the CLI. To manage tasks, services, and container instances that were not created by the Amazon ECS CLI, use the AWS Command Line Interface or the AWS Management Console.

The following parameters are supported in compose files for the Amazon ECS CLI:

- `command`
- `cpu_shares`
- `dns`
- `dns_search`
- `entrypoint`
- `environment`: If an environment variable value is not specified in the compose file, but it exists in the shell environment, the shell environment variable value is passed to the task definition that is created for any associated tasks or services.

#### Important

We do not recommend using plaintext environment variables for sensitive information, such as credential data.

- `env_file`

#### Important

We do not recommend using plaintext environment variables for sensitive information, such as credential data.

- `extra_hosts`
- `hostname`
- `image`
- `labels`
- `links`
- `log_driver`
- `log_opt`

- `mem_limit` (in bytes)
- `ports`
- `privileged`
- `read_only`
- `security_opt`
- `ulimits`
- `user`
- `volumes`
- `volumes_from`
- `working_dir`

### Important

The `build` directive is not supported at this time.

For more information about Docker compose file syntax, see the [Compose file reference](#) in the Docker documentation.

## Syntax

```
ecs-cli compose [--verbose] [--file compose-file] [--project-name project-name] service
[subcommand] [arguments] [--help]
```

## Options

Name	Description
<code>--verbose, --debug</code>	Increases the verbosity of command output to aid in diagnostics.  Required: No
<code>--file, -f <i>compose-file</i></code>	Specifies the Docker compose file to use. At this time, the latest version of the Amazon ECS CLI supports <a href="#">Docker compose file syntax</a> versions 1 and 2. If the <code>COMPOSE_FILE</code> environment variable is set when <b>ecs-cli compose</b> is run, then the Docker compose file is set to the value of that environment variable.  Type: String Default: <code>./docker-compose.yml</code> Required: No
<code>--project-name, -p <i>project-name</i></code>	Specifies the project name to use. If the <code>COMPOSE_PROJECT_NAME</code> environment variable is set when <b>ecs-cli compose</b> is run, then the project name is set to the value of that environment variable.  Type: String Default: The current directory name. Required: No

Name	Description
<code>--help, -h</code>	Shows the help text for the specified command.  Required: No

## Available Subcommands

The **ecs-cli compose service** command supports the following subcommands and arguments:

**create** `--deployment-max-percent n` `--deployment-min-healthy-percent n` `--load-balancer-name value` `--target-group-arn value` `--container-name value` `--container-port value` `--role value`

Creates an ECS service from your compose file. The service is created with a desired count of 0, so no containers are started by this command.

The `--deployment-max-percent` option specifies the upper limit (as a percentage of the service's `desiredCount`) of the number of running tasks that can be running in a service during a deployment (the default value is 200). The `--deployment-min-healthy-percent` option specifies the lower limit (as a percentage of the service's `desiredCount`) of the number of running tasks that must remain running and healthy in a service during a deployment (the default value is 100). For more information, see [maximumPercent](#) (p. 137) and [minimumHealthyPercent](#) (p. 138).

You can optionally run your service behind a load balancer. The load balancer distributes traffic across the tasks that are associated with the service. For more information, see [Service Load Balancing](#) (p. 138). After you create a service, the load balancer name or target group ARN, container name, and container port specified in the service definition are immutable.

### Note

You must create your load balancer resources in the before you can configure a service to use them. Your load balancer resources should reside in the same VPC as your container instances and they should be configured to use the same subnets. You must also add a security group rule to your container instance security group that allows inbound traffic from your load balancer. For more information, see [Creating a Load Balancer](#) (p. 142).

- To configure your service to use an existing Elastic Load Balancing Classic Load Balancer, you must specify the load balancer name, the container name (as it appears in a container definition), and the container port to access from the load balancer. When a task from this service is placed on a container instance, the container instance is registered with the load balancer specified here.
- To configure your service to use an existing Elastic Load Balancing Application Load Balancer, you must specify the load balancer target group ARN, the container name (as it appears in a container definition), and the container port to access from the load balancer. When a task from this service is placed on a container instance, the container instance and port combination is registered as a target in the target group specified here.

### start

Starts one copy of each of the containers on the created ECS service. This command updates the desired count of the service to 1.

**up** `--deployment-max-percent n` `--deployment-min-healthy-percent n` `--load-balancer-name value` `--target-group-arn value` `--container-name value` `--container-port value` `--role value`

Creates an ECS service from your compose file (if it does not already exist) and runs one instance of that task on your cluster (a combination of **create** and **start**). This command updates the desired count of the service to 1.

The `--deployment-max-percent` option specifies the upper limit (as a percentage of the service's `desiredCount`) of the number of running tasks that can be running in a service during a deployment

(the default value is 200). The `--deployment-min-healthy-percent` option specifies the lower limit (as a percentage of the service's `desiredCount`) of the number of running tasks that must remain running and healthy in a service during a deployment (the default value is 100). For more information, see [maximumPercent](#) (p. 137) and [minimumHealthyPercent](#) (p. 138).

You can optionally run your service behind a load balancer. The load balancer distributes traffic across the tasks that are associated with the service. For more information, see [Service Load Balancing](#) (p. 138). After you create a service, the load balancer name or target group ARN, container name, and container port specified in the service definition are immutable.

#### Note

You must create your load balancer resources in the before you can configure a service to use them. Your load balancer resources should reside in the same VPC as your container instances and they should be configured to use the same subnets. You must also add a security group rule to your container instance security group that allows inbound traffic from your load balancer. For more information, see [Creating a Load Balancer](#) (p. 142).

- To configure your service to use an existing Elastic Load Balancing Classic Load Balancer, you must specify the load balancer name, the container name (as it appears in a container definition), and the container port to access from the load balancer. When a task from this service is placed on a container instance, the container instance is registered with the load balancer specified here.
- To configure your service to use an existing Elastic Load Balancing Application Load Balancer, you must specify the load balancer target group ARN, the container name (as it appears in a container definition), and the container port to access from the load balancer. When a task from this service is placed on a container instance, the container instance and port combination is registered as a target in the target group specified here.

#### ps

Lists all the containers in your cluster that belong to the service created with the compose project.

**scale** [`--deployment-max-percent` *n*] [`--deployment-min-healthy-percent` *n*] *n*

Scales the desired count of the service to the specified count.

The `--deployment-max-percent` option specifies the upper limit (as a percentage of the service's `desiredCount`) of the number of running tasks that can be running in a service during a deployment (the default value is 200). The `--deployment-min-healthy-percent` option specifies the lower limit (as a percentage of the service's `desiredCount`) of the number of running tasks that must remain running and healthy in a service during a deployment (the default value is 100). For more information, see [maximumPercent](#) (p. 137) and [minimumHealthyPercent](#) (p. 138).

#### stop

Stops the running tasks that belong to the service created with the compose project. This command updates the desired count of the service to 0.

#### rm

Updates the desired count of the service to 0 and then deletes the service.

#### help

Shows the help text for the specified command.

## Examples

### Example 1

This example brings up an ECS service with the project name `hello-world` from the `hello-world.yml` compose file.

```
ecs-cli compose --project-name hello-world --file hello-world.yml service up
```

Output:

```
INFO[0001] Using ECS task definition          TaskDefinition=ecscompose-hello-
world:3
INFO[0001] Created an ECS Service            serviceName=ecscompose-service-
hello-world taskDefinition=ecscompose-hello-world:3
INFO[0002] Updated ECS service successfully  desiredCount=1
      serviceName=ecscompose-service-hello-world
INFO[0002] Describe ECS Service status       desiredCount=1 runningCount=0
      serviceName=ecscompose-service-hello-world
INFO[0033] Describe ECS Service status       desiredCount=1 runningCount=0
      serviceName=ecscompose-service-hello-world
INFO[0063] Describe ECS Service status       desiredCount=1 runningCount=0
      serviceName=ecscompose-service-hello-world
INFO[0093] Describe ECS Service status       desiredCount=1 runningCount=0
      serviceName=ecscompose-service-hello-world
INFO[0108] ECS Service has reached a stable state desiredCount=1 runningCount=1
      serviceName=ecscompose-service-hello-world
```

## Example 2

This example scales the service created by the `hello-world` project to a desired count of 2.

```
ecs-cli compose --project-name hello-world --file hello-world.yml service scale 2
```

Output:

```
INFO[0001] Updated ECS service successfully  desiredCount=2
      serviceName=ecscompose-service-hello-world
INFO[0001] Describe ECS Service status       desiredCount=2 runningCount=1
      serviceName=ecscompose-service-hello-world
INFO[0032] Describe ECS Service status       desiredCount=2 runningCount=1
      serviceName=ecscompose-service-hello-world
INFO[0063] ECS Service has reached a stable state desiredCount=2 runningCount=2
      serviceName=ecscompose-service-hello-world
```

## Example 3

This example scales the service created by the `hello-world` project to a desired count of 0 and then deletes the service.

```
ecs-cli compose --project-name hello-world --file hello-world.yml service rm
```

Output:

```
INFO[0000] Updated ECS service successfully  desiredCount=0
      serviceName=ecscompose-service-hello-world
INFO[0000] Describe ECS Service status       desiredCount=0 runningCount=2
      serviceName=ecscompose-service-hello-world
INFO[0016] ECS Service has reached a stable state desiredCount=0 runningCount=0
      serviceName=ecscompose-service-hello-world
INFO[0016] Deleted ECS service              service=ecscompose-service-hello-
world
INFO[0016] ECS Service has reached a stable state desiredCount=0 runningCount=0
      serviceName=ecscompose-service-hello-world
```

## Example 4

This example creates a service from the `nginx-compose.yml` compose file and configures it to use an existing Application Load Balancer.

```
ecs-cli compose -f nginx-compose.yml service up --target-group-arn  
arn:aws:elasticloadbalancing:us-east-1:aws_account_id:targetgroup/ecs-cli-  
alb/9856106fcc5d4be8 --container-name nginx --container-port 80 --role ecsServiceRole
```

### Output:

```
INFO[0000] Using ECS task definition                TaskDefinition="ecscompose-ecs-  
cli:3"  
INFO[0001] Created an ECS service                  service=ecscompose-service-ecs-cli  
taskDefinition="ecscompose-ecs-cli:3"  
INFO[0001] Updated ECS service successfully        desiredCount=1  
serviceName=ecscompose-service-ecs-cli  
INFO[0001] Describe ECS Service status            desiredCount=1 runningCount=0  
serviceName=ecscompose-service-ecs-cli  
INFO[0016] ECS Service has reached a stable state  desiredCount=1 runningCount=1  
serviceName=ecscompose-service-ecs-cli
```

# Using the AWS CLI with Amazon ECS

The following steps will help you set up a cluster, register a task definition, run a task, and perform other common scenarios in Amazon ECS with the AWS CLI.

## Important

Before you begin, be sure that you've completed the steps in [Setting Up with Amazon ECS \(p. 8\)](#) and that your AWS user has the required permissions specified in the [Amazon ECS First Run Wizard \(p. 217\)](#) IAM policy example.

The AWS Command Line Interface (CLI) is a unified tool to manage your AWS services. With just one tool to download and configure, you can control multiple AWS services from the command line and automate them through scripts. For more information on the AWS CLI, see <http://aws.amazon.com/cli/>.

For more information on the other tools available for managing your AWS resources, including the different AWS SDKs, IDE toolkits, and the Windows PowerShell command line tools, see <http://aws.amazon.com/tools/>.

1. [Step 1: \(Optional\) Create a Cluster \(p. 256\)](#)
2. [Step 2: Launch an Instance with the Amazon ECS AMI \(p. 257\)](#)
3. [Step 3: List Container Instances \(p. 258\)](#)
4. [Step 4: Describe your Container Instance \(p. 258\)](#)
5. [Step 5: Register a Task Definition \(p. 260\)](#)
6. [Step 6: List Task Definitions \(p. 261\)](#)
7. [Step 7: Run a Task \(p. 262\)](#)
8. [Step 8: List Tasks \(p. 262\)](#)
9. [Step 9: Describe the Running Task \(p. 263\)](#)

## Step 1: (Optional) Create a Cluster

By default, your account receives a `default` cluster when you launch your first container instance.

### Note

The benefit of using the `default` cluster that is provided for you is that you don't have to specify the `--cluster cluster_name` option in the subsequent commands. If you do create your own, non-default, cluster you need to specify `--cluster cluster_name` for each command that you intend to use with that cluster.

Create your own cluster with a unique name with the following command:

```
aws ecs create-cluster --cluster-name MyCluster
```

Output:

```
{
  "cluster": {
    "clusterName": "MyCluster",
    "status": "ACTIVE",
    "clusterArn": "arn:aws:ecs:region:aws_account_id:cluster/MyCluster"
  }
}
```

## Step 2: Launch an Instance with the Amazon ECS AMI

You must have an Amazon ECS container instance in your cluster before you can run tasks on it. If you do not have any container instances in your cluster, see [Launching an Amazon ECS Container Instance \(p. 42\)](#) for more information. The current Amazon ECS–optimized AMI IDs by region are listed below for reference.

Region	AMI Name	AMI ID	EC2 console link
us-east-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-275ffe31	<a href="#">Launch instance</a>
us-east-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-62745007	<a href="#">Launch instance</a>
us-west-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-689bc208	<a href="#">Launch instance</a>
us-west-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-62d35c02	<a href="#">Launch instance</a>
eu-west-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-95f8d2f3	<a href="#">Launch instance</a>
eu-west-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-bf9481db	<a href="#">Launch instance</a>
eu-central-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-085e8a67	<a href="#">Launch instance</a>
ap-northeast-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-f63f6f91	<a href="#">Launch instance</a>



Region	AMI Name	AMI ID	EC2 console link
ap-southeast-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-b4ae1dd7	<a href="#">Launch instance</a>
ap-southeast-2	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-fbe9eb98	<a href="#">Launch instance</a>
ca-central-1	<b>amzn-ami-2016.09.g-amazon-ecs-optimized</b>	ami-ee58e58a	<a href="#">Launch instance</a>

## Step 3: List Container Instances

Within a few minutes of launching your container instance, the Amazon ECS agent registers the instance with your default cluster. You can list the container instances in a cluster by running the following command:

```
aws ecs list-container-instances --cluster default
```

Output:

```
{
  "containerInstanceArns": [
    "arn:aws:ecs:us-east-1:aws_account_id:container-instance/container_instance_ID"
  ]
}
```

## Step 4: Describe your Container Instance

After you have the ARN or ID of a container instance, you can use the **describe-container-instances** command to get valuable information on the instance, such as remaining and registered CPU and memory resources.

```
aws ecs describe-container-instances --cluster default --container-
instances container_instance_ID
```

Output:

```
{
  "failures": [],
  "containerInstances": [
    {
      "status": "ACTIVE",
      "registeredResources": [
        {
          "integerValue": 1024,
          "longValue": 0,
          "type": "INTEGER",
          "name": "CPU",
          "doubleValue": 0.0
        },
        {
          "integerValue": 995,
          "longValue": 0,
          "type": "INTEGER",
          "name": "MEMORY",
          "doubleValue": 0.0
        }
      ]
    }
  ]
}
```

```
        "name": "MEMORY",
        "doubleValue": 0.0
    },
    {
        "name": "PORTS",
        "longValue": 0,
        "doubleValue": 0.0,
        "stringSetValue": [
            "22",
            "2376",
            "2375",
            "51678"
        ],
        "type": "STRINGSET",
        "integerValue": 0
    },
    {
        "name": "PORTS_UDP",
        "longValue": 0,
        "doubleValue": 0.0,
        "stringSetValue": [],
        "type": "STRINGSET",
        "integerValue": 0
    }
],
"ec2InstanceId": "instance_id",
"agentConnected": true,
"containerInstanceArn": "arn:aws:ecs:us-west-2:aws_account_id:container-instance/container_instance_ID",
"pendingTasksCount": 0,
"remainingResources": [
    {
        "integerValue": 1024,
        "longValue": 0,
        "type": "INTEGER",
        "name": "CPU",
        "doubleValue": 0.0
    },
    {
        "integerValue": 995,
        "longValue": 0,
        "type": "INTEGER",
        "name": "MEMORY",
        "doubleValue": 0.0
    },
    {
        "name": "PORTS",
        "longValue": 0,
        "doubleValue": 0.0,
        "stringSetValue": [
            "22",
            "2376",
            "2375",
            "51678"
        ],
        "type": "STRINGSET",
        "integerValue": 0
    },
    {
        "name": "PORTS_UDP",
        "longValue": 0,
        "doubleValue": 0.0,
        "stringSetValue": [],
        "type": "STRINGSET",
        "integerValue": 0
    }
]
```

```
    ],
    "runningTasksCount": 0,
    "attributes": [
      {
        "name": "com.amazonaws.ecs.capability.privileged-container"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.17"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.18"
      },
      {
        "name": "com.amazonaws.ecs.capability.docker-remote-api.1.19"
      },
      {
        "name": "com.amazonaws.ecs.capability.logging-driver.json-file"
      },
      {
        "name": "com.amazonaws.ecs.capability.logging-driver.syslog"
      }
    ],
    "versionInfo": {
      "agentVersion": "1.5.0",
      "agentHash": "b197edd",
      "dockerVersion": "DockerVersion: 1.7.1"
    }
  }
}
```

You can also find the Amazon EC2 instance ID that you can use to monitor the instance in the Amazon EC2 console or with the **aws ec2 describe-instances --instance-id *instance\_id*** command.

## Step 5: Register a Task Definition

Before you can run a task on your ECS cluster, you must register a task definition. Task definitions are lists of containers grouped together. The following example is a simple task definition that uses a `busybox` image from Docker Hub and simply sleeps for 360 seconds. For more information about the available task definition parameters, see [Amazon ECS Task Definitions \(p. 90\)](#).

```
{
  "containerDefinitions": [
    {
      "name": "sleep",
      "image": "busybox",
      "cpu": 10,
      "command": [
        "sleep",
        "360"
      ],
      "memory": 10,
      "essential": true
    }
  ],
  "family": "sleep360"
}
```

The above example JSON can be passed to the AWS CLI in two ways: you can save the task definition JSON as a file and pass it with the `--cli-input-json file://path_to_file.json` option, or you can

escape the quotation marks in the JSON and pass the JSON container definitions on the command line as in the below example. If you choose to pass the container definitions on the command line, your command additionally requires a `--family` parameter that is used to keep multiple versions of your task definition associated with each other.

To use a JSON file for container definitions:

```
aws ecs register-task-definition --cli-input-json file://$HOME/tasks/sleep360.json
```

To use a JSON string for container definitions:

```
aws ecs register-task-definition --family sleep360 --container-definitions "[{\"name\": \"sleep\", \"image\": \"busybox\", \"cpu\": 10, \"command\": [\"sleep\", \"360\"], \"memory\": 10, \"essential\": true}]"
```

The **register-task-definition** returns a description of the task definition after it completes its registration.

```
{
  "taskDefinition": {
    "volumes": [],
    "taskDefinitionArn": "arn:aws:ec2:us-east-1:aws_account_id:task-definition/sleep360:1",
    "containerDefinitions": [
      {
        "environment": [],
        "name": "sleep",
        "mountPoints": [],
        "image": "busybox",
        "cpu": 10,
        "portMappings": [],
        "command": [
          "sleep",
          "360"
        ],
        "memory": 10,
        "essential": true,
        "volumesFrom": []
      }
    ],
    "family": "sleep360",
    "revision": 1
  }
}
```

## Step 6: List Task Definitions

You can list the task definitions for your account at any time with the **list-task-definitions** command. The output of this command shows the `family` and `revision` values that you can use together when calling **run-task** or **start-task**.

```
aws ecs list-task-definitions
```

Output:

```
{
  "taskDefinitionArns": [
    "arn:aws:ec2:us-east-1:aws_account_id:task-definition/sleep300:1",
  ]
}
```

```
    "arn:aws:ec2:us-east-1:aws_account_id:task-definition/sleep300:2",  
    "arn:aws:ec2:us-east-1:aws_account_id:task-definition/sleep360:1",  
    "arn:aws:ec2:us-east-1:aws_account_id:task-definition/wordpress:3",  
    "arn:aws:ec2:us-east-1:aws_account_id:task-definition/wordpress:4",  
    "arn:aws:ec2:us-east-1:aws_account_id:task-definition/wordpress:5",  
    "arn:aws:ec2:us-east-1:aws_account_id:task-definition/wordpress:6"  
  ]  
}
```

## Step 7: Run a Task

After you have registered a task for your account and have launched a container instance that is registered to your cluster, you can run the registered task in your cluster. For this example, you place a single instance of the `sleep360:1` task definition in your default cluster.

```
aws ecs run-task --cluster default --task-definition sleep360:1 --count 1
```

Output:

```
{  
  "tasks": [  
    {  
      "taskArn": "arn:aws:ecs:us-east-1:aws_account_id:task/task_ID",  
      "overrides": {  
        "containerOverrides": [  
          {  
            "name": "sleep"  
          }  
        ]  
      },  
      "lastStatus": "PENDING",  
      "containerInstanceArn": "arn:aws:ecs:us-east-1:aws_account_id:container-  
instance/container_instance_ID",  
      "clusterArn": "arn:aws:ecs:us-east-1:aws_account_id:cluster/default",  
      "desiredStatus": "RUNNING",  
      "taskDefinitionArn": "arn:aws:ecs:us-east-1:aws_account_id:task-definition/  
sleep360:1",  
      "containers": [  
        {  
          "containerArn": "arn:aws:ecs:us-  
east-1:aws_account_id:container/container_ID",  
          "taskArn": "arn:aws:ecs:us-east-1:aws_account_id:task/task_ID",  
          "lastStatus": "PENDING",  
          "name": "sleep"  
        }  
      ]  
    }  
  ]  
}
```

## Step 8: List Tasks

List the tasks for your cluster. You should see the task that you ran in the previous section. You can take the task ID or the full ARN that is returned from this command and use it to describe the task later.

```
aws ecs list-tasks --cluster default
```

Output:

```
{
  "taskArns": [
    "arn:aws:ecs:us-east-1:aws_account_id:task/task_ID"
  ]
}
```

## Step 9: Describe the Running Task

Describe the task using the task ID retrieved earlier to get more information about the task.

```
aws ecs describe-tasks --cluster default --task task_ID
```

Output:

```
{
  "failures": [],
  "tasks": [
    {
      "taskArn": "arn:aws:ecs:us-east-1:aws_account_id:task/task_ID",
      "overrides": {
        "containerOverrides": [
          {
            "name": "sleep"
          }
        ]
      },
      "lastStatus": "RUNNING",
      "containerInstanceArn": "arn:aws:ecs:us-east-1:aws_account_id:container-
instance/container_instance_ID",
      "clusterArn": "arn:aws:ecs:us-east-1:aws_account_id:cluster/default",
      "desiredStatus": "RUNNING",
      "taskDefinitionArn": "arn:aws:ecs:us-east-1:aws_account_id:task-definition/
sleep360:1",
      "containers": [
        {
          "containerArn": "arn:aws:ecs:us-
east-1:aws_account_id:container/container_ID",
          "taskArn": "arn:aws:ecs:us-east-1:aws_account_id:task/task_ID",
          "lastStatus": "RUNNING",
          "name": "sleep",
          "networkBindings": []
        }
      ]
    }
  ]
}
```

# Common Use Cases in Amazon ECS

This topic provides guidance for two common use cases in Amazon ECS: microservices and batch jobs. Here you can find considerations and external resources that may be useful for getting your application running on Amazon ECS, and the common aspects of each solution.

## Topics

- [Microservices \(p. 264\)](#)
- [Batch Jobs \(p. 266\)](#)

## Microservices

Microservices are built with a software architectural method that decomposes complex applications into smaller, independent services. Containers are optimal for running small, decoupled services, and they offer the following advantages:

- Containers make services easy to model in an immutable image with all of your dependencies.
- Containers can use any application and any programming language.
- The container image is a versioned artifact, so you can track your container images to the source they came from.
- You can test your containers locally, and deploy the same artifact to scale.

The following sections cover some of the aspects and challenges that you must consider when designing a microservices architecture to run on Amazon ECS. You can also view the microservices reference architecture on GitHub. For more information, see [Deploying Microservices with Amazon ECS, AWS CloudFormation, and an Application Load Balancer](#).

## Topics

- [Auto Scaling \(p. 265\)](#)
- [Service Discovery \(p. 265\)](#)
- [Authorization and Secrets Management \(p. 265\)](#)
- [Logging \(p. 265\)](#)
- [Continuous Integration and Continuous Deployment \(p. 266\)](#)

## Auto Scaling

The application load for your microservice architecture can change over time. A responsive application can scale out or in, depending on actual or anticipated load. Amazon ECS provides you with several tools to scale not only your services that are running in your clusters, but the actual clusters themselves.

For example, Amazon ECS provides CloudWatch metrics for your clusters and services. For more information, see [Amazon ECS CloudWatch Metrics \(p. 169\)](#). You can monitor the memory and CPU utilization for your clusters and services. Then, use those metrics to trigger CloudWatch alarms that can automatically scale out your cluster when its resources are running low, and scale them back in when you don't need as many resources. For more information, see [Tutorial: Scaling Container Instances with CloudWatch Alarms \(p. 179\)](#).

In addition to scaling your cluster size, your Amazon ECS service can optionally be configured to use Service Auto Scaling to adjust its desired count up or down in response to CloudWatch alarms. Service Auto Scaling is available in all regions that support Amazon ECS. For more information, see [Service Auto Scaling \(p. 149\)](#).

## Service Discovery

Service discovery is a key component of most distributed systems and service-oriented architectures. With service discovery, your microservice components are automatically discovered as they get created and terminated on a given infrastructure. There are several approaches that you can use to make your services discoverable. The following resources describe a few examples:

- [Run Containerized Microservices with Amazon EC2 Container Service and Application Load Balancer](#): This post describes how to use the dynamic port mapping and path-based routing features of Elastic Load Balancing Application Load Balancers to provide service discovery for a microservice architecture.
- [Amazon EC2 Container Service - Reference Architecture: Service Discovery](#): This Amazon ECS reference architecture provides service discovery to containers using CloudWatch Events, Lambda, and Amazon Route 53 private hosted zones.
- [Service Discovery via Consul with Amazon ECS](#): This post shows how a third party tool called [Consul by HashiCorp](#) can augment the capabilities of Amazon ECS by providing service discovery for an ECS cluster (complete with an example application).

## Authorization and Secrets Management

Managing secrets, such as database credentials for an application, has always been a challenging issue. The [Managing Secrets for Amazon ECS Applications Using Parameter Store and IAM Roles for Tasks](#) post focuses on how to integrate the [IAM roles for tasks \(p. 212\)](#) functionality of Amazon ECS with the Amazon EC2 Systems Manager parameter store. Parameter store provides a centralized store to manage your configuration data, whether it's plaintext data such as database strings or secrets such as passwords, encrypted through AWS Key Management Service.

## Logging

You can configure your container instances to send log information to CloudWatch Logs. This enables you to view different logs from your container instances in one convenient location. For more information about getting started using CloudWatch Logs on your container instances that were launched with the Amazon ECS-optimized AMI, see [Using CloudWatch Logs with Container Instances \(p. 49\)](#).

You can configure the containers in your tasks to send log information to CloudWatch Logs. This enables you to view different logs from your containers in one convenient location, and it prevents your container



logs from taking up disk space on your container instances. For more information about getting started using the `awslogs` log driver in your task definitions, see [Using the awslogs Log Driver \(p. 114\)](#).

## Continuous Integration and Continuous Deployment

Continuous integration and continuous deployment (CICD) is a common process for microservice architectures that are based on Docker containers. You can create a pipeline that takes the following actions:

- Monitors changes to a source code repository
- Builds a new Docker image from that source
- Pushes the image to an image repository such as Amazon ECR or Docker Hub
- Updates your Amazon ECS services to use the new image in your application

The following resources outline how to do this in different ways:

- [ECS Reference Architecture: Continuous Deployment](#): This reference architecture demonstrates how to achieve continuous deployment of an application to Amazon ECS using AWS CodePipeline, AWS CodeBuild, and AWS CloudFormation.
- [Continuous Delivery Pipeline for Amazon ECS Using Jenkins, GitHub, and Amazon ECR](#): This AWS labs repository helps you set up and configure a continuous delivery pipeline for Amazon ECS using Jenkins, GitHub, and Amazon ECR.

## Batch Jobs

Docker containers are particularly suited for batch job workloads. Batch jobs are often short-lived and embarrassingly parallel. You can package your batch processing application into a Docker image so that you can deploy it anywhere, such as in an Amazon ECS task. If you are interested in running batch job workloads, consider the following resources:

- [AWS Batch](#): For fully managed batch processing at any scale, you should consider using AWS Batch. AWS Batch enables developers, scientists, and engineers to easily and efficiently run hundreds of thousands of batch computing jobs on AWS. AWS Batch dynamically provisions the optimal quantity and type of compute resources (for example, CPU or memory optimized instances) based on the volume and specific resource requirements of the batch jobs submitted. For more information, see [the AWS Batch product detail pages](#).
- [Amazon ECS Reference Architecture: Batch Processing](#): This reference architecture illustrates how to use AWS CloudFormation, Amazon S3, Amazon SQS, and CloudWatch alarms to handle batch processing on Amazon ECS.

# Amazon ECS Service Limits

The following table provides the default limits for Amazon ECS for an AWS account which can be changed. For more information on the service limits for other AWS services that you can use with Amazon ECS, such as Elastic Load Balancing and Auto Scaling, see [AWS Service Limits](#) in the *Amazon Web Services General Reference*.

Resource	Default Limit
Number of clusters per region, per account	1000
Number of container instances per cluster	1000
Number of services per cluster	500

The following table provides other limitations for Amazon ECS that cannot be changed.

Resource	Default Limit
Number of load balancers per service	1
Number of tasks per service (the desired count)	1000
Number of tasks launched ( <code>count</code> ) per <b>run-task</b>	10
Number of container instances per <b>start-task</b>	10
Throttle on container instance registration rate	1 per second / 60 max per minute
Task definition size limit	32 KiB
Task definition max containers	10
Throttle on task definition registration rate	1 per second / 60 max per minute

# Logging Amazon ECS API Calls By Using AWS CloudTrail

Amazon ECS is integrated with AWS CloudTrail, a service that captures API calls made by or on behalf of Amazon ECS in your AWS account and delivers the log files to an Amazon S3 bucket that you specify. CloudTrail captures API calls from the Amazon ECS console or from the Amazon ECS API. Using the information collected by CloudTrail, you can determine what request was made to Amazon ECS, the source IP address from which the request was made, who made the request, when it was made, and so on. To learn more about CloudTrail, including how to configure and enable it, see the [AWS CloudTrail User Guide](#).

## Amazon ECS Information in CloudTrail

When CloudTrail logging is enabled in your AWS account, API calls made to Amazon ECS actions are tracked in log files. Amazon ECS records are written together with other AWS service records in a log file. CloudTrail determines when to create and write to a new file based on a time period and file size.

All of the Amazon ECS actions are logged and are documented in the [Amazon EC2 Container Service API Reference](#). For example, calls to the **CreateService**, **RunTask**, and **RegisterContainerInstance** actions generate entries in the CloudTrail log files.

Every log entry contains information about who generated the request. The user identity information in the log helps you determine whether the request was made with root or IAM user credentials, with temporary security credentials for a role or federated user, or by another AWS service. For more information, see the **userIdentity** field in the [CloudTrail Event Reference](#).

You can store your log files in your bucket for as long as you want, but you can also define Amazon S3 life cycle rules to archive or delete log files automatically. By default, your log files are encrypted by using Amazon S3 server-side encryption (SSE).

You can choose to have CloudTrail publish Amazon SNS notifications when new log files are delivered if you want to take quick action upon log file delivery. For more information, see [Configuring Amazon SNS Notifications](#).

You can also aggregate Amazon ECS log files from multiple AWS regions and multiple AWS accounts into a single S3 bucket. For more information, see [Aggregating CloudTrail Log Files to a Single Amazon S3 Bucket](#).

## Understanding Amazon ECS Log File Entries

CloudTrail log files can contain one or more log entries where each entry is made up of multiple JSON-formatted events. A log entry represents a single request from any source and includes information about the requested action, any parameters, the date and time of the action, and so on. The log entries are not guaranteed to be in any particular order. That is, they are not an ordered stack trace of the public API calls.

# Amazon ECS Troubleshooting

You may need to troubleshoot issues with your load balancers, tasks, services, or container instances. This chapter helps you find diagnostic information from the Amazon ECS container agent, the Docker daemon on the container instance, and the service event log in the Amazon ECS console.

## Topics

- [Checking Stopped Tasks for Errors \(p. 270\)](#)
- [Service Event Messages \(p. 272\)](#)
- [CannotCreateContainerError: API error \(500\): devmapper \(p. 274\)](#)
- [Troubleshooting Service Load Balancers \(p. 275\)](#)
- [Enabling Docker Debug Output \(p. 276\)](#)
- [Amazon ECS Log File Locations \(p. 277\)](#)
- [Amazon ECS Logs Collector \(p. 279\)](#)
- [Agent Introspection Diagnostics \(p. 279\)](#)
- [Docker Diagnostics \(p. 281\)](#)
- [API failures Error Messages \(p. 283\)](#)

## Checking Stopped Tasks for Errors

If you have trouble starting a task (for example, you run the task and the task displays a `PENDING` status and then disappears) your task might be stopping because of an error. You can view errors like this in the Amazon ECS console by displaying the stopped task and inspecting it for error messages.

### To check stopped tasks for errors

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the **Clusters** page, choose the cluster in which your stopped task resides.
3. On the **Cluster : *clustername*** page, choose the **Tasks** tab to view your tasks.
4. In the **Desired task status** table header, choose **Stopped** to view stopped tasks, and then choose the stopped task you want to inspect. The most recent stopped tasks are listed first.
5. In the **Details** section, inspect the **Stopped reason** field to see the reason the task was stopped.

## Details

---

<b>Cluster</b>	default
<b>Container Instance</b>	dd3599e9-2ca6-40f4-9da5-a0bb10408260
<b>EC2 instance id</b>	i-83c6ab47
<b>Task Definition</b>	curler:4
<b>Last status</b>	STOPPED
<b>Desired status</b>	STOPPED
<b>Created at</b>	2015-11-20 13:31:01 -0800
<b>Stopped at</b>	2015-11-20 13:31:03 -0800
<b>Stopped reason</b>	Essential container in task exited

Some possible reasons and their explanations are listed below:

Task failed ELB health checks in (elb elb-name)

The current task failed the ELB health check for the load balancer that is associated with the task's service. For more information, see [Troubleshooting Service Load Balancers \(p. 275\)](#).

Scaling activity initiated by (deployment deployment-id)

When you reduce the desired count of a stable service, some tasks need to be stopped in order to reach the desired number. Tasks that are stopped by downscaling services have this stopped reason.

Host EC2 (instance *id*) stopped/terminated

If you stop or terminate a container instance with running tasks, then the tasks are given this stopped reason.

Container instance deregistration forced by user

If you force the deregistration of a container instance with running tasks, then the tasks are given this stopped reason.

Essential container in task exited

Containers marked as `essential` in task definitions cause a task to stop if they exit or die. When an essential container exiting is the cause of a stopped task, the [Step 6 \(p. 272\)](#) can provide more diagnostic information as to why the container stopped.

6. If you have a container that has stopped, expand the container and inspect the **Status reason** row to see what caused the task state to change.

## Containers

---

	Name	Container Id	Status
▼	curler	3f871451-c9f1-4d6f-a...	STOPPED (CannotPull)
Details			
<b>Status reason</b> CannotPullContainerError: Error: image tutum/bogus:lat			
<b>Command</b> ["/usr/bin/watch","curl","-v","http://amazon-ecs-200477"]			

In the previous example, the container image name cannot be found. This can happen if you misspell the image name.

If this inspection does not provide enough information, you can connect to the container instance with SSH and inspect the Docker container locally. For more information, see [Inspect Docker Containers](#) (p. 282).

## Service Event Messages

If you are troubleshooting a problem with a service, the first place you should check for diagnostic information is the service event log.

### To check the service event log in the Amazon ECS console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the **Clusters** page, choose the cluster in which your service resides.
3. On the **Cluster** : *clustername* page, choose the service that you would like to inspect.
4. On the **Service** : *servicename* page, choose the **Events** tab.

<div>Tasks</div> <div>Events</div>		
<div> <div> <div></div> Filter in this page </div> </div>		
Event Id	Event Time	Message
22153606-5c...	2015-04-24 06:32:20 -0700	(service sample-weba
d863e60c-d3...	2015-04-24 06:30:47 -0700	(service sample-weba
dc59a716-b1...	2015-04-24 06:29:14 -0700	(service sample-weba
27c37c68-57...	2015-04-24 06:27:41 -0700	(service sample-weba
16a36873-8e...	2015-04-24 06:26:08 -0700	(service sample-weba
8cee3c0f-693...	2015-04-24 06:24:35 -0700	(service sample-weba
2137e914-18...	2015-04-24 06:23:02 -0700	(service sample-weba
4142d52d-62...	2015-04-24 06:21:29 -0700	(service sample-weba
d4f45e33-766...	2015-04-24 06:19:56 -0700	(service sample-weba
9ad2546b-12...	2015-04-24 06:18:22 -0700	(service sample-weba

- Examine the **Message** column for errors or other helpful information.

(service *service-name*) was unable to place a task because the resources could not be found.

In the above image, this service could not find the available resources to add another task. The possible causes for this are:



**Not enough ports**

If your task uses fixed host port mapping (for example, your task uses port 80 on the host for a web server), you must have at least one container instance per task, because only one container can use a single host port at a time. You should add container instances to your cluster or reduce your number of desired tasks.

**Not enough memory**

If your task definition specifies 1000 MiB of memory, and the container instances in your cluster each have 1024 MiB of memory, you can only run one copy of this task per container instance. You can experiment with less memory in your task definition so that you could launch more than one task per container instance, or launch more container instances into your cluster.

**Not enough CPU**

A container instance has 1,024 CPU units for every CPU core. If your task definition specifies 1,000 CPU units, and the container instances in your cluster each have 1,024 CPU units, you can only run one copy of this task per container instance. You can experiment with less CPU units in your task definition so that you could launch more than one task per container instance, or launch more container instances into your cluster.

**Container instance missing required attribute**

Some task definition parameters require a specific Docker remote API version to be installed on the container instance. Others, such as the logging driver options, require the container instances to register those log drivers with the `ECS_AVAILABLE_LOGGING_DRIVERS` agent configuration variable. If your task definition contains a parameter that requires a specific container instance attribute, and you do not have any available container instances that can satisfy this requirement, the task cannot be placed. For more information on which attributes are required for specific task definition parameters and agent configuration variables, see [Task Definition Parameters \(p. 95\)](#) and [Amazon ECS Container Agent Configuration \(p. 76\)](#).

**(service *service-name*) was unable to place a task because no container instance met all of its requirements. The closest matching container-instance *container-instance-id* encountered error "AGENT".**

The Amazon ECS container agent on the closest matching container instance for task placement is disconnected. If you can connect to the container instance with SSH, you can examine the agent logs; for more information, see [Amazon ECS Container Agent Log \(p. 278\)](#). You should also verify that the agent is running on the instance. If you are using the Amazon ECS-optimized AMI, you can try stopping and restarting the agent with the following commands:

```
[ec2-user ~]$ sudo stop ecs
ecs stop/waiting
[ec2-user ~]$ sudo start ecs
ecs start/running, process 26119
```

**(service *service-name*) (instance *instance-id*) is unhealthy in (elb *elb-name*) due to (reason Instance has failed at least the UnhealthyThreshold number of health checks consecutively.)**

This service is registered with a load balancer and the load balancer health checks are failing. For more information, see [Troubleshooting Service Load Balancers \(p. 275\)](#).

CannotCreateContainerError: API error (500): devmapper

The following Docker error indicates that the thin pool storage on your container instance is full, and that the Docker daemon cannot create new containers:

```
CannotCreateContainerError: API error (500): devmapper: Thin Pool has 4350 free data blocks which is less than minimum required 4454 free data blocks. Create more free space in thin pool or use dm.min_free_space option to change behavior
```

By default, Amazon ECS-optimized AMIs from version 2015.09.d and later launch with an 8-GiB volume for the operating system that is attached at `/dev/xvda` and mounted as the root of the file system. There is an additional 22-GiB volume that is attached at `/dev/xvdcz` that Docker uses for image and metadata storage. If this storage space is filled up, the Docker daemon cannot create new containers.

The easiest way to add storage to your container instances is to terminate the existing instances and launch new ones with larger data storage volumes. However, if you are unable to do this, you can add storage to the volume group that Docker uses and extend its logical volume by following the procedures in [Storage Configuration](#) (p. 36).

If your container instance storage is filling up too quickly, there are a few actions that you can take to reduce this effect:

- (Amazon ECS container agent 1.8.0 and later) Reduce the amount of time that stopped or exited containers remain on your container instances. The `ECS_ENGINE_TASK_CLEANUP_WAIT_DURATION` agent configuration variable sets the time duration to wait from when a task is stopped until the Docker container is removed (by default, this value is 3 hours). This removes the Docker container data. If this value is set too low, you may not be able to inspect your stopped containers or view the logs before they are removed. For more information, see [Amazon ECS Container Agent Configuration](#) (p. 76).
- Remove non-running containers and unused images from your container instances. You can use the following example commands to manually remove stopped containers and unused images. Deleted containers cannot be inspected later, and deleted images must be pulled again before starting new containers from them.

To remove non-running containers, execute the following command on your container instance:

```
$ docker rm $(docker ps -aq)
```

To remove unused images, execute the following command on your container instance:

```
$ docker rmi $(docker images -q)
```

- Remove unused data blocks within containers. You can use the following command to run **fstrim** on any running container and discard any data blocks that are unused by the container file system.

```
$ sudo sh -c "docker ps -q | xargs docker inspect --format='{{ .State.Pid }}' | xargs -IZ fstrim /proc/Z/root/"
```

## Troubleshooting Service Load Balancers

Amazon ECS services can register tasks with an Elastic Load Balancing load balancer. Load balancer configuration errors are common causes for stopped tasks. If your stopped tasks were started by services that use a load balancer, consider the following possible causes.

Improper IAM permissions for the `ecsServiceRole` IAM role

The `ecsServiceRole` allows Amazon ECS services to register container instances with Elastic Load Balancing load balancers. You must have the proper permissions set for this role. For more information, see [Amazon ECS Service Scheduler IAM Role](#) (p. 209).

#### Container instance security group

If your container is mapped to port 80 on your container instance, your container instance security group must allow inbound traffic on port 80 for the load balancer health checks to pass.

#### Elastic Load Balancing load balancer not configured for all Availability Zones

Your load balancer should be configured to use all of the Availability Zones in a region, or at least all of the Availability Zones in which your container instances reside. If a service uses a load balancer and starts a task on a container instance that resides in an Availability Zone that the load balancer is not configured to use, the task never passes the health check and it is killed.

#### Elastic Load Balancing load balancer health check misconfigured

The load balancer health check parameters can be overly restrictive or point to resources that do not exist. If a container instance is determined to be unhealthy, it is removed from the load balancer. Be sure to verify that the following parameters are configured correctly for your service load balancer.

##### Ping Port

The **Ping Port** value for a load balancer health check is the port on the container instances that the load balancer checks to determine if it is healthy. If this port is misconfigured, the load balancer will likely deregister your container instance from itself. This port should be configured to use the `hostPort` value for the container in your service's task definition that you are using with the health check.

##### Ping Path

This value is often set to `index.html`, but if your service does not respond to that request, then the health check fails. If your container does not have an `index.html` file, you can set this to `/` to target the base URL for the container instance.

##### Response Timeout

This is the amount of time that your container has to return a response to the health check ping. If this value is lower than the amount of time required for a response, the health check fails.

##### Health Check Interval

This is the amount of time between health check pings. The shorter your health check intervals are, the faster your container instance can reach the **Unhealthy Threshold**.

##### Unhealthy Threshold

This is the number of times your health check can fail before your container instance is considered unhealthy. If you have an unhealthy threshold of 2, and a health check interval of 30 seconds, then your task has 60 seconds to respond to the health check ping before it is assumed unhealthy. You can raise the unhealthy threshold or the health check interval to give your tasks more time to respond.

#### Unable to update the service `servicename`: Load balancer container name or port changed in task definition

If your service uses a load balancer, the load balancer configuration defined for your service when it was created cannot be changed. If you update the task definition for the service, the container name and container port that were specified when the service was created must remain in the task definition.

To change the load balancer name, the container name, or the container port associated with a service load balancer configuration, you must create a new service.

## Enabling Docker Debug Output

If you are having trouble with Docker containers or images, you can enable debug mode on your Docker daemon. Enabling debugging provides more verbose output from the daemon and you can use this information to find out more about why your containers or images are having issues.

Enabling Docker debug mode can be especially useful in retrieving error messages that are sent from container registries, such as Amazon ECR, and, in many circumstances, enabling debug mode is the only way to see these error messages.

### Important

This procedure is written for the Amazon ECS-optimized AMI. For other operating systems, see [Enable debugging](#) and [Control and configure Docker with systemd](#) in the Docker documentation.

### To enable Docker daemon debug mode on the Amazon ECS-optimized AMI

1. Connect to your container instance. For more information, see [Connect to Your Container Instance](#) (p. 48).
2. Open the Docker options file with a text editor, such as **vi**. For the Amazon ECS-optimized AMI, the Docker options file is at `/etc/sysconfig/docker`.
3. Find the Docker options statement and add the `-D` option to the string, inside the quotes.

#### Note

If the Docker options statement begins with a `#`, you need to remove that character to uncomment the statement and enable the options.

For the Amazon ECS-optimized AMI, the Docker options statement is called `OPTIONS`. For example:

```
# Additional startup options for the Docker daemon, for example:
# OPTIONS="--ip-forward=true --iptables=true"
# By default we limit the number of open files per container
OPTIONS="-D --default-ulimit nofile=1024:4096"
```

4. Save the file and exit your text editor.
5. Restart the Docker daemon.

```
$ sudo service docker restart
```

Output:

```
Stopping docker: [ OK ]
Starting docker: . [ OK ]
```

6. Restart the Amazon ECS agent.

```
$ sudo start ecs
```

Your Docker logs should now show more verbose output. For example:

```
time="2015-12-30T21:48:21.907640838Z" level=debug msg="Unexpected response from
server: \"{\\\"errors\\\":[{\\\"code\\\":\\\"DENIED\\\",\\\"message\\\":\\\"User:
arn:aws:sts:1111:assumed-role/ecrReadOnly/i-abcdefg is not authorized to perform:
ecr:InitiateLayerUpload on resource: arn:aws:ecr:us-east-1:1111:repository/nginx_test
\\\"}]}\\\" http.Header{\\\"Connection\\\":[\\\"keep-alive\\\"], \\\"Content-Type\\\":
[\\\"application/json; charset=utf-8\\\"], \\\"Date\\\":[\\\"Wed, 30 Dec 2015
21:48:21 GMT\\\"], \\\"Docker-Distribution-API-Version\\\":[\\\"registry/2.0\\\"],
\\\"Content-Length\\\":[\\\"235\\\"]}"
```

## Amazon ECS Log File Locations

Amazon ECS stores logs in the `/var/log/ecs` folder of your container instances. There are logs available from the Amazon ECS container agent and the `ecs-init` service that controls the state of the agent (start/

stop) on the container instance. You can view these log files by connecting to a container instance using SSH. For more information, see [Connect to Your Container Instance \(p. 48\)](#).

**Note**

If you are unsure how to collect all of the various logs on your container instances, you can use the Amazon ECS logs collector. For more information, see [Amazon ECS Logs Collector \(p. 279\)](#).

## Amazon ECS Container Agent Log

The Amazon ECS container agent stores logs at `/var/log/ecs/ecs-agent.log.timestamp`.

**Note**

You can increase the verbosity of the container agent logs by setting `ECS_LOGLEVEL=debug` and restarting the container agent. For more information, see [Amazon ECS Container Agent Configuration \(p. 76\)](#).

```
[ec2-user ~]$ cat /var/log/ecs/ecs-agent.log.2016-08-15-15
2016-08-15T15:54:41Z [INFO] Starting Agent: Amazon ECS Agent - v1.12.0 (895f3c1)
2016-08-15T15:54:41Z [INFO] Loading configuration
2016-08-15T15:54:41Z [WARN] Invalid value for task cleanup duration, will be overridden to
3h0m0s, parsed value 0, minimum threshold 1m0s
2016-08-15T15:54:41Z [INFO] Checkpointing is enabled. Attempting to load state
2016-08-15T15:54:41Z [INFO] Loading state! module="statemanager"
2016-08-15T15:54:41Z [INFO] Detected Docker versions [1.17 1.18 1.19 1.20 1.21 1.22]
2016-08-15T15:54:41Z [INFO] Registering Instance with ECS
2016-08-15T15:54:41Z [INFO] Registered! module="api client"
```

## Amazon ECS `ecs-init` Log

The `ecs-init` process stores logs at `/var/log/ecs/ecs-init.log.timestamp`.

```
[ec2-user ~]$ cat /var/log/ecs/ecs-init.log.2015-04-22-20
2015-04-22T20:51:45Z [INFO] pre-start
2015-04-22T20:51:45Z [INFO] Loading Amazon EC2 Container Service Agent into Docker
2015-04-22T20:51:46Z [INFO] start
2015-04-22T20:51:46Z [INFO] No existing agent container to remove.
2015-04-22T20:51:46Z [INFO] Starting Amazon EC2 Container Service Agent
```

## IAM Roles for Tasks Credential Audit Log

When the IAM roles for tasks credential provider is used to provide credentials to tasks, these requests are logged in `/var/log/ecs/audit.log.YYYY-MM-DD-HH`.

The log entry format is as follows:

- Timestamp
- HTTP response code
- IP address and port number of request origin
- Relative URI of the credential provider
- The user agent that made the request
- The task ARN that the requesting container belongs to
- The `GetCredentials` API name and version number
- The Amazon ECS cluster name that the container instance is registered to
- The container instance ARN

An example log entry is shown below:

```
[ec2-user ~]$ cat /var/log/ecs/audit.log.2016-07-13-16
2016-07-13T16:11:53Z 200 172.17.0.5:52444 "/v1/credentials" "python-requests/2.7.0
CPython/2.7.6 Linux/4.4.14-24.50.amzn1.x86_64" TASK_ARN GetCredentials
1 CLUSTER_NAME CONTAINER_INSTANCE_ARN
```

## Amazon ECS Logs Collector

If you are unsure how to collect all of the various logs on your container instances, you can use the Amazon ECS logs collector, which is [available on GitHub](#). The script collects general operating system logs as well as Docker and Amazon ECS container agent logs, which can be helpful for troubleshooting AWS Support cases, and then it compresses and archives the collected information into a single file that can easily be shared for diagnostic purposes. It also supports enabling debug mode for the Docker daemon and the Amazon ECS container agent on Amazon Linux variants, such as the Amazon ECS-optimized AMI. Currently, the Amazon ECS logs collector supports the following operating systems:

- Amazon Linux
- Red Hat Enterprise Linux 7
- Debian 8

### Note

The source code for the Amazon ECS logs collector is [available on GitHub](#). We encourage you to submit pull requests for changes that you would like to have included. However, Amazon Web Services does not currently provide support for running modified copies of this software.

### To download and run the Amazon ECS logs collector

1. Connect to your container instance. For more information, see [Connect to Your Container Instance](#) (p. 48).
2. Download the Amazon ECS logs collector script.

```
[ec2-user ~]$ curl -O https://raw.githubusercontent.com/aws-labs/ecs-logs-collector/master/ecs-logs-collector.sh
```

3. Run the script to collect the logs and create the archive.

### Note

To enable debug mode for the Docker daemon and the Amazon ECS container agent, add the `--mode=debug` option to the command below.

```
[ec2-user ~]$ sudo bash ./ecs-logs-collector.sh
```

After you have run the script, you can examine the collected logs in the `collect` folder that the script created. The `collect.tgz` file is a compressed archive of all of the logs, which you can share with AWS Support for diagnostic help.

## Agent Introspection Diagnostics

The Amazon ECS agent introspection API can provide helpful diagnostic information. For example, you can use the agent introspection API to get the Docker ID for a container in your task. You can use the agent

introspection API by connecting to a container instance using SSH. For more information, see [Connect to Your Container Instance](#) (p. 48).

The below example shows two tasks, one that is currently running and one that was stopped.

### Note

The command below is piped through the **python -mjson.tool** for greater readability.

```
[ec2-user ~]$ curl http://localhost:51678/v1/tasks | python -mjson.tool
```

Output:

```
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
100 1095  100 1095    0     0  117k      0  --:--:--  --:--:--  --:--:--  133k
{
  "Tasks": [
    {
      "Arn": "arn:aws:ecs:us-west-2:aws_account_id:task/090eff9b-1ce3-4db6-848a-a8d14064fd24",
      "Containers": [
        {
          "DockerId":
            "189a8ff4b5f04affe40e5160a5ffadca395136eb5faf4950c57963c06f82c76d",
          "DockerName": "ecs-console-sample-app-static-6-simple-app-86caf9bcabe3e9c61600",
          "Name": "simple-app"
        },
        {
          "DockerId":
            "f7f1f8a7a245c5da83aa92729bd28c6bcb004d1f6a35409e4207e1d34030e966",
          "DockerName": "ecs-console-sample-app-static-6-busybox-ce83ce978a87a890ab01",
          "Name": "busybox"
        }
      ],
      "Family": "console-sample-app-static",
      "KnownStatus": "STOPPED",
      "Version": "6"
    },
    {
      "Arn": "arn:aws:ecs:us-west-2:aws_account_id:task/1810e302-eaea-4da9-a638-097bea534740",
      "Containers": [
        {
          "DockerId":
            "dc7240fe892ab233dbbcee5044d95e1456c120dba9a6b56ec513da45c38e3aeb",
          "DockerName": "ecs-console-sample-app-static-6-simple-app-f0e5859699a7aecfb101",
          "Name": "simple-app"
        },
        {
          "DockerId":
            "096d685fb85a1ff3e021c8254672ab8497e3c13986b9cf005cbae9460b7b901e",
          "DockerName": "ecs-console-sample-app-static-6-busybox-92e4b8d0ecd0cce69a01",
          "Name": "busybox"
        }
      ],
      "DesiredStatus": "RUNNING",
      "Family": "console-sample-app-static",
      "KnownStatus": "RUNNING",
      "Version": "6"
    }
  ]
}
```

```
}  
  ]  
}
```

In the above example, the stopped task (`090eff9b-1ce3-4db6-848a-a8d14064fd24`) has two containers. You can use **docker inspect** *container-ID* to view detailed information on each container. For more information, see [Amazon ECS Container Agent Introspection \(p. 87\)](#).

## Docker Diagnostics

Docker provides several diagnostic tools that can help you troubleshoot problems with your containers and tasks. For more information about all of the available Docker command line utilities, go to the [Docker Command Line](#) topic in the Docker documentation. You can access the Docker command line utilities by connecting to a container instance using SSH. For more information, see [Connect to Your Container Instance \(p. 48\)](#).

The exit codes that Docker containers report can also provide some diagnostic information (for example, exit code 137 means that the container received a `SIGKILL` signal). For more information, see [Exit Status](#) in the Docker documentation.

### List Docker Containers

You can use the **docker ps** command on your container instance to list the running containers. In the below example, only the Amazon ECS container agent is running. For more information, go to [docker ps](#) in the Docker documentation.

```
[ec2-user ~]$ docker ps
```

Output:

CONTAINER ID	IMAGE	COMMAND	CREATED
STATUS	PORTS	NAMES	
cee0d6986de0	amazon/amazon-ecs-agent:latest	"/agent"	22 hours ago
Up 22 hours	127.0.0.1:51678->51678/tcp	ecs-agent	

You can use the **docker ps -a** command to see all containers (even stopped or killed containers). This is helpful for listing containers that are unexpectedly stopping. In the following example, container `f7f1f8a7a245` exited 9 seconds ago, so it would not show up in a **docker ps** output without the `-a` flag.

```
[ec2-user ~]$ docker ps -a
```

Output:

CONTAINER ID	IMAGE	COMMAND	NAMES
CREATED	STATUS	PORTS	
db4d48e411b1	amazon/ecs-emptyvolume-base:autogenerated	"not-applicable"	19 seconds ago ecs-console-
sample-app-static-6-internalecs-emptyvolume-source-c09288a6b0cba8a53700			
f7f1f8a7a245	busybox:buildroot-2014.02	"\sh -c '/bin/sh -c	22 hours ago Exited (137) 9 seconds ago ecs-console-
sample-app-static-6-busybox-ce83ce978a87a890ab01			
189a8ff4b5f0	httpd:2	"httpd-foreground"	22 hours ago Exited (137) 40 seconds ago ecs-console-
sample-app-static-6-simple-app-86caf9bcabe3e9c61600			



0c7dca9321e3	amazon/ecs-emptyvolume-base:autogenerated	"not-applicable"	22
hours ago		ecs-console-	
sample-app-static-6-internalecs-emptyvolume-source-90fefaa68498a8a80700			
cee0d6986de0	amazon/amazon-ecs-agent:latest	"/agent"	22
hours ago	Up 22 hours	127.0.0.1:51678->51678/tcp	ecs-agent

## View Docker Logs

You can view the `STDOUT` and `STDERR` streams for a container with the **docker logs** command. In this example, the logs are displayed for the `dc7240fe892a` container and piped through the **head** command for brevity. For more information, go to [docker logs](#) in the Docker documentation.

```
[ec2-user ~]$ docker logs dc7240fe892a | head
```

Output:

```
AH00558: httpd: Could not reliably determine the server's fully qualified domain name,
using 172.17.0.11. Set the 'ServerName' directive globally to suppress this message
AH00558: httpd: Could not reliably determine the server's fully qualified domain name,
using 172.17.0.11. Set the 'ServerName' directive globally to suppress this message
[Thu Apr 23 19:48:36.956682 2015] [mpm_event:notice] [pid 1:tid 140327115417472] AH00489:
Apache/2.4.12 (Unix) configured -- resuming normal operations
[Thu Apr 23 19:48:36.956827 2015] [core:notice] [pid 1:tid 140327115417472] AH00094:
Command line: 'httpd -D FOREGROUND'
10.0.1.86 - - [23/Apr/2015:19:48:59 +0000] "GET / HTTP/1.1" 200 348
10.0.0.154 - - [23/Apr/2015:19:48:59 +0000] "GET / HTTP/1.1" 200 348
10.0.1.86 - - [23/Apr/2015:19:49:28 +0000] "GET / HTTP/1.1" 200 348
10.0.0.154 - - [23/Apr/2015:19:49:29 +0000] "GET / HTTP/1.1" 200 348
10.0.1.86 - - [23/Apr/2015:19:49:50 +0000] "-" 408 -
10.0.0.154 - - [23/Apr/2015:19:49:50 +0000] "-" 408 -
10.0.1.86 - - [23/Apr/2015:19:49:58 +0000] "GET / HTTP/1.1" 200 348
10.0.0.154 - - [23/Apr/2015:19:49:59 +0000] "GET / HTTP/1.1" 200 348
10.0.1.86 - - [23/Apr/2015:19:50:28 +0000] "GET / HTTP/1.1" 200 348
10.0.0.154 - - [23/Apr/2015:19:50:29 +0000] "GET / HTTP/1.1" 200 348
time="2015-04-23T20:11:20Z" level="fatal" msg="write /dev/stdout: broken pipe"
```

## Inspect Docker Containers

If you have the Docker ID of a container, you can inspect it with the **docker inspect** command. Inspecting containers provides the most detailed view of the environment in which a container was launched. For more information, go to [docker inspect](#) in the Docker documentation.

```
[ec2-user ~]$ docker inspect dc7240fe892a
```

Output:

```
[{
  "AppArmorProfile": "",
  "Args": [],
  "Config": {
    "AttachStderr": false,
    "AttachStdin": false,
    "AttachStdout": false,
    "Cmd": [
      "httpd-foreground"
    ],
    "CpuShares": 10,
    "Cpuset": "",
```

```
"Domainname": "",
"Entrypoint": null,
"Env": [
  "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/local/
apache2/bin",
  "HTTPD_PREFIX=/usr/local/apache2",
  "HTTPD_VERSION=2.4.12",
  "HTTPD_BZ2_URL=https://www.apache.org/dist/httpd/httpd-2.4.12.tar.bz2"
],
"ExposedPorts": {
  "80/tcp": {}
},
"Hostname": "dc7240fe892a",
...
```

## API failures Error Messages

In some cases, an API call that you have triggered through the Amazon ECS console or the AWS CLI exits with a `failures` error message. The following possible API `failures` error messages are explained below for each API call. The failures occur on a particular resource, and the resource in parentheses is the resource associated with the failure.

Many resources are region-specific, so make sure the console is set to the correct region for your resources, or that your AWS CLI commands are being sent to the correct region with the `--region region` option.

- `DescribeClusters`

MISSING (cluster ID)

Your cluster was not found. The cluster name may not have been spelled correctly or the wrong region may be specified.

- `DescribeInstances`

MISSING (container instance ID)

The container instance you are attempting to describe does not exist. Perhaps the wrong cluster or region has been specified, or the container instance ARN or ID is misspelled.

- `DescribeServices`

MISSING (service ID)

The service you are attempting to describe does not exist. Perhaps the wrong cluster or region has been specified, or the container instance ARN or ID is misspelled.

- `DescribeTasks`

MISSING (task ID)

The task you are trying to describe does not exist. Perhaps the wrong cluster or region has been specified, or the task ARN or ID is misspelled.

- `RunTask` Or `StartTask`

RESOURCE: \* (container instance ID)

The resource or resources requested by the task are unavailable on the given container instance. If the resource is CPU or memory, you may need to add container instances to your cluster.

AGENT (container instance ID)

The container instance that you attempted to launch a task onto has an agent which is currently disconnected. In order to prevent extended wait times for task placement, the request was rejected.

ATTRIBUTE (container instance ID)

Your task definition contains a parameter that requires a specific container instance attribute that is not available on your container instances. For more information on which attributes are required for specific task definition parameters and agent configuration variables, see [Task Definition Parameters](#) (p. 95) and [Amazon ECS Container Agent Configuration](#) (p. 76).

- StartTask

MISSING (container instance ID)

The container instance you attempted to launch the task onto does not exist. Perhaps the wrong cluster or region has been specified, or the container instance ARN or ID is misspelled.

INACTIVE (container instance ID)

The container instance that you attempted to launch a task onto was previously deregistered with Amazon ECS and cannot be used.

# Windows Containers (Beta)

Amazon ECS now supports Windows containers on container instances that are launched with the Microsoft Windows Server 2016 Base with Containers AMI. This is considered a beta, and you should not use this for a production environment at this time.

Windows container instances use their own version of the Amazon ECS container agent. On Windows Server 2016, the Amazon ECS container agent runs as a process on the host. Unlike the Linux platform, the agent does not run inside a container because it uses the host's registry and the named pipe at `\\.\pipe\docker_engine` to communicate with the Docker daemon.

The source code for the Amazon ECS container agent is [available on GitHub](#). We encourage you to submit pull requests for changes that you would like to have included. However, Amazon Web Services does not currently provide support for running modified copies of this software. You can view open issues for Amazon ECS and Windows on our [GitHub issues page](#).

## Topics

- [Windows Container Caveats](#) (p. 285)
- [Windows Containers AWS CloudFormation Template](#) (p. 286)
- [Getting Started with Windows Containers](#) (p. 299)
- [Windows Task Definitions](#) (p. 305)
- [Windows IAM Roles for Tasks](#) (p. 308)
- [Pushing Windows Images to Amazon ECR](#) (p. 309)

## Windows Container Caveats

Here are some things you should know about Windows containers and Amazon ECS.

- Windows containers cannot run on Linux container instances and vice versa. To ensure proper task placement for Windows and Linux tasks, you should keep Windows and Linux container instances in separate clusters, and only place Windows tasks on Windows clusters.
- Windows containers and container instances cannot support all the task definition parameters that are available for Linux containers and container instances. For some parameters, they are not supported at

all, and others behave differently on Windows than they do on Linux. For more information, see [Windows Task Definitions \(p. 305\)](#).

- The IAM roles for tasks feature requires that you configure your Windows container instances to allow the feature at launch, and your containers must run some provided PowerShell code when they use the feature. For more information, see [Windows IAM Roles for Tasks \(p. 308\)](#).
- The IAM roles for tasks feature uses a credential proxy to provide credentials to the containers. This credential proxy occupies port 80 on the container instance, so if you use IAM roles for tasks, port 80 is not available for tasks. For web service containers, you can use an Application Load Balancer and dynamic port mapping to provide standard HTTP port 80 connections to your containers. For more information, see [Service Load Balancing \(p. 138\)](#).
- The Windows server Docker images are large (9 GiB), so your container instances require more storage space than Linux container instances, which typically have smaller image sizes.
- Container instances can take up to 15 minutes to download and extract the Windows server Docker images the first time they use them. This time can be doubled if you enable IAM roles for tasks.

## Windows Containers AWS CloudFormation Template

Here is an AWS CloudFormation template that you can use to get started with Windows containers. For more information about creating stacks with AWS CloudFormation templates, see [Creating a Stack on the AWS CloudFormation Console](#) in the *AWS CloudFormation User Guide*.

This AWS CloudFormation template provides a reference implementation of an Amazon ECS cluster running a sample application. This template requires an existing VPC with at least two public subnets.

The template creates an Amazon ECS cluster with a configurable number of container instances, an Application Load Balancer, the necessary security group configuration, an Amazon ECS task definition, an Amazon ECS service, and an Application Auto Scaling policy that allows the service to scale out in response to metrics emitted by the Application Load Balancer.

The container instances that are launched into the cluster are configured with an Auto Scaling group and an associated launch configuration. The launch configuration contains configuration data for the container instances, such as volume type and size, instance type, IAM role, and Amazon EC2 user data. The user data is run on every instance in the Auto Scaling group at boot to pull down the ECS Agent, configure it, and run it, so that the instance can register into the ECS cluster.

An Amazon ECS task definition and service are also created by the template. The task definition references the `microsoft/iis` container image and provides a command for it to execute at startup, as well as additional parameters like CPU shares and which CloudWatch Logs log group to send logging information to. The service is configured to run one or more copies of this task definition on the cluster and associate the container with an Application Load Balancer. Application Auto Scaling is also enabled on the service.

The template also creates three different IAM roles. The first is the `ECSServiceRole`, which allows Amazon ECS to manage your service on your behalf; for example, to register new tasks into your Application Load Balancer. The next role is the `Ec2Role`, which provides permissions to each EC2 instance in the cluster and allows the container agent to perform its necessary actions, like polling the ECS APIs on your behalf. Finally, we create a role for Application Auto Scaling to help your service scale in and out in response to CloudWatch alarms on your behalf.

### Note

The `AMIID`'s included in this template are updated periodically so if you use this template you should confirm they are current before deploying or updating your cluster.

```
{  
  "AWSTemplateFormatVersion": "2010-09-09",
```

```
"Parameters": {
  "KeyName": {
    "Type": "AWS::EC2::KeyPair::KeyName",
    "Description": "Name of an existing EC2 key pair to enable SSH access to the ECS
instances."
  },
  "VpcId": {
    "Type": "AWS::EC2::VPC::Id",
    "Description": "Select a default VPC ID."
  },
  "SubnetID": {
    "Type": "List<AWS::EC2::Subnet::Id>",
    "Description": "Select a default subnet ID in your selected VPC."
  },
  "DesiredCapacity": {
    "Type": "Number",
    "Default": "1",
    "Description": "Number of instances to launch in your ECS cluster."
  },
  "MaxSize": {
    "Type": "Number",
    "Default": "1",
    "Description": "Maximum number of instances that can be launched in your ECS
cluster."
  },
  "InstanceType": {
    "Description": "EC2 instance type",
    "Type": "String",
    "Default": "t2.micro",
    "AllowedValues": [
      "t2.micro",
      "t2.small",
      "t2.medium",
      "t2.large",
      "m3.medium",
      "m3.large",
      "m3.xlarge",
      "m3.2xlarge",
      "m4.large",
      "m4.xlarge",
      "m4.2xlarge",
      "m4.4xlarge",
      "m4.10xlarge",
      "c4.large",
      "c4.xlarge",
      "c4.2xlarge",
      "c4.4xlarge",
      "c4.8xlarge",
      "c3.large",
      "c3.xlarge",
      "c3.2xlarge",
      "c3.4xlarge",
      "c3.8xlarge",
      "r3.large",
      "r3.xlarge",
      "r3.2xlarge",
      "r3.4xlarge",
      "r3.8xlarge",
      "i2.xlarge",
      "i2.2xlarge",
      "i2.4xlarge",
      "i2.8xlarge"
    ],
    "ConstraintDescription": "Please choose a valid instance type."
  }
},
},
```

```

"Mappings": {
  "AWSRegionToAMI": {
    "us-east-1": {
      "AMIID": "ami-e7b755f1"
    },
    "us-east-2": {
      "AMIID": "ami-247c5941"
    },
    "us-west-1": {
      "AMIID": "ami-4699ca26"
    },
    "us-west-2": {
      "AMIID": "ami-7a803d1a"
    },
    "ca-central-1": {
      "AMIID": "ami-06f64b62"
    },
    "eu-west-1": {
      "AMIID": "ami-eef4de9d"
    },
    "eu-west-2": {
      "AMIID": "ami-a7868cc3"
    },
    "eu-central-1": {
      "AMIID": "ami-7fee2210"
    },
    "ap-south-1": {
      "AMIID": "ami-8cd1a5e3"
    },
    "sa-east-1": {
      "AMIID": "ami-dd3da2b1"
    },
    "ap-northeast-1": {
      "AMIID": "ami-a14834c6"
    },
    "ap-northeast-2": {
      "AMIID": "ami-7c8e5912"
    },
    "ap-southeast-1": {
      "AMIID": "ami-3c6bc05f"
    },
    "ap-southeast-2": {
      "AMIID": "ami-7e70741d"
    }
  }
},
"Resources": {
  "EcsSecurityGroup": {
    "Type": "AWS::EC2::SecurityGroup",
    "Properties": {
      "GroupDescription": "ECS Security Group",
      "VpcId": {
        "Ref": "VpcId"
      }
    }
  },
  "EcsSecurityGroupHTTPinbound": {
    "Type": "AWS::EC2::SecurityGroupIngress",
    "Properties": {
      "GroupId": {
        "Ref": "EcsSecurityGroup"
      },
      "IpProtocol": "tcp",
      "FromPort": "80",
      "ToPort": "80",
      "CidrIp": "0.0.0.0/0"
    }
  }
}

```

```

    }
  },
  "EcsSecurityGroupRDPInbound": {
    "Type": "AWS::EC2::SecurityGroupIngress",
    "Properties": {
      "GroupId": {
        "Ref": "EcsSecurityGroup"
      },
      "IpProtocol": "tcp",
      "FromPort": "3389",
      "ToPort": "3389",
      "CidrIp": "0.0.0.0/0"
    }
  },
  "EcsSecurityGroupALBports": {
    "Type": "AWS::EC2::SecurityGroupIngress",
    "Properties": {
      "GroupId": {
        "Ref": "EcsSecurityGroup"
      },
      "IpProtocol": "tcp",
      "FromPort": "31000",
      "ToPort": "61000",
      "SourceSecurityGroupId": {
        "Ref": "EcsSecurityGroup"
      }
    }
  },
  "ECSCluster": {
    "Type": "AWS::ECS::Cluster"
  },
  "CloudwatchLogsGroup": {
    "Type": "AWS::Logs::LogGroup",
    "Properties": {
      "LogGroupName": {
        "Fn::Join": [
          "-",
          [
            "ECSLogGroup",
            {
              "Ref": "AWS::StackName"
            }
          ]
        ]
      },
      "RetentionInDays": 14
    }
  },
  "taskdefinition": {
    "Type": "AWS::ECS::TaskDefinition",
    "Properties": {
      "ContainerDefinitions": [
        {
          "Name": "windows_sample_app",
          "Cpu": "100",
          "Essential": "true",
          "Image": "microsoft/iis",
          "Memory": "500",
          "EntryPoint": [
            "powershell",
            "-Command"
          ],
          "Command": [
            "New-Item -Path C:\\inetpub\\wwwroot\\index.html -Type file -Value '<html>
<head> <title>Amazon ECS Sample App</title> <style>body {margin-top: 40px; background-
color: #333;} </style> </head><body> <div style=color:white;text-align:center> <h1>Amazon

```



```
ECS Sample App</h1> <h2>Congratulations!</h2> <p>Your application is now running on a
container in Amazon ECS.</p>' ; C:\\ServiceMonitor.exe w3svc"
    },
    "LogConfiguration": {
        "LogDriver": "awslogs",
        "Options": {
            "awslogs-group": {
                "Ref": "CloudwatchLogsGroup"
            },
            "awslogs-region": {
                "Ref": "AWS::Region"
            },
            "awslogs-stream-prefix": "ecs-windows-sample-app"
        }
    },
    "PortMappings": [
        {
            "ContainerPort": 80
        }
    ]
}
}
},
"ECSALB": {
    "Type": "AWS::ElasticLoadBalancingV2::LoadBalancer",
    "Properties": {
        "Name": "ECSALB",
        "Scheme": "internet-facing",
        "LoadBalancerAttributes": [
            {
                "Key": "idle_timeout.timeout_seconds",
                "Value": "30"
            }
        ],
        "Subnets": {
            "Ref": "SubnetID"
        },
        "SecurityGroups": [
            {
                "Ref": "EcsSecurityGroup"
            }
        ]
    }
},
"ALBListener": {
    "Type": "AWS::ElasticLoadBalancingV2::Listener",
    "DependsOn": "ECSServiceRole",
    "Properties": {
        "DefaultActions": [
            {
                "Type": "forward",
                "TargetGroupArn": {
                    "Ref": "ECSTargetGroup"
                }
            }
        ],
        "LoadBalancerArn": {
            "Ref": "ECSALB"
        },
        "Port": "80",
        "Protocol": "HTTP"
    }
},
"ECSALBListenerRule": {
    "Type": "AWS::ElasticLoadBalancingV2::ListenerRule",
```

```

    "DependsOn": "ALBListener",
    "Properties": {
      "Actions": [
        {
          "Type": "forward",
          "TargetGroupArn": {
            "Ref": "ECSTargetGroup"
          }
        }
      ],
      "Conditions": [
        {
          "Field": "path-pattern",
          "Values": [
            "/"
          ]
        }
      ],
      "ListenerArn": {
        "Ref": "ALBListener"
      },
      "Priority": 1
    }
  },
  "ECSTargetGroup": {
    "Type": "AWS::ElasticLoadBalancingV2::TargetGroup",
    "DependsOn": "ECSALB",
    "Properties": {
      "HealthCheckIntervalSeconds": 10,
      "HealthCheckPath": "/",
      "HealthCheckProtocol": "HTTP",
      "HealthCheckTimeoutSeconds": 5,
      "HealthyThresholdCount": 2,
      "Name": "ECSTargetGroup",
      "Port": 80,
      "Protocol": "HTTP",
      "UnhealthyThresholdCount": 2,
      "VpcId": {
        "Ref": "VpcId"
      }
    }
  },
  "ECSAutoScalingGroup": {
    "Type": "AWS::AutoScaling::AutoScalingGroup",
    "Properties": {
      "VPCZoneIdentifier": {
        "Ref": "SubnetID"
      },
      "LaunchConfigurationName": {
        "Ref": "ContainerInstances"
      },
      "MinSize": "1",
      "MaxSize": {
        "Ref": "MaxSize"
      },
      "DesiredCapacity": {
        "Ref": "DesiredCapacity"
      }
    }
  },
  "CreationPolicy": {
    "ResourceSignal": {
      "Timeout": "PT15M"
    }
  },
  "UpdatePolicy": {
    "AutoScalingRollingUpdate": {

```

```

        "MinInstancesInService": "1",
        "MaxBatchSize": "1",
        "PauseTime": "PT15M",
        "WaitOnResourceSignals": "true"
    }
},
"ContainerInstances": {
    "Type": "AWS::AutoScaling::LaunchConfiguration",
    "Metadata": {
        "AWS::CloudFormation::Init": {
            "config": {
                "files": {
                    "c:\\cfn\\cfn-hup.conf": {
                        "content": {
                            "Fn::Join": [
                                "",
                                [
                                    "[main]\\n",
                                    "stack=",
                                    {
                                        "Ref": "AWS::StackId"
                                    },
                                    "\\n",
                                    "region=",
                                    {
                                        "Ref": "AWS::Region"
                                    },
                                    "\\n"
                                ]
                            ]
                        }
                    },
                    "c:\\cfn\\hooks.d\\cfn-auto-reloader.conf": {
                        "content": {
                            "Fn::Join": [
                                "",
                                [
                                    "[cfn-auto-reloader-hook]\\n",
                                    "triggers=post.update\\n",
                                    "path=Resources.ContainerInstances.Metadata.AWS::CloudFormation::Init\\n",
                                    "action=cfn-init.exe -v -s ",
                                    {
                                        "Ref": "AWS::StackId"
                                    },
                                    " -r ContainerInstances",
                                    " --region ",
                                    {
                                        "Ref": "AWS::Region"
                                    },
                                    "\\n"
                                ]
                            ]
                        }
                    }
                ]
            }
        }
    },
    "services": {
        "windows": {
            "cfn-hup": {
                "enabled": "true",
                "ensureRunning": "true",
                "files": [
                    "c:\\cfn\\cfn-hup.conf",
                    "c:\\cfn\\hooks.d\\cfn-auto-reloader.conf"
                ]
            }
        }
    }
}

```

```

    }
  }
}
},
"Properties": {
  "ImageId": {
    "Fn::FindInMap": [
      "AWSRegionToAMI",
      {
        "Ref": "AWS::Region"
      },
      "AMIID"
    ],
  },
  "SecurityGroups": [
    {
      "Ref": "EcsSecurityGroup"
    }
  ],
  "InstanceType": {
    "Ref": "InstanceType"
  },
  "IamInstanceProfile": {
    "Ref": "EC2InstanceProfile"
  },
  "KeyName": {
    "Ref": "KeyName"
  },
  "BlockDeviceMappings": [
    {
      "DeviceName": "/dev/sda1",
      "Ebs": {
        "VolumeSize": "100",
        "VolumeType": "gp2"
      }
    }
  ],
  "AssociatePublicIpAddress": "true",
  "UserData": {
    "Fn::Base64": {
      "Fn::Join": [
        "",
        [
          "<powershell> \n",
          " # Set agent env variables for the Machine context (durable)\n",
          " [Environment]::SetEnvironmentVariable(\"ECS_CLUSTER\", \"",
          {
            "Ref": "ECSCluster"
          },
          "\",",
          " \"Machine\")",
          "\n",
          "$agentVersion = 'v1.14.0';",
          "$agentZipUri = \"https://s3.amazonaws.com/amazon-ecs-agent/ecs-agent-";
          windows-$agentVersion.zip\";",
          "$agentZipMD5Uri = \"$agentZipUri.md5\";",
          "$ecsExeDir = \"$env:ProgramFiles\\Amazon\\ECS\";",
          "$zipFile = \"$env:TEMP\\ecs-agent.zip\";",
          "echo \"log\" >> c:\\windows\\temp\\log1.txt;",
          "echo $zipFile >> c:\\windows\\temp\\log1.txt;",
          "echo $ecsExeDir >> c:\\windows\\temp\\log1.txt;",
          "$md5File = \"$env:TEMP\\ecs-agent.zip.md5\";",
          "Invoke-RestMethod -OutFile $zipFile -Uri $agentZipUri;",
          "Invoke-RestMethod -OutFile $md5File -Uri $agentZipMD5Uri;",

```

```

        "$expectedMD5 = (Get-Content $md5File);",
        "$md5 = New-Object -TypeName
System.Security.Cryptography.MD5CryptoServiceProvider;",
        "$actualMD5 =
[System.BitConverter]::ToString($md5.ComputeHash([System.IO.File]::ReadAllBytes($zipFile))).replace(\
\", \\\");",
        "if($expectedMD5 -ne $actualMD5) {",
        "echo \"Download does not match hash.\";",
        "echo \"Expected: $expectedMD5 - Got: $actualMD5\";",
        "exit 1;",
        "};",
        "Expand-Archive -Path $zipFile -DestinationPath $secsExeDir -Force;",
        "$jobname = \"ECS-Agent-Init\";",
        "$script = \"cd '$secsExeDir'; .\\amazon-ecs-agent.ps1\";",
        "$repeat = (New-TimeSpan -Minutes 1);",
        "try {",
        "Unregister-ScheduledJob -Name $jobname | out-null",
        "}",
        "catch{;",
        "Invoke-Expression(\"cd $secsExeDir; .\\amazon-ecs-agent.ps1\");",
        "$scriptblock = [scriptblock]::Create(\"$script\");",
        "$trigger = New-JobTrigger -At (Get-Date).Date -RepeatIndefinitely -
RepetitionInterval $repeat -Once;",
        "$options = New-ScheduledJobOption -RunElevated -ContinueIfGoingOnBattery -
StartIfOnBattery;",
        "Register-ScheduledJob -Name $jobname -ScriptBlock $scriptblock -Trigger
$trigger -ScheduledJobOption $options -RunNow;",
        "echo $scriptblock >> c:\\windows\\temp\\log1.txt;",
        "echo $trigger >> c:\\windows\\temp\\log1.txt;",
        "echo $options >> c:\\windows\\temp\\log1.txt;",
        "# end of script\\n",
        "cfn-init.exe -v -s ",
        {
            "Ref": "AWS::StackId"
        },
        " -r ContainerInstances",
        " --region ",
        {
            "Ref": "AWS::Region"
        },
        "\\n",
        "cfn-signal.exe -e $lastexitcode --stack ",
        {
            "Ref": "AWS::StackName"
        },
        " --resource ECSAutoScalingGroup ",
        " --region ",
        {
            "Ref": "AWS::Region"
        },
        "; \\n",
        "</powershell>\\n",
        "<persist>true</persist>"
    ]
}
}
}
},
"service": {
    "Type": "AWS::ECS::Service",
    "DependsOn": "ALBListener",
    "Properties": {
        "Cluster": {
            "Ref": "ECSCluster"
        }
    }
},

```

```

        "DesiredCount": "1",
        "LoadBalancers": [
            {
                "ContainerName": "windows_sample_app",
                "ContainerPort": "80",
                "TargetGroupArn": {
                    "Ref": "ECSTargetGroup"
                }
            }
        ],
        "Role": {
            "Ref": "ECSServiceRole"
        },
        "TaskDefinition": {
            "Ref": "taskdefinition"
        }
    }
},
"ECSServiceRole": {
    "Type": "AWS::IAM::Role",
    "Properties": {
        "AssumeRolePolicyDocument": {
            "Statement": [
                {
                    "Effect": "Allow",
                    "Principal": {
                        "Service": [
                            "ecs.amazonaws.com"
                        ]
                    },
                    "Action": [
                        "sts:AssumeRole"
                    ]
                }
            ]
        },
        "Path": "/",
        "Policies": [
            {
                "PolicyName": "ecs-service",
                "PolicyDocument": {
                    "Statement": [
                        {
                            "Effect": "Allow",
                            "Action": [
                                "elasticloadbalancing:DeregisterInstancesFromLoadBalancer",
                                "elasticloadbalancing:DeregisterTargets",
                                "elasticloadbalancing:Describe*",
                                "elasticloadbalancing:RegisterInstancesWithLoadBalancer",
                                "elasticloadbalancing:RegisterTargets",
                                "ec2:Describe*",
                                "ec2:AuthorizeSecurityGroupIngress"
                            ],
                            "Resource": "*"
                        }
                    ]
                }
            }
        ]
    }
},
"ServiceScalingTarget": {
    "Type": "AWS::ApplicationAutoScaling::ScalableTarget",
    "DependsOn": "service",
    "Properties": {
        "MaxCapacity": 2,

```

```

        "MinCapacity": 1,
        "ResourceId": {
            "Fn::Join": [
                "",
                [
                    "service/",
                    {
                        "Ref": "ECSCluster"
                    },
                    "/",
                    {
                        "Fn::GetAtt": [
                            "service",
                            "Name"
                        ]
                    }
                ]
            ]
        },
        "RoleARN": {
            "Fn::GetAtt": [
                "AutoscalingRole",
                "Arn"
            ]
        },
        "ScalableDimension": "ecs:service:DesiredCount",
        "ServiceNamespace": "ecs"
    }
},
"ServiceScalingPolicy": {
    "Type": "AWS::ApplicationAutoScaling::ScalingPolicy",
    "Properties": {
        "PolicyName": "AStepPolicy",
        "PolicyType": "StepScaling",
        "ScalingTargetId": {
            "Ref": "ServiceScalingTarget"
        },
        "StepScalingPolicyConfiguration": {
            "AdjustmentType": "PercentChangeInCapacity",
            "Cooldown": 60,
            "MetricAggregationType": "Average",
            "StepAdjustments": [
                {
                    "MetricIntervalLowerBound": 0,
                    "ScalingAdjustment": 200
                }
            ]
        }
    }
},
"ALB500sAlarmScaleUp": {
    "Type": "AWS::CloudWatch::Alarm",
    "Properties": {
        "EvaluationPeriods": "1",
        "Statistic": "Average",
        "Threshold": "10",
        "AlarmDescription": "Alarm if our ALB generates too many HTTP 500s.",
        "Period": "60",
        "AlarmActions": [
            {
                "Ref": "ServiceScalingPolicy"
            }
        ]
    },
    "Namespace": "AWS/ApplicationELB",
    "Dimensions": [
        {

```

```

        "Name": "ECSService",
        "Value": {
            "Ref": "service"
        }
    },
    "ComparisonOperator": "GreaterThanOrEqualTo",
    "MetricName": "HTTPCode_ELB_5XX_Count"
},
"EC2Role": {
    "Type": "AWS::IAM::Role",
    "Properties": {
        "AssumeRolePolicyDocument": {
            "Statement": [
                {
                    "Effect": "Allow",
                    "Principal": {
                        "Service": [
                            "ec2.amazonaws.com"
                        ]
                    },
                    "Action": [
                        "sts:AssumeRole"
                    ]
                }
            ]
        },
        "Path": "/",
        "Policies": [
            {
                "PolicyName": "ecs-service",
                "PolicyDocument": {
                    "Statement": [
                        {
                            "Effect": "Allow",
                            "Action": [
                                "ecs:CreateCluster",
                                "ecs:DeregisterContainerInstance",
                                "ecs:DiscoverPollEndpoint",
                                "ecs:Poll",
                                "ecs:RegisterContainerInstance",
                                "ecs:StartTelemetrySession",
                                "ecs:Submit*",
                                "logs:CreateLogStream",
                                "logs:PutLogEvents"
                            ],
                            "Resource": "*"
                        }
                    ]
                }
            }
        ]
    }
},
"AutoscalingRole": {
    "Type": "AWS::IAM::Role",
    "Properties": {
        "AssumeRolePolicyDocument": {
            "Statement": [
                {
                    "Effect": "Allow",
                    "Principal": {
                        "Service": [
                            "application-autoscaling.amazonaws.com"
                        ]
                    }
                }
            ]
        }
    }
}

```



```

        },
        "Action": [
            "sts:AssumeRole"
        ]
    }
],
"Path": "/",
"Policies": [
    {
        "PolicyName": "service-autoscaling",
        "PolicyDocument": {
            "Statement": [
                {
                    "Effect": "Allow",
                    "Action": [
                        "application-autoscaling:*",
                        "cloudwatch:DescribeAlarms",
                        "cloudwatch:PutMetricAlarm",
                        "ecs:DescribeServices",
                        "ecs:UpdateService"
                    ],
                    "Resource": "*"
                }
            ]
        }
    }
],
},
"EC2InstanceProfile": {
    "Type": "AWS::IAM::InstanceProfile",
    "Properties": {
        "Path": "/",
        "Roles": [
            {
                "Ref": "EC2Role"
            }
        ]
    }
},
},
"Outputs": {
    "ecsservice": {
        "Value": {
            "Ref": "service"
        }
    },
    "ecscluster": {
        "Value": {
            "Ref": "ECSCluster"
        }
    },
    "ECSALB": {
        "Description": "Your ALB DNS URL",
        "Value": {
            "Fn::Join": [
                "",
                [
                    {
                        "Fn::GetAtt": [
                            "ECSALB",
                            "DNSName"
                        ]
                    }
                ]
            ]
        }
    }
}
]

```

```
    ]
  },
  "taskdef": {
    "Value": {
      "Ref": "taskdefinition"
    }
  }
}
```

## Getting Started with Windows Containers

This tutorial walks you through manually getting Windows containers running on Amazon ECS. You create a cluster for your Windows container instances, launch one or more container instances into your cluster, register a task definition that uses a Windows container image, create a service that uses that task definition, and then view the sample webpage that the container runs.

If you would rather have your cluster set up automatically with a provided AWS CloudFormation template, see [Windows Containers AWS CloudFormation Template](#) (p. 286).

### Topics

- [Step 1: Create a Windows Cluster](#) (p. 299)
- [Step 2: Launching a Windows Container Instance into your Cluster](#) (p. 299)
- [Step 3: Register a Windows Task Definition](#) (p. 302)
- [Step 4: Create a Service with Your Task Definition](#) (p. 304)
- [Step 5: View Your Service](#) (p. 304)

## Step 1: Create a Windows Cluster

You should create a new cluster for your Windows containers. Linux container instances cannot run Windows containers, and vice versa, so proper task placement is best accomplished by running Windows and Linux container instances in separate clusters. In this tutorial, you create a cluster called `windows` for your Windows containers.

You can create a cluster with the AWS Management Console. For more information, see [Creating a Cluster](#) (p. 27).

You can also create a cluster using the AWS CLI with the following command:

```
$ aws ecs create-cluster --cluster-name windows
```

## Step 2: Launching a Windows Container Instance into your Cluster

You can launch Windows container instance using the AWS Management Console, as described in this topic. Before you begin, be sure that you've completed the steps in [Setting Up with Amazon ECS](#) (p. 8). After you've launched your instance, you can use it to run tasks.

### To launch a Windows container instance

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.

2. From the navigation bar, select the region to use.

**Note**

Amazon ECS is available in the following regions:

Region Name	Region
US East (N. Virginia)	us-east-1
US East (Ohio)	us-east-2
US West (N. California)	us-west-1
US West (Oregon)	us-west-2
EU (Ireland)	eu-west-1
EU (London)	eu-west-2
EU (Frankfurt)	eu-central-1
Asia Pacific (Tokyo)	ap-northeast-1
Asia Pacific (Singapore)	ap-southeast-1
Asia Pacific (Sydney)	ap-southeast-2
Canada (Central)	ca-central-1

3. From the console dashboard, choose **Launch Instance**.
4. On the **Choose an Amazon Machine Image (AMI)** page, choose **Quick Start**.
5. Choose the **Microsoft Windows Server 2016 Base with Containers** AMI for your container instance.
6. On the **Choose an Instance Type** page, you can select the hardware configuration of your instance. The `t2.micro` instance type is selected by default. The instance type that you select determines the resources available for your tasks to run on.
7. Choose **Next: Configure Instance Details**.
8. On the **Configure Instance Details** page, set the **Auto-assign Public IP** check box depending on whether to make your instance accessible from the public Internet. If your instance should be accessible from the Internet, verify that the **Auto-assign Public IP** field is set to **Enable**. If your instance should not be accessible from the Internet, choose **Disable**.

**Note**

Container instances need external network access to communicate with the Amazon ECS service endpoint, so if your container instances do not have public IP addresses, then they must use network address translation (NAT) to provide this access. For more information, see [NAT Instances](#) in the *Amazon VPC User Guide*.

9. On the **Configure Instance Details** page, select the `ecsInstanceRole` **IAM role** value that you created for your container instances in [Setting Up with Amazon ECS \(p. 8\)](#).

**Important**

If you do not launch your container instance with the proper IAM permissions, your Amazon ECS agent will not connect to your cluster. For more information, see [Amazon ECS Container Instance IAM Role \(p. 206\)](#).

10. Configure your Windows container instance with the provided user data PowerShell script. By default, this script registers your container instance into the `windows` cluster that you created earlier. To launch into another cluster instead of `windows`, replace that value of the `ECS_CLUSTER` environment variable in the script below with the name of your cluster.

### Note

To use the IAM roles for tasks feature with your Windows containers, replace the value of the `ECS_ENABLE_TASK_IAM_ROLE` environment variable in the script below with `true`. For more information, see [Windows IAM Roles for Tasks \(p. 308\)](#).

```
<powershell>
## The string 'windows' should be replaced with your cluster name

# Set agent env variables for the Machine context (durable)
[Environment]::SetEnvironmentVariable("ECS_CLUSTER", "windows", "Machine")
[Environment]::SetEnvironmentVariable("ECS_ENABLE_TASK_IAM_ROLE", "false", "Machine")
$agentVersion = 'v1.14.0-1.windows.1'
$agentZipUri = "https://s3.amazonaws.com/amazon-ecs-agent/ecs-agent-windows-
$agentVersion.zip"
$agentZipMD5Uri = "$agentZipUri.md5"

### --- Nothing user configurable after this point ---
$ecsExeDir = "$env:ProgramFiles\Amazon\ECS"
$zipFile = "$env:TEMP\ecs-agent.zip"
$md5File = "$env:TEMP\ecs-agent.zip.md5"

### Get the files from S3
Invoke-RestMethod -OutFile $zipFile -Uri $agentZipUri
Invoke-RestMethod -OutFile $md5File -Uri $agentZipMD5Uri

## MD5 Checksum
$expectedMD5 = (Get-Content $md5File)
$md5 = New-Object -TypeName System.Security.Cryptography.MD5CryptoServiceProvider
$actualMD5 =
[System.BitConverter]::ToString($md5.ComputeHash([System.IO.File]::ReadAllBytes($zipFile))).replac
''

if($expectedMD5 -ne $actualMD5) {
    echo "Download doesn't match hash."
    echo "Expected: $expectedMD5 - Got: $actualMD5"
    exit 1
}

## Put the executables in the executable directory.
Expand-Archive -Path $zipFile -DestinationPath $ecsExeDir -Force

## Start the agent script in the background.
$jobname = "ECS-Agent-Init"
$script = "cd '$ecsExeDir'; .\amazon-ecs-agent.ps1"
$repeat = (New-Timespan -Minutes 1)

$jobpath = $env:LOCALAPPDATA + "\Microsoft\Windows\PowerShell\ScheduledJobs\$jobname
\ScheduledJobDefinition.xml"
if($(Test-Path -Path $jobpath)) {
    echo "Job definition already present"
    exit 0
}

$scriptblock = [scriptblock]::Create("$script")
$trigger = New-JobTrigger -At (Get-Date).Date -RepeatIndefinitely -RepetitionInterval
$repeat -Once
$options = New-ScheduledJobOption -RunElevated -ContinueIfGoingOnBattery -
StartIfOnBattery
Register-ScheduledJob -Name $jobname -ScriptBlock $scriptblock -Trigger $trigger -
ScheduledJobOption $options -RunNow
Add-JobTrigger -Name $jobname -Trigger (New-JobTrigger -AtStartup -RandomDelay 00:1:00)
</powershell>
```

```
<persist>true</persist>
```

11. Choose **Next: Add Storage**.
12. On the **Add Storage** page, configure the storage for your container instance. The Windows OS and container images are quite large (approximately 9 GiB for the Windows server core base layers), and just a few images and containers quickly fill up the default 30 GiB volume size that the launch wizard uses. A larger root volume size (for example, 200 GiB) allows for more containers and images on your instance.  
  
You can optionally increase or decrease the volume size for your instance to meet your application needs.
13. Choose **Review and Launch**.
14. On the **Review Instance Launch** page, under **Security Groups**, you'll see that the wizard created and selected a security group for you. By default, you should have port 3389 for RDP connectivity. If you want your containers to receive inbound traffic from the Internet, you need to open those ports as well.
  - a. Choose **Edit security groups**.
  - b. On the **Configure Security Group** page, ensure that the **Create a new security group** option is selected.
  - c. Add rules for any other ports that your containers may need (the sample task definition later in this walk through uses port 8000, so you should open that to **Anywhere**), and choose **Review and Launch**.
15. On the **Review Instance Launch** page, choose **Launch**.
16. In the **Select an existing key pair or create a new key pair** dialog box, choose **Choose an existing key pair**, then select the key pair that you created when getting set up.

When you are ready, select the acknowledgment field, and then choose **Launch Instances**.

17. A confirmation page lets you know that your instance is launching. Choose **View Instances** to close the confirmation page and return to the console.
18. On the **Instances** screen, you can view the status of your instance. It takes a short time for an instance to launch. When you launch an instance, its initial state is `pending`. After the instance starts, its state changes to `running`, and it receives a public DNS name. (If the **Public DNS** column is hidden, choose the **Show/Hide** icon and choose **Public DNS**.)
19. After your instance has launched, you can view your cluster in the Amazon ECS console to see that your container instance has registered with it.

#### Note

It can take up to 15 minutes for your Windows instance to register with your cluster.

## Step 3: Register a Windows Task Definition

Before you can run Windows containers in your Amazon ECS cluster, you must register a task definition. The following task definition example displays a simple webpage on port 80 of a container instance with the `microsoft/iis` container image.

```
{
  "family": "windows-simple-iis",
  "containerDefinitions": [
    {
      "name": "windows_sample_app",
      "image": "microsoft/iis",
      "cpu": 100,
      "entryPoint": ["powershell", "-Command"],
      "command": ["New-Item -Path C:\\inetpub\\wwwroot\\index.html -Type file -Value '<html>
<head> <title>Amazon ECS Sample App</title> <style>body {margin-top: 40px; background-
```

```
color: #333;} </style> </head><body> <div style=color:white;text-align:center> <h1>Amazon
ECS Sample App</h1> <h2>Congratulations!</h2> <p>Your application is now running on a
container in Amazon ECS.</p>'; C:\\ServiceMonitor.exe w3svc"],
  "portMappings": [
    {
      "protocol": "tcp",
      "containerPort": 80,
      "hostPort": 80
    }
  ],
  "memory": 500,
  "essential": true
}
]
```

### To register the sample task definition

1. Create a file called `windows-simple-iis.json`.
2. Open the file with your favorite text editor and add the sample JSON above to the file and save it.
3. Using the AWS CLI, run the following command to register the task definition with Amazon ECS.

#### Note

Make sure that your AWS CLI is configured to use the same region that your Windows cluster exists in, or add the `--region your_cluster_region` option to your command.

```
$ aws ecs register-task-definition --cli-input-json file://windows-simple-iis.json
{
  "taskDefinition": {
    "status": "ACTIVE",
    "family": "windows-simple-iis",
    "volumes": [],
    "taskDefinitionArn": "arn:aws:ecs:us-east-1:130757420319:task-definition/
windows-simple-iis:1",
    "containerDefinitions": [
      {
        "environment": [],
        "name": "windows_sample_app",
        "mountPoints": [],
        "image": "microsoft/iis",
        "cpu": 100,
        "portMappings": [
          {
            "protocol": "tcp",
            "containerPort": 80,
            "hostPort": 80
          }
        ],
        "entryPoint": [
          "powershell",
          "-Command"
        ],
        "memory": 500,
        "command": [
          "New-Item -Path C:\\inetpub\\wwwroot\\index.html -Type file -
Value '<html> <head> <title>Amazon ECS Sample App</title> <style>body {margin-top:
40px; background-color: #333;} </style> </head><body> <div style=color:white;text-
align:center> <h1>Amazon ECS Sample App</h1> <h2>Congratulations!</h2> <p>Your
application is now running on a container in Amazon ECS.</p>'; C:\\ServiceMonitor.exe
w3svc"
        ],
        "essential": true,
        "volumesFrom": []
      }
    ]
  }
}
```

```
    }  
  },  
  "revision": 1  
}  
}
```

## Step 4: Create a Service with Your Task Definition

After you have registered your task definition, you can place tasks in your cluster with it. The following procedure creates a service with your task definition and places one task on your cluster.

### To create a service with your task definition

- Using the AWS CLI, run the following command to create your service.

```
$ aws ecs create-service --cluster windows --task-definition windows-simple-iis --  
desired-count 1 --service-name windows-simple-iis  
{  
  "service": {  
    "status": "ACTIVE",  
    "taskDefinition": "arn:aws:ecs:us-east-1:130757420319:task-definition/windows-  
simple-iis:1",  
    "pendingCount": 0,  
    "loadBalancers": [],  
    "createdAt": 1479849211.046,  
    "desiredCount": 1,  
    "serviceName": "windows-simple-iis",  
    "clusterArn": "arn:aws:ecs:us-east-1:130757420319:cluster/windows",  
    "serviceArn": "arn:aws:ecs:us-east-1:130757420319:service/windows-simple-iis",  
    "deploymentConfiguration": {  
      "maximumPercent": 200,  
      "minimumHealthyPercent": 100  
    },  
    "deployments": [  
      {  
        "status": "PRIMARY",  
        "pendingCount": 0,  
        "createdAt": 1479849211.046,  
        "desiredCount": 1,  
        "taskDefinition": "arn:aws:ecs:us-east-1:130757420319:task-definition/  
windows-simple-iis:1",  
        "updatedAt": 1479849211.046,  
        "id": "ecs-svc/9223370557005564761",  
        "runningCount": 0  
      }  
    ],  
    "events": [],  
    "runningCount": 0  
  }  
}
```

## Step 5: View Your Service

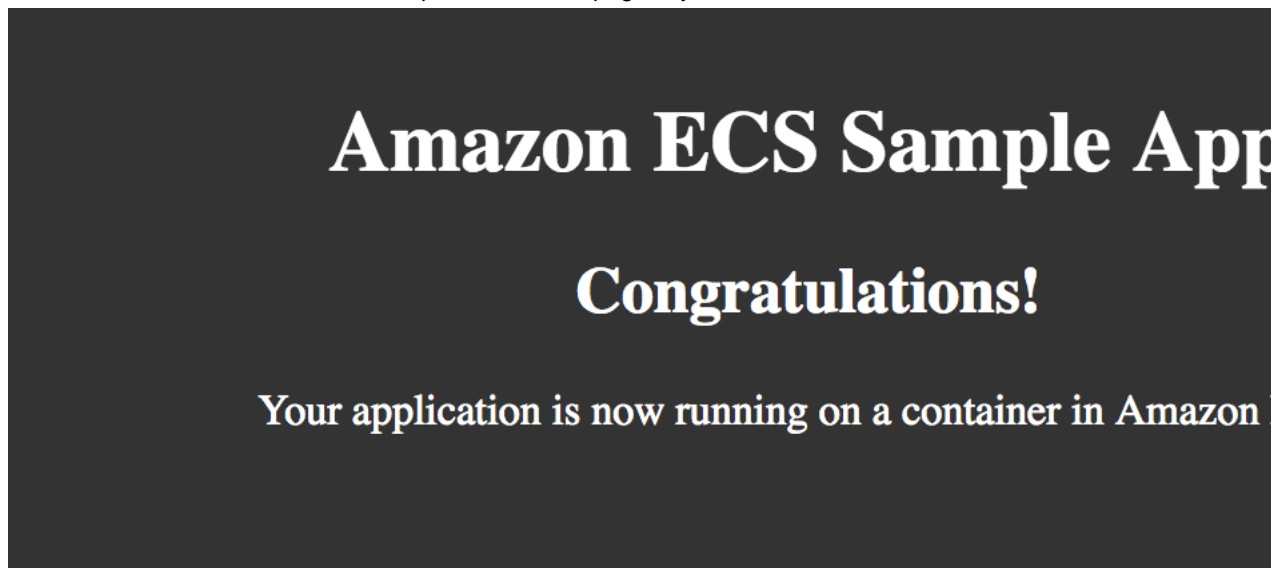
After your service has launched a task into your cluster, you can view the service and open the IIS test page in a browser to verify that the container is running.

### Note

It can take up to 15 minutes for your container instance to download and extract the Windows container base layers.

### To view your service

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. On the **Clusters** page, choose the **windows** cluster.
3. In the **Services** tab, choose the **windows-simple-iis** service.
4. On the **Service: windows-simple-iis** page, choose the task ID for the task in your service.
5. On the **Task** page, expand the **iis** container to view its information.
6. In the **Network bindings** of the container, you should see an **External Link** IP address and port combination link. Choose that link to open the IIS test page in your browser.



## Windows Task Definitions

Windows containers and container instances cannot support all the task definition parameters that are available for Linux containers and container instances. For some parameters, they are not supported at all, and others behave differently on Windows than they do on Linux.

### Windows Task Definition Parameters

The following matrix explains which parameters are supported, not supported, or behave differently on Windows containers. For more information about these parameters as they relate to Amazon ECS, see [Task Definition Parameters \(p. 95\)](#).

family

Supported: Yes

taskRoleArn

Supported: Yes

Additional notes: IAM roles for tasks on Windows require that you set the `ECS_ENABLE_TASK_IAM_ROLE` environment variable to `true` when you launch your container instances. Your containers must also run some configuration code in order to take advantage of the feature. For more information, see [Windows IAM Roles for Tasks \(p. 308\)](#).



`networkMode`

Supported: No

Additional notes: Docker for Windows uses different network modes than Docker for Linux. When you register a task definition with Windows containers, you must not specify a network mode. If you use the console to register a task definition with Windows containers, you must use the JSON input form and remove the network mode object; otherwise, the network mode is registered as `bridge`, which fails.

`containerDefinitions`

Supported: Yes

Additional notes: Not all container definition parameters are supported. Review the list below for individual parameter support.

`name`

Supported: Yes

`image`

Supported: Yes

`memory`

Supported: Unknown behavior on Windows side

Additional notes: The memory parameter is a required in Amazon ECS task definitions; however, there is no published documentation from Microsoft as to how this parameter behaves on the container instance. Amazon ECS treats this parameter in the same manner that it does for Linux container instances: if you provide 500 MiB to a container, that amount of memory is removed from the available resources on the container instance when the task is placed).

`memoryReservation`

Supported: No

`portMappings`

Supported: Limited

Additional notes: Port mappings on Windows use the `NetNAT` gateway address rather than `localhost`. There is no loopback for port mappings on Windows, so you cannot access a container's mapped port from the host itself.

`cpu`

Supported: Unknown behavior on Windows side

Additional notes: There is no published documentation from Microsoft as to how this parameter behaves on the container instance. Amazon ECS treats this parameter in the same manner that it does for Linux container instances: if you provide 500 CPU shares to a container, that number of CPU shares is removed from the available resources on the container instance when the task is placed.

`essential`

Supported: Yes

`entryPoint`

Supported: Yes

`command`

Supported: Yes

`workingDirectory`

Supported: Yes

`environment`

Supported: Yes

`disableNetworking`

Supported: No

`links`

Supported: No

`hostname`

Supported: Yes

`dnsServers`

Supported: No

`dnsSearchDomains`

Supported: No

`extraHosts`

Supported: No

`readonlyRootFilesystem`

Supported: No

`mountPoints`

Supported: Limited

Additional notes: Containers can mount whole directories on the same drive as `$env:ProgramData`. Containers cannot mount directories on a different drive, and mount point cannot be across drives.

`volumesFrom`

Supported: Yes

`logConfiguration`

Supported: Yes

Additional notes: The list of available log drivers for Docker can be found at [Configure logging drivers](#) in the Docker documentation. Amazon ECS currently supports a subset of the logging drivers available to the Docker daemon (shown in the valid values at [logDriver \(p. 105\)](#)); we have tested the `awslogs` and `json-file` log drivers with Windows containers on Amazon ECS. Additional log drivers may be available in future releases of the Amazon ECS container agent.

`privileged`

Supported: No

`user`

Supported: No

`dockerLabels`

Supported: Yes

`volumes`

Supported: Yes

name

Supported: Yes

host

Supported: Limited

Additional notes: Containers can mount whole directories on the same drive as `$env:ProgramData`. Containers cannot mount directories on a different drive, and mount point cannot be across drives. For example, you can mount `C:\my\path:C:\my\path` and `D:\:D:\`, but not `D:\my\path:C:\my\path` or `D:\:C:\my\path`.

## Windows Sample Task Definitions

Below is a sample task definition that can help you get started with Windows containers on Amazon ECS.

### Example Amazon ECS Console Sample Application for Windows

The following task definition is the Amazon ECS console sample application that is produced in the first-run wizard for Amazon ECS; it has been ported to use the `microsoft/iis` Windows container image.

```
{
  "family": "windows-simple-iis",
  "containerDefinitions": [
    {
      "name": "windows_sample_app",
      "image": "microsoft/iis",
      "cpu": 100,
      "entryPoint": ["powershell", "-Command"],
      "command": ["New-Item -Path C:\\inetpub\\wwwroot\\index.html -Type file -Value '<html>
<head> <title>Amazon ECS Sample App</title> <style>body {margin-top: 40px; background-
color: #333;} </style> </head><body> <div style=color:white;text-align:center> <h1>Amazon
ECS Sample App</h1> <h2>Congratulations!</h2> <p>Your application is now running on a
container in Amazon ECS.</p>' C:\\ServiceMonitor.exe w3svc"],
      "portMappings": [
        {
          "protocol": "tcp",
          "containerPort": 80,
          "hostPort": 80
        }
      ],
      "memory": 500,
      "essential": true
    }
  ]
}
```

## Windows IAM Roles for Tasks

IAM roles for tasks with Windows requires extra configuration, but much of this configuration is similar to enabling IAM roles for tasks on Linux container instances. The following requirements must be met to enable IAM roles for tasks for Windows containers.

- When you launch your container instances, you must enable the feature by setting the `ECS_ENABLE_TASK_IAM_ROLE` environment variable in the container instances startup script.
- You must bootstrap your container with the networking commands that are provided in [IAM Roles for Task Container Bootstrap Script](#) (p. 309).

- You must create an IAM role and policy for your tasks. For more information, see [Creating an IAM Role and Policy for your Tasks \(p. 214\)](#).
- Your container must use an AWS SDK that supports IAM roles for tasks. For more information, see [Using a Supported AWS SDK \(p. 216\)](#).
- You must specify the IAM role you created for your tasks when you register the task definition, or as an override when you run the task. For more information, see [Specifying an IAM Role for your Tasks \(p. 216\)](#).
- The IAM roles for the task credential provider use port 80 on the container instance, so if you enable IAM roles for tasks on your container instance, your containers cannot use port 80 for the host port in any port mappings. To expose your containers on port 80, we recommend configuring a service for them that uses load balancing. You can use port 80 on the load balancer, and the traffic can be routed to another host port on your container instances. For more information, see [Service Load Balancing \(p. 138\)](#).

## IAM Roles for Task Container Bootstrap Script

Before containers can access the credential proxy on the container instance to get credentials, the container must be bootstrapped with the required networking commands. The following code example script should be run on your containers when they start.

```
# Copyright 2014-2016 Amazon.com, Inc. or its affiliates. All Rights Reserved.
#
# Licensed under the Apache License, Version 2.0 (the "License"). You may
# not use this file except in compliance with the License. A copy of the
# License is located at
#
# http://aws.amazon.com/apache2.0/
#
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# permissions and limitations under the License.

$gateway = (Get-WMIObject -Class Win32_IP4RouteTable | Where { $_.Destination -eq '0.0.0.0'
-and $_.Mask -eq '0.0.0.0' } | Sort-Object Metric1 | Select NextHop).NextHop
$ifIndex = (Get-NetAdapter -InterfaceDescription "Hyper-V Virtual Ethernet*" | Sort-Object
| Select ifIndex).ifIndex
New-NetRoute -DestinationPrefix 169.254.170.2/32 -InterfaceIndex $ifIndex -NextHop $gateway
```

## Pushing Windows Images to Amazon ECR

You can push Windows Docker container images to Amazon ECR. You must be using a version of Docker that supports Windows containers. The following procedures show you how to pull a Windows Docker image, create an Amazon ECR repository to store the image, tag the image to that repository, authenticate the image to the Amazon ECR registry, and then push the image to that repository.

### To pull and tag a Windows Docker image

1. Pull a Windows Docker image locally. This example uses the `microsoft/iis` image.

```
PS C:\> docker pull microsoft/iis
Using default tag: latest
latest: Pulling from microsoft/iis

3889bb8d808b: Pull complete
04ee5d718c7a: Pull complete
```

```
c0931dd15237: Pull complete
61784b745c20: Pull complete
d05122f129ca: Pull complete
Digest: sha256:25586570b058da9882d4af640d326d0cc26dfd60b67e1cee63f35ea54d83c882
Status: Downloaded newer image for microsoft/iis:latest
```

2. Create an Amazon ECR repository for your image.

```
PS C:\> aws ecr create-repository --repository-name iis
{
  "repository": {
    "registryId": "111122223333",
    "repositoryName": "iis",
    "repositoryArn": "arn:aws:ecr:us-west-2:111122223333:repository/iis",
    "createdAt": 1481845593.0,
    "repositoryUri": "111122223333.dkr.ecr.us-west-2.amazonaws.com/iis"
  }
}
```

3. Tag the image with the `repositoryUri` that was returned from the previous command.

```
PS C:\> docker tag microsoft/iis 111122223333.dkr.ecr.us-west-2.amazonaws.com/iis
```

4. Authenticate your Docker client to the Amazon ECR registry.

```
PS C:\> Invoke-Expression -Command (aws ecr get-login)
```

5. Push the image to Amazon ECR.

```
PS C:\> docker push 111122223333.dkr.ecr.us-west-2.amazonaws.com/iis
The push refers to a repository [111122223333.dkr.ecr.us-west-2.amazonaws.com/iis]
1e4f77a75bd4: Pushed
ac90fb7da567: Pushed
c7090349c7b3: Pushed
b9454c3094c6: Skipped foreign layer
3fd27ecef6a3: Skipped foreign layer
latest: digest: sha256:0ddc7af8691072bb2dd8b3f189388b33604c90774d3dc0485b1bf379f9bec4c5
size: 1574
```

# AWS Glossary

For the latest AWS terminology, see the [AWS Glossary](#) in the *AWS General Reference*.