

# Application Auto Scaling



# Application Auto Scaling: User Guide

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# What is Application Auto Scaling?

Application Auto Scaling is a web service for developers and system administrators who need a solution for automatically scaling their scalable resources for individual Amazon services beyond Amazon EC2.

In the China (Beijing) Region, you can configure automatic scaling for the following resources:

- Aurora replicas
- DynamoDB tables and global secondary indexes
- Amazon Elastic Container Service (ECS) services
- Amazon EMR clusters
- Amazon Keyspaces (for Apache Cassandra) tables
- Lambda function provisioned concurrency
- Amazon Managed Streaming for Apache Kafka (MSK) broker storage
- Amazon Neptune clusters
- SageMaker endpoint variants
- Spot Fleet requests
- Custom resources provided by your own applications or services. For more information, see the [GitHub repository](#).

In the China (Ningxia) Region, you can configure automatic scaling for the following resources:

- Aurora replicas
- DynamoDB tables and global secondary indexes
- Amazon Elastic Container Service (ECS) services
- Amazon EMR clusters
- Amazon Keyspaces (for Apache Cassandra) tables
- Lambda function provisioned concurrency
- Amazon Managed Streaming for Apache Kafka (MSK) broker storage
- Amazon Neptune clusters

- SageMaker endpoint variants
- Spot Fleet requests

To see the regional availability for any of the Amazon services listed above, see the [Region table](#).

For information about scaling your fleet of Amazon EC2 instances using Auto Scaling groups, see the [Amazon EC2 Auto Scaling User Guide](#).

## Features of Application Auto Scaling

Application Auto Scaling allows you to automatically scale your scalable resources according to conditions that you define.

- **Target tracking scaling** – Scale a resource based on a target value for a specific CloudWatch metric.
- **Step scaling** – Scale a resource based on a set of scaling adjustments that vary based on the size of the alarm breach.
- **Scheduled scaling** – Scale a resource one time only or on a recurring schedule.

## Work with Application Auto Scaling

You can configure scaling using the following interfaces depending on the resource that you are scaling:

- **Amazon Web Services Management Console** – Provides a web interface that you can use to configure scaling. If you've signed up for an Amazon account, access Application Auto Scaling by signing into the Amazon Web Services Management Console. Then, open the service console for one of the resources listed in the introduction. Ensure that you open the console in the same Amazon Web Services Region as the resource that you want to work with.

### Note

Console access is not available for all resources. For more information, see [Amazon services that you can use with Application Auto Scaling](#).

- **Amazon Command Line Interface (Amazon CLI)** – Provides commands for a broad set of Amazon Web Services, and is supported on Windows, macOS, and Linux. To get started, see

[Set up the Amazon CLI](#). For more information, see [application-autoscaling](#) in the *Amazon CLI Command Reference*.

- **Amazon Tools for Windows PowerShell** – Provides commands for a broad set of Amazon products for those who script in the PowerShell environment. To get started, see the [Amazon Tools for Windows PowerShell User Guide](#). For more information, see the [Amazon Tools for PowerShell Cmdlet Reference](#).
- **Amazon SDKs** – Provides language-specific API operations and takes care of many of the connection details, such as calculating signatures, handling request retries, and handling errors. For more information, see [Amazon SDKs](#).
- **HTTPS API** – Provides low-level API actions that you call using HTTPS requests. For more information, see the [Application Auto Scaling API Reference](#).
- **Amazon CloudFormation** – Supports configuring scaling using a CloudFormation template. For more information, see [Create Application Auto Scaling resources with Amazon CloudFormation](#).

To connect programmatically to an Amazon Web Service, you use an endpoint. For information about endpoints for calls to Application Auto Scaling, see [Endpoints and ARNs for Amazon Web Services in China](#) in the *Getting Started with Amazon Web Services in China*.

# Get started with Application Auto Scaling

This topic explains key concepts to help you learn about Application Auto Scaling and start using it.

## Scalable target

An entity that you create to specify the resource that you want to scale. Each scalable target is uniquely identified by a service namespace, resource ID, and scalable dimension, which represents some capacity dimension of the underlying service. For example, an Amazon ECS service supports auto scaling of its task count, a DynamoDB table supports auto scaling of the read and write capacity of the table and its global secondary indexes, and an Aurora cluster supports scaling of its replica count.

### Tip

Each scalable target also has a minimum and maximum capacity. Scaling policies will never go higher or lower than the minimum-maximum range. You can make out-of-band changes directly to the underlying resource that are outside of this range, which Application Auto Scaling doesn't know about. However, anytime a scaling policy is invoked or the `RegisterScalableTarget` API is called, Application Auto Scaling retrieves the current capacity and compares it to the minimum and maximum capacity. If it falls outside of the minimum-maximum range, then the capacity is updated to comply with the set minimum and maximum.

## Scale in

When Application Auto Scaling automatically decreases capacity for a scalable target, the scalable target *scales in*. When scaling policies are set, they cannot scale in the scalable target lower than its minimum capacity.

## Scale out

When Application Auto Scaling automatically increases capacity for a scalable target, the scalable target *scales out*. When scaling policies are set, they cannot scale out the scalable target higher than its maximum capacity.

## Scaling policy

A scaling policy instructs Application Auto Scaling to track a specific CloudWatch metric. Then, it determines what scaling action to take when the metric is higher or lower than a certain threshold value. For example, you might want to scale out if the CPU usage across your cluster starts to rise, and scale in when it drops again.

The metrics that are used for auto scaling are published by the target service, but you can also publish your own metric to CloudWatch and then use it with a scaling policy.

A cooldown period between scaling activities lets the resource stabilize before another scaling activity starts. Application Auto Scaling continues to evaluate metrics during the cooldown period. When the cooldown period ends, the scaling policy initiates another scaling activity if needed. While a cooldown period is in effect, if a larger scale out is necessary based on the current metric value, the scaling policy scales out immediately.

## Scheduled action

Scheduled actions automatically scale resources at a specific date and time. They work by modifying the minimum and maximum capacity for a scalable target, and therefore can be used to scale in and out on a schedule by setting the minimum capacity high or the maximum capacity low. For example, you can use scheduled actions to scale an application that doesn't consume resources on weekends by decreasing capacity on Friday and increasing capacity on the following Monday.

You can also use scheduled actions to optimize the minimum and maximum values over time to adapt to situations where higher than normal traffic is expected, for example, marketing campaigns or seasonal fluctuations. Doing this can help you improve performance for times when you need to scale out higher for the increasing usage, and reduce costs at times when you use fewer resources.

## Learn more

[Amazon services that you can use with Application Auto Scaling](#) — This section introduces you to the services that you can scale and helps you set up auto scaling by registering a scalable target. It also describes each of the IAM service-linked roles that Application Auto Scaling creates to access resources in the target service.

[Target tracking scaling policies](#) — One of the primary features of Application Auto Scaling is target tracking scaling policies. Learn how target tracking policies automatically adjust desired capacity to

keep utilization at a constant level based on your configured metric and target values. For example, you can configure target tracking to keep the average CPU utilization for your Spot Fleet at 50 percent. Application Auto Scaling then launches or terminates EC2 instances as required to keep the aggregated CPU utilization across all servers at 50 percent.

# Amazon services that you can use with Application Auto Scaling

Application Auto Scaling integrates with other Amazon services so that you can add scaling capabilities to meet your application's demand. Auto scaling is an optional feature of the service that is disabled by default in almost all cases.









The following table lists the Amazon services that you can use with Application Auto Scaling, including information about supported methods for configuring auto scaling. You can also use Application Auto Scaling with custom resources.

**Console access** – You can configure a compatible Amazon service to start auto scaling by configuring a scaling policy in the console of the target service.

**CLI access** – You can configure a compatible Amazon service to start auto scaling using the Amazon CLI.

















**SDK access** – You can configure a compatible Amazon service to start auto scaling using the Amazon SDKs.

**CloudFormation access** – You can configure a compatible Amazon service to start auto scaling using an Amazon CloudFormation stack template. For more information, see [Create Application Auto Scaling resources with Amazon CloudFormation](#).

Amazon service	Console access <sup>1</sup>	CLI access	SDK access	CloudFormation access
<a href="#">AppStream 2.0</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Aurora</a>	 Yes	 Yes	 Yes	 Yes

Amazon service	Console access <sup>1</sup>	CLI access	SDK access	CloudFormation access
<a href="#">Amazon Comprehend</a>	 No	 Yes	 Yes	 Yes
<a href="#">Amazon DynamoDB</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Amazon ECS</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Amazon ElastiCache</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Amazon EMR</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Amazon Keyspaces</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Lambda</a>	 No	 Yes	 Yes	 Yes
<a href="#">Amazon MSK</a>	 Yes	 Yes	 Yes	 Yes



Amazon service	Console access <sup>1</sup>	CLI access	SDK access	CloudFormation access
<a href="#">Amazon Neptune</a>	 No	 Yes	 Yes	 Yes
<a href="#">SageMaker</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Spot Fleet</a>	 Yes	 Yes	 Yes	 Yes
<a href="#">Custom resources</a>	 No	 Yes	 Yes	 Yes

<sup>1</sup> Console access for configuring scaling policies. Most services don't support configuring scheduled scaling from the console. Currently, only Amazon AppStream 2.0, ElastiCache, and Spot Fleet provide console access for scheduled scaling.

## Amazon AppStream 2.0 and Application Auto Scaling

You can scale AppStream 2.0 fleets using target tracking scaling policies, step scaling policies, and scheduled scaling.

Use the following information to help you integrate AppStream 2.0 with Application Auto Scaling.

### Service-linked role created for AppStream 2.0

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering AppStream 2.0 resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_AppStreamFleet`

## Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `appstream.application-autoscaling.amazonaws.com`

## Registering AppStream 2.0 fleets as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for an AppStream 2.0 fleet. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the AppStream 2.0 console, then AppStream 2.0 automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for an AppStream 2.0 fleet. The following example registers the desired capacity of a fleet called `sample-fleet`, with a minimum capacity of one fleet instance and a maximum capacity of five fleet instances.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace appstream \  
  --scalable-dimension appstream:fleet:DesiredCapacity \  
  --resource-id fleet/sample-fleet \  
  --min-capacity 1 \  
  --max-capacity 5
```

If successful, this command returns the ARN of the scalable target.

```
{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide ResourceId, ScalableDimension, ServiceNamespace, MinCapacity, and MaxCapacity as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your AppStream 2.0 resources in the following documentation:

[Fleet Auto Scaling for AppStream 2.0](#) in the *Amazon AppStream 2.0 Administration Guide*

## Amazon Aurora and Application Auto Scaling

You can scale Aurora DB clusters using target tracking scaling policies, step scaling policies, and scheduled scaling.

Use the following information to help you integrate Aurora with Application Auto Scaling.

### Service-linked role created for Aurora

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Aurora resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- AWSServiceRoleForApplicationAutoScaling\_RDSCluster

### Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `rds.application-autoscaling.amazonaws.com`

## Registering Aurora DB clusters as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for an Aurora cluster. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the Aurora console, then Aurora automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for an Aurora cluster. The following example registers the count of Aurora Replicas in a cluster called `my-db-cluster`, with a minimum capacity of one Aurora Replica and a maximum capacity of eight Aurora Replicas.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace rds \  
  --scalable-dimension rds:cluster:ReadReplicaCount \  
  --resource-id cluster:my-db-cluster \  
  --min-capacity 1 \  
  --max-capacity 8
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Aurora resources in the following documentation:

[Using Amazon Aurora Auto Scaling with Aurora replicas](#) in the *Amazon RDS User Guide*

## Amazon Comprehend and Application Auto Scaling

You can scale Amazon Comprehend document classification and entity recognizer endpoints using target tracking scaling policies and scheduled scaling.

Use the following information to help you integrate Amazon Comprehend with Application Auto Scaling.

### Service-linked role created for Amazon Comprehend

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Amazon Comprehend resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_ComprehendEndpoint`

### Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `comprehend.application-autoscaling.amazonaws.com`

## Registering Amazon Comprehend resources as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for an Amazon Comprehend document classification or entity recognizer

endpoint. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

To configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for a document classification endpoint. The following example registers the desired number of inference units to be used by the model for a document classifier endpoint using the endpoint's ARN, with a minimum capacity of one inference unit and a maximum capacity of three inference units.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace comprehend \  
  --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits \  
  --resource-id arn:aws-cn:comprehend:us-west-2:123456789012:document-classifier-  
endpoint/EXAMPLE \  
  --min-capacity 1 \  
  --max-capacity 3
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

Call the [register-scalable-target](#) command for an entity recognizer endpoint. The following example registers the desired number of inference units to be used by the model for an entity recognizer using the endpoint's ARN, with a minimum capacity of one inference unit and a maximum capacity of three inference units.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace comprehend \  
  --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits \  
  --resource-id arn:aws-cn:comprehend:us-west-2:123456789012:entity-recognizer-  
endpoint/EXAMPLE \  
  --min-capacity 1 \  
  --max-capacity 3
```

```
--min-capacity 1 \  
--max-capacity 3
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Amazon Comprehend resources in the following documentation:

[Auto scaling with endpoints](#) in the *Amazon Comprehend Developer Guide*

## Amazon DynamoDB and Application Auto Scaling

You can scale DynamoDB tables and global secondary indexes using target tracking scaling policies and scheduled scaling.

Use the following information to help you integrate DynamoDB with Application Auto Scaling.

### Service-linked role created for DynamoDB

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering DynamoDB resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_DynamoDBTable`

## Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `dynamodb.application-autoscaling.amazonaws.com`

## Registering DynamoDB resources as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for a DynamoDB table or global secondary index. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the DynamoDB console, then DynamoDB automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for a table's write capacity. The following example registers the provisioned write capacity of a table called `my-table`, with a minimum capacity of five write capacity units and a maximum capacity of 10 write capacity units.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:WriteCapacityUnits \  
  --resource-id table/my-table \  
  --min-capacity 5 \  
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{
```



```
"ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

Call the [register-scalable-target](#) command for a table's read capacity. The following example registers the provisioned read capacity of a table called `my-table`, with a minimum capacity of five read capacity units and a maximum capacity of 10 read units.

```
aws application-autoscaling register-scalable-target \
  --service-namespace dynamodb \
  --scalable-dimension dynamodb:table:ReadCapacityUnits \
  --resource-id table/my-table \
  --min-capacity 5 \
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

Call the [register-scalable-target](#) command for the write capacity of a global secondary index. The following example registers the provisioned write capacity of a global secondary index called `my-table-index`, with a minimum capacity of five write capacity units and a maximum capacity of 10 write capacity units.

```
aws application-autoscaling register-scalable-target \
  --service-namespace dynamodb \
  --scalable-dimension dynamodb:index:WriteCapacityUnits \
  --resource-id table/my-table/index/my-table-index \
  --min-capacity 5 \
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

```
}
```

Call the [register-scalable-target](#) command for the read capacity of a global secondary index. The following example registers the provisioned read capacity of a global secondary index called `my-table-index`, with a minimum capacity of five read capacity units and a maximum capacity of 10 read capacity units.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace dynamodb \  
  --scalable-dimension dynamodb:index:ReadCapacityUnits \  
  --resource-id table/my-table/index/my-table-index \  
  --min-capacity 5 \  
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your DynamoDB resources in the following documentation:

- [Managing throughput capacity with DynamoDB Auto Scaling](#) in the *Amazon DynamoDB Developer Guide*
- [Evaluate your table's auto scaling settings](#) in the *Amazon DynamoDB Developer Guide*
- [How to use Amazon CloudFormation to configure auto scaling for DynamoDB tables and indexes on the Amazon Blog](#)

You can also find a tutorial for scheduled scaling in [Tutorial: Get started with scheduled scaling using the Amazon CLI](#). In this tutorial, you learn the basic steps to configure scaling so your DynamoDB table scales at scheduled times.

## Amazon ECS and Application Auto Scaling

You can scale ECS services using target tracking scaling policies, step scaling policies, and scheduled scaling.

Use the following information to help you integrate Amazon ECS with Application Auto Scaling.

### Service-linked role created for Amazon ECS

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Amazon ECS resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_ECSService`

### Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `ecs.application-autoscaling.amazonaws.com`

## Registering ECS services as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for an Amazon ECS service. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the Amazon ECS console, then Amazon ECS automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for an Amazon ECS service. The following example registers a scalable target for a service called `sample-app-service`, running on the default cluster, with a minimum task count of one task and a maximum task count of 10 tasks.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace ecs \  
  --scalable-dimension ecs:service:DesiredCount \  
  --resource-id service/default/sample-app-service \  
  --min-capacity 1 \  
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Amazon ECS resources in the following documentation:

- [Service auto scaling](#) in the *Amazon Elastic Container Service Developer Guide*
- [Configuring service auto scaling](#) in the *Amazon Elastic Container Service Best Practices Guide*

**Note**

For instructions for suspending scale-out processes while Amazon ECS deployments are in progress, see the following documentation:

[Service auto scaling and deployments](#) in the *Amazon Elastic Container Service Developer Guide*

## ElastiCache for Redis and Application Auto Scaling

You can scale ElastiCache for Redis replication groups using target tracking scaling policies and scheduled scaling.

Use the following information to help you integrate ElastiCache with Application Auto Scaling.

### Service-linked role created for ElastiCache

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering ElastiCache resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_ElastiCacheRG`

### Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `elasticache.application-autoscaling.amazonaws.com`

## Registering ElastiCache for Redis replication groups as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for an ElastiCache replication group. A scalable target is a resource that

Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the ElastiCache console, then ElastiCache automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for an ElastiCache replication group. The following example registers the desired number of node groups for a replication group called `mycluster`, with a minimum capacity of one and a maximum capacity of five.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace elasticache \  
  --scalable-dimension elasticache:replication-group:NodeGroups \  
  --resource-id replication-group/mycluster \  
  --min-capacity 1 \  
  --max-capacity 5
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

The following example registers the desired number of replicas per node group for a replication group called `mycluster`, with a minimum capacity of 1 and a maximum capacity of 5.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace elasticache \  
  --scalable-dimension elasticache:replication-group:Replicas \  
  --resource-id replication-group/mycluster \  
  --min-capacity 1 \  
  --max-capacity 5
```

If successful, this command returns the ARN of the scalable target.

```
{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your ElastiCache resources in the following documentation:

[Auto Scaling ElastiCache for Redis clusters](#) in the *Amazon ElastiCache for Redis User Guide*

## Amazon Keyspaces (for Apache Cassandra) and Application Auto Scaling

You can scale Amazon Keyspaces tables using target tracking scaling policies and scheduled scaling.

Use the following information to help you integrate Amazon Keyspaces with Application Auto Scaling.

### Service-linked role created for Amazon Keyspaces

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Amazon Keyspaces resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_CassandraTable`

## Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `cassandra.application-autoscaling.amazonaws.com`

## Registering Amazon Keyspaces tables as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for an Amazon Keyspaces table. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the Amazon Keyspaces console, then Amazon Keyspaces automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for an Amazon Keyspaces table. The following example registers the provisioned write capacity of a table called `mytable`, with a minimum capacity of five write capacity units and a maximum capacity of 10 write capacity units.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace cassandra \  
  --scalable-dimension cassandra:table:WriteCapacityUnits \  
  --resource-id keyspace/mykeyspace/table/mytable \  
  --min-capacity 5 \  
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{
```



```
"ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

The following example registers the provisioned read capacity of a table called `mytable`, with a minimum capacity of five read capacity units and a maximum capacity of 10 read capacity units.

```
aws application-autoscaling register-scalable-target \
  --service-namespace cassandra \
  --scalable-dimension cassandra:table:ReadCapacityUnits \
  --resource-id keyspace/mykeyspace/table/mytable \
  --min-capacity 5 \
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Amazon Keyspaces resources in the following documentation:

[Managing throughput capacity with Amazon Keyspaces auto scaling](#) in the *Amazon Keyspaces (for Apache Cassandra) Developer Guide*

## Amazon Lambda and Application Auto Scaling

You can scale Amazon Lambda provisioned concurrency using target tracking scaling policies and scheduled scaling.

Use the following information to help you integrate Lambda with Application Auto Scaling.

## Service-linked role created for Lambda

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Lambda resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_LambdaConcurrency`

## Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `lambda.application-autoscaling.amazonaws.com`

## Registering Lambda functions as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for a Lambda function. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

To configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for a Lambda function. The following example registers the provisioned concurrency for an alias called BLUE for a function called my-function, with a minimum capacity of 0 and a maximum capacity of 100.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace lambda \  
  --scalable-dimension lambda:function:ProvisionedConcurrency \  
  --resource-id function:my-function:BLUE \  
  --min-capacity 0 --max-capacity 100
```

```
--min-capacity 0 \  
--max-capacity 100
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Lambda functions in the following documentation:

- [Configuring provisioned concurrency](#) in the *Amazon Lambda Developer Guide*
- [Scheduling Lambda Provisioned Concurrency for recurring peak usage](#) on the Amazon Blog

## Amazon Managed Streaming for Apache Kafka (MSK) and Application Auto Scaling

You can scale out Amazon MSK cluster storage using target tracking scaling policies. Scale in by the target tracking policy is disabled.

Use the following information to help you integrate Amazon MSK with Application Auto Scaling.

### Service-linked role created for Amazon MSK

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Amazon MSK resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_KafkaCluster`

## Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `kafka.application-autoscaling.amazonaws.com`

## Registering Amazon MSK cluster storage as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create a scaling policy for the storage volume size per broker of an Amazon MSK cluster. A scalable target is a resource that Application Auto Scaling can scale. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the Amazon MSK console, then Amazon MSK automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for an Amazon MSK cluster. The following example registers the storage volume size per broker of an Amazon MSK cluster, with a minimum capacity of 100 GiB and a maximum capacity of 800 GiB.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace kafka \  
  --scalable-dimension kafka:broker-storage:VolumeSize \  
  --resource-id arn:aws-cn:kafka:us-east-1:123456789012:cluster/demo-  
cluster-1/6357e0b2-0e6a-4b86-a0b4-70df934c2e31-5 \  
  --min-capacity 100 \  
  --max-capacity 800
```

If successful, this command returns the ARN of the scalable target.

```
{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

### Note

When an Amazon MSK cluster is the scalable target, scale in is disabled and cannot be enabled.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Amazon MSK resources in the following documentation:

[Automatic scaling](#) in the *Amazon Managed Streaming for Apache Kafka Developer Guide*

## Amazon Neptune and Application Auto Scaling

You can scale Neptune clusters using target tracking scaling policies and scheduled scaling.

Use the following information to help you integrate Neptune with Application Auto Scaling.

### Service-linked role created for Neptune

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Neptune resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_NeptuneCluster`

## Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `neptune.application-autoscaling.amazonaws.com`

## Registering Neptune clusters as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for a Neptune cluster. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

To configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for a Neptune cluster. The following example registers the desired capacity of a cluster called `mycluster`, with a minimum capacity of one and a maximum capacity of eight.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace neptune \  
  --scalable-dimension neptune:cluster:ReadReplicaCount \  
  --resource-id cluster:mycluster \  
  --min-capacity 1 \  
  --max-capacity 8
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Neptune resources in the following documentation:

[Auto-scaling the number of replicas in an Amazon Neptune DB cluster](#) in the *Neptune User Guide*

## Amazon SageMaker and Application Auto Scaling

You can scale SageMaker endpoint variants, provisioned concurrency for serverless endpoints, and inference components using target tracking scaling policies, step scaling policies, and scheduled scaling.

Use the following information to help you integrate SageMaker with Application Auto Scaling.

### Service-linked role created for SageMaker

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering SageMaker resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_SageMakerEndpoint`

### Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `sagemaker.application-autoscaling.amazonaws.com`

## Registering SageMaker endpoint variants as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for a SageMaker model (variant). A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the SageMaker console, then SageMaker automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for a product variant. The following example registers the desired instance count for a product variant called `my-variant`, running on the `my-endpoint` endpoint, with a minimum capacity of one instance and a maximum capacity of eight instances.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace sagemaker \  
  --scalable-dimension sagemaker:variant:DesiredInstanceCount \  
  --resource-id endpoint/my-endpoint/variant/my-variant \  
  --min-capacity 1 \  
  --max-capacity 8
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.



## Registering the provisioned concurrency of serverless endpoints as scalable targets with Application Auto Scaling

Application Auto Scaling also requires a scalable target before you can create scaling policies or scheduled actions for the provisioned concurrency of serverless endpoints.

If you configure auto scaling using the SageMaker console, then SageMaker automatically registers a scalable target for you.

Otherwise, use one of the following methods to register the scalable target:

- Amazon CLI:

Call the [register-scalable-target](#) command for a product variant. The following example registers the provisioned concurrency for a product variant called `my-variant`, running on the `my-endpoint` endpoint, with a minimum capacity of one and a maximum capacity of ten.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace sagemaker \  
  --scalable-dimension sagemaker:variant:DesiredProvisionedConcurrency \  
  --resource-id endpoint/my-endpoint/variant/my-variant \  
  --min-capacity 1 \  
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

# Registering inference components as scalable targets with Application Auto Scaling

Application Auto Scaling also requires a scalable target before you can create scaling policies or scheduled actions for inference components.

- Amazon CLI:

Call the [register-scalable-target](#) command for an inference component. The following example registers the desired copy count for an inference component called `my-inference-component`, with a minimum capacity of zero copies and a maximum capacity of three copies.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace sagemaker \  
  --scalable-dimension sagemaker:inference-component:DesiredCopyCount \  
  --resource-id inference-component/my-inference-component \  
  --min-capacity 0 \  
  --max-capacity 3
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your SageMaker resources in the *Amazon SageMaker Developer Guide*:

- [Automatically scale Amazon SageMaker models](#)
- [Automatically scale Provisioned Concurrency for a serverless endpoint](#)
- [Set auto scaling policies for multi-model endpoint deployments](#)

- [Autoscale an asynchronous endpoint](#)

### Note

In 2023, SageMaker introduced new inference capabilities built on real-time inference endpoints. You create a SageMaker endpoint with an endpoint configuration that defines the instance type and initial instance count for the endpoint. Then, create an inference component, which is a SageMaker hosting object that you can use to deploy a model to an endpoint. For information about scaling inference components, see [Amazon SageMaker adds new inference capabilities to help reduce foundation model deployment costs and latency](#) and [Reduce model deployment costs by 50% on average using the latest features of Amazon SageMaker](#) on the Amazon Blog.

## Amazon EC2 Spot Fleet and Application Auto Scaling

You can scale Spot Fleets using target tracking scaling policies, step scaling policies, and scheduled scaling.

Use the following information to help you integrate Spot Fleet with Application Auto Scaling.

### Service-linked role created for Spot Fleet

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering Spot Fleet resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_EC2SpotFleetRequest`

### Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `ec2.application-autoscaling.amazonaws.com`

## Registering Spot Fleets as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for a Spot Fleet. A scalable target is a resource that Application Auto Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

If you configure auto scaling using the Spot Fleet console, then Spot Fleet automatically registers a scalable target for you.

If you want to configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for a Spot Fleet. The following example registers the target capacity of a Spot Fleet using its request ID, with a minimum capacity of two instances and a maximum capacity of 10 instances.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace ec2 \  
  --scalable-dimension ec2:spot-fleet-request:TargetCapacity \  
  --resource-id spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE \  
  --min-capacity 2 \  
  --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your Spot Fleet in the following documentation:

[Automatic scaling for Spot Fleet](#) in the *Amazon EC2 User Guide*

## Custom resources and Application Auto Scaling

You can scale custom resources using target tracking scaling policies, step scaling policies, and scheduled scaling.

Use the following information to help you integrate custom resources with Application Auto Scaling.

### Service-linked role created for custom resources

The following [service-linked role](#) is automatically created in your Amazon Web Services account when registering custom resources as scalable targets with Application Auto Scaling. This role allows Application Auto Scaling to perform supported operations within your account. For more information, see [Service-linked roles for Application Auto Scaling](#).

- `AWSServiceRoleForApplicationAutoScaling_CustomResource`

### Service principal used by the service-linked role

The service-linked role in the previous section can be assumed only by the service principal authorized by the trust relationships defined for the role. The service-linked role used by Application Auto Scaling grants access to the following service principal:

- `custom-resource.application-autoscaling.amazonaws.com`

## Registering custom resources as scalable targets with Application Auto Scaling

Application Auto Scaling requires a scalable target before you can create scaling policies or scheduled actions for a custom resource. A scalable target is a resource that Application Auto

Scaling can scale out and scale in. Scalable targets are uniquely identified by the combination of resource ID, scalable dimension, and namespace.

To configure auto scaling using the Amazon CLI or one of the Amazon SDKs, you can use the following options:

- Amazon CLI:

Call the [register-scalable-target](#) command for a custom resource. The following example registers a custom resource as a scalable target, with a minimum desired count of one capacity unit and a maximum desired count of 10 capacity units. The `custom-resource-id.txt` file contains a string that identifies the resource ID, which represents the path to the custom resource through your Amazon API Gateway endpoint.

```
aws application-autoscaling register-scalable-target \  
  --service-namespace custom-resource \  
  --scalable-dimension custom-resource:ResourceType:Property \  
  --resource-id file://~/custom-resource-id.txt \  
  --min-capacity 1 \  
  --max-capacity 10
```

Contents of `custom-resource-id.txt`:

```
https://example.execute-api.us-west-2.amazonaws.com/prod/  
scalableTargetDimensions/1-23456789
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

- Amazon SDK:

Call the [RegisterScalableTarget](#) operation and provide `ResourceId`, `ScalableDimension`, `ServiceNamespace`, `MinCapacity`, and `MaxCapacity` as parameters.

## Related resources

If you are just getting started with Application Auto Scaling, you can find additional useful information about scaling your custom resources in the following documentation:

[GitHub repository](#)

# Set up to start using Application Auto Scaling

Complete the tasks in this section to set up Application Auto Scaling for the first time:

## Topics

- [Sign up to Amazon](#)
- [Set up the Amazon CLI](#)
- [Use Amazon CloudShell to work with Application Auto Scaling from the command line](#)

## Sign up to Amazon

If you do not have an Amazon Web Services account, use the following procedure to create one.

### To sign up for Amazon Web Services

1. Open <http://www.amazonaws.cn/> and choose **Sign Up**.
2. Follow the on-screen instructions.

### Using Application Auto Scaling in Amazon Web Services Regions

Application Auto Scaling is available in multiple Amazon Web Services Regions. A global Amazon Web Services account allows you to work with resources in most Regions. When using Application Auto Scaling with resources in the China Regions, keep in mind that you must have a separate Amazon Web Services (China) account. In addition, there are some differences in how Application Auto Scaling is implemented. For more information on using Application Auto Scaling in the China Regions, see [Application Auto Scaling in China](#).

After setting up your Amazon Web Services account, continue to the next topic: [Set up the Amazon CLI](#).

## Set up the Amazon CLI

The Amazon Command Line Interface (Amazon CLI) is a unified developer tool for managing Amazon services, including Application Auto Scaling. Follow the steps to download and configure the Amazon CLI.



## To set up the Amazon CLI

1. Download, install, and configure version 1 or 2 of the Amazon CLI. The same Application Auto Scaling functionality is available in version 1 and 2. For instructions, see the following topics in the *Amazon Command Line Interface User Guide*:

### Amazon CLI version 1

- [Installing, updating, and uninstalling the Amazon CLI](#)
- [Configuring the Amazon CLI](#)

### Amazon CLI version 2

- [Installing or updating the latest version of the Amazon CLI](#)
- [Quick setup](#)

#### Note

For CLI access, you need an access key ID and a secret access key. Use temporary credentials instead of long-term access keys when possible. Temporary credentials include an access key ID, a secret access key, and a security token that indicates when the credentials expire. To increase the security of your Amazon Web Services account, we strongly recommend that you do not use the access credentials associated with your Amazon Web Services account root user. For more information, see [Programmatic access](#) in the *Amazon Web Services General Reference* and [Security best practices in IAM](#) in the *IAM User Guide*.

2. To confirm that the Amazon CLI profile is configured correctly, run the following command in a command window.

```
aws configure
```

If your profile has been configured correctly, you should see output similar to the following.

```
AWS Access Key ID [*****52FQ]:
AWS Secret Access Key [*****xgyZ]:
Default region name [us-east-1]:
```

```
Default output format [json]:
```

3. Run the following command to verify that the Application Auto Scaling commands for the Amazon CLI are installed.

```
aws application-autoscaling help
```

## Use Amazon CloudShell to work with Application Auto Scaling from the command line

Amazon CloudShell lets you skip installing the Amazon CLI in your development environment, and use it in the Amazon Web Services Management Console instead. In addition to avoiding installation, you also don't need to configure credentials, and you don't need to specify a region. Your Amazon Web Services Management Console session provides this context to the Amazon CLI. You can use Amazon CloudShell in [supported Amazon Web Services Regions](#).

You can run Amazon CLI commands against services using your preferred shell (Bash, PowerShell, or Z shell).

You can launch Amazon CloudShell from the Amazon Web Services Management Console using either one of the following two methods:

- Choose the Amazon CloudShell icon on the console navigation bar. It's located to the right of the search box.
- Use the search box on the console navigation bar to search for **CloudShell** and then choose the **CloudShell** option.

When Amazon CloudShell launches in a new browser window for the first time, a welcome panel displays and lists key features. After you close this panel, status updates are provided while the shell configures and forwards your console credentials. When the command prompt displays, the shell is ready for interaction.

For more information on this service, see the [Amazon CloudShell User Guide](#).

# Create Application Auto Scaling resources with Amazon CloudFormation

Application Auto Scaling is integrated with Amazon CloudFormation, a service that helps you to model and set up your Amazon resources so that you can spend less time creating and managing your resources and infrastructure. You create a template that describes all the Amazon resources that you want, and Amazon CloudFormation provisions and configures those resources for you.

When you use Amazon CloudFormation, you can reuse your template to set up your Application Auto Scaling resources consistently and repeatedly. Describe your resources once, and then provision the same resources over and over in multiple Amazon Web Services accounts and Regions.

## Application Auto Scaling and Amazon CloudFormation templates

To provision and configure resources for Application Auto Scaling and related services, you must understand [Amazon CloudFormation templates](#). Templates are formatted text files in JSON or YAML. These templates describe the resources that you want to provision in your Amazon CloudFormation stacks. If you're unfamiliar with JSON or YAML, you can use Amazon CloudFormation Designer to help you get started with Amazon CloudFormation templates. For more information, see [What is Amazon CloudFormation Designer?](#) in the *Amazon CloudFormation User Guide*.

When you create a stack template for Application Auto Scaling resources, you must provide the following:

- A namespace for the target service (for example, **appstream**). See the [AWS::ApplicationAutoScaling::ScalableTarget](#) reference to obtain service namespaces.
- A scalable dimension associated with the target resource (for example, **appstream:fleet:DesiredCapacity**). See the [AWS::ApplicationAutoScaling::ScalableTarget](#) reference to obtain scalable dimensions.
- A resource ID for the target resource (for example, **fleet/sample-fleet**). See the [AWS::ApplicationAutoScaling::ScalableTarget](#) reference for information about the syntax and examples of specific resource IDs.

- A service-linked role for the target resource (for example, `arn:aws-cn:iam::012345678910:role/aws-service-role/appstream.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_AppStreamFleet`). See the [Service-linked role ARN reference](#) table to obtain role ARNs.

To learn more about Application Auto Scaling resources, see the [Application Auto Scaling](#) reference in the *Amazon CloudFormation User Guide*.

## Example template snippets

You can find example snippets to include in Amazon CloudFormation templates in the following sections of the *Amazon CloudFormation User Guide*:

- For examples of scaling policies and scheduled actions, see [Configure Application Auto Scaling resources with Amazon CloudFormation](#).
- For more examples of scaling policies, see [AWS::ApplicationAutoScaling::ScalingPolicy](#).

## Learn more about Amazon CloudFormation

To learn more about Amazon CloudFormation, see the following resources:

- [Amazon CloudFormation](#)
- [Amazon CloudFormation User Guide](#)
- [Amazon CloudFormation API Reference](#)
- [Amazon CloudFormation Command Line Interface User Guide](#)

# Scheduled scaling

With scheduled scaling, you can set up automatic scaling for your application based on predictable load changes by creating scheduled actions that increase or decrease capacity at specific times. This allows you to scale your application proactively to match predictable load changes.

For example, let's say you experience a regular weekly traffic pattern where load increases mid-week and declines toward the end of the week. You can configure a scaling schedule in Application Auto Scaling that aligns with this pattern:

- On Wednesday morning, one scheduled action increases capacity by increasing the previously set minimum capacity of the scalable target.
- On Friday evening, another scheduled action decreases capacity by decreasing the previously set maximum capacity of the scalable target.

These scheduled scaling actions allow you to optimize costs and performance. Your application has sufficient capacity to handle the mid-week traffic peak, but does not over-provision unneeded capacity at other times.

You can use scheduled scaling and scaling policies together to get the benefits of proactive and reactive approaches to scaling. After a scheduled scaling action runs, the scaling policy can continue to make decisions about whether to further scale capacity. This helps you ensure that you have sufficient capacity to handle the load for your application. While your application scales to match demand, current capacity must fall within the minimum and maximum capacity that was set by your scheduled action.

## Topics

- [How scheduled scaling works](#)
- [Schedule recurring scaling actions using cron expressions](#)
- [Example scheduled actions for Application Auto Scaling](#)
- [Manage scheduled scaling for Application Auto Scaling](#)
- [Tutorial: Get started with scheduled scaling using the Amazon CLI](#)

# How scheduled scaling works

This topic describes how scheduled scaling works and introduces the key considerations you need to understand to use it effectively.

## Contents

- [How it works](#)
- [Considerations](#)
- [Commonly used commands for scheduled action creation, management, and deletion](#)
- [Related resources](#)
- [Limitations](#)

## How it works

To use scheduled scaling, create *scheduled actions*, which tell Application Auto Scaling to perform scaling activities at specific times. When you create a scheduled action, you specify the scalable target, when the scaling activity should occur, a minimum capacity, and a maximum capacity. You can create scheduled actions that scale one time only or that scale on a recurring schedule.

At the specified time, Application Auto Scaling scales based on the new capacity values, by comparing current capacity to the specified minimum and maximum capacity.

- If current capacity is less than the specified minimum capacity, Application Auto Scaling scales out (increases capacity) to the specified minimum capacity.
- If current capacity is greater than the specified maximum capacity, Application Auto Scaling scales in (decreases capacity) to the specified maximum capacity.

## Considerations

When you create a scheduled action, keep the following in mind:

- A scheduled action sets the `MinCapacity` and `MaxCapacity` to what is specified by the scheduled action at the date and time specified. The request can optionally include only one of these sizes. For example, you can create a scheduled action with only the minimum capacity specified. In some cases, however, you must include both sizes to ensure that the new minimum

capacity is not greater than the maximum capacity, or the new maximum capacity is not less than the minimum capacity.

- By default, the recurring schedules that you set are in Coordinated Universal Time (UTC). You can change the time zone to correspond to your local time zone or a time zone for another part of your network. When you specify a time zone that observes daylight saving time, the action automatically adjusts for Daylight Saving Time (DST). For more information, see [Schedule recurring scaling actions using cron expressions](#).
- You can temporarily turn off scheduled scaling for a scalable target. This helps you prevent scheduled actions from being active without having to delete them. You can then resume scheduled scaling when you want to use it again. For more information, see [Suspend and resume scaling for Application Auto Scaling](#).
- The order in which scheduled actions run is guaranteed for the same scalable target, but not for scheduled actions across scalable targets.
- To complete a scheduled action successfully, the specified resource must be in a scalable state in the target service. If it isn't, the request fails and returns an error message, for example, Resource Id [ActualResourceId] is not scalable. Reason: The status of all DB instances must be 'available' or 'incompatible-parameters'.
- Due to the distributed nature of Application Auto Scaling and the target services, the delay between the time the scheduled action is triggered and the time the target service honors the scaling action might be a few seconds. Because scheduled actions are run in the order that they are specified, scheduled actions with start times close to each other can take longer to run.

## Commonly used commands for scheduled action creation, management, and deletion

The commonly used commands for working with schedule scaling include:

- [register-scalable-target](#) to register Amazon or custom resources as scalable targets (a resource that Application Auto Scaling can scale), and to suspend and resume scaling.
- [put-scheduled-action](#) to add or modify scheduled actions for an existing scalable target.
- [describe-scaling-activities](#) to return information about scaling activities in an Amazon Region.
- [describe-scheduled-actions](#) to return information about scheduled actions in an Amazon Region.
- [delete-scheduled-action](#) to delete a scheduled action.

## Related resources

For a detailed example of using scheduled scaling, see the blog post [Scheduling Amazon Lambda Provisioned Concurrency for recurring peak usage](#) on the Amazon Compute Blog.

For a tutorial that walks through how to create scheduled actions using sample Amazon resources, see [Tutorial: Get started with scheduled scaling using the Amazon CLI](#).

For information about creating scheduled actions for Auto Scaling groups, see [Scheduled scaling for Amazon EC2 Auto Scaling](#) in the *Amazon EC2 Auto Scaling User Guide*.

## Limitations

The following are limitations when using scheduled scaling:

- The names of scheduled actions must be unique per scalable target.
- Application Auto Scaling doesn't provide second-level precision in schedule expressions. The finest resolution using a cron expression is 1 minute.
- The scalable target can't be an Amazon MSK cluster. Scheduled scaling is not supported for Amazon MSK.
- Console access to view, add, update, or remove scheduled actions on scalable resources depends on the resource that you use. For more information, see [Amazon services that you can use with Application Auto Scaling](#).

## Schedule recurring scaling actions using cron expressions

### Important

For help with cron expressions for Amazon EC2 Auto Scaling, see the [Recurring schedules](#) topic in the *Amazon EC2 Auto Scaling User Guide*. With Amazon EC2 Auto Scaling, you use traditional cron syntax instead of the custom cron syntax that Application Auto Scaling uses.

You can create scheduled actions that run on a recurring schedule using a cron expression.

To create a recurring schedule, specify a cron expression and a time zone to describe when that scheduled action is to recur. The supported time zone values are the canonical names of the IANA



time zones supported by [Joda-Time](#) (such as Etc/GMT+9 or Pacific/Tahiti). You can optionally specify a date and time for the start time, the end time, or both. For an example command that uses the Amazon CLI to create a scheduled action, see [Create a recurring scheduled action that specifies a time zone](#).

The supported cron expression format consists of six fields separated by white spaces: [Minutes] [Hours] [Day\_of\_Month] [Month] [Day\_of\_Week] [Year]. For example, the cron expression `30 6 ? * MON *` configures a scheduled action that recurs every Monday at 6:30 AM. The asterisk is used as a wildcard to match all values for a field.

For more information about the cron syntax for Application Auto Scaling scheduled actions, see [Cron expressions reference](#) in the *Amazon EventBridge User Guide*.

When you create a recurring schedule, choose your start and end times carefully. Keep the following in mind:

- If you specify a start time, Application Auto Scaling performs the action at this time, and then performs the action based on the specified recurrence.
- If you specify an end time, the action stops repeating after this time. Application Auto Scaling does not keep track of previous values and revert back to those previous values after the end time.
- The start time and end time must be set in UTC when you use the Amazon CLI or the Amazon SDKs to create or update a scheduled action.

## Examples

You can refer to the following table when you create a recurring schedule for an Application Auto Scaling scalable target. The following examples are the correct syntax for using Application Auto Scaling to create or update a scheduled action.

Minutes	Hours	Day of month	Month	Day of week	Year	Meaning
0	10	*	*	?	*	Run at 10:00 am (UTC) every day

Minutes	Hours	Day of month	Month	Day of week	Year	Meaning
15	12	*	*	?	*	Run at 12:15 pm (UTC) every day
0	18	?	*	MON-FRI	*	Run at 6:00 pm (UTC) every Monday through Friday
0	8	1	*	?	*	Run at 8:00 am (UTC) the 1st day of every month
0/15	*	*	*	?	*	Run every 15 minutes
0/10	*	?	*	MON-FRI	*	Run every 10 minutes Monday through Friday

Minutes	Hours	Day of month	Month	Day of week	Year	Meaning
0/5	8-17	?	*	MON-FRI	*	Run every 5 minutes Monday through Friday between 8:00 am and 5:55 pm (UTC)

### Exception

You can also create a cron expression with a string value that contains seven fields. In this case, you can use the first three fields to specify the time for when a scheduled action should be run, including the seconds. The full cron expression has the following space-separated fields: [Seconds] [Minutes] [Hours] [Day\_of\_Month] [Month] [Day\_of\_Week] [Year]. However, this approach doesn't guarantee that the scheduled action will run on the precise second that you specify. Also, some service consoles may not support the seconds field in a cron expression.

## Example scheduled actions for Application Auto Scaling

The following examples show how to create scheduled actions with the Amazon CLI [put-scheduled-action](#) command. When you specify the new capacity, you can specify a minimum capacity, a maximum capacity, or both.

For brevity, the examples in this topic illustrate CLI commands for a few of the services that integrate with Application Auto Scaling. To specify a different scalable target, specify its namespace in `--service-namespace`, its scalable dimension in `--scalable-dimension`, and its resource ID in `--resource-id`. For more information and examples for each service, see the topics in [Amazon services that you can use with Application Auto Scaling](#).

When using the Amazon CLI, remember that your commands run in the Amazon Web Services Region configured for your profile. If you want to run the commands in a different Region, either change the default Region for your profile, or use the `--region` parameter with the command.

## Contents

- [Create a scheduled action that occurs only once](#)
- [Create a scheduled action that runs on a recurring interval](#)
- [Create a scheduled action that runs on a recurring schedule](#)
- [Create a one-time scheduled action that specifies a time zone](#)
- [Create a recurring scheduled action that specifies a time zone](#)

## Create a scheduled action that occurs only once

To automatically scale your scalable target one time only, at a specified date and time, use the `--schedule "at(yyyy-mm-ddThh:mm:ss)"` option.

### Example Example: To scale out one time only

The following is an example of creating a scheduled action to scale out capacity at a specific date and time.

At the date and time specified for `--schedule` (10:00 PM UTC on March 31, 2021), if the value specified for `MinCapacity` is above the current capacity, Application Auto Scaling scales out to `MinCapacity`.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action --service-namespace custom-resource \  
  --scalable-dimension custom-resource:ResourceType:Property \  
  --resource-id file://~/custom-resource-id.txt \  
  --scheduled-action-name scale-out \  
  --schedule "at(2021-03-31T22:00:00)" \  
  --scalable-target-action MinCapacity=3
```

### Windows

```
aws application-autoscaling put-scheduled-action --service-namespace custom-resource --  
scalable-dimension custom-resource:ResourceType:Property --resource-id file://~/custom-  
resource-id.txt --scheduled-action-name scale-out --schedule "at(2021-03-31T22:00:00)"  
--scalable-target-action MinCapacity=3
```

### Note

When this scheduled action runs, if the maximum capacity is less than the value specified for minimum capacity, you must specify a new minimum and maximum capacity, and not just the minimum capacity.

## Example Example: To scale in one time only

The following is an example of creating a scheduled action to scale in capacity at a specific date and time.

At the date and time specified for `--schedule` (10:30 PM UTC on March 31, 2021), if the value specified for `MaxCapacity` is below the current capacity, Application Auto Scaling scales in to `MaxCapacity`.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action --service-namespace custom-resource \
  --scalable-dimension custom-resource:ResourceType:Property \
  --resource-id file://~/custom-resource-id.txt \
  --scheduled-action-name scale-in \
  --schedule "at(2021-03-31T22:30:00)" \
  --scalable-target-action MinCapacity=0,MaxCapacity=0
```

### Windows

```
aws application-autoscaling put-scheduled-action --service-namespace custom-resource --
scalable-dimension custom-resource:ResourceType:Property --resource-id file://~/custom-
resource-id.txt --scheduled-action-name scale-in --schedule "at(2021-03-31T22:30:00)"
--scalable-target-action MinCapacity=0,MaxCapacity=0
```

## Create a scheduled action that runs on a recurring interval

To schedule scaling at a recurring interval, use the `--schedule "rate(value unit)"` option. The value must be a positive integer. The unit can be `minute`, `minutes`, `hour`, `hours`, `day`, or `days`. For more information, see [Rate expressions](#) in the *Amazon CloudWatch Events User Guide*.

The following is an example of a scheduled action that uses a rate expression.

On the specified schedule (every 5 hours starting on January 30, 2021 at 12:00 PM UTC and ending on January 31, 2021 at 10:00 PM UTC), if the value specified for MinCapacity is above the current capacity, Application Auto Scaling scales out to MinCapacity. If the value specified for MaxCapacity is below the current capacity, Application Auto Scaling scales in to MaxCapacity.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action --service-namespace ecs \
  --scalable-dimension ecs:service:DesiredCount \
  --resource-id service/my-cluster/my-service \
  --scheduled-action-name my-recurring-action \
  --schedule "rate(5 hours)" \
  --start-time 2021-01-30T12:00:00 \
  --end-time 2021-01-31T22:00:00 \
  --scalable-target-action MinCapacity=3,MaxCapacity=10
```

### Windows

```
aws application-autoscaling put-scheduled-action --service-namespace ecs --scalable-
dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-service
--scheduled-action-name my-recurring-action --schedule "rate(5 hours)" --start-
time 2021-01-30T12:00:00 --end-time 2021-01-31T22:00:00 --scalable-target-action
MinCapacity=3,MaxCapacity=10
```

## Create a scheduled action that runs on a recurring schedule

To schedule scaling on a recurring schedule, use the `--schedule "cron(fields)"` option. For more information, see [Schedule recurring scaling actions using cron expressions](#).

The following is an example of a scheduled action that uses a cron expression.

On the specified schedule (every day at 9:00 AM UTC), if the value specified for MinCapacity is above the current capacity, Application Auto Scaling scales out to MinCapacity. If the value specified for MaxCapacity is below the current capacity, Application Auto Scaling scales in to MaxCapacity.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action --service-namespace appstream \
  --scalable-dimension appstream:fleet:DesiredCapacity \
  --resource-id fleet/sample-fleet \
```

```
--scheduled-action-name my-recurring-action \  
--schedule "cron(0 9 * * ? *)" \  
--scalable-target-action MinCapacity=10,MaxCapacity=50
```

## Windows

```
aws application-autoscaling put-scheduled-action --service-namespace appstream --  
scalable-dimension appstream:fleet:DesiredCapacity --resource-id fleet/sample-fleet --  
scheduled-action-name my-recurring-action --schedule "cron(0 9 * * ? *)" --scalable-  
target-action MinCapacity=10,MaxCapacity=50
```

## Create a one-time scheduled action that specifies a time zone

Scheduled actions are set to the UTC time zone by default. To specify a different time zone, include the `--timezone` option and specify the canonical name for the time zone (America/New\_York, for example). For more information, see <https://www.joda.org/joda-time/timezones.html>, which provides information about the IANA time zones that are supported when calling [put-scheduled-action](#).

The following is an example that uses the `--timezone` option when creating a scheduled action to scale capacity at a specific date and time.

At the date and time specified for `--schedule` (5:00 PM local time on January 31, 2021), if the value specified for `MinCapacity` is above the current capacity, Application Auto Scaling scales out to `MinCapacity`. If the value specified for `MaxCapacity` is below the current capacity, Application Auto Scaling scales in to `MaxCapacity`.

## Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action --service-namespace comprehend \  
--scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits \  
--resource-id arn:aws-cn:comprehend:us-west-2:123456789012:document-classifier-  
endpoint/EXAMPLE \  
--scheduled-action-name my-one-time-action \  
--schedule "at(2021-01-31T17:00:00)" --timezone "America/New_York" \  
--scalable-target-action MinCapacity=1,MaxCapacity=3
```

## Windows

```
aws application-autoscaling put-scheduled-action --service-namespace comprehend --  
scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
```

```
--resource-id arn:aws-cn:comprehend:us-west-2:123456789012:document-classifier-
endpoint/EXAMPLE --scheduled-action-name my-one-time-action --schedule
"at(2021-01-31T17:00:00)" --timezone "America/New_York" --scalable-target-action
MinCapacity=1,MaxCapacity=3
```

## Create a recurring scheduled action that specifies a time zone

The following is an example that uses the `--timezone` option when creating a recurring scheduled action to scale capacity. For more information, see [Schedule recurring scaling actions using cron expressions](#).

On the specified schedule (every Monday through Friday at 6:00 PM local time), if the value specified for `MinCapacity` is above the current capacity, Application Auto Scaling scales out to `MinCapacity`. If the value specified for `MaxCapacity` is below the current capacity, Application Auto Scaling scales in to `MaxCapacity`.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action --service-namespace lambda \
--scalable-dimension lambda:function:ProvisionedConcurrency \
--resource-id function:my-function:BLUE \
--scheduled-action-name my-recurring-action \
--schedule "cron(0 18 ? * MON-FRI *)" --timezone "Etc/GMT+9" \
--scalable-target-action MinCapacity=10,MaxCapacity=50
```

### Windows

```
aws application-autoscaling put-scheduled-action --service-namespace lambda
--scalable-dimension lambda:function:ProvisionedConcurrency --resource-
id function:my-function:BLUE --scheduled-action-name my-recurring-action --schedule
"cron(0 18 ? * MON-FRI *)" --timezone "Etc/GMT+9" --scalable-target-action
MinCapacity=10,MaxCapacity=50
```

## Manage scheduled scaling for Application Auto Scaling

The Amazon CLI includes several other commands that help you manage your scheduled actions.

For brevity, the examples in this topic illustrate CLI commands for a few of the services that integrate with Application Auto Scaling. To specify a different scalable target, specify its namespace in `--service-namespace`, its scalable dimension in `--scalable-dimension`, and



its resource ID in `--resource-id`. For more information and examples for each service, see the topics in [Amazon services that you can use with Application Auto Scaling](#).

When using the Amazon CLI, remember that your commands run in the Amazon Web Services Region configured for your profile. If you want to run the commands in a different Region, either change the default Region for your profile, or use the `--region` parameter with the command.

## Contents

- [View scaling activities for a specified service](#)
- [Describing all scheduled actions for a specified service](#)
- [Describe one or more scheduled actions for a scalable target](#)
- [Turn off scheduled scaling for a scalable target](#)
- [Delete a scheduled action](#)

## View scaling activities for a specified service

To view the scaling activities for all of the scalable targets in a specified service namespace, use the [describe-scaling-activities](#) command.

The following example retrieves the scaling activities associated with the dynamodb service namespace.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-activities --service-namespace dynamodb
```

### Windows

```
aws application-autoscaling describe-scaling-activities --service-namespace dynamodb
```

If the command succeeds, you see output similar to the following.

```
{
  "ScalingActivities": [
    {
      "ScalableDimension": "dynamodb:table:WriteCapacityUnits",
      "Description": "Setting write capacity units to 10.",
      "ResourceId": "table/my-table",
      "ActivityId": "4d1308c0-bbcf-4514-a673-b0220ae38547",
```

```

        "StartTime": 1561574415.086,
        "ServiceNamespace": "dynamodb",
        "EndTime": 1561574449.51,
        "Cause": "maximum capacity was set to 10",
        "StatusMessage": "Successfully set write capacity units to 10. Change
successfully fulfilled by dynamodb.",
        "StatusCode": "Successful"
    },
    {
        "ScalableDimension": "dynamodb:table:WriteCapacityUnits",
        "Description": "Setting min capacity to 5 and max capacity to 10",
        "ResourceId": "table/my-table",
        "ActivityId": "f2b7847b-721d-4e01-8ef0-0c8d3bacc1c7",
        "StartTime": 1561574414.644,
        "ServiceNamespace": "dynamodb",
        "Cause": "scheduled action name my-second-scheduled-action was triggered",
        "StatusMessage": "Successfully set min capacity to 5 and max capacity to
10",
        "StatusCode": "Successful"
    },
    {
        "ScalableDimension": "dynamodb:table:WriteCapacityUnits",
        "Description": "Setting write capacity units to 15.",
        "ResourceId": "table/my-table",
        "ActivityId": "d8ea4de6-9eaa-499f-b466-2cc5e681ba8b",
        "StartTime": 1561574108.904,
        "ServiceNamespace": "dynamodb",
        "EndTime": 1561574140.255,
        "Cause": "minimum capacity was set to 15",
        "StatusMessage": "Successfully set write capacity units to 15. Change
successfully fulfilled by dynamodb.",
        "StatusCode": "Successful"
    },
    {
        "ScalableDimension": "dynamodb:table:WriteCapacityUnits",
        "Description": "Setting min capacity to 15 and max capacity to 20",
        "ResourceId": "table/my-table",
        "ActivityId": "3250fd06-6940-4e8e-bb1f-d494db7554d2",
        "StartTime": 1561574108.512,
        "ServiceNamespace": "dynamodb",
        "Cause": "scheduled action name my-first-scheduled-action was triggered",
        "StatusMessage": "Successfully set min capacity to 15 and max capacity to
20",
        "StatusCode": "Successful"
    }

```

```

    }
  ]
}

```

To change this command so that it retrieves the scaling activities for only one of your scalable targets, add the `--resource-id` option.

## Describing all scheduled actions for a specified service

To describe the scheduled actions for all of the scalable targets in a specified service namespace, use the [describe-scheduled-actions](#) command.

The following example retrieves the scheduled actions associated with the `ec2` service namespace.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scheduled-actions --service-namespace ec2
```

### Windows

```
aws application-autoscaling describe-scheduled-actions --service-namespace ec2
```

If successful, this command returns output similar to the following.

```

{
  "ScheduledActions": [
    {
      "ScheduledActionName": "my-one-time-action",
      "ScheduledActionARN": "arn:aws-cn:autoscaling:us-west-2:123456789012:scheduledAction:493a6261-fbb9-432d-855d-3c302c14bdb9:resource/ec2/spot-fleet-request/sfr-107dc873-0802-4402-a901-37294EXAMPLE:scheduledActionName/my-one-time-action",
      "ServiceNamespace": "ec2",
      "Schedule": "at(2021-01-31T17:00:00)",
      "Timezone": "America/New_York",
      "ResourceId": "spot-fleet-request/sfr-107dc873-0802-4402-a901-37294EXAMPLE",
      "ScalableDimension": "ec2:spot-fleet-request:TargetCapacity",
      "ScalableTargetAction": {
        "MaxCapacity": 1
      },
      "CreationTime": 1607454792.331
    }
  ]
}

```

```

    },
    {
      "ScheduledActionName": "my-recurring-action",
      "ScheduledActionARN": "arn:aws-cn:autoscaling:us-
west-2:123456789012:scheduledAction:493a6261-fbb9-432d-855d-3c302c14bdb9:resource/ec2/
spot-fleet-request/sfr-107dc873-0802-4402-a901-37294EXAMPLE:scheduledActionName/my-
recurring-action",
      "ServiceNamespace": "ec2",
      "Schedule": "rate(5 minutes)",
      "ResourceId": "spot-fleet-request/sfr-107dc873-0802-4402-
a901-37294EXAMPLE",
      "ScalableDimension": "ec2:spot-fleet-request:TargetCapacity",
      "StartTime": 1604059200.0,
      "EndTime": 1612130400.0,
      "ScalableTargetAction": {
        "MinCapacity": 3,
        "MaxCapacity": 10
      },
      "CreationTime": 1607454949.719
    },
    {
      "ScheduledActionName": "my-one-time-action",
      "ScheduledActionARN": "arn:aws-cn:autoscaling:us-
west-2:123456789012:scheduledAction:4bce34c7-bb81-4ecf-b776-5c726efb1567:resource/ec2/
spot-fleet-request/sfr-40edeb7b-9ae7-44be-bef2-5c4c8EXAMPLE:scheduledActionName/my-one-
time-action",
      "ServiceNamespace": "ec2",
      "Schedule": "at(2020-12-08T9:36:00)",
      "Timezone": "America/New_York",
      "ResourceId": "spot-fleet-request/sfr-40edeb7b-9ae7-44be-
bef2-5c4c8EXAMPLE",
      "ScalableDimension": "ec2:spot-fleet-request:TargetCapacity",
      "ScalableTargetAction": {
        "MinCapacity": 1,
        "MaxCapacity": 3
      },
      "CreationTime": 1607456031.391
    }
  ]
}

```

## Describe one or more scheduled actions for a scalable target

To retrieve information about the scheduled actions for a specified scalable target, add the `--resource-id` option when describing scheduled actions using the [describe-scheduled-actions](#) command.

If you include the `--scheduled-action-names` option and specify the name of a scheduled action as its value, the command returns only the scheduled action whose name is a match, as shown in the following example.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scheduled-actions --service-namespace ec2 \  
--resource-id spot-fleet-request/sfr-40edeb7b-9ae7-44be-bef2-5c4c8EXAMPLE \  
--scheduled-action-names my-one-time-action
```

### Windows

```
aws application-autoscaling describe-scheduled-actions --service-namespace ec2 --  
resource-id spot-fleet-request/sfr-40edeb7b-9ae7-44be-bef2-5c4c8EXAMPLE --scheduled-  
action-names my-one-time-action
```

The following is example output.

```
{  
  "ScheduledActions": [  
    {  
      "ScheduledActionName": "my-one-time-action",  
      "ScheduledActionARN": "arn:aws-cn:autoscaling:us-  
west-2:123456789012:scheduledAction:4bce34c7-bb81-4ecf-b776-5c726efb1567:resource/ec2/  
spot-fleet-request/sfr-40edeb7b-9ae7-44be-bef2-5c4c8EXAMPLE:scheduledActionName/my-one-  
time-action",  
      "ServiceNamespace": "ec2",  
      "Schedule": "at(2020-12-08T9:36:00)",  
      "Timezone": "America/New_York",  
      "ResourceId": "spot-fleet-request/sfr-40edeb7b-9ae7-44be-  
bef2-5c4c8EXAMPLE",  
      "ScalableDimension": "ec2:spot-fleet-request:TargetCapacity",  
      "ScalableTargetAction": {  
        "MinCapacity": 1,  
        "MaxCapacity": 3
```

```

        },
        "CreationTime": 1607456031.391
    }
]
}

```

If more than one value is provided for the `--scheduled-action-names` option, all scheduled actions whose names are a match are included in the output.

## Turn off scheduled scaling for a scalable target

You can temporarily turn off scheduled scaling without deleting your scheduled actions. For more information, see [Suspend and resume scaling for Application Auto Scaling](#).

Suspend scheduled scaling on a scalable target by using the [register-scalable-target](#) command with the `--suspended-state` option, and specifying `true` as the value of the `ScheduledScalingSuspended` attribute, as shown in the following example.

### Linux, macOS, or Unix

```

aws application-autoscaling register-scalable-target --service-namespace rds \
  --scalable-dimension rds:cluster:ReadReplicaCount --resource-id cluster:my-db-cluster \
  --suspended-state '{"ScheduledScalingSuspended": true}'

```

### Windows

```

aws application-autoscaling register-scalable-target --service-namespace rds --
scalable-dimension rds:cluster:ReadReplicaCount --resource-id cluster:my-db-cluster --
suspended-state "{\"ScheduledScalingSuspended\": true}"

```

If successful, this command returns the ARN of the scalable target.

```

{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}

```

To resume scheduled scaling, run this command again, specifying `false` as the value of the `ScheduledScalingSuspended` attribute.

## Delete a scheduled action

When you are finished with a scheduled action, you can delete it using the [delete-scheduled-action](#) command.

### Linux, macOS, or Unix

```
aws application-autoscaling delete-scheduled-action --service-namespace ec2 \  
--scalable-dimension ec2:spot-fleet-request:TargetCapacity \  
--resource-id spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-37294EXAMPLE \  
--scheduled-action-name my-recurring-action
```

### Windows

```
aws application-autoscaling delete-scheduled-action --service-namespace ec2 --scalable-  
dimension ec2:spot-fleet-request:TargetCapacity --resource-id spot-fleet-request/  
sfr-73fbd2ce-aa30-494c-8788-37294EXAMPLE --scheduled-action-name my-recurring-action
```

If successful, this command returns to the prompt.

## Tutorial: Get started with scheduled scaling using the Amazon CLI

The following tutorial shows you how to use the Amazon CLI to get started with scheduled scaling by helping you create scheduled actions that scale a sample DynamoDB table called `TestTable`. If you don't already have a `TestTable` table in DynamoDB that you use for testing, you can create one now by running the **create-table** command shown in [Step 1: Create a DynamoDB table](#) in the *Amazon DynamoDB Developer Guide*.

When using the Amazon CLI, remember that your commands run in the Amazon Region that's configured for your profile. If you want to run the commands in a different Region, either change the default Region for your profile, or use the `--region` parameter with the command.

### Note

You may incur Amazon charges as part of this tutorial. Please monitor your [Free tier](#) usage and make sure that you understand the costs associated with the number of units of read and write capacity that your DynamoDB database uses.

## Contents

- [Step 1: Register your scalable target](#)
- [Step 2: Create two scheduled actions](#)
- [Step 3: View the scaling activities](#)
- [Step 4: Next steps](#)
- [Step 5: Clean up](#)

## Step 1: Register your scalable target

Begin by registering your DynamoDB table as a scalable target with Application Auto Scaling.

### To register your scalable target with Application Auto Scaling

1. First, use the [describe-scalable-targets](#) command to check whether any DynamoDB resources are already registered. This lets you verify that the TestTable table is unregistered, in case it is not a new table.

#### Linux, macOS, or Unix

```
aws application-autoscaling describe-scalable-targets \  
--service-namespace dynamodb
```

#### Windows

```
aws application-autoscaling describe-scalable-targets --service-namespace dynamodb
```

If there are no existing scalable targets, this is the response.

```
{  
  "ScalableTargets": []  
}
```

2. Use the following [register-scalable-target](#) command to register the write capacity of your DynamoDB table called TestTable. Set a minimum desired capacity of 5 write capacity units and a maximum desired capacity of 10 write capacity units.

#### Linux, macOS, or Unix



```
aws application-autoscaling register-scalable-target \  
  --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:WriteCapacityUnits \  
  --resource-id table/TestTable \  
  --min-capacity 5 --max-capacity 10
```

## Windows

```
aws application-autoscaling register-scalable-target --service-namespace dynamodb  
  --scalable-dimension dynamodb:table:WriteCapacityUnits --resource-id table/  
TestTable --min-capacity 5 --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

## Step 2: Create two scheduled actions

Application Auto Scaling allows you to schedule the time when a scaling action should occur. You specify the scalable target, the schedule, and the minimum and maximum capacity. At the specified time, Application Auto Scaling updates the minimum and maximum value for the scalable target. If its current capacity is outside of this range, this results in a scaling activity.

Scheduling updates to the minimum and maximum capacity is also helpful if you decide to create a scaling policy. A scaling policy allows your resources to scale dynamically based on current resource utilization. A common guardrail for a scaling policy is having appropriate values for minimum and maximum capacity.

For this exercise, we create two one-time actions for scale out and scale in.

### To create and view the scheduled actions

1. To create the first scheduled action, use the following [put-scheduled-action](#) command.

The **at** command in `--schedule` schedules the action to be run once at a specified date and time in the future. Hours are in 24-hour format in UTC. Schedule the action to occur about 5 minutes from now.

At the date and time specified, Application Auto Scaling updates the `MinCapacity` and `MaxCapacity` values. Assuming the table currently has 5 write capacity units, Application Auto Scaling scales out to `MinCapacity` to put the table within the new desired range of 15-20 write capacity units.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action \  
  --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:WriteCapacityUnits \  
  --resource-id table/TestTable \  
  --scheduled-action-name my-first-scheduled-action \  
  --schedule "at(2019-05-20T17:05:00)" \  
  --scalable-target-action MinCapacity=15,MaxCapacity=20
```

### Windows

```
aws application-autoscaling put-scheduled-action --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:WriteCapacityUnits --resource-id table/ \  
TestTable --scheduled-action-name my-first-scheduled-action --schedule \  
  "at(2019-05-20T17:05:00)" --scalable-target-action MinCapacity=15,MaxCapacity=20
```

This command does not return any output if it is successful.

2. To create the second scheduled action that Application Auto Scaling uses to scale in, use the following [put-scheduled-action](#) command.

Schedule the action to occur about 10 minutes from now.

At the date and time specified, Application Auto Scaling updates the table's `MinCapacity` and `MaxCapacity`, and scales in to `MaxCapacity` to return the table to the original desired range of 5-10 write capacity units.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action \  
  --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:WriteCapacityUnits \  
  --resource-id table/TestTable \  
  --scheduled-action-name my-second-scheduled-action \  
  --schedule "at(2019-05-20T17:10:00)" \  
  --scalable-target-action MaxCapacity=10
```

```
--service-namespace dynamodb \  
--scalable-dimension dynamodb:table:WriteCapacityUnits \  
--resource-id table/TestTable \  
--scheduled-action-name my-second-scheduled-action \  
--schedule "at(2019-05-20T17:10:00)" \  
--scalable-target-action MinCapacity=5,MaxCapacity=10
```

## Windows

```
aws application-autoscaling put-scheduled-action --service-namespace dynamodb  
--scalable-dimension dynamodb:table:WriteCapacityUnits --resource-id table/  
TestTable --scheduled-action-name my-second-scheduled-action --schedule  
"at(2019-05-20T17:10:00)" --scalable-target-action MinCapacity=5,MaxCapacity=10
```

3. (Optional) Get a list of scheduled actions for the specified service namespace using the following [describe-scheduled-actions](#) command.

## Linux, macOS, or Unix

```
aws application-autoscaling describe-scheduled-actions \  
--service-namespace dynamodb
```

## Windows

```
aws application-autoscaling describe-scheduled-actions --service-namespace dynamodb
```

The following is example output.

```
{  
  "ScheduledActions": [  
    {  
      "ScalableDimension": "dynamodb:table:WriteCapacityUnits",  
      "Schedule": "at(2019-05-20T18:35:00)",  
      "ResourceId": "table/TestTable",  
      "CreationTime": 1561571888.361,  
      "ScheduledActionARN": "arn:aws:autoscaling:us-  
east-1:123456789012:scheduledAction:2d36aa3b-cdf9-4565-b290-81db519b227d:resource/  
dynamodb/table/TestTable:scheduledActionName/my-first-scheduled-action",  
      "ScalableTargetAction": {  
        "MinCapacity": 15,  
        "MaxCapacity": 20
```

```
    },
    "ScheduledActionName": "my-first-scheduled-action",
    "ServiceNamespace": "dynamodb"
  },
  {
    "ScalableDimension": "dynamodb:table:WriteCapacityUnits",
    "Schedule": "at(2019-05-20T18:40:00)",
    "ResourceId": "table/TestTable",
    "CreationTime": 1561571946.021,
    "ScheduledActionARN": "arn:aws:autoscaling:us-
east-1:123456789012:scheduledAction:2d36aa3b-cdf9-4565-b290-81db519b227d:resource/
dynamodb/table/TestTable:scheduledActionName/my-second-scheduled-action",
    "ScalableTargetAction": {
      "MinCapacity": 5,
      "MaxCapacity": 10
    },
    "ScheduledActionName": "my-second-scheduled-action",
    "ServiceNamespace": "dynamodb"
  }
]
}
```

### Step 3: View the scaling activities

In this step, you view the scaling activities triggered by the scheduled actions, and then verify that DynamoDB changed the table's write capacity.

#### To view the scaling activities

1. Wait for the time you chose, and verify that your scheduled actions are working by using the following [describe-scaling-activities](#) command.

#### Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-activities \
  --service-namespace dynamodb
```

#### Windows

```
aws application-autoscaling describe-scaling-activities --service-namespace dynamodb
```

The following is example output for the first scheduled action while the scheduled action is in progress.

Scaling activities are ordered by creation date, with the newest scaling activities returned first.

```
{
  "ScalingActivities": [
    {
      "ScalableDimension": "dynamodb:table:WriteCapacityUnits",
      "Description": "Setting write capacity units to 15.",
      "ResourceId": "table/TestTable",
      "ActivityId": "d8ea4de6-9eaa-499f-b466-2cc5e681ba8b",
      "StartTime": 1561574108.904,
      "ServiceNamespace": "dynamodb",
      "Cause": "minimum capacity was set to 15",
      "StatusMessage": "Successfully set write capacity units to 15. Waiting for change to be fulfilled by dynamodb.",
      "StatusCode": "InProgress"
    },
    {
      "ScalableDimension": "dynamodb:table:WriteCapacityUnits",
      "Description": "Setting min capacity to 15 and max capacity to 20",
      "ResourceId": "table/TestTable",
      "ActivityId": "3250fd06-6940-4e8e-bb1f-d494db7554d2",
      "StartTime": 1561574108.512,
      "ServiceNamespace": "dynamodb",
      "Cause": "scheduled action name my-first-scheduled-action was triggered",
      "StatusMessage": "Successfully set min capacity to 15 and max capacity to 20",
      "StatusCode": "Successful"
    }
  ]
}
```

The following is example output after both scheduled actions have run.

```
{
```

```
"ScalingActivities": [  
  {  
    "ScalableDimension": "dynamodb:table:WriteCapacityUnits",  
    "Description": "Setting write capacity units to 10.",  
    "ResourceId": "table/TestTable",  
    "ActivityId": "4d1308c0-bbcf-4514-a673-b0220ae38547",  
    "StartTime": 1561574415.086,  
    "ServiceNamespace": "dynamodb",  
    "EndTime": 1561574449.51,  
    "Cause": "maximum capacity was set to 10",  
    "StatusMessage": "Successfully set write capacity units to 10. Change  
successfully fulfilled by dynamodb.",  
    "StatusCode": "Successful"  
  },  
  {  
    "ScalableDimension": "dynamodb:table:WriteCapacityUnits",  
    "Description": "Setting min capacity to 5 and max capacity to 10",  
    "ResourceId": "table/TestTable",  
    "ActivityId": "f2b7847b-721d-4e01-8ef0-0c8d3bacc1c7",  
    "StartTime": 1561574414.644,  
    "ServiceNamespace": "dynamodb",  
    "Cause": "scheduled action name my-second-scheduled-action was  
triggered",  
    "StatusMessage": "Successfully set min capacity to 5 and max capacity  
to 10",  
    "StatusCode": "Successful"  
  },  
  {  
    "ScalableDimension": "dynamodb:table:WriteCapacityUnits",  
    "Description": "Setting write capacity units to 15.",  
    "ResourceId": "table/TestTable",  
    "ActivityId": "d8ea4de6-9eaa-499f-b466-2cc5e681ba8b",  
    "StartTime": 1561574108.904,  
    "ServiceNamespace": "dynamodb",  
    "EndTime": 1561574140.255,  
    "Cause": "minimum capacity was set to 15",  
    "StatusMessage": "Successfully set write capacity units to 15. Change  
successfully fulfilled by dynamodb.",  
    "StatusCode": "Successful"  
  },  
  {  
    "ScalableDimension": "dynamodb:table:WriteCapacityUnits",  
    "Description": "Setting min capacity to 15 and max capacity to 20",  
    "ResourceId": "table/TestTable",
```

```

        "ActivityId": "3250fd06-6940-4e8e-bb1f-d494db7554d2",
        "StartTime": 1561574108.512,
        "ServiceNamespace": "dynamodb",
        "Cause": "scheduled action name my-first-scheduled-action was
triggered",
        "StatusMessage": "Successfully set min capacity to 15 and max capacity
to 20",
        "StatusCode": "Successful"
    }
]
}

```

2. After running the scheduled actions successfully, open the DynamoDB console and choose the table that you want to work with. View the **Write capacity units** under the **Capacity** tab. After the second scaling action ran, the write capacity units should have been scaled from 15 to 10.

You can also verify the table's current write capacity by using the following [describe-table](#) command. Include the `--query` option to filter the output. For more information about the output filtering capabilities of the Amazon CLI, see [Controlling command output from the Amazon CLI](#) in the *Amazon Command Line Interface User Guide*.

### Linux, macOS, or Unix

```
aws dynamodb describe-table --table-name TestTable \
--query 'Table.[TableName,TableStatus,ProvisionedThroughput]'
```

### Windows

```
aws dynamodb describe-table --table-name TestTable --query "Table.
[TableName,TableStatus,ProvisionedThroughput]"
```

The following is example output.

```
[
  "TestTable",
  "ACTIVE",
  {
    "NumberOfDecreasesToday": 1,
    "WriteCapacityUnits": 10,
    "LastIncreaseDateTime": 1561574133.264,
    "ReadCapacityUnits": 5,

```

```
    "LastDecreaseDateTime": 1561574435.607
  }
]
```

## Step 4: Next steps

If you want to try scaling with both scheduled scaling and a scaling policy, follow the steps in [Tutorial: Configure auto scaling to handle a heavy workload](#).

## Step 5: Clean up

When you are done working with the getting started exercises, you can clean up the associated resources as follows.

### To delete the scheduled actions

The following [delete-scheduled-action](#) command deletes a specified scheduled action. You can skip this step if you want to keep the scheduled action for future use.

### Linux, macOS, or Unix

```
aws application-autoscaling delete-scheduled-action \
  --service-namespace dynamodb \
  --scalable-dimension dynamodb:table:WriteCapacityUnits \
  --resource-id table/TestTable \
  --scheduled-action-name my-second-scheduled-action
```

### Windows

```
aws application-autoscaling delete-scheduled-action --service-namespace dynamodb --
scalable-dimension dynamodb:table:WriteCapacityUnits --resource-id table/TestTable --
scheduled-action-name my-second-scheduled-action
```

### To deregister the scalable target

Use the following [deregister-scalable-target](#) command to deregister the scalable target. If you have any scaling policies that you created or any scheduled actions that have not yet been deleted, they are deleted by this command. You can skip this step if you want to keep the scalable target registered for future use.



## Linux, macOS, or Unix

```
aws application-autoscaling deregister-scalable-target \  
  --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:WriteCapacityUnits \  
  --resource-id table/TestTable
```

## Windows

```
aws application-autoscaling deregister-scalable-target --service-namespace dynamodb --  
scalable-dimension dynamodb:table:WriteCapacityUnits --resource-id table/TestTable
```

## To delete the DynamoDB table

Use the following [delete-table](#) command to delete the table that you used in this tutorial. You can skip this step if you want to keep the table for future use.

## Linux, macOS, or Unix

```
aws dynamodb delete-table --table-name TestTable
```

## Windows

```
aws dynamodb delete-table --table-name TestTable
```

# Target tracking scaling policies

A target tracking scaling policy automatically scales your application based on a target metric value. This allows your application to maintain optimal performance and cost efficiency without manual intervention.

With target tracking, you select a metric and a target value to represent the ideal average utilization or throughput level for your application. Application Auto Scaling creates and manages the CloudWatch alarms that trigger scaling events when the metric deviates from the target. This is similar to how a thermostat maintains a target temperature.

For example, let's say that you currently have an application that runs on Spot Fleet, and you want the CPU utilization of the fleet to stay at around 50 percent when the load on the application changes. This gives you extra capacity to handle traffic spikes without maintaining an excessive number of idle resources.

You can meet this need by creating a target tracking scaling policy that targets an average CPU utilization of 50 percent. Then, Application Auto Scaling will scale out (increase capacity) when CPU exceeds 50 percent to handle increased load. It will scale in (decrease capacity) when CPU drops below 50 percent to optimize costs during periods of low utilization.

Target tracking policies remove the need to manually define CloudWatch alarms and scaling adjustments. Application Auto Scaling handles this automatically based on the target you set.

You can base target tracking policies on either predefined or custom metrics:

- **Predefined metrics**—Metrics provided by Application Auto Scaling like average CPU utilization or average request count per target.
- **Custom metrics**—You can use metric math to combine metrics, leverage existing metrics, or use your own custom metrics published to CloudWatch.

Choose a metric that changes inversely proportional to a change in the capacity of your scalable target. So if you double capacity, the metric decreases by 50 percent. This allows the metric data to accurately trigger proportional scaling events.

## Topics

- [How target tracking scaling works](#)
- [Create a target tracking scaling policy using the Amazon CLI](#)

- [Create a target tracking scaling policy for Application Auto Scaling using metric math](#)

## How target tracking scaling works

This topic describes how target tracking scaling works and introduces the key elements of a target tracking scaling policy.

### Contents

- [How it works](#)
- [Choose metrics](#)
- [Define target value](#)
- [Define cooldown periods](#)
- [Considerations](#)
- [Multiple scaling policies](#)
- [Commonly used commands for scaling policy creation, management, and deletion](#)
- [Related resources](#)
- [Limitations](#)

## How it works

To use target tracking scaling, you create a target tracking scaling policy and specify the following:

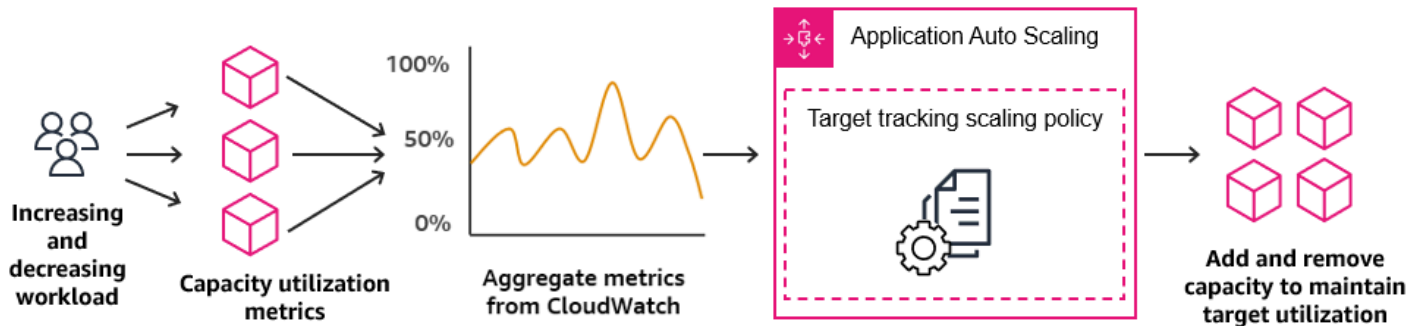
- **Metric**—A CloudWatch metric to track, such as average CPU utilization or average request count per target.
- **Target value**—The target value for the metric, such as 50 percent CPU utilization or 1000 requests per target per minute.

Application Auto Scaling creates and manages the CloudWatch alarms that invoke the scaling policy and calculates the scaling adjustment based on the metric and the target value. It adds and removes capacity as required to keep the metric at, or close to, the specified target value.

When the metric is above the target value, Application Auto Scaling scales out by adding capacity to reduce the difference between the metric value and the target value. When the metric is below the target value, Application Auto Scaling scales in by removing capacity.

Scaling activities are performed with cooldown periods between them to prevent rapid fluctuations in capacity. You can optionally configure the cooldown periods for your scaling policy.

The following diagram shows an overview of how a target tracking scaling policy works when the set up is complete.



Note that a target tracking scaling policy is more aggressive in adding capacity when utilization increases than it is in removing capacity when utilization decreases. For example, if the policy's specified metric reaches its target value, the policy assumes that your application is already heavily loaded. So it responds by adding capacity proportional to the metric value as fast as it can. The higher the metric, the more capacity is added.

When the metric falls below the target value, the policy expects that utilization will eventually increase again. In this case, it slows down scaling by removing capacity only when utilization passes a threshold that is far enough below the target value (usually more than 10% lower) for utilization to be considered to have slowed. The intention of this more conservative behavior is to ensure that removing capacity only happens when the application is no longer experiencing demand at the same high level that it was previously.

## Choose metrics

You can create target tracking scaling policies with either predefined metrics or custom metrics.

When you create a target tracking scaling policy with a predefined metric type, you choose one metric from the list of predefined metrics in [Predefined metrics for target tracking scaling policies](#).

Keep the following in mind when choosing a metric:

- Not all custom metrics work for target tracking. The metric must be a valid utilization metric and describe how busy a scalable target is. The metric value must increase or decrease proportionally to the capacity of the scalable target so that the metric data can be used to proportionally scale the scalable target.

- To use the `ALBRequestCountPerTarget` metric, you must specify the `ResourceLabel` parameter to identify the target group that is associated with the metric.
- When a metric emits real 0 values to CloudWatch (for example, `ALBRequestCountPerTarget`), Application Auto Scaling can scale in to 0 when there is no traffic to your application for a sustained period of time. To have your scalable target scale in to 0 when no requests are routed it, the scalable target's minimum capacity must be set to 0.
- Instead of publishing new metrics to use in your scaling policy, you can use metric math to combine existing metrics. For more information, see [Create a target tracking scaling policy for Application Auto Scaling using metric math](#).
- To see whether the service you are using supports specifying a custom metric in the service's console, consult the documentation for that service.
- We recommend that you use metrics that are available at one-minute intervals to help you scale faster in response to utilization changes. Target tracking will evaluate metrics aggregated at a one-minute granularity for all predefined metrics and custom metrics, but the underlying metric might publish data less frequently. For example, all Amazon EC2 metrics are sent in five-minute intervals by default, but they are configurable to one minute (known as detailed monitoring). This choice is up to the individual services. Most try to use the smallest interval possible.

## Define target value

When you create a target tracking scaling policy, you must specify a target value. The target value represents the optimal average utilization or throughput for your application. To use resources cost efficiently, set the target value as high as possible with a reasonable buffer for unexpected traffic increases. When your application is optimally scaled out for a normal traffic flow, the actual metric value should be at or just below the target value.

When a scaling policy is based on throughput, such as the request count per target for an Application Load Balancer, network I/O, or other count metrics, the target value represents the optimal average throughput from a single entity (such as a single target of your Application Load Balancer target group), for a one-minute period.

## Define cooldown periods

You can optionally define cooldown periods in your target tracking scaling policy.

A cooldown period specifies the amount of time the scaling policy waits for a previous scaling activity to take effect.

There are two types of cooldown periods:

- With the *scale-out cooldown period*, the intention is to continuously (but not excessively) scale out. After Application Auto Scaling successfully scales out using a scaling policy, it starts to calculate the cooldown time. A scaling policy won't increase the desired capacity again unless either a larger scale out is triggered or the cooldown period ends. While the scale-out cooldown period is in effect, the capacity added by the initiating scale-out activity is calculated as part of the desired capacity for the next scale-out activity.
- With the *scale-in cooldown period*, the intention is to scale in conservatively to protect your application's availability, so scale-in activities are blocked until the scale-in cooldown period has expired. However, if another alarm triggers a scale-out activity during the scale-in cooldown period, Application Auto Scaling scales out the target immediately. In this case, the scale-in cooldown period stops and doesn't complete.

Each cooldown period is measured in seconds and applies only to scaling policy-related scaling activities. During a cooldown period, when a scheduled action starts at the scheduled time, it can trigger a scaling activity immediately without waiting for the cooldown period to expire.

You can start with the default values, which can be later fine-tuned. For example, you might need to increase a cooldown period to prevent your target tracking scaling policy from being too aggressive about changes that occur over short periods of time.

### Default values

Application Auto Scaling provides a default value of 600 for ElastiCache replication groups and a default value of 300 for the following scalable targets:

- AppStream 2.0 fleets
- Aurora DB clusters
- ECS services
- Neptune clusters
- SageMaker endpoint variants
- SageMaker inference components
- SageMaker Serverless provisioned concurrency
- Spot Fleets
- Custom resources

For all other scalable targets, the default value is 0 or null:

- Amazon Comprehend document classification and entity recognizer endpoints
- DynamoDB tables and global secondary indexes
- Amazon Keyspaces tables
- Lambda provisioned concurrency
- Amazon MSK broker storage

Null values are treated the same as zero values when Application Auto Scaling evaluates the cooldown period.

You can update any of the default values, including null values, to set your own cooldown periods.

## Considerations

The following considerations apply when working with target tracking scaling policies:

- Do not create, edit, or delete the CloudWatch alarms that are used with a target tracking scaling policy. Application Auto Scaling creates and manages the CloudWatch alarms that are associated with your target tracking scaling policies and deletes them when no longer needed.
- If the metric is missing data points, this causes the CloudWatch alarm state to change to `INSUFFICIENT_DATA`. When this happens, Application Auto Scaling cannot scale your scalable target until new data points are found. For information about creating alarms when there is insufficient data, see [Monitor with CloudWatch alarms](#).
- If the metric is sparsely reported by design, metric math can be helpful. For example, to use the most recent values, then use the `FILL(m1, REPEAT)` function where `m1` is the metric.
- You may see gaps between the target value and the actual metric data points. This is because Application Auto Scaling always acts conservatively by rounding up or down when it determines how much capacity to add or remove. This prevents it from adding insufficient capacity or removing too much capacity. However, for a scalable target with a small capacity, the actual metric data points might seem far from the target value.

For a scalable target with a larger capacity, adding or removing capacity causes less of a gap between the target value and the actual metric data points.

- A target tracking scaling policy assumes that it should perform scale out when the specified metric is above the target value. You cannot use a target tracking scaling policy to scale out when the specified metric is below the target value.

## Multiple scaling policies

You can have multiple target tracking scaling policies for a scalable target, provided that each of them uses a different metric. The intention of Application Auto Scaling is to always prioritize availability, so its behavior differs depending on whether the target tracking policies are ready for scale out or scale in. It will scale out the scalable target if any of the target tracking policies are ready for scale out, but will scale in only if all of the target tracking policies (with the scale-in portion enabled) are ready to scale in.

If multiple scaling policies instruct the scalable target to scale out or in at the same time, Application Auto Scaling scales based on the policy that provides the largest capacity for both scale in and scale out. This provides greater flexibility to cover multiple scenarios and ensures that there is always enough capacity to process your workloads.

You can disable the scale-in portion of a target tracking scaling policy to use a different method for scale in than you use for scale out. For example, you can use a step scaling policy for scale in while using a target tracking scaling policy for scale out.

We recommend caution, however, when using target tracking scaling policies with step scaling policies because conflicts between these policies can cause undesirable behavior. For example, if the step scaling policy initiates a scale-in activity before the target tracking policy is ready to scale in, the scale-in activity will not be blocked. After the scale-in activity completes, the target tracking policy could instruct the scalable target to scale out again.

For workloads that are cyclical in nature, you also have the option to automate capacity changes on a schedule using scheduled scaling. For each scheduled action, a new minimum capacity value and a new maximum capacity value can be defined. These values form the boundaries of the scaling policy. The combination of scheduled scaling and target tracking scaling can help reduce the impact of a sharp increase in utilization levels, when capacity is needed immediately.

## Commonly used commands for scaling policy creation, management, and deletion

The commonly used commands for working with scaling policies include:

- [register-scalable-target](#) to register Amazon or custom resources as scalable targets (a resource that Application Auto Scaling can scale), and to suspend and resume scaling.
- [put-scaling-policy](#) to add or modify scaling policies for an existing scalable target.



- [describe-scaling-activities](#) to return information about scaling activities in an Amazon Region.
- [describe-scaling-policies](#) to return information about scaling policies in an Amazon Region.
- [delete-scaling-policy](#) to delete a scaling-policy.

## Related resources

For information about creating target tracking scaling policies for Auto Scaling groups, see [Target tracking scaling policies for Amazon EC2 Auto Scaling](#) in the *Amazon EC2 Auto Scaling User Guide*.

## Limitations

The following are limitations when using target tracking scaling policies:

- The scalable target can't be an Amazon EMR cluster. Target tracking scaling policies are not supported for Amazon EMR.
- When an Amazon MSK cluster is the scalable target, scale in is disabled and cannot be enabled.
- You cannot use the `RegisterScalableTarget` or `PutScalingPolicy` API operations to update an Amazon Auto Scaling scaling plan. For information about using scaling plans, see the [Amazon Auto Scaling](#) documentation.
- Console access to view, add, update, or remove target tracking scaling policies on scalable resources depends on the resource that you use. For more information, see [Amazon services that you can use with Application Auto Scaling](#).

## Create a target tracking scaling policy using the Amazon CLI

You can create a target tracking scaling policy for Application Auto Scaling by using the Amazon CLI for the following configuration tasks.

1. Register a scalable target.
2. Add a target tracking scaling policy on the scalable target.

For brevity, the examples in this topic illustrate CLI commands for an Amazon EC2 Spot Fleet. To specify a different scalable target, specify its namespace in `--service-namespace`, its scalable dimension in `--scalable-dimension`, and its resource ID in `--resource-id`. For more information and examples for each service, see the topics in [Amazon services that you can use with Application Auto Scaling](#).

When using the Amazon CLI, remember that your commands run in the Amazon Web Services Region configured for your profile. If you want to run the commands in a different Region, either change the default Region for your profile, or use the `--region` parameter with the command.

## Contents

- [Register a scalable target](#)
- [Create a target tracking scaling policy](#)
- [Describe target tracking scaling policies](#)
- [Delete a target tracking scaling policy](#)

## Register a scalable target

If you haven't already done so, register the scalable target. Use the [register-scalable-target](#) command to register a specific resource in the target service as a scalable target. The following example registers a Spot Fleet request with Application Auto Scaling. Application Auto Scaling can scale the number of instances in the Spot Fleet at a minimum of 2 instances and a maximum of 10. Replace each *user input placeholder* with your own information.

### Linux, macOS, or Unix

```
aws application-autoscaling register-scalable-target --service-namespace ec2 \  
  --scalable-dimension ec2:spot-fleet-request:TargetCapacity \  
  --resource-id spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE \  
  --min-capacity 2 --max-capacity 10
```

### Windows

```
aws application-autoscaling register-scalable-target --service-namespace ec2 --  
scalable-dimension ec2:spot-fleet-request:TargetCapacity --resource-id spot-fleet-  
request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE --min-capacity 2 --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

## Create a target tracking scaling policy

To create a target tracking scaling policy, you can use the following examples to help you get started.

### To create a target tracking scaling policy

1. Use the following `cat` command to store a target value for your scaling policy and a predefined metric specification in a JSON file named `config.json` in your home directory. The following is an example target tracking configuration that keeps the average CPU utilization at 50 percent.

```
$ cat ~/config.json
{
  "TargetValue": 50.0,
  "PredefinedMetricSpecification":
    {
      "PredefinedMetricType": "EC2SpotFleetRequestAverageCPUUtilization"
    }
}
```

For more information, see [PredefinedMetricSpecification](#) in the *Application Auto Scaling API Reference*.

Alternatively, you can use a custom metric for scaling by creating a customized metric specification and adding values for each parameter from CloudWatch. The following is an example target tracking configuration that keeps the average utilization of the specified metric at 100.

```
$ cat ~/config.json
{
  "TargetValue": 100.0,
  "CustomizedMetricSpecification":{
    "MetricName": "MyUtilizationMetric",
    "Namespace": "MyNamespace",
    "Dimensions": [
      {
        "Name": "MyOptionalMetricDimensionName",
        "Value": "MyOptionalMetricDimensionValue"
      }
    ],
  },
}
```

```

    "Statistic": "Average",
    "Unit": "Percent"
  }
}

```

For more information, see [CustomizedMetricSpecification](#) in the *Application Auto Scaling API Reference*.

2. Use the following [put-scaling-policy](#) command, along with the `config.json` file you created, to create a scaling policy named `cpu50-target-tracking-scaling-policy`.

### Linux, macOS, or Unix

```

aws application-autoscaling put-scaling-policy --service-namespace ec2 \
  --scalable-dimension ec2:spot-fleet-request:TargetCapacity \
  --resource-id spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE \
  --policy-name cpu50-target-tracking-scaling-policy --policy-type
TargetTrackingScaling \
  --target-tracking-scaling-policy-configuration file://config.json

```

### Windows

```

aws application-autoscaling put-scaling-policy --service-namespace ec2 --scalable-
dimension ec2:spot-fleet-request:TargetCapacity --resource-id spot-fleet-request/
sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE --policy-name cpu50-target-tracking-
scaling-policy --policy-type TargetTrackingScaling --target-tracking-scaling-
policy-configuration file://config.json

```

If successful, this command returns the ARNs and names of the two CloudWatch alarms created on your behalf.

```

{
  "PolicyARN": "arn:aws-cn:autoscaling:region:account-
id:scalingPolicy:policy-id:resource/ec2/spot-fleet-request/sfr-73fbd2ce-
aa30-494c-8788-1cee4EXAMPLE:policyName/cpu50-target-tracking-scaling-policy",
  "Alarms": [
    {
      "AlarmARN": "arn:aws-cn:cloudwatch:region:account-
id:alarm:TargetTracking-spot-fleet-request/sfr-73fbd2ce-
aa30-494c-8788-1cee4EXAMPLE-AlarmHigh-d4f0770c-b46e-434a-a60f-3b36d653feca",

```

```

        "AlarmName": "TargetTracking-spot-fleet-request/sfr-73fbd2ce-
aa30-494c-8788-1cee4EXAMPLE-AlarmHigh-d4f0770c-b46e-434a-a60f-3b36d653feca"
    },
    {
        "AlarmARN": "arn:aws-cn:cloudwatch:region:account-
id:alarm:TargetTracking-spot-fleet-request/sfr-73fbd2ce-
aa30-494c-8788-1cee4EXAMPLE-AlarmLow-1b437334-d19b-4a63-a812-6c67aaf2910d",
        "AlarmName": "TargetTracking-spot-fleet-request/sfr-73fbd2ce-
aa30-494c-8788-1cee4EXAMPLE-AlarmLow-1b437334-d19b-4a63-a812-6c67aaf2910d"
    }
]
}

```

## Describe target tracking scaling policies

You can describe all scaling policies for the specified service namespace using the following [describe-scaling-policies](#) command.

```
aws application-autoscaling describe-scaling-policies --service-namespace ec2
```

You can filter the results to just the target tracking scaling policies using the `--query` parameter. For more information about the syntax for query, see [Controlling command output from the Amazon CLI](#) in the *Amazon Command Line Interface User Guide*.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-policies --service-namespace ec2 \
--query 'ScalingPolicies[?PolicyType==`TargetTrackingScaling`]'
```

### Windows

```
aws application-autoscaling describe-scaling-policies --service-namespace ec2 --query
"ScalingPolicies[?PolicyType==`TargetTrackingScaling`]"
```

The following is example output.

```
[
  {
    "PolicyARN": "PolicyARN",
```

```

    "TargetTrackingScalingPolicyConfiguration": {
      "PredefinedMetricSpecification": {
        "PredefinedMetricType": "EC2SpotFleetRequestAverageCPUUtilization"
      },
      "TargetValue": 50.0
    },
    "PolicyName": "cpu50-target-tracking-scaling-policy",
    "ScalableDimension": "ec2:spot-fleet-request:TargetCapacity",
    "ServiceNamespace": "ec2",
    "PolicyType": "TargetTrackingScaling",
    "ResourceId": "spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE",
    "Alarms": [
      {
        "AlarmARN": "arn:aws-cn:cloudwatch:region:account-
id:alarm:TargetTracking-spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE-
AlarmHigh-d4f0770c-b46e-434a-a60f-3b36d653feca",
        "AlarmName": "TargetTracking-spot-fleet-request/sfr-73fbd2ce-
aa30-494c-8788-1cee4EXAMPLE-AlarmHigh-d4f0770c-b46e-434a-a60f-3b36d653feca"
      },
      {
        "AlarmARN": "arn:aws-cn:cloudwatch:region:account-
id:alarm:TargetTracking-spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE-
AlarmLow-1b437334-d19b-4a63-a812-6c67aaf2910d",
        "AlarmName": "TargetTracking-spot-fleet-request/sfr-73fbd2ce-
aa30-494c-8788-1cee4EXAMPLE-AlarmLow-1b437334-d19b-4a63-a812-6c67aaf2910d"
      }
    ],
    "CreationTime": 1515021724.807
  }
]

```

## Delete a target tracking scaling policy

When you are finished with a target tracking scaling policy, you can delete it using the [delete-scaling-policy](#) command.

The following command deletes the specified target tracking scaling policy for the specified Spot Fleet request. It also deletes the CloudWatch alarms that Application Auto Scaling created on your behalf.

### Linux, macOS, or Unix

```
aws application-autoscaling delete-scaling-policy --service-namespace ec2 \
```

```
--scalable-dimension ec2:spot-fleet-request:TargetCapacity \  
--resource-id spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE \  
--policy-name cpu50-target-tracking-scaling-policy
```

## Windows

```
aws application-autoscaling delete-scaling-policy --service-namespace ec2 --scalable-  
dimension ec2:spot-fleet-request:TargetCapacity --resource-id spot-fleet-request/  
sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE --policy-name cpu50-target-tracking-scaling-  
policy
```

# Create a target tracking scaling policy for Application Auto Scaling using metric math

Using metric math, you can query multiple CloudWatch metrics and use math expressions to create new time series based on these metrics. You can visualize the resulting time series in the CloudWatch console and add them to dashboards. For more information about metric math, see [Using metric math](#) in the *Amazon CloudWatch User Guide*.

The following considerations apply to metric math expressions:

- You can query any available CloudWatch metric. Each metric is a unique combination of metric name, namespace, and zero or more dimensions.
- You can use any arithmetic operator (+ - \* / ^), statistical function (such as AVG or SUM), or other function that CloudWatch supports.
- You can use both metrics and the results of other math expressions in the formulas of the math expression.
- Any expressions used in a metric specification must eventually return a single time series.
- You can verify that a metric math expression is valid by using the CloudWatch console or the CloudWatch [GetMetricData](#) API.

## Topics

- [Example: Amazon SQS queue backlog per task](#)
- [Limitations](#)

## Example: Amazon SQS queue backlog per task

To calculate the Amazon SQS queue backlog per task, take the approximate number of messages available for retrieval from the queue and divide that number by the number of Amazon ECS tasks running in the service. For more information, see [Amazon Elastic Container Service \(ECS\) Auto Scaling using custom metrics](#) on the Amazon Compute Blog.

The logic for the expression is this:

```
sum of (number of messages in the queue)/(number of tasks that are
currently in the RUNNING state)
```

Then your CloudWatch metric information is the following.

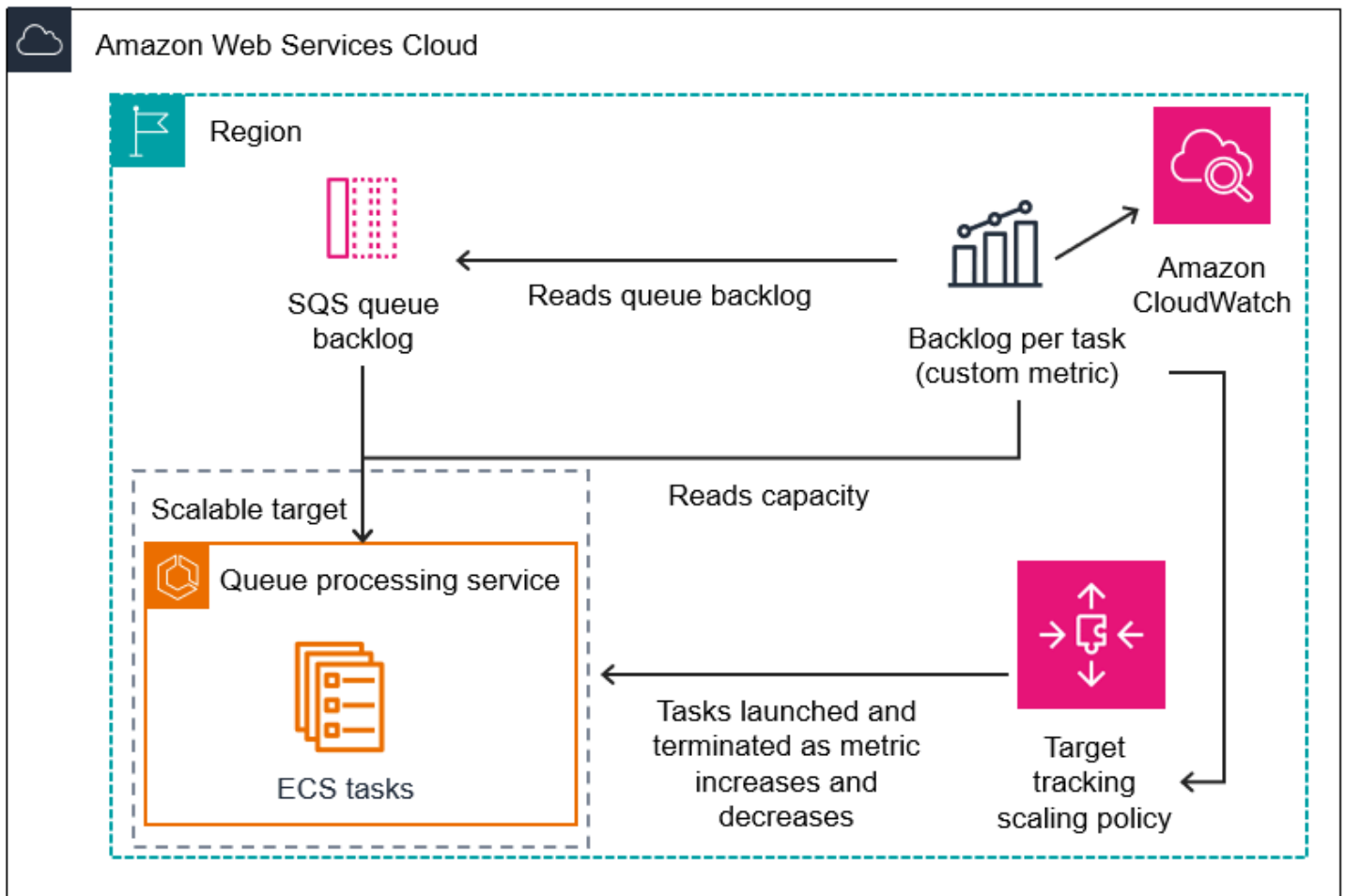
ID	CloudWatch metric	Statistic	Period
m1	ApproximateNumberOfMessagesVisible	Sum	1 minute
m2	RunningTaskCount	Average	1 minute

Your metric math ID and expression are the following.

ID	Expression
e1	(m1)/(m2)

The following diagram illustrates the architecture for this metric:





## To use this metric math to create a target tracking scaling policy (Amazon CLI)

1. Store the metric math expression as part of a customized metric specification in a JSON file named `config.json`.

Use the following example to help you get started. Replace each *user input placeholder* with your own information.

```
{
  "CustomizedMetricSpecification": {
    "Metrics": [
      {
        "Label": "Get the queue size (the number of messages waiting to be
processed)",
        "Id": "m1",
        "MetricStat": {
          "Metric": {
```

```

        "MetricName": "ApproximateNumberOfMessagesVisible",
        "Namespace": "AWS/SQS",
        "Dimensions": [
            {
                "Name": "QueueName",
                "Value": "my-queue"
            }
        ]
    },
    "Stat": "Sum"
},
"ReturnData": false
},
{
    "Label": "Get the ECS running task count (the number of currently
running tasks)",
    "Id": "m2",
    "MetricStat": {
        "Metric": {
            "MetricName": "RunningTaskCount",
            "Namespace": "ECS/ContainerInsights",
            "Dimensions": [
                {
                    "Name": "ClusterName",
                    "Value": "my-cluster"
                },
                {
                    "Name": "ServiceName",
                    "Value": "my-service"
                }
            ]
        }
    },
    "Stat": "Average"
},
"ReturnData": false
},
{
    "Label": "Calculate the backlog per instance",
    "Id": "e1",
    "Expression": "m1 / m2",
    "ReturnData": true
}
]
},

```

```
"TargetValue": 100
}
```

For more information, see [TargetTrackingScalingPolicyConfiguration](#) in the *Application Auto Scaling API Reference*.

### Note

Following are some additional resources that can help you find metric names, namespaces, dimensions, and statistics for CloudWatch metrics:

- For information about the available metrics for Amazon services, see [Amazon services that publish CloudWatch metrics](#) in the *Amazon CloudWatch User Guide*.
- To get the exact metric name, namespace, and dimensions (if applicable) for a CloudWatch metric with the Amazon CLI, see [list-metrics](#).

2. To create this policy, run the [put-scaling-policy](#) command using the JSON file as input, as demonstrated in the following example.

```
aws application-autoscaling put-scaling-policy --policy-name sqs-backlog-target-tracking-scaling-policy \
  --service-namespace ecs --scalable-dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-service \
  --policy-type TargetTrackingScaling --target-tracking-scaling-policy-configuration file://config.json
```

If successful, this command returns the policy's Amazon Resource Name (ARN) and the ARNs of the two CloudWatch alarms created on your behalf.

```
{
  "PolicyARN": "arn:aws-cn:autoscaling:us-west-2:012345678910:scalingPolicy:8784a896-b2ba-47a1-b08c-27301cc499a1:resource/ecs/service/my-cluster/my-service:policyName/sqs-backlog-target-tracking-scaling-policy",
  "Alarms": [
    {
      "AlarmARN": "arn:aws-cn:cloudwatch:us-west-2:012345678910:alarm:TargetTracking-service/my-cluster/my-service-AlarmHigh-9bc77b56-0571-4276-ba0f-d4178882e0a0",
      "AlarmName": "TargetTracking-service/my-cluster/my-service-AlarmHigh-9bc77b56-0571-4276-ba0f-d4178882e0a0"
    }
  ]
}
```

```
    },  
    {  
      "AlarmARN": "arn:aws-cn:cloudwatch:us-  
west-2:012345678910:alarm:TargetTracking-service/my-cluster/my-service-  
AlarmLow-9b6ad934-6d37-438e-9e05-02836ddcbdc4",  
      "AlarmName": "TargetTracking-service/my-cluster/my-service-  
AlarmLow-9b6ad934-6d37-438e-9e05-02836ddcbdc4"  
    }  
  ]  
}
```

**Note**

If this command throws an error, make sure that you have updated the Amazon CLI locally to the latest version.

## Limitations

- The maximum request size is 50 KB. This is the total payload size for the [PutScalingPolicy](#) API request when you use metric math in the policy definition. If you exceed this limit, Application Auto Scaling rejects the request.
- The following services are not supported when using metric math with target tracking scaling policies:
  - Amazon Keyspaces (for Apache Cassandra)
  - DynamoDB
  - Amazon EMR
  - Amazon MSK
  - Amazon Neptune

## Step scaling policies

A step scaling policy scales your application's capacity in predefined increments based on CloudWatch alarms. You can define separate scaling policies to handle scaling out (increasing capacity) and scaling in (decreasing capacity) when an alarm threshold is breached.

With step scaling policies, you create and manage the CloudWatch alarms that invoke the scaling process. When an alarm is breached, Application Auto Scaling initiates the scaling policy associated with that alarm.

The step scaling policy scales capacity using a set of adjustments, known as *step adjustments*. The size of the adjustment varies based on the magnitude of the alarm breach.

- If the breach exceeds the first threshold, Application Auto Scaling will apply the first step adjustment.
- If the breach exceeds the second threshold, Application Auto Scaling will apply the second step adjustment, and so on.

This allows the scaling policy to respond appropriately to both minor and major changes in the alarm metric.

The policy will continue to respond to additional alarm breaches, even while a scaling activity is in progress. This means Application Auto Scaling will evaluate all alarm breaches as they occur. A cooldown period is used to protect against over-scaling due to multiple alarm breaches occurring in rapid succession.

Like target tracking, step scaling can help automatically scale your application's capacity as traffic changes occur. However, target tracking policies tend to be easier to implement and manage for steady scaling needs.

You can use step scaling policies with the following scalable targets:

- AppStream 2.0 fleets
- Aurora DB clusters
- ECS services
- EMR clusters
- SageMaker endpoint variants

- SageMaker inference components
- SageMaker Serverless provisioned concurrency
- Spot Fleets
- Custom resources

## Topics

- [How step scaling works](#)
- [Create a step scaling policy using the Amazon CLI](#)

# How step scaling works

This topic describes how step scaling works and introduces the key elements of a step scaling policy.

## Contents

- [How it works](#)
- [Step adjustments](#)
- [Scaling adjustment types](#)
- [Cooldown period](#)
- [Commonly used commands for scaling policy creation, management, and deletion](#)
- [Considerations](#)
- [Related resources](#)
- [Limitations](#)

## How it works

To use step scaling, you create a CloudWatch alarm that monitors a metric for your scalable target. Define the metric, threshold value, and number of evaluation periods that determine an alarm breach. You also create a step scaling policy that defines how to scale capacity when the alarm threshold is breached and associate it with your scalable target.

Add the step adjustments in the policy. You can define different step adjustments based on the breach size of the alarm. For example:

- Scale out by 10 capacity units if the alarm metric reaches 60 percent
- Scale out by 30 capacity units if the alarm metric reaches 75 percent
- Scale out by 40 capacity units if the alarm metric reaches 85 percent

When the alarm threshold is breached for the specified number of evaluation periods, Application Auto Scaling will apply the step adjustments defined in the policy. The adjustments can continue for additional alarm breaches until the alarm state returns to OK.

Scaling activities are performed with cooldown periods between them to prevent rapid fluctuations in capacity. You can optionally configure the cooldown periods for your scaling policy.

## Step adjustments

When you create a step scaling policy, you specify one or more step adjustments that automatically scale the capacity of the target dynamically based on the size of the alarm breach. Each step adjustment specifies the following:

- A lower bound for the metric value
- An upper bound for the metric value
- The amount by which to scale, based on the scaling adjustment type

CloudWatch aggregates metric data points based on the statistic for the metric associated with your CloudWatch alarm. When the alarm is breached, the appropriate scaling policy is invoked. Application Auto Scaling applies your specified aggregation type to the most recent metric data points from CloudWatch (as opposed to the raw metric data). It compares this aggregated metric value against the upper and lower bounds defined by the step adjustments to determine which step adjustment to perform.

You specify the upper and lower bounds relative to the breach threshold. For example, let's say you made a CloudWatch alarm and a scale-out policy for when the metric is above 50 percent. You then made a second alarm and a scale-in policy for when the metric is below 50 percent. You made a set of step adjustments with an adjustment type of `PercentChangeInCapacity` for each policy:

### Example: Step adjustments for scale-out policy

Lower bound	Upper bound	Adjustment
0	10	0

Lower bound	Upper bound	Adjustment
10	20	10
20	null	30

### Example: Step adjustments for scale-in policy

Lower bound	Upper bound	Adjustment
-10	0	0
-20	-10	-10
null	-20	-30

This creates the following scaling configuration.

Metric value								
-infinity	30%	40%	60%	70%	infinity			
-----								
-30%		-10%		Unchanged		+10%		+30%
-----								

Now, let's say that you use this scaling configuration on a scalable target that has a capacity of 10. The following points summarize the behavior of the scaling configuration in relation to the capacity of the scalable target:

- The original capacity is maintained while the aggregated metric value is greater than 40 and less than 60.
- If the metric value gets to 60, Application Auto Scaling increases the capacity of the scalable target by 1, to 11. That's based on the second step adjustment of the scale-out policy (add 10 percent of 10). After the new capacity is added, Application Auto Scaling increases the current capacity to 11. If the metric value rises to 70 even after this increase in capacity, Application Auto Scaling increases the target capacity by 3, to 14. That's based on the third step adjustment of the scale-out policy (add 30 percent of 11, 3.3, rounded down to 3).



- If the metric value gets to 40, Application Auto Scaling decreases the capacity of the scalable target by 1, to 13, based on the second step adjustment of the scale-in policy (remove 10 percent of 14, 1.4, rounded down to 1). If the metric value falls to 30 even after this decrease in capacity, Application Auto Scaling decreases the target capacity by 3, to 10, based on the third step adjustment of the scale-in policy (remove 30 percent of 13, 3.9, rounded down to 3).

When you specify the step adjustments for your scaling policy, note the following:

- The ranges of your step adjustments can't overlap or have a gap.
- Only one step adjustment can have a null lower bound (negative infinity). If one step adjustment has a negative lower bound, then there must be a step adjustment with a null lower bound.
- Only one step adjustment can have a null upper bound (positive infinity). If one step adjustment has a positive upper bound, then there must be a step adjustment with a null upper bound.
- The upper and lower bound can't be null in the same step adjustment.
- If the metric value is above the breach threshold, the lower bound is inclusive and the upper bound is exclusive. If the metric value is below the breach threshold, the lower bound is exclusive and the upper bound is inclusive.

## Scaling adjustment types

You can define a scaling policy that performs the optimal scaling action, based on the scaling adjustment type that you choose. You can specify the adjustment type as a percentage of the current capacity of your scalable target or in absolute numbers.

Application Auto Scaling supports the following adjustment types for step scaling policies:

- **ChangeInCapacity**—Increase or decrease the current capacity of the scalable target by the specified value. A positive value increases the capacity and a negative value decreases the capacity. For example: If the current capacity is 3 and the adjustment is 5, then Application Auto Scaling adds 5 to the capacity for a total of 8.
- **ExactCapacity**—Change the current capacity of the scalable target to the specified value. Specify a non-negative value with this adjustment type. For example: If the current capacity is 3 and the adjustment is 5, then Application Auto Scaling changes the capacity to 5.
- **PercentChangeInCapacity**—Increase or decrease the current capacity of the scalable target by the specified percentage. A positive value increases the capacity and a negative value decreases

the capacity. For example: If the current capacity is 10 and the adjustment is 10 percent, then Application Auto Scaling adds 1 to the capacity for a total of 11.

### Note

If the resulting value is not an integer, Application Auto Scaling rounds it as follows:

- Values greater than 1 are rounded down. For example, 12.7 is rounded to 12.
- Values between 0 and 1 are rounded to 1. For example, .67 is rounded to 1.
- Values between 0 and -1 are rounded to -1. For example, -.58 is rounded to -1.
- Values less than -1 are rounded up. For example, -6.67 is rounded to -6.

With **PercentChangeInCapacity**, you can also specify the minimum amount to scale using the **MinAdjustmentMagnitude** parameter. For example, suppose that you create a policy that adds 25 percent and you specify a minimum amount of 2. If the scalable target has a capacity of 4 and the scaling policy is performed, 25 percent of 4 is 1. However, because you specified a minimum increment of 2, Application Auto Scaling adds 2.

## Cooldown period

You can optionally define a cooldown period in your step scaling policy.

A cooldown period specifies the amount of time the scaling policy waits for a previous scaling activity to take effect.

There are two ways to plan for the use of cooldown periods for a step scaling configuration:

- With the cooldown period for scale-out policies, the intention is to continuously (but not excessively) scale out. After Application Auto Scaling successfully scales out using a scaling policy, it starts to calculate the cooldown time. A scaling policy won't increase the desired capacity again unless either a larger scale out is triggered or the cooldown period ends. While the scale-out cooldown period is in effect, the capacity added by the initiating scale-out activity is calculated as part of the desired capacity for the next scale-out activity.
- With the cooldown period for scale-in policies, the intention is to scale in conservatively to protect your application's availability, so scale-in activities are blocked until the scale-in cooldown period has expired. However, if another alarm triggers a scale-out activity during the

scale-in cooldown period, Application Auto Scaling scales out the target immediately. In this case, the scale-in cooldown period stops and doesn't complete.

For example, when a traffic peak occurs, an alarm is triggered and Application Auto Scaling automatically adds capacity to help handle the increased load. If you set a cooldown period for your scale-out policy, when the alarm triggers the policy to increase the capacity by 2, the scaling activity completes successfully, and the scale-out cooldown period starts. If an alarm triggers again during the cooldown period but at a more aggressive step adjustment of 3, the previous increase of 2 is considered part of the current capacity. Therefore, only 1 is added to the capacity. This allows faster scaling than waiting for the cooldown to expire but without adding more capacity than you need.

The cooldown period is measured in seconds and applies only to scaling policy-related scaling activities. During a cooldown period, when a scheduled action starts at the scheduled time, it can trigger a scaling activity immediately without waiting for the cooldown period to expire.

The default value is 300 if no value is specified.

## Commonly used commands for scaling policy creation, management, and deletion

The commonly used commands for working with scaling policies include:

- [register-scalable-target](#) to register Amazon or custom resources as scalable targets (a resource that Application Auto Scaling can scale), and to suspend and resume scaling.
- [put-scaling-policy](#) to add or modify scaling policies for an existing scalable target.
- [describe-scaling-activities](#) to return information about scaling activities in an Amazon Region.
- [describe-scaling-policies](#) to return information about scaling policies in an Amazon Region.
- [delete-scaling-policy](#) to delete a scaling-policy.

## Considerations

The following considerations apply when working with step scaling policies:

- Consider whether you can predict the step adjustments on the application accurately enough to use step scaling. If your scaling metric increases or decreases proportionally to the capacity of

the scalable target, we recommend that you use a target tracking scaling policy instead. You still have the option to use step scaling as an additional policy for a more advanced configuration. For example, you can configure a more aggressive response when utilization reaches a certain level.

- Make sure to choose an adequate margin between the scale-out and scale-in thresholds to prevent flapping. Flapping is an infinite loop of scaling in and scaling out. That is, if a scaling action is taken, the metric value would change and start another scaling action in the reverse direction.

## Related resources

For information about creating step scaling policies for Auto Scaling groups, see [Step and simple scaling policies for Amazon EC2 Auto Scaling](#) in the *Amazon EC2 Auto Scaling User Guide*.

## Limitations

- Console access to view, add, update, or remove step scaling policies on scalable resources depends on the resource that you use. For more information, see [Amazon services that you can use with Application Auto Scaling](#).

## Create a step scaling policy using the Amazon CLI

You can create a step scaling policy for Application Auto Scaling by using the Amazon CLI for the following configuration tasks.

1. Register a scalable target.
2. Add a step scaling policy on the scalable target.
3. Create a CloudWatch alarm for the policy.

For brevity, the examples in this topic illustrate CLI commands for an Amazon ECS service. To specify a different scalable target, specify its namespace in `--service-namespace`, its scalable dimension in `--scalable-dimension`, and its resource ID in `--resource-id`. For more information and examples for each service, see the topics in [Amazon services that you can use with Application Auto Scaling](#).

When using the Amazon CLI, remember that your commands run in the Amazon Web Services Region configured for your profile. If you want to run the commands in a different Region, either change the default Region for your profile, or use the `--region` parameter with the command.

## Contents

- [Register a scalable target](#)
- [Create a step scaling policy](#)
- [Create an alarm that invokes the scaling policy](#)
- [Describe step scaling policies](#)
- [Delete a step scaling policy](#)

## Register a scalable target

If you haven't already done so, register the scalable target. Use the [register-scalable-target](#) command to register a specific resource in the target service as a scalable target. The following example registers an Amazon ECS service with Application Auto Scaling. Application Auto Scaling can scale the number of tasks at a minimum of 2 tasks and a maximum of 10. Replace each *user input placeholder* with your own information.

### Linux, macOS, or Unix

```
aws application-autoscaling register-scalable-target --service-namespace ecs \  
  --scalable-dimension ecs:service:DesiredCount \  
  --resource-id service/my-cluster/my-service \  
  --min-capacity 2 --max-capacity 10
```

### Windows

```
aws application-autoscaling register-scalable-target --service-namespace ecs --  
scalable-dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-service  
  --min-capacity 2 --max-capacity 10
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

## Create a step scaling policy

To create a step scaling policy for your scalable target, you can use the following examples to help you get started.

### Scale out

#### To create a step scaling policy for scale out (increase capacity)

1. Use the following `cat` command to store a step scaling policy configuration in a JSON file named `config.json` in your home directory. The following is an example configuration with an adjustment type of `PercentChangeInCapacity` that increases the capacity of the scalable target based on the following step adjustments (assuming a CloudWatch alarm threshold of 70):
  - Increase capacity by 10 percent when the value of the metric is greater than or equal to 70 but less than 85
  - Increase capacity by 20 percent when the value of the metric is greater than or equal to 85 but less than 95
  - Increase capacity by 30 percent when the value of the metric is greater than or equal to 95

```
$ cat ~/config.json
{
  "AdjustmentType": "PercentChangeInCapacity",
  "MetricAggregationType": "Average",
  "Cooldown": 60,
  "MinAdjustmentMagnitude": 1,
  "StepAdjustments": [
    {
      "MetricIntervalLowerBound": 0.0,
      "MetricIntervalUpperBound": 15.0,
      "ScalingAdjustment": 10
    },
    {
      "MetricIntervalLowerBound": 15.0,
      "MetricIntervalUpperBound": 25.0,
      "ScalingAdjustment": 20
    },
    {
```

```

    "MetricIntervalLowerBound": 25.0,
    "ScalingAdjustment": 30
  }
]
}

```

For more information, see [StepScalingPolicyConfiguration](#) in the *Application Auto Scaling API Reference*.

2. Use the following [put-scaling-policy](#) command, along with the `config.json` file that you created, to create a scaling policy named `my-step-scaling-policy`.

### Linux, macOS, or Unix

```

aws application-autoscaling put-scaling-policy --service-namespace ecs \
  --scalable-dimension ecs:service:DesiredCount \
  --resource-id service/my-cluster/my-service \
  --policy-name my-step-scaling-policy --policy-type StepScaling \
  --step-scaling-policy-configuration file://config.json

```

### Windows

```

aws application-autoscaling put-scaling-policy --service-namespace ecs --
scalable-dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-
service --policy-name my-step-scaling-policy --policy-type StepScaling --step-
scaling-policy-configuration file://config.json

```

The output includes the ARN that serves as a unique name for the policy. You need it to create a CloudWatch alarm for your policy.

```

{
  "PolicyARN": "arn:aws-
cn:autoscaling:region:123456789012:scalingPolicy:ac542982-cbeb-4294-891c-
a5a941dfa787:resource/ecs/service/my-cluster/my-service:policyName/my-step-
scaling-policy"
}

```

## Scale in

### To create a step scaling policy for scale in (decrease capacity)

1. Use the following `cat` command to store a step scaling policy configuration in a JSON file named `config.json` in your home directory. The following is an example configuration with an adjustment type of `ChangeInCapacity` that decreases the capacity of the scalable target based on the following step adjustments (assuming a CloudWatch alarm threshold of 50):
  - Decrease capacity by 1 when the value of the metric is less than or equal to 50 but greater than 40
  - Decrease capacity by 2 when the value of the metric is less than or equal to 40 but greater than 30
  - Decrease capacity by 3 when the value of the metric is less than or equal to 30

```
$ cat ~/config.json
{
  "AdjustmentType": "ChangeInCapacity",
  "MetricAggregationType": "Average",
  "Cooldown": 60,
  "StepAdjustments": [
    {
      "MetricIntervalUpperBound": 0.0,
      "MetricIntervalLowerBound": -10.0,
      "ScalingAdjustment": -1
    },
    {
      "MetricIntervalUpperBound": -10.0,
      "MetricIntervalLowerBound": -20.0,
      "ScalingAdjustment": -2
    },
    {
      "MetricIntervalUpperBound": -20.0,
      "ScalingAdjustment": -3
    }
  ]
}
```



For more information, see [StepScalingPolicyConfiguration](#) in the *Application Auto Scaling API Reference*.

2. Use the following [put-scaling-policy](#) command, along with the `config.json` file that you created, to create a scaling policy named `my-step-scaling-policy`.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scaling-policy --service-namespace ecs \  
  --scalable-dimension ecs:service:DesiredCount \  
  --resource-id service/my-cluster/my-service \  
  --policy-name my-step-scaling-policy --policy-type StepScaling \  
  --step-scaling-policy-configuration file://config.json
```

### Windows

```
aws application-autoscaling put-scaling-policy --service-namespace ecs --  
scalable-dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-  
service --policy-name my-step-scaling-policy --policy-type StepScaling --step-  
scaling-policy-configuration file://config.json
```

The output includes the ARN that serves as a unique name for the policy. You need it to create a CloudWatch alarm for your policy.

```
{  
  "PolicyARN": "arn:aws-  
cn:autoscaling:region:123456789012:scalingPolicy:ac542982-cbeb-4294-891c-  
a5a941dfa787:resource/ecs/service/my-cluster/my-service:policyName/my-step-  
scaling-policy"  
}
```

## Create an alarm that invokes the scaling policy

Finally, use the following CloudWatch [put-metric-alarm](#) command to create an alarm to use with your step scaling policy. In this example, you have an alarm based on average CPU utilization. The alarm is configured to be in an ALARM state if it reaches a threshold of 70 percent for at least two consecutive evaluation periods of 60 seconds. To specify a different CloudWatch metric or use your own custom metric, specify its name in `--metric-name` and its namespace in `--namespace`.

## Linux, macOS, or Unix

```
aws cloudwatch put-metric-alarm --alarm-name Step-Scaling-AlarmHigh-ECS:service/my-cluster/my-service \
  --metric-name CPUUtilization --namespace AWS/ECS --statistic Average \
  --period 60 --evaluation-periods 2 --threshold 70 \
  --comparison-operator GreaterThanOrEqualToThreshold \
  --dimensions Name=ClusterName,Value=default Name=ServiceName,Value=sample-app-service \
  --alarm-actions PolicyARN
```

## Windows

```
aws cloudwatch put-metric-alarm --alarm-name Step-Scaling-AlarmHigh-ECS:service/my-cluster/my-service --metric-name CPUUtilization --namespace AWS/ECS --statistic Average --period 60 --evaluation-periods 2 --threshold 70 --comparison-operator GreaterThanOrEqualToThreshold --dimensions Name=ClusterName,Value=default Name=ServiceName,Value=sample-app-service --alarm-actions PolicyARN
```

## Describe step scaling policies

You can describe all scaling policies for the specified service namespace using the following [describe-scaling-policies](#) command.

```
aws application-autoscaling describe-scaling-policies --service-namespace ecs
```

You can filter the results to just the step scaling policies using the `--query` parameter. For more information about the syntax for query, see [Controlling command output from the Amazon CLI](#) in the *Amazon Command Line Interface User Guide*.

## Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-policies --service-namespace ecs \
  --query 'ScalingPolicies[?PolicyType==`StepScaling`]'
```

## Windows

```
aws application-autoscaling describe-scaling-policies --service-namespace ecs --query "ScalingPolicies[?PolicyType==`StepScaling`]"
```

The following is example output.

```
[
  {
    "PolicyARN": "PolicyARN",
    "StepScalingPolicyConfiguration": {
      "MetricAggregationType": "Average",
      "Cooldown": 60,
      "StepAdjustments": [
        {
          "MetricIntervalLowerBound": 0.0,
          "MetricIntervalUpperBound": 15.0,
          "ScalingAdjustment": 1
        },
        {
          "MetricIntervalLowerBound": 15.0,
          "MetricIntervalUpperBound": 25.0,
          "ScalingAdjustment": 2
        },
        {
          "MetricIntervalLowerBound": 25.0,
          "ScalingAdjustment": 3
        }
      ],
      "AdjustmentType": "ChangeInCapacity"
    },
    "PolicyType": "StepScaling",
    "ResourceId": "service/my-cluster/my-service",
    "ServiceNamespace": "ecs",
    "Alarms": [
      {
        "AlarmName": "Step-Scaling-AlarmHigh-ECS:service/my-cluster/my-
service",
        "AlarmARN": "arn:aws-cn:cloudwatch:region:012345678910:alarm:Step-
Scaling-AlarmHigh-ECS:service/my-cluster/my-service"
      }
    ],
    "PolicyName": "my-step-scaling-policy",
    "ScalableDimension": "ecs:service:DesiredCount",
    "CreationTime": 1515024099.901
  }
]
```

## Delete a step scaling policy

When you no longer need a step scaling policy, you can delete it. To delete both the scaling policy and the CloudWatch alarm, complete the following tasks.

### To delete your scaling policy

Use the following [delete-scaling-policy](#) command.

#### Linux, macOS, or Unix

```
aws application-autoscaling delete-scaling-policy --service-namespace ecs \  
  --scalable-dimension ecs:service:DesiredCount \  
  --resource-id service/my-cluster/my-service \  
  --policy-name my-step-scaling-policy
```

#### Windows

```
aws application-autoscaling delete-scaling-policy --service-namespace ecs --scalable-  
dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-service --  
policy-name my-step-scaling-policy
```

### To delete the CloudWatch alarm

Use the [delete-alarms](#) command. You can delete one or more alarms at a time. For example, use the following command to delete the Step-Scaling-AlarmHigh-ECS:service/my-cluster/my-service and Step-Scaling-AlarmLow-ECS:service/my-cluster/my-service alarms.

```
aws cloudwatch delete-alarms --alarm-name Step-Scaling-AlarmHigh-ECS:service/my-  
cluster/my-service Step-Scaling-AlarmLow-ECS:service/my-cluster/my-service
```

# Tutorial: Configure auto scaling to handle a heavy workload

## Important

Before you explore this tutorial, we recommend that you first review the following introductory tutorial: [Tutorial: Get started with scheduled scaling using the Amazon CLI](#).

In this tutorial, you learn how to scale out and in based on time windows when your application will have a heavier than normal workload. This is helpful when you have an application that can suddenly have a large number of visitors on a regular schedule or on a seasonal basis.

You can use a target tracking scaling policy together with scheduled scaling to handle the extra load. Scheduled scaling automatically initiates changes to your `MinCapacity` and `MaxCapacity` on your behalf, based on a schedule that you specify. When a target tracking scaling policy is active on the resource, it can scale dynamically based on current resource utilization, within the new minimum and maximum capacity range.

After completing this tutorial, you'll know how to:

- Use scheduled scaling to add extra capacity to meet a heavy load before it arrives, and then remove the extra capacity when it's no longer required.
- Use a target tracking scaling policy to scale your application based on current resource utilization.

## Contents

- [Prerequisites](#)
- [Step 1: Register your scalable target](#)
- [Step 2: Set up scheduled actions according to your requirements](#)
- [Step 3: Add a target tracking scaling policy](#)
- [Step 4: Next steps](#)
- [Step 5: Clean up](#)

## Prerequisites

This tutorial assumes that you have already done the following:

- You created an Amazon account. For more information, see [Set up to start using Application Auto Scaling](#).
- You installed and configured the Amazon CLI. For more information, see [Set up the Amazon CLI](#).
- Your account has all of the necessary permissions for registering and deregistering resources as scalable targets with Application Auto Scaling. It also has all of the necessary permissions for creating scaling policies and scheduled actions. For more information, see [Identity and Access Management for Application Auto Scaling](#).
- You have a supported resource in a non-production environment available to use for this tutorial. If you don't already have one, create one now. For information about the Amazon services and resources that work with Application Auto Scaling, see the [Amazon services that you can use with Application Auto Scaling](#) section.

### Note

While completing this tutorial, there are two steps in which you set your resource's minimum and maximum capacity values to 0 to reset the current capacity to 0. Depending on which resource you're using with Application Auto Scaling, you might be unable to reset the current capacity to 0 during these steps. To help you address the issue, a message in the output will indicate that minimum capacity cannot be less than the value specified and will provide the minimum capacity value that the Amazon resource can accept.

## Step 1: Register your scalable target

Start by registering your resource as a scalable target with Application Auto Scaling. A scalable target is a resource that Application Auto Scaling can scale out and scale in.

### To register your scalable target with Application Auto Scaling

- Use the following [register-scalable-target](#) command to register a new scalable target. Set the `--min-capacity` and `--max-capacity` values to 0 to reset the current capacity to 0.

Replace the sample text for `--service-namespace` with the namespace of the Amazon service you're using with Application Auto Scaling, `--scalable-dimension` with the scalable dimension associated with the resource you're registering, and `--resource-id` with an identifier for the resource. These values vary based on which resource is used and how the resource ID is constructed. See the topics in the [Amazon services that you can use with Application Auto Scaling](#) section for more information. These topics include example commands that show you how to register scalable targets with Application Auto Scaling.

### Linux, macOS, or Unix

```
aws application-autoscaling register-scalable-target \  
  --service-namespace namespace \  
  --scalable-dimension dimension \  
  --resource-id identifier \  
  --min-capacity 0 --max-capacity 0
```

### Windows

```
aws application-autoscaling register-scalable-target --service-namespace namespace \  
  --scalable-dimension dimension --resource-id identifier --min-capacity 0 --max-  
  capacity 0
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

## Step 2: Set up scheduled actions according to your requirements

You can use the [put-scheduled-action](#) command to create scheduled actions that are configured to meet your business needs. In this tutorial, we focus on a configuration that stops consuming resources outside of working hours by reducing capacity to 0.

## To create a scheduled action that scales out in the morning

1. To scale out the scalable target, use the following [put-scheduled-action](#) command. Include the `--schedule` parameter with a recurring schedule, in UTC, using a cron expression.

On the specified schedule (every day at 9:00 AM UTC), Application Auto Scaling updates the `MinCapacity` and `MaxCapacity` values to the desired range of 1-5 capacity units.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action \  
  --service-namespace namespace \  
  --scalable-dimension dimension \  
  --resource-id identifier \  
  --scheduled-action-name my-first-scheduled-action \  
  --schedule "cron(0 9 * * ? *)" \  
  --scalable-target-action MinCapacity=1,MaxCapacity=5
```

### Windows

```
aws application-autoscaling put-scheduled-action --service-namespace namespace --  
scalable-dimension dimension --resource-id identifier --scheduled-action-name my-  
first-scheduled-action --schedule "cron(0 9 * * ? *)" --scalable-target-action  
MinCapacity=1,MaxCapacity=5
```

This command does not return any output if it is successful.

2. To confirm that your scheduled action exists, use the following [describe-scheduled-actions](#) command.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scheduled-actions \  
  --service-namespace namespace \  
  --query 'ScheduledActions[?ResourceId==`identifier`]'
```

### Windows

```
aws application-autoscaling describe-scheduled-actions --service-  
namespace namespace --query "ScheduledActions[?ResourceId==`identifier`]"
```



The following is example output.

```
[
  {
    "ScheduledActionName": "my-first-scheduled-action",
    "ScheduledActionARN": "arn",
    "Schedule": "cron(0 9 * * ? *)",
    "ScalableTargetAction": {
      "MinCapacity": 1,
      "MaxCapacity": 5
    },
    ...
  }
]
```

## To create a scheduled action that scales in at night

1. Repeat the preceding procedure to create another scheduled action that Application Auto Scaling uses to scale in at the end of the day.

On the specified schedule (every day at 8:00 PM UTC), Application Auto Scaling updates the target's `MinCapacity` and `MaxCapacity` to 0, as instructed by the following [put-scheduled-action](#) command.

### Linux, macOS, or Unix

```
aws application-autoscaling put-scheduled-action \
  --service-namespace namespace \
  --scalable-dimension dimension \
  --resource-id identifier \
  --scheduled-action-name my-second-scheduled-action \
  --schedule "cron(0 20 * * ? *)" \
  --scalable-target-action MinCapacity=0,MaxCapacity=0
```

### Windows

```
aws application-autoscaling put-scheduled-action --service-namespace namespace --scalable-dimension dimension --resource-id identifier --scheduled-action-name my-
```

```
second-scheduled-action --schedule "cron(0 20 * * ? *)" --scalable-target-action
MinCapacity=0,MaxCapacity=0
```

2. To confirm that your scheduled action exists, use the following [describe-scheduled-actions](#) command.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scheduled-actions \
  --service-namespace namespace \
  --query 'ScheduledActions[?ResourceId==`identifier`]'
```

### Windows

```
aws application-autoscaling describe-scheduled-actions --service-
namespace namespace --query "ScheduledActions[?ResourceId==`identifier`]"
```

The following is example output.

```
[
  {
    "ScheduledActionName": "my-first-scheduled-action",
    "ScheduledActionARN": "arn",
    "Schedule": "cron(0 9 * * ? *)",
    "ScalableTargetAction": {
      "MinCapacity": 1,
      "MaxCapacity": 5
    },
    ...
  },
  {
    "ScheduledActionName": "my-second-scheduled-action",
    "ScheduledActionARN": "arn",
    "Schedule": "cron(0 20 * * ? *)",
    "ScalableTargetAction": {
      "MinCapacity": 0,
      "MaxCapacity": 0
    },
    ...
  }
]
```

## Step 3: Add a target tracking scaling policy

Now that you have the basic schedule in place, add a target tracking scaling policy to scale based on current resource utilization.

With target tracking, Application Auto Scaling compares the target value in the policy to the current value of the specified metric. When they are unequal for a period of time, Application Auto Scaling adds or removes capacity to maintain steady performance. As the load on your application and the metric value increases, Application Auto Scaling adds capacity as fast as it can without going above `MaxCapacity`. When Application Auto Scaling removes capacity because the load is minimal, it does so without going below `MinCapacity`. By adjusting the capacity based on usage, you only pay for what your application needs.

If the metric has insufficient data because your application does not have any load, Application Auto Scaling does not add or remove capacity. In other words, Application Auto Scaling prioritizes availability in situations where not enough information is available.

You can add multiple scaling policies, but make sure you do not add conflicting step scaling policies, which might cause undesirable behavior. For example, if the step scaling policy initiates a scale-in activity before the target tracking policy is ready to scale in, the scale-in activity will not be blocked. After the scale-in activity completes, the target tracking policy could instruct Application Auto Scaling to scale out again.

### To create a target tracking scaling policy

1. Use the following [put-scaling-policy](#) command to create the policy.

The metrics that are most frequently used for target tracking are predefined, and you can use them without supplying the full metric specification from CloudWatch. For more information about the available predefined metrics, see [Target tracking scaling policies](#).

Before you run this command, make sure that your predefined metric expects the target value. For example, to scale out when CPU reaches 50% utilization, specify a target value of 50.0. Or, to scale out Lambda provisioned concurrency when usage reaches 70% utilization, specify a target value of 0.7. For information about target values for a particular resource, refer to the documentation that is provided by the service about how to configure target tracking. For more information, see [Amazon services that you can use with Application Auto Scaling](#).

### Linux, macOS, or Unix

```
aws application-autoscaling put-scaling-policy \
  --service-namespace namespace \
  --scalable-dimension dimension \
  --resource-id identifier \
  --policy-name my-scaling-policy --policy-type TargetTrackingScaling \
  --target-tracking-scaling-policy-configuration '{ "TargetValue": 50.0,
  "PredefinedMetricSpecification": { "PredefinedMetricType": "predefinedmetric" } }'
```

## Windows

```
aws application-autoscaling put-scaling-policy --service-namespace namespace --
scalable-dimension dimension --resource-id identifier --policy-name my-scaling-
policy --policy-type TargetTrackingScaling --target-tracking-scaling-policy-
configuration "{ \"TargetValue\": 50.0, \"PredefinedMetricSpecification\":
{ \"PredefinedMetricType\": \"predefinedmetric\" } }"
```

If successful, this command returns the ARNs and names of the two CloudWatch alarms that were created on your behalf.

2. To confirm that your scheduled action exists, use the following [describe-scaling-policies](#) command.

## Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-policies --service-namespace namespace \
  --query 'ScalingPolicies[?ResourceId==`identifier`]'
```

## Windows

```
aws application-autoscaling describe-scaling-policies --service-namespace namespace
--query "ScalingPolicies[?ResourceId==`identifier`]"
```

The following is example output.

```
[
  {
    "PolicyARN": "arn",
    "TargetTrackingScalingPolicyConfiguration": {
      "PredefinedMetricSpecification": {
```

```
        "PredefinedMetricType": "predefinedmetric"
      },
      "TargetValue": 50.0
    },
    "PolicyName": "my-scaling-policy",
    "PolicyType": "TargetTrackingScaling",
    "Alarms": [],
    ...
  }
]
```

## Step 4: Next steps

When a scaling activity occurs, you see a record of it in the output of the scaling activities for the scalable target, for example:

```
Successfully set desired count to 1. Change successfully fulfilled by ecs.
```

To monitor your scaling activities with Application Auto Scaling, you can use the following [describe-scaling-activities](#) command.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-activities
  --service-namespace namespace \
  --scalable-dimension dimension \
  --resource-id identifier
```

### Windows

```
aws application-autoscaling describe-scaling-activities --service-namespace namespace
  --scalable-dimension dimension --resource-id identifier
```

## Step 5: Clean up

To prevent your account from accruing charges for resources created while actively scaling, you can clean up the associated scaling configuration as follows.

Deleting the scaling configuration does not delete the underlying Amazon resource. It also does not return it to its original capacity. You can use the console of the service where you created the resource to delete it or adjust its capacity.

## To delete the scheduled actions

The following [delete-scheduled-action](#) command deletes a specified scheduled action. You can skip this step if you want to keep the scheduled actions that you created.

### Linux, macOS, or Unix

```
aws application-autoscaling delete-scheduled-action \  
  --service-namespace namespace \  
  --scalable-dimension dimension \  
  --resource-id identifier \  
  --scheduled-action-name my-second-scheduled-action
```

### Windows

```
aws application-autoscaling delete-scheduled-action --service-namespace namespace \  
  --scalable-dimension dimension --resource-id identifier --scheduled-action-name my-  
second-scheduled-action
```

## To delete the scaling policy

The following [delete-scaling-policy](#) command deletes a specified target tracking scaling policy. You can skip this step if you want to keep the scaling policy that you created.

### Linux, macOS, or Unix

```
aws application-autoscaling delete-scaling-policy \  
  --service-namespace namespace \  
  --scalable-dimension dimension \  
  --resource-id identifier \  
  --policy-name my-scaling-policy
```

### Windows

```
aws application-autoscaling delete-scaling-policy --service-namespace namespace --  
scalable-dimension dimension --resource-id identifier --policy-name my-scaling-policy
```

## To deregister the scalable target

Use the following [deregister-scalable-target](#) command to deregister the scalable target. If you have any scaling policies that you created or any scheduled actions that have not yet been deleted, they are deleted by this command. You can skip this step if you want to keep the scalable target registered for future use.

### Linux, macOS, or Unix

```
aws application-autoscaling deregister-scalable-target \  
  --service-namespace namespace \  
  --scalable-dimension dimension \  
  --resource-id identifier
```

### Windows

```
aws application-autoscaling deregister-scalable-target --service-namespace namespace --  
scalable-dimension dimension --resource-id identifier
```

# Suspend and resume scaling for Application Auto Scaling

This topic explains how to suspend and then resume one or more of the scaling activities for the scalable targets in your application. The suspend-resume feature is used to temporarily pause scaling activities triggered by your scaling policies and scheduled actions. This can be useful, for example, when you don't want automatic scaling to potentially interfere while you are making a change or investigating a configuration issue. Your scaling policies and scheduled actions can be retained, and when you are ready, scaling activities can be resumed.

In the example CLI commands that follow, you pass the JSON-formatted parameters in a `config.json` file. You can also pass these parameters on the command line by using quotation marks to enclose the JSON data structure. For more information, see [Using quotation marks with strings in the Amazon CLI](#) in the *Amazon Command Line Interface User Guide*.

## Contents

- [Scaling activities](#)
- [Suspend and resume scaling activities](#)

### Note

For instructions for suspending scale-out processes while Amazon ECS deployments are in progress, see the following documentation:

[Service auto scaling and deployments](#) in the *Amazon Elastic Container Service Developer Guide*

## Scaling activities

Application Auto Scaling supports putting the following scaling activities in a suspended state:

- All scale-in activities that are triggered by a scaling policy.
- All scale-out activities that are triggered by a scaling policy.
- All scaling activities that involve scheduled actions.



The following descriptions explain what happens when individual scaling activities are suspended. Each one can be suspended and resumed independently. Depending on the reason for suspending a scaling activity, you might need to suspend multiple scaling activities together.

#### DynamicScalingInSuspended

- Application Auto Scaling does not remove capacity when a target tracking scaling policy or a step scaling policy is triggered. This allows you to temporarily disable scale-in activities associated with scaling policies without deleting the scaling policies or their associated CloudWatch alarms. When you resume scale in, Application Auto Scaling evaluates policies with alarm thresholds that are currently in breach.

#### DynamicScalingOutSuspended

- Application Auto Scaling does not add capacity when a target tracking scaling policy or a step scaling policy is triggered. This allows you to temporarily disable scale-out activities associated with scaling policies without deleting the scaling policies or their associated CloudWatch alarms. When you resume scale out, Application Auto Scaling evaluates policies with alarm thresholds that are currently in breach.

#### ScheduledScalingSuspended

- Application Auto Scaling does not initiate the scaling actions that are scheduled to run during the suspension period. When you resume scheduled scaling, Application Auto Scaling only evaluates scheduled actions whose execution time has not yet passed.

## Suspend and resume scaling activities

You can suspend and resume individual scaling activities or all scaling activities for your Application Auto Scaling scalable target.

### Note

For brevity, these examples illustrate how to suspend and resume scaling for a DynamoDB table. To specify a different scalable target, specify its namespace in `--service-namespace`, its scalable dimension in `--scalable-dimension`, and its resource ID in

`--resource-id`. For more information and examples for each service, see the topics in [Amazon services that you can use with Application Auto Scaling](#).

## To suspend a scaling activity

Open a command-line window and use the [register-scalable-target](#) command with the `--suspended-state` option as follows.

### Linux, macOS, or Unix

```
aws application-autoscaling register-scalable-target --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table \  
  --suspended-state file://config.json
```

### Windows

```
aws application-autoscaling register-scalable-target --service-namespace dynamodb --  
scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table --  
suspended-state file://config.json
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

To only suspend scale-in activities that are triggered by a scaling policy, specify the following in `config.json`.

```
{  
  "DynamicScalingInSuspended": true  
}
```

To only suspend scale-out activities that are triggered by a scaling policy, specify the following in `config.json`.

```
{
```

```
"DynamicScalingOutSuspended":true
}
```

To only suspend scaling activities that involve scheduled actions, specify the following in config.json.

```
{
  "ScheduledScalingSuspended":true
}
```

## To suspend all scaling activities

Use the [register-scalable-target](#) command with the `--suspended-state` option as follows.

### Linux, macOS, or Unix

```
aws application-autoscaling register-scalable-target --service-namespace dynamodb \
  --scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table \
  --suspended-state file://config.json
```

### Windows

```
aws application-autoscaling register-scalable-target --service-namespace dynamodb --
scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table --
suspended-state file://config.json
```

This example assumes that the file config.json contains the following JSON-formatted parameters.

```
{
  "DynamicScalingInSuspended":true,
  "DynamicScalingOutSuspended":true,
  "ScheduledScalingSuspended":true
}
```

If successful, this command returns the ARN of the scalable target.

```
{
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"
}
```

## View suspended scaling activities

Use the [describe-scalable-targets](#) command to determine which scaling activities are in a suspended state for a scalable target.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scalable-targets --service-namespace dynamodb \  
--scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table
```

### Windows

```
aws application-autoscaling describe-scalable-targets --service-namespace dynamodb --  
scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table
```

The following is example output.

```
{  
  "ScalableTargets": [  
    {  
      "ServiceNamespace": "dynamodb",  
      "ScalableDimension": "dynamodb:table:ReadCapacityUnits",  
      "ResourceId": "table/my-table",  
      "MinCapacity": 1,  
      "MaxCapacity": 20,  
      "SuspendedState": {  
        "DynamicScalingOutSuspended": true,  
        "DynamicScalingInSuspended": true,  
        "ScheduledScalingSuspended": true  
      },  
      "CreationTime": 1558125758.957,  
      "RoleARN": "arn:aws-cn:iam::123456789012:role/aws-  
service-role/dynamodb.application-autoscaling.amazonaws.com/  
AWSServiceRoleForApplicationAutoScaling_DynamoDBTable"  
    }  
  ]  
}
```

## Resume scaling activities

When you are ready to resume the scaling activity, you can resume it using the [register-scalable-target](#) command.

The following example command resumes all scaling activities for the specified scalable target.

### Linux, macOS, or Unix

```
aws application-autoscaling register-scalable-target --service-namespace dynamodb \  
  --scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table \  
  --suspended-state file://config.json
```

### Windows

```
aws application-autoscaling register-scalable-target --service-namespace dynamodb --  
scalable-dimension dynamodb:table:ReadCapacityUnits --resource-id table/my-table --  
suspended-state file://config.json
```

This example assumes that the file `config.json` contains the following JSON-formatted parameters.

```
{  
  "DynamicScalingInSuspended":false,  
  "DynamicScalingOutSuspended":false,  
  "ScheduledScalingSuspended":false  
}
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

# Scaling activities for Application Auto Scaling

Application Auto Scaling monitors your scaling policy's CloudWatch metrics and initiates a scaling activity when thresholds are exceeded. It also initiates scaling activities when you modify the maximum or minimum size of the scalable target, either manually or following a schedule.

When a scaling activity occurs, Application Auto Scaling does one of the following:

- Increases the capacity of the scalable target (referred to as *scaling out*)
- Decreases the capacity of the scalable target (referred to as *scaling in*)

You can look up scaling activities from the last six weeks.

## Looking up scaling activities by scalable target

To see the scaling activities for a specific scalable target, use the following [describe-scaling-activities](#) command.

### Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-activities --service-namespace ecs \  
  --scalable-dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-  
service
```

### Windows

```
aws application-autoscaling describe-scaling-activities --service-namespace ecs --  
scalable-dimension ecs:service:DesiredCount --resource-id service/my-cluster/my-service
```

The following is an example response, where `Status Code` contains the current status of the activity and `Status Message` contains information about the status of the scaling activity.

```
{  
  "ScalingActivities": [  
    {  
      "ScalableDimension": "ecs:service:DesiredCount",  
      "Description": "Setting desired count to 1.",  
      "ResourceId": "service/my-cluster/my-service",
```

```
    "ActivityId": "e6c5f7d1-dbbb-4a3f-89b2-51f33e766399",
    "StartTime": 1462575838.171,
    "ServiceNamespace": "ecs",
    "EndTime": 1462575872.111,
    "Cause": "monitor alarm web-app-cpu-lt-25 in state ALARM triggered policy
web-app-cpu-lt-25",
    "StatusMessage": "Successfully set desired count to 1. Change successfully
fulfilled by ecs.",
    "StatusCode": "Successful"
  }
]
```

For a description of the fields in the response, see [ScalingActivity](#) in the *Application Auto Scaling API Reference*.

The following status codes indicate when the scaling event that leads to the scaling activity reaches a completed state:

- **Successful** – Scaling was completed successfully
- **Overridden** – The desired capacity was updated by a newer scaling event
- **Unfulfilled** – Scaling timed out or the target service cannot fulfill the request
- **Failed** – Scaling failed with an exception

#### Note

The scaling activity might also have a status of `Pending` or `InProgress`. All scaling activities have a `Pending` status before the target service responds. After the target responds, the status of the scaling activity changes to `InProgress`.

## Including not scaled activities

By default, the scaling activities do not reflect times when Application Auto Scaling makes a decision about whether to not scale.

For example, suppose that an Amazon ECS service exceeds the maximum threshold of a given metric, but the number of tasks is already at the maximum number of allowed tasks. In this case, Application Auto Scaling does not scale out the desired number of tasks.

To include activities that aren't scaled (*not scaled activities*) in the response, add the `--include-not-scaled-activities` option to the [describe-scaling-activities](#) command.

## Linux, macOS, or Unix

```
aws application-autoscaling describe-scaling-activities --include-not-scaled-activities \
  --service-namespace ecs --scalable-dimension ecs:service:DesiredCount \
  --resource-id service/my-cluster/my-service
```

## Windows

```
aws application-autoscaling describe-scaling-activities --include-not-scaled-activities \
  --service-namespace ecs --scalable-dimension ecs:service:DesiredCount --resource-id \
  service/my-cluster/my-service
```

### Note

If this command throws an error, make sure that you have updated the Amazon CLI locally to the latest version.

To confirm that the response includes the not scaled activities, the `NotScaledReasons` element is shown in the output for some, if not all, failed scaling activities.

```
{
  "ScalingActivities": [
    {
      "ScalableDimension": "ecs:service:DesiredCount",
      "Description": "Attempting to scale due to alarm triggered",
      "ResourceId": "service/my-cluster/my-service",
      "ActivityId": "4d759079-a31f-4d0c-8468-504c56e2eecf",
      "StartTime": 1664928867.915,
      "ServiceNamespace": "ecs",
      "Cause": "monitor alarm web-app-cpu-gt-75 in state ALARM triggered policy \
web-app-cpu-gt-75",
      "StatusCode": "Failed",
      "NotScaledReasons": [
        {
          "Code": "AlreadyAtMaxCapacity",
          "MaxCapacity": 4
        }
      ]
    }
  ]
}
```



```

    ]
  }
}

```

For a description of the fields in the response, see [ScalingActivity](#) in the *Application Auto Scaling API Reference*.

If a not scaled activity is returned, depending on the reason code listed in Code, attributes like `CurrentCapacity`, `MaxCapacity`, and `MinCapacity` might be present in the response.

To prevent large quantities of duplicate entries, only the first not scaled activity will be recorded in the scaling activity history. Any subsequent not scaled activities will not generate new entries unless the reason for not scaling changes.

## Understanding not scaled reason codes

The following are the reason codes for a not scaled activity.

Reason code	Definition			
AutoScalingAnticipatedFlapping	Auto scaling algorithm decided not to take a scaling action because it would lead to <i>flapping</i> . Flapping is an infinite loop of scaling in and scaling out. That is, if a scaling action is taken, the metric value would change to start another			

Reason code	Definition			
	scaling action in the reverse direction.			
TargetServicePutResourceAsUnscalable	The target service has temporarily put the resource in an unscalable state. Application Auto Scaling will retry if the auto scaling conditions configured in the scaling policy are met.			
AlreadyAtMaxCapacity	Scaling is blocked by the maximum capacity that you specified. If you want Application Auto Scaling to scale out, you need to increase the maximum capacity.			

Reason code	Definition			
AlreadyAtMinCapacity	Scaling is blocked by the minimum capacity that you specified. If you want Application Auto Scaling to scale in, you need to decrease the minimum capacity.			
AlreadyAtDesiredCapacity	Auto scaling algorithm calculated the revised capacity to be equal to the current capacity.			

# Application Auto Scaling monitoring

Monitoring is an important part of maintaining the reliability, availability, and performance of Application Auto Scaling and your other Amazon solutions. You should collect monitoring data from all parts of your Amazon solution so that you can more easily debug a multi-point failure if one occurs. Amazon provides monitoring tools to watch Application Auto Scaling, report when something is wrong, and take automatic actions when appropriate.

You can use the following features to help you manage your Amazon resources:

## Amazon CloudTrail

With Amazon CloudTrail, you can track the calls made to the Application Auto Scaling API by or on behalf of your Amazon Web Services account. CloudTrail stores the information in log files in the Amazon S3 bucket that you specify. You can identify which users and accounts called Application Auto Scaling, the source IP address from which the calls were made, and when the calls occurred. For more information, see [Log Application Auto Scaling API calls with Amazon CloudTrail](#).

### Note

For information about other Amazon services that can help you log and collect data about your workloads, see the [Logging and monitoring guide for application owners](#) guide in the *Amazon Prescriptive Guidance*.

## Amazon CloudWatch

Amazon CloudWatch helps you analyze logs and, in real time, monitor the metrics of your Amazon resources and hosted applications. You can collect and track metrics, create customized dashboards, and set alarms that notify you or take actions when a specified metric reaches a threshold that you specify. For example, you can have CloudWatch track resource utilization and notify you when utilization is very high or when the metric's alarm has gone into the INSUFFICIENT\_DATA state. For more information, see [Monitor your resources using CloudWatch](#).

CloudWatch also tracks Amazon API usage metrics for Application Auto Scaling. You can use these metrics to configure alarms that alert you when your API call volume violates a threshold

that you define. For more information, see [Amazon usage metrics](#) in the *Amazon CloudWatch User Guide*.

## Amazon EventBridge

Amazon EventBridge is a serverless event bus service that makes it easy to connect your applications with data from a variety of sources. EventBridge delivers a stream of real-time data from your own applications, Software-as-a-Service (SaaS) applications, and Amazon services and routes that data to targets such as Lambda. This lets you monitor events that happen in services, and build event-driven architectures. For more information, see [Monitor Application Auto Scaling events with Amazon EventBridge](#).

## Amazon Health Dashboard

The Amazon Health Dashboard (PHD) displays information, and also provides notifications that are invoked by changes in the health of Amazon resources. The information is presented in two ways: on a dashboard that shows recent and upcoming events organized by category, and in a full event log that shows all events from the past 90 days. For more information, see [Amazon Health Dashboard notifications for Application Auto Scaling](#).

# Log Application Auto Scaling API calls with Amazon CloudTrail

Application Auto Scaling is integrated with Amazon CloudTrail, a service that provides a record of actions taken by a user, role, or an Amazon service using the Application Auto Scaling API. CloudTrail captures all API calls for Application Auto Scaling as events. The calls captured include calls from the Amazon Web Services Management Console and code calls to the Application Auto Scaling API. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for Application Auto Scaling. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in **Event history**. Using the information collected by CloudTrail, you can determine the request that was made to Application Auto Scaling, the IP address from which the request was made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, see the [Amazon CloudTrail User Guide](#).

## Application Auto Scaling information in CloudTrail

CloudTrail is enabled on your Amazon Web Services account when you create the account. When Application Auto Scaling activity occurs, that activity is recorded in a CloudTrail event along with other Amazon service events in **Event history**. You can view, search, and download recent events

in your Amazon Web Services account. For more information, see [Viewing events with CloudTrail event history](#).

For an ongoing record of events in your Amazon Web Services account, including events for Application Auto Scaling, create a trail. A *trail* enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all Amazon Web Services Regions. The trail logs events from all Regions in the Amazon partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other Amazon Web Services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see the following:

- [Overview for creating a trail](#)
- [CloudTrail supported services and integrations](#)
- [Configuring Amazon SNS notifications for CloudTrail](#)
- [Receiving CloudTrail log files from multiple regions](#) and [Receiving CloudTrail log files from multiple accounts](#)

All Application Auto Scaling actions are logged by CloudTrail and are documented in the [Application Auto Scaling API Reference](#). For example, calls to the `PutScalingPolicy`, `DeleteScalingPolicy`, and `DescribeScalingPolicies` actions generate entries in the CloudTrail log files.

Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or Amazon Identity and Access Management (IAM) user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.
- Whether the request was made by another Amazon service.

For more information, see the [CloudTrail userIdentity element](#).

## Understand Application Auto Scaling log file entries

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of

the action, request parameters, and so on. CloudTrail log files aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the `DescribeScalableTargets` action.

```
{
  "eventVersion": "1.05",
  "userIdentity": {
    "type": "Root",
    "principalId": "123456789012",
    "arn": "arn:aws:iam::123456789012:root",
    "accountId": "123456789012",
    "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
    "sessionContext": {
      "attributes": {
        "mfaAuthenticated": "false",
        "creationDate": "2018-08-21T17:05:42Z"
      }
    }
  },
  "eventTime": "2018-08-16T23:20:32Z",
  "eventSource": "autoscaling.amazonaws.com",
  "eventName": "DescribeScalableTargets",
  "awsRegion": "us-west-2",
  "sourceIPAddress": "72.21.196.68",
  "userAgent": "EC2 Spot Console",
  "requestParameters": {
    "serviceNamespace": "ec2",
    "scalableDimension": "ec2:spot-fleet-request:TargetCapacity",
    "resourceIds": [
      "spot-fleet-request/sfr-05ceaf79-3ba2-405d-e87b-612857f1357a"
    ]
  },
  "responseElements": null,
  "additionalEventData": {
    "service": "application-autoscaling"
  },
  "requestID": "0737e2ea-fb2d-11e3-bfd8-99133058e7bb",
  "eventID": "3fcfb182-98f8-4744-bd45-b38835ab61cb",
  "eventType": "AwsApiCall",
  "recipientAccountId": "123456789012"
}
```

## Related resources

With CloudWatch Logs, you can monitor and receive alerts for specific events captured by CloudTrail. The events sent to CloudWatch Logs are those configured to be logged by your trail, so make sure you have configured your trail or trails to log the event types that you are interested in monitoring. CloudWatch Logs can monitor information in the log files and notify you when certain thresholds are met. You can also archive your log data in highly durable storage. For more information, see the [Amazon CloudWatch Logs User Guide](#) and the [Monitoring CloudTrail log files with Amazon CloudWatch Logs](#) topic in the *Amazon CloudTrail User Guide*.

## Monitor your resources using CloudWatch

This section provides information about monitoring metrics for your scalable resources using CloudWatch.

### Topics

- [Build dashboards with CloudWatch](#)
- [Monitor with CloudWatch alarms](#)
- [Monitor resource usage with CloudWatch](#)

## Build dashboards with CloudWatch

You can monitor how your application uses resources by using Amazon CloudWatch, which generates metrics about your usage and performance. CloudWatch collects raw data from your Amazon resources and the applications that you run on Amazon, and processes it into readable, near real time metrics. The metrics are kept for 15 months so that you can access historical information to gain a better perspective on how your application is performing. For more information, see the [Amazon CloudWatch User Guide](#).

CloudWatch dashboards are customizable home pages in the CloudWatch console that you can use to monitor your resources in a single view, even those resources that are spread across different Regions. You can use CloudWatch dashboards to create customized views of selected metrics for your Amazon resources. You can select the color used for each metric on each graph, so you can more easily track the same metric across multiple graphs.



## To create a CloudWatch dashboard

1. Open the CloudWatch console at <https://console.amazonaws.cn/cloudwatch/>.
2. In the navigation pane, choose **Dashboard**, and then choose **Create new dashboard**.
3. Enter a name for the dashboard, such as the name of the service for which you want to view CloudWatch data.
4. Choose **Create dashboard**.
5. Choose a type of widget to add to your dashboard, such as a line graph. Then choose **Configure**, and choose the metric that you want to add to your dashboard. For more information, see [Add or remove a graph from a CloudWatch dashboard](#) in the *Amazon CloudWatch User Guide*

By default, the metrics that you create in the CloudWatch dashboards are averages. While CloudWatch allows you to choose any statistic for each metric, not all combinations are useful. For example, the average, minimum, and maximum statistics for CPU utilization are useful, but the sum statistic is not.

A commonly used measure of application performance is average CPU utilization. If there is an increase in CPU utilization and you have insufficient capacity to handle it, the application might become unresponsive. On the other hand, if you have too much capacity and resources are running when utilization is low, this increases the costs for using that service.

Depending on the service, you also have metrics that track the amount of provisioned throughput that is available. For example, for the number of invocations that are being processed on a function alias or version with provisioned concurrency, Lambda emits the `ProvisionedConcurrencyUtilization` metric. If you are starting a large job and invoke the same function many times simultaneously, the job might experience latency when it exceeds the amount of provisioned concurrency available. On the other hand, if you have more provisioned concurrency than you need, your costs might be higher than they should be.

Metrics do not appear before the resource has been set up completely. Also, if a metric hasn't published data in the past 14 days, you can't find it when searching for metrics to add to a graph on a CloudWatch dashboard. For information about how to add any metric manually, see [Graph metrics manually on a CloudWatch dashboard](#) in the *Amazon CloudWatch User Guide*.

For more information, refer to the service's documentation that's available from the table in [Monitor resource usage with CloudWatch](#).

## Monitor with CloudWatch alarms

You can create alarms to notify you when Amazon CloudWatch has detected any problems that might require your attention.

A CloudWatch alarm watches a single metric. It invokes one or more actions only when the alarm state changes, and has persisted for the period that you specify. For example, you can set an alarm that notifies you when a metric value falls to or exceeds a certain level, ensuring that you are notified before a potential problem occurs.

CloudWatch also allows you to set an alarm that notifies you when the metric is in `INSUFFICIENT_DATA` state. Any metric, for any Amazon service, can alarm on `INSUFFICIENT_DATA`. This is the initial state of a new alarm, but the alarm state also changes to `INSUFFICIENT_DATA` if CloudWatch metrics become unavailable, or not enough data is available for the metric to determine the alarm state. For example, Amazon Lambda emits the `ProvisionedConcurrencyUtilization` metric to CloudWatch every minute only when the Lambda function is active. If the function is inactive, this results in the alarm going to the `INSUFFICIENT_DATA` state while waiting for the metrics. This is normal and might not necessarily mean that there is a problem, but it could be indicative of a problem if you expected activity within a period of time but there was none.

This topic explains how to create an alarm that sends a notification when the metric is within or outside a threshold that you define, or when there is insufficient data. For more detailed information about alarms, see [Using Amazon CloudWatch alarms](#) in the *Amazon CloudWatch User Guide*.

### To create an alarm that sends email

1. Open the CloudWatch console at <https://console.amazonaws.cn/cloudwatch/>.
2. In the navigation pane, choose **Alarms, Create Alarm**.
3. Choose **Select Metric**.

You are directed to a page where you can find all of your metrics. The types of metrics available to you depends on the services and features that you use. Metrics are grouped first by the service namespace, then by the various dimension combinations within each namespace.

4. Select a metric namespace (for example, **Lambda**) and then a metric dimension (for example, **By Function Name**).

The **All metrics** tab displays all metrics for the selected dimension and namespace.

5. Select the check box next to the metric that you want to create an alarm for, and then choose **Select metric**.
6. Configure the alarm as follows, and then choose **Next**:
  - Under **Metric**, select an aggregation period of 1 minute or 5 minutes. If you use one minute as an aggregation period for a metric, there will be one data point every minute. The shorter period creates a more sensitive alarm.
  - Under **Conditions**, configure your threshold, for example, the value that the metric must exceed before a notification is generated.
  - Under **Additional configuration**, for **Datapoints to alarm**, enter the number of data points (evaluation periods) during which the metric value must meet the threshold conditions to trigger the alarm. For example, two consecutive periods of 5 minutes would take 10 minutes to trigger the alarm.
  - For **Missing data treatment**, keep the default and treat missing data points as missing.

Some metrics are reported only when there is activity occurring. This can result in a sparsely reported metric. If a metric is frequently missing data points by design, the state of the alarm is `INSUFFICIENT_DATA` during those periods. To force the alarm to maintain the previous `ALARM` or `OK` state to keep alerts from flapping, you could choose to ignore missing data instead.

7. Under **Notification**, choose or create an SNS topic to notify when the alarm is in `ALARM` state, `OK` state, or `INSUFFICIENT_DATA` state. To have the alarm send multiple notifications for the same alarm state or for different alarm states, choose **Add notification**.
8. When finished, choose **Next**.
9. Enter a name and, optionally, a description for the alarm, and then choose **Next**.
10. Choose **Create alarm**.

### To check the state of your alarms

1. Open the CloudWatch console at <https://console.amazonaws.cn/cloudwatch/>.
2. In the navigation pane, choose **Alarms** to see a list of alarms.
3. To filter alarms, use the drop-down filters next to the search field, and choose the filter option that you want to apply.

- To edit or delete an alarm, select the alarm and then choose **Actions, Edit** or **Actions, Delete**.

## Monitor resource usage with CloudWatch

With Amazon CloudWatch, you get nearly continuous visibility into your applications across scalable resources. CloudWatch is a monitoring service for Amazon resources. You can use CloudWatch to collect and track metrics, set alarms, and automatically react to changes in your Amazon resources. You can also create dashboards to monitor the specific metrics or sets of metrics you need.

When you interact with the services that integrate with Application Auto Scaling, they send the metrics shown in the following table to CloudWatch. In CloudWatch, metrics are grouped first by the service namespace, and then by the various dimension combinations within each namespace. These metrics can help you monitor resource usage and plan capacity for your applications. If your application's workload is not constant, this indicates that you should consider using auto scaling. For detailed descriptions of these metrics, see the documentation for the metric of interest.

### Contents

- [CloudWatch metrics for monitoring resource usage](#)
- [Predefined metrics for target tracking scaling policies](#)

### CloudWatch metrics for monitoring resource usage

The following table lists the CloudWatch metrics that are available to support monitoring resource usage. The list is not exhaustive but will give you a good starting point. If you do not see these metrics in the CloudWatch console, make sure that you have completed the set up of the resource. For more information, see the [Amazon CloudWatch User Guide](#).

Scalable resource	Namespace	CloudWatch metric	Link to documentation
<b>AppStream 2.0</b>			
Fleets	AWS/ AppStream	Name: Available Capacity	<a href="#">AppStream 2.0 metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
		Dimension : Fleet	
Fleets	AWS/ AppStream	Name: CapacityUtilization  Dimension : Fleet	<a href="#">AppStream 2.0 metrics</a>
<b>Aurora</b>			
Replicas	AWS/ RDS	Name: CPUUtilization  Dimensions: DBClusterIdentifier, Role (READER)	<a href="#">Aurora cluster-level metrics</a>
Replicas	AWS/ RDS	Name: DatabaseConnections  Dimensions: DBClusterIdentifier, Role (READER)	<a href="#">Aurora cluster-level metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
<b>Amazon Comprehend</b>			
Document classification endpoints	AWS/Comprehend	Name: Inference Utilization  Dimension: EndpointArn	<a href="#">Amazon Comprehend endpoint metrics</a>
Entity recognizer endpoints	AWS/Comprehend	Name: Inference Utilization  Dimension: EndpointArn	<a href="#">Amazon Comprehend endpoint metrics</a>
<b>DynamoDB</b>			

Scalable resource	Namespace	CloudWatch metric	Link to documentation
Tables and global secondary indexes	AWS/ DynamoDB	Name: ProvisionedReadCapacityUnits  Dimensions: TableName, GlobalSecondaryIndexName	<a href="#">DynamoDB metrics</a>
Tables and global secondary indexes	AWS/ DynamoDB	Name: ProvisionedWriteCapacityUnits  Dimensions: TableName, GlobalSecondaryIndexName	<a href="#">DynamoDB metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
Tables and global secondary indexes	AWS/ DynamoDB	Name: ConsumedReadCapacityUnits  Dimensions: TableName, GlobalSecondaryIndexName	<a href="#">DynamoDB metrics</a>
Tables and global secondary indexes	AWS/ DynamoDB	Name: ConsumedWriteCapacityUnits  Dimensions: TableName, GlobalSecondaryIndexName	<a href="#">DynamoDB metrics</a>
<b>Amazon ECS</b>			



Scalable resource	Namespace	CloudWatch metric	Link to documentation
Services	AWS/ECS	Name: CPUUtilization  Dimensions: ClusterName, ServiceName	<a href="#">Amazon ECS metrics</a>
Services	AWS/ECS	Name: MemoryUtilization  Dimensions: ClusterName, ServiceName	<a href="#">Amazon ECS metrics</a>
Services	AWS/ApplicationELB	Name: RequestCountPerTarget  Dimension: TargetGroup	<a href="#">Application Load Balancer metrics</a>
<b>ElastiCache</b>			

Scalable resource	Namespace	CloudWatch metric	Link to documentation
Clusters (replication groups)	AWS/ Elast iCache	Name: DatabaseMemoryUsageCountedForEvictPercentage  Dimension: : ReplicationGroupId	<a href="#">ElastiCache for Redis metrics</a>
Clusters (replication groups)	AWS/ Elast iCache	Name: DatabaseCapacityUsageCountedForEvictPercentage  Dimension: : ReplicationGroupId	<a href="#">ElastiCache for Redis metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
Clusters (replication groups)	AWS/ ElastiCache	Name: EngineCPUUtilization  Dimensions: ReplicationGroupId, Role (Primary)	<a href="#">ElastiCache for Redis metrics</a>
Clusters (replication groups)	AWS/ ElastiCache	Name: EngineCPUUtilization  Dimensions: ReplicationGroupId, Role (Replica)	<a href="#">ElastiCache for Redis metrics</a>
<b>Amazon EMR</b>			
Clusters	AWS/ ElasticMapReduce	Name: YARNMemoryAvailablePercentage  Dimension: ClusterId	<a href="#">Amazon EMR metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
<b>Amazon Keyspaces</b>			
Tables	AWS/Cassandra	Name: ProvisionedReadCapacityUnits  Dimensions: Keyspace, TableName	<a href="#">Amazon Keyspaces metrics</a>
Tables	AWS/Cassandra	Name: ProvisionedWriteCapacityUnits  Dimensions: Keyspace, TableName	<a href="#">Amazon Keyspaces metrics</a>
Tables	AWS/Cassandra	Name: ConsumedReadCapacityUnits  Dimensions: Keyspace, TableName	<a href="#">Amazon Keyspaces metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
Tables	AWS/ Cassandra	Name: ConsumedWriteCapacityUnits  Dimensions: Keyspace, TableName	<a href="#">Amazon Keyspaces metrics</a>
<b>Lambda</b>			
Provisioned concurrency	AWS/ Lambda	Name: ProvisionedConcurrencyUtilization  Dimensions: FunctionName, Resource	<a href="#">Lambda function metrics</a>
<b>Amazon MSK</b>			
Broker storage	AWS/ Kafka	Name: KafkaDataLogsDiskUsed  Dimensions: ClusterName	<a href="#">Amazon MSK metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
Broker storage	AWS/ Kafka	Name: KafkaData LogsDiskUsed  Dimension s: Cluster Name, Broker ID	<a href="#">Amazon MSK metrics</a>
<b>Neptune</b>			
Clusters	AWS/ Neptune	Name: CPUUtilization  Dimension s: DBCluster Identifier, Role (READER)	<a href="#">Neptune metrics</a>
<b>SageMaker</b>			

Scalable resource	Namespace	CloudWatch metric	Link to documentation
Endpoint variants	AWS/SageMaker	Name: <code>InvocationsPerInstance</code>  Dimensions: <code>EndpointName</code> , <code>VariantName</code>	<a href="#">Invocation metrics</a>
Inference components	AWS/SageMaker	Name: <code>InvocationsPerCopy</code>  Dimensions: <code>InferenceComponentName</code>	<a href="#">Invocation metrics</a>
Provisioned concurrency for a serverless endpoint	AWS/SageMaker	Name: <code>ServerlessProvisionedConcurrencyUtilization</code>  Dimensions: <code>EndpointName</code> , <code>VariantName</code>	<a href="#">Serverless endpoint metrics</a>

Scalable resource	Namespace	CloudWatch metric	Link to documentation
<b>Spot Fleet (Amazon EC2)</b>			
Spot Fleets	AWS/ EC2Spot	Name: CPUUtilization  Dimension : FleetRequestId	<a href="#">Spot Fleet metrics</a>
Spot Fleets	AWS/ EC2Spot	Name: NetworkIn  Dimension : FleetRequestId	<a href="#">Spot Fleet metrics</a>
Spot Fleets	AWS/ EC2Spot	Name: NetworkOut  Dimension : FleetRequestId	<a href="#">Spot Fleet metrics</a>



Scalable resource	Namespace	CloudWatch metric	Link to documentation
Spot Fleets	AWS/ ApplicationELB	Name: RequestCountPerTarget  Dimension: TargetGroup	<a href="#">Application Load Balancer metrics</a>

## Predefined metrics for target tracking scaling policies

The following table lists the predefined metric types from the [Application Auto Scaling API Reference](#) with their corresponding CloudWatch metric name. Each predefined metric represents an aggregation of the values of the underlying CloudWatch metric. The result is the average resource usage over a one-minute period, based on a percentage unless otherwise noted. The predefined metrics are only used within the context of setting up target tracking scaling policies.

You can find more information about these metrics in the service's documentation that's available from the table in [CloudWatch metrics for monitoring resource usage](#).

Predefined metric type	CloudWatch metric name
<b>AppStream 2.0</b>	
AppStreamAverageCapacityUtilization	CapacityUtilization
<b>Aurora</b>	
RDSReaderAverageCPUUtilization	CPUUtilization
RDSReaderAverageDatabaseConnections	DatabaseConnections <sup>1</sup>

Predefined metric type	CloudWatch metric name
<b>Amazon Comprehend</b>	
ComprehendInferenceUtilization	InferenceUtilization
<b>DynamoDB</b>	
DynamoDBReadCapacityUtilization	ProvisionedReadCapacityUnits, ConsumedReadCapacityUnits <sup>2</sup>
DynamoDBWriteCapacityUtilization	ProvisionedWriteCapacityUnits, ConsumedWriteCapacityUnits <sup>2</sup>
<b>Amazon ECS</b>	
ECSServiceAverageCPUUtilization	CPUUtilization
ECSServiceAverageMemoryUtilization	MemoryUtilization
ALBRequestCountPerTarget	RequestCountPerTarget <sup>1</sup>
<b>ElastiCache</b>	
ElastiCacheDatabaseMemoryUsageCountedForEvictPercentage	DatabaseMemoryUsageCountedForEvictPercentage
ElastiCacheDatabaseCapacityUsageCountedForEvictPercentage	DatabaseCapacityUsageCountedForEvictPercentage
ElastiCachePrimaryEngineCPUUtilization	EngineCPUUtilization
ElastiCacheReplicaEngineCPUUtilization	EngineCPUUtilization
<b>Amazon Keyspaces</b>	
CassandraReadCapacityUtilization	ProvisionedReadCapacityUnits, ConsumedReadCapacityUnits <sup>2</sup>

Predefined metric type	CloudWatch metric name
CassandraWriteCapacityUtilization	ProvisionedWriteCapacityUnits, ConsumedWriteCapacityUnits <sup>2</sup>
<b>Lambda</b>	
LambdaProvisionedConcurrencyUtilization	ProvisionedConcurrencyUtilization
<b>Amazon MSK</b>	
KafkaBrokerStorageUtilization	KafkaDataLogsDiskUsed
<b>Neptune</b>	
NeptuneReaderAverageCPUUtilization	CPUUtilization
<b>SageMaker</b>	
SageMakerVariantInvocationsPerInstance	InvocationsPerInstance <sup>1</sup>
SageMakerInferenceComponentInvocationsPerCopy	InvocationsPerCopy <sup>1</sup>
SageMakerVariantProvisionedConcurrencyUtilization	ServerlessProvisionedConcurrencyUtilization
<b>Spot Fleet</b>	
EC2SpotFleetRequestAverageCPUUtilization	CPUUtilization <sup>3</sup>
EC2SpotFleetRequestAverageNetworkIn <sup>3</sup>	NetworkIn <sup>1 3</sup>
EC2SpotFleetRequestAverageNetworkOut <sup>3</sup>	NetworkOut <sup>1 3</sup>

Predefined metric type	CloudWatch metric name
ALBRequestCountPerTarget	RequestCountPerTarget <sup>1</sup>

<sup>1</sup> Metric is based on a count instead of a percentage.

<sup>2</sup> For DynamoDB and Amazon Keyspaces, the predefined metrics are an aggregation of two CloudWatch metrics to support scaling based on provisioned throughput consumption.

<sup>3</sup> For best scaling performance, Amazon EC2 detailed monitoring should be used.

## Monitor Application Auto Scaling events with Amazon EventBridge

Amazon EventBridge, formerly called CloudWatch Events, helps you monitor events that are specific to Application Auto Scaling and initiate target actions that use other Amazon Web Services. Events from Amazon Web Services are delivered to EventBridge in near real time.

Using EventBridge, you can create *rules* that match incoming *events* and route them to *targets* for processing.

For more information, see [Getting started with Amazon EventBridge](#) in the *Amazon EventBridge User Guide*.

### Application Auto Scaling events

The following examples show events for Application Auto Scaling. Events are produced on a best-effort basis.

Only events that are specific to scaled to max and API calls via CloudTrail are currently available for Application Auto Scaling.

#### Event types

- [Event for state change: scaled to max](#)
- [Events for API calls via CloudTrail](#)

## Event for state change: scaled to max

The following example event shows that Application Auto Scaling increased (scaled out) the capacity of the scalable target to its maximum size limit. If demand increases again, Application Auto Scaling will be prevented from scaling the target to a larger size because it is already scaled to its maximum size.

In the detail object, the values for the `resourceId`, `serviceNamespace`, and `scalableDimension` attributes identify the scalable target. The values for the `newDesiredCapacity` and `oldDesiredCapacity` attributes refer to the new capacity after the scale-out event and the original capacity before the scale-out event. The `maxCapacity` is the maximum size limit of the scalable target.

```
{
  "version": "0",
  "id": "11112222-3333-4444-5555-666677778888",
  "detail-type": "Application Auto Scaling Scaling Activity State Change",
  "source": "aws.application-autoscaling",
  "account": "123456789012",
  "time": "2019-06-12T10:23:40Z",
  "region": "us-west-2",
  "resources": [],
  "detail": {
    "startTime": "2022-06-12T10:20:43Z",
    "endTime": "2022-06-12T10:23:40Z",
    "newDesiredCapacity": 8,
    "oldDesiredCapacity": 5,
    "minCapacity": 2,
    "maxCapacity": 8,
    "resourceId": "table/my-table",
    "scalableDimension": "dynamodb:table:WriteCapacityUnits",
    "serviceNamespace": "dynamodb",
    "statusCode": "Successful",
    "scaledToMax": true,
    "direction": "scale-out"
  }
}
```

To create a rule that captures all `scaledToMax` state change events for all scalable targets, use the following sample event pattern.

```
{
  "source": [
```

```
    "aws.application-autoscaling"
  ],
  "detail-type": [
    "Application Auto Scaling Scaling Activity State Change"
  ],
  "detail": {
    "scaledToMax": [
      true
    ]
  }
}
```

## Events for API calls via CloudTrail

A *trail* is a configuration that Amazon CloudTrail uses to deliver events as log files to an Amazon S3 bucket. CloudTrail log files contain log entries. An event represents a log entry, and it includes information about the requested action, the date and time of the action, and request parameters. To learn how to get started with CloudTrail, see [Creating a trail](#) in the *Amazon CloudTrail User Guide*.

Events that are delivered via CloudTrail have `AWS API Call via CloudTrail` as the value for `detail-type`.

The following example event represents a CloudTrail log file entry that shows that a console user called the Application Auto Scaling [RegisterScalableTarget](#) action.

```
{
  "version": "0",
  "id": "99998888-7777-6666-5555-444433332222",
  "detail-type": "AWS API Call via CloudTrail",
  "source": "aws.autoscaling",
  "account": "123456789012",
  "time": "2022-07-13T16:50:15Z",
  "region": "us-west-2",
  "resources": [],
  "detail": {
    "eventVersion": "1.08",
    "userIdentity": {
      "type": "IAMUser",
      "principalId": "123456789012",
      "arn": "arn:aws-cn:iam::123456789012:user/Bob",
      "accountId": "123456789012",
```

```
"accessKeyId": "AKIAIOSFODNN7EXAMPLE",
"sessionContext": {
  "sessionIssuer": {
    "type": "Role",
    "principalId": "123456789012",
    "arn": "arn:aws:iam::123456789012:role/Admin",
    "accountId": "123456789012",
    "userName": "Admin"
  },
  "webIdFederationData": {},
  "attributes": {
    "creationDate": "2022-07-13T15:17:08Z",
    "mfaAuthenticated": "false"
  }
},
"eventTime": "2022-07-13T16:50:15Z",
"eventSource": "autoscaling.amazonaws.com",
"eventName": "RegisterScalableTarget",
"awsRegion": "us-west-2",
"sourceIPAddress": "AWS Internal",
"userAgent": "EC2 Spot Console",
"requestParameters": {
  "resourceId": "spot-fleet-request/sfr-73fbd2ce-aa30-494c-8788-1cee4EXAMPLE",
  "serviceNamespace": "ec2",
  "scalableDimension": "ec2:spot-fleet-request:TargetCapacity",
  "minCapacity": 2,
  "maxCapacity": 10
},
"responseElements": null,
"additionalEventData": {
  "service": "application-autoscaling"
},
"requestID": "e9caf887-8d88-11e5-a331-3332aa445952",
"eventID": "49d14f36-6450-44a5-a501-b0fdcdfaeb98",
"readOnly": false,
"eventType": "AwsApiCall",
"managementEvent": true,
"recipientAccountId": "123456789012",
"eventCategory": "Management",
"sessionCredentialFromConsole": "true"
}
```

To create a rule based on all [DeleteScalingPolicy](#) and [DeregisterScalableTarget](#) API calls for all scalable targets, use the following sample event pattern:

```
{
  "source": [
    "aws.autoscaling"
  ],
  "detail-type": [
    "AWS API Call via CloudTrail"
  ],
  "detail": {
    "eventSource": [
      "autoscaling.amazonaws.com"
    ],
    "eventName": [
      "DeleteScalingPolicy",
      "DeregisterScalableTarget"
    ],
    "additionalEventData": {
      "service": [
        "application-autoscaling"
      ]
    }
  }
}
```

For more information about using CloudTrail, see [Log Application Auto Scaling API calls with Amazon CloudTrail](#).

## Amazon Health Dashboard notifications for Application Auto Scaling

To help you manage failed scaling events, your Amazon Health Dashboard provides support for notifications that are emitted by Application Auto Scaling. Only scale out events that are specific to your DynamoDB resources are currently available.

The Amazon Health Dashboard is part of the Amazon Health service. It requires no setup and can be viewed by any user that is authenticated in your account. For more information, see [Getting started with the Amazon Health Dashboard](#).



If your DynamoDB resources are not scaling out due to your DynamoDB service quota limits, you receive a message similar to the following. If you receive this message, it should be treated as an alarm to take action.

Hello,

A scaling action has attempted to scale out your DynamoDB resources in the eu-west-1 region. This operation has been prevented because it would have exceeded a table-level write throughput limit (Provisioned mode). This limit restricts the provisioned write capacity of the table and all of its associated global secondary indexes. To address the issue, refer to the Amazon DynamoDB Developer Guide for current limits and how to request higher limits [1].

To identify your DynamoDB resources that are impacted, use the `describe-scaling-activities` command or the `DescribeScalingActivities` operation [2] [3].

Look for a scaling activity with `StatusCode "Failed"` and a `StatusMessage` similar to `"Failed to set write capacity units to 45000. Reason: The requested WriteCapacityUnits, 45000, is above the per table maximum for the account in eu-west-1. Per table maximum: 40000."` You can also view these scaling activities from the Capacity tab of your tables in the Amazon Web Services Management Console for DynamoDB.

We strongly recommend that you address this issue to ensure that your tables are prepared to handle increases in traffic. This notification is sent only once in each 12 hour period, even if another failed scaling action occurs.

[1] <https://docs.aws.amazon.com/amazondynamodb/latest/developerguide/Limits.html#default-limits-throughput-capacity-modes>

[2] <https://docs.aws.amazon.com/cli/latest/reference/application-autoscaling/describe-scaling-activities.html>

[3] [https://docs.aws.amazon.com/autoscaling/application/APIReference/API\\_DescribeScalingActivities.html](https://docs.aws.amazon.com/autoscaling/application/APIReference/API_DescribeScalingActivities.html)

Sincerely,  
Amazon Web Services

# Tagging support for Application Auto Scaling

You can use the Amazon CLI or an SDK to tag Application Auto Scaling scalable targets. Scalable targets are the entities that represent the Amazon or custom resources that Application Auto Scaling can scale.

Each tag is a label consisting of a user-defined key and value using the Application Auto Scaling API. Tags can help you configure granular access to specific scalable targets according to your organization's needs. For more information, see [ABAC with Application Auto Scaling](#).

You can add tags to new scalable targets when you register them, or you can add them to existing scalable targets.

The commonly used commands for managing tags include:

- [register-scalable-target](#) to tag new scalable targets when you register them.
- [tag-resource](#) to add tags to an existing scalable target.
- [list-tags-for-resource](#) to return the tags on a scalable target.
- [untag-resource](#) to delete a tag.

## Tagging example

Use the following [register-scalable-target](#) command with the `--tags` option. This example tags a scalable target with two tags: a tag key named **environment** with the tag value of **production**, and a tag key named **iscontainerbased** with the tag value of **true**.

Replace the sample values for `--min-capacity` and `--max-capacity` and sample text for `--service-namespace` with the namespace of the Amazon service you're using with Application Auto Scaling, `--scalable-dimension` with the scalable dimension associated with the resource you're registering, and `--resource-id` with an identifier for the resource. For more information and examples for each service, see the topics in [Amazon services that you can use with Application Auto Scaling](#).

```
aws application-autoscaling register-scalable-target \  
  --service-namespace namespace \  
  --scalable-dimension dimension \  
  --resource-id identifier \  
  --tags key=value key=value
```

```
--min-capacity 1 --max-capacity 10 \  
--tags environment=production,iscontainerbased=true
```

If successful, this command returns the ARN of the scalable target.

```
{  
  "ScalableTargetARN": "arn:aws-cn:application-autoscaling:region:account-  
id:scalable-target/1234abcd56ab78cd901ef1234567890ab123"  
}
```

### Note

If this command throws an error, make sure that you have updated the Amazon CLI locally to the latest version.

## Tags for security

Use tags to verify that the requester (such as an IAM user or role) has permissions to perform certain actions. Provide tag information in the condition element of an IAM policy by using one or more of the following condition keys:

- Use `aws:ResourceTag/tag-key: tag-value` to allow (or deny) user actions on scalable targets with specific tags.
- Use `aws:RequestTag/tag-key: tag-value` to require that a specific tag be present (or not present) in a request.
- Use `aws:TagKeys [tag-key, ...]` to require that specific tag keys be present (or not present) in a request.

For example, the following IAM policy grants permissions to use the `DeregisterScalableTarget`, `DeleteScalingPolicy`, and `DeleteScheduledAction` actions. However, it also denies the actions if the scalable target being acted upon has the tag **environment=production**.

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

```

    "Effect": "Allow",
    "Action": [
      "application-autoscaling:DeregisterScalableTarget",
      "application-autoscaling>DeleteScalingPolicy",
      "application-autoscaling>DeleteScheduledAction"
    ],
    "Resource": "*"
  },
  {
    "Effect": "Deny",
    "Action": [
      "application-autoscaling:DeregisterScalableTarget",
      "application-autoscaling>DeleteScalingPolicy",
      "application-autoscaling>DeleteScheduledAction"
    ],
    "Resource": "*",
    "Condition": {
      "StringEquals": {"aws:ResourceTag/environment": "production"}
    }
  }
]
}

```

## Control access to tags

Use tags to verify that the requester (such as an IAM user or role) has permissions to add, modify, or delete tags for scalable targets.

For example, you could create an IAM policy that allows removing only the tag with the **temporary** key from scalable targets.

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "application-autoscaling:UntagResource",
      "Resource": "*",
      "Condition": {
        "ForAllValues:StringEquals": { "aws:TagKeys": [temporary] }
      }
    }
  ]
}

```

```
}  
  ]  
}
```

# Security in Application Auto Scaling

Cloud security at Amazon is the highest priority. As an Amazon customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between Amazon and you. The [shared responsibility model](#) describes this as security *of* the cloud and security *in* the cloud:

- **Security of the cloud** – Amazon is responsible for protecting the infrastructure that runs Amazon services in the Amazon Cloud. Amazon also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the [Amazon compliance programs](#). To learn about the compliance programs that apply to Application Auto Scaling, see [Amazon services in scope by compliance program](#).
- **Security in the cloud** – Your responsibility is determined by the Amazon service that you use. You are also responsible for other factors including the sensitivity of your data, your company's requirements, and applicable laws and regulations.

This documentation helps you understand how to apply the shared responsibility model when using Application Auto Scaling. The following topics show you how to configure Application Auto Scaling to meet your security and compliance objectives. You also learn how to use other Amazon services that help you to monitor and secure your Application Auto Scaling resources.

## Topics

- [Application Auto Scaling and interface VPC endpoints](#)
- [Application Auto Scaling and data protection](#)
- [Identity and Access Management for Application Auto Scaling](#)
- [Compliance validation for Application Auto Scaling](#)
- [Resilience in Application Auto Scaling](#)
- [Infrastructure security in Application Auto Scaling](#)

## Application Auto Scaling and interface VPC endpoints

You can improve the security posture of your VPC by configuring Application Auto Scaling to use an interface VPC endpoint. Interface endpoints are powered by Amazon PrivateLink, a technology

that enables you to privately access Application Auto Scaling APIs by restricting all network traffic between your VPC and Application Auto Scaling to the Amazon network. With interface endpoints, