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# **Amazon Elastic Container Service**

## **Developer Guide**

### **API Version 2014-11-13**



## Amazon Elastic Container Service: Developer Guide

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# What is Amazon Elastic Container Service?

Amazon Elastic 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. You can host your cluster on a serverless infrastructure that is managed by Amazon ECS by launching your services or tasks using the Fargate launch type. For more control you can host your tasks on a cluster of Amazon Elastic Compute Cloud (Amazon EC2) instances that you manage by using the EC2 launch type. For more information about launch types, see [Amazon ECS Launch Types \(p. 133\)](#).

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.

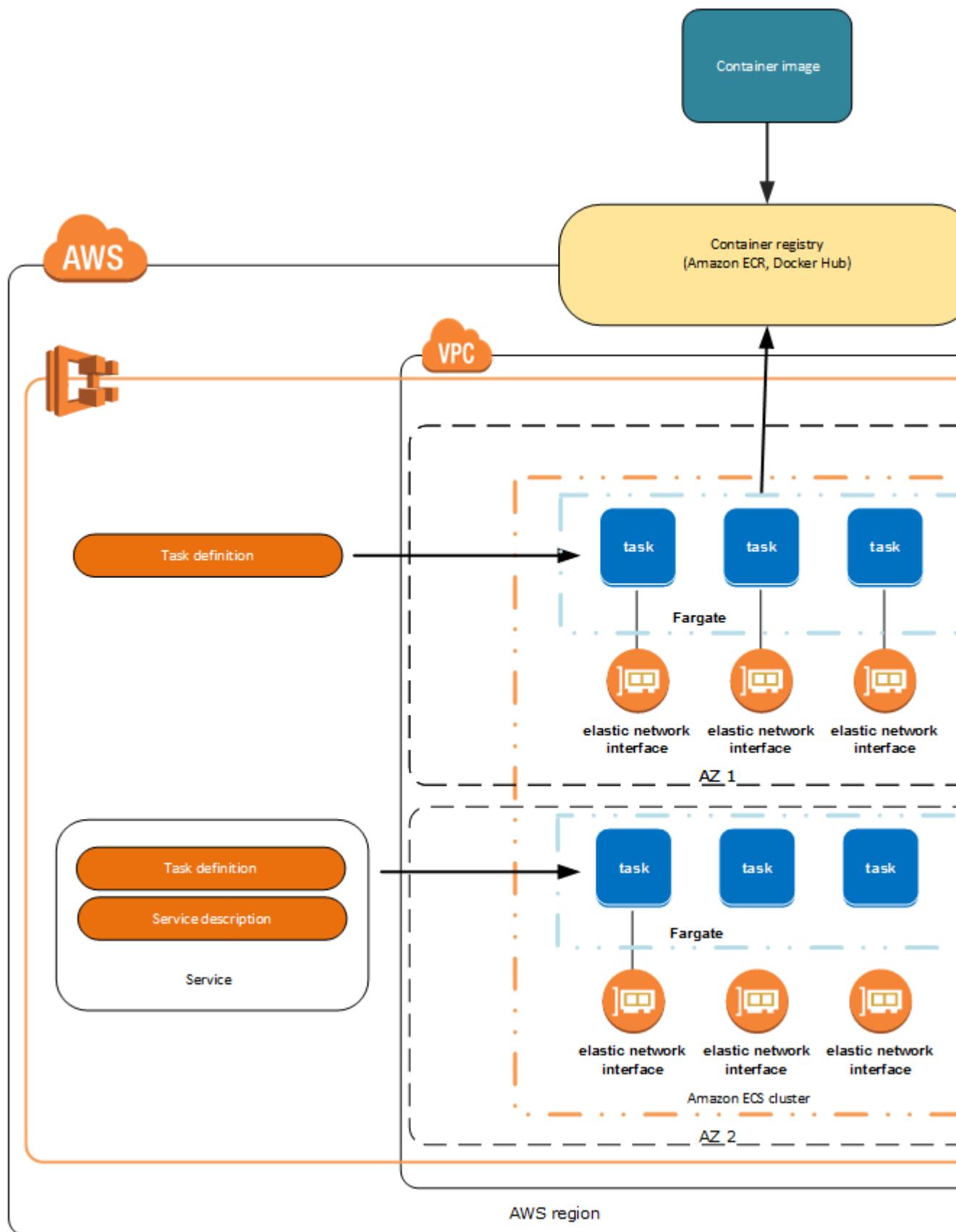
You can use Amazon ECS to schedule the placement of containers across your cluster based on your resource needs, isolation policies, and availability requirements. Amazon ECS eliminates the need for you to operate your own cluster management and configuration management systems or worry about scaling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

## 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 diagram shows the architecture of an Amazon ECS environment using the Fargate launch type:



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

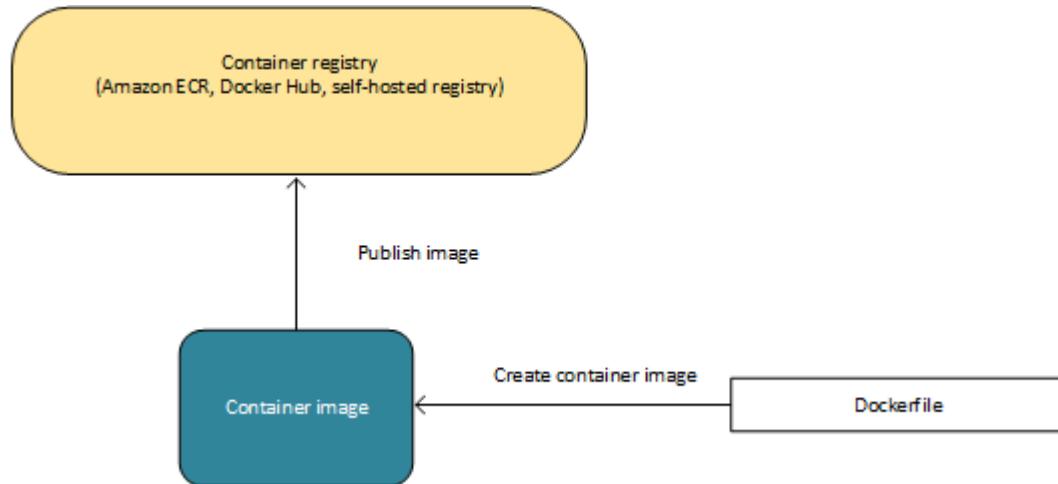
## Containers and Images

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 cluster. For more information about container technology, see [Docker Basics \(p. 14\)](#).

### Note

The Fargate launch type only supports using container images hosted in Amazon ECR or publicly on Docker Hub. Private repositories are currently only supported using the EC2 launch type.



## 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, up to a maximum of ten, that form your application. It can be thought of as a blueprint for your application. Task definitions specify various parameters for your application. Examples of task definition parameters are 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. The specific parameters available for the task definition depend on which launch type you are using. For more information about creating task definitions, see [Amazon ECS Task Definitions \(p. 100\)](#).

The following is an example of a simple task definition containing a single container that runs an NGINX web server using the Fargate launch type. For a more extended example demonstrating the use of multiple containers in a task definition, see [Example Task Definitions \(p. 143\)](#).

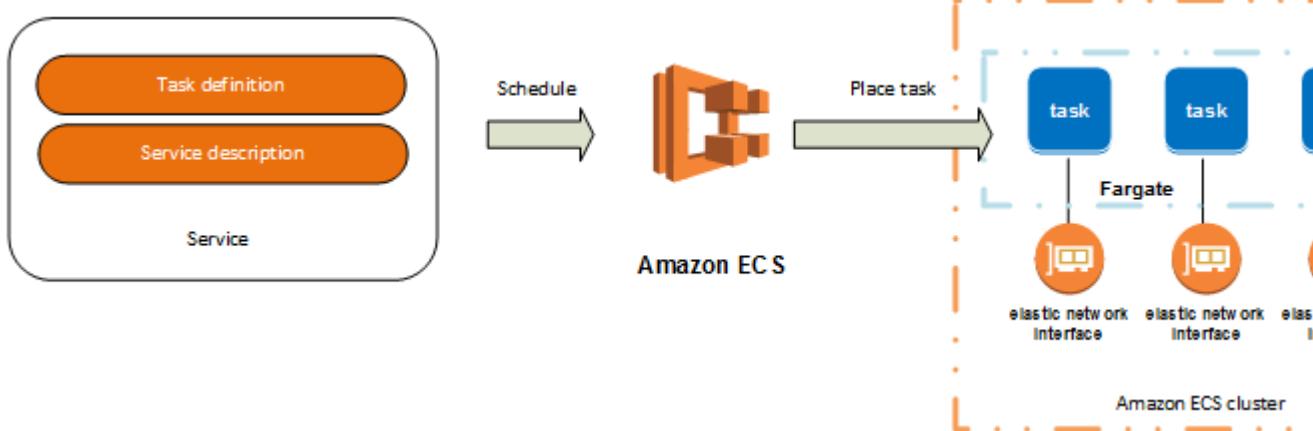
```
{  
    "family": "webserver",  
    "containerDefinitions": [  
        {  
            "name": "web",  
            "image": "nginx",  
            "memory": "100",  
            "portMappings": [  
                {  
                    "containerPort": 80,  
                    "hostPort": 80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

```
        "cpu": "99"
    },
],
"requiresCompatibilities": [
    "FARGATE"
],
"networkMode": "awsvpc",
"memory": "100",
"cpu": "99",
}
```

## Tasks and Scheduling

A *task* is the instantiation of a task definition within a 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 within your cluster. 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 \(p. 147\)](#).



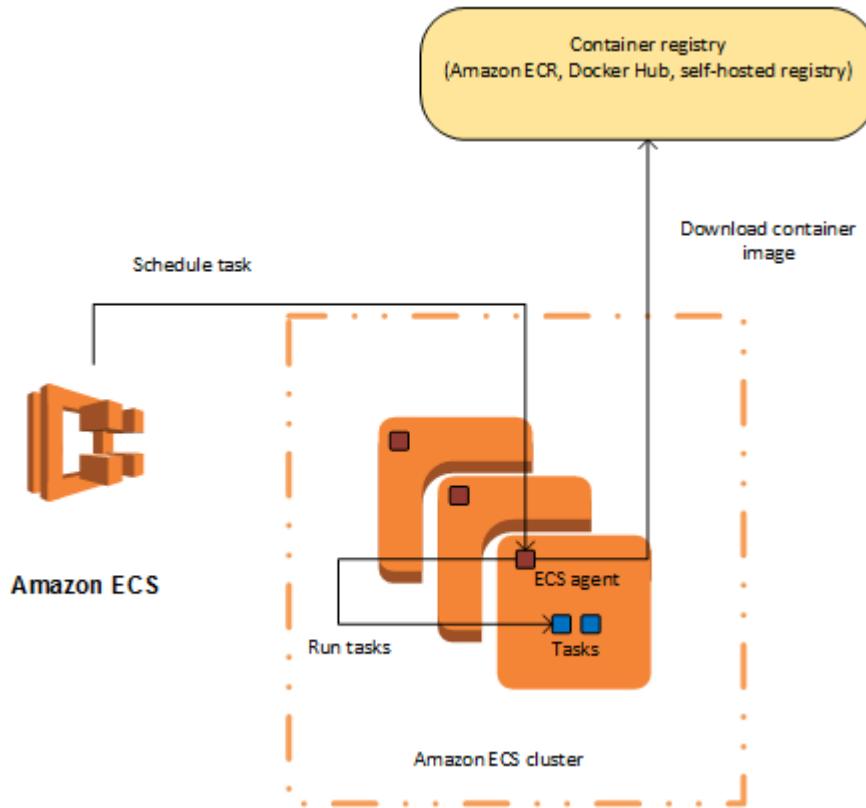
## Clusters

When you run tasks using Amazon ECS, you place them on a *cluster*, which is a logical grouping of resources. If you use the Fargate launch type with tasks within your cluster, Amazon ECS manages your cluster resources. If you use the EC2 launch type, then your clusters will be a group of container instances you manage. Amazon ECS downloads your container images from a registry that you specify, and runs those images within your cluster.

For more information about creating clusters, see [Amazon ECS Clusters \(p. 25\)](#). If you are using the EC2 launch type, you can read about creating container instances at [Amazon ECS Container Instances \(p. 30\)](#).

## Container Agent

The *container agent* runs on each infrastructure resource within an Amazon ECS cluster. It sends information about the resource'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 \(p. 69\)](#).



## 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 Fargate 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 using Fargate \(p. 19\)](#) 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 along 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 \(p. 224\)](#).

### Auto Scaling

Auto Scaling is a web service that enables you to automatically scale out or in your tasks based on user-defined policies, health status checks, and schedules. You can use Auto Scaling with a

Fargate task within a service to scale in response to a number of metrics or with a EC2 task to scale the container instances within your cluster. For more information, see [Tutorial: Scaling Container Instances with CloudWatch Alarms \(p. 208\)](#).

### 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 \(p. 165\)](#).

### Amazon Elastic 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 Elastic 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 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 using Fargate \(p. 19\)](#).

### 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 \(p. 264\)](#).

### 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](#).

# 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. 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 \(p. 8\)](#)
3. [Create an IAM Role for your Container Instances and Services \(p. 10\)](#)
4. [Create a Key Pair \(p. 10\)](#)
5. [Create a Virtual Private Cloud \(p. 11\)](#)
6. [Create a Security Group \(p. 12\)](#)
7. [Install the AWS CLI \(p. 13\)](#)

## 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**.

**Note**

This might be unavailable in your browser if you previously signed into the AWS Management Console. In that case, choose **Sign In to the Console**, and then choose **Create a new 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. Use your AWS account email address and password to sign in to the [AWS Management Console](#) as the [AWS account root user](#).
2. In the navigation pane of the console, choose **Users**, and then choose **Add user**.
3. For **User name**, type **Administrator**.
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 **Administrators**.
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](#).

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 the next section. 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 \(p. 238\)](#) and [Amazon ECS Service Scheduler IAM Role \(p. 247\)](#) before launching container instances or using Elastic Load Balancing load balancers with services.

# Create a Key Pair

For Amazon ECS, a key pair is only needed if you intend on using the EC2 launch type.

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 (Ohio) region, you must create a key pair for the instance in the same region.
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-useast2`.
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.  

The screenshot shows a dropdown menu for selecting a file type. The options are 'PuTTY Private Key Files (\*.ppk)' (which is highlighted in blue), 'PuTTY Private Key Files (\*.ppk)', and 'All Files (\*.\*)' (which is also visible below the first option).
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.

## Create a Virtual Private Cloud

Amazon Virtual Private Cloud (Amazon VPC) enables you to launch AWS resources into a virtual network that you've defined. We strongly suggest that you launch your container instances in a VPC.

**Note**

The Amazon ECS console first run experience creates a VPC for your cluster, so if you intend to use the Amazon ECS console, you can skip to the next section.

If you have a default VPC, you also can skip this section and move to the next task, [Create a Security Group \(p. 12\)](#). To determine whether you have a default VPC, see [Supported Platforms in the Amazon EC2 Console](#) in the *Amazon EC2 User Guide for Linux Instances*. Otherwise, you can create a nondefault VPC in your account using the steps below.

### Important

If your account supports Amazon EC2 Classic in a region, then you do not have a default VPC in that region.

#### To create a nondefault VPC

1. Open the Amazon VPC console at <https://console.aws.amazon.com/vpc/>.
2. From the navigation bar, select a region for the VPC. VPCs are specific to a region, so you should select the same region in which you created your key pair.
3. On the VPC dashboard, choose **Start VPC Wizard**.
4. On the **Step 1: Select a VPC Configuration** page, ensure that **VPC with a Single Public Subnet** is selected, and choose **Select**.
5. On the **Step 2: VPC with a Single Public Subnet** page, enter a friendly name for your VPC in the **VPC name** field. Leave the other default configuration settings, and choose **Create VPC**. On the confirmation page, choose **OK**.

For more information about Amazon VPC, see [What is Amazon VPC?](#) in the *Amazon VPC User Guide*.

## Create a Security Group

Security groups act as a firewall for associated container instances, controlling both inbound and outbound traffic at the container instance level. You can add rules to a security group that enable you to connect to your container instance from your IP address using SSH. You can also add rules that allow inbound and outbound HTTP and HTTPS access from anywhere. Add any rules to open ports that are required by your tasks.

### Note

The Amazon ECS console first run experience creates a security group for your instances and load balancer based on the task definition you use, so if you intend to use the Amazon ECS console, you can move ahead to the next section.

Note that if you plan to launch container instances in multiple regions, you need to create a security group in each region. For more information about regions, see [Regions and Availability Zones](#) in the *Amazon EC2 User Guide for Linux Instances*.

### Tip

You need the public IP address of your local computer, which you can get using a service. For example, we provide the following service: <http://checkip.amazonaws.com/>. To locate another service that provides your IP address, use the search phrase "what is my IP address." If you are connecting through an Internet service provider (ISP) or from behind a firewall without a static IP address, you need to find out the range of IP addresses used by client computers.

#### To create a security group with least privilege

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. From the navigation bar, select a region for the security group. Security groups are specific to a region, so you should select the same region in which you created your key pair.
3. Choose **Security Groups** in the navigation pane.
4. Choose **Create Security Group**.
5. Enter a name for the new security group and a description. Choose a name that is easy for you to remember, such as *ecs-instances-default-cluster*.
6. In the **VPC** list, ensure that your default VPC is selected; it's marked with an asterisk (\*).

**Note**

If your account supports Amazon EC2 Classic, select the VPC that you created in the previous task.

7. Amazon ECS container instances do not require any inbound ports to be open. However, you might want to add an SSH rule so you can log into the container instance and examine the tasks with Docker commands. You can also add rules for HTTP and HTTPS if you want your container instance to host a task that runs a web server. Complete the following steps to add these optional security group rules.

On the **Inbound** tab, create the following rules (choose **Add Rule** for each new rule), and then choose **Create**:

- Choose **HTTP** from the **Type** list, and make sure that **Source** is set to **Anywhere (0.0.0.0/0)**.
- Choose **HTTPS** from the **Type** list, and make sure that **Source** is set to **Anywhere (0.0.0.0/0)**.
- Choose **SSH** from the **Type** list. In the **Source** field, ensure that **Custom IP** is selected, and specify the public IP address of your computer or network in CIDR notation. To specify an individual IP address in CIDR notation, add the routing prefix /32. For example, if your IP address is 203.0.113.25, specify 203.0.113.25/32. If your company allocates addresses from a range, specify the entire range, such as 203.0.113.0/24.

**Important**

For security reasons, we don't recommend that you allow SSH access from all IP addresses (0.0.0.0/0) to your instance, except for testing purposes and only for a short time.

## Install the AWS CLI

The AWS Management Console can be used to manage all operations manually with Amazon ECS. However, installing the AWS CLI on your local desktop or a developer box enables you to build scripts that can automate common management tasks in Amazon ECS.

To use the AWS CLI with Amazon ECS, install the latest AWS CLI, version. 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 Elastic 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 \(p. 14\)](#)
- [Create a Docker Image \(p. 15\)](#)
- [\(Optional\) Push your image to Amazon Elastic Container Registry \(p. 16\)](#)
- [Next Steps \(p. 17\)](#)

## Installing Docker

### Note

If you already have Docker installed, skip to [Create a Docker Image \(p. 15\)](#).

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.

```
sudo yum update -y
```

4. Install the most recent Docker Community Edition package.

```
sudo yum install -y docker
```

5. Start the Docker service.

```
sudo service docker start
```

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

```
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.

```
docker info
```

**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?
```

## Create a Docker Image

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 web application, and test it on your local system or EC2 instance, and then push the image to a container registry (such as Amazon ECR or Docker Hub) so you can use it in an ECS task definition.

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

1. Create a file called `Dockerfile`. 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](#).

```
touch Dockerfile
```

2. Edit the `Dockerfile` you just created and add the following content.

```
FROM ubuntu:12.04

# Install dependencies
RUN apt-get update -y
RUN apt-get install -y apache2

# Install apache and write hello world message
RUN echo "Hello World!" > /var/www/index.html

# 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 then write the "Hello World!" content to the web server's document root. The `EXPOSE` instruction exposes port 80 on the container, and the `CMD` instruction starts the web server.

3. Build the Docker image from your Dockerfile.

**Note**

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

```
docker build -t hello-world .
```

4. Run **docker images** to verify that the image was created correctly.

```
docker images --filter reference=hello-world
```

Output:

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
hello-world	latest	e9ffedc8c286	4 minutes ago	258MB

5. 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](#).

```
docker run -p 80:80 hello-world
```

**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.

6. 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
```

You should see a web page with your "Hello World!" statement.

7. Stop the Docker container by typing **Ctrl + c**.

## (Optional) Push your image to Amazon Elastic Container Registry

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 Elastic Container Registry product detail pages](#).

**Note**

This section requires the AWS CLI. If you do not have the AWS CLI installed on your system, see [Installing the AWS Command Line Interface](#) in the [AWS Command Line Interface User Guide](#).

## To tag your image and push it to Amazon ECR

1. Create an Amazon ECR repository to store your hello-world image. Note the `repositoryUri` in the output.

```
aws ecr create-repository --repository-name hello-world
```

Output:

```
{  
    "repository": {  
        "registryId": "aws_account_id",  
        "repositoryName": "hello-world",  
        "repositoryArn": "arn:aws:ecr:us-east-1:aws_account_id:repository/hello-world",  
        "createdAt": 1505337806.0,  
        "repositoryUri": "aws_account_id.dkr.ecr.us-east-1.amazonaws.com/hello-world"  
    }  
}
```

2. Tag the hello-world image with the `repositoryUri` value from the previous step.

```
docker tag hello-world aws_account_id.dkr.ecr.us-east-1.amazonaws.com/hello-world
```

3. Run the `aws ecr get-login --no-include-email` command to get the `docker login` authentication command string for your registry.

### Note

The `get-login` command is available in the AWS CLI starting with version 1.9.15; however, we recommend version 1.11.91 or later for recent versions of Docker (17.06 or later). You can check your AWS CLI version with the `aws --version` command. If you are using Docker version 17.06 or later, include the `--no-include-email` option after `get-login`. If you receive an `Unknown options: --no-include-email` error, install the latest version of the AWS CLI. For more information, see [Installing the AWS Command Line Interface](#) in the [AWS Command Line Interface User Guide](#).

```
aws ecr get-login --no-include-email
```

4. 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.

5. Push the image to Amazon ECR with the `repositoryUri` value from the earlier step.

```
docker push aws_account_id.dkr.ecr.us-east-1.amazonaws.com/hello-world
```

## Next Steps

After the image push is finished, you can use your image in your Amazon ECS task definitions, which you can use to run tasks with.

**Note**

This section requires the AWS CLI. If you do not have the AWS CLI installed on your system, see [Installing the AWS Command Line Interface](#) in the *AWS Command Line Interface User Guide*.

**To register a task definition with the hello-world image**

1. Create a file called `hello-world-task-def.json` with the following contents, substituting the `repositoryUri` from the previous section for the `image` field.

```
{  
    "family": "hello-world",  
    "containerDefinitions": [  
        {  
            "name": "hello-world",  
            "image": "aws_account_id.dkr.ecr.us-east-1.amazonaws.com/hello-world",  
            "cpu": 10,  
            "memory": 500,  
            "portMappings": [  
                {  
                    "containerPort": 80,  
                    "hostPort": 80  
                }  
            ],  
            "entryPoint": [  
                "/usr/sbin/apache2",  
                "-D",  
                "FOREGROUND"  
            ],  
            "essential": true  
        }  
    ]  
}
```

2. Register a task definition with the `hello-world-task-def.json` file.

```
aws ecs register-task-definition --cli-input-json file://hello-world-task-def.json
```

The task definition is registered in the `hello-world` family as defined in the JSON file.

**To run a task with the hello-world task definition**

**Important**

Before you can run tasks in Amazon ECS, you need to launch container instances into a default 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 using Fargate \(p. 19\)](#).

- Use the following AWS CLI command to run a task with the `hello-world` task definition.

```
aws ecs run-task --task-definition hello-world
```

# Getting Started with Amazon ECS using Fargate

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

The Amazon ECS first run wizard will guide you through the process to get started. 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 \(p. 256\)](#) IAM policy example.

## Step 1: Create a container and task definition

A task definition is like a blueprint for your application. Each 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. Open the Amazon ECS console first run wizard at <https://console.aws.amazon.com/ecs/home#/firstRun>.
2. Configure your container definition parameters.

For **Container definition**, the first run wizard comes preloaded with the `sample-app` and `nginx` container definitions in the console. You can optionally rename the container or review and edit the resources used by the container (such as CPU units and memory limits) by choosing **Edit** and editing the values shown.

For more information on what each of these container definition parameters does, see [Container Definitions \(p. 108\)](#).

## Note

If you are using an Amazon ECR image in your container 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`.

3. For **Task definition**, the first run wizard defines a task definition to use with the preloaded container definitions. You can optionally rename the task definition and edit the resources used by the task (such as the **Task memory** and **Task CPU** values) by choosing **Edit** and editing the values shown.

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.

For more information on what each of these task definition parameters does, see [Task Definition Parameters \(p. 106\)](#).

4. Choose **Next** to continue.

## Step 2: 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.

The first run wizard comes preloaded with a service definition, and you can see the `sample-app-service` service defined in the console. You can optionally rename the service or review and edit the details by choosing **Edit** and doing the following:

1. In the **Service name** field, select a name for your service.
2. In the **Number of desired tasks** field, enter the number of tasks you would like to launch with your specified task definition.
3. In the **Security Group** field, specify a range of IPv4 addresses to allow inbound traffic from, in CIDR block notation. For example, `203.0.113.0/24`.
4. (Optional) You can choose to use an Application Load Balancer with your service. When a task is launched from a service that is configured to use a load balancer, the task is launched on its registered with the load balancer and traffic from the load balancer is distributed across the instances in the load balancer. For more details, see [Introduction to Application Load Balancers](#).

**Important**

Application Load Balancers do incur cost while they exist in your AWS resources. For more information on Application Load Balancer pricing, see [Application Load Balancer Pricing](#).

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

- a. In the **Application load balancing** section, choose the **Load balancer listener port**. The default value 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 \(p. 165\)](#).
- b. In the **Application Load Balancer target group** field, specify a name for the target group.
5. Review your service settings and click **Save, Next**.

### Step 3: Configure cluster

In this section of the wizard, you name your cluster, and then Amazon ECS takes care of the networking and IAM configuration for you.

1. In the **Cluster name** field, choose a name for your cluster.
2. Click **Next** to proceed.

### Step 4: Review

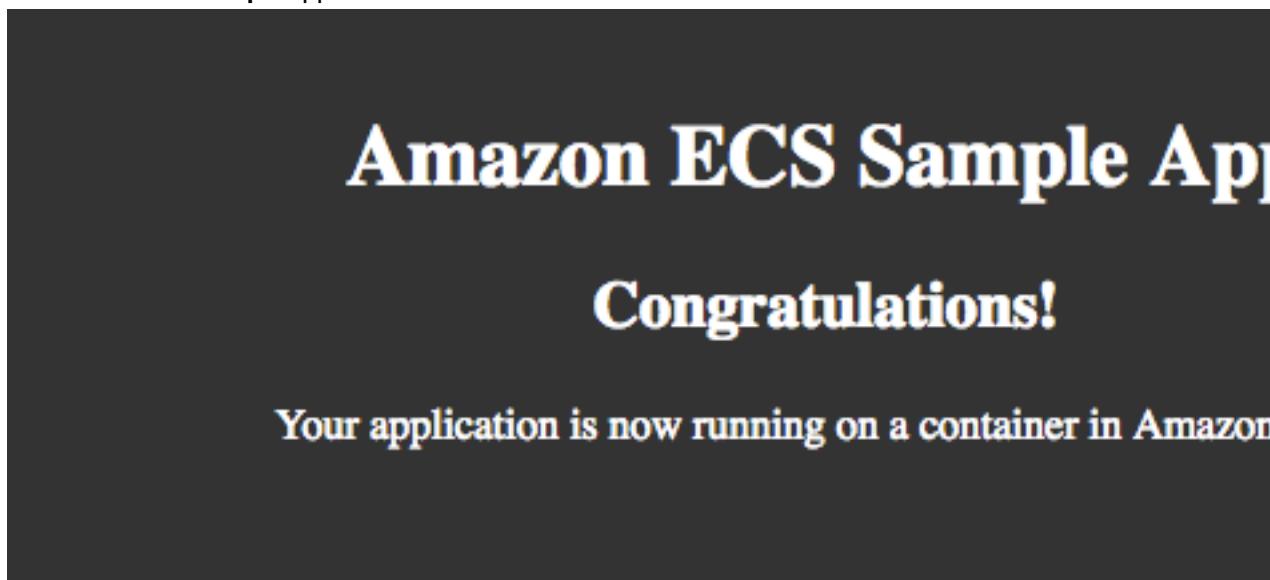
1. Review your task definition, task configuration, and cluster configurations and click **Create** to finish. You are directed to a **Launch Status** page that shows the status of your launch and describes each step of the process (this can take a few minutes to complete while your Auto Scaling group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

### Step 5: (Optional) View your service's containers

If your service is a web-based application, such as the **Amazon ECS sample** application, you can view its containers with a web browser.

1. On the **Service: *service-name*** page, choose the **Tasks** tab.
2. Choose a task from the list of tasks in your service.
3. In the **Network** section, choose the **ENI Id** for your task. This will take you to the EC2 console where you can view the details of the network interface associated with your task, including its **IPv4 Public IP address**.

4. Enter the **IPv4 Public IP** address in your web browser and you should see a web page that displays the **Amazon ECS sample** application.



# 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 \(p. 22\)](#)
- [Delete Services \(p. 22\)](#)
- [Deregister Container Instances \(p. 22\)](#)
- [Delete a Cluster \(p. 23\)](#)
- [Delete the AWS CloudFormation Stack \(p. 23\)](#)

## 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 \(p. 194\)](#) 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 \(p. 195\)](#) 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 \(p. 67\)](#) 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.

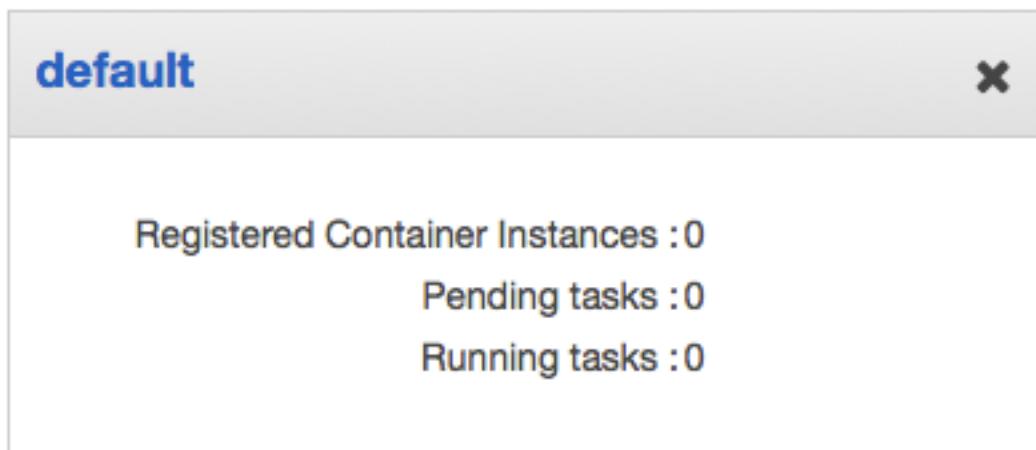
```
aws ecs deregister-container-instance --cluster default --container-instance container_instance_id --region us-west-2 --force
```

## 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 ECS cluster is a logical grouping of tasks or services. When you first use Amazon ECS, a default cluster is created for you, but you can create multiple clusters in an account to keep your resources separate.

## Topics

- [Cluster Concepts \(p. 25\)](#)
- [Creating a Cluster \(p. 25\)](#)
- [Scaling a Cluster \(p. 27\)](#)
- [Deleting a Cluster \(p. 29\)](#)

## Cluster Concepts

- Clusters are region-specific.
- Clusters can contain tasks using both the Fargate and EC2 launch types. For more information on launch types, see [Amazon ECS Launch Types \(p. 133\)](#).
- For tasks using the EC2 launch type, clusters can contain multiple different container instance types, but each container instance may only be 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 \(p. 258\)](#) section in [Amazon ECS IAM Policy Examples \(p. 256\)](#).

## Creating a Cluster

You can create an 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 \(p. 8\)](#). If you are launching tasks with the EC2 launch type, you can register container instances into the cluster after creating it.

### Note

This cluster creation wizard provides a simple way to create the resources that are needed by an Amazon ECS cluster, and it lets you customize several common cluster configuration options. However, this wizard does not 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/awslabs/ecs-refarch-cloudformation>.

Do not attempt to modify the underlying resources directly after 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.
3. In the navigation pane, choose **Clusters**.

4. On the **Clusters** page, choose **Create Cluster**.
5. For **Select cluster compatibility**, choose one of the following and then choose **Next Step**:
  - **Networking only**—This choice takes you through the options to launch a cluster of tasks using the Fargate launch type. The Fargate launch type allows you to run your containerized applications without the need to provision and manage the backend infrastructure. Register your task definition and Fargate launches the container for you.
  - **EC2 Linux + Networking**—This choice takes you through the choices to launch a cluster of tasks using the EC2 launch type using Linux containers. The EC2 launch type allows you to run your containerized applications on a cluster of Amazon EC2 instances that you manage.
  - **EC2 Windows + Networking** – This choice takes you through the choices to launch a cluster of tasks using the EC2 launch type using Windows containers. The EC2 launch type allows you to run your containerized applications on a cluster of Amazon EC2 instances that you manage. For more information, see [Windows Containers \(p. 361\)](#).

If you chose the **Networking only** cluster template, do the following, otherwise skip to the next section:

### Using the Networking only cluster template

1. On the **Configure cluster** page, choose a **Cluster name**. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
2. In the **Networking** section, configure the VPC for your cluster. You can leave the default settings in or you can modify these settings by following the substeps below.
  - a. (Optional) If you choose to create a new VPC, for **CIDR Block**, select a CIDR block for your VPC. For more information, see [Your VPC and Subnets](#) in the *Amazon VPC User Guide*.
  - b. For **Subnets**, select the subnets to use for your VPC. You can keep the default settings or you can modify them to meet your needs.
3. Choose **Create**.

If you chose the **EC2 Linux + Networking** or **EC2 Windows + Networking** templates, do the following:

### Using the EC2 Linux + Networking or EC2 Windows + Networking cluster template

1. For **Cluster name**, enter a name for your cluster. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
2. (Optional) If you wish to create a cluster with no resources, choose **Create an empty cluster**, **Create**.
3. For **Provisioning model**, choose one of the following:
  - **On-Demand Instance**—With On-Demand Instances, you pay for compute capacity by the hour with no long-term commitments or upfront payments.
  - **Spot**—Spot Instances allow you to bid on spare Amazon EC2 computing capacity for up to 90% off the On-Demand price. For more information, see [Spot Instances](#).

#### Note

Spot Instances are subject to possible interruptions. We recommend that you avoid Spot Instances for applications that can't be interrupted. For more information, see [Spot Instance Interruptions](#).

4. For Spot Instances, do the following; otherwise, skip to the next step.
  - a. For **Spot Instance allocation strategy**, choose the strategy that meets your needs. For more information, see [Spot Fleet Allocation Strategy](#).
  - b. For **Maximum bid price (per instance/hour)**, specify a bid price. Your Spot Instances are not launched if your bid price is lower than the Spot price for the instance types that you selected.

5. For **EC2 instance types**, choose the EC2 instance type for your container instances. The instance type that you select determines the resources available for your tasks.
6. For **Number of instances**, choose the number of 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 \(p. 32\)](#).
7. 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.
8. 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*.
9. 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**, create a new VPC, or select an existing VPC.
  - b. (Optional) If you chose to create a new VPC, for **CIDR Block**, select a CIDR block for your VPC. For more information, see [Your VPC and Subnets](#) in the *Amazon VPC User Guide*.
  - c. For **Subnets**, select 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**, select 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*.

- e. In the **Container instance IAM role** section, select 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 does not connect to your cluster. For more information, see [Amazon ECS Container Instance IAM Role \(p. 238\)](#).

- f. If you chose the Spot Instance type earlier, the **Spot Fleet Role IAM role** section indicates that an IAM role **ecsSpotFleetRole** will be created.
- g. Choose **Create**.

## Scaling a Cluster

If you have a cluster that contains Amazon EC2 container instances, the following will help you scale the number of Amazon EC2 instances in your cluster.

If your cluster was created with the console first-run experience described in [Getting Started with Amazon ECS using Fargate \(p. 19\)](#) 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 using Fargate \(p. 19\)](#) 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 \(p. 43\)](#).

### 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 in which your cluster exists.
3. In the navigation pane, choose **Clusters**.
4. Select the cluster to scale.
5. On the **Cluster : name** page, choose **ECS Instances**.

The screenshot shows the 'ECS Instances' tab selected in the navigation bar. A large blue button labeled 'Scale ECS Instances' is prominently displayed. Below it, there is a filter input field with the placeholder 'Filter in this page'. The main content area displays two container instances:

Container Instance	EC2 Instance
▶ 0667bf4a-111c-4c09-8529-fd833136644e	i-3df10de7
▶ fbb03e32-00aa-4231-9c24-0dc790193608	i-70621ab4

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. For **Desired number of instances**, enter the number of instances to which to scale your cluster to and choose **Scale**.

#### Note

If you reduce the number of container instances in your cluster, randomly selected container instances are terminated until the desired count is achieved, and 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 \(p. 29\)](#) 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 using Fargate \(p. 19\)](#) after November 24th, 2015, or the cluster creation wizard described in [Creating a Cluster \(p. 25\)](#), 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 \(p. 67\)](#). 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 \(p. 23\)](#).

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

### Note

If your cluster has registered container instances, you must deregister or terminate them. For more information, see [Deregister a Container Instance \(p. 67\)](#).

5. Choose **Delete Cluster**. You 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 \(p. 67\)](#). 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 \(p. 23\)](#).

# 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 using the EC2 launch type are placed on your active container instances.

**Note**

Tasks using the Fargate launch type are deployed onto AWS-managed infrastructure so this topic does not apply.

**Topics**

- [Container Instance Concepts \(p. 30\)](#)
- [Container Instance Lifecycle \(p. 31\)](#)
- [Check the Instance Role for Your Account \(p. 31\)](#)
- [Container Instance AMIs \(p. 32\)](#)
- [Subscribing to Amazon ECS–Optimized AMI Update Notifications \(p. 40\)](#)
- [Launching an Amazon ECS Container Instance \(p. 43\)](#)
- [Bootstrapping Container Instances with Amazon EC2 User Data \(p. 46\)](#)
- [Connect to Your Container Instance \(p. 52\)](#)
- [Using CloudWatch Logs with Container Instances \(p. 53\)](#)
- [Container Instance Draining \(p. 60\)](#)
- [Managing Container Instances Remotely \(p. 61\)](#)
- [Starting a Task at Container Instance Launch Time \(p. 64\)](#)
- [Deregister a Container Instance \(p. 67\)](#)

## 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 \(p. 69\)](#).
- 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 \(p. 238\)](#).
- 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, 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 Gateways](#) in the

[Amazon VPC User Guide](#) and [HTTP Proxy Configuration \(p. 97\)](#) in this guide. For help creating a VPC, see [Tutorial: Creating a VPC with Public and Private Subnets for Your Clusters \(p. 333\)](#)

- 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:
  - You should not deregister an instance from one cluster and re-register it 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 \(p. 43\)](#).
  - 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 \(p. 43\)](#) 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. In this case, 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 \(p. 74\)](#).

If you change the status of a container instance to `DRAINING`, new tasks are not placed on the container instance. 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 \(p. 60\)](#).

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 AWS Management Console and 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 exists, you do not need to create it. If the role does not exist, follow the procedures in [Amazon ECS Container Instance IAM Role \(p. 238\)](#) to create the role.

## Container Instance AMIs

The basic Amazon Elastic 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 \(p. 69\)](#).
- 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 \(p. 73\)](#).

#### 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 \(p. 32\)](#).

## 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 \(p. 32\)](#), 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-2017.09.d-amazon-ecs-optimized`) consists of:

- The latest minimal version of the Amazon Linux AMI
- The latest version of the Amazon ECS container agent (1.16.0)

- The recommended version of Docker for the latest Amazon ECS container agent (17.06.2-ce)
- The latest version of the `ecs-init` package to run and monitor the Amazon ECS agent (1.16.0-1)

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

Region	AMI Name	AMI ID	EC2 console link
us-east-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-58f5db3d	<a href="#">Launch instance</a>
us-east-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-fad25980	<a href="#">Launch instance</a>
us-west-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-7114c909	<a href="#">Launch instance</a>
us-west-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-62e0d802	<a href="#">Launch instance</a>
eu-west-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-dbfee1bf	<a href="#">Launch instance</a>
eu-west-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-4cbe0935	<a href="#">Launch instance</a>
eu-central-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-05991b6a	<a href="#">Launch instance</a>
ap-northeast-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-7267c01c	<a href="#">Launch instance</a>
ap-northeast-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-56bd0030	<a href="#">Launch instance</a>
ap-southeast-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-14b55f76	<a href="#">Launch instance</a>
ap-southeast-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-1bdc8b78	<a href="#">Launch instance</a>
ca-central-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-918b30f5	<a href="#">Launch instance</a>

#### Topics

- [How to Launch the Latest Amazon ECS-Optimized AMI \(p. 33\)](#)
- [Amazon ECS-Optimized AMI Versions \(p. 34\)](#)
- [Storage Configuration \(p. 36\)](#)

## 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 using Fargate \(p. 19\)](#).

- You can launch your container instances manually in the Amazon EC2 console by following the procedures in [Launching an Amazon ECS Container Instance \(p. 43\)](#). 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 Linux AMI IDs by region are listed below for reference.

Region	AMI Name	AMI ID	EC2 console link
us-east-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-58f5db3d	<a href="#">Launch instance</a>
us-east-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-fad25980	<a href="#">Launch instance</a>
us-west-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-7114c909	<a href="#">Launch instance</a>
us-west-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-62e0d802	<a href="#">Launch instance</a>
eu-west-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-dbfeelbf	<a href="#">Launch instance</a>
eu-west-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-4cbe0935	<a href="#">Launch instance</a>
eu-central-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-05991b6a	<a href="#">Launch instance</a>
ap-northeast-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-7267c01c	<a href="#">Launch instance</a>
ap-northeast-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-56bd0030	<a href="#">Launch instance</a>
ap-southeast-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-14b55f76	<a href="#">Launch instance</a>
ap-southeast-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-1bdc8b78	<a href="#">Launch instance</a>
ca-central-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-918b30f5	<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 \(p. 73\)](#).

## Amazon ECS-Optimized AMI Versions

The table below lists the current and previous versions of the Amazon ECS-optimized AMI and their corresponding versions of the Amazon ECS container agent, Docker, and the `ecs-init` package.

We always recommend using the latest version of the Amazon ECS-optimized AMI. For more information, see [How to Launch the Latest Amazon ECS-Optimized AMI \(p. 33\)](#).

<b>Amazon ECS-optimized Linux AMI</b>	<b>Amazon ECS container agent version</b>	<b>Docker version</b>	<b>ecs-init version</b>
<b>2017.09.d</b>	1.16.0	17.06.2-ce	1.16.0-1
<b>2017.09.c</b>	1.15.2	17.06.2-ce	1.15.1-1
<b>2017.09.b</b>	1.15.1	17.06.2-ce	1.15.1-1
<b>2017.09.a</b>	1.15.0	17.06.2-ce	1.15.0-4
<b>2017.03.g</b>	1.14.5	17.03.2-ce	1.14.5-1
<b>2017.03.f</b>	1.14.4	17.03.2-ce	1.14.4-1
<b>2017.03.e</b>	1.14.3	17.03.1-ce	1.14.3-1
<b>2017.03.d</b>	1.14.3	17.03.1-ce	1.14.3-1
<b>2017.03.c</b>	1.14.3	17.03.1-ce	1.14.3-1
<b>2017.03.b</b>	1.14.3	17.03.1-ce	1.14.3-1
<b>2016.09.g</b>	1.14.1	1.12.6	1.14.1-1
<b>2016.09.f</b>	1.14.0	1.12.6	1.14.0-2
<b>2016.09.e</b>	1.14.0	1.12.6	1.14.0-1
<b>2016.09.d</b>	1.13.1	1.12.6	1.13.1-2
<b>2016.09.c</b>	1.13.1	1.11.2	1.13.1-1
<b>2016.09.b</b>	1.13.1	1.11.2	1.13.1-1
<b>2016.09.a</b>	1.13.0	1.11.2	1.13.0-1
<b>2016.03.j</b>	1.13.0	1.11.2	1.13.0-1
<b>2016.03.i</b>	1.12.2	1.11.2	1.12.2-1
<b>2016.03.h</b>	1.12.1	1.11.2	1.12.1-1
<b>2016.03.g</b>	1.12.0	1.11.2	1.12.0-1
<b>2016.03.f</b>	1.11.1	1.11.2	1.11.1-1
<b>2016.03.e</b>	1.11.0	1.11.2	1.11.0-1
<b>2016.03.d</b>	1.10.0	1.11.1	1.10.0-1
<b>2016.03.c</b>	1.10.0	1.11.1	1.10.0-1
<b>2016.03.b</b>	1.9.0	1.9.1	1.9.0-1
<b>2016.03.a</b>	1.8.2	1.9.1	1.8.2-1
<b>2015.09.g</b>	1.8.1	1.9.1	1.8.1-1
<b>2015.09.f</b>	1.8.0	1.9.1	1.8.0-1
<b>2015.09.e</b>	1.7.1	1.9.1	1.7.1-1

Amazon ECS-optimized Linux AMI	Amazon ECS container agent version	Docker version	<code>ecs-init</code> version
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
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

## 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.

#### Note

You can increase these default volume sizes by changing the block device mapping settings for your instances when you launch them; however, you cannot specify a smaller volume size than the default. For more information, see [Block Device Mapping](#) in the *Amazon EC2 User Guide for Linux Instances*.

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).

- a. 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

- b. 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				

- c. 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 ( $10^9$  bytes), instead of GiB ( $2^{30}$  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 \(p. 81\)](#).
- 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 \(p. 52\)](#).
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	<b>612.75g</b>

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
```

7. 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	<b>1.60t</b>

8. 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

9. 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---	<b>1.40t</b>			0.04	0.12				

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

**Note**

Because **docker info** displays storage values as GB ( $10^9$  bytes), instead of GiB ( $2^{30}$  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. Then, 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	<code>arn:aws:sns:us-east-1:177427601217:ecs-optimized-amazon-ami-update</code>
us-east-2	<code>arn:aws:sns:us-east-2:177427601217:ecs-optimized-amazon-ami-update</code>

AWS Region	Amazon SNS Topic ARN
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
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 **Subscriptions** in the left navigation, then **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.
3. From the console dashboard, choose **Launch Instance**.
4. On the **Choose an Amazon Machine Image (AMI)** page, choose **Community AMIs**.
5. 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 \(p. 69\)](#).

#### 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-2017.09.d-amazon-ecs-optimized** AMI.

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

Region	AMI ID
us-east-2	ami-58f5db3d
us-east-1	ami-fad25980
us-west-2	ami-7114c909
us-west-1	ami-62e0d802
eu-west-2	ami-dbfee1bf
eu-west-1	ami-4cbe0935

Region	AMI ID
eu-central-1	ami-05991b6a
ap-northeast-2	ami-7267c01c
ap-northeast-1	ami-56bd0030
ap-southeast-2	ami-14b55f76
ap-southeast-1	ami-1bdc8b78
ca-central-1	ami-918b30f5

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, configure the following fields accordingly.
  - a. Set the **Number of instances** field depending on how many container instances you want to add to your cluster.
  - b. (Optional) If you want to use Spot Instances, set the **Purchasing option** field by selecting the checkbox next to **Request Spot Instances**. You will also need to set the other fields related to Spot Instances. See [Spot Instance Requests](#) for more details.

**Note**

If you are using Spot Instances and see a `Not available` message, you may need to choose a different instance type.

- c. For **Network**, choose the VPC to launch your container instance into.
- d. For **Subnet**, choose a subnet to use, or keep the default option to choose the default subnet in any Availability Zone.
- e. 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, 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 Gateways](#) in the *Amazon VPC User Guide* and [HTTP Proxy Configuration \(p. 97\)](#) in this guide. For help creating a VPC, see [Tutorial: Creating a VPC with Public and Private Subnets for Your Clusters \(p. 333\)](#)

- f. 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 \(p. 238\)](#).

- g. (Optional) Configure your Amazon ECS container instance with user data, such as the agent environment variables from [Amazon ECS Container Agent Configuration \(p. 81\)](#). 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 \(p. 87\)](#).

```
#!/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 \(p. 46\)](#).

9. Choose **Next: Add Storage**.

10. 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.

11. Choose **Review and Launch**.

12. 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**.

13. On the **Review Instance Launch** page, choose **Launch**.

14. 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**.

15. A confirmation page lets you know that your instance is launching. Choose **View Instances** to close the confirmation page and return to the console.
16. 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 booothooks, 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 8.g \(p. 44\)](#) of [Launching an Amazon ECS Container Instance \(p. 43\)](#).

## Topics

- [Amazon ECS Container Agent \(p. 46\)](#)
- [Docker Daemon \(p. 46\)](#)
- [cloud-init-per Utility \(p. 47\)](#)
- [MIME Multi Part Archive \(p. 48\)](#)
- [Example Container Instance User Data Configuration Scripts \(p. 48\)](#)

## 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 \(p. 81\)](#).

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={"https://index.docker.io/v1/":
{"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 booothook from running multiple times. The **cloud-init-per** utility is provided to control booothook frequency in this manner. For more information, see [cloud-init-per Utility \(p. 47\)](#).

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+--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+--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 booothook 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 booothook 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 booothook has run, it still runs 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 booothook runs. The semaphore file is written to `/var/lib/cloud/instances/instance_id/sem/bootper.name.instance`.

**cmd**

The command and arguments that the booothook should execute.

In the example below, the command `echo '$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+--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 booothook 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 MIME multi-part file

This example MIME multi-part 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-shellscrip; charset="us-ascii"  
  
#!/bin/bash  
# Set any ECS agent configuration options  
echo "ECS_CLUSTER=my-ecs-cluster" >> /etc/ecs/ecs.config  
  
---BOUNDARY====
```

## Example Container Instance User Data Configuration Scripts

The following example user data scripts configure an Amazon ECS container instance at launch.

## Amazon ECS-optimized AMI Container Instance with Amazon EFS File System

This example user data script configures an instance launched from the Amazon ECS-optimized AMI to use an existing Amazon EFS file system. For more information, see [Tutorial: Using Amazon EFS File Systems with Amazon ECS \(p. 336\)](#)

This script does the following:

- Install the `nfs-utils` package, which installs an NFS client
- Create a mount directory for the NFS file system at `/efs`
- Create a mount entry in the `/etc/fstab` file for the file system and then mount the file system
- Write the cluster name, `default`, to the Amazon ECS agent configuration file

You can use this script for your own container instances, provided that they are launched from an Amazon ECS-optimized AMI. Be sure to replace the `ECS_CLUSTER=default` line in the configuration file to specify your own cluster name, if you are not using the `default` cluster. For more information about launching container instances, see [Launching an Amazon ECS Container Instance \(p. 43\)](#).

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

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

# Install nfs-utils
cloud-init-per once yum_update yum update -y
cloud-init-per once install_nfs_utils yum install -y nfs-utils

# Create /efs folder
cloud-init-per once mkdir_efs mkdir /efs

# Mount /efs
cloud-init-per once mount_efs echo -e '$fs-abcd1234.efs.us-east-1.amazonaws.com:/ /efs nfs4
nfsvers=4.1,rsize=1048576,wszie=1048576,hard,timeo=600,retrans=2 0 0' >> /etc/fstab
mount -a

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

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

====BOUNDARY==--
```

## Ubuntu Container Instance with `systemd`

This example user data script configures an Ubuntu 16.04 instance to:

- Install Docker
- Create the required `iptables` rules for IAM roles for tasks
- Create the required directories for the Amazon ECS container agent
- Write the Amazon ECS container agent configuration file
- Write the `systemd` unit file to monitor the agent

- Enable and start the **systemd** unit

You can use this script for your own container instances, provided that they are launched from an Ubuntu 16.04 AMI. Be sure to replace the `ECS_CLUSTER=default` line in the configuration file to specify your own cluster name, if you are not using the default cluster. For more information about launching container instances, see [Launching an Amazon ECS Container Instance \(p. 43\)](#).

```
#!/bin/bash
# Install Docker
apt-get update -y && apt-get install -y docker.io

# Set iptables rules
echo 'net.ipv4.conf.all.route_localnet = 1' >> /etc/sysctl.conf
sysctl -p /etc/sysctl.conf
iptables -t nat -A PREROUTING -p tcp -d 169.254.170.2 --dport 80 -j DNAT --to-destination
127.0.0.1:51679
iptables -t nat -A OUTPUT -d 169.254.170.2 -p tcp -m tcp --dport 80 -j REDIRECT --to-ports
51679

# Write iptables rules to persist after reboot
iptables-save > /etc/iptables/rules.v4

# Create directories for ECS agent
mkdir -p /var/log/ecs /var/lib/ecs/data /etc/ecs

# Write ECS config file
cat << EOF > /etc/ecs/ecs.config
ECS_DATADIR=/data
ECS_ENABLE_TASK_IAM_ROLE=true
ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST=true
ECS_LOGFILE=/log/ecs-agent.log
ECS_AVAILABLE_LOGGING_DRIVERS=[ "json-file", "awslogs" ]
ECS_LOGLEVEL=info
ECS_CLUSTER=default
EOF

# Write systemd unit file
cat << EOF > /etc/systemd/system/docker-container@ecs-agent.service
[Unit]
Description=Docker Container %i
Requires=docker.service
After=docker.service

[Service]
Restart=always
ExecStartPre=-/usr/bin/docker rm -f %i
ExecStart=/usr/bin/docker run --name %i \
--restart=on-failure:10 \
--volume=/var/run:/var/run \
--volume=/var/log/ecs/:/log \
--volume=/var/lib/ecs/data:/data \
--volume=/etc/ecs:/etc/ecs \
--net=host \
--env-file=/etc/ecs/ecs.config \
amazon/amazon-ecs-agent:latest
ExecStop=/usr/bin/docker stop %i

[Install]
WantedBy=default.target
EOF

systemctl enable docker-container@ecs-agent.service
systemctl start docker-container@ecs-agent.service
```

## CentOS Container Instance with `systemd` and SELinux

This example user data script configures a CentOS 7 instance with SELinux enabled to:

- Install Docker
- Create the required `iptables` rules for IAM roles for tasks
- Create the required directories for the Amazon ECS container agent
- Write the Amazon ECS container agent configuration file
- Write the `systemd` unit file to monitor the agent
- Enable and start the `systemd` unit

### Note

The `docker run` command in the `systemd` unit file below contains the required modifications for SELinux, including the `--privileged` flag, and the `:z` suffixes to the volume mounts.

You can use this script for your own container instances (provided that they are launched from an CentOS 7 AMI), but be sure to replace the `ECS_CLUSTER=default` line in the configuration file to specify your own cluster name (if you are not using the default cluster). For more information about launching container instances, see [Launching an Amazon ECS Container Instance \(p. 43\)](#).

```
#!/bin/bash
# Install Docker
yum install -y docker

# Set iptables rules
echo 'net.ipv4.conf.all.route_localnet = 1' >> /etc/sysctl.conf
sysctl -p /etc/sysctl.conf
iptables -t nat -A PREROUTING -p tcp -d 169.254.170.2 --dport 80 -j DNAT --to-destination 127.0.0.1:51679
iptables -t nat -A OUTPUT -d 169.254.170.2 -p tcp -m tcp --dport 80 -j REDIRECT --to-ports 51679

# Write iptables rules to persist after reboot
iptables-save > /etc/sysconfig/iptables

# Create directories for ECS agent
mkdir -p /var/log/ecs /var/lib/ecs/data /etc/ecs

# Write ECS config file
cat << EOF > /etc/ecs/ecs.config
ECS_DATADIR=/data
ECS_ENABLE_TASK_IAM_ROLE=true
ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST=true
ECS_LOGFILE=/log/ecs-agent.log
ECS_AVAILABLE_LOGGING_DRIVERS=["json-file","awslogs"]
ECS_LOGLEVEL=info
ECS_CLUSTER=default
EOF

# Write systemd unit file
cat << EOF > /etc/systemd/system/docker-container@ecs-agent.service
[Unit]
Description=Docker Container %I
Requires=docker.service
After=docker.service

[Service]
Restart=always
ExecStartPre=-/usr/bin/docker rm -f %i
ExecStart=/usr/bin/docker run --name %i \
```

```
--privileged \
--restart=on-failure:10 \
--volume=/var/run:/var/run \
--volume=/var/log/ecs/:/log:z \
--volume=/var/lib/ecs/data:/data:z \
--volume=/etc/ecs:/etc/ecs \
--net=host \
--env-file=/etc/ecs/ecs.config \
amazon/amazon-ecs-agent:latest
ExecStop=/usr/bin/docker stop %i

[Install]
WantedBy=default.target
EOF

systemctl enable docker-container@ecs-agent.service
systemctl start docker-container@ecs-agent.service
```

## 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 \(p. 137\)](#). For more information on CloudWatch Logs, see [Monitoring Log Files](#) in the *Amazon CloudWatch User Guide*.

**Topics**

- [CloudWatch Logs IAM Policy \(p. 53\)](#)
- [Installing the CloudWatch Logs Agent \(p. 54\)](#)
- [Configuring and Starting the CloudWatch Logs Agent \(p. 54\)](#)
- [Viewing CloudWatch Logs \(p. 57\)](#)
- [Configuring CloudWatch Logs at Launch with User Data \(p. 58\)](#)

## 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:PutLogEvents"  
            ]  
        }  
    ]  
}
```

```
        "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 \(p. 238\)](#) 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.

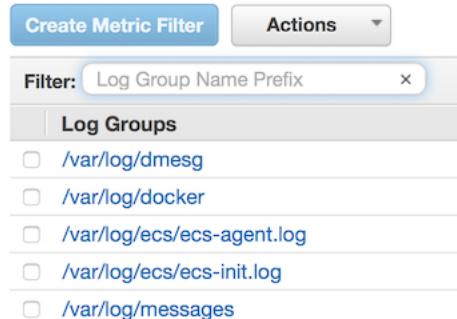
**Note**

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 \(p. 54\)](#).

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.

The screenshot shows the AWS CloudWatch Events interface. At the top, there is a search bar labeled "Filter: Search for events" and a date/time filter button. Below this, a section titled "Event Data" displays a list of log entries. The entries are timestamped and show the ECS agent starting up, loading configuration, and registering with the service. One entry specifically mentions "Registration completed successfully" for a container instance with ID "east-1:0123456789:container-instance/07dfaf0a-eded-42c9".

```
▼ 2016-02-11T20:31:02Z [INFO] Starting Agent: Amazon ECS
▼ 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="state"
▼ 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"
▼ 2016-02-11T20:31:02Z [INFO] Registration completed successfully
east-1:0123456789:container-instance/07dfaf0a-eded-42c9
▼ 2016-02-11T20:31:02Z [INFO] Saving state! module="state"
```

## 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-shellscrip; 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-shellscrip; charset="us-ascii"
#!/bin/bash
# Set the region to send CloudWatch Logs data to (the region where the container instance
# is located)
region=$(curl -s 169.254.169.254/latest/dynamic/instance-identity/document | jq -r .region)
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 \(p. 53\)](#), 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 \(p. 43\)](#).

## 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 \(p. 162\)](#).

Any PENDING or RUNNING tasks that do not belong to a service are unaffected; 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 \(p. 61\)](#)
- [Installing the SSM Agent on the Amazon ECS-optimized AMI \(p. 62\)](#)
- [Using Run Command \(p. 63\)](#)

## 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 \(p. 238\)](#) 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. \(p. 52\)](#)
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 \(p. 43\)](#), but in [Step 8.g \(p. 44\)](#), 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*.

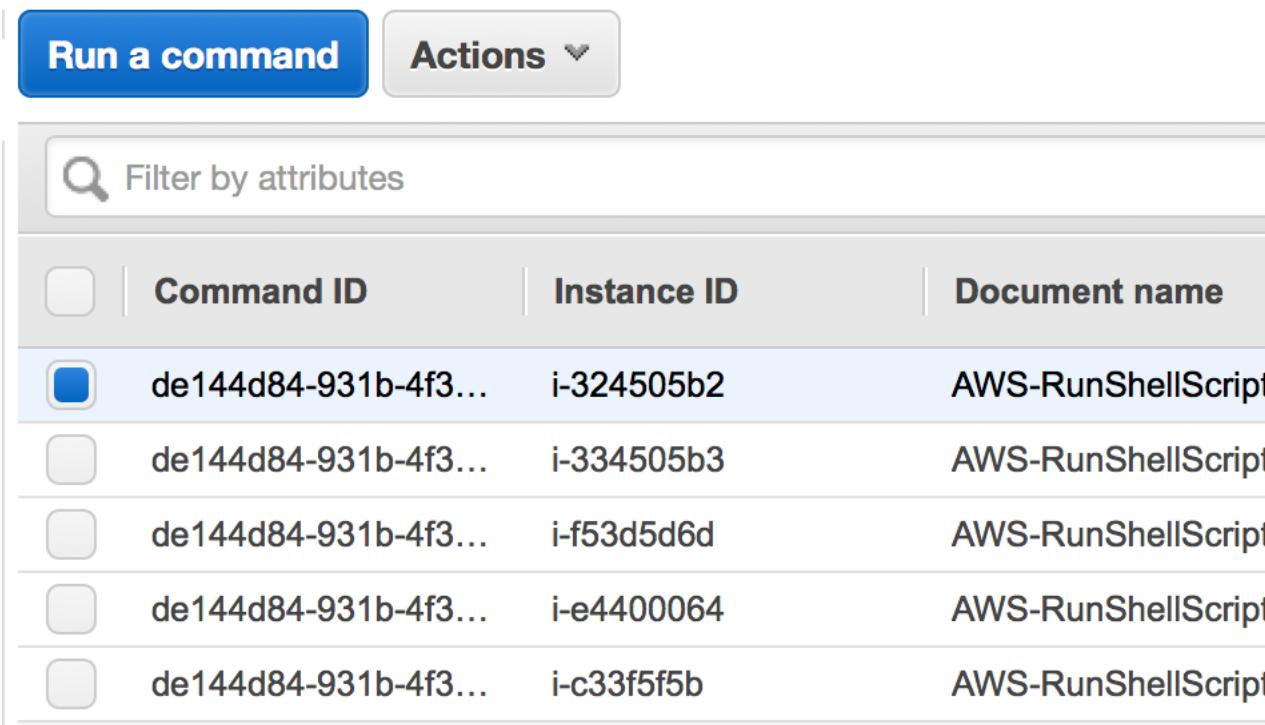
### Example: To update container instance software with Run Command

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. 61)
2. Install the SSM agent on your container instances. For more information, see [Installing the SSM Agent on the Amazon ECS-optimized AMI](#) (p. 62).
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.



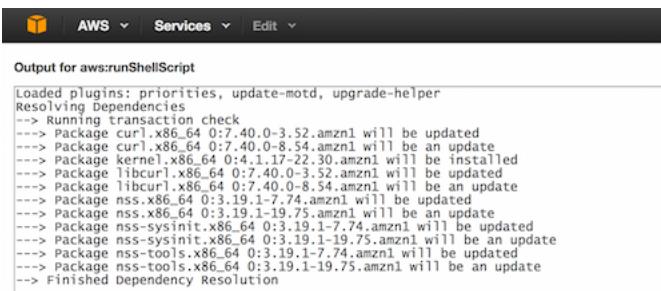
The screenshot shows a table of command logs. The columns are: Command ID, Instance ID, and Document name. There are five rows of data:

Command ID	Instance ID	Document name
de144d84-931b-4f3...	i-324505b2	AWS-RunShellScript
de144d84-931b-4f3...	i-334505b3	AWS-RunShellScript
de144d84-931b-4f3...	i-f53d5d6d	AWS-RunShellScript
de144d84-931b-4f3...	i-e4400064	AWS-RunShellScript
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.



```
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. Then, use Amazon ECS to place the task at launch time with Amazon EC2 user data.

The Amazon 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 \(p. 102\)](#).
2. Modify your `ecsInstanceRole` IAM role to add permissions for the `StartTask` API operation. For more information, see [Amazon ECS Container Instance IAM Role \(p. 238\)](#).
  - 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 \(p. 238\)](#) 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, Select**.
  - f. For **Policy Name**, enter `StartTask`.
  - g. For **Policy Document**, 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 \(p. 43\)](#), but in [Step 8.g \(p. 44\)](#). Then, copy and paste the MIME multi-part 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 mult-ipart 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/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/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**.

Task	Task Definition	Container Inst...	Last s...
008caebc-7134...	console-sample...	65dcdeeb-1928...	RUNNING
210a3211-7d97...	console-sample...	d6dcfbdb-3178...	RUNNING
231f6bb6-5fcf...	console-sample...	93370a56-0d1f...	RUNNING
2a299085-9fbc...	console-sample...	a5de569e-d589...	RUNNING
2b84224c-383e...	console-sample...	8df73536-5502...	RUNNING

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 \(p. 43\)](#).

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**.

The screenshot shows the AWS ECS Instances page. At the top, there are three tabs: Services, Tasks, and ECS Instances. The ECS Instances tab is selected, indicated by an orange border. Below the tabs, a message says "Add additional ECS Instances using Auto Scaling or Amazon EC2." There is a "Filter in this page" input field. A table follows, with columns labeled "Container Instance" and "EC2 Instance". The first row shows a Container Instance ID (3de21d77-d1d7-4795-a3b3-edede6e5d7d353) and its corresponding EC2 Instance ID (i-501f2599). The table has a header row and two data rows.

Container Instance	EC2 Instance
▶ 3de21d77-d1d7-4795-a3b3-edede6e5d7d353	i-501f2599

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.

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 support running modified copies of this software.

**Note**

The Amazon ECS container agent is installed on the AWS-managed infrastructure used for tasks using the Fargate launch type. No additional configuration is needed so this topic does not apply if you are only using tasks with the Fargate launch type.

**Topics**

- [Installing the Amazon ECS Container Agent \(p. 69\)](#)
- [Amazon ECS Container Agent Versions \(p. 72\)](#)
- [Updating the Amazon ECS Container Agent \(p. 74\)](#)
- [Amazon ECS Container Agent Configuration \(p. 81\)](#)
- [Automated Task and Image Cleanup \(p. 88\)](#)
- [Private Registry Authentication \(p. 89\)](#)
- [Amazon ECS Container Metadata \(p. 92\)](#)
- [Amazon ECS Container Agent Introspection \(p. 95\)](#)
- [HTTP Proxy Configuration \(p. 97\)](#)

## 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 \(p. 238\)](#).
2. Connect to your instance.
3. Install the `ecs-init` package. For more information about `ecs-init`, see 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 about your new container instance with the agent introspection API. For more information, see the section called "Amazon ECS Container Agent Introspection" (p. 95).

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

Output:

```
{  
    "Cluster": "default",  
    "ContainerInstanceArn": "<container_instance_ARN>",  
    "Version": "Amazon ECS Agent - v1.16.0 (1ca656c)"  
}
```

### 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 \(p. 238\)](#).
2. Connect to your instance.
3. Install Docker on your instance. Amazon ECS requires a minimum Docker version of 1.5.0 (version 17.06.2-ce 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 allow the port proxy to route traffic using loopback addresses.

```
ubuntu:~$ sudo sh -c "echo 'net.ipv4.conf.all.route_localnet = 1' >> /etc/sysctl.conf"
ubuntu:~$ sudo sysctl -p /etc/sysctl.conf
```

6. Run the following commands on your container instance to enable IAM roles for tasks. For more information, see [IAM Roles for Tasks \(p. 251\)](#).

```
ubuntu:~$ iptables -t nat -A PREROUTING -p tcp -d 169.254.170.2 --dport 80 -j DNAT --to-destination 127.0.0.1:51679
ubuntu:~$ iptables -t nat -A OUTPUT -d 169.254.170.2 -p tcp -m tcp --dport 80 -j REDIRECT --to-ports 51679
```

7. Write the new **iptables** configuration to your operating system-specific location.

- For Debian/Ubuntu:

```
sudo sh -c 'iptables-save > /etc/iptables/rules.v4'
```

- For CentOS/RHEL:

```
sudo sh -c 'iptables-save > /etc/sysconfig/iptables'
```

8. Create the /etc/ecs directory and create the Amazon ECS container agent configuration file.

```
ubuntu:~$ sudo mkdir -p /etc/ecs && sudo touch /etc/ecs/ecs.config
```

9. Edit the /etc/ecs/ecs.config file and add the following contents. If you do not want your container instance to register with the default cluster, specify your cluster name as the value for **ECS\_CLUSTER**.

```
ECS_DATADIR=/data
ECS_ENABLE_TASK_IAM_ROLE=true
ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST=true
ECS_LOGFILE=/log/ecs-agent.log
ECS_AVAILABLE_LOGGING_DRIVERS=["json-file","awslogs"]
ECS_LOGLEVEL=info
ECS_CLUSTER=default
```

For more information about these and other agent runtime options, see [Amazon ECS Container Agent Configuration \(p. 81\)](#).

**Note**

You can optionally store your agent environment variables in Amazon S3 (which can be downloaded to your container instances at launch time using Amazon EC2 user data). This is recommended for sensitive information such as authentication credentials for private repositories. For more information, see [Storing Container Instance Configuration in Amazon S3 \(p. 87\)](#) and [Private Registry Authentication \(p. 89\)](#).

10. 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 after exiting. 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. For example **systemd** unit files for Ubuntu 16.04 and CentOS 7, see [Example Container Instance User Data Configuration Scripts \(p. 48\)](#).

The following example agent run command is broken into separate lines to show each option. For more information about these and other agent runtime options, see [Amazon ECS Container Agent Configuration \(p. 81\)](#).

### Important

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 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.

```
ubuntu:~$ sudo mkdir -p /var/log/ecs /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.

```
ubuntu:~$ sudo docker run --name ecs-agent \
--detach=true \
--restart=on-failure:10 \
--volume=/var/run:/var/run \
--volume=/var/log/ecs/:/log \
--volume=/var/lib/ecs/data:/data \
--volume=/etc/ecs:/etc/ecs \
--net=host \
--env-file=/etc/ecs/ecs.config \
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 \(p. 74\)](#).

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 \(p. 43\)](#).

To install the latest version of the Amazon ECS container agent on another operating system, see [Installing the Amazon ECS Container Agent \(p. 69\)](#). The table in [Amazon ECS-Optimized AMI Container Agent Versions \(p. 73\)](#) 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 \(p. 74\)](#) 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 Linux AMI	Amazon ECS container agent version	Docker version	ecs-init version
2017.09.d	1.16.0	17.06.2-ce	1.16.0-1
2017.09.c	1.15.2	17.06.2-ce	1.15.1-1
2017.09.b	1.15.1	17.06.2-ce	1.15.1-1
2017.09.a	1.15.0	17.06.2-ce	1.15.0-4
2017.03.g	1.14.5	17.03.2-ce	1.14.5-1
2017.03.f	1.14.4	17.03.2-ce	1.14.4-1
2017.03.e	1.14.3	17.03.1-ce	1.14.3-1
2017.03.d	1.14.3	17.03.1-ce	1.14.3-1
2017.03.c	1.14.3	17.03.1-ce	1.14.3-1
2017.03.b	1.14.3	17.03.1-ce	1.14.3-1
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

Amazon ECS-optimized Linux AMI	Amazon ECS container agent version	Docker version	<code>ecs-init</code> version
<b>2016.03.j</b>	1.13.0	1.11.2	1.13.0-1
<b>2016.03.i</b>	1.12.2	1.11.2	1.12.2-1
<b>2016.03.h</b>	1.12.1	1.11.2	1.12.1-1
<b>2016.03.g</b>	1.12.0	1.11.2	1.12.0-1
<b>2016.03.f</b>	1.11.1	1.11.2	1.11.1-1
<b>2016.03.e</b>	1.11.0	1.11.2	1.11.0-1
<b>2016.03.d</b>	1.10.0	1.11.1	1.10.0-1
<b>2016.03.c</b>	1.10.0	1.11.1	1.10.0-1
<b>2016.03.b</b>	1.9.0	1.9.1	1.9.0-1
<b>2016.03.a</b>	1.8.2	1.9.1	1.8.2-1
<b>2015.09.g</b>	1.8.1	1.9.1	1.8.1-1
<b>2015.09.f</b>	1.8.0	1.9.1	1.8.0-1
<b>2015.09.e</b>	1.7.1	1.9.1	1.7.1-1
<b>2015.09.d</b>	1.7.1	1.9.1	1.7.1-1
<b>2015.09.c</b>	1.7.0	1.7.1	1.7.0-1
<b>2015.09.b</b>	1.6.0	1.7.1	1.6.0-1
<b>2015.09.a</b>	1.5.0	1.7.1	1.5.0-1
<b>2015.03.g</b>	1.4.0	1.7.1	1.4.0-2
<b>2015.03.f</b>	1.4.0	1.6.2	1.4.0-1
<b>2015.03.e</b>	1.3.1	1.6.2	1.3.1-1
<b>2015.03.d</b>	1.2.1	1.6.2	1.2.0-2
<b>2015.03.c</b>	1.2.0	1.6.2	1.2.0-1
<b>2015.03.b</b>	1.1.0	1.6.0	1.0-3
<b>2015.03.a</b>	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 \(p. 32\)](#).

## 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.

**Note**

Agent updates do not apply to Windows container instances. We recommend that you launch new container instances to update the agent version in your Windows clusters.

**Topics**

- [Checking Your Amazon ECS Container Agent Version \(p. 75\)](#)
- [Updating the Amazon ECS Container Agent on the Amazon ECS-Optimized AMI \(p. 76\)](#)
- [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\) \(p. 79\)](#)

## 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 tabs for Services, Tasks, ECS Instances (which is selected), and Metrics. Below the tabs, a yellow warning box contains the text "⚠️ Outdated ECS Agent" and "One or more container instances are not running the latest version of the ECS Agent." A blue button labeled "Scale ECS Instances" is visible. Below the warning box is a table with three columns: "Container Instance", "EC2 Instance", and "Agent Connected". The first row shows a container instance with ID "f4ed6cb3-10c6-4add..." and EC2 instance "i-bccc56b2", with the "Agent Connected" status set to "true".

Container Instance	EC2 Instance	Agent Connected
f4ed6cb3-10c6-4add...	i-bccc56b2	true

If your agent version is 1.16.0, you are running the latest container agent. If your agent version is below 1.16.0, 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 \(p. 76\)](#).
- If your container instance is not running the Amazon ECS-optimized AMI, see [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\) \(p. 79\)](#).

**Important**

To update the Amazon ECS agent version from versions before 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 AMI version. Any container instances that use a preview version should be retired and replaced with the most recent AMI. For more information, see [Launching an Amazon ECS Container Instance \(p. 43\)](#).

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 \(p. 95\)](#).

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

1. Log in to 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 - v1.16.0 (1ca656c)"  
}
```

**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. You should update your version.

## 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 \(p. 32\)](#).

- 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 \(p. 77\)](#).
- 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 \(p. 77\)](#).

**Note**

Agent updates do not apply to Windows container instances. We recommend that you launch new container instances to update the agent version in your Windows clusters.

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

1. Log in to your container instance via SSH. For more information, see [Connect to Your Container Instance \(p. 52\)](#).
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. Restart 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**

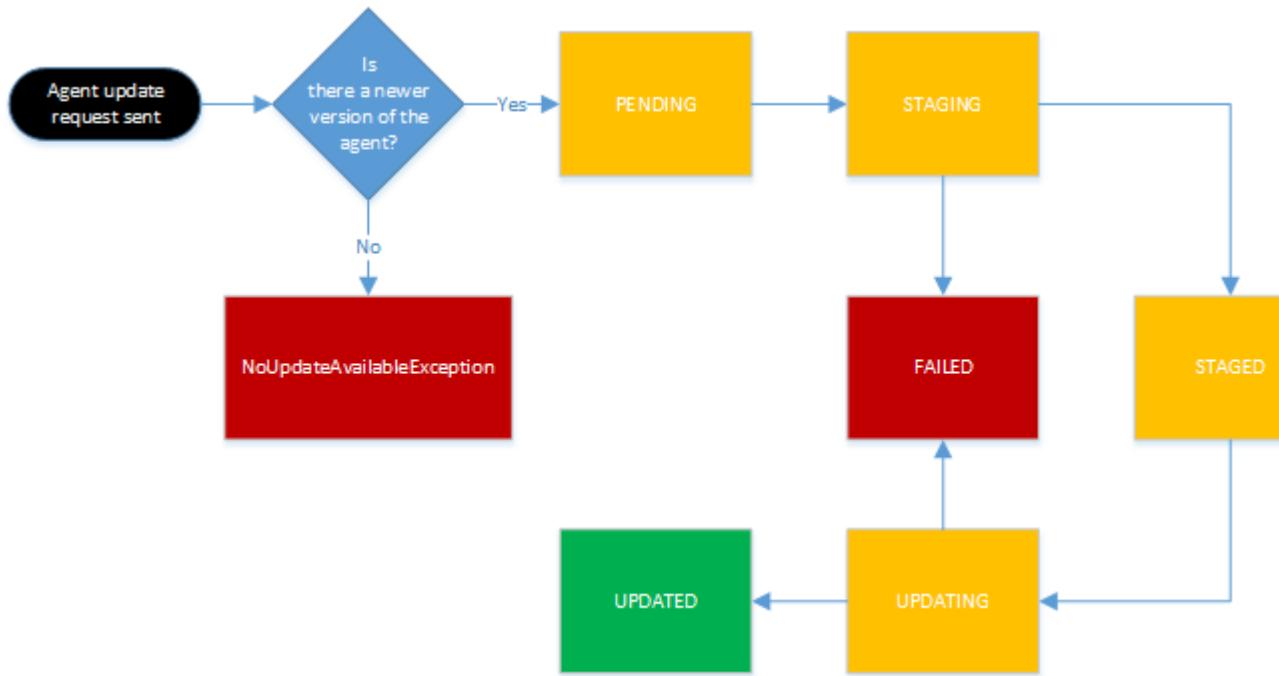
This update process is only supported on the Amazon ECS-optimized AMI. For container instances that are running other operating systems, see [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\) \(p. 79\)](#).

**Note**

Agent updates with the `UpdateContainerAgent` API operation do not apply to Windows container instances. We recommend that you launch new container instances to update the agent version in your Windows clusters.

To update the Amazon ECS agent version from versions before 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 AMI version. Any container instances that use a preview version should be retired and replaced with the most recent AMI. For more information, see [Launching an Amazon ECS Container Instance \(p. 43\)](#).

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

### Note

Agent updates do not apply to Windows container instances. We recommend that you launch new container instances to update the agent version in your Windows clusters.

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

### Note

Agent updates with the `UpdateContainerAgent` API operation do not apply to Windows container instances. We recommend that you launch new container instances to update the agent version in your Windows clusters.

- 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)

### Note

Agent updates do not apply to Windows container instances. We recommend that you launch new container instances to update the agent version in your Windows clusters.

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

```
ubuntu:~$ 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.

```
ubuntu:~$ docker stop ecs-agent
```

4. Delete the agent container.

```
ubuntu:~$ docker rm ecs-agent
```

5. Ensure that the `/etc/ecs` directory and the Amazon ECS container agent configuration file exist at `/etc/ecs/ecs.config`.

```
ubuntu:~$ sudo mkdir -p /etc/ecs && sudo touch /etc/ecs/ecs.config
```

6. Edit the `/etc/ecs/ecs.config` file and ensure that it contains at least the following variable declarations. If you do not want your container instance to register with the default cluster, specify your cluster name as the value for `ECS_CLUSTER`.

```
ECS_DATADIR=/data
ECS_ENABLE_TASK_IAM_ROLE=true
ECS_ENABLE_TASK_IAM_ROLE_NETWORK_HOST=true
ECS_LOGFILE=/log/ecs-agent.log
ECS_AVAILABLE_LOGGING_DRIVERS=["json-file","awslogs"]
ECS_LOGLEVEL=info
ECS_CLUSTER=default
```

For more information about these and other agent runtime options, see [Amazon ECS Container Agent Configuration \(p. 81\)](#).

**Note**

You can optionally store your agent environment variables in Amazon S3 (which can be downloaded to your container instances at launch time using Amazon EC2 user data). This is recommended for sensitive information such as authentication credentials for private repositories. For more information, see [Storing Container Instance Configuration in Amazon S3 \(p. 87\)](#) and [Private Registry Authentication \(p. 89\)](#).

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

```
ubuntu:~$ 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
```

8. 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 after exiting. 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. For example **systemd** unit files for Ubuntu 16.04 and CentOS 7, see [Example Container Instance User Data Configuration Scripts \(p. 48\)](#).

The following example agent run command is broken into separate lines to show each option. For more information about these and other agent runtime options, see [Amazon ECS Container Agent Configuration \(p. 81\)](#).

**Important**

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 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.

```
ubuntu:~$ sudo mkdir -p /var/log/ecs /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.

```
ubuntu:~$ sudo docker run --name ecs-agent \
--detach=true \
--restart=on-failure:10 \
--volume=/var/run:/var/run \
--volume=/var/log/ecs/:/log \
--volume=/var/lib/ecs/data:/data \
--volume=/etc/ecs:/etc/ecs \
--net=host \
--env-file=/etc/ecs/ecs.config \
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 \(p. 46\)](#).

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 \(p. 81\)](#)
- [Storing Container Instance Configuration in Amazon S3 \(p. 87\)](#)

## Available Parameters

The following are the available environment keys:

`ECS_CLUSTER`

Example Values: `MyCluster`

Default Value: `default`

The cluster that this agent should check into. If this value is undefined, then the `default` cluster is assumed. If the `default` cluster does not exist, the Amazon ECS container agent attempts to create it. If a non-default cluster is specified and it does not exist, registration fails.

**ECS\_RESERVED\_PORTS**

Example Values: [ 22, 80, 5000, 8080 ]

Default Value: [ 22, 2375, 2376, 51678 ]

An array of ports that should be marked as unavailable for scheduling on this container instance.

**ECS\_RESERVED\_PORTS\_UDP**

Example Values: [ 53, 123 ]

Default Value: [ ]

An array of UDP ports that should be marked as unavailable for scheduling on this container instance.

**ECS\_ENGINE\_AUTH\_TYPE**

Example Values: dockercfg | docker

Default Value: Null

Required for private registry authentication. This is the type of authentication data in **ECS\_ENGINE\_AUTH\_DATA**. For more information, see [Authentication Formats \(p. 89\)](#).

**ECS\_ENGINE\_AUTH\_DATA**

Example Values:

- **ECS\_ENGINE\_AUTH\_TYPE=dockercfg**: { "https://index.docker.io/v1/": { "auth": "zq212MzEXAMPLE7o6T25Dk0i", "email": "email@example.com" } }
- **ECS\_ENGINE\_AUTH\_TYPE=docker**: { "https://index.docker.io/v1/": { "username": "my\_name", "password": "my\_password", "email": "email@example.com" } }

Default Value: Null

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 **docker login**. 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 [Authentication Formats \(p. 89\)](#).

**AWS\_DEFAULT\_REGION**

Example Values: us-east-1

Default Value: Taken from EC2 instance metadata.

The region to be used in API requests as well as to infer the correct back end host.

**AWS\_ACCESS\_KEY\_ID**

Example Values: AKIAIOSFODNN7EXAMPLE

Default Value: Taken from EC2 instance metadata.

The [access key](#) used by the agent for all calls.

**AWS\_SECRET\_ACCESS\_KEY**

Example Values: wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY

Default Value: Taken from EC2 instance metadata.

The [secret key](#) used by the agent for all calls.

**AWS\_SESSION\_TOKEN**

The [session token](#) used for temporary credentials.

Default Value: Taken from EC2 instance metadata.

**DOCKER\_HOST**

Example Values: `unix:///var/run/docker.sock`

Default Value: `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.

**ECS\_LOGLEVEL**

Example Values: `crit | error | warn | info | debug`

Default Value: `info`

The level to log at on `stdout`.

**ECS\_LOGFILE**

Example Values: `/ecs-agent.log`

Default Value: Null

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.

**ECS\_CHECKPOINT**

Example Values: `true | false`

Default Value: If `ECS_DATADIR` is explicitly set to a non-empty value, then `ECS_CHECKPOINT` is set to `true`; otherwise, it is set to `false`.

Whether to save the checkpoint state to the location specified with `ECS_DATADIR`.

**ECS\_DATADIR**

Example Values: `/data`

Default Value: Null

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.

**ECS\_UPDATES\_ENABLED**

Example Values: `true | false`

Default Value: `false`

Whether to exit for ECS agent updates when they are requested.

**ECS\_UPDATE\_DOWNLOAD\_DIR**

Example Values: `/cache`

The filesystem location to place update tarballs within the container when they are downloaded.

**ECS\_DISABLE\_METRICS**

Example Values: true | false

Default Value: false

Whether to disable CloudWatch metrics for Amazon ECS. If this value is set to true, CloudWatch metrics are not collected.

**ECS\_RESERVED\_MEMORY**

Example Values: 32

Default Value: 0

The amount of memory, in MiB, to reserve for processes that are not managed by ECS.

**ECS\_AVAILABLE\_LOGGING\_DRIVERS**

Example Values: [ "json-file", "awslogs" ]

Default Value: [ "json-file", "awslogs" ]

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 `ECS_AVAILABLE_LOGGING_DRIVERS` environment variable before containers placed on that instance can use log configuration options for those drivers in tasks. For information about how to use the `awslogs` log driver, see [Using the awslogs Log Driver \(p. 137\)](#). For more information about the different log drivers available for your Docker version and how to configure them, see [Configure logging drivers](#) in the Docker documentation.

**ECS\_DISABLE\_PRIVILEGED**

Example Values: true | false

Default Value: false

Whether launching privileged containers is disabled on the container instance. If this value is set to true, privileged containers are not permitted.

**ECS\_SELINUX\_CAPABLE**

Example Values: true | false

Default Value: false

Whether SELinux is available on the container instance.

**ECS\_APPARMOR\_CAPABLE**

Example Values: true | false

Default Value: false

Whether AppArmor is available on the container instance.

**ECS\_ENGINE\_TASK\_CLEANUP\_WAIT\_DURATION**

Example Values: 1h (Valid time units are "ns", "us" (or "μs"), "ms", "s", "m", and "h".)

Default Value: 3h

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.

**ECS\_CONTAINER\_STOP\_TIMEOUT**

Example Values: 10m (Valid time units are "ns", "us" (or "μs"), "ms", "s", "m", and "h".)

Default Value: 30s

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.

**HTTP\_PROXY**

Example Values: 10.0.0.131:3128

Default Value: Null

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 [HTTP Proxy Configuration \(p. 97\)](#).

**NO\_PROXY**

Example Values:

- Linux: 169.254.169.254,169.254.170.2,/var/run/docker.sock
- Windows: 169.254.169.254,169.254.170.2,\.\pipe\docker\_engine

Default Value: Null

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 [HTTP Proxy Configuration \(p. 97\)](#).

**ECS\_ENABLE\_TASK\_IAM\_ROLE**

Example Values: true | false

Default Value: 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 [IAM Roles for Tasks \(p. 251\)](#).

**ECS\_ENABLE\_TASK\_IAM\_ROLE\_NETWORK\_HOST**

Example Values: true | false

Default Value: 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 [IAM Roles for Tasks \(p. 251\)](#).

**ECS\_DISABLE\_IMAGE\_CLEANUP**

Example Values: true

Default Value: false

Whether to disable automated image cleanup for the Amazon ECS agent. For more information, see [Automated Task and Image Cleanup \(p. 88\)](#).

**ECS\_IMAGE\_CLEANUP\_INTERVAL**

Example Values: 30m

Default Value: 30m

The time interval between automated image cleanup cycles. If set to less than 10 minutes, the value is ignored.

**ECS\_IMAGE\_MINIMUM\_CLEANUP\_AGE**

Example Values: 30m

Default Value: 1h

The minimum time interval between when an image is pulled and when it can be considered for automated image cleanup.

**ECS\_NUM\_IMAGES\_DELETE\_PER\_CYCLE**

Example Values: 5

Default Value: 5

The maximum number of images to delete in a single automated image cleanup cycle. If set to less than 1, the value is ignored.

**ECS\_INSTANCE\_ATTRIBUTES**

Example Values: {"custom\_attribute": "custom\_attribute\_value"}

Default Value: Null

A list of custom attributes, in JSON form, to apply to your container instances. Using this attribute at instance registration adds the custom attributes, allowing you to skip the manual method of adding custom attributes via the AWS Management Console.

**Note**

Attributes added will not apply to container instances that are already registered.

To add custom attributes to already registered container instances, see [Adding an Attribute \(p. 153\)](#).

For information about custom attributes to use, see [Attributes \(p. 152\)](#).

An invalid JSON value for this variable causes the agent to exit with a code of 5. A message appears 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 happens but the agent exits with a code of 5 and a message is written to the agent logs. For information about how to locate the agent logs, see [Amazon ECS Container Agent Log \(p. 352\)](#).

**ECS\_ENABLE\_CONTAINER\_METADATA**

Example Values: true

Default Value: false

When true, the agent creates a file describing the container's metadata. The file can be located and consumed by using the container environment variable \$ECS\_CONTAINER\_METADATA\_FILE.

**ECS\_HOST\_DATA\_DIR**

Example Values: /var/lib/ecs

Default Value: /var/lib/ecs

The source directory on the host from which ECS\_DATADIR is mounted. We use this to determine the source mount path for container metadata files in the case the ECS agent is running as a container. We do not use this value in Windows because the ECS agent does not run as a container.

# 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 \(p. 238\)](#).
4. Under **Managed Policies**, choose **Attach Policy**.
5. On the **Attach Policy** page, for **Filter**, type `S3` to narrow the policy results.
6. Select the box to the left of the **AmazonS3ReadOnlyAccess** policy and choose **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 \(p. 81\)](#) using the following format. This example configures private registry authentication. For more information, see [Private Registry Authentication \(p. 89\)](#).

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

2. To store your configuration file, create a private bucket in Amazon S3. 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 \(p. 43\)](#). In [Step 8.g \(p. 44\)](#), 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, your container instance storage can quickly fill up with Docker images that you are no longer using and will likely never use again. For example, you may use a continuous integration and continuous deployment (CI/CD) pipeline.

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 \(p. 74\)](#).

## 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 \(p. 81\)](#).

### 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. The least-recently referenced images are 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 \(p. 87\)](#).

## 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 and entering your registry user name, password, and email address. You can also log in to a container instance and run the command there. 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": "zg212MzEXAMPLE7o6T25Dkoi"
    }
  }
}
```

### Important

Newer versions of Docker create a configuration file as shown above with an outer auths object. The Amazon ECS agent only supports dockerconfig 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 | jq .auths
```

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=dockerconfig  
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=dockerconfig  
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_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 in to 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.

```
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.

```
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 \(p. 74\)](#).

4. Stop the `ecs` service.

```
sudo stop ecs
```

Output:

```
ecs stop/waiting
```

5. Restart the `ecs` service.

```
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 operation. For more information, see [the section called "Amazon ECS Container Agent Introspection" \(p. 95\)](#).

```
curl http://localhost:51678/v1/metadata
```

Output:

```
{  
    "Cluster": "default",  
    "ContainerInstanceArn": "<container_instance_ARN>",  
    "Version": "Amazon ECS Agent - v1.16.0 (1ca656c)"  
}
```

## Amazon ECS Container Metadata

Beginning with version 1.15.0 of the Amazon ECS container agent, various container metadata is available within ECS task containers. By enabling this feature, you can query the information about a task, container, and container instance from within the container or from the container instance by reading the metadata file for each container. The metadata file is created on the host instance and mounted in the container as a Docker volume.

The container metadata file location is set to the `ECS_CONTAINER_METADATA_FILE` environment variable inside the container. You can read the file contents from inside the container with the following command:

- **For Linux instances:**

```
cat $ECS_CONTAINER_METADATA_FILE
```

- **For Windows instances (PowerShell):**

```
Get-Content -path $env:ECS_CONTAINER_METADATA_FILE
```

The container metadata file is cleaned up on the host instance when the container is cleaned up. You can adjust when this happens with the `ECS_ENGINE_TASK_CLEANUP_WAIT_DURATION` container agent variable. For more information, see [Automated Task and Image Cleanup \(p. 88\)](#).

### Topics

- [Enabling Container Metadata \(p. 92\)](#)
- [Container Metadata File Locations \(p. 93\)](#)
- [Container Metadata File Format \(p. 93\)](#)

## Enabling Container Metadata

This feature is disabled by default. You can enable container metadata at the container instance level by setting the `ECS_ENABLE_CONTAINER_METADATA` container agent variable to `true`. You can set this

variable in the `/etc/ecs/ecs.config` configuration file and restart the agent. You can also set it as a Docker environment variable at run time when the agent container is started. For more information, see [Amazon ECS Container Agent Configuration \(p. 81\)](#).

**Note**

The minimum Amazon ECS container agent version to support this feature is 1.15.0.

If the `ECS_ENABLE_CONTAINER_METADATA` is set to `true` when the agent starts, metadata files are created for any already running ECS containers and any future containers started by ECS.

## Container Metadata File Locations

By default, the container metadata file is written to the following host and container paths.

- **For Linux instances:**

- Host path: `/var/lib/ecs/data/metadata/task_id/container_name/ecs-container-metadata.json`

**Note**

The Linux host path assumes that the default data directory mount path (`/var/lib/ecs/data`) is used when the agent is started. If you are not using the Amazon ECS-optimized AMI (or the `ecs-init` package to start and maintain the container agent), be sure to set the `ECS_HOST_DATA_DIR` agent configuration variable to the host path where the container agent's state file is located. For more information, see [Amazon ECS Container Agent Configuration \(p. 81\)](#).

- Container path: `/opt/ecs/metadata/random_ID/ecs-container-metadata.json`

- **For Windows instances:**

- Host path: `C:\ProgramData\Amazon\ECS\data\metadata\task_id\container_name\ecs-container-metadata.json`
- Container path: `C:\ProgramData\Amazon\ECS\metadata\random_ID\ecs-container-metadata.json`

However, for easy access, the container metadata file location is set to the `ECS_CONTAINER_METADATA_FILE` environment variable inside the container. You can read the file contents from inside the container with the following command:

- **For Linux instances:**

```
cat $ECS_CONTAINER_METADATA_FILE
```

- **For Windows instances (PowerShell):**

```
Get-Content -path $env:ECS_CONTAINER_METADATA_FILE
```

## Container Metadata File Format

The following information is stored in the container metadata JSON file.

`ContainerInstanceARN`

The full Amazon Resource Name (ARN) of the host container instance.

`TaskARN`

The full Amazon Resource Name (ARN) of the task that the container belongs to.

**ContainerID**

The Docker container ID (and not the Amazon ECS container ID) for the container.

**ContainerName**

The container name from the Amazon ECS task definition for the container.

**DockerContainerName**

The container name that the Docker daemon uses for the container (for example, the name that shows up in `docker ps` command output).

**ImageID**

The SHA digest for the Docker image used to start the container.

**ImageName**

The image name and tag for the Docker image used to start the container.

**PortMappings**

Any port mappings associated with the container.

**ContainerPort**

The port on the container that is exposed.

**HostPort**

The port on the host container instance that is exposed.

**BindIp**

The bind IP address that is assigned to the container by Docker. This IP address is only applied with the bridge network mode, and it is only accessible from the container instance.

**Protocol**

The network protocol used for the port mapping.

**Networks**

The network mode and IP address for the container.

**NetworkMode**

The network mode for the task to which the container belongs.

**IPv4Addresses**

The IP addresses associated with the container.

**MetadataFileStatus**

The status of the metadata file. When the status is `READY`, the metadata file is current and complete. If the file is not ready yet (for example, the moment the task is started), a truncated version of the file format is available. To avoid a likely race condition where the container has started, but the metadata has not yet been written, you can parse the metadata file and wait for this parameter to be set to `READY` before depending on the metadata. This is usually available in less than 1 second from when the container starts.

### Example Amazon ECS container metadata file (`READY`)

The following example shows a container metadata file in the `READY` status.

```
{
```

```
"ContainerInstanceARN": "arn:aws:ecs:us-west-2:012345678910:container-instance/1f73d099-b914-411c-a9ff-81633b7741dd",
"TaskARN": "arn:aws:ecs:us-west-2:012345678910:task/2b88376d-aba3-4950-9ddf-bcb0f388a40c",
"ContainerID": "98e44444008169587b826b4cd76c6732e5899747e753af1e19a35db64f9e9c32",
"ContainerName": "metadata",
"DockerContainerName": "/ecs-metadata-7-metadata-f0edfb6d09fdef20800",
"ImageID": "sha256:c24f66af34b4d76558f7743109e2476b6325fcf6cc167c6e1e07cd121a22b341",
"ImageName": "httpd:2.4",
"PortMappings": [
{
  "ContainerPort": 80,
  "HostPort": 80,
  "BindIp": "",
  "Protocol": "tcp"
},
],
"Networks": [
{
  "NetworkMode": "bridge",
  "IPv4Addresses": [
    "172.17.0.2"
  ]
}
],
"MetadataFileStatus": "READY"
}
```

#### Example Incomplete Amazon ECS container metadata file (not yet READY)

The following example shows a container metadata file that has not yet reached the READY status. The information in the file is limited to a few parameters that are known from the task definition. The container metadata file should be ready within 1 second after the container starts.

```
{
  "ContainerInstanceARN": "arn:aws:ecs:us-west-2:012345678910:container-
instance/1f73d099-b914-411c-a9ff-81633b7741dd",
  "TaskARN": "arn:aws:ecs:us-west-2:012345678910:task/
d90675f8-1a98-444b-805b-3d9cab6fcfd4",
  "ContainerName": "metadata"
}
```

## Amazon ECS Container Agent Introspection

The Amazon ECS container agent provides an API operation for gathering details about the container instance on which the agent is running and the associated tasks 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, log in to your container instance via SSH and run the following command. Metadata includes the container instance ID, the Amazon ECS cluster in which the container instance is registered, and the Amazon ECS container agent version information.

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

Output:

```
{
  "Cluster": "default",
```

```
    "ContainerInstanceArn": "<container_instance_ARN>",
    "Version": "Amazon ECS Agent - v1.16.0 (1ca656c)"
}
```

To view information about all of the tasks that are running on a container instance, log in to 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-e8bfdd9b488dff36c00",
          "Name": "wordpress"
        }
      ]
    }
  ]
}
```

You can view information for a particular task that is running on a container instance. To specify a specific task or container, append one of the following to the request:

- The task ARN (`?taskarn=task_arn`)
- The Docker ID for a container (`?dockerid=docker_id`)

To get task information with a container's Docker ID, log in to your container instance via SSH and run the following command.

**Note**

Amazon ECS container agents before version 1.14.2 require full Docker container IDs for the introspection API, 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=79c796ed2a7f
```

Output:

```
{
```

```

    "Arn": "arn:aws:ecs:us-east-1:<aws_account_id>:task/e01d58a8-151b-40e8-
bc01-22647b9ecfec",
    "Containers": [
        {
            "DockerId": "79c796ed2a7f864f485c76f83f3165488097279d296a7c05bd5201a1c69b2920",
            "DockerName": "ecs-nginx-efs-2-nginx-9ac0808dd0afa495f001",
            "Name": "nginx"
        }
    ],
    "DesiredStatus": "RUNNING",
    "Family": "nginx-efs",
    "KnownStatus": "RUNNING",
    "Version": "2"
}

```

## HTTP Proxy Configuration

To configure your Amazon ECS container agent to use an HTTP proxy, set the following variables in the `/etc/ecs/ecs.config`, `/etc/init/ecs.override`, and `/etc/sysconfig/docker` files at launch time (with Amazon EC2 user data). You could also manually edit the configuration file and restart the agent afterwards.

`/etc/ecs/ecs.config`

`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, your container instances may not have external network access through an Amazon VPC internet gateway, 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.

`/etc/init/ecs.override`

`env 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 `ecs-init` to connect to the internet. For example, your container instances may not have external network access through an Amazon VPC internet gateway, NAT gateway, or instance.

`env 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.

`/etc/sysconfig/docker`

`export 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 Docker daemon to connect to the internet. For example, your container instances may not have external network access through an Amazon VPC internet gateway, NAT gateway, or instance.

`export NO_PROXY=169.254.169.254`

Set this value to `169.254.169.254` to filter EC2 instance metadata from the proxy.

Setting these environment variables in the above files only affects the Amazon ECS container agent, `ecs-init`, and the Docker daemon. They do not configure 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, `ecs-init`, the Docker daemon, and `yum` to use an HTTP proxy that you specify. You can also specify a cluster into which the container instance registers itself.

To use this script when you launch a container instance, follow the steps in [Launching an Amazon ECS Container Instance \(p. 43\)](#), and in [Step 8.g \(p. 44\)](#). Then, 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 "export NO_PROXY=169.254.169.254" >> /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

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

# AWS Fargate Platform Versions

AWS Fargate platform versions are used to refer to a specific runtime environment for Fargate task infrastructure. When specifying the `LATEST` platform version when running a task or creating a service, you will get the most current platform version available for your tasks. When you scale up your service, those tasks will receive the platform version that was specified on the service's current deployment.

## Available Platform Versions

### Fargate Platform Version-1.0.0

- Based on Amazon Linux 2017.09
- Initial release

# 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:

- The Docker images to use with the containers in your task
- How much CPU and memory to use with each container
- The launch type to use, which determines the infrastructure on which your tasks are hosted
- Whether containers are linked together in a task
- The Docker networking mode to use for the containers in your task
- (Optional) The ports from the container to map 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
- (Optional) The environment variables that should be passed to the container when it starts
- Any data volumes that should be used with the containers in the task
- (Optional) The IAM role that your tasks should use for permissions

You can define multiple containers in a task definition. The parameters that you use depend on the launch type you choose for the task. Not all parameters are valid. For more information about the parameters available and which launch types they are valid for in a task definition, see [Task Definition Parameters \(p. 106\)](#).

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 \(p. 100\)](#).

## Topics

- [Application Architecture \(p. 100\)](#)
- [Creating a Task Definition \(p. 102\)](#)
- [Task Definition Parameters \(p. 106\)](#)
- [Using Data Volumes in Tasks \(p. 126\)](#)
- [Task Networking with the awsvpc Network Mode \(p. 131\)](#)
- [Amazon ECS Launch Types \(p. 133\)](#)
- [Using the awslogs Log Driver \(p. 137\)](#)
- [Example Task Definitions \(p. 143\)](#)
- [Updating a Task Definition \(p. 145\)](#)
- [Deregistering Task Definitions \(p. 146\)](#)

## Application Architecture

How you architect your application on Amazon ECS depends on several factors, with the launch type you are using being a key differentiator. We give the following guidance, broken down by launch type, which should assist in the process.

## Using the Fargate Launch Type

When architecting your application using the Fargate launch type for your tasks, the main question is when should you put multiple containers into the same task definition versus deploying containers separately in multiple task definitions.

You should put multiple containers in the same task definition if:

- Containers share a common lifecycle (that is, they should be launched and terminated together)
- Containers are required to be run on the same underlying host (that is, one container references the other on a localhost port)
- You want your containers to share resources

Otherwise you should define your containers in separate tasks definitions so that you can scale, provision, and deprovision them separately.

## Using the EC2 Launch Type

When you're considering how to model task definitions and services using the EC2 launch type, it helps to think about what processes need to run together and how to scale each component.

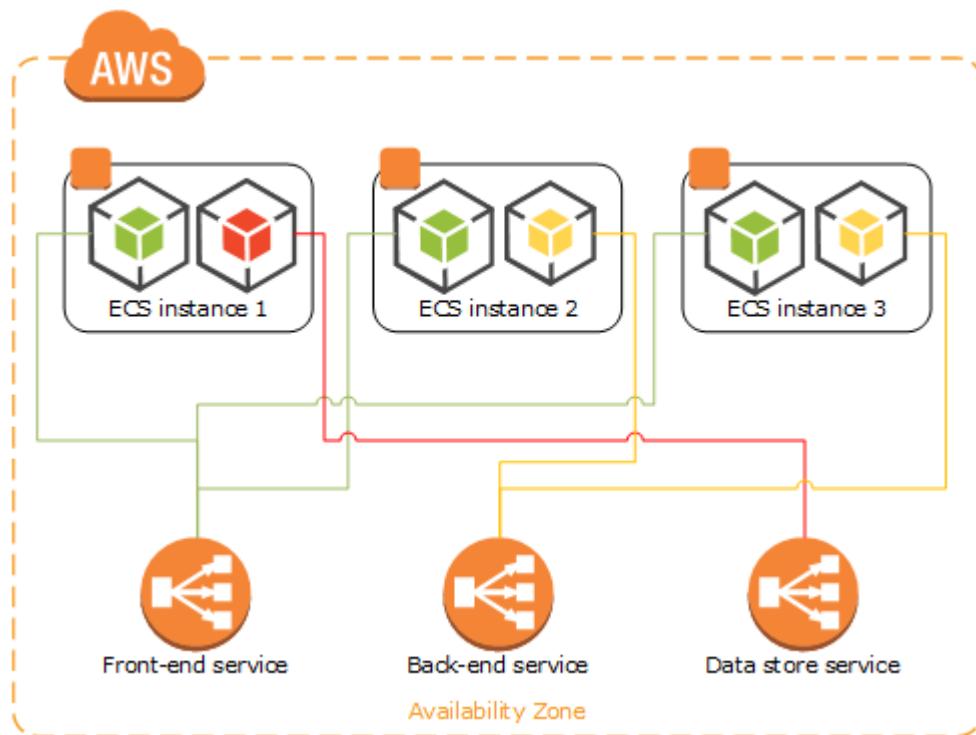
As an example, imagine an application that consists of the following components:

- A frontend service that displays information on a webpage
- A backend service that provides APIs for the frontend 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 anticipated
- 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 backend 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 \(p. 188\)](#). In your services, you can associate containers with Elastic Load Balancing load balancers. For more information, see [Service Load Balancing \(p. 165\)](#). 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 \(p. 194\)](#).

## Creating a Task Definition

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

You can define multiple containers and data volumes in a task definition. For more information about the parameters available in a task definition, see [Task Definition Parameters \(p. 106\)](#).

### To create a new task definition

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. In the navigation pane, choose **Task Definitions**.
3. On the **Task Definitions** page, choose **Create new Task Definition**.
4. On the **Select compatibilities** page, select the launch type that your task should use and choose **Next step**.
5. (Optional) If you have a JSON representation of your task definition, complete the following steps:
  - a. On the **Configure task and container definitions** 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**.
- Scroll to the bottom of the page and choose **Configure via JSON**.
6. If you chose **Fargate**, complete the following steps. If you chose **EC2**, skip to the next section.

### Using the Fargate launch type compatibility template

1. For **Task Definition Name**, type a name for your task definition. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
2. (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 \(p. 251\)](#).

**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 \(p. 254\)](#).

3. For **Task execution IAM role**, either select your task execution role or select **Create new role** so the console can create one for you.
4. For **Task size**, choose a value for **Task memory (GB)** and **Task CPU (vCPU)**.
5. 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 \(p. 106\)](#).
  - c. Choose **Add** to add your container to the task definition.
6. (Optional) To define data volumes for your task, choose **Add volume**. For more information, see [Using Data Volumes in Tasks \(p. 126\)](#).
  - For **Name**, type a name for your volume. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
7. Choose **Create**.

### Using the EC2 launch type compatibility template

If you chose **EC2**, complete the following steps:

1. For **Task Definition Name**, type a name for your task definition. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
2. (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 \(p. 251\)](#).

**Note**

Only roles that have 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 \(p. 254\)](#).

3. (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`. The `awsvpc` network mode is required if your task definition uses the Fargate launch type. If the network mode is set to `none`, you can't specify port

mappings in your container definitions, and the task's containers do not have external connectivity. If the network mode is `awsvpc`, the task is allocated an elastic network interface. The host and `awsvpc` network modes offer the highest networking performance for containers because they use the Amazon EC2 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.

4. (Optional) For **Task size**, choose a value for **Task memory (GB)** and **Task CPU (vCPU)**.
  5. (Optional) For **Constraint**, define how tasks that are created from this task definition are placed in your cluster. For tasks that use the Fargate launch type, you can use constraints to place tasks based on Availability Zone or by task group. For tasks that use the EC2 launch type, you can use constraints to place tasks based on Availability Zone, instance type, or custom attributes. For more information, see [Amazon ECS Task Placement Constraints \(p. 152\)](#).
  6. 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 \(p. 106\)](#).
    - c. Choose **Add** to add your container to the task definition.
  7. (Optional) To define data volumes for your task, choose **Add volume**. For more information, see [Using Data Volumes in Tasks \(p. 126\)](#).
    - 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.
  8. 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 \(p. 106\)](#).

```
{
    "family": "",
    "taskRoleArn": "",
    "executionRoleArn": "",
    "networkMode": "awsvpc",
    "containerDefinitions": [
        {
            "name": "",
            "image": "",
            "cpu": 0,
            "memory": 0,
            "memoryReservation": 0,
            "links": [
                ""
            ],
            "portMappings": [
                {
                    "hostPort": 8080,
                    "containerPort": 8080,
                    "protocol": "tcp"
                }
            ]
        }
    ]
}
```

```
"portMappings": [
    {
        "containerPort": 0,
        "hostPort": 0,
        "protocol": "udp"
    }
],
"essential": true,
"entryPoint": [
    ""
],
"command": [
    ""
],
"environment": [
    {
        "name": "",
        "value": ""
    }
],
"mountPoints": [
    {
        "sourceVolume": "",
        "containerPath": "",
        "readOnly": true
    }
],
"volumesFrom": [
    {
        "sourceContainer": "",
        "readOnly": true
    }
],
"linuxParameters": {
    "capabilities": {
        "add": [
            ""
        ],
        "drop": [
            ""
        ]
    },
    "devices": [
        {
            "hostPath": "",
            "containerPath": "",
            "permissions": [
                "read"
            ]
        }
    ],
    "initProcessEnabled": true
},
"hostname": "",
"user": "",
"workingDirectory": "",
"disableNetworking": true,
"privileged": true,
"readonlyRootFilesystem": true,
"dnsServers": [
    ""
],
"dnsSearchDomains": [
    ""
],
"extraHosts": [
```

```
{
    "hostname": "",
    "ipAddress": ""
},
"dockerSecurityOptions": [
    ""
],
"dockerLabels": {
    "KeyName": ""
},
"ulimits": [
    {
        "name": "rss",
        "softLimit": 0,
        "hardLimit": 0
    }
],
"logConfiguration": {
    "logDriver": "awslogs",
    "options": {
        "KeyName": ""
    }
}
],
"volumes": [
    {
        "name": "",
        "host": {
            "sourcePath": ""
        }
    }
],
"placementConstraints": [
    {
        "type": "memberOf",
        "expression": ""
    }
],
"requiresCompatibilities": [
    "EC2"
],
"cpu": "",
"memory": ""
}
```

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 separate parts: the task family, the IAM task role, the network mode, container definitions, volumes, task placement constraints, and launch types. 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. The network mode determines how the networking is configured for your containers. 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 task

placement constraints customize how your tasks are placed within the infrastructure. The launch type determines which infrastructure your tasks use.

The family and container definitions are required in a task definition, while task role, network mode, volumes, task placement constraints, and launch type are optional.

#### Parts

- [Family \(p. 107\)](#)
- [Task Role \(p. 107\)](#)
- [Network Mode \(p. 107\)](#)
- [Container Definitions \(p. 108\)](#)
- [Volumes \(p. 123\)](#)
- [Task Placement Constraints \(p. 124\)](#)
- [Launch Types \(p. 125\)](#)
- [Task Size \(p. 125\)](#)

## 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 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 \(p. 251\)](#).

IAM roles for tasks on Windows require that the `-EnableTaskIAMRole` option is set when you launch the Amazon ECS-optimized Windows AMI. 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 \(p. 369\)](#).

## Network Mode

`networkMode`

Type: string

Required: no

The Docker networking mode to use for the containers in the task. The valid values are `none`, `bridge`, `awsvpc`, and `host`. The default Docker network mode is `bridge`. If using the Fargate launch type, the `awsvpc` network mode is required. If using the EC2 launch type, any network mode can be used. If the network mode is set to `none`, you can't specify port mappings in your container definitions, and the task's containers do not have external connectivity. The `host` and `awsvpc` network modes offer the highest networking performance for containers because they use the Amazon EC2 network stack instead of the virtualized network stack provided by the `bridge` mode.

With the `host` and `awsvpc` network modes, exposed container ports are mapped directly to the corresponding host port (for the `host` network mode) or the attached elastic network interface port (for the `awsvpc` network mode), so you cannot take advantage of dynamic host port mappings.

If the network mode is `awsvpc`, the task is allocated an Elastic Network Interface, and you must specify a `NetworkConfiguration` when you create a service or run a task with the task definition. For more information, see [Task Networking with the `awsvpc` Network Mode \(p. 131\)](#).

**Note**

Currently, only the Amazon ECS-optimized AMI, other Amazon Linux variants with the `ecs-init` package, or AWS Fargate infrastructure support the `awsvpc` network mode.

If the network mode is `host`, you can't run multiple instantiations of the same task on a single container instance when port mappings are used.

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 choose the `<default>` network mode object.

## 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 \(p. 108\)](#)
- [Advanced Container Definition Parameters \(p. 112\)](#)

## 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. Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed. 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. 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 either `repository-url/image:tag` or `repository-url/image@digest`. 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](#).

- The Fargate launch type only supports images in Amazon ECR or public repositories in Docker Hub.
- Images in Amazon ECR repositories can be specified by using either the full `registry/repository:tag` or `registry/repository@digest` naming convention. For example, `aws_account_id.dkr.ecr.region.amazonaws.com/my-web-app:latest` or `aws_account_id.dkr.ecr.region.amazonaws.com/my-web-app@sha256:94afdf1f2e64d908bc90dbca0035a5b567EXAMPLE`
- 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: string

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](#).

If your containers will be part of a task using the Fargate launch type, this field is optional and the only requirement is that the total amount of memory reserved for all containers within a task be lower than the task `memory` value.

For containers that will be part of a task using the EC2 launch type, 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.

For task definitions that use the `awsvpc` network mode, you should only specify the `containerPort`. The `hostPort` can be left blank or it must be the same value as the `containerPort`.

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.

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 `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.

#### `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 using containers in a task with the Fargate, exposed ports should be specified using `containerPort`.

If using containers in a task with the EC2 launch type and 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.

#### `hostPort`

Type: integer

Required: no

The port number on the container instance to reserve for your container.

If using containers in a task with the Fargate, the `hostPort` can either be left blank or needs to be the same value as the `containerPort`.

If using containers in a task with the EC2 launch type, 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).

**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 \(p. 74\)](#).

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 \(p. 112\)](#)
- [Network Settings \(p. 114\)](#)
- [Storage and Logging \(p. 116\)](#)
- [Security \(p. 119\)](#)
- [Resource Limits \(p. 122\)](#)
- [Docker Labels \(p. 123\)](#)

## Environment

cpu

Type: integer

Required: no

The number of cpu units to reserve for the container. This parameter maps to CpuShares in the [Create a container](#) section of the [Docker Remote API](#) and the --cpu-shares option to [docker run](#).

This field is optional for tasks using the Fargate launch type, and the only requirement is that the total amount of CPU reserved for all containers within a task be lower than the task-level cpu value.

#### 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.

Linux containers share unallocated CPU units with other containers on the container instance with the same ratio as their allocated amount. 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.

On Linux container instances, 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.

On Windows container instances, the CPU limit is enforced as an absolute limit, or a quota. Windows containers only have access to the specified amount of CPU that is described in the task definition.

#### 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 \(p. 100\)](#).

```
"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 plaintext 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](#).

**Note**

This parameter is not supported for Windows containers.

```
"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. Only supported if the network mode of a task definition is set to bridge. 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](#).

**Note**

This parameter is not supported for Windows containers.

**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](#).

**Note**

This parameter is not supported for Windows containers.

```
"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](#).

**Note**

This parameter is not supported for Windows containers.

```
"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](#).

**Note**

This parameter is not supported for Windows containers.

```
"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](#).

**Note**

This parameter is not supported for Windows containers.

```
"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](#).

Windows containers can mount whole directories on the same drive as `$env:ProgramData`. Windows containers cannot mount directories on a different drive, and mount point cannot be across drives.

`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.

If using the Fargate launch type, the only supported value is `awslogs`. 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 \(p. 137\)](#).

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.

**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.

**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 \(p. 81\)](#).

```
"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 earlier are log drivers that the Amazon ECS container agent can communicate with by default.

If using the Fargate launch type, the only supported value is `awslogs`.

**Note**

If you have a custom driver that is not listed earlier 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.

`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.

## 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](#).

**Note**

This parameter is not supported for Windows containers or tasks using the Fargate launch type.

```
"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](#).

**Note**

This parameter is not supported for Windows containers.

```
"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](#).

**Note**

This parameter is not supported for Windows containers or tasks using the Fargate launch type.

```
"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 \(p. 81\)](#).

**linuxParameters**

Type: [LinuxParameters](#) object

Required: no

Linux-specific options that are applied to the container, such as [KernelCapabilities](#).

**Note**

This parameter is not supported for Windows containers or tasks using the Fargate launch type.

```
"linuxParameters": {  
    "capabilities": {  
        "add": ["string", ...],  
        "drop": ["string", ...]  
    }  
}
```

**capabilities**

Type: [KernelCapabilities](#) object

Required: no

The Linux capabilities for the container that are added to or dropped from the default configuration provided by Docker. For more information about the default capabilities and the non-default available capabilities, see [Runtime privilege and Linux capabilities](#) in the [Docker run reference](#). For more detailed information about these Linux capabilities, see the [capabilities\(7\)](#) Linux manual page.

**add**

Type: string array

Valid values: "ALL" | "AUDIT\_CONTROL" | "AUDIT\_WRITE" | "BLOCK\_SUSPEND" | "CHOWN" | "DAC\_OVERRIDE" | "DAC\_READ\_SEARCH" | "FOWNER" | "FSETID" | "IPC\_LOCK" | "IPC\_OWNER" | "KILL" | "LEASE" | "LINUX\_IMMUTABLE" | "MAC\_ADMIN" | "MAC\_OVERRIDE" | "MKNOD" | "NET\_ADMIN" | "NET\_BIND\_SERVICE" | "NET\_BROADCAST" | "NET\_RAW" | "SETFCAP" | "SETGID" | "SETPCAP" | "SETUID" | "SYS\_ADMIN" | "SYS\_BOOT" | "SYS\_CHROOT" | "SYS\_MODULE" | "SYS\_NICE" | "SYS\_PACCT" | "SYS\_PTRACE" | "SYS\_RAWIO" | "SYS\_RESOURCE" | "SYS\_TIME" | "SYS\_TTY\_CONFIG" | "SYSLOG" | "WAKE\_ALARM"

Required: no

The Linux capabilities for the container to add to the default configuration provided by Docker. This parameter maps to CapAdd in the [Create a container](#) section of the [Docker Remote API](#) and the --cap-add option to [docker run](#).

**drop**

Type: string array

Valid values: "ALL" | "AUDIT\_CONTROL" | "AUDIT\_WRITE" | "BLOCK\_SUSPEND" | "CHOWN" | "DAC\_OVERRIDE" | "DAC\_READ\_SEARCH" | "FOWNER" | "FSETID" | "IPC\_LOCK" | "IPC\_OWNER" | "KILL" | "LEASE" | "LINUX\_IMMUTABLE" | "MAC\_ADMIN" | "MAC\_OVERRIDE" | "MKNOD" | "NET\_ADMIN" | "NET\_BIND\_SERVICE" | "NET\_BROADCAST" | "NET\_RAW" | "SETFCAP" | "SETGID" | "SETPCAP" | "SETUID" | "SYS\_ADMIN" | "SYS\_BOOT" | "SYS\_CHROOT" | "SYS\_MODULE" | "SYS\_NICE" | "SYS\_PACCT" | "SYS\_PTRACE" | "SYS\_RAWIO" | "SYS\_RESOURCE" | "SYS\_TIME" | "SYS\_TTY\_CONFIG" | "SYSLOG" | "WAKE\_ALARM"

Required: no

The Linux capabilities for the container to remove from the default configuration provided by Docker. This parameter maps to CapDrop in the [Create a container](#) section of the [Docker Remote API](#) and the --cap-drop option to [docker run](#).

**devices**

Any host devices to expose to the container. This parameter maps to Devices in the [Create a container](#) section of the [Docker Remote API](#) and the --device option to [docker run](#).

Type: Array of [Device](#) objects

Required: No

**hostPath**

The path for the device on the host container instance.

Type: String

Required: Yes

**containerPath**

The path inside the container at which to expose the host device.

Type: String

Required: No

**permissions**

The explicit permissions to provide to the container for the device. By default, the container will be able to `read`, `write`, and `mknod` the device.

Type: Array of strings

Valid Values: `read` | `write` | `mknod`

**initProcessEnabled**

Run an `init` process inside the container that forwards signals and reaps processes. This parameter maps to the `--init` option to [docker run](#).

This parameter requires version 1.25 of the Docker Remote API or greater on your container instance.

## 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.

**Note**

This parameter is not supported for Windows containers.

```
"ulimits": [
    {
        "name": "core" | "cpu" | "data" | "fsiz" | "locks" | "memlock" | "msgqueue" | "nice" | "nofile" | "nproc" | "rss" | "rtpr" | "rtime" | "sigpending" | "stack",
        "softLimit": integer,
        "hardLimit": integer
    }
    ...
]
```

**name**

Type: string

Valid values: `core` | `cpu` | `data` | `fsiz` | `locks` | `memlock` | `msgqueue` | `nice` | `nofile` | `nproc` | `rss` | `rtpr` | `rtime` | `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.

```
"dockerLabels": {"string": "string"
...}
```

## 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.

If you are using the Fargate launch type, the `host` and `sourcePath` parameters are not supported.

For more information, see [Using Data Volumes in Tasks \(p. 126\)](#).

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.

Windows containers can mount whole directories on the same drive as \$env:ProgramData. Windows 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.

By default, Docker-managed volumes are created in /var/lib/docker/volumes/. 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 you are using the Fargate launch type, the `sourcePath` parameter is not supported.

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"  
   }  
 }  
 ]
```

## Task Placement Constraints

When you register a task definition, you can provide task placement constraints that customize how Amazon ECS places tasks.

If you are using the Fargate launch type, task placement constraints are not supported.

For tasks that use the EC2 launch type, you can use constraints to place tasks based on Availability Zone, instance type, or custom attributes. For more information, see [Amazon ECS Task Placement Constraints \(p. 152\)](#).

The following parameters are allowed in a container definition:

`expression`

Type: string

Required: no

A cluster query language expression to apply to the constraint. For more information, see [Cluster Query Language \(p. 155\)](#).

`type`

Type: string

Required: yes

The type of constraint. Use `memberOf` to restrict selection to a group of valid candidates.

## Launch Types

When you register a task definition, you specify the launch type that you will be using for your task. For more details about launch types, see [Amazon ECS Launch Types \(p. 133\)](#).

The following parameter is allowed in a container definition:

`requiresCompatibilities`

Type: string

Required: no

The launch type the task is using. This will enable a check to ensure that all of the parameters used in the task definition meet the requirements of the launch type.

Valid values are `FARGATE` and `EC2`. For more information about launch types, see [Amazon ECS Launch Types \(p. 133\)](#).

## Task Size

When you register a task definition, you can specify the total cpu and memory used for the task. This is separate from the `cpu` and `memory` values at the container definition level. If using the EC2 launch type, this field is optional and any value can be used. If using the Fargate launch type, this field is required and you must use one of the following values, which determines your range of valid values for the `memory` parameter.

**Note**

The task-level CPU and memory parameters are not supported for Windows containers. Windows containers must specify CPU and memory at the container level.

The following parameter is allowed in a container definition:

`cpu`

Type: string

Required: no

The number of `cpu` units used by the task. If using the EC2 launch type, this field is optional and any value can be used. If using the Fargate launch type, this field is required and you must use one of the following values, which determines your range of valid values for the `memory` parameter:

CPU value	Memory value
256 (.25 vCPU)	512MB, 1GB, 2GB
512 (.5 vCPU)	1GB, 2GB, 3GB, 4GB
1024 (1 vCPU)	2GB, 3GB, 4GB, 5GB, 6GB, 7GB, 8GB

CPU value	Memory value
2048 (2 vCPU)	Between 4GB and 16GB in 1GB increments
4096 (4 vCPU)	Between 8GB and 30GB in 1GB increments

#### memory

Type: string

Required: no

The amount (in MiB) of memory used by the task. If using the EC2 launch type, this field is optional and any value can be used. If using the Fargate launch type, this field is required and you must use one of the following values, which determines your range of valid values for the `cpu` parameter:

Memory value	CPU value
512MB, 1GB, 2GB	256 (.25 vCPU)
1GB, 2GB, 3GB, 4GB	512 (.5 vCPU)
2GB, 3GB, 4GB, 5GB, 6GB, 7GB, 8GB	1024 (1 vCPU)
Between 4GB and 16GB in 1GB increments	2048 (2 vCPU)
Between 8GB and 30GB in 1GB increments	4096 (4 vCPU)

## 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 booothook](#) 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 \(p. 81\)](#). 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 website 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.

## Task Networking with the `awsvpc` Network Mode

The task networking features provided by the `awsvpc` network mode give Amazon ECS tasks the same networking properties as Amazon EC2 instances. When you use the `awsvpc` network mode in your task definitions, every task that is launched from that task definition gets its own elastic network interface, a primary private IP address, and an internal DNS hostname. The task networking feature simplifies container networking and gives you more control over how containerized applications communicate with each other and other services within your VPCs.

Task networking also provides greater security for your containers by allowing you to use security groups and network monitoring tools at a more granular level within ECS tasks. Because each task gets its own elastic network interface, you can also take advantage of other Amazon EC2 networking features like VPC Flow Logs so that you can monitor traffic to and from your tasks. Additionally, containers that belong to the same task can communicate over the `localhost` interface. A task can only have one elastic network interface associated with it at a given time.

To use task networking, specify the `awsvpc` network mode in your task definition. Then, when you run a task or create a service, specify a network configuration that includes the subnets in which to place your tasks and the security groups to attach to its associated elastic network interface. The tasks are placed on valid container instances in those subnets and the specified security groups are associated with the elastic network interface that is provisioned for the task.

The elastic network interface that is created for your task is fully managed by Amazon ECS. Amazon ECS creates the elastic network interface and attaches it to the container instance with the specified security group. The task sends and receives network traffic on the elastic network interface in the same way that Amazon EC2 instances do with their primary network interfaces. These elastic network interfaces are visible in the Amazon EC2 console for your account, but they cannot be detached manually or modified by your account. This is to prevent accidental deletion of an elastic network interface that is associated with a running task. You can view the elastic network interface attachment information for tasks in the Amazon ECS console or with the [DescribeTasks](#) API operation. When the task stops or if the service is scaled down, the elastic network interface is released.

## Enabling Task Networking

Your ECS container instances require at least version 1.15.0 of the container agent to enable task networking. 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 \(p. 74\)](#). If you are using the Amazon ECS-optimized AMI, your instance needs at least version 1.15.0-4 of the `ecs-init` package. If your container instances are launched from version 2017.09.a or later, then they contain the required versions of the container agent and `ecs-init`. For more information, see [Amazon ECS-Optimized AMI \(p. 32\)](#).

**Important**

Currently, only the Amazon ECS-optimized AMI, or other Amazon Linux variants with the `ecs-init` package, support task networking.

To use task networking, your task definitions must specify the `awsvpc` network mode. For more information, see [Network Mode \(p. 107\)](#). When you run tasks or create services using a task definition that specifies the `awsvpc` network mode, you specify a network configuration that contains the VPC subnets to be considered for placement and the security groups to attach to the task's elastic network interface.

Tasks and services that use the `awsvpc` network mode require the Amazon ECS service-linked role to provide Amazon ECS with the permissions to make calls to other AWS services on your behalf. This role is created for you automatically when you create a cluster, or if you create or update a service in the AWS Management Console. For more information, see [Using Service-Linked Roles for Amazon ECS \(p. 243\)](#). You can also create the service-linked role with the following AWS CLI command:

```
aws iam create-service-linked-role --aws-service-name ecs.amazonaws.com
```

## Task Networking Considerations

There are several things to consider when using task networking.

- The `awsvpc` network mode does not provide task elastic network interfaces with public IP addresses. To access the internet, tasks must be launched in a private subnet that is configured to use a NAT gateway. For more information, see [NAT Gateways](#) in the *Amazon VPC User Guide*. Inbound network access must be from within the VPC using the private IP address or DNS hostname, or routed through a load balancer from within the VPC. Tasks launched within public subnets do not have outbound network access.
- Currently, only the Amazon ECS-optimized AMI, or other Amazon Linux variants with the `ecs-init` package, support task networking. Your Amazon ECS container instances require at least version 1.15.0 of the container agent to enable task networking. We recommend using the latest container agent version.
- Each task that uses the `awsvpc` network mode receives its own elastic network interface, which is attached to the container instance that hosts it. EC2 instances have a limit to the number of elastic network interfaces that can be attached to them, and the primary network interface counts as one. For example, a `c4.large` instance may have up to three elastic network interfaces attached to it. The primary network adapter for the instance counts as one, so you can attach two more elastic network interfaces to the instance. Because each `awsvpc` task requires an elastic network interface, you can only run two such tasks on this instance type. For more information about how many elastic network interfaces are supported per instance type, see [IP Addresses Per Network Interface Per Instance Type](#) in the *Amazon EC2 User Guide for Linux Instances*.
- Amazon ECS only accounts for the elastic network interfaces that it attaches to your container instances for you. If you have attached elastic network interfaces to your container instances manually, then Amazon ECS could try to place a task on an instance without sufficient available network adapter attachments. In this case, the task would time out, move from `PROVISIONING` to `DEPROVISIONING`, and then to `STOPPED`. We recommend that you do not attach elastic network interfaces to your container instances manually.
- Container instances must be registered with the `ecs.capability.task-eni` to be considered for placement of tasks with the `awsvpc` network mode. Container instances running version 1.15.0-4 or later of `ecs-init` are registered with this attribute.

- The elastic network interfaces that are created and attached to your container instances cannot be detached manually or modified by your account. This is to prevent the accidental deletion of an elastic network interface that is associated with a running task. To release the elastic network interfaces for a task, stop the task.

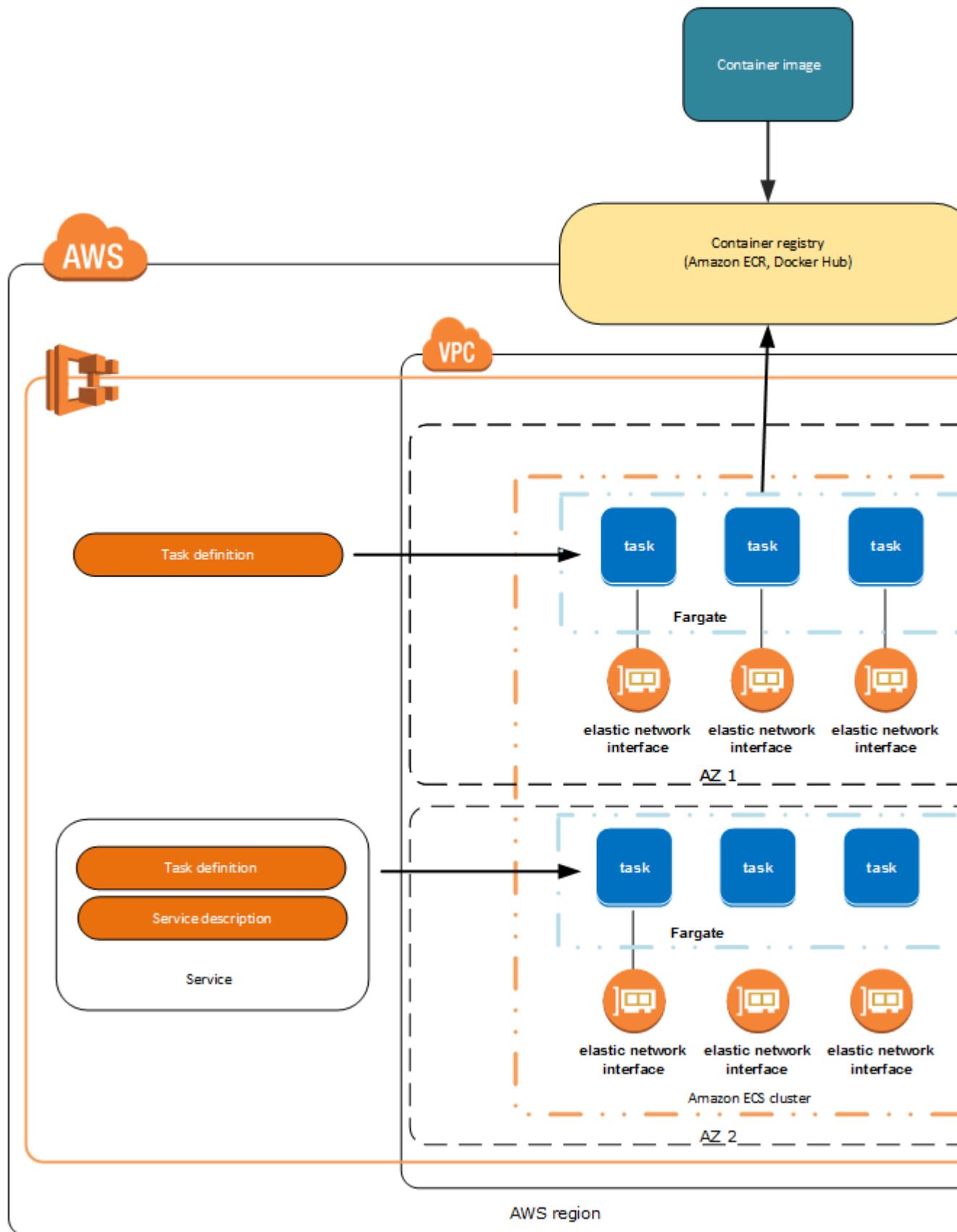
## Amazon ECS Launch Types

An Amazon ECS launch type determines the type of infrastructure on which your tasks and services are hosted.

### Fargate Launch Type

The Fargate launch type allows you to run your containerized applications without the need to provision and manage the backend infrastructure. Just register your task definition and Fargate launches the container for you.

This diagram shows the general architecture:



If you use the Fargate launch type, the following task parameters are not valid:

- `dockerSecurityOptions`
- `links`
- `linuxParameters`
- `placementConstraints`
- `privileged`

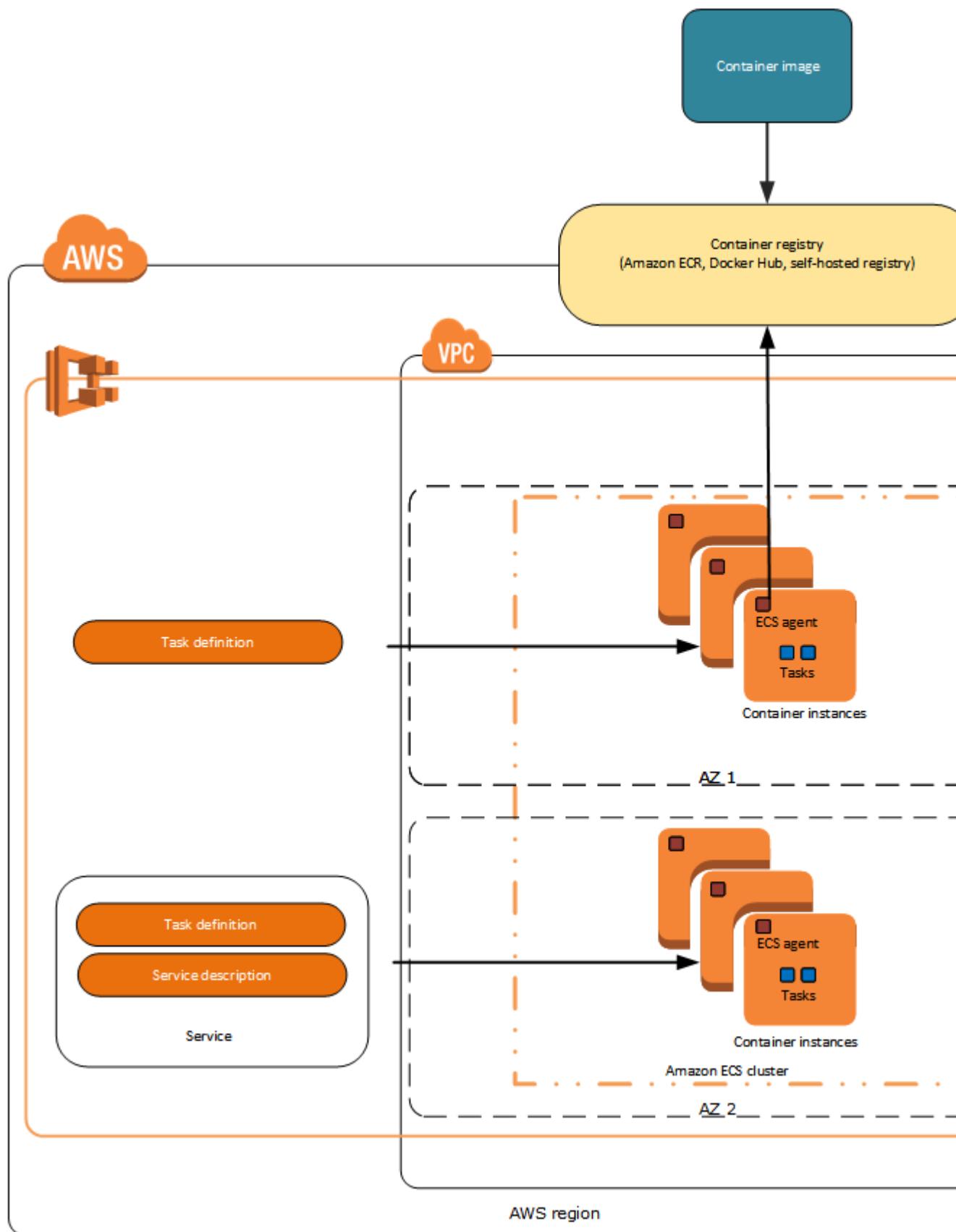
If you use the Fargate launch type, the following task parameters can be used but with limitations:

- `networkMode` - The only valid value is `awsvpc`. For more information, see [Network Mode \(p. 107\)](#).
- `portMappings` - You should specify any exposed ports as `containerPort`. The `hostPort` can be left blank.
- `logConfiguration` - The only valid value is `awslogs`. For more information, see [Using the awslogs Log Driver \(p. 137\)](#).
- `volumes` - The `host` and `sourcePath` values are not valid. There are also specific service limits related to volumes for tasks using the Fargate launch type. For more information, see [Amazon ECS Service Limits \(p. 342\)](#).
- There are separate task definition parameters for container and task size. The container size parameters are optional. The task size parameters are required and have specific values that must be used. For more information, see [Task Size \(p. 125\)](#).

## EC2 Launch Type

The EC2 launch type allows you to run your containerized applications on a cluster of Amazon EC2 instances that you manage.

This diagram shows the general architecture:



# Using the awslogs Log Driver

You can configure the containers in your tasks to send log information to CloudWatch Logs. If you are using the Fargate launch type for your tasks, this allows you to view the logs from your containers. If you are using the EC2 launch type, 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 \(p. 53\)](#). For more information about CloudWatch Logs, see [Monitoring Log Files](#) in the *Amazon CloudWatch User Guide*.

## Topics

- [Enabling the awslogs Log Driver for Your Containers \(p. 137\)](#)
- [Creating Your Log Groups \(p. 137\)](#)
- [Available awslogs Log Driver Options \(p. 139\)](#)
- [Specifying a Log Configuration in your Task Definition \(p. 139\)](#)
- [Viewing awslogs Container Logs in CloudWatch Logs \(p. 141\)](#)

## Enabling the awslogs Log Driver for Your Containers

If you are using the Fargate launch type for your tasks, all you need to do to enable the awslogs log driver is add the required `logConfiguration` parameters to your task definition. For more information, see [Specifying a Log Configuration in your Task Definition \(p. 139\)](#).

If you are using the EC2 launch type for your tasks and want to enable the awslogs log driver, your Amazon ECS container instances require at least version 1.9.0 of the container agent. For information about checking your agent version and updating to the latest version, see [Updating the Amazon ECS Container Agent \(p. 74\)](#).

### 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 \(p. 69\)](#).

```
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 \(p. 240\)](#).

## 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 should ensure the log groups that you intend your containers to use are created. The console provides an auto-configure

option so if you register your task definitions in the console and choose the **Auto-configure CloudWatch Logs** option your log groups will be created for you. Alternatively, you can manually create your log groups using the following steps.

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 `us-west-2` 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 us-west-2
```

## Using the Auto-configuration Feature to Create a Log Group

When registering a task definition in the Amazon ECS console, you have the option to allow Amazon ECS to auto-configure your CloudWatch logs, which will also create the specified log groups for you. The auto-configuration option sets up the CloudWatch logs and log groups with the specified prefix to make it easy.

### To create a log group in the Amazon ECS console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. In the left navigation pane, choose **Task Definitions**, **Create new Task Definition**.
3. Choose your compatibility option and then **Next Step**.
4. Choose **Add container** to begin creating your container definition.
5. In the **Storage and Logging** section, for **Log configuration** choose **Auto-configure CloudWatch Logs**.
6. Enter your `awslogs` log driver options. For more details, see [Specifying a Log Configuration in your Task Definition \(p. 139\)](#).
7. Complete the rest of the task definition wizard.

## 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.

**Note**

Although there are more options available for the awslogs log driver in the [Docker documentation](#), not all of those options are supported in Amazon ECS yet.

`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 \(p. 137\)](#).

`awslogs-stream-prefix`

Required: No, unless using the Fargate launch type in which case it is required.

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.

You must specify a stream-prefix for your logs in order to have your logs appear in the Log pane when using the Amazon ECS console.

## Specifying a Log Configuration in your Task Definition

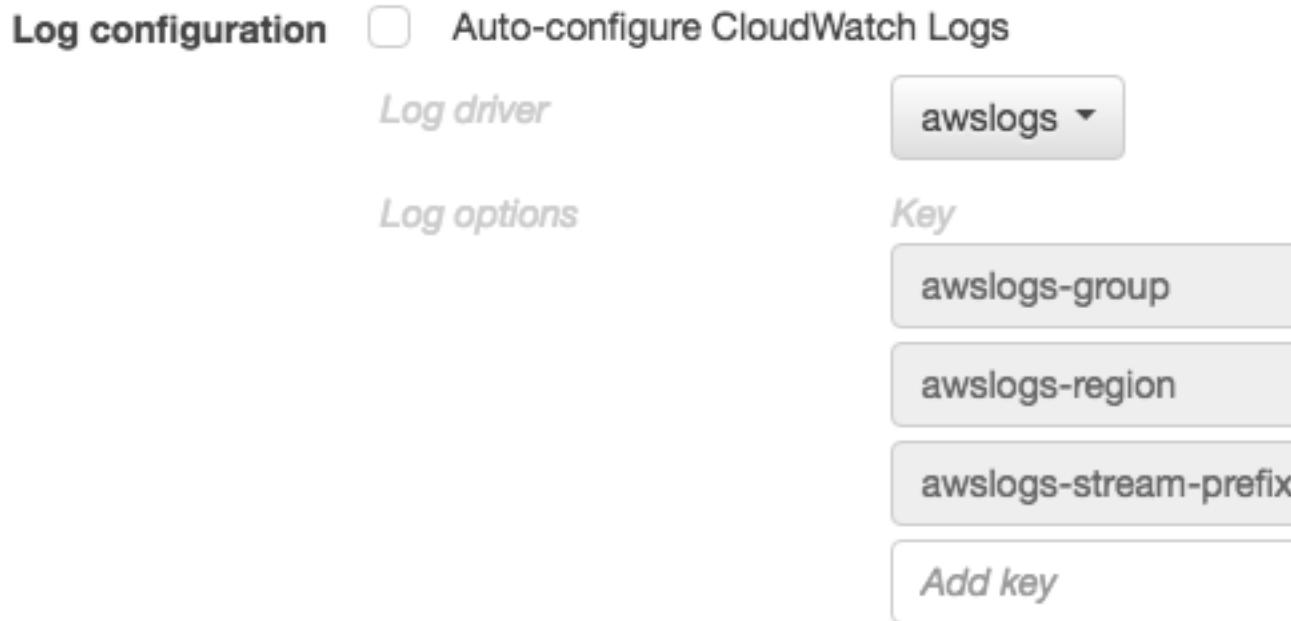
Before your containers can send logs to CloudWatch, you must specify the awslogs log driver for containers in your task definition. This section describes the log configuration for a container to use the awslogs log driver. For more information, see [Creating a Task Definition \(p. 102\)](#).

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": "us-west-2",  
                    "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": "us-west-2",  
                    "awslogs-stream-prefix": "awslogs-example"  
                }  
            }  
        }  
}
```

In the Amazon ECS console, the log configuration for the `wordpress` container is specified as shown in the image below.



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 \(p. 148\)](#) and [Creating a Service \(p. 188\)](#).

## 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 [View logs in CloudWatch](#)

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 \(p. 137\)](#).

The screenshot shows the AWS CloudWatch Logs console interface. At the top, there is a blue button labeled "Create Metric Filter" and a grey "Actions" button with a dropdown arrow. Below these are two input fields: "Filter:" containing "Log Group Name Prefix" and a close button "x". Underneath is a section titled "Log Groups" with a table. The table has two rows, each with a checkbox and a link: " awslogs-mysql" and " awslogs-wordpress".

4. Choose a log stream to view.

Filter events		
	Time (UTC -07:00)	Message
	2016-09-09	<i>No older events found at the selected time.</i>
▶	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 de-
▶	12:56:49	AH00558: apache2: Could not reliably de-
▶	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/2016:20:06:57]

## 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 \(p. 106\)](#) and [Creating a Task Definition \(p. 102\)](#).

### Example Example: WordPress and MySQL

The following example 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/).

```
{  
  "containerDefinitions": [  
    {  
      "name": "wordpress",  
      "links": [  
        "mysql"  
      ],  
      "image": "wordpress",  
      "essential": true,  
      "portMappings": [  
        {  
          "hostPort": 80,  
          "containerPort": 80  
        }  
      ]  
    }  
  ]  
}
```

```

    "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"
}

```

### **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.

### **Example Example: 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 \(p. 137\)](#).

```

{
  "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"  
}
```

### Example Example: 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 \(p. 251\)](#).

```
{  
  "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"  
}
```

### Example Example: Entrypoint with Command

The following example demonstrates the syntax for a Docker container that uses an entry point and a command argument. This container pings `google.com` four times and then exits.

```
{  
  "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, create a task definition revision. If the task definition is used in a service, you must update that service to use the updated task definition.

### 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 to revise and choose **Create new revision**.
5. On the **Create new revision of Task Definition** page, make changes. For example, to change the existing container definitions (such as the container image, memory limits, or port mappings), select the container, make the changes, and then choose **Update**.
6. Verify the information and choose **Create**.
7. If your task definition is used in a service, update your service with the updated task definition. For more information, see [Updating a Service \(p. 194\)](#).

## 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 lifecycle 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, Deregister**.
7. Verify the information in the **Deregister Task Definition** window, and choose **Deregister** to finish.

# Scheduling Amazon ECS Tasks

Amazon Elastic 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. You can specify task placement strategies and constraints that allow you to run tasks in the configuration you choose, such as spread out across availability zones. It is also possible to integrate with custom or third-party schedulers.

## 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 infrastructure 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 \(p. 161\)](#).

## 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 [Running Tasks \(p. 148\)](#) and [RunTask in the Amazon Elastic Container Service API Reference](#).

## Running Tasks on a cron-like Schedule

If you have tasks to run at set intervals in your cluster, such as a backup operation or a log scan, you can use the Amazon ECS console to create a CloudWatch Events rule that runs one or more tasks in your cluster at specified times. Your scheduled event rule can be set to either a specific interval (run every  $N$  minutes, hours, or days), or for more complicated scheduling, you can use a cron expression. For more information, see [Scheduled Tasks \(cron\) \(p. 158\)](#).

## 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. Custom schedulers use the `StartTask` API operation to place tasks on specific container instances within your cluster. For more information, see [StartTask in the Amazon Elastic Container Service API Reference](#).

### Note

Custom schedulers are only compatible with tasks using the EC2 launch type. If you are using the Fargate launch type for your tasks then the `StartTask` API will not work.

## 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 \(p. 150\)](#).

## Contents

- [Running Tasks \(p. 148\)](#)
- [Amazon ECS Task Placement \(p. 150\)](#)
- [Scheduled Tasks \(cron\) \(p. 158\)](#)
- [Task Life Cycle \(p. 159\)](#)
- [Task Retirement \(p. 160\)](#)

# 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 \(p. 161\)](#).

## To run a task

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. 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.
3. Choose **Actions, Run Task**.
4. For **Launch Type**, choose your desired launch type. For more information about launch types, see [Amazon ECS Launch Types \(p. 133\)](#).
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. If your task definition uses the `awsvpc` network mode, complete these substeps. Otherwise, continue to the next step.
  - a. For **Cluster VPC**, choose the VPC that your container instances reside in.
  - b. For **Subnets**, choose the available subnets for your task.

### Important

Only private subnets are supported for the `awsvpc` network mode. Because tasks do not receive public IP addresses, a NAT gateway is required for outbound internet access, and inbound internet traffic should be routed through a load balancer.

- c. For **Security groups**, a security group has been created for your task that allows HTTP traffic from the internet (0.0.0.0/0). To edit the name or the rules of this security group, or to choose an existing security group, choose **Edit** and then modify your security group settings.
7. (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 \(p. 150\)](#) for examples.

For more information, see [Amazon ECS Task Placement \(p. 150\)](#).

8. (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 \(p. 251\)](#).

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 \(p. 254\)](#).

- b. For **Task Execution 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 \(p. 251\)](#).

Note that only roles with the **Amazon EC2 Container Service Task Execution 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 \(p. 254\)](#).

- c. For **Container Overrides**, choose a container to which to send a command or environment variable override.

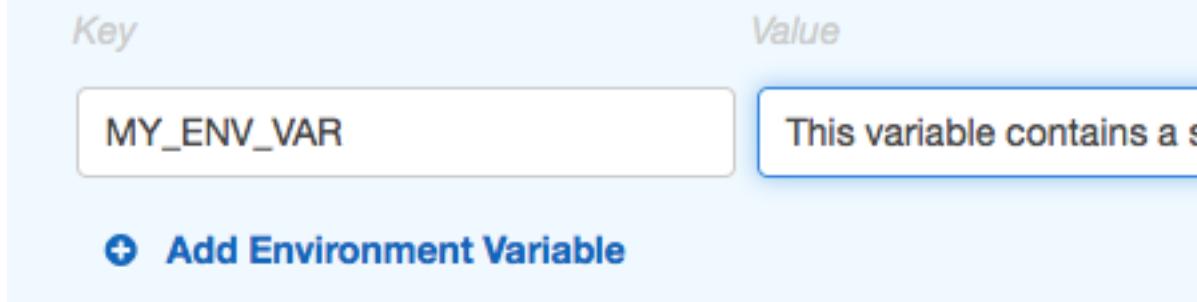
- **For a command override:** For **Command override**, type the command override to send. If your container definition does not specify an `ENTRYPOINT`, the format should be a comma-separated list of non-quoted strings. For example:

```
/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).



This environment variable override is sent to the container as:

```
MY_ENV_VAR="This variable contains a string."
```

9. 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 \(p. 344\)](#) 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.

**Note**

Task placement strategies are best effort. Amazon ECS still attempts to place tasks even when the most optimal placement option is unavailable. However, task placement constraints are binding, and they can prevent task placement.

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 \(p. 150\)](#)
- [Amazon ECS Task Placement Constraints \(p. 152\)](#)
- [Cluster Query Language \(p. 155\)](#)

## 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 \(p. 150\)](#).

## 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"
    }
]
```

## 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 \(p. 150\)](#).

### 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 \(p. 155\)](#).

### 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 \(p. 86\)](#).

### 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 ECS console at <https://console.aws.amazon.com/ecs/>.
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 \(p. 155\)](#).

### 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 \(p. 152\)](#).

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 \(p. 148\)](#) and [Creating a Service \(p. 188\)](#). You can also apply a group filter when listing container instances. For more information, see [Filtering by Attribute \(p. 153\)](#).

## 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
```

### Note

For more details about attributes, see [Attributes \(p. 152\)](#).

You can also select container instances by task group. Specify task groups as follows:

```
task:group
```

### Note

For more details about task groups, see [Task Groups \(p. 155\)](#).

### Operator

The comparison operator. The following operators are supported.

Operator	Description
<code>==, equals</code>	String equality
<code>!=, not_equals</code>	String inequality
<code>&gt;, greater_than</code>	Greater than
<code>&gt;=, greater_than_equal</code>	Greater than or equal to
<code>&lt;, less_than</code>	Less than
<code>&lt;=, less_than_equal</code>	Less than or equal to
<code>exists</code>	Subject exists
<code>!exists, not_exists</code>	Subject does not exist
<code>in</code>	Value in argument list
<code>!in, not_in</code>	Value not in argument list
<code>=~, matches</code>	Pattern match
<code>!~, not_matches</code>	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)
```

## Scheduled Tasks (cron)

You can run Amazon ECS tasks on a cron-like schedule using CloudWatch Events rules and targets.

If you have tasks to run at set intervals in your cluster, such as a backup operation or a log scan, you can use the Amazon ECS console to create a CloudWatch Events rule that runs one or more tasks in your cluster at the specified times. Your scheduled event rule can be set to either a specific interval (run every *N* minutes, hours, or days), or for more complicated scheduling, you can use a cron expression. For more information, see [Schedule Expressions for Rules](#) in the *Amazon CloudWatch Events User Guide*.

### Creating a scheduled task

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. Choose the cluster in which to create your scheduled task.
3. On the **Cluster: *cluster-name*** page, choose **Scheduled Tasks, Create**.
4. For **Schedule rule name**, enter a unique name for your schedule rule. Up to 64 letters, numbers, periods, hyphens, and underscores are allowed.
5. (Optional) For **Schedule rule description**, enter a description for your rule. Up to 512 characters are allowed.
6. For **Schedule rule type**, choose whether to use a fixed interval schedule or a cron expression for your schedule rule. For more information, see [Schedule Expressions for Rules](#) in the *Amazon CloudWatch Events User Guide*.
  - For **Run at fixed interval**, enter the interval and unit for your schedule.
  - For **Cron expression**, enter the cron expression for your task schedule. These expressions have six required fields, and fields are separated by white space. For more information, and examples of cron expressions, see [Cron Expressions](#) in the *Amazon CloudWatch Events User Guide*.
7. Create a target for your schedule rule.
  - a. For **Target ID**, enter a unique identifier for your target. Up to 64 letters, numbers, periods, hyphens, and underscores are allowed.
  - b. For **Task definition**, choose the family and revision (family:revision) of the task definition to run for this target.
  - c. For **Number of tasks**, enter the number of instantiations of the specified task definition to run on your cluster when the rule executes.
  - d. (Optional) For **Task role override**, choose the IAM role to use for the task in your target, instead of the task definition default. For more information, see [IAM Roles for Tasks \(p. 251\)](#). 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 \(p. 254\)](#).
  - e. For **CloudWatch Events IAM role for this target**, choose an existing CloudWatch Events service role (`ecsEventsRole`) that you may have already created. Or, choose **Create new role** to create the required IAM role that allows CloudWatch Events to make calls to Amazon ECS to run tasks on your behalf. For more information, see [CloudWatch Events IAM Role \(p. 251\)](#).
  - f. (Optional) In the **Container overrides** section, you can expand individual containers and override the command and/or environment variables for that container that are defined in the task definition.
8. (Optional) To add additional targets (other tasks to run when this rule is executed), choose **Add targets** and repeat the previous substeps for each additional target.
9. Choose **Create**.

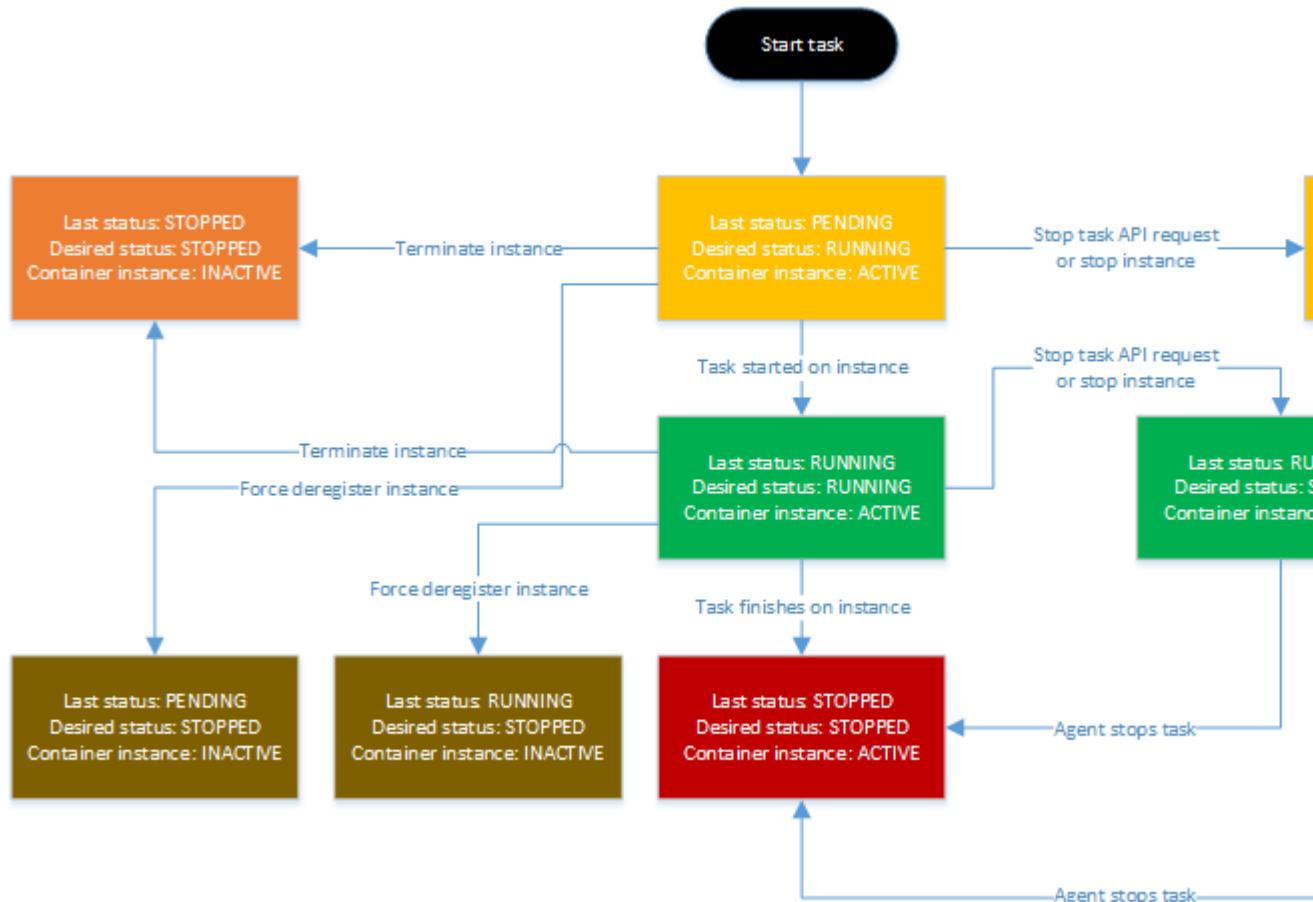
### To edit a scheduled task

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. Choose the cluster in which to edit your scheduled task.
3. On the Cluster: **cluster-name** page, choose **Scheduled Tasks**.
4. Select the box to the left of the schedule rule to edit, and choose **Edit**.
5. Edit the fields to update and choose **Update**.

## 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.

## Task Retirement

A task is scheduled to be retired when AWS detects irreparable failure of the underlying hardware hosting the task. When a task reaches its scheduled retirement date, it is stopped or terminated by AWS.

If the task is part of a service, then the task is automatically stopped and the service schedule will start a new one to replace it. If you are using standalone tasks, then you will receive notification of the task retirement described below.

### Identifying Tasks Scheduled for Retirement

If your task is scheduled for retirement, you'll receive an email prior to the event with the task ID and retirement date. This email is sent to the address that's associated with your account; the same email address that you use to log in to the AWS Management Console. If you use an email account that you do not check regularly, then you can use the [AWS Personal Health Dashboard](#) to determine if any of your tasks are scheduled for retirement. To update the contact information for your account, go to the [Account Settings](#) page.

### Working With Tasks Scheduled for Retirement

If the task is part of a service, then the task is automatically stopped and the service schedule will start a new one to replace it. If you are using standalone tasks, then you can start a new task to replace it. See [Running Tasks \(p. 148\)](#) for more information.

# 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 \(p. 161\)](#)
- [Service Definition Parameters \(p. 162\)](#)
- [Service Load Balancing \(p. 165\)](#)
- [Service Auto Scaling \(p. 179\)](#)
- [Creating a Service \(p. 188\)](#)
- [Updating a Service \(p. 194\)](#)
- [Deleting a Service \(p. 195\)](#)

## 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 \(p. 165\)](#).
- 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 \(p. 162\)](#).
- When the service scheduler launches new tasks or stops running tasks that use the Fargate launch type, it attempts to maintain balance across the Availability Zones in your service.
- When the service scheduler launches new tasks using the EC2 launch type, the scheduler uses 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. For tasks using the EC2 launch type, the scheduler uses 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": "",  
    "launchType": "EC2",  
    "platformVersion": "",  
    "role": "",  
    "deploymentConfiguration": {  
        "maximumPercent": 0,  
        "minimumHealthyPercent": 0  
    },  
    "placementConstraints": [  
        {  
            "type": "memberOf",  
            "expression": ""  
        }  
    ],  
    "placementStrategy": [  
        {  
            "type": "spread",  
            "field": ""  
        }  
    ],  
    "networkConfiguration": {  
        "awsvpcConfiguration": {  
            "subnets": [  
                ""  
            ],  
            "securityGroups": [  
                ""  
            ],  
            "assignPublicIp": "DISABLED"  
        }  
    }  
}
```

### 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 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 Application Load Balancers and Network 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.

`launchType`

The launch type on which to run your service. If one is not specified, Standard will be used by default. For more information, see [Amazon ECS Launch Types \(p. 133\)](#).

`platformVersion`

The platform version on which to run your service. If one is not specified, the latest version will be used by default.

AWS Fargate platform versions are used to refer to a specific runtime environment for Fargate task infrastructure. When specifying the `LATEST` platform version when running a task or creating a service, you will get the most current platform version available for your tasks. When you scale up your service, those tasks will receive the platform version that was specified on the service's current deployment. For more information, see [AWS Fargate Platform Versions \(p. 99\)](#).

`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 on which the load balancer is hosted is reported as healthy. The default value for `minimumHealthyPercent` is 50% in the console and 100% for the AWS CLI, the AWS SDKs, and the APIs.

The minimum number of 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). If you are using the Fargate launch type, task placement constraints are not supported.

`placementStrategy`

The placement strategy objects to use for tasks in your service. You can specify a maximum of four strategy rules per service.

`networkConfiguration`

The network configuration for the service. This parameter is required for task definitions that use the `awsvpc` network mode to receive their own Elastic Network Interface, and it is not supported for other network modes. If using the Fargate launch type, the `awsvpc` network mode is required. For more information, see [Task Networking with the awsvpc Network Mode \(p. 131\)](#).

`awsvpcConfiguration`

An object representing the subnets and security groups for a task or service.

`subnets`

The subnets associated with the task or service.

`securityGroups`

The security groups associated with the task or service. If you do not specify a security group, the default security group for the VPC is used.

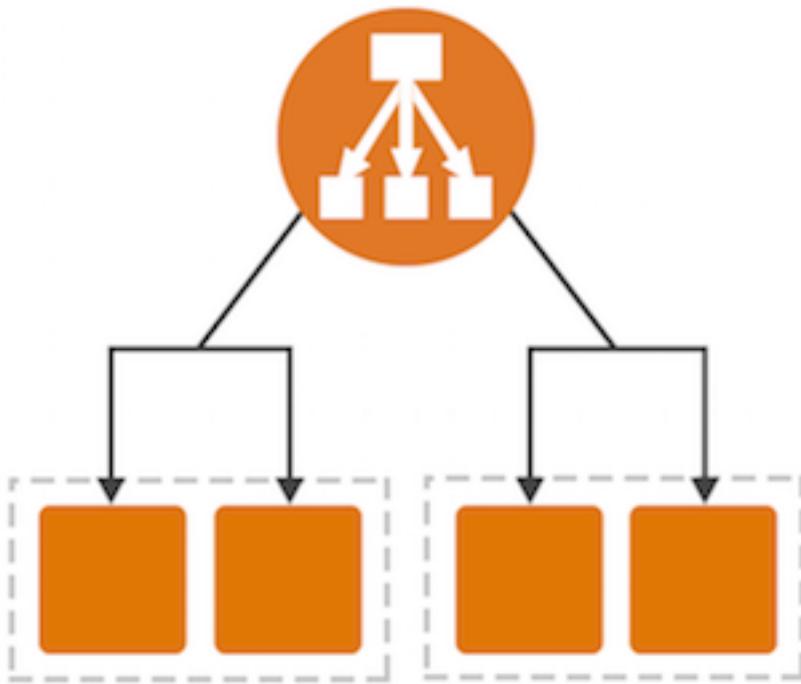
## Service Load Balancing

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 three types of load balancers: Application Load Balancers, Network Load Balancers, and Classic Load Balancers.

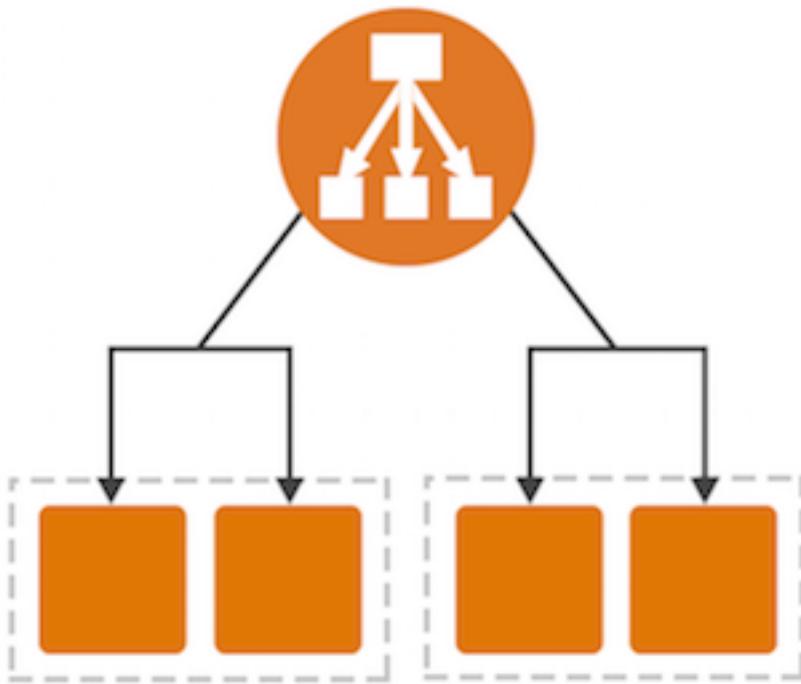
**Application Load Balancer**

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 [User Guide for Application Load Balancers](#).



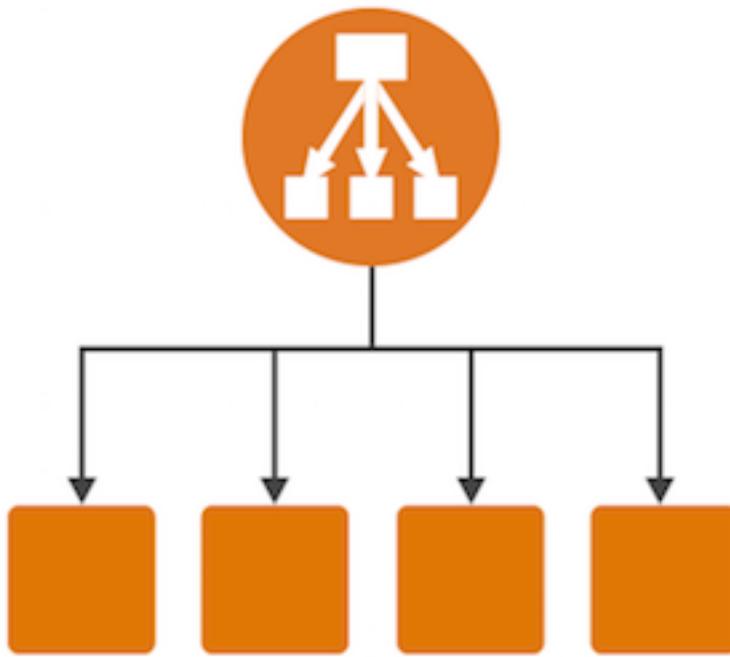
#### Network Load Balancer

A Network Load Balancer makes routing decisions at the transport layer (TCP/SSL). It can handle millions of requests per second. After the load balancer receives a connection, it selects a target from the target group for the default rule using a flow hash routing algorithm. It attempts to open a TCP connection to the selected target on the port specified in the listener configuration. It forwards the request without modifying the headers. Network 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 Network 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 [User Guide for Network Load Balancers](#).



#### 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 [User Guide for Classic Load Balancers](#).



Elastic Load Balancing supports the following types of load balancers: Application Load Balancers, Network Load Balancers, and Classic Load Balancers, and Amazon ECS services can use either type of load balancer. Application Load Balancers are used to route HTTP/HTTPS traffic. Network Load Balancers and Classic Load Balancers are used to route TCP or Layer 7 traffic.

Application Load Balancers offer several 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 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 \(p. 169\)](#)
- [Check the Service Role for Your Account \(p. 169\)](#)

- [Creating a Load Balancer \(p. 170\)](#)

## 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 *User Guide for Classic Load Balancers*.

### 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 Availability Zones 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 \(p. 350\)](#).

## Check the Service Role for Your Account

Amazon ECS needs permissions 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 \(p. 247\)](#) 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 network traffic and routes it to your Amazon ECS container instances.

Elastic Load Balancing supports the following types of load balancers: Application Load Balancers, Network Load Balancers, and Classic Load Balancers, and Amazon ECS services can use either type of load balancer. Application Load Balancers are used to route HTTP/HTTPS traffic. Network Load Balancers and Classic Load Balancers are used to route TCP or Layer 7 traffic.

Application Load Balancers offer several 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 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 \(p. 171\)](#)
- [Creating a Network Load Balancer \(p. 174\)](#)
- [Creating a Classic Load Balancer \(p. 175\)](#)

## 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 the frontend (client to load balancer) connections, and protocol and a port for the backend (load balancer to backend 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 Zones 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. You can select only one subnet per Availability Zone. Your load balancer subnet configuration must include all Availability Zones 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 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:

Description:

Type	Protocol	Port Range	Source
HTTP	TCP	80	Anywhere 0.0.0.0/0

Add Rule

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

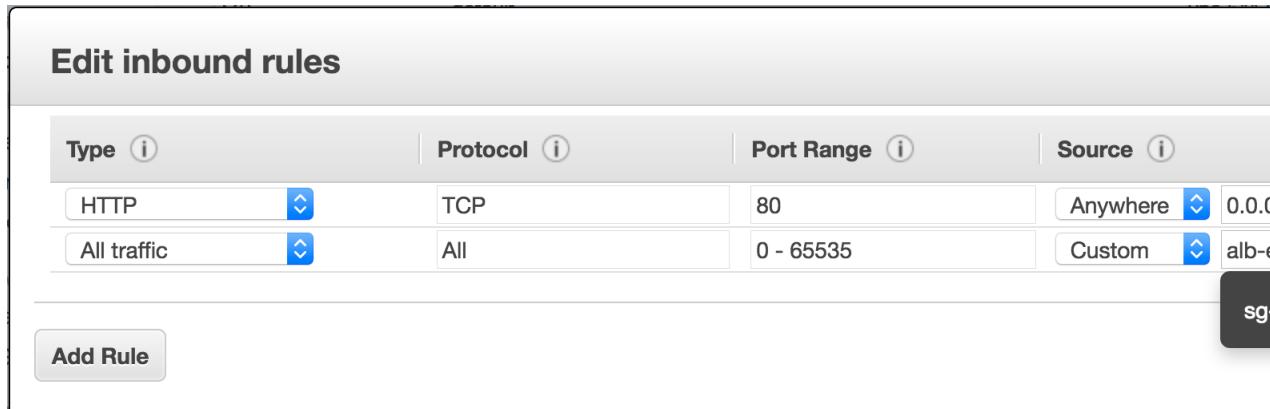
Review your load balancer and target group configuration and choose **Create** to create your load balancer.

## 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 \(p. 172\)](#). This rule allows all traffic from your Application Load Balancer to reach the containers in your tasks that are registered with your load balancer.



7. 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 \(p. 188\)](#).

## Creating a Network Load Balancer

This section walks you through the process of creating a Network 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 port for the frontend (client to load balancer) connections, and a protocol and port for the backend (load balancer to backend 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 **Create** under **Network Load Balancer**.
6. Complete the **Configure Load Balancer** page as follows:
  - a. For **Name**, type a name for your load balancer.
  - b. For **Scheme**, choose either **internet-facing** or **internal**. 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 **Listeners**, the default is a listener that accepts TCP traffic on port 80. You can keep the default listener settings, modify the protocol or port of the listener, or choose **Add listener** 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.

- d. For **Availability Zones**, select the VPC that you used for your EC2 instances. For each Availability Zone that you used to launch your EC2 instances, select an Availability Zone and then select the public subnet for that Availability Zone. To associate an Elastic IP address with the subnet, select it from **Elastic IP**.
- e. Choose **Next: Configure Routing**.

## Configure Routing

You register targets, such as Amazon EC2 instances, with a target group. The target group that you configure in this step is used as the target group in the listener rule, which forwards requests to the target group. For more information, see [Target Groups for Your Network Load Balancers](#).

### To configure your target group

1. For **Target group**, keep the default, **New target group**.
2. For **Name**, type a name for the 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 with the Target Group

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 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 \(p. 188\)](#).

## 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 port for the frontend (client to load balancer) connections and a protocol, and a protocol and port for the backend (load balancer to backend instance) connections. In this example, you configure a listener that accepts HTTP requests on port 80 and sends them to the backend instances 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 **Classic Load Balancer**.
6. 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 *User Guide for Classic Load Balancers*.
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 Availability Zones 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:

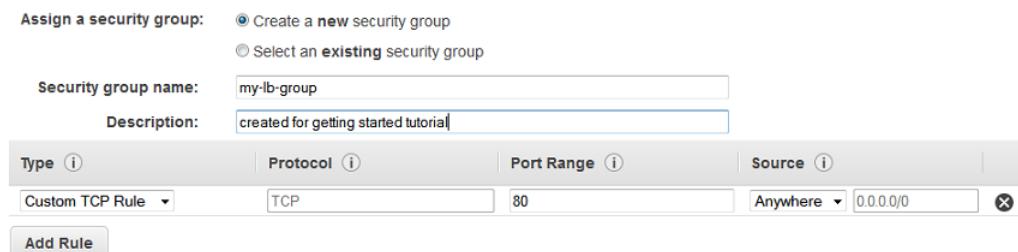
Create a new security group  
 Select an existing security group

Security group name: my-lb-group

Description: created for getting started tutorial

Type	Protocol	Port Range	Source
Custom TCP Rule	TCP	80	Anywhere 0.0.0.0

**Add Rule**



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 an HTTPS load balancer and using additional security features, see [HTTPS Load Balancers](#) in the *User Guide for Classic Load Balancers*.

### 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	HTTP
Ping Port	80
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. You can tag your load balancer later on; for more information, see [Tag Your Classic Load Balancer](#) in the *User Guide for Classic Load Balancers*.

#### 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 \(p. 188\)](#).

# 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 \(p. 205\)](#).

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 Amazon 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 \(p. 208\)](#).

## 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 \(p. 262\)](#) and [Update Services \(p. 263\)](#) 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 \(p. 193\)](#) or [update service \(p. 194\)](#) 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 \(p. 249\)](#).

## 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 \(p. 179\)](#), 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 \(p. 188\)](#).

To update an existing service to use Service Auto Scaling, see [Updating a Service \(p. 194\)](#).

## 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 Elastic 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 \(p. 205\)](#).

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 \(p. 240\)](#).

### 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.

**I want to**  **Deploy a sample application onto an Amazon ECS Cluster**  
Amazon ECS will set up an autoscaling group and help you create management.

**Store container images securely with Amazon ECR**  
Create and manage a new private image repository and use the Docker daemon to push images to it. Note that the repository is managed through AWS Identity and Access Management (IAM).

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).

- 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

- 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.

## Service : sample-webapp

---

### Details

---

**Cluster** [service-autoscaling](#)

**Status** [ACTIVE](#)

**Task Definition** [console-sample-app-static:6](#)

**Desired count** 1

**Pending count** 0

**Running count** 1

**Service Role** [ecsServiceRole](#)

### Load

---

Loa

E

SMA

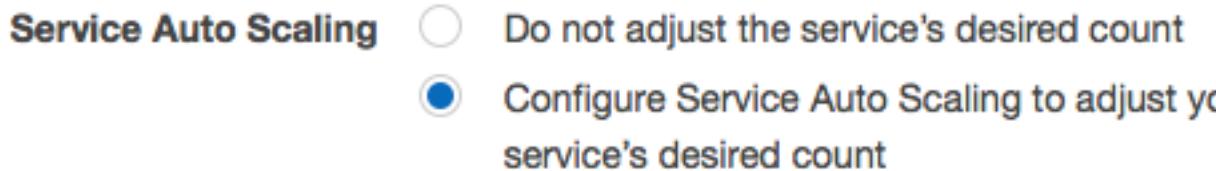
### Deploy

---

Min

- 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.



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 \(p. 249\)](#).

### 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.

- 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 **Coldown 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 Average of CPUUtilization < 25  
for 1 consecutive periods of 1 minute

- 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 Remove 1 tasks when 25

10. For **Coldown 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

1. 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.
2. 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.

## Tutorial: Service Auto Scaling with Custom CloudWatch Metrics

The following procedures help you to create a custom CloudWatch alarm and associate it with Service Auto Scaling to scale up (and down) your service.

In this tutorial, you configure Service Auto Scaling on the service with a custom CloudWatch alarm that uses the `HealthyHostCount` metric to scale your service up or down, depending on the number of healthy hosts behind your Application Load Balancer.

## 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. This tutorial also assumes you have already created your cluster and service which includes an Application Load Balancer. 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 \(p. 240\)](#).

## Step 1: Create a CloudWatch Alarm

Create the custom CloudWatch alarm you will use as an autoscaling trigger.

### Creating a CloudWatch alarm

1. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
2. In the navigation pane, choose **Alarms**, **Create Alarm**.
3. Under **CloudWatch Metrics by Category**, choose the **ApplicationELB Metrics** category.
4. Select the row with the **Per AppELB, per TG Metrics** and the **HealthyHostCount** metric.
5. For the statistic, choose **Minimum**.
6. For the period, choose **1 Minute**.
7. Choose **Next**.
8. Under **Alarm Threshold**, type a unique name for the alarm (for example, `HealthyHostCount`) and a description of the alarm (for example, `Alarm when all hosts are unhealthy`).
9. Under **Whenever, for is**, select `<` and type **1**. For **for**, type **3**.
10. Under **Additional settings**, for **Treat missing data as**, choose **ignore (maintain alarm state)** so that missing data points do not trigger alarm state changes.
11. Under **Actions**, for **Whenever this alarm**, choose **State is ALARM**. For **Send notification to** choose an existing SNS topic or create a new one.

To create an SNS topic, choose **New list**. For **Send notification to**, type a name for the SNS topic (for example, `HealthyHostCount`), and for **Email list**, type a comma-separated list of email addresses to be notified when the alarm changes to the **ALARM** state. Each email address is sent a topic subscription confirmation email. You must confirm the subscription before notifications can be sent.

12. Choose **Create Alarm**.

## Step 2: Update a Service with Auto Scaling Configuration

After you have created a CloudWatch alarm for your cluster and service, you can update your service to associate it with the alarm.

### 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, choose **Configure Service Auto Scaling**.
8. On the **Service Auto Scaling** page, do the following:
  - a. Select **Configure Service Auto Scaling to adjust your service's desired count**.
  - b. For **Minimum number of tasks**, enter 1.
  - c. For **Desired number of tasks**, enter 2.
  - d. For **Maximum number of tasks**, enter 3.
  - e. 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 \(p. 249\)](#).
9. Under the **Automatic task scaling policies** section, choose **Add scaling policy**.
10. On the **Add policy** page, do the following:
  - a. For **Policy name**, enter a descriptive name for your policy (for example, `HealthyHostCount`).
  - b. For **Execute policy when**, select **Use an existing Alarm** and choose the alarm you created in the previous section.
  - c. For **Scaling action**, select **Add** and then enter **1** for the number of **tasks** when **0 > HealthyHostCount > -infinity**.
  - d. (Optional) You can repeat [Step 10.c \(p. 188\)](#) to configure multiple scaling actions for a single alarm (for example, to remove 1 task if `HealthyHostCount` is above 3).
  - e. For **Cooldown period**, enter **300** as the number of seconds between scaling actions.
  - f. Choose **Save**.
11. On the **Service Auto Scaling** page, choose **Save** to complete the update of your service.

## 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 \(p. 165\)](#). 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 \(p. 162\)](#).

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 \(p. 110\)](#).
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 \(p. 150\)](#) for examples.

For more information, see [Amazon ECS Task Placement \(p. 150\)](#).

# Configure Network

## VPC and Security Groups

If your service's task definition uses the `awsvpc` network mode, you must configure VPC, subnet, and security group settings for your service. For more information, see [the section called "Task Networking" \(p. 131\)](#).

### To configure VPC and security group settings for your service

1. For **Cluster VPC**, choose the VPC that your container instances reside in.
2. For **Subnets**, choose the available subnets for your service task placement.

#### Important

Only private subnets are supported for the `awsvpc` network mode. Because tasks do not receive public IP addresses, a NAT gateway is required for outbound internet access, and inbound internet traffic should be routed through a load balancer.

3. For **Security groups**, a security group has been created for your service's tasks, which allows HTTP traffic from the internet (0.0.0.0/0). To edit the name or the rules of this security group, or to choose an existing security group, choose **Edit** and then modify your security group settings.

## (Optional) Configuring Your Service to Use a Load Balancer

If you are not configuring your service to use a load balancer, you can choose **None** as the load balancer type and move on to the next section, [\(Optional\) Configuring Your Service to Use Service Auto Scaling \(p. 192\)](#).

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 \(p. 170\)](#).

#### Note

You must create your Elastic Load Balancing load balancer resources before 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 \(p. 188\)](#).
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, which enables you to place multiple tasks using the same port on a single container instance. Multiple services can use the same listener port on a single load balancer with rule-based routing and paths.

#### Network Load Balancer

Allows containers to use dynamic host port mapping, which enables you to place multiple tasks using the same port on a single container instance. Multiple services can use the same listener port on a single load balancer with rule-based routing.

### 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. For more information, see [Amazon ECS Service Scheduler IAM Role \(p. 247\)](#).

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 next step depends 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 \(p. 191\)](#). If you've chosen a Network Load Balancer, follow the steps in [To configure a Network Load Balancer \(p. 191\)](#). If you've chosen a Classic Load Balancer, follow the steps in [To configure a Classic Load Balancer \(p. 192\)](#).

### 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 \(p. 171\)](#) (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 \(p. 171\)](#) (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 *User Guide for Application Load Balancers*.
  - 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 \(p. 194\)](#).

### To configure a Network 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 \(p. 171\)](#) (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 \(p. 171\)](#) (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 *User Guide for Application Load Balancers*.
  - For **Health check path**, enter the path to which the load balancer should send health check pings.
5. When you are finished configuring your Network Load Balancer, choose **Save** to save your configuration and proceed to [Review and Create Your Service \(p. 194\)](#).

### 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 \(p. 175\)](#) (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 \(p. 194\)](#).

## (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 \(p. 179\)](#).

### 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 \(p. 188\)](#).
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 is not 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 is not 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 \(p. 249\)](#).

## To configure scaling policies for your service

These steps 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 \(p. 205\)](#).
  - 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, two 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%.



5. (Optional) You can repeat [Step 4 \(p. 193\)](#) to configure multiple scaling actions for a single alarm (for example, to add one task if CPU utilization is between 75-85%, and to add two 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 \(p. 193\)](#) through [Step 7 \(p. 194\)](#) 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 on which it is hosted 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 **Configure Service** page, your service information is pre-populated. Change the task definition, deployment configuration, or number of desired tasks (or any combination of these) and choose **Next step**.
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 \(p. 192\) of \(Optional\) Configuring Your Service to Use Service Auto Scaling \(p. 192\)](#).
  - 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 \(p. 194\)](#).

**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.

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 Elastic 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 \(p. 72\)](#).
- 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 \(p. 238\)](#).

- 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 metrics made available will depend on the launch type of the tasks and services in your clusters. If you are using the Fargate launch type for your services then CPU and memory utilization metrics are provided to assist in the monitoring of your services. For the Amazon EC2 launch type you will own and need to monitor the EC2 instances that make up your underlying infrastructure so additional CPU and memory reservation and utilization metrics are made available at the cluster, service, and task level.

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 and reservation utilization metrics for your Amazon ECS clusters
- The CPU and memory utilization metrics for your Amazon ECS services

## Topics

- [Monitoring Tools \(p. 198\)](#)
- [Amazon ECS CloudWatch Metrics \(p. 200\)](#)
- [Amazon ECS Event Stream for CloudWatch Events \(p. 213\)](#)

## 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 \(p. 200\)](#).

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 \(p. 208\)](#)

- Amazon CloudWatch Logs – 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. This method for accessing logs must be used for tasks using the Fargate launch type, but also works with tasks using the EC2 launch type. For more information, see [Using the awslogs Log Driver \(p. 137\)](#).

You can also monitor, store, and access the operating system and Amazon ECS container agent log files from your Amazon ECS container instances. This method for accessing logs can be used for containers using the EC2 launch type. For more information, see [Using CloudWatch Logs with Container Instances \(p. 53\)](#).

- 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 \(p. 213\)](#) 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 \(p. 343\)](#) 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 \(p. 200\)](#)
- [Available Metrics and Dimensions \(p. 200\)](#)
- [Cluster Reservation \(p. 203\)](#)
- [Cluster Utilization \(p. 204\)](#)
- [Service Utilization \(p. 205\)](#)
- [Service RUNNING Task Count \(p. 206\)](#)
- [Viewing Amazon ECS Metrics \(p. 207\)](#)
- [Tutorial: Scaling Container Instances with CloudWatch Alarms \(p. 208\)](#)

## Enabling CloudWatch Metrics

Any task or service using the Fargate launch type will be enabled for CloudWatch metrics automatically, no need for further action.

For any task or service using the Standard launch type, 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 \(p. 74\)](#).

If you are starting your agent manually (for example, if you are not using the Amazon ECS-optimized AMI for your container instances), see [Manually Updating the Amazon ECS Container Agent \(for Non-Amazon ECS-optimized AMIs\) \(p. 79\)](#).

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 \(p. 240\)](#).

### 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 \(p. 81\)](#).

## 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.

The metrics made available will depend on the launch type of the tasks and services in your clusters. If you are using the Fargate launch type for your services then CPU and memory utilization metrics are provided to assist in the monitoring of your services. For the Amazon EC2 launch type you will own and need to monitor the EC2 instances that make up your underlying infrastructure so additional CPU and memory reservation and utilization metrics are made available at the cluster, service, and task level.

Amazon ECS sends the following metrics to CloudWatch every minute. When Amazon ECS collects metrics, it collects multiple data points every 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 during one minute.

The `AWS/ECS` namespace includes the following metrics.

Metric	Description
<code>CPUReservation</code>	<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. This metric is only used for tasks using the EC2 launch type.</p> <p>Valid Dimensions: <code>ClusterName, ServiceName</code></p> <p>Valid Statistics: Average, Minimum, Maximum, Sum, Data Samples.</p> <p>Unit: Percent</p>
<code>CPUUtilization</code>	<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. Cluster CPU utilization metrics are only used for tasks using the EC2 launch type.</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. Service CPU utilization metrics are used for tasks using both the Fargate and the EC2 launch type.</p> <p>Valid Dimensions: <code>ClusterName, ServiceName</code></p>

Metric	Description
	<p>Valid Statistics: Average, Minimum, Maximum, Sum, Data Samples.</p> <p>Unit: Percent</p>
<code>MemoryReservation</code>	<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. This metric is only used for tasks using the EC2 launch type.</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>
<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. Cluster memory utilization metrics are only used for tasks using the EC2 launch type.</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. Service memory utilization metrics are used for tasks using both the Fargate and the EC2 launch type.</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

If you are using tasks with the EC2 launch type and have Linux container instances, the Amazon ECS container agent relies on Docker stats 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
ClusterName	This dimension filters the data you request for all resources in a specified cluster. All Amazon ECS metrics are filtered by ClusterName.
ServiceName	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. This metric is only utilized on clusters with tasks or services using the Standard launch type and is not compatible with any using the Fargate launch type.

$$\text{Cluster CPU reservation} = \frac{(\text{Total CPU units reserved by tasks in cluster}) \times 100}{(\text{Total CPU units registered by container instances in cluster})}$$

$$\text{Cluster memory reservation} = \frac{(\text{Total MiB of memory reserved by tasks in cluster} \times 100)}{(\text{Total MiB of memory registered by container instances in cluster})}$$

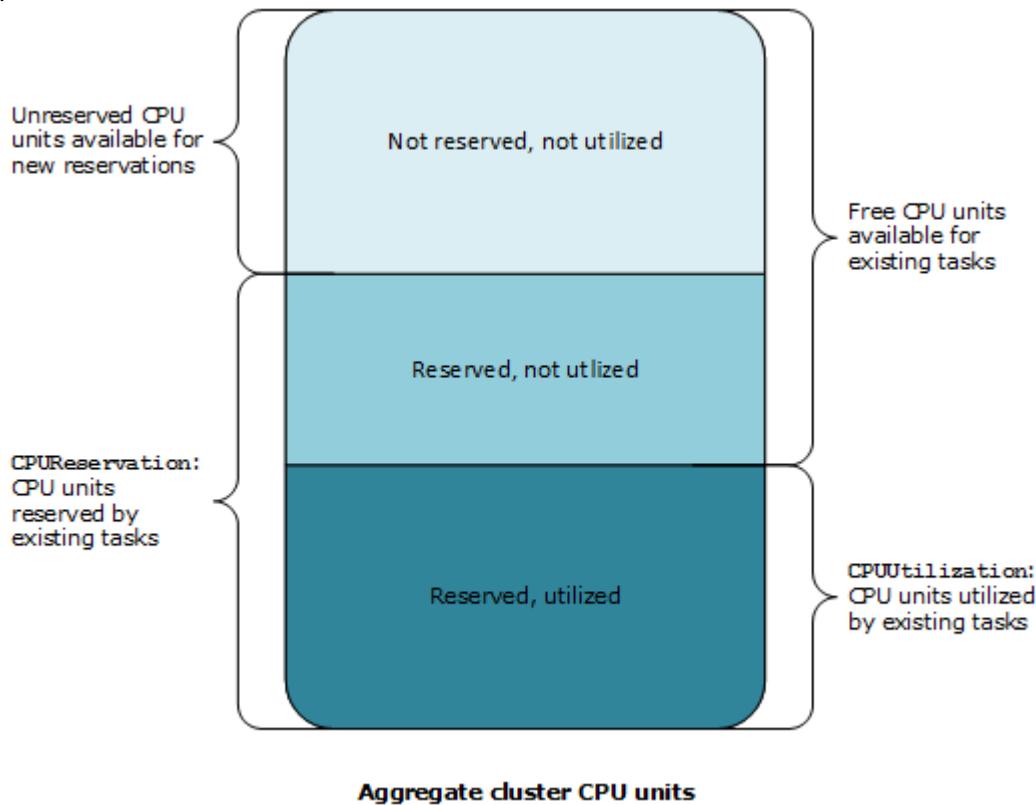
When you run a task in a cluster, Amazon ECS parses its task definition and reserves the aggregate CPU units and MiB of memory that is specified in its container definitions. Each minute, Amazon ECS calculates the number of CPU units and MiB of memory that are currently reserved for each task that is 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. 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, 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 \(p. 112\)](#) 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. This metric is only utilized on clusters with tasks or services using the Standard launch type and is not compatible with any using the Fargate launch type.

$$\text{Cluster CPU utilization} = \frac{(\text{Total CPU units used by tasks in cluster}) \times 100}{(\text{Total CPU units registered by container instances in cluster})}$$

$$\text{Cluster memory utilization} = \frac{(\text{Total MiB of memory used by tasks in cluster} \times 100)}{(\text{Total MiB of memory registered by container instances in cluster})}$$

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. This metric is compatible with services with tasks using both the Standard and Fargate launch types.

$$\text{Service CPU utilization} = \frac{\text{(Total CPU units used by tasks in service)} \times 100}{\text{(Total CPU units specified in task definition)} \times (\text{number of tasks in service})}$$

$$\text{Service memory utilization} = \frac{\text{(Total MiB of memory used by tasks in service)} \times 100}{\text{(Total MiB of memory specified in task definition)} \times (\text{number of tasks in service})}$$

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 specified 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 specifies a total of 512 CPU units and 1,024 MiB of memory (with the hard limit `memory` parameter) 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 total memory), and there are no other tasks running on the cluster. Although the task specifies 512 CPU units, 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 specified amount (2,048 / 512); however, the specified memory of 1,024 MiB is a hard limit and it cannot be exceeded, so in this case, service memory utilization cannot exceed 100%.

If the previous example used the soft limit `memoryReservation` instead of the hard limit `memory` parameter, the service's tasks could use more than the specified 1,024 MiB of memory if they needed to. In this case, the service's memory utilization could 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

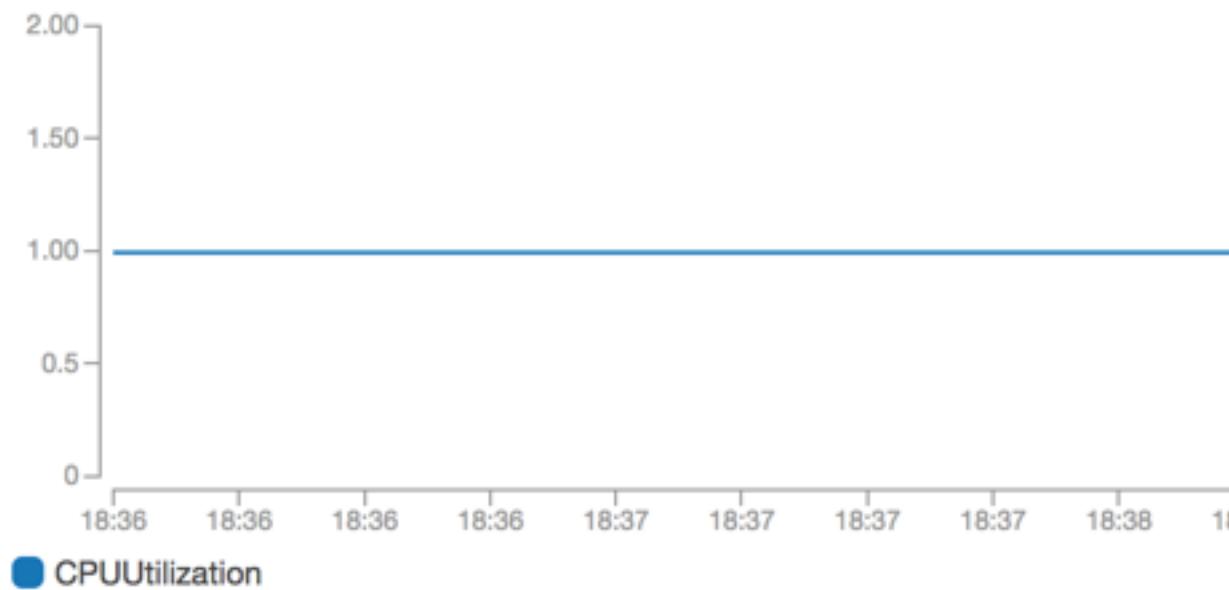
utilization. If the task is idle and using 128 CPU units and 128 MiB of memory, then the service reports 25% CPU utilization and 12.5% memory utilization.

## 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. Choose **Metrics** section on the navigation pane.
3. On the **All metrics** tab, choose **ECS**.
4. Choose **ClusterName, ServiceName** and choose any metric (either `CPUUtilization` or `MemoryUtilization`) that corresponds to the service to view running tasks in.
5. On the **Graphed metrics** tab, change the **Period** to **1 Minute** and the **Statistic** to **Sample Count**.
6. The value displayed in the graph indicates the number of `RUNNING` tasks in the service.



All metrics	Graphed metrics (1)	Graph options	
	Label	Namespace	Dimensions
	CPUUtilization	AWS/ECS	Dimensions (2)

## 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 \(p. 207\)](#)
- [Viewing Service Metrics in the Amazon ECS Console \(p. 207\)](#)
- [Viewing Amazon ECS Metrics in the CloudWatch Console \(p. 207\)](#)

## 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 \(p. 203\)](#) and [Cluster Utilization \(p. 204\)](#).

### 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 \(p. 205\)](#).

### 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.

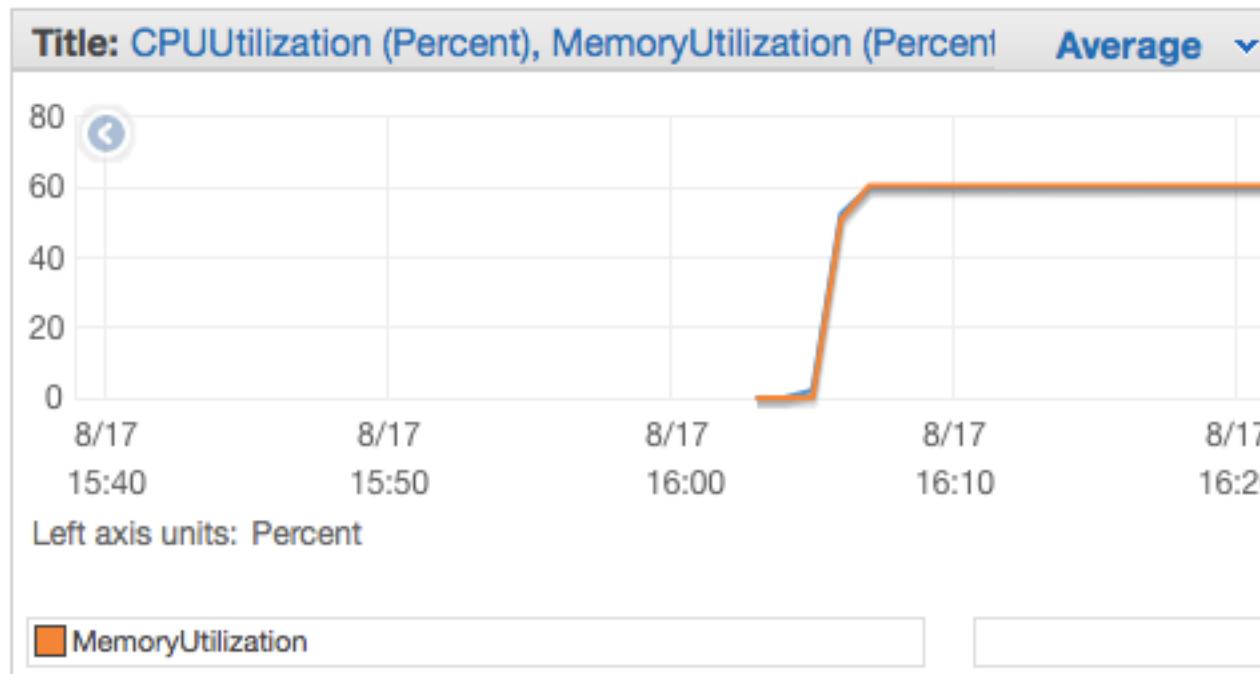
## Viewing Amazon ECS Metrics in the CloudWatch Console

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 \(p. 203\)](#), [Cluster Utilization \(p. 204\)](#), [Service Utilization \(p. 205\)](#), and the [Service RUNNING Task Count \(p. 206\)](#). 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 contain container instances 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. Amazon 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 \(p. 74\)](#).

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 \(p. 240\)](#).

## 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 Metrics > 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.

<b>Name:</b>	<input type="text" value="memory-above-75-pct"/>
<b>Description:</b>	<input type="text" value="Cluster memory reservation above 75%"/>
 <b>Whenever:</b> MemoryReservation	
is:	<input type="button" value="&gt;"/> <input type="text" value="75"/>
for:	<input type="text" value="1"/> 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-2017.09.d-amazon-ecs-optimized** AMI.

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

Region	AMI Name	AMI ID	EC2 console link
us-east-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-58f5db3d	<a href="#">Launch instance</a>
us-east-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-fad25980	<a href="#">Launch instance</a>
us-west-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-7114c909	<a href="#">Launch instance</a>
us-west-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-62e0d802	<a href="#">Launch instance</a>
eu-west-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-dbfeelbf	<a href="#">Launch instance</a>
eu-west-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-4cbe0935	<a href="#">Launch instance</a>
eu-central-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-05991b6a	<a href="#">Launch instance</a>
ap-northeast-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-7267c01c	<a href="#">Launch instance</a>

Region	AMI Name	AMI ID	EC2 console link
ap-northeast-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-56bd0030	<a href="#">Launch instance</a>
ap-southeast-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-14b55f76	<a href="#">Launch instance</a>
ap-southeast-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-1bdc8b78	<a href="#">Launch instance</a>
ca-central-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-918b30f5	<a href="#">Launch instance</a>

7. 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**.
8. 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 IAM Role \(p. 238\)](#).
  - **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**.
9. (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 \(p. 81\)](#).
10. Choose **Next: Add Storage**.
11. 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**.
12. 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**.
13. Review your launch configuration and choose **Create launch configuration**.
14. 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

1. 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.
2. 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 your Amazon ECS clusters. If your tasks are using the Fargate launch type you can see the state of your tasks. If your tasks are using the Standard launch type, you can see the state of both the container instances 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. 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 \(p. 218\)](#)

Events are relatively ordered, so that you can easily tell when an event occurred in relation to other events.

### Topics

- [Amazon ECS Events \(p. 213\)](#)
- [Handling Events \(p. 218\)](#)
- [Tutorial: Listening for Amazon ECS CloudWatch Events \(p. 220\)](#)
- [Tutorial: Sending Amazon Simple Notification Service Alerts for Task Stopped Events \(p. 221\)](#)

## Amazon ECS Events

Amazon ECS sends two types of events to CloudWatch Events: container instance events and task events. Container instance events are only sent if you are using the Standard launch type for our tasks. For tasks using the Fargate launch type you will only receive task state events. Amazon ECS tracks the state of 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 \(p. 214\)](#)
- [Task State Change Events \(p. 217\)](#)

## 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 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 Elastic Container Service API Reference*). For more information about CloudWatch Events parameters, see [Events and Event Patterns](#) in the *Amazon CloudWatch Events User Guide*.

```
{  
    "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 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 Elastic Container Service API Reference*). For more information about CloudWatch Events parameters, see [Events and Event Patterns](#) in the *Amazon CloudWatch Events User Guide*.

```
{
    "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/3305bea1-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",
        "group": "task-group",
        "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:

- *ECSCtrInstanceState*: 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 using Fargate \(p. 19\)](#) 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 Events 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 using Fargate \(p. 19\)](#) 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 \(p. 238\)](#). 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 \(p. 247\)](#). 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 \(p. 225\)](#)
- [Supported Resource-Level Permissions for Amazon ECS API Actions \(p. 228\)](#)
- [Creating Amazon ECS IAM Policies \(p. 231\)](#)
- [Managed Policies and Trust Relationships \(p. 231\)](#)
- [Amazon ECS Container Instance IAM Role \(p. 238\)](#)
- [Amazon ECS Task Execution IAM Role \(p. 241\)](#)
- [Using Service-Linked Roles for Amazon ECS \(p. 243\)](#)
- [Amazon ECS Service Scheduler IAM Role \(p. 247\)](#)
- [Amazon ECS Service Auto Scaling IAM Role \(p. 249\)](#)
- [Amazon EC2 Container Service Task Role \(p. 250\)](#)
- [CloudWatch Events IAM Role \(p. 251\)](#)
- [IAM Roles for Tasks \(p. 251\)](#)

- [Amazon ECS IAM Policy Examples \(p. 256\)](#)

## Policy Structure

The following topics explain the structure of an IAM policy.

### Topics

- [Policy Syntax \(p. 225\)](#)
- [Actions for Amazon ECS \(p. 226\)](#)
- [Amazon Resource Names for Amazon ECS \(p. 226\)](#)
- [Condition Keys for Amazon ECS \(p. 227\)](#)
- [Checking that Users Have the Required Permissions \(p. 228\)](#)

## 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 \(p. 226\)](#).
- **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 \(p. 226\)](#). For more information about which API actions support which ARNs, see [Supported Resource-Level Permissions for Amazon ECS API Actions \(p. 228\)](#). 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 \(p. 227\)](#).

For more information about example IAM policy statements for Amazon ECS, see [Creating Amazon ECS IAM Policies \(p. 231\)](#).

## 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 Elastic 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 \(p. 228\)](#).

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	arn:aws:ecs:*
All Amazon ECS resources owned by the specified account in the specified region	arn:aws:ecs:region:account:*
Cluster	arn:aws:ecs:region:account:cluster/ <i>cluster-name</i>
Container instance	arn:aws:ecs:region:account:container-instance/ <i>container-instance-id</i>
Task definition	arn:aws:ecs:region:account:task-definition/ <i>task-definition-family-name</i> : <i>task-definition-revision-number</i>
Service	arn:aws:ecs:region:account:service/ <i>service-name</i>
Task	arn:aws:ecs:region:account:task/ <i>task-id</i>
Container	arn:aws:ecs:region:account:container/ <i>container-id</i>

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 \(p. 228\)](#). For example policy statements for Amazon ECS, see [Creating Amazon ECS IAM Policies \(p. 231\)](#).

## 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  arn:aws:ecs: <i>region:account:container-instance/container-instance-id</i>	ecs:cluster
DeleteCluster	Cluster  arn:aws:ecs: <i>region:account:cluster/my-cluster</i>	N/A
DeregisterContainerInstance	Cluster  arn:aws:ecs: <i>region:account:cluster/my-cluster</i>	N/A
DescribeClusters	Cluster  arn:aws:ecs: <i>region:account:cluster/my-cluster1</i> , arn:aws:ecs: <i>region:account:cluster/my-cluster2</i>	N/A
DescribeContainerInstances	Container instance  arn:aws:ecs: <i>region:account:container-instance/container-instance-id1</i> , arn:aws:ecs: <i>region:account:container-instance/container-instance-id2</i>	ecs:cluster
DescribeTasks	Task  arn:aws:ecs: <i>region:account:task/1abf0f6d-a411-4033-b8eb-a4eed3ad252a</i> , arn:aws:ecs: <i>region:account:task/1abf0f6d-a411-4033-b8eb-a4eed3ad252b</i>	ecs:cluster
ListAttributes	Cluster  arn:aws:ecs: <i>region:account:cluster/my-cluster</i>	N/A
ListContainerInstances	Cluster  arn:aws:ecs: <i>region:account:cluster/my-cluster</i>	N/A
ListTasks	Container instance	ecs:cluster

API action	Resource	Condition keys
	arn:aws:ecs:region:account:container-instance/ <i>container-instance-id</i>	
Poll	Container instance  arn:aws:ecs:region:account:container-instance/ <i>container-instance-id</i>	ecs:cluster
PutAttributes	Container instance  arn:aws:ecs:region:account:container-instance/ <i>container-instance-id</i>	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/ <i>container-instance-id</i>	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/ <i>container-instance-id</i>	ecs:cluster
UpdateContainerInstances	Container instance  arn:aws:ecs:region:account:container-instance/ <i>container-instance-id</i>	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**, **Create policy**.
3. On the **Visual editor** tab, choose **Choose a Service** and select **EC2 Container Service**.
4. Choose **Select actions** and then choose the actions to add to the policy. For example policies, see [Amazon ECS IAM Policy Examples \(p. 256\)](#).
5. (Optional) Choose **Specify request conditions (optional)** to add conditions to the policy that you are creating. Conditions limit a JSON policy statement's effect. For example, you can specify that a user is allowed to perform the actions on the resources only when that user's request happens within a certain time range. You can also use commonly used conditions to limit whether a user must be authenticated using a multi-factor authentication (MFA) device, or if the request must originate from within a certain range of IP addresses. For lists of all of the context keys that you can use in a policy condition, see [AWS Service Actions and Condition Context Keys for Use in IAM Policies](#).
6. Choose **Review policy**.
7. In the **Name** field, type your own unique name, such as `AmazonECSUserPolicy`.
8. 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. Choose **Permissions**, **Add permissions**.
4. In the **Grant permissions** section, choose **Attach existing policies directly**.
5. Select the custom policy that you created in the previous procedure and choose **Next: Review**.
6. Review your details and choose **Add permissions** to finish.

# Managed Policies and Trust Relationships

Amazon ECS and Amazon ECR provide several managed policies and trust relationships that you can attach to IAM users, EC2 instances, and Amazon ECS tasks 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 and Trust Relationships \(p. 232\)](#)
- [Amazon ECR Managed Policies \(p. 237\)](#)

# Amazon ECS Managed Policies and Trust Relationships

Amazon ECS provides several managed policies and trust relationships that you can attach to IAM users, EC2 instances, or Amazon ECS tasks 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 Elastic Container Service API Reference*.

## Topics

- [AmazonECS\\_FullAccess](#) (p. 232)
  - [AmazonEC2ContainerServiceFullAccess](#) (p. 234)
  - [AmazonEC2ContainerServiceforEC2Role](#) (p. 235)
  - [AmazonEC2ContainerServiceRole](#) (p. 235)
  - [AmazonEC2ContainerServiceAutoscaleRole](#) (p. 236)
  - [AmazonEC2ContainerServiceTaskRole](#) (p. 236)
  - [AmazonEC2ContainerServiceEventsRole](#) (p. 237)

## AmazonECS\_FullAccess

This managed policy provides administrative access to Amazon ECS resources and enables ECS features through access to other AWS service resources, including VPCs, Auto Scaling groups, and AWS CloudFormation stacks.

```

        "ec2:CreateSecurityGroup",
        "ec2:CreateSubnet",
        "ec2:CreateVpc",
        "ec2:DeleteSubnet",
        "ec2:DeleteVpc",
        "ec2:Describe*",
        "ec2:DetachInternetGateway",
        "ec2:DisassociateRouteTable",
        "ec2:ModifySubnetAttribute",
        "ec2:ModifyVpcAttribute",
        "ec2:RequestSpotFleet",
        "elasticloadbalancing:CreateListener",
        "elasticloadbalancing:CreateLoadBalancer",
        "elasticloadbalancing:CreateRule",
        "elasticloadbalancing:CreateTargetGroup",
        "elasticloadbalancing:DeleteListener",
        "elasticloadbalancing:DeleteLoadBalancer",
        "elasticloadbalancing:DeleteRule",
        "elasticloadbalancing:DeleteTargetGroup",
        "elasticloadbalancing:DescribeListeners",
        "elasticloadbalancing:DescribeLoadBalancers",
        "elasticloadbalancing:DescribeRules",
        "elasticloadbalancing:DescribeTargetGroups",
        "ecs:*",
        "events:DescribeRule",
        "events:DeleteRule",
        "events>ListRuleNamesByTarget",
        "events>ListTargetsByRule",
        "events:PutRule",
        "events:PutTargets",
        "events:RemoveTargets",
        "iam>ListAttachedRolePolicies",
        "iam>ListInstanceProfiles",
        "iam>ListRoles"
    ],
    "Resource": [
        "*"
    ]
},
{
    "Effect": "Allow",
    "Action": [
        "ec2>DeleteInternetGateway",
        "ec2>DeleteRoute",
        "ec2>DeleteRouteTable",
        "ec2>DeleteSecurityGroup"
    ],
    "Resource": [
        "*"
    ],
    "Condition": {
        "StringLike": {
            "ec2:ResourceTag/aws:cloudformation:stack-name": "EC2ContainerService-"
        }
    }
},
{
    "Effect": "Allow",
    "Action": "iam>CreateServiceLinkedRole",
    "Resource": [
        "arn:aws:iam::*:role/aws-service-role/ecs.amazonaws.com/
AWSServiceRoleForECS*"
    ],
    "Condition": {
        "StringLike": {

```

```

        "iam:AWSServiceName": "ecs.amazonaws.com"
    }
}
{
    "Action": "iam:PassRole",
    "Effect": "Allow",
    "Resource": [
        "*"
    ],
    "Condition": {
        "StringLike": {
            "iam:PassedToService": "ecs-tasks.amazonaws.com"
        }
    }
},
{
    "Action": "iam:PassRole",
    "Effect": "Allow",
    "Resource": [
        "arn:aws:iam::*:role/ecsInstanceRole*"
    ],
    "Condition": {
        "StringLike": {
            "iam:PassedToService": ["ec2.amazonaws.com", "ec2.amazonaws.com.cn"]
        }
    }
},
{
    "Action": "iam:PassRole",
    "Effect": "Allow",
    "Resource": [
        "arn:aws:iam::*:role/ecsAutoscaleRole*"
    ],
    "Condition": {
        "StringLike": {
            "iam:PassedToService": ["application-autoscaling.amazonaws.com",
"application-autoscaling.amazonaws.com.cn"]
        }
    }
}
]
}

```

## AmazonEC2ContainerServiceFullAccess

This managed 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:*,"
            ]
        }
    ]
}
```

```
        "events:DescribeRule",
        "events>DeleteRule",
        "events>ListRuleNamesByTarget",
        "events>ListTargetsByRule",
        "events:PutRule",
        "events:PutTargets",
        "events:RemoveTargets",
        "iam:ListInstanceProfiles",
        "iam:ListRoles",
        "iam:PassRole"
    ],
    "Resource": "*"
}
]
}
```

## AmazonEC2ContainerServiceforEC2Role

This managed policy allows Amazon ECS container instances to make calls to AWS on your behalf. For more information, see [Amazon ECS Container Instance IAM Role \(p. 238\)](#).

```
{
    "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": "*"
        }
    ]
}
```

## AmazonEC2ContainerServiceRole

This managed 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 \(p. 247\)](#).

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "ec2>AuthorizeSecurityGroupIngress",
                "ec2>Describe*",
                "elasticloadbalancing>DeregisterInstancesFromLoadBalancer",
                "elasticloadbalancing>RegisterInstancesWithLoadBalancer"
            ],
            "Resource": "*"
        }
    ]
}
```

```
        "elasticloadbalancing:DeregisterTargets",
        "elasticloadbalancing:Describe*",
        "elasticloadbalancing:RegisterInstancesWithLoadBalancer",
        "elasticloadbalancing:RegisterTargets"
    ],
    "Resource": "*"
}
]
```

## AmazonEC2ContainerServiceAutoscaleRole

This managed 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 \(p. 249\)](#).

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "Stmt1456535218000",
            "Effect": "Allow",
            "Action": [
                "ecs:DescribeServices",
                "ecs:UpdateService"
            ],
            "Resource": [
                "*"
            ]
        },
        {
            "Sid": "Stmt1456535243000",
            "Effect": "Allow",
            "Action": [
                "cloudwatch:DescribeAlarms"
            ],
            "Resource": [
                "*"
            ]
        }
    ]
}
```

## AmazonEC2ContainerServiceTaskRole

This IAM trust relationship 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 \(p. 250\)](#).

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "",
            "Effect": "Allow",
            "Principal": {
                "Service": "ecs-tasks.amazonaws.com"
            },
            "Action": "sts:AssumeRole"
        }
    ]
}
```

## AmazonEC2ContainerServiceEventsRole

This policy allows CloudWatch Events to run tasks on your behalf. For more information, see [Scheduled Tasks \(cron\) \(p. 158\)](#).

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

## 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 Elastic Container Registry API Reference*.

### Topics

- [AmazonEC2ContainerRegistryFullAccess \(p. 237\)](#)
- [AmazonEC2ContainerRegistryPowerUser \(p. 237\)](#)
- [AmazonEC2ContainerRegistryReadOnly \(p. 238\)](#)

## AmazonEC2ContainerRegistryFullAccess

This managed policy allows full administrator access to Amazon ECR.

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

## AmazonEC2ContainerRegistryPowerUser

This managed 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 managed 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 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. 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. This role only applies if you are using the EC2 launch type.

### 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 \(p. 251\)](#).

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 \(p. 251\)](#)) 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 \(p. 107\)](#).

```
sudo iptables --insert FORWARD 1 --in-interface docker+ --destination 169.254.169.254/32 --jump DROP
```

You must save this `iptables` rule on your container instance for it to survive a reboot. For the Amazon ECS-optimized AMI, use the following command. For other operating systems, consult the documentation for that OS.

```
sudo service iptables save
```

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 role**.
3. Choose the **AWS service** role type, and then choose **EC2 Container Service**.
4. Choose the **EC2 Container Service** use case and then **Next: Permissions**.
5. In the **Attached permissions policy** section, select **AmazonEC2ContainerServiceRole** and then choose **Next: Review**.
6. For **Role name**, type `ecsInstanceRole` and optionally you can enter a description.
7. 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 \(p. 87\)](#).

### 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 \(p. 238\)](#).
4. Choose the **Permissions** tab, then **Attach policy**.
5. On the **Attach policy** page, type `s3` into the **Filter: Policy type** field to narrow the policy results.
6. 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 Task Execution IAM Role

The Amazon ECS container agent makes calls to the Amazon ECS API actions on your behalf, so it requires an IAM policy and role for the service to know that the agent belongs to you. The following actions are covered by the task execution role:

- Calls to Amazon ECR to pull the container image
- Calls to CloudWatch to store container application logs

The `AmazonEC2ContainerServiceTaskExecutionRole` policy is shown below.

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "ecr:GetAuthorizationToken",  
                "ecr:BatchCheckLayerAvailability",  
                "ecr:GetDownloadUrlForLayer",  
                "ecr:BatchGetImage",  
                "logs>CreateLogStream",  
                "logs:PutLogEvents"  
            ],  
            "Resource": "*"  
        }  
    ]}
```

```
    ]  
}
```

The Amazon ECS task execution role is automatically created for you in the console first-run experience; however, you should manually attach the managed IAM policy for tasks 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 task execution role and to attach the managed IAM policy if needed.

#### To check for the `ecsTaskExecutionRole` 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 `ecsTaskExecutionRole`. 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. Ensure that the **AmazonECSTaskExecutionRolePolicy** managed policy is attached to the role. If the policy is attached, your Amazon ECS task execution role is properly configured. If not, follow the substeps below to attach the policy.
  - a. Choose **Attach policy**.
  - b. In the **Filter** box, type **AmazonECSTaskExecutionRolePolicy** to narrow the available policies to attach.
  - c. Check the box to the left of the **AmazonECSTaskExecutionRolePolicy** policy and choose **Attach policy**.
5. Choose the **Trust relationships** tab, and **Edit trust relationship**.
6. 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": [  
        {  
            "Sid": "",  
            "Effect": "Allow",  
            "Principal": {  
                "Service": "ecs-tasks.amazonaws.com"  
            },  
            "Action": "sts:AssumeRole"  
        }  
    ]  
}
```

#### To create the `ecsTaskExecutionRole` IAM role

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles** and then choose **Create role**.
3. In the **Select type of trusted entity** section, choose **EC2 Container Service**.
4. For **Select your use case**, choose **EC2 Container Service Task**, then choose **Next: Permissions**.
5. In the **Attach permissions policy** section, search for **AmazonECSTaskExecutionRolePolicy** and select the policy and choose **Next: Review**.
6. For **Role Name**, type `ecsTaskExecutionRole` and choose **Create role**.

# Using Service-Linked Roles for Amazon ECS

Amazon Elastic Container Service uses AWS Identity and Access Management (IAM) [service-linked roles](#). A service-linked role is a unique type of IAM role that is linked directly to Amazon ECS. Service-linked roles are predefined by Amazon ECS and include all the permissions that the service requires to call other AWS services on your behalf.

A service-linked role makes setting up Amazon ECS easier because you don't have to manually add the necessary permissions. Amazon ECS defines the permissions of its service-linked roles, and unless defined otherwise, only Amazon ECS can assume its roles. The defined permissions include the trust policy and the permissions policy, and that permissions policy cannot be attached to any other IAM entity.

You can delete the roles only after first deleting their related resources. This protects your Amazon ECS resources because you can't inadvertently remove permission to access the resources.

For information about other services that support service-linked roles, see [AWS Services That Work with IAM](#) and look for the services that have **Yes** in the **Service-Linked Role** column. Choose a **Yes** with a link to view the service-linked role documentation for that service.

## Service-Linked Role Permissions for Amazon ECS

Amazon ECS uses the service-linked role named **AWSServiceRoleForECS – Role** to enable Amazon ECS to manage your cluster..

The **AWSServiceRoleForECS** service-linked role trusts the following services to assume the role:

- `ecs.amazonaws.com`

The role permissions policy allows Amazon ECS to complete the following actions on the specified resources:

- `ec2:AttachNetworkInterface` on all AWS resources that the API operation supports
- `ec2>CreateNetworkInterface` on all AWS resources that the API operation supports
- `ec2:CreateNetworkInterfacePermission` on all AWS resources that the API operation supports
- `ec2>DeleteNetworkInterface` on all AWS resources that the API operation supports
- `ec2:DeleteNetworkInterfacePermission` on all AWS resources that the API operation supports
- `ec2:Describe*` on all AWS resources that descriptive Amazon EC2 API operations support
- `ec2:DetachNetworkInterface` on all AWS resources that the API operation supports
- `elasticloadbalancing:DeregisterInstancesFromLoadBalancer` on all AWS resources that the API operation supports
- `elasticloadbalancing:DeregisterTargets` on all AWS resources that the API operation supports
- `elasticloadbalancing:Describe*` on all AWS resources that descriptive Elastic Load Balancing API operations support
- `elasticloadbalancing:RegisterInstancesWithLoadBalancer` on all AWS resources that the API operation supports
- `elasticloadbalancing:RegisterTargets` on all AWS resources that the API operation supports

You must configure permissions to allow an IAM entity (such as a user, group, or role) to create, edit, or delete a service-linked role.

### To allow an IAM entity to create the **AWSServiceRoleForECS** service-linked role

Add the following statement to the permissions policy for the IAM entity that needs to create the service-linked role:

```
{  
    "Effect": "Allow",  
    "Action": [  
        "iam:CreateServiceLinkedRole",  
        "iam:PutRolePolicy"  
    ],  
    "Resource": "arn:aws:iam::*:role/aws-service-role/ecs.amazonaws.com/  
AWSServiceRoleForECS*",  
    "Condition": {"StringLike": {"iam:AWSPropertyName": "ecs.amazonaws.com"}}  
}
```

#### To allow an IAM entity to edit the description of the AWSServiceRoleForECS service-linked role

Add the following statement to the permissions policy for the IAM entity that needs to edit the description of a service-linked role:

```
{  
    "Effect": "Allow",  
    "Action": [  
        "iam:UpdateRoleDescription"  
    ],  
    "Resource": "arn:aws:iam::*:role/aws-service-role/ecs.amazonaws.com/  
AWSServiceRoleForECS*",  
    "Condition": {"StringLike": {"iam:AWSPropertyName": "ecs.amazonaws.com"}}  
}
```

#### To allow an IAM entity to delete the AWSServiceRoleForECS service-linked role

Add the following statement to the permissions policy for the IAM entity that needs to delete a service-linked role:

```
{  
    "Effect": "Allow",  
    "Action": [  
        "iam>DeleteServiceLinkedRole",  
        "iam:GetServiceLinkedRoleDeletionStatus"  
    ],  
    "Resource": "arn:aws:iam::*:role/aws-service-role/ecs.amazonaws.com/  
AWSServiceRoleForECS*",  
    "Condition": {"StringLike": {"iam:AWSPropertyName": "ecs.amazonaws.com"}}  
}
```

## Creating a Service-Linked Role for Amazon ECS

Under most circumstances, you don't need to manually create a service-linked role. For example, when you create a new cluster (for example, with the Amazon ECS first run, the cluster creation wizard, or the AWS CLI or SDKs), or create or update a service in the AWS Management Console, Amazon ECS creates the service-linked role for you, if it does not already exist.

### Important

The IAM entity that is creating the cluster must have the appropriate IAM permissions to create the service-linked role and apply a policy to it. Otherwise, the automatic creation fails.

## Creating a Service-Linked Role in IAM (AWS CLI)

You can use IAM commands from the AWS Command Line Interface to create a service-linked role with the trust policy and inline policies that the service needs to assume the role.

### To create a service-linked role (CLI)

Use the following command:

```
$ aws iam create-service-linked-role --aws-service-name ecs.amazonaws.com
```

## Editing a Service-Linked Role for Amazon ECS

Amazon ECS does not allow you to edit the AWSServiceRoleForECS service-linked role. After you create a service-linked role, you cannot change the name of the role because various entities might reference the role. You can, however, edit the description of the role. For more information, see [Modifying a Role](#) in the [IAM User Guide](#).

## Deleting a Service-Linked Role for Amazon ECS

If you no longer use Amazon ECS, we recommend that you delete the role. That way you don't have an unused entity that is not actively monitored or maintained. However, you must delete all Amazon ECS clusters in all regions before you can delete the service-linked role.

### Cleaning up a Service-Linked Role

Before you can use IAM to delete a service-linked role, you must first confirm that the role has no active sessions and delete all Amazon ECS clusters in all AWS Regions.

#### To check whether the service-linked role has an active session

1. Open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane, choose **Roles** and choose the AWSServiceRoleForECS name (not the check box).
3. On the **Summary** page, choose **Access Advisor** and review recent activity for the service-linked role.

#### Note

If you are unsure whether Amazon ECS is using the AWSServiceRoleForECS role, you can try to delete the role. If the service is using the role, then the deletion fails and you can view the regions where the role is being used. If the role is being used, then you must wait for the session to end before you can delete the role. You cannot revoke the session for a service-linked role.

#### To remove Amazon ECS resources used by the AWSServiceRoleForECS service-linked role

You must delete all Amazon ECS clusters in all AWS Regions before you can delete the AWSServiceRoleForECS role.

1. Scale all Amazon ECS services down to a desired count of 0 in all regions, and then delete the services. For more information, see [Updating a Service \(p. 194\)](#) and [Deleting a Service \(p. 195\)](#).
2. Force deregister all container instances from all clusters in all regions. For more information, see [Deregister a Container Instance \(p. 67\)](#).
3. Delete all Amazon ECS clusters in all regions. For more information, see [Deleting a Cluster \(p. 29\)](#).

## Deleting a Service-Linked Role in IAM (Console)

You can use the IAM console to delete a service-linked role.

### To delete a service-linked role (console)

1. Sign in to the AWS Management Console and open the IAM console at <https://console.aws.amazon.com/iam/>.
2. In the navigation pane of the IAM console, choose **Roles**. Then select the check box next to **AWS*ServiceRoleForECS***, not the name or row itself.
3. For **Role actions** at the top of the page, choose **Delete role**.
4. In the confirmation dialog box, review the service last accessed data, which shows when each of the selected roles last accessed an AWS service. This helps you to confirm whether the role is currently active. If you want to proceed, choose **Yes, Delete** to submit the service-linked role for deletion.
5. Watch the IAM console notifications to monitor the progress of the service-linked role deletion. Because the IAM service-linked role deletion is asynchronous, after you submit the role for deletion, the deletion task can succeed or fail.
  - If the task succeeds, then the role is removed from the list and a notification of success appears at the top of the page.
  - If the task fails, you can choose **View details** or **View Resources** from the notifications to learn why the deletion failed. If the deletion fails because the role is using the service's resources, then the notification includes a list of resources, if the service returns that information. You can then [clean up the resources](#) and submit the deletion again.

#### Note

You might have to repeat this process several times, depending on the information that the service returns. For example, your service-linked role might use six resources and your service might return information about five of them. If you clean up the five resources and submit the role for deletion again, the deletion fails and the service reports the one remaining resource. A service might return all of the resources, a few of them, or it might not report any resources.

- If the task fails and the notification does not include a list of resources, then the service might not return that information. To learn how to clean up the resources for that service, see [AWS Services That Work with IAM](#). Find your service in the table, and choose the **Yes** link to view the service-linked role documentation for that service.

## Deleting a Service-Linked Role in IAM (AWS CLI)

You can use IAM commands from the AWS Command Line Interface to delete a service-linked role.

### To delete a service-linked role (CLI)

1. Because a service-linked role cannot be deleted if it is being used or has associated resources, you must submit a deletion request. That request can be denied if these conditions are not met. You must capture the `deletion-task-id` from the response to check the status of the deletion task. Type the following command to submit a service-linked role deletion request:

```
$ aws iam delete-service-linked-role --role-name AWSServiceRoleForECS+OPTIONAL-SUFFIX
```

2. Type the following command to check the status of the deletion task:

```
$ aws iam get-service-linked-role-deletion-status --deletion-task-id deletion-task-id
```

The status of the deletion task can be `NOT_STARTED`, `IN_PROGRESS`, `SUCCEEDED`, or `FAILED`. If the deletion fails, the call returns the reason that it failed so that you can troubleshoot. If the deletion fails because the role is using the service's resources, then the notification includes a list of resources, if the service returns that information. You can then [clean up the resources](#) and submit the deletion again.

**Note**

You might have to repeat this process several times, depending on the information that the service returns. For example, your service-linked role might use six resources and your service might return information about five of them. If you clean up the five resources and submit the role for deletion again, the deletion fails and the service reports the one remaining resource. A service might return all of the resources, a few of them, or it might not report any resources. To learn how to clean up the resources for a service that does not report any resources, see [AWS Services That Work with IAM](#). Find your service in the table, and choose the **Yes** link to view the service-linked role documentation for that service.

## Deleting a Service-Linked Role in IAM (AWSAPI)

You can use the IAM API to delete a service-linked role.

### To delete a service-linked role (API)

1. To submit a deletion request for a service-linked roll, call [DeleteServiceLinkedRole](#). In the request, specify the `AWSServiceRoleForECS` role name.

Because a service-linked role cannot be deleted if it is being used or has associated resources, you must submit a deletion request. That request can be denied if these conditions are not met. You must capture the `DeletionTaskId` from the response to check the status of the deletion task.

2. To check the status of the deletion, call [GetServiceLinkedRoleDeletionStatus](#). In the request, specify the `DeletionTaskId`.

The status of the deletion task can be `NOT_STARTED`, `IN_PROGRESS`, `SUCCEEDED`, or `FAILED`. If the deletion fails, the call returns the reason that it failed so that you can troubleshoot. If the deletion fails because the role is using the service's resources, then the notification includes a list of resources, if the service returns that information. You can then [clean up the resources](#) and submit the deletion again.

**Note**

You might have to repeat this process several times, depending on the information that the service returns. For example, your service-linked role might use six resources and your service might return information about five of them. If you clean up the five resources and submit the role for deletion again, the deletion fails and the service reports the one remaining resource. A service might return all of the resources, a few of them, or it might not report any resources. To learn how to clean up the resources for a service that does not report any resources, see [AWS Services That Work with IAM](#). Find your service in the table, and choose the **Yes** link to view the service-linked role documentation for that service.

## 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 role**.
3. In the **Select type of trusted entity** section, choose **EC2 Container Service**.
4. In the **Select your use case** section, choose **EC2 Container Service** and then choose **Next: Permissions**.
5. In the **Attached permissions policy** section, select the **AmazonEC2ContainerServiceRole** policy and then choose **Next: Review**.
6. For **Role Name**, type `ecsServiceRole`, enter a **Role description**, and then choose **Create role**.

## 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 \(p. 179\)](#). 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 \(p. 179\)](#) or [update service \(p. 194\)](#) 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 **Select Role Type** section, scroll down and choose **Select** next to the **Amazon Elastic Container Service Autoscale Role** service role.
4. In the **Attach Policy** section, select the **AmazonEC2ContainerServiceAutoscaleRole** policy and then choose **Next Step**.
5. In the **Role Name** field, type `ecsAutoscaleRole` to name the role, 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 trust relationship policy. For more information, see [Creating an IAM Role and Policy for your Tasks \(p. 254\)](#).

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"  
        }  
    ]  
}
```

## CloudWatch Events IAM Role

Before you can use Amazon ECS scheduled tasks with CloudWatch Events rules and targets, the CloudWatch Events service needs permission to run Amazon ECS tasks on your behalf. These permissions are provided by the CloudWatch Events IAM role (`ecsEventsRole`).

The CloudWatch Events role is created for you in the AWS Management Console when you configure a scheduled task. For more information, see [Scheduled Tasks \(cron\) \(p. 158\)](#).

The `AmazonEC2ContainerServiceEventsRole` policy is shown below.

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

## 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 are not prevented from accessing the credentials that are supplied to the container instance profile (through the Amazon EC2 instance metadata server). 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 \(p. 238\)](#). You can prevent containers on the docker0 bridge from accessing the credential information supplied to the container instance profile (while still allowing the permissions that are provided by the task role) by running the following **iptables** command on your container instances. However, containers will no longer 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 \(p. 107\)](#).

```
sudo iptables --insert FORWARD 1 --in-interface docker+ --destination 169.254.169.254/32 --jump DROP
```

You must save this **iptables** rule on your container instance for it to survive a reboot. For the Amazon ECS-optimized AMI, use the following command. For other operating systems, consult the documentation for that OS.

```
sudo service iptables save
```

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`.

### Note

When you specify an IAM role for a task, the AWS CLI or other SDKs in the containers for that task use the AWS credentials provided by the task role exclusively and they no longer inherit any IAM permissions from the container instance.

From inside the container, you can query the credentials with the following command:

```
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 \(p. 253\)](#) and [Using a Supported AWS SDK \(p. 255\)](#).

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 \(p. 353\)](#).

#### Topics

- [Benefits of Using IAM Roles for Tasks \(p. 253\)](#)
- [Enabling Task IAM Roles on your Container Instances \(p. 253\)](#)
- [Creating an IAM Role and Policy for your Tasks \(p. 254\)](#)
- [Using a Supported AWS SDK \(p. 255\)](#)
- [Specifying an IAM Role for your Tasks \(p. 255\)](#)

## 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 \(p. 74\)](#). 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 \(p. 32\)](#).

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 \(p. 81\)](#)):

`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 \(for Non-Amazon ECS-optimized AMIs\) \(p. 79\)](#). 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:

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

You must save these **iptables** rules on your container instance for them to survive a reboot. You can use the **iptables-save** and **iptables-restore** commands to save your **iptables** rules and restore them at boot. For more information, consult your specific operating system documentation.

## 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 **Select Role Type** section, choose **Select** next to the **Amazon EC2 Container Service Task Role** service role.
4. In the **Attach Policy** section, select the policy you want to use for your tasks (in this example `AmazonECSTaskS3BucketPolicy`), and then choose **Next Step**.
5. In the **Role Name** field, enter a name for your role. For this example, type `AmazonECSTaskS3BucketRole` to name the role, 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 \(p. 102\)](#).

### 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 \(p. 148\)](#).

## 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 \(p. 256\)](#)
  - [Clusters \(p. 258\)](#)
  - [Container Instances \(p. 259\)](#)
  - [Task Definitions \(p. 260\)](#)
  - [Run Tasks \(p. 260\)](#)
  - [Start Tasks \(p. 261\)](#)
  - [List and Describe Tasks \(p. 261\)](#)
  - [Create Services \(p. 262\)](#)
  - [Update Services \(p. 263\)](#)

## 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 \(p. 237\)](#).

```
"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:ListRolePolicies"
      ]
    }
  ]
}

```

```
    "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 Elastic 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](#) files ([Version 1](#) and [Version 2](#)), a popular open-source specification 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 support running modified copies of this software.

## Topics

- [Installing the Amazon ECS CLI \(p. 264\)](#)
- [Configuring the Amazon ECS CLI \(p. 265\)](#)
- [Migrating Configuration Files \(p. 267\)](#)
- [Amazon ECS CLI Tutorial \(p. 268\)](#)
- [Amazon ECS Command Line Reference \(p. 276\)](#)

## Installing the Amazon ECS CLI

Follow these instructions to install the Amazon ECS CLI on your macOS, Linux, or Windows system.

### To install the Amazon ECS CLI

1. Download the binary.

- For macOS:

```
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
```

- For Windows systems:

Open Windows PowerShell and run the following commands:

```
PS C:\> New-Item 'C:\Program Files\Amazon\ECSCLI' -type directory
PS C:\> Invoke-WebRequest -OutFile 'C:\Program Files\Amazon\ECSCLI\ecs-cli.exe'
https://s3.amazonaws.com/amazon-ecs-cli/ecs-cli-windows-amd64-latest.exe
```

## Note

If you encounter permission issues, ensure you are running PowerShell as Administrator.

2. (Optional) Verify the downloaded binary with the MD5 sum provided.

- For macOS (compare the two output strings to verify that they match):

```
curl -s https://s3.amazonaws.com/amazon-ecs-cli/ecs-cli-darwin-amd64-latest.md5 &&
md5 -q /usr/local/bin/ecs-cli
```

- For Linux systems (look for an OK in the output string):

```
echo "$(curl -s https://s3.amazonaws.com/amazon-ecs-cli/ecs-cli-linux-amd64-
latest.md5) /usr/local/bin/ecs-cli" | md5sum -c -
```

- For Windows systems:

Open Windows PowerShell and find the md5 hash of the executable you downloaded:

```
PS C:\> Get-FileHash ecs-cli.exe -Algorithm MD5
```

Compare that with this md5 hash:

```
PS C:\> Invoke-WebRequest -OutFile md5.txt https://
s3.amazonaws.com/amazon-ecs-cli/ecs-cli-windows-amd64-
latest.md5
PS C:\> Get-Content md5.txt
```

3. Apply execute permissions to the binary.

- For macOS and Linux systems:

```
sudo chmod +x /usr/local/bin/ecs-cli
```

- For Windows systems:

Edit the environment variables and add C:\Program Files\Amazon\ECSCLI to the PATH variable field, separated from existing entries by using a semicolon. For example:

```
C:\existing\path;C:\Program Files\Amazon\ECSCLI
```

Restart PowerShell (or the command prompt) so the changes will go into effect.

**Note**

Once the PATH variable is set, the ECS CLI can be used from either Windows PowerShell or the command prompt.

4. Verify that the CLI is working properly.

```
ecs-cli --version
```

5. Proceed to [Configuring the Amazon ECS CLI \(p. 265\)](#).

**Important**

You must configure the ECS CLI with your AWS credentials, an AWS region, and an Amazon ECS cluster name before you can use it.

## 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. Configuration information is stored in the `~/ .ecs` directory on macOS and Linux systems and in `C:\Users\<username>\AppData\local\ecs` on Windows systems.

### To configure the Amazon ECS CLI

1. Set up a CLI profile with the following command, substituting `profile_name` with your desired profile name, `$AWS_ACCESS_KEY_ID` and `$AWS_SECRET_ACCESS_KEY` environment variables with your AWS credentials.

```
ecs-cli configure profile --profile-name profile_name --access-key $AWS_ACCESS_KEY_ID  
--secret-key $AWS_SECRET_ACCESS_KEY
```

2. Complete the configuration with the following command, substituting `launch_type` with the launch type you want to use by default, `region_name` with your desired AWS region, `cluster_name` with the name of an existing Amazon ECS cluster or a new cluster to use, and `configuration_name` for the name you'd like to give this configuration.

```
ecs-cli configure --cluster cluster_name --default-launch-type launch_type --  
region region_name --config-name configuration_name
```

After you have installed and configured the CLI, you can try the [Amazon ECS CLI Tutorial \(p. 268\)](#). For more information, see the [Amazon ECS Command Line Reference \(p. 276\)](#).

## Profiles

The Amazon ECS CLI supports the configuring of multiple sets of AWS credentials as named *profiles* using the `ecs-cli configure profile` command. A default profile can be set by using the `ecs-cli configure profile default` command. These profiles can then be referenced when you run Amazon ECS CLI commands that require credentials using the `--ecs-profile` flag otherwise the default profile is used.

For more information, see [ecs-cli configure profile \(p. 281\)](#) and [ecs-cli configure profile default \(p. 283\)](#).

## Cluster Configurations

A cluster configuration is a set of fields that describes an Amazon ECS cluster including the name of the cluster and the region. A default cluster configuration can be set by using the `ecs-cli configure default` command. The Amazon ECS CLI supports the configuring of multiple named cluster configurations using the `--config-name` option.

For more information, see [ecs-cli configure \(p. 278\)](#) and [ecs-cli configure default \(p. 280\)](#).

## Order of Precedence

There are multiple methods for passing both the credentials and the region in an Amazon ECS CLI command. The following is the order of precedence for each of these.

The order of precedence for credentials is:

1. ECS CLI profile flags
  - a. ECS profile (`--ecs-profile`)
  - b. AWS profile (`--aws-profile`)
2. Environment variables
  - a. `ECS_PROFILE`

- b. AWS\_PROFILE
- c. AWS\_ACCESS\_KEY\_ID, AWS\_SECRET\_ACCESS\_KEY, and AWS\_SESSION\_TOKEN
3. ECS config-attempts to fetch credentials from the default ECS profile
4. Default AWS profile-attempts to use credentials (aws\_access\_key\_id, aws\_secret\_access\_key) or assume\_role (role\_arn, source\_profile) from the AWS profile name
  - a. AWS\_DEFAULT\_PROFILE environment variable (defaults to default)
5. EC2 Instance role

The order of precedence for region is:

1. ECS CLI flags
  - a. Region flag (--region)
  - b. Cluster config flag (--cluster-config)
2. ECS config-attempts to fetch the region from the default ECS profile
3. Environment variables-attempts to fetch the region from the following environment variables:
  - a. AWS\_REGION
  - b. AWS\_DEFAULT\_REGION
4. AWS profile-attempts to use the region from the AWS profile name
  - a. AWS\_PROFILE environment variable
  - b. AWS\_DEFAULT\_PROFILE environment variable (defaults to default)

## Migrating Configuration Files

The process of configuring the Amazon ECS CLI has changed significantly in the latest version (v1.0.0) to allow the addition of new features. A migration command has been introduced that converts an older (v0.6.6 and older) configuration file to the current format. The old configuration files are deprecated, we recommend converting your configuration to the newest format to take advantage of the new features. The configuration-related changes and new features introduced in v1.0.0 in the new YAML formatted configuration files include:

- Splitting up of credential and cluster-related configuration information into two separate files. Credential information is stored in `~/.ecs/credentials` and cluster configuration information is stored in `~/.ecs/config`.
- The configuration files are formatted in YAML.
- Support for storing multiple named configurations.
- Deprecation of the field `compose-service-name-prefix` (name used for creating a service `<compose_service_name_prefix> + <project_name>`). This field can still be configured. However, if it is not configured, there is no longer a default value assigned. For ECS CLI v0.6.6 and earlier, the default was `ecscompose-service-`.
- Removal of the field `compose-project-name-prefix` (name used for creating a task definition `<compose_project_name_prefix> + <project_name>`). Amazon ECS CLI v1.0.0 and later can still read old configuration files; so if this field is present then it is still read and used. However, configuring this field is not supported in v1.0.0+ with the `ecs-cli configure` command, and if the field is manually added to a v1.0.0+ configuration file it causes the Amazon ECS CLI to throw an error.
- The field `cfn-stack-name-prefix` (name used for creating CFN stacks `<cfn_stack_name_prefix> + <cluster_name>`) has been changed to `cfn-stack-name`. Instead of specifying a prefix, the exact name of a CloudFormation template can be configured.
- Amazon ECS CLI v0.6.6 and earlier allowed configuring credentials using a named AWS profile from the `~/.aws/credentials` file on your system. This functionality has been removed. However, a new

flag, `--aws-profile`, has been added which allows the referencing of an AWS profile inline in all commands that require credentials.

**Note**

The `--project-name` flag can be used to set the Project name.

## Migrating Older Configuration Files to the v1.0.0+ Format

While all versions of the Amazon ECS CLI support reading from the older configuration file format, upgrading to the new format is required to take advantage of some new features, for example using multiple named cluster profiles. Migrating your legacy configuration file to the new format is easy with the `ecs-cli configure migrate` command. The command takes the configuration information stored in the old format in `~/.ecs/config` and converts it to a pair of files in the new format, overwriting your old configuration file in the process.

When running the `ecs-cli configure migrate` command there is a warning message displayed with the old configuration file, and a preview of the new configuration files. User confirmation is required before the migration proceeds. If the `--force` flag is used, then the warning message is not displayed, and the migration proceeds without any confirmation. If `cfn-stack-name-prefix` is used in the legacy file, then `cfn-stack-name` is stored in the new file as `<cfn_stack_name_prefix> + <cluster_name>`.

For more information, see [ecs-cli configure migrate \(p. 283\)](#).

## Amazon ECS CLI Tutorial

These simple tutorials show a few of the different commands and capabilities of the Amazon ECS CLI. We provide tutorials using both the Fargate and EC2 launch types. Before you can start this tutorial, you must install and configure the Amazon ECS CLI. For more information, see [Installing the Amazon ECS CLI \(p. 264\)](#).

**Topics**

- [Amazon ECS CLI Tutorial using Fargate Launch Type \(p. 268\)](#)
- [Amazon ECS CLI Tutorial using EC2 Launch Type \(p. 272\)](#)

## Amazon ECS CLI Tutorial using Fargate Launch Type

This tutorial shows you how to set up a cluster and deploy a task using the Fargate launch type. It is expected that you have set up an AWS account, and have installed and configured the AWS CLI. For more information on how to configure your environment, see [AWS Command Line Interface](#).

### Step 1: Prerequisites

Amazon ECS needs permissions so that your Fargate task will be able to store logs in CloudWatch. Create a role policy ahead of time so it can be referenced later.

#### Create the Task Execution Role

1. Create a file named `execution-assume-role.json` with the following contents:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Sid": "",  
            "Effect": "Allow",  
            "Principal": {  
                "Service": "ecs-tasks.amazonaws.com"  
            },  
            "Action": "sts:AssumeRole"  
        }  
    ]  
}
```

2. Using the AWS CLI, create the task execution role:

```
aws iam --region us-east-1 create-role --role-name ecsExecutionRole --assume-role-policy-document file://execution-assume-role.json
```

3. Using the AWS CLI attach the task execution role policy:

```
aws iam --region us-east-1 attach-role-policy --role-name ecsExecutionRole --policy-arn arn:aws:iam::aws:policy/service-role/AmazonECSTaskExecutionRolePolicy
```

In order for CloudWatch logs to be collected from your Fargate tasks, you must create a CloudWatch log group:

### Create a CloudWatch Log Group

- Using the AWS CLI, create a CloudWatch log group:

```
aws logs create-log-group --log-group-name tutorial --region us-east-1
```

## Step 2: Configure the ECS CLI

The ECS CLI requires credentials in order to make API requests on your behalf. It can pull credentials from environment variables, an AWS profile, or an Amazon ECS profile. For more information see [Configuring the Amazon ECS CLI \(p. 265\)](#).

### Create an ECS CLI Configuration

1. Create a cluster configuration:

```
ecs-cli configure --cluster tutorial --region us-east-1 --default-launch-type FARGATE  
--config-name tutorial
```

2. Create a profile using your access key and secret key:

```
ecs-cli configure profile --access-key AWS_ACCESS_KEY_ID --secret-key AWS_SECRET_ACCESS_KEY --profile-name tutorial
```

#### Note

If this is the first time you are configuring the ECS CLI these configurations will be marked as default. If this is not your first time configuring the ECS CLI, see [ecs-cli configure](#)

[default \(p. 280\)](#) and [ecs-cli configure profile default \(p. 283\)](#) to set this as the default configuration and profile.

## Step 3: Create a Cluster and Security Group

Create an Amazon ECS cluster with the `ecs-cli up` command. Since you specified Fargate as your default launch type in the cluster configuration, this command will create an empty cluster and a VPC configured with two public subnets.

```
ecs-cli up
```

### Note

This command may take a few minutes to complete as your resources are created. Take note of the VPC and subnet IDs that are created as they will be used later.

Using the AWS CLI create a security group using the VPC ID from the previous output:

```
aws ec2 create-security-group --group-name "my-sg" --description "My security group" --vpc-id "VPC_ID"
```

Using AWS CLI, add a security group rule to allow inbound access on port 80:

```
aws ec2 authorize-security-group-ingress --group-id "security_group_id" --protocol tcp --port 80 --cidr 0.0.0.0/0
```

## Step 4: Create a Compose File

For this step, create a simple Docker compose file that creates a WordPress application. At this time, the Amazon ECS CLI supports [Docker compose file syntax](#) versions 1 and 2.

Here is the compose file, which you can call `docker-compose.yml`. The `wordpress` container exposes port 80 for inbound traffic to the web server. It also configures container logs to go to the CloudWatch log group created earlier. This is the recommended best practice for Fargate tasks.

```
version: '2'
services:
  wordpress:
    image: wordpress
    ports:
      - "80:80"
    logging:
      driver: awslogs
      options:
        awslogs-group: tutorial
        awslogs-region: us-east-1
        awslogs-stream-prefix: wordpress
```

In addition to the Docker compose information, there are some Amazon ECS specific parameters you need to specify for the service. Using the VPC, subnet, and security group IDs from the previous step, create a file named `ecs-params.yml` with the following content:

```
version: 1
task_definition:
  task_execution_role: ecsExecutionRole
```

```
ecs_network_mode: awsvpc
task_size:
  mem_limit: 0.5GB
  cpu_limit: 256
run_params:
  network_configuration:
    awsvpc_configuration:
      subnets:
        - "subnet ID 1"
        - "subnet ID 2"
      security_groups:
        - "security group ID"
  assign_public_ip: ENABLED
```

#### Note

The `assign_public_ip` and `task_size` parameters are only valid for a Fargate task. This task definition will fail if the launch type is changed to EC2.

## Step 5: Deploy the Compose File to a Cluster

After you create the compose file, you can deploy it to your cluster with `ecs-cli compose service up`. By default, the command looks for files called `docker-compose.yml` and `ecs-params.yml` in the current directory; you can specify a different docker compose file with the `--file` option, and a different ECS Params file with the `--ecs-params` option. By default, the resources created by this command have the current directory in their titles, but you can override that with the `--project-name` option.

```
ecs-cli compose --project-name tutorial service up
```

## Step 6: View the Running Containers on a Cluster

After you deploy the compose file, you can view the containers that are running in the service with `ecs-cli compose service ps`.

```
ecs-cli compose --project-name tutorial service ps
```

Output:

```
WARN[0000] Skipping unsupported YAML option...          option name=networks
WARN[0000] Skipping unsupported YAML option for service...  option name=networks service
name=wordpress
Name                           State    Ports TaskDefinition
a06a6642-12c5-4006-b1d1-033994580605/wordpress  RUNNING  54.146.193.73:80->80/tcp
  tutorial:9
```

In the above example, you can see the `wordpress` container from your compose file, and also the IP address and port of the web server. If you point your web browser at that address, you should see the WordPress installation wizard. Also in the output is the `task-id` of the container. Copy the task ID; you will use it in the next step.

## Step 7: View the Container Logs

View the logs for the task:

```
ecs-cli logs --task-id a06a6642-12c5-4006-b1d1-033994580605 --follow
```

**Note**

The `--follow` option tells the ECS CLI to continuously poll for logs.

## Step 8: Scale the Tasks on the Cluster

You can scale up your task count to increase the number of instances of your application with `ecs-cli compose service scale`. In this example, the running count of the application is increased to two.

```
ecs-cli compose --project-name tutorial service scale 2
```

Now you should see two more containers in your cluster:

```
ecs-cli compose --project-name tutorial service ps
```

Output:

```
WARN[0000] Skipping unsupported YAML option...          option name=networks
WARN[0000] Skipping unsupported YAML option for service...  option name=networks service
name=wordpress
Name                           State    Ports          TaskDefinition
880f09ed-613d-44bf-99bb-42ca44f82904/wordpress  RUNNING  34.224.60.24:80->80/tcp
tutorial:9
a06a6642-12c5-4006-b1d1-033994580/wordpress  RUNNING  54.146.193.73:80->80/tcp  tutorial:9
```

## Step 9: 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 --project-name tutorial service down
```

Now, take down your cluster, which cleans up the resources that you created earlier with `ecs-cli up`.

```
ecs-cli down --force
```

# Amazon ECS CLI Tutorial using EC2 Launch Type

## 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
```

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:

- `cap_add` (Not valid for tasks using the Fargate launch type)
- `cap_drop` (Not valid for tasks using the Fargate launch type)
- `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` (Not valid for tasks using the Fargate launch type)
- `log_driver` (Compose file version 1 only)
- `log_opt` (Compose file version 1 only)
- `logging` (Compose file version 2 only)
  - `driver`
  - `options`
- `mem_limit` (in bytes)
- `mem_reservation` (in bytes)
- `ports`
- `privileged` (Not valid for tasks using the Fargate launch type)
- `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
```

## 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
```

Name	State	Ports
TaskDefinition	RUNNING	
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
```

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                                         serviceName=ecscompose-service-
INFO[0000] Created an ECS Service             docker-compose taskDefinition=ecscompose-docker-compose:2
INFO[0000] Updated ECS service successfully    serviceName=ecscompose-service-docker-compose
INFO[0000] Describe ECS Service status        desiredCount=1
                                                 desiredCount=1 runningCount=0
                                                 serviceName=ecscompose-service-docker-compose
INFO[0015] ECS Service has reached a stable state
                                                 serviceName=ecscompose-service-docker-compose
                                                 desiredCount=1 runningCount=1
```

## 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           stackStatus=DELETE_IN_PROGRESS
INFO[0121] Deleted cluster                      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. List the help text for the Amazon ECS CLI by using the following command:

```
ecs-cli --help
```

### Available Commands

- [ecs-cli \(p. 277\)](#)
- [ecs-cli configure \(p. 278\)](#)
- [ecs-cli configure default \(p. 280\)](#)
- [ecs-cli configure profile \(p. 281\)](#)
- [ecs-cli configure profile default \(p. 283\)](#)
- [ecs-cli configure migrate \(p. 283\)](#)
- [ecs-cli up \(p. 284\)](#)
- [ecs-cli down \(p. 289\)](#)
- [ecs-cli scale \(p. 290\)](#)
- [ecs-cli logs \(p. 292\)](#)
- [ecs-cli ps \(p. 294\)](#)

- [ecs-cli push \(p. 295\)](#)
- [ecs-cli pull \(p. 297\)](#)
- [ecs-cli images \(p. 298\)](#)
- [ecs-cli license \(p. 301\)](#)
- [ecs-cli compose \(p. 301\)](#)
- [ecs-cli compose service \(p. 309\)](#)

## 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 \(p. 268\)](#).

Help text is available for each individual subcommand with **ecs-cli *subcommand* --help**.

### Syntax

```
ecs-cli [--version] [subcommand] [--help]
```

### Options

Name	Description
--version, -v	Prints the version information for the Amazon ECS CLI. Required: No
--help, -h	Show the help text for the specified command. 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 \(p. 278\)](#).

#### **migrate**

Migrates a legacy configuration file (ECS CLI v0.6.6 and older) to the new configuration file format (ECS CLI v1.0.0 and later). The command prints a summary of the changes to be made and then asks for confirmation to proceed. For more information, see [ecs-cli configure migrate \(p. 283\)](#).

#### **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 \(p. 284\)](#).

**down**

Deletes the AWS CloudFormation stack that was created by [ecs-cli up](#) and the associated resources. For more information, see [ecs-cli down \(p. 289\)](#).

**scale**

Modifies the number of container instances in an ECS cluster. For more information, see [ecs-cli scale \(p. 290\)](#).

**logs**

Retrieves container logs from CloudWatch Logs. Only valid for tasks that use the `awslogs` driver and has a log stream prefix specified. For more information, see [ecs-cli logs \(p. 292\)](#).

**ps**

Lists all of the running containers in an ECS cluster. For more information, see [ecs-cli ps \(p. 294\)](#).

**push**

Pushes an image to an Amazon ECR repository. For more information, see [ecs-cli push \(p. 295\)](#).

**pull**

Pulls an image from an ECR repository. For more information, see [ecs-cli pull \(p. 297\)](#).

**images**

Lists all of the running containers in an ECS cluster. For more information, see [ecs-cli images \(p. 298\)](#).

**license**

Prints the `LICENSE` files for the Amazon ECS CLI and its dependencies. For more information, see [ecs-cli license \(p. 301\)](#).

**compose**

Executes `docker-compose`-style commands on an ECS cluster. For more information, see [ecs-cli compose \(p. 301\)](#).

**help**

Shows the help text for the specified command.

## ecs-cli configure

### Description

Configures the AWS region to use, resource creation prefixes, and the ECS cluster name to use with the Amazon ECS CLI. Stores a single named cluster configuration in the `~/.ecs/config` file. The first cluster configuration that is created is set as the default.

### Working with Multiple Cluster Configurations

The following should be noted when using multiple cluster configurations:

- Multiple cluster configurations may be stored, but one is always the default.
- The first cluster configuration that is stored is set as the default.
- Use the `ecs-cli configure default` command to change which cluster configuration is set as the default. For more information, see [ecs-cli configure default \(p. 280\)](#)

- A non-default cluster configuration can be referenced in a command by using the `--cluster-config` flag.

For more information, see [ecs-cli configure default \(p. 280\)](#).

## Syntax

```
ecs-cli configure --cluster cluster_name --region region [--default-launch-type
launch_type] [--config-name config_name] [--cfn-stack-name stack_name] [--help]
```

## Options

Name	Description
<code>--cluster, -c <i>cluster_name</i></code>	<p>Specifies the ECS cluster name to use. Defaults to the cluster configured using the <code>configure</code> command.</p> <p>Type: String</p> <p>Required: Yes</p>
<code>--region, -r <i>region</i></code>	<p>Specifies the AWS region to use. Defaults to the cluster configured using the <code>configure</code> command.</p> <p>Type: String</p> <p>Required: Yes</p>
<code>--config-name <i>config_name</i></code>	<p>Specifies the name of this cluster configuration. This is the name that can be referenced in commands using the <code>--cluster-config</code> flag. If this option is omitted, then the name is set to <code>default</code>.</p> <p>Type: String</p> <p>Required: No</p>
<code>--cfn-stack-name <i>stack_name</i></code>	<p>Specifies the stack name to add to the AWS CloudFormation stack that is created on <code>ecs-cli up</code>.</p> <p><b>Important</b>          It is not recommended to use this parameter. It is included to ensure backwards compatibility with previous versions of the ECS CLI.</p> <p>Type: String</p> <p>Default: <code>amazon-ecs-cli-setup-&lt;cluster_name&gt;</code></p> <p>Required: No</p>
<code>--default-launch-type <i>launch_type</i></code>	<p>Specifies the default launch type to use. Valid values are <code>FARGATE</code> or <code>EC2</code>. If not specified, no default launch type is used. For more information about launch types, see <a href="#">Amazon ECS Launch Types (p. 133)</a>.</p> <p>Type: String</p> <p>Required: No</p>

Name	Description
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example configures the Amazon ECS CLI to create a cluster configuration named `ecs-cli-demo`, which uses `FARGATE` as the default launch type for cluster `ecs-cli-demo` in the `us-west-2` region.

```
ecs-cli configure --region us-west-2 --cluster ecs-cli-demo --default-launch-type FARGATE
--config-name ecs-cli-demo
```

Output:

```
INFO[0000] Saved ECS CLI cluster configuration ecs-cli-demo.
```

Contents of the `~/.ecs/config` file after running the command:

```
version: v1
default: fargate
clusters:
  ecs-cli-demo:
    cluster: ecs-cli-demo
    region: us-west-2
    default_launch_type: "FARGATE"
```

## ecs-cli configure default

### Description

Sets the cluster configuration to be read from by default.

#### Note

Unlike the AWS CLI, the Amazon ECS CLI does not expect or require that the default configuration be named `default`. The name of a configuration does not determine whether it is default.

### Syntax

```
ecs-cli configure default --config-name config_name
```

### Options

Name	Description
--config-name config_name	Specifies the name of the cluster configuration to use by default in subsequent commands.

Name	Description
	Type: String  Required: Yes
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example configures the Amazon ECS CLI to set the `ecs-cli-demo` cluster configuration as the default.

```
ecs-cli configure default --config-name ecs-cli-demo
```

There is no output if the command is successful.

## ecs-cli configure profile

### Description

Configures your AWS credentials in a named Amazon ECS profile, which is stored in the `~/.ecs/credentials` file. If multiple profiles are created, you can change the profile used by default with the **ecs-cli configure profile default** command. For more information, see [ecs-cli configure profile default \(p. 283\)](#).

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 profile**, the values of those variables are stored in the Amazon ECS CLI configuration file.
- You can pass credentials directly on the command line with the `--access-key` and `--secret-key` options.
- You can provide the name of a new profile with the `--profile-name` flag. If a profile name is not provided, then the profile is named `default`.
- The first profile configured is set as the default profile. The Amazon ECS CLI uses credentials specified in this profile unless the `--ecs-profile` flag is used.

## Working with Multiple Profiles

The following should be noted when using multiple profiles:

- Multiple profiles may be configured, but one is always the default. This profile is used when an Amazon ECS CLI command is run that requires credentials.
- The first profile that is created is set as the default profile.
- To change the default profile, use the `ecs-cli configure profile default` command. For more information, see [ecs-cli configure profile default \(p. 283\)](#).

- A non-default profile can be referenced in a command using the `--ecs-profile` flag.

## Syntax

```
ecs-cli configure profile --profile-name profile_name --access-key
aws_access_key_id --secret-key aws_secret_access_key
```

## Options

Name	Description
<code>--profile-name <i>profile_name</i></code>	<p>Specifies the name of this ECS profile. This is the name that can be referenced in commands using the <code>--ecs-profile</code> flag. If this option is omitted, then the name is set to <code>default</code>.</p> <p>Type: String</p> <p>Required: Yes</p>
<code>--access-key <i>aws_access_key_id</i></code>	<p>Specifies the AWS access key to use. If the <code>AWS_ACCESS_KEY_ID</code> environment variable is set when <code>ecs-cli configure profile</code> is run, then the AWS access key ID is set to the value of that environment variable.</p> <p>Type: String</p> <p>Required: Yes</p>
<code>--secret-key <i>aws_secret_access_key</i></code>	<p>Specifies the AWS secret key to use. If the <code>AWS_SECRET_ACCESS_KEY</code> environment variable is set when <code>ecs-cli configure profile</code> is run, then the AWS secret access key is set to the value of that environment variable.</p> <p>Type: String</p> <p>Required: Yes</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 profile named `default` with a set of access keys.

```
ecs-cli configure profile --profile-name default --access-key $AWS_ACCESS_KEY_ID --secret-key $AWS_SECRET_ACCESS_KEY
```

Output:

```
INFO[0000] Saved ECS CLI profile configuration default.
```

## ecs-cli configure profile default

### Description

Sets the Amazon ECS profile to be read from by default.

### Syntax

```
ecs-cli configure profile default --profile-name profile_name
```

### Options

Name	Description
--profile-name <i>profile_name</i>	Specifies the name of the ECS profile to be marked as default.  Type: String  Required: Yes
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example configures the Amazon ECS CLI to set the `default` profile as the default profile to be used.

```
ecs-cli configure profile default --profile-name default
```

There is no output if the command is successful.

## ecs-cli configure migrate

### Description

Migrates a legacy configuration file (ECS CLI v0.6.6 and older) to the new configuration file format (ECS CLI v1.0.0 and later). The command prints a summary of the changes that will be made and then asks for confirmation to proceed.

### Syntax

```
ecs-cli configure migrate [--force]
```

### Options

Name	Description
--force	Omits the interactive description and confirmation step that normally occurs during the configuration file migration.

Name	Description
	Required: No
--help, -h	Shows the help text for the specified command. Required: No

## Examples

### Example

This example migrates the legacy Amazon ECS CLI configuration file to the new YAML format.

```
ecs-cli configure migrate
```

## ecs-cli up

### Description

Creates 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 [--verbose] [--capability-iam | --instance-role
instance-profile-name] [--keypair keypair_name] [--size n] [--azs
availability_zone_1,availability_zone_2] [--security-group
security_group_id[,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] [--launch-type launch_type] [--no-associate-
public-ip-address] [--force] [--cluster cluster_name] [--region region] [--
help]
```

### Options

Name	Description
--verbose, --debug	Provides more verbose output for debugging purposes. Required: No
--capability-iam	Acknowledges that this command may create IAM resources. This option is only used if using tasks with the EC2 launch type.  This parameter is required if you do not specify an instance profile name with --instance-role. You cannot specify both options. Required: No

Name	Description
--keypair <i>keypair_name</i>	<p>Specifies the name of an existing Amazon EC2 key pair to enable SSH access to the EC2 instances in your cluster. This option is only used if using tasks with the EC2 launch type.</p> <p>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>.</p> <p>Type: String</p> <p>Required: No</p>
--size <i>n</i>	<p>Specifies the number of instances to launch and register to the cluster. This option is only used if using tasks with the EC2 launch type.</p> <p>Type: Integer</p> <p>Default: 1</p> <p>Required: No</p>
--azs <i>availability_zone_1,availability_zone_2</i>	<p>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 --vpc option.</p> <p><b>Warning</b> Leaving this option blank can result in a failure to launch container instances when the randomly chosen zone is unavailable .</p> <p>Type: String</p> <p>Required: No</p>
--security-group <i>security_group_id[,security_group_id...]</i>	<p>Specifies a comma-separated list of existing security groups 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>
--cidr <i>ip_range</i>	<p>Specifies a CIDR/IP range for the security group to use for container instances in your cluster.</p> <p><b>Note</b> This parameter is ignored if an existing security group is specified with the --security-group option.</p> <p>Type: CIDR/IP range</p> <p>Default: 0.0.0.0/0</p> <p>Required: No</p>

Name	Description
--port <i>port_number</i>	<p>Specifies a port to open on the security group to use for container instances in your cluster.</p> <p><b>Note</b> This parameter is ignored if an existing security group is specified with the --security-group option.</p> <p>Type: Integer</p> <p>Default: 80</p> <p>Required: No</p>
--subnets <i>subnet_1,subnet_2</i>	<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 --vpc option.</p>
--vpc <i>vpc_id</i>	<p>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 --subnets option. If you do not specify a VPC ID, a new VPC is created with two subnets.</p> <p>Type: String</p> <p>Required: No</p>
--instance-type <i>instance_type</i>	<p>Specifies the EC2 instance type for your container instances. This option is only used if using tasks with the EC2 launch type.</p> <p>For more information on EC2 instance types, see <a href="#">Amazon EC2 Instances</a>.</p> <p>Type: String</p> <p>Default: t2.micro</p> <p>Required: No</p>
--image-id <i>ami_id</i>	<p>Specifies the Amazon EC2 AMI ID to use for your container instances. This option is only used if using tasks with the EC2 launch type.</p> <p>Type: String</p> <p>Default: The latest Amazon ECS-optimized AMI for the specified region.</p> <p>Required: No</p>

Name	Description
--no-associate-public-ip-address	<p>Do not assign public IP addresses to new instances in this VPC. Unless this option is specified, new instances in this VPC receive an automatically assigned public IP address. This option is only used if using tasks with the EC2 launch type.</p> <p>Required: No</p>
--force, -f	<p>Forces the recreation of any existing resources that match your current configuration. This option is useful for cleaning up stale resources from previous failed attempts.</p> <p>Required: No</p>
--instance-role, -f <i>instance-profile-name</i>	<p>Specifies a custom IAM instance profile name for instances in your cluster. This option is only used if using tasks with the EC2 launch type.</p> <p>This parameter is required if you do not specify the --capability-iam option. You cannot specify both options.</p> <p>Required: No</p>
--launch-type <i>launch_type</i>	<p>Specifies the launch type to use. Available options are FARGATE or EC2. For more information about launch types, see <a href="#">Amazon ECS Launch Types (p. 133)</a>.</p> <p>This overrides the default launch type stored in your cluster configuration.</p> <p>Type: String</p> <p>Required: No</p>
--cluster, -c <i>cluster_name</i>	<p>Specifies the ECS cluster name to use. Defaults to the cluster configured using the <b>configure</b> command.</p> <p>Type: String</p> <p>Required: No</p>
--region, -r <i>region</i>	<p>Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.</p> <p>Type: String</p> <p>Required: No</p>
--cluster-config <i>cluster_config_name</i>	<p>Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.</p> <p>Type: String</p> <p>Required: No</p>

Name	Description
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code> .  Type: String  Required: No
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Creating a Cluster to Use with Tasks That Will Use the EC2 Launch Type

This example brings up a cluster of four `c4.large` instances and configures them to use the EC2 key pair called `id_rsa`.

```
ecs-cli up --keypair keypair_name --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
Cluster creation succeeded.
VPC created: vpc-abcd1234
Security Group created: sg-abcd1234
Subnets created: subnet-abcd1234
Subnets created: subnet-dcba4321
```

### Creating a Cluster to Use with Tasks That Will Use the Fargate Launch Type

This example brings up a cluster for your Fargate tasks and creates a new VPC with two subnets.

```
ecs-cli up --launch-type FARGATE --capability-iam
```

Output:

```
INFO[0001] Created cluster                                     cluster=ecs-cli-demo region=us-west-2
INFO[0003] Waiting for your cluster resources to be created...
INFO[0003] Cloudformation stack status                         stackStatus="CREATE_IN_PROGRESS"
```

```
INFO[0066] Waiting for your cluster resources to be created...
INFO[0066] Cloudformation stack status stackStatus="CREATE_IN_PROGRESS"
Cluster creation succeeded.
VPC created: vpc-abcd1234
Subnets created: subnet-abcd1234
Subnets created: subnet-dcba4321
```

## 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 \(p. 22\)](#) to remove them and then delete your cluster.

### Syntax

```
ecs-cli down --force [--cluster cluster_name] [--region region] [--help]
```

### Options

Name	Description
<b>--force, -f</b>	Acknowledges that this command permanently deletes resources.  Required: Yes
<b>--cluster, -c <i>cluster_name</i></b>	Specifies the ECS cluster name to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
<b>--region, -r <i>region</i></b>	Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
<b>--cluster-config <i>cluster_config_name</i></b>	Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.

Name	Description
	Type: String  Required: No
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code> .  Type: String  Required: No
--help, -h	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 [--cluster cluster_name] [--region region] [--help]
```

## Options

Name	Description
--capability-iam	Acknowledges that this command may create IAM resources.  Required: Yes
--size <i>n</i>	Specifies the number of instances to maintain in your cluster.  Type: Integer  Required: Yes
--cluster, -c <i>cluster_name</i>	Specifies the ECS cluster name to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
--region, -r <i>region</i>	Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
--cluster-config <i>cluster_config_name</i>	Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.  Type: String  Required: No
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code> .  Type: String  Required: No
--help, -h	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 logs

### Description

Retrieves container logs from CloudWatch Logs. Only valid for tasks that use the awslogs driver and have a log stream prefix specified.

### Syntax

```
ecs-cli logs --task-id task_id [--task-def task_definition] [--follow]
[--filter-pattern search_string] [--since n_minutes] [--start-time
2006-01-02T15:04:05+07:00] [--end-time 2006-01-02T15:04:05+07:00] [--timestamps] [--help]
```

### Options

Name	Description
--cluster, -c <i>cluster_name</i>	Specifies the ECS cluster name to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
--region, -r <i>region</i>	Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
--task-id <i>task_id</i>	Prints the logs for this ECS task.  Type: String  Required: Yes
--task-def <i>task_definition</i>	Specifies the name or full Amazon Resource Name (ARN) of the ECS task definition associated with the task ID. This is only needed if the task has been stopped.  Type: String

Name	Description
	Required: No
--follow	Specifies if the logs should be streamed.  Required: No
--filter-pattern <i>search_string</i>	Specifies the substring to search for within the logs.  Type: String  Required: No
--since <i>n</i>	Returns logs newer than a relative duration in minutes. Can't be used with --start-time.  Type: Integer  Required: No
--start-time <i>timestamp</i>	Returns logs after a specific date (format: RFC 3339. Example: 2006-01-02T15:04:05+07:00). Cannot be used with --since flag.  Required: No
--end-time <i>timestamp</i>	Returns logs before a specific date (format: RFC 3339. Example: 2006-01-02T15:04:05+07:00). Cannot be used with --follow.  Required: No
--timestamps	Specifies if time stamps are shown on each line in the log output.  Required: No
--cluster-config <i>cluster_config_name</i>	Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.  Type: String  Required: No
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in ~/.aws/credentials.  Type: String  Required: No

Name	Description
--help, -h	Shows the help text for the specified command.  Required: No

## Examples

### Example

This example prints the log for a task.

```
ecs-cli logs --task-id task_id
```

The contents of the log is in the output if successful.

## ecs-cli ps

### Description

Lists all running containers in your ECS cluster.

The IP address displayed by the Amazon ECS CLI depends heavily upon how you have configured your task and cluster:

- For tasks using the EC2 launch type without task networking - the IP address shown is the public IP address of the Amazon EC2 instance running your task, or the instances private IP if it lacks a public IP address.
- For tasks using the EC2 launch type with task networking - the ECS CLI only shows a private IP address obtained from the network interfaces section of the Describe Task output for the task.
- For tasks using the Fargate launch type - the Amazon ECS CLI returns the public IP assigned to the elastic network instance attached to the Fargate task. If the elastic network instance lacks a public IP, then the Amazon ECS CLI falls back to the private IP obtained from the network interfaces section of the Describe Task output.

## Syntax

```
ecs-cli ps [--cluster cluster_name] [--region region] [--help]
```

### Options

Name	Description
--cluster, -c <i>cluster_name</i>	Specifies the ECS cluster name to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
--region, -r <i>region</i>	Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String

Name	Description
	Required: No
--cluster-config <i>cluster_config_name</i>	Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.  Type: String  Required: No
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code> .  Type: String  Required: No
--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] [--region region] 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
--region, -r <i>region</i>	Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code> .  Type: String  Required: No
--cluster-config <i>cluster_config_name</i>	Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.  Type: String  Required: No
--help, -h	Shows the help text for the specified command.  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
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] [--region region] 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
--region, -r <i>region</i>	Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.  Type: String  Required: No
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code> .  Type: String  Required: No
--cluster-config <i>cluster_config_name</i>	Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.  Type: String

Name	Description
	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] [--region region] [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
--region, -r <i>region</i>	Specifies the AWS region to use. Defaults to the cluster configured using the <code>configure</code> command.

Name	Description
	Type: String  Required: No
--ecs-profile <i>ecs_profile</i>	Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.  Type: String  Required: No
--aws-profile <i>aws_profile</i>	Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code> .  Type: String  Required: No
--cluster-config <i>cluster_config_name</i>	Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.  Type: String  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:b38267a51fb4460699bc2bcd53d42fec697bb4e4f9a819df3e762cec393b2a	17 minutes ago		
40.1 MB			
amazon-ecs-sample	latest		
sha256:bf04071a8edecc309f4d109ae36f24a5c272a115b6f7e636f77940059024d71c	2 weeks ago		
105 MB			
golang	latest		
sha256:137b22efee2df470b0cd28ebfc1ae583be0baf09334a5a882096193577d983ab	4 days ago		
266 MB			
amazonlinux	latest		
sha256:a59d563b5139deee8cb108bfb97bf3e9021b8cce6dec8ff49733230cb2f0eca	4 days ago		
98.8 MB			
awsbatch/fetch_and_run	latest		
sha256:543800007416d0ccff4f63643bb18eff4b874ea772128efcdc231ff456a37fc	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	PUSHED AT	IMAGE DIGEST	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:b38267a51fb4460699bc2bcd53d42fec697bb4e4f9a819df3e762cec393b2a	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 \(p. 309\)](#).

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:

- `cap_add` (Not valid for tasks using the Fargate launch type)
- `cap_drop` (Not valid for tasks using the Fargate launch type)
- `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` (Not valid for tasks using the Fargate launch type)
- `log_driver` (Compose file version 1 only)
- `log_opt` (Compose file version 1 only)
- `logging` (Compose file version 2 only)
  - `driver`
  - `options`
- `mem_limit` (in bytes)
- `mem_reservation` (in bytes)
- `ports`
- `privileged` (Not valid for tasks using the Fargate launch type)
- `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.

## Using Amazon ECS Parameters

Since there are certain fields in an Amazon ECS task definition that do not correspond to fields in a Docker compose file, you can specify those values using the `--ecs-params` flag. By default, the command looks for an ECS params file in the current directory, called `ecs-params.yml`. Currently, the file supports the follow schema:

```
version: 1
task_definition:
  ecs_network_mode: string
  task_role_arn: string
  task_execution_role: string
  task_size:
    cpu_limit: string
    mem_limit: string
  services:
    <service_name>:
      essential: boolean
run_configuration:
  network_configuration:
    awsvpc_configuration:
      subnets:
        - subnet_id1
        - subnet_id2
      security_groups:
        - secgroup_id1
        - secgroup_id2
      assign_public_ip: ENABLED
```

The fields listed under `task_definition` correspond to fields to be included in your Amazon ECS task definition. The following are descriptions for each:

- `ecs_network_mode` - Corresponds to `networkMode` in an ECS task definition. Supported values are `none`, `bridge`, `host`, or `awsvpc`. If not specified, this defaults to `bridge`. If you are using task networking, this field must be set to `awsvpc`. For more information, see [Network Mode \(p. 107\)](#).
- `task_role_arn` - the name or full ARN of an IAM role to be associated with the task. For more information, see [Task Role \(p. 107\)](#).
- `task_execution_role` - the name or full ARN of the task execution role. This is a required field if you want your tasks to be able to store container application logs in CloudWatch or allow your tasks to pull container images from Amazon ECR. For more information, see [Amazon ECS Task Execution IAM Role \(p. 241\)](#).
- `task_size` - the CPU and memory values for the task. If using the EC2 launch type, this field is optional and any value can be used. If using the Fargate launch type, this field is required and you must use one of the following sets of values for the `cpu` and `memory` parameters.

CPU value	Memory value
256 (.25 vCPU)	512MB, 1GB, 2GB
512 (.5 vCPU)	1GB, 2GB, 3GB, 4GB
1024 (1 vCPU)	2GB, 3GB, 4GB, 5GB, 6GB, 7GB, 8GB
2048 (2 vCPU)	Between 4GB and 16GB in 1GB increments
4096 (4 vCPU)	Between 8GB and 30GB in 1GB increments

For more information, see [Task Size \(p. 125\)](#).

- **services** - corresponds to the services listed in your Docker compose file, with `service_name` matching the name of the container to run. Its fields are merged into a container definition. The only field you can specify on it is `essential`. If not specified, the value for `essential` defaults to `true`.

The fields listed under `run_params` are for values needed as options to API calls not specifically related to a task definition, such as `compose up` (RunTask) and `compose service up` (CreateService). Currently, the only supported parameter under `run_params` is `network_configuration`, which is a required parameter to use task networking. It is required when using tasks with the Fargate launch type.

- `network_configuration` - required field if you specified `awsvpc` for `ecs_network_mode`. It uses one nested parameter, `awsvpc_configuration`, which has the following subfields:
  - `subnets` - list of subnet IDs used to associate with your tasks. The listed subnets must be in the same VPC and Availability Zone as the instances on which to launch your tasks.
  - `security_groups` - list of security group IDs to associate with your tasks. The listed security must be in the same VPC as the instances on which to launch your tasks.
  - `assign_public_ip` - supported values for this field are `ENABLED` or `DISABLED`. This field is only used for tasks using the Fargate launch type. If this field is present in tasks using task networking with the EC2 launch type, the request fails.

## Syntax

```
ecs-cli compose [--verbose] [--file compose-file] [--project-name project-name]
[--task-role-arn role_value] [--cluster cluster_name] [--region region] [--ecs-
params ecs-params.yml] [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 <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 <code>ecs-cli compose</code> is run, then the Docker compose file is set to the value of that environment variable.

Name	Description
	<p>Type: String</p> <p>Default: ./docker-compose.yml</p> <p>Required: No</p>
--project-name, -p <i>project-name</i>	<p>Specifies the project name to use. If the COMPOSE_PROJECT_NAME 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.</p> <p>Type: String</p> <p>Default: The current directory name.</p> <p>Required: No</p>
--task-role-arn <i>role_value</i>	<p>Specifies the short name or full Amazon Resource Name (ARN) of the IAM role that containers in this task can assume. All containers in this task are granted the permissions that are specified in this role.</p> <p>Type: String</p> <p>Required: No</p>
--ecs-params	<p>Specifies the ECS parameters that are not native to Docker compose files. For more information, see <a href="#">Using Amazon ECS Parameters (p. 303)</a>.</p> <p>Default: ./ecs-params.yml</p> <p>Required: No</p>
--cluster, -c <i>cluster_name</i>	<p>Specifies the ECS cluster name to use. Defaults to the cluster configured using the <b>configure</b> command.</p> <p>Type: String</p> <p>Required: No</p>
--region, -r <i>region</i>	<p>Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.</p> <p>Type: String</p> <p>Required: No</p>
--ecs-profile <i>ecs_profile</i>	<p>Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.</p> <p>Type: String</p> <p>Required: No</p>

Name	Description
--aws-profile <i>aws_profile</i>	<p>Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in <code>~/.aws/credentials</code>.</p> <p>Type: String</p> <p>Required: No</p>
--cluster-config <i>cluster_config_name</i>	<p>Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.</p> <p>Type: String</p> <p>Required: No</p>
--help, -h	<p>Shows the help text for the specified command.</p> <p>Type: Boolean</p> <p>Required: No</p>

## Available Subcommands

The **ecs-cli compose** command supports the following subcommands. Each of these subcommands have their own flags associated with them, which can be displayed using the `--help` flag.

### **create**

Creates an ECS task definition from your compose file.

### **ps, list**

Lists all the containers in your cluster that were started by the compose project.

### **run [containerName] ["command ..." ...]**

Starts all containers overriding commands with the supplied one-off commands for the containers.

### **scale *n***

Scales the number of running tasks to the specified count.

### **start**

Starts a single task from the task definition created from your compose file.

### **stop, down**

Stops all the running tasks created by the compose project.

### **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**)

### **service [*subcommand*]**

Creates an ECS service from your compose file. For more information, see [ecs-cli compose service \(p. 309\)](#).

### **help**

Shows the help text for the specified command.

## Examples

### Register a Task Definition

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
```

### Register a Task Definition Using the EC2 Launch Type without Task Networking

This example creates a task definition with the project name `hello-world` from the `hello-world.yml` compose file with additional ECS parameters specified.

Example `ecs-params.yml` file:

```
version: 1
task_definition:
  ecs_network_mode: host
  task_role_arn: myCustomRole
services:
  my_service:
    essential: false
```

```
ecs-cli compose --project-name hello-world --file hello-world.yml --ecs-params ecs-params.yml create
```

Output:

```
INFO[0000] Using ECS task definition TaskDefinition=ecscompose-hello-world:5
```

### Register a Task Definition Using the EC2 Launch Type with Task Networking

This example creates a task definition with the project name `hello-world` from the `hello-world.yml` compose file. Additional ECS parameters are specified for task and network configuration for the EC2 launch type. Then one instance of the task is run using the EC2 launch type.

Example ECS params file:

```
version: 1
task_definition:
  ecs_network_mode: awsvpc
  services:
    my_service:
      essential: false

run_params:
  network_configuration:
```

```
awsvpc_configuration:
  subnets:
    - subnet-abcd1234
    - subnet-dcba4321
  security_groups:
    - sg-abcd1234
    - sg-dcba4321
```

Command:

```
ecs-cli compose --project-name hello-world --file hello-world.yml --ecs-params ecs-params.yml create
```

Output:

INFO[0000] Using ECS task definition	TaskDefinition=ecscompose-hello-world:5
--------------------------------------	---

## Register a Task Definition Using the Fargate Launch Type with Task Networking

This example creates a task definition with the project name `hello-world` from the `hello-world.yml` compose file. Additional ECS parameters are specified for task and network configuration for the Fargate launch type. Then one instance of the task is run using the Fargate launch type.

Example ECS params file:

```
version: 1
task_definition:
  ecs_network_mode: awsvpc
  task_execution_role: ecsTaskExecutionRole
  task_size:
    cpu_limit: 512
    mem_limit: 2GB
  services:
    my_service:
      essential: false

run_params:
  network_configuration:
    awsvpc_configuration:
      subnets:
        - subnet-abcd1234
        - subnet-dcba4321
      security_groups:
        - sg-abcd1234
        - sg-dcba4321
      assign_public_ip: ENABLED
```

Command:

```
ecs-cli compose --project-name hello-world --file hello-world.yml --ecs-params ecs-params.yml up --launch-type FARGATE
```

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 \(p. 301\)](#).

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 and service from a compose file, the task definition and service are called [`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:

- `cap_add` (Not valid for tasks using the Fargate launch type)
- `cap_drop` (Not valid for tasks using the Fargate launch type)
- `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` (Not valid for tasks using the Fargate launch type)
- `log_driver` (Compose file version 1 only)
- `log_opt` (Compose file version 1 only)

- logging (Compose file version 2 only)
  - driver
  - options
- mem\_limit (in bytes)
- mem\_reservation (in bytes)
- ports
- privileged (Not valid for tasks using the Fargate launch type)
- 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
--verbose, --debug	<p>Increases the verbosity of command output to aid in diagnostics.</p> <p>Required: No</p>
--file, -f <i>compose-file</i>	<p>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 COMPOSE_FILE 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.</p> <p>Type: String</p> <p>Default: ./docker-compose.yml</p> <p>Required: No</p>
--project-name, -p <i>project-name</i>	<p>Specifies the project name to use. If the COMPOSE_PROJECT_NAME 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.</p> <p>Type: String</p>

Name	Description
	<p>Default: The current directory name.</p> <p>Required: No</p>
--task-role-arn <i>role_value</i>	<p>Specifies the short name or full Amazon Resource Name (ARN) of the IAM role that containers in this task can assume. All containers in this task are granted the permissions that are specified in this role.</p> <p>Type: String</p> <p>Required: No</p>
--ecs-params	<p>Specifies the ECS parameters that are not native to Docker compose files. For more information, see <a href="#">Using Amazon ECS Parameters (p. 303)</a>.</p> <p>Default: ./ecs-params.yml</p> <p>Required: No</p>
--cluster, -c <i>cluster_name</i>	<p>Specifies the ECS cluster name to use. Defaults to the cluster configured using the <b>configure</b> command.</p> <p>Type: String</p> <p>Required: No</p>
--region, -r <i>region</i>	<p>Specifies the AWS region to use. Defaults to the cluster configured using the <b>configure</b> command.</p> <p>Type: String</p> <p>Required: No</p>
--ecs-profile <i>ecs_profile</i>	<p>Specifies the name of the ECS profile configuration to use. Defaults to the profile configured using the <b>configure profile</b> command.</p> <p>Type: String</p> <p>Required: No</p>
--aws-profile <i>aws_profile</i>	<p>Specifies the AWS profile to use. Enables you to use the AWS credentials from an existing named profile in ~/.aws/credentials.</p> <p>Type: String</p> <p>Required: No</p>
--cluster-config <i>cluster_config_name</i>	<p>Specifies the name of the ECS cluster configuration to use. Defaults to the cluster configuration set as the default.</p> <p>Type: String</p> <p>Required: No</p>

Name	Description
--help, -h	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*] [--launch-type *launch\_type*]**

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 \(p. 164\)](#) and [minimumHealthyPercent \(p. 164\)](#).

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 \(p. 165\)](#). 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 \(p. 170\)](#).

- 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*] [--timeout *value*] [--launch-type *launch\_type*]**

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 \(p. 164\)](#) and [minimumHealthyPercent \(p. 164\)](#).

The `--timeout` option specifies the timeout value in minutes (decimals supported) to wait for the running task count to change. If the running task count has not changed for the specified period of time, then the CLI times out and returns an error. Setting the timeout to 0 will cause the command to return without checking for success. The default timeout value is 5 minutes.

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 \(p. 165\)](#). 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 \(p. 170\)](#).

- 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, list**

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*] [--timeout *value*] *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 \(p. 164\)](#) and [minimumHealthyPercent \(p. 164\)](#).

The `--timeout` option specifies the timeout value in minutes (decimals supported) to wait for the running task count to change. If the running task count has not changed for the specified period of time, then the CLI times out and returns an error. Setting the timeout to 0 will cause the command to return without checking for success. The default timeout value is 5 minutes.

**stop [--timeout *value*]**

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.

The `--timeout` option specifies the timeout value in minutes (decimals supported) to wait for the running task count to change. If the running task count has not changed for the specified period of

time, then the CLI times out and returns an error. Setting the timeout to 0 will cause the command to return without checking for success. The default timeout value is 5 minutes.

**rm, delete, down [--timeout *value*]**

Updates the desired count of the service to 0 and then deletes the service.

The --timeout option specifies the timeout value in minutes (decimals supported) to wait for the running task count to change. If the running task count has not changed for the specified period of time, then the CLI times out and returns an error. Setting the timeout to 0 will cause the command to return without checking for success. The default timeout value is 5 minutes.

**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[0000] Using ECS task definition           TaskDefinition="ecscompose-hello-
world:7"
INFO[0000] Created an ECS service             service=ecscompose-service-hello-
world taskDefinition="ecscompose-hello-world:7"
INFO[0000] Updated ECS service successfully     desiredCount=1
       serviceName=ecscompose-service-hello-world
INFO[0015] (service ecscompose-service-hello-world) has started 1 tasks: (task
       682dc22f-8bfa-4c28-b6f8-3a916bd8f86a). timestamp=2017-08-18 21:16:00 +0000 UTC
INFO[0060] Service status                      desiredCount=1 runningCount=1
       serviceName=ecscompose-service-hello-world
INFO[0060] ECS Service has reached a stable state
       serviceName=ecscompose-service-hello-world      desiredCount=1 runningCount=1
```

### 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[0000] Updated ECS service successfully     desiredCount=2
       serviceName=ecscompose-service-hello-world
INFO[0000] Service status                      desiredCount=2 runningCount=1
       serviceName=ecscompose-service-hello-world
INFO[0030] (service ecscompose-service-hello-world) has started 1 tasks: (task
       80602da8-442c-48ea-a8a9-80328c302b89). timestamp=2017-08-18 21:17:44 +0000 UTC
INFO[0075] Service status                      desiredCount=2 runningCount=2
       serviceName=ecscompose-service-hello-world
INFO[0075] ECS Service has reached a stable state
       serviceName=ecscompose-service-hello-world      desiredCount=2 runningCount=2
```

## 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] Service status                         desiredCount=0 runningCount=2
serviceName=ecscompose-service-hello-world
INFO[0015] Service status                         desiredCount=0 runningCount=0
serviceName=ecscompose-service-hello-world
INFO[0015] (service ecscompose-service-hello-world) has stopped 2 running tasks: (task
682dc22f-8bfa-4c28-b6f8-3a916bd8f86a) (task 80602da8-442c-48ea-a8a9-80328c302b89).
timestamp=2017-08-18 21:25:28 +0000 UTC
INFO[0015] ECS Service has reached a stable state      desiredCount=0 runningCount=0
serviceName=ecscompose-service-hello-world
INFO[0015] Deleted ECS service                      service=ecscompose-service-hello-
world
INFO[0015] 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
```

# Using the AWS CLI with Amazon ECS

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/>.

The following steps will help you set up an Amazon ECS cluster using either a Fargate or EC2 task:

## Topics

- [AWS CLI Walkthrough with a Fargate Task \(p. 316\)](#)
- [AWS CLI Walkthrough with an EC2 Task \(p. 322\)](#)

## AWS CLI Walkthrough with a Fargate Task

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 \(p. 256\)](#) IAM policy example.

[Step 1: \(Optional\) Create a Cluster \(p. 316\)](#)

[Step 2: Register a Task Definition \(p. 317\)](#)

[Step 3: List Task Definitions \(p. 319\)](#)

[Step 4: Create a Service \(p. 319\)](#)

[Step 5: List Services \(p. 320\)](#)

[Step 6: Describe the Running Service \(p. 320\)](#)

## Step 1: (Optional) Create a Cluster

By default, your account receives a default cluster.

### 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 fargate-cluster
```

Output:

```
{
  "cluster": {
    "status": "ACTIVE",
    "statistics": [],
    "clusterName": "fargate-cluster",
    "registeredContainerInstancesCount": 0,
    "pendingTasksCount": 0,
    "runningTasksCount": 0,
    "activeServicesCount": 0,
    "clusterArn": "arn:aws:ecs:region:aws_account_id:cluster/fargate-cluster"
  }
}
```

## Step 2: 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 creates a PHP web app. For more information about the available task definition parameters, see [Amazon ECS Task Definitions \(p. 100\)](#).

```
{
  "family": "sample-fargate",
  "networkMode": "awsvpc",
  "containerDefinitions": [
    {
      "name": "fargate-app",
      "image": "httpd:2.4",
      "portMappings": [
        {
          "containerPort": 80,
          "hostPort": 80,
          "protocol": "tcp"
        }
      ],
      "essential": true,
      "entryPoint": [
        "sh",
        "-c"
      ],
      "command": [
        "/bin/sh -c \'echo '<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> </div></body></
html>' > /usr/local/apache2/htdocs/index.html && httpd-foreground\'"
      ]
    }
  ],
  "requiresCompatibilities": [
    "FARGATE"
  ],
  "cpu": "256",
  "memory": "512"
}
```

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/fargate-task.json
```

The **register-task-definition** returns a description of the task definition after it completes its registration.

```
{
    "taskDefinition": {
        "status": "ACTIVE",
        "networkMode": "awsvpc",
        "family": "sample-fargate",
        "placementConstraints": [],
        "requiresAttributes": [
            {
                "name": "com.amazonaws.ecs.capability.docker-remote-api.1.18"
            },
            {
                "name": "ecs.capability.task-eni"
            }
        ],
        "cpu": "256",
        "compatibilities": [
            "EC2",
            "FARGATE"
        ],
        "volumes": [],
        "memory": "512",
        "requiresCompatibilities": [
            "FARGATE"
        ],
        "taskDefinitionArn": "arn:aws:ecs:region:aws_account_id:task-definition/sample-fargate:2",
        "containerDefinitions": [
            {
                "environment": [],
                "name": "fargate-app",
                "mountPoints": [],
                "image": "httpd:2.4",
                "cpu": 0,
                "portMappings": [
                    {
                        "protocol": "tcp",
                        "containerPort": 80,
                        "hostPort": 80
                    }
                ],
                "entryPoint": [
                    "sh",
                    "-c"
                ],
                "command": [
                    "/bin/sh -c \"echo '<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> </div></body></html>' > /usr/local/apache2/htdocs/index.html && httpd-foreground\""
                ],
                "essential": true,
                "volumesFrom": []
            }
        ]
    }
}
```

```
        ],
        "revision": 2
    }
}
```

## Step 3: 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:ecs:region:aws_account_id:task-definition/sample-fargate:1",
        "arn:aws:ecs:region:aws_account_id:task-definition/sample-fargate:2"
    ]
}
```

## Step 4: Create a Service

After you have registered a task for your account, you can create a service for the registered task in your cluster. For this example, we will create a service where at least 2 instances of the `sample-fargate:1` task definition will be kept running in your cluster.

```
aws ecs create-service --cluster fargate-cluster --service-name fargate-service --
task-definition sample-fargate:1 --desired-count 2 --launch-type "FARGATE" --network-
configuration "awsvpcConfiguration={subnets=[subnet-abcd1234],securityGroups=[sg-
abcd1234]}"
```

Output:

```
{
    "service": {
        "status": "ACTIVE",
        "taskDefinition": "arn:aws:ecs:region:aws_account_id:task-definition/sample-
fargate:1",
        "pendingCount": 0,
        "launchType": "FARGATE",
        "loadBalancers": [],
        "roleArn": "arn:aws:iam::aws_account_id:role/aws-service-role/ecs.amazonaws.com/
AWSServiceRoleForECS",
        "placementConstraints": [],
        "createdAt": 1510811361.128,
        "desiredCount": 2,
        "networkConfiguration": {
            "awsvpcConfiguration": {
                "subnets": [
                    "subnet-abcd1234"
                ],
                "securityGroups": [
                    "sg-abcd1234"
                ],
                "assignPublicIp": "DISABLED"
            }
        }
    }
}
```

```
        },
        "platformVersion": "LATEST",
        "serviceName": "fargate-service",
        "clusterArn": "arn:aws:ecs:region:aws_account_id:cluster/fargate-cluster",
        "serviceArn": "arn:aws:ecs:region:aws_account_id:service/fargate-service",
        "deploymentConfiguration": {
            "maximumPercent": 200,
            "minimumHealthyPercent": 100
        },
        "deployments": [
            {
                "status": "PRIMARY",
                "networkConfiguration": {
                    "awsvpcConfiguration": {
                        "subnets": [
                            "subnet-abcd1234"
                        ],
                        "securityGroups": [
                            "sg-abcd1234"
                        ],
                        "assignPublicIp": "DISABLED"
                    }
                },
                "pendingCount": 0,
                "launchType": "FARGATE",
                "createdAt": 1510811361.128,
                "desiredCount": 2,
                "taskDefinition": "arn:aws:ecs:region:aws_account_id:task-definition/
sample-fargate:1",
                "updatedAt": 1510811361.128,
                "platformVersion": "0.0.1",
                "id": "ecs-svc/9223370526043414679",
                "runningCount": 0
            }
        ],
        "events": [],
        "runningCount": 0,
        "placementStrategy": []
    }
}
```

## Step 5: List Services

List the services for your cluster. You should see the service that you created in the previous section. You can take the service name or the full ARN that is returned from this command and use it to describe the service later.

```
aws ecs list-services --cluster fargate-cluster
```

Output:

```
{
    "serviceArns": [
        "arn:aws:ecs:region:aws_account_id:service/fargate-service"
    ]
}
```

## Step 6: Describe the Running Service

Describe the service using the service name retrieved earlier to get more information about the task.

```
aws ecs describe-services --cluster fargate-cluster --services fargate-service
```

Output:

```
{  
    "services": [  
        {  
            "status": "ACTIVE",  
            "taskDefinition": "arn:aws:ecs:region:aws_account_id:task-definition/sample-fargate:1",  
            "pendingCount": 2,  
            "launchType": "FARGATE",  
            "loadBalancers": [],  
            "roleArn": "arn:aws:iam::aws_account_id:role/aws-service-role/ecs.amazonaws.com/AWSServiceRoleForECS",  
            "placementConstraints": [],  
            "createdAt": 1510811361.128,  
            "desiredCount": 2,  
            "networkConfiguration": {  
                "awsvpcConfiguration": {  
                    "subnets": [  
                        "subnet-abcd1234"  
                    ],  
                    "securityGroups": [  
                        "sg-abcd1234"  
                    ],  
                    "assignPublicIp": "DISABLED"  
                }  
            },  
            "platformVersion": "LATEST",  
            "serviceName": "fargate-service",  
            "clusterArn": "arn:aws:ecs:region:aws_account_id:cluster/fargate-cluster",  
            "serviceArn": "arn:aws:ecs:region:aws_account_id:service/fargate-service",  
            "deploymentConfiguration": {  
                "maximumPercent": 200,  
                "minimumHealthyPercent": 100  
            },  
            "deployments": [  
                {  
                    "status": "PRIMARY",  
                    "networkConfiguration": {  
                        "awsvpcConfiguration": {  
                            "subnets": [  
                                "subnet-abcd1234"  
                            ],  
                            "securityGroups": [  
                                "sg-abcd1234"  
                            ],  
                            "assignPublicIp": "DISABLED"  
                        }  
                    },  
                    "pendingCount": 2,  
                    "launchType": "FARGATE",  
                    "createdAt": 1510811361.128,  
                    "desiredCount": 2,  
                    "taskDefinition": "arn:aws:ecs:region:aws_account_id:task-definition/sample-fargate:1",  
                    "updatedAt": 1510811361.128,  
                    "platformVersion": "0.0.1",  
                    "id": "ecs-svc/9223370526043414679",  
                    "runningCount": 0  
                }  
            ],  
            "events": [  
            ]  
        }  
    ]  
}
```

```
{  
    "message": "(service fargate-service) has started 2 tasks: (task  
53c0de40-ea3b-489f-a352-623bf1235f08) (task d0aec985-901b-488f-9fb4-61b991b332a3).",  
    "id": "92b8443e-67fb-4886-880c-07e73383ea83",  
    "createdAt": 1510811841.408  
},  
{  
    "message": "(service fargate-service) has started 2 tasks: (task  
b4911bee-7203-4113-99d4-e89ba457c626) (task cc5853e3-6e2d-4678-8312-74f8a7d76474).",  
    "id": "d85c6ec6-a693-43b3-904a-a997e1fc844d",  
    "createdAt": 1510811601.938  
},  
{  
    "message": "(service fargate-service) has started 2 tasks: (task  
cba86182-52bf-42d7-9df8-b744699e6cfc) (task f4c1ad74-a5c6-4620-90cf-2aff118df5fc).",  
    "id": "095703e1-0ca3-4379-a7c8-c0f1b8b95ace",  
    "createdAt": 1510811364.691  
}  
],  
    "runningCount": 0,  
    "placementStrategy": []  
}  
]  
},  
"failures": []  
}
```

## AWS CLI Walkthrough with an EC2 Task

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 \(p. 256\)](#) IAM policy example.

[Step 1: \(Optional\) Create a Cluster \(p. 322\)](#)

[Step 2: Launch an Instance with the Amazon ECS AMI \(p. 323\)](#)

[Step 3: List Container Instances \(p. 324\)](#)

[Step 4: Describe your Container Instance \(p. 324\)](#)

[Step 5: Register a Task Definition \(p. 326\)](#)

[Step 6: List Task Definitions \(p. 327\)](#)

[Step 7: Run a Task \(p. 328\)](#)

[Step 8: List Tasks \(p. 328\)](#)

[Step 9: Describe the Running Task \(p. 329\)](#)

## 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 \(p. 43\)](#) for more information.

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

Region	AMI Name	AMI ID	EC2 console link
us-east-2	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-58f5db3d	<a href="#">Launch instance</a>
us-east-1	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-fad25980	<a href="#">Launch instance</a>
us-west-2	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-7114c909	<a href="#">Launch instance</a>
us-west-1	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-62e0d802	<a href="#">Launch instance</a>
eu-west-2	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-dbfee1bf	<a href="#">Launch instance</a>
eu-west-1	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-4cbe0935	<a href="#">Launch instance</a>
eu-central-1	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-05991b6a	<a href="#">Launch instance</a>
ap-northeast-2	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-7267c01c	<a href="#">Launch instance</a>
ap-northeast-1	<a href="#">amzn-ami-2017.09.d-amazon-ecs-optimized</a>	ami-56bd0030	<a href="#">Launch instance</a>

Region	AMI Name	AMI ID	EC2 console link
ap-southeast-2	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-14b55f76	<a href="#">Launch instance</a>
ap-southeast-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-1bdc8b78	<a href="#">Launch instance</a>
ca-central-1	<b>amzn-ami-2017.09.d-amazon-ecs-optimized</b>	ami-918b30f5	<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
                }
            ]
        }
    ]
}
```

```
        "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,

```

{
    "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 \(p. 330\)](#)
- [Batch Jobs \(p. 332\)](#)

## 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 \(p. 330\)](#)
- [Service Discovery \(p. 331\)](#)
- [Authorization and Secrets Management \(p. 331\)](#)
- [Logging \(p. 331\)](#)
- [Continuous Integration and Continuous Deployment \(p. 331\)](#)

## 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 \(p. 200\)](#). 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 \(p. 208\)](#).

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 \(p. 179\)](#).

## 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 Elastic 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 \(p. 251\)](#) functionality of Amazon ECS with the AWS 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 \(p. 53\)](#).

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 \(p. 137\)](#).

## 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.

# Tutorial: Creating a VPC with Public and Private Subnets for Your Clusters

Container instances in your clusters need external network access to communicate with the Amazon ECS service endpoint. However, you might have tasks and services that you would like to run in private subnets. Creating a VPC with both public and private subnets provides you the flexibility to launch tasks and services in either a public or private subnet. Tasks and services in the private subnets can access the internet through a NAT gateway. Services in both the public and private subnets can be configured to use a load balancer so that they can still be reached from the public internet.

This tutorial guides you through creating a VPC with two public subnets and two private subnets, which are provided with internet access through a NAT gateway.

## Topics

- [Step 1: Create an Elastic IP Address for Your NAT Gateway \(p. 333\)](#)
- [Step 2: Run the VPC Wizard \(p. 333\)](#)
- [Step 3: Create Additional Subnets \(p. 334\)](#)
- [Next Steps \(p. 334\)](#)

## Step 1: Create an Elastic IP Address for Your NAT Gateway

A NAT gateway requires an Elastic IP address in your public subnet, but the VPC wizard does not create one for you. Create the Elastic IP address before running the VPC wizard.

### To create an Elastic IP address

1. Open the Amazon VPC console at <https://console.aws.amazon.com/vpc/>.
2. In the left navigation pane, choose **Elastic IPs**.
3. Choose **Allocate new address**, **Allocate**, **Close**.
4. Note the **Allocation ID** for your newly created Elastic IP address; you enter this later in the VPC wizard.

## Step 2: Run the VPC Wizard

The VPC wizard automatically creates and configures most of your VPC resources for you.

### To run the VPC wizard

1. In the left navigation pane, choose **VPC Dashboard**.
2. Choose **Start VPC Wizard**, **VPC with Public and Private Subnets**, **Select**.

3. For **VPC name**, give your VPC a unique name.
4. For **Elastic IP Allocation ID**, choose the ID of the Elastic IP address that you created earlier.
5. Choose **Create VPC**.
6. When the wizard is finished, choose **OK**. Note the Availability Zone in which your VPC subnets were created. Your additional subnets should be created in a different Availability Zone.

## Step 3: Create Additional Subnets

The wizard creates a VPC with a single public and a single private subnet in a single Availability Zone. For greater availability, you should create at least one more of each subnet type in a different Availability Zone so that your VPC has both public and private subnets across two Availability Zones.

### To create an additional private subnet

1. In the left navigation pane, choose **Subnets**.
2. Choose **Create Subnet**.
3. For **Name tag**, enter a name for your subnet, such as **Private subnet**.
4. For **VPC**, choose the VPC that you created earlier.
5. For **Availability Zone**, choose a different Availability Zone than your original subnets in the VPC.
6. For **IPv4 CIDR block**, enter a valid CIDR block. For example, the wizard creates CIDR blocks in 10.0.0.0/24 and 10.0.1.0/24 by default. You could use **10.0.3.0/24** for your second private subnet.
7. Choose **Yes, Create**.

### To create an additional public subnet

1. In the left navigation pane, choose **Subnets** and then **Create Subnet**.
2. For **Name tag**, enter a name for your subnet, such as **Public subnet**.
3. For **VPC**, choose the VPC that you created earlier.
4. For **Availability Zone**, choose the same Availability Zone as the additional private subnet that you created in the previous procedure.
5. For **IPv4 CIDR block**, enter a valid CIDR block. For example, the wizard creates CIDR blocks in 10.0.0.0/24 and 10.0.1.0/24 by default. You could use **10.0.2.0/24** for your second public subnet.
6. Choose **Yes, Create**.
7. Select the public subnet that you just created and choose **Route Table, Edit**.
8. By default, the private route table is selected. Choose the other available route table so that the **0.0.0.0/0** destination is routed to the internet gateway (**igw-xxxxxxxx**) and choose **Save**.
9. With your second public subnet still selected, choose **Subnet Actions, Modify auto-assign IP settings**.
10. Select **Enable auto-assign public IPv4 address** and choose **Save, Close**.

## Next Steps

After you have created your VPC, you should consider the following next steps:

- Create security groups for your public and private resources if they require inbound network access. For more information, see [Working with Security Groups](#) in the *Amazon VPC User Guide*.
- Create Amazon ECS clusters in your private or public subnets. For more information, see [Creating a Cluster \(p. 25\)](#). If you use the cluster creation wizard in the Amazon ECS console, you can specify

the VPC that you just created and the public or private subnets in which to launch your instances, depending on your use case.

- To make your containers directly accessible from the internet, launch instances into your *public* subnets. Be sure to configure your container instance security groups appropriately.
- To avoid making containers directly accessible from the internet, launch instances into your *private* subnets.
- Create a load balancer in your public subnets that can route traffic to services in your public or private subnets. For more information, see [Service Load Balancing \(p. 165\)](#).

# Tutorial: Using Amazon EFS File Systems with Amazon ECS

Amazon Elastic File System (Amazon EFS) provides simple, scalable file storage for use with Amazon EC2 instances. With Amazon EFS, storage capacity is elastic, growing and shrinking automatically as you add and remove files. Your applications can have the storage they need, when they need it.

You can use Amazon EFS file systems with Amazon ECS to export file system data across your fleet of container instances. That way, your tasks have access to the same persistent storage, no matter the instance on which they land. However, you must configure your container instance AMI to mount the Amazon EFS file system before the Docker daemon starts. Also, your task definitions must reference volume mounts on the container instance to use the file system. The following sections help you get started using Amazon EFS with Amazon ECS.

## Topics

- [Step 1: Gather Cluster Information \(p. 336\)](#)
- [Step 2: Create a Security Group for an Amazon EFS File System \(p. 336\)](#)
- [Step 3: Create an Amazon EFS File System \(p. 337\)](#)
- [Step 4: Configure Container Instances \(p. 337\)](#)
- [Step 5: Create a Task Definition to Use the Amazon EFS File System \(p. 339\)](#)
- [Step 6: Add Content to the Amazon EFS File System \(p. 340\)](#)
- [Step 7: Run a Task and View the Results \(p. 341\)](#)

## Step 1: Gather Cluster Information

Before you can create all of the required resources to use Amazon EFS with your Amazon ECS cluster, gather some basic information about the cluster, such as the VPC it is hosted inside of, and the security group that it uses.

### To gather the VPC and security group IDs for a cluster

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. Select one of the container instances from your cluster and view the **Description** tab of the instance details. If you created your cluster with the Amazon ECS first-run or cluster creation wizards, the cluster name should be part of the EC2 instance name. For example, a cluster named `default` has this EC2 instance name: `ECS Instance - EC2ContainerService-default`.
3. Record the **VPC ID** value for your container instance. Later, you create a security group and an Amazon EFS file system in this VPC.
4. Open the security group to view its details.
5. Record the **Group ID**. Later, you allow inbound traffic from this security group to your Amazon EFS file system.

## Step 2: Create a Security Group for an Amazon EFS File System

In this section, you create a security group for your Amazon EFS file system that allows inbound access from your container instances.

#### To create a security group for an Amazon EFS file system

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the left navigation pane, choose **Security Groups**, **Create Security Group**.
3. For **Security group name**, enter a unique name for your security group. For example, `EFS-access-for-sg-dc025fa2`.
4. For **Description**, enter a description for your security group.
5. For **VPC**, choose the VPC that you identified earlier for your cluster.
6. Choose **Inbound, Add rule**.
7. For **Type**, choose **All traffic**.
8. For **Source**, choose **Custom** and then enter the security group ID that you identified earlier for your cluster.
9. Choose **Create**.

## Step 3: Create an Amazon EFS File System

Before you can use Amazon EFS with your container instances, you must create an Amazon EFS file system.

#### To create an Amazon EFS file system for Amazon ECS container instances

1. Open the Amazon Elastic File System console at <https://console.aws.amazon.com/efs/>.
2. Choose **Create file system**.
3. On the **Configure file system access** page, choose the VPC that your container instances are hosted in and choose **Next Step**. By default, each subnet in the specified VPC receives a mount target that uses the default security group for that VPC.

##### Note

Your Amazon EFS file system and your container instances must be in the same VPC.

4. For **Security groups**, add the security group that you created in the previous section. Choose **Next step**.
5. (Optional) Add tags for your file system. For example, you could specify a unique name for the file system by entering that name in the **Value** column next to the **Name** key.
6. Choose a performance mode for your file system and choose **Next Step**.

##### Note

**General Purpose** is the default, and it is recommended for most file systems.

7. Review your file system options and choose **Create File System**.

## Step 4: Configure Container Instances

After you've created your Amazon EFS file system in the same VPC as your container instances, you must configure the container instances to access and use the file system. Your container instances must mount the Amazon EFS file system before the Docker daemon starts, or you can restart the Docker daemon after the file system is mounted.

#### Configure a running container instance to use an Amazon EFS file system

1. Log in to the container instance via SSH. For more information, see [Connect to Your Container Instance \(p. 52\)](#).
2. Create a mount point for your Amazon EFS file system. For example, `/efs`.

```
sudo mkdir /efs
```

3. Install NFS client software on your container instance.

- For Amazon Linux, CentOS, and Red Hat Enterprise Linux:

```
sudo yum install -y nfs-utils
```

- For Ubuntu and Debian:

```
sudo apt-get install -y nfs-common
```

4. Mount your file system with the following command. Be sure to replace the file system ID and region with your own.

```
sudo mount -t nfs4 -o  
nfsvers=4.1,rsize=1048576,wszie=1048576,hard,timeo=600,retrans=2 fs-613c8628.efs.us-  
east-1.amazonaws.com:/ /efs
```

5. Validate that the file system is mounted correctly with the following command. You should see a file system entry that matches your Amazon EFS file system. If not, see [Troubleshooting Amazon EFS](#) in the *Amazon Elastic File System User Guide*.

```
mount | grep efs
```

6. Make a backup of the /etc/fstab file.

```
sudo cp /etc/fstab /etc/fstab.bak
```

7. Update the /etc/fstab file to automatically mount the file system at boot.

```
echo 'fs-613c8628.efs.us-east-1.amazonaws.com:/ /efs nfs4  
nfsvers=4.1,rsize=1048576,wszie=1048576,hard,timeo=600,retrans=2 0 0' | sudo tee -a /  
etc/fstab
```

8. Reload the file system table to verify that your mounts are working properly.

```
sudo mount -a
```

**Note**

If you receive an error while running the above command, examine your /etc/fstab file for problems. If necessary, restore it with the backup that you created earlier.

9. Restart Docker so that it can see the new file system. The following commands apply to the Amazon ECS-optimized AMI. If you are using a different operating system, adjust the commands accordingly.

**Note**

These commands stop all containers that are running on the container instance.

- a. Stop the Amazon ECS container agent.

```
sudo stop ecs
```

- b. Restart the Docker daemon.

```
sudo service docker restart
```

- c. Start the Amazon ECS container agent.

```
sudo start ecs
```

### Bootstrap an instance to use Amazon EFS with user data

You can use an Amazon EC2 user data script to bootstrap an Amazon ECS–optimized AMI at boot. For more information, see [Bootstrapping Container Instances with Amazon EC2 User Data \(p. 46\)](#).

1. Follow the container instance launch instructions at [Launching an Amazon ECS Container Instance \(p. 43\)](#).
2. On [Step 8.g \(p. 44\)](#), pass the following user data to configure your instance. If you are not using the default cluster, be sure to replace the `ECS_CLUSTER=default` line in the configuration file to specify your own cluster name.

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

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

# Install nfs-utils
cloud-init-per once yum_update yum update -y
cloud-init-per once install_nfs_utils yum install -y nfs-utils

# Create /efs folder
cloud-init-per once mkdir_efs mkdir /efs

# Mount /efs
cloud-init-per once mount_efs echo -e 'fs-abcd1234.efs.us-east-1.amazonaws.com:/ /efs
    nfs4 nfsvers=4.1,rsize=1048576,wszie=1048576,hard,timeout=600,retrans=2 0 0' >> /etc/
fstab
mount -a

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

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

====BOUNDARY====
```

## Step 5: Create a Task Definition to Use the Amazon EFS File System

Because the file system is mounted on the host container instance, you must create a volume mount in your Amazon ECS task definition that allows your containers to access the file system. For more information, see [Using Data Volumes in Tasks \(p. 126\)](#).

The following task definition creates a data volume called `efs-html` at `/efs/html` on the host container instance Amazon EFS file system. The `nginx` container mounts the host data volume at the NGINX root, `/usr/share/nginx/html`.

```
{
```

```

"containerDefinitions": [
  {
    "memory": 128,
    "portMappings": [
      {
        "hostPort": 80,
        "containerPort": 80,
        "protocol": "tcp"
      }
    ],
    "essential": true,
    "mountPoints": [
      {
        "containerPath": "/usr/share/nginx/html",
        "sourceVolume": "efs-html"
      }
    ],
    "name": "nginx",
    "image": "nginx"
  }
],
"volumes": [
  {
    "host": {
      "sourcePath": "/efs/html"
    },
    "name": "efs-html"
  }
],
"family": "nginx-efs"
}

```

You can save this task definition to a file called `nginx-efs.json` and register it to use in your own clusters with the following AWS CLI command. For more information, see [Installing the AWS Command Line Interface](#) in the *AWS Command Line Interface User Guide*.

```
aws ecs register-task-definition --cli-input-json file://nginx-efs.json
```

## Step 6: Add Content to the Amazon EFS File System

For the NGINX example task, you created a directory at `/efs/html` on the container instance to host the web content. Before the NGINX containers can serve any web content, you must add the content to the file system. In this section, you log in to a container instance and add an `index.html` file.

### To add content to the file system

1. Connect using SSH to one of your container instances that is using the Amazon EFS file system. For more information, see [Connect to Your Container Instance \(p. 52\)](#).
2. Write a simple HTML file by copying and pasting the following block of text into a terminal.

```

sudo bash -c "cat >/efs/html/index.html <<'EOF'
<html>
  <body>
    <h1>It Works!</h1>
    <p>You are using an Amazon EFS file system for persistent container storage.</p>
</body>
</html>"
```

```
</body>
</html>
EOF
```

## Step 7: Run a Task and View the Results

Now that your Amazon EFS file system is available on your container instances and there is web content for the NGINX containers to serve, you can run a task using the task definition that you created earlier. The NGINX web servers serve your simple HTML page. If you update the content in your Amazon EFS file system, those changes are propagated to any containers that have also mounted that file system.

### To run a task and view the results

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. Choose the cluster that you have configured to use Amazon EFS.
3. Choose **Tasks, Run new task**.
4. For **Task Definition**, choose the `nginx-efs` taskjob definition that you created earlier and choose **Run Task**. For more information on the other options in the run task workflow, see [Running Tasks \(p. 148\)](#).
5. Below the **Tasks** tab, choose the task that you just ran.
6. Expand the container name at the bottom of the page, and choose the IP address that is associated with the container. Your browser should open a new tab with the following message:

**It Works!**

You are using an Amazon EFS file system for persistent container storage

#### Note

If you do not see the message, make sure that the security group for your container instances allows inbound network traffic on port 80.

# 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
Number of tasks using the EC2 launch type per service (the desired count)	1000
Number of tasks using the Fargate launch type, per region, per account	20
Number of public IP addresses for tasks using the Fargate launch type	20

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 launched (count) 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
Maximum layer size of an image used by a task using the Fargate launch type	4 GB
Maximum size of a shared volume used by multiple containers within a task using the Fargate launch type	4 GB
Maximum container storage for tasks using the Fargate launch type	10 GB

# 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 Elastic 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

- [Invalid CPU or memory value specified \(p. 344\)](#)
- [Checking Stopped Tasks for Errors \(p. 344\)](#)
- [Service Event Messages \(p. 346\)](#)
- [CannotCreateContainerError: API error \(500\): devmapper \(p. 349\)](#)
- [Troubleshooting Service Load Balancers \(p. 350\)](#)
- [Enabling Docker Debug Output \(p. 351\)](#)
- [Amazon ECS Log File Locations \(p. 352\)](#)
- [Amazon ECS Logs Collector \(p. 353\)](#)
- [Agent Introspection Diagnostics \(p. 354\)](#)
- [Docker Diagnostics \(p. 355\)](#)
- [API failures Error Messages \(p. 357\)](#)
- [Troubleshooting IAM Roles for Tasks \(p. 359\)](#)

## Invalid CPU or memory value specified

When registering a task, if you specify an invalid 'cpu' or 'memory' setting you will receive the following error:

An error occurred (ClientException) when calling the RegisterTaskDefinition operation: Invalid 'cpu' setting for task. For more information, see the Troubleshooting section of the Amazon ECS Developer Guide.

To resolve this issue you must specify one of the following valid CPU and memory settings:

CPU	Memory
256 (.25 vCPU)	512MB, 1GB, 2GB
512 (.5 vCPU)	1GB, 2GB, 3GB, 4GB
1024 (1 vCPU)	2GB, 3GB, 4GB, 5GB, 6GB, 7GB, 8GB
2048 (2 vCPU)	Between 4GB and 16GB in 1GB increments
4096 (4 vCPU)	Between 8GB and 30GB in 1GB increments

## 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>	<a href="#">default</a>
<b>Container Instance</b>	<a href="#">dd3599e9-2ca6-40f4-9da5-a0bb10408260</a>
<b>EC2 instance id</b>	<a href="#">i-83c6ab47</a>
<b>Task Definition</b>	<a href="#">curler:4</a>
<b>Last status</b>	<b>STOPPED</b>
<b>Desired status</b>	<b>STOPPED</b>
<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 \(p. 350\)](#).

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 \(p. 346\)](#) 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 (CannotPullContainerError)

### Details

---

**Status reason** CannotPullContainerError: Error: image tutum/bogus:latest not found  
**Command** [/usr/bin/watch, "curl", "-v", "http://amazon-ecs-2004777444.us-east-1.elb.amazonaws.com"]

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 \(p. 357\)](#).

## 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 : clusternamespace** page, choose the service that you would like to inspect.

4. On the Service : *servicename* page, choose the **Events** tab.

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

5. 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.

#### Not enough available ENI attachment points

Tasks that use the `awsvpc` network mode each receive their own Elastic Network Interface (ENI), which is attached to the container instance that hosts it. Amazon EC2 instances have a limit to the number of ENIs that can be attached to them, and the primary network interface counts as one. For example, a `c4.large` instance may have 3 network interfaces attached to it. The primary network adapter for the instance counts as one, so you can attach 2 more ENIs to the instance. Because each `awsvpc` task requires an ENI, you can only run 2 such tasks on this instance type. For more information about how many ENIs are supported per instance type, see [IP Addresses Per Network Interface Per Instance Type](#) in the *Amazon EC2 User Guide for Linux Instances*. You can add container instances to your cluster to provide more available network adapters.

#### 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 \(p. 106\)](#) and [Amazon ECS Container Agent Configuration \(p. 81\)](#).

(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 \(p. 352\)](#). 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 command:

```
sudo stop ecs && sudo start ecs
```

(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 \(p. 350\)](#).

## 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 deamon 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 \(p. 81\)](#).
- 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 -I% fstrim /proc/%/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 \(p. 247\)](#).

## 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 \(p. 52\)](#).
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
\\\"}]}\\n\" http.Header{\\\"Connection\\\": []string{\\\"keep-alive\\\"}, \\\"Content-Type\\\":
[]string{\\\"application/json; charset=utf-8\\\"}, \\\"Date\\\": []string{\\\"Wed, 30 Dec 2015
21:48:21 GMT\\\"}, \\\"Docker-Distribution-Api-Version\\\": []string{\\\"registry/2.0\\\"},
\\\"Content-Length\\\": []string{\\\"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 \(p. 52\)](#).

**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 \(p. 353\)](#).

## Amazon ECS Container Agent Log

The Amazon ECS container agent stores logs at `/var/log/ecs/ecs-agent.log.timestamp` on Linux instances, and `C:\ProgramData\Amazon\ECS\log\ecs-agent.log.timestamp` on Windows instances.

**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 \(p. 81\)](#).

```
cat /var/log/ecs/ecs-agent.log.2016-08-15-15
```

Output:

```
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`.

```
cat /var/log/ecs/ecs-init.log.2015-04-22-20
```

Output:

```
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:

```
cat /var/log/ecs/audit.log.2016-07-13-16
```

Output:

```
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 \(p. 52\)](#).
2. Download the Amazon ECS logs collector script.

```
curl -O https://raw.githubusercontent.com/awslabs/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. Note that this may restart the Docker daemon, which kills all containers that are running on the instance. You should consider draining the container instance and moving any important tasks to other container instances before enabling debug mode. For more information, see [Container Instance Draining \(p. 60\)](#).

```
[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 \(p. 52\)](#).

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.

```
curl http://localhost:51678/v1/tasks | python -mjson.tool
```

Output:

```
% Total    % Received % Xferd  Average Speed   Time     Time      Time  Current
                                         Dload  Upload   Total   Spent   Left  Speed
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": "f7f1f8a7a245c5da83aa92729bd28c6bc004d1f6a35409e4207e1d34030e966",
          "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 \(p. 95\)](#).

## 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 \(p. 52\)](#).

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.

```
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.

```
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	busybox:buildroot-2014.02	"\"sh -c '/bin/sh -c	22
f7f1f8a7a245	Exited (137) 9 seconds ago		ecs-console-
hours ago			
sample-app-static-6-busybox-ce83ce978a87a890ab01	189a8ff4b5f0	"httpd-foreground"	22
189a8ff4b5f0	httpd:2		ecs-console-
hours ago	Exited (137) 40 seconds ago		
sample-app-static-6-simple-app-86caf9bcabe3e9c61600	0c7dca9321e3	"not-applicable"	22
0c7dca9321e3	amazon/ecs-emptyvolume-base:autogenerated		ecs-console-
hours ago			
sample-app-static-6-internalecs-emptyvolume-source-90fefaa68498a8a80700	cee0d6986de0	"httpd-foreground"	22
cee0d6986de0	amazon/amazon-ecs-agent:latest		ecs-console-
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.

```
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.

```
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` 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, memory, ports, or ENIs, you may need to add container instances to your cluster. For `RESOURCE : ENI` errors, your cluster does not have any available Elastic Network Interface attachment points, which are required for tasks that use the `awsvpc` network mode. Amazon EC2 instances have a limit to the number of ENIs that can be attached to them, and the primary network interface counts as one. For more information about how many ENIs are supported per instance type, see [IP Addresses Per Network Interface Per Instance Type](#) in the [Amazon EC2 User Guide for Linux Instances](#).

**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 example, if your task uses the `awsvpc` network mode, but there are no instances in your specified subnets with the `ecs.capability.task-eni` attribute. For more information on which attributes are required for specific task definition parameters and agent configuration variables, see [Task Definition Parameters \(p. 106\)](#) and [Amazon ECS Container Agent Configuration \(p. 81\)](#).

- `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.

## Troubleshooting IAM Roles for Tasks

If you are having trouble configuring IAM roles for tasks in your cluster, you can try this known good configuration to help debug your own configuration.

The following procedure helps you to:

- Create a CloudWatch Logs log group to store your test logs
- Create a task IAM role that has full Amazon ECS permissions
- Register a task definition with a known good AWS CLI configuration that is compatible with IAM roles for tasks
- Run a task from that task definition to test your container instance support for IAM roles for tasks
- View the container logs from that task in CloudWatch Logs to verify that it works

### To test IAM roles for tasks with a known good configuration

1. Create a CloudWatch Logs log group called `ecs-tasks`.
  - a. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
  - b. In the left navigation pane, choose **Logs**.
  - c. Choose **Actions, Create log group**.
  - d. For **Log Group Name**, enter `ecs-tasks`.
  - e. Choose **Create log group** to finish.
2. Create an IAM role for your task to use.
  - a. Open the IAM console at <https://console.aws.amazon.com/iam/>.
  - b. In the navigation pane, choose **Roles, Create new role**.
  - c. For **AWS Service Role**, choose **Amazon Elastic Container Service Task Role**.
  - d. On the **Attach Policy** page, choose **AmazonEC2ContainerServiceFullAccess**, and then choose **Next Step**.
  - e. On the **Set role name and review** page, for **Role name**, enter `ECS-task-full-access` and choose **Create role**.
3. Register a task definition that uses your new role.
  - a. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
  - b. In the navigation pane, choose **Task Definitions**.
  - c. On the **Task Definitions** page, choose **Create new Task Definition**.
  - d. Scroll to the bottom of the page and choose **Configure via JSON**.
  - e. Paste the sample task definition JSON below into the text area (replacing the pre-populated JSON there) and choose **Save**.

#### Note

Replace the `awslogs-region` value with the region that you created your CloudWatch Logs log group in.

{

```

"taskRoleArn": "ECS-task-full-access",
"containerDefinitions": [
    {
        "memory": 128,
        "essential": true,
        "name": "amazonlinux",
        "image": "amazonlinux",
        "entryPoint": [
            "/bin/bash",
            "-c"
        ],
        "command": [
            "yum install -y aws-cli; aws ecs list-tasks --region us-west-2"
        ],
        "logConfiguration": {
            "logDriver": "awslogs",
            "options": {
                "awslogs-group": "ecs-tasks",
                "awslogs-region": "us-west-2",
                "awslogs-stream-prefix": "iam-role-test"
            }
        }
    ],
    "family": "iam-role-test"
}

```

- f. Verify your information and choose **Create**.
4. Run a task from your task definition.
  - a. On the **Task Definition: iam-role-test** registration confirmation page, choose **Actions, Run Task**.
  - b. On the **Run Task** page, choose **Run Task** to run your task.
5. View the container logs in the CloudWatch Logs console.
  - a. Open the CloudWatch console at <https://console.aws.amazon.com/cloudwatch/>.
  - b. In the left navigation pane, choose **Logs**.
  - c. Choose the **ecs-tasks** log group.
  - d. Choose the most recent log stream.
  - e. Scroll down to view the last lines of the log stream. You should see the output of the **aws ecs list-tasks** command.

```

{
    "taskArns": [
        "arn:aws:ecs:us-east-1:aws_account_id:task/d48feb62-46e2-4cbc-a36b-e0400b993d1d"
    ]
}

```

#### Note

If you receive an "Unable to locate credentials" error, then IAM roles for tasks is not enabled on your container instances. For more information, see [Enabling Task IAM Roles on your Container Instances \(p. 253\)](#).

# Windows Containers

Amazon ECS now supports Windows containers on container instances that are launched with the Amazon ECS-optimized Windows AMI.

Windows container instances use their own version of the Amazon ECS container agent. On the Amazon ECS-optimized Windows AMI, the Amazon ECS container agent runs as a service 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 \(p. 361\)](#)
- [Getting Started with Windows Containers \(p. 362\)](#)
- [Windows Task Definitions \(p. 367\)](#)
- [Windows IAM Roles for Tasks \(p. 369\)](#)
- [Pushing Windows Images to Amazon ECR \(p. 370\)](#)

## 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. You can ensure that Windows task definitions are only placed on Windows instances by setting the following placement constraint: `memberOf(ecs.os-type=='windows')`.
- 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 \(p. 367\)](#).
- 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 \(p. 369\)](#).
- 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 \(p. 165\)](#).
- 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.

# 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 web page that the container runs.

## Topics

- [Step 1: Create a Windows Cluster \(p. 362\)](#)
- [Step 2: Launching a Windows Container Instance into your Cluster \(p. 362\)](#)
- [Step 3: Register a Windows Task Definition \(p. 365\)](#)
- [Step 4: Create a Service with Your Task Definition \(p. 366\)](#)
- [Step 5: View Your Service \(p. 366\)](#)

## 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.

### To create a cluster with the AWS Management Console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. In the navigation pane, choose **Clusters**.
3. On the **Clusters** page, choose **Create Cluster**.
4. Choose **EC2 Windows + Networking** and choose **Next step**.
5. For **Cluster name** enter a name for your cluster (in this example, windows is the name of the cluster). Up to 255 letters (uppercase and lowercase), numbers, hyphens, and underscores are allowed.
6. Choose **Create an empty cluster**, **Create**.

### To create a cluster with the AWS CLI

- You can 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.
3. From the console dashboard, choose **Launch Instance**.
4. On the **Choose an Amazon Machine Image (AMI)** page, choose **Community AMIs**.
5. Type **ECS\_Optimized** in the **Search community AMIs** field and press the **Enter** key. Choose **Select** next to the **Windows\_Server-2016-English-Full-ECS\_Optimized-2017.11.24** AMI.

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

Region	AMI ID
us-east-2	ami-b19fb1d4
us-east-1	ami-9f1182e5
us-west-2	ami-0b60bc73
us-west-1	ami-a8003bc8
eu-west-2	ami-3da4bb59
eu-west-1	ami-94d360ed
eu-central-1	ami-b4ed61db
ap-northeast-2	ami-bb3691d5
ap-northeast-1	ami-5ed66f38
ap-southeast-2	ami-918075f3
ap-southeast-1	ami-ec32618f
ca-central-1	ami-2859e24c

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 Gateways](#) in the *Amazon VPC User Guide* and [HTTP Proxy Configuration \(p. 97\)](#) in this guide. For help creating a VPC, see [Tutorial: Creating a VPC with Public and Private Subnets for Your Clusters \(p. 333\)](#).

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 \(p. 238\)](#).

10. Expand the **Advanced Details** section and paste the provided user data PowerShell script into the **User data** field. 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 the red text in the script below with the name of your cluster.

**Note**

The `-EnableTaskIAMRole` option is required to enable IAM roles for tasks. For more information, see [Windows IAM Roles for Tasks \(p. 369\)](#).

```
<powershell>
Import-Module ECSTools
Initialize-ECSAgent -Cluster 'windows' -EnableTaskIAMRole
</powershell>
```

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 50 GiB volume size for the Amazon ECS-optimized Windows AMI. 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 8080, 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 container 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 web page on port 8080 of a container instance with the `microsoft/iis` container image.

### To register the sample task definition with the AWS Management Console

1. Open the Amazon ECS console at <https://console.aws.amazon.com/ecs/>.
2. In the navigation pane, choose **Task Definitions**.
3. On the **Task Definitions** page, choose **Create new Task Definition**.
4. Scroll to the bottom of the page and choose **Configure via JSON**.
5. Paste the sample task definition JSON below into the text area (replacing the pre-populated JSON there) and choose **Save**.

```
{  
    "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": 8080  
                }  
            ],  
            "memory": 500,  
            "essential": true  
        }  
    ]  
}
```

6. Verify your information and choose **Create**.

### To register the sample task definition with the AWS CLI

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
```

## 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 from your task definition with the AWS Management Console

1. On the **Task Definition: windows-simple-iis** registration confirmation page, choose **Actions, Create Service**.
2. On the **Create Service** page, enter the following information and then choose **Create service**.
  - **Cluster:** windows
  - **Number of tasks:** 1
  - **Service name:** windows-simple-iis

### To create a service from your task definition with the AWS CLI

- 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
```

## Step 5: View Your Service

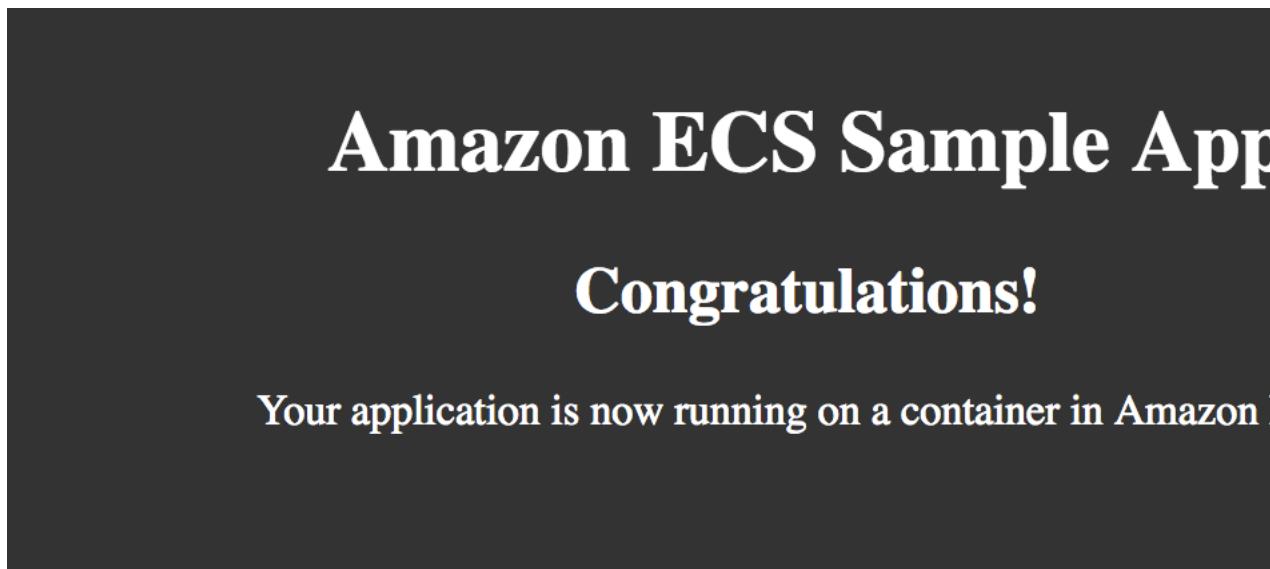
After your service has launched a task into your cluster, you can view the service and open the IIS test page in a browser to verify that the container is running.

### 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 not supported or behave differently on Windows containers than they do with Linux containers. For more information about these parameters as they relate to Amazon ECS, see [Task Definition Parameters \(p. 106\)](#).

`taskRoleArn`

Supported: Yes

IAM roles for tasks on Windows require that the `-EnableTaskIAMRole` option is set when you launch the Amazon ECS-optimized Windows AMI. 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 \(p. 369\)](#).

`networkMode`

Supported: No

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 choose the `<default>` network mode object.

`containerDefinitions`

Supported: Yes

Additional notes: Not all container definition parameters are supported. Review the list below for individual parameter support.

`portMappings`

Supported: Limited

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: Yes

Amazon ECS treats this parameter in the same manner that it does for Linux containers: 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. However, on a Windows container instance, the CPU limit is enforced as an absolute limit, or a quota. Windows containers only have access to the specified amount of CPU that is described in the task definition.

`disableNetworking`

Supported: No

`dnsServers`

Supported: No

`dnsSearchDomains`

Supported: No

`dockerSecurityOptions`

Supported: No

`extraHosts`

Supported: No

`links`

Supported: No

`mountPoints`

Supported: Limited

Windows containers can mount whole directories on the same drive as `$env:ProgramData`. Windows containers cannot mount directories on a different drive, and mount point cannot be across drives.

`linuxParameters`

Supported: No

`privileged`

Supported: No

`readonlyRootFilesystem`

Supported: No

`user`

Supported: No

`ulimits`

Supported: No

`volumes`

Supported: Yes

name

Supported: Yes

host

Supported: Limited

Windows containers can mount whole directories on the same drive as \$env:ProgramData. Windows 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": 8080
        }
      ],
      "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 –EnableTaskIAMRole option for the in the container instances user data script. For example:

```
<powershell>
```

```
Import-Module ECSTools
Initialize-ECSAgent -Cluster 'windows' -EnableTaskIAMRole
</powershell>
```

- You must bootstrap your container with the networking commands that are provided in [IAM Roles for Task Container Bootstrap Script \(p. 370\)](#).
- You must create an IAM role and policy for your tasks. For more information, see [Creating an IAM Role and Policy for your Tasks \(p. 254\)](#).
- Your container must use an AWS SDK that supports IAM roles for tasks. For more information, see [Using a Supported AWS SDK \(p. 255\)](#).
- 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 \(p. 255\)](#).
- 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 \(p. 165\)](#).

## 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/
#
# 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.

$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: sha256:25586570b058da9882d4af640d326d0cc26df60b67e1cee63f35ea54d83c882
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.

**Note**

The `get-login` command is available in the AWS CLI starting with version 1.9.15; however, we recommend version 1.11.91 or later for recent versions of Docker (17.06 or later). You can check your AWS CLI version with the `aws --version` command. If you are using Docker version 17.06 or later, include the `--no-include-email` option after `get-login`. If you receive an Unknown options: `--no-include-email` error, install the latest version of the AWS CLI. For more information, see [Installing the AWS Command Line Interface](#) in the [AWS Command Line Interface User Guide](#).

```
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*.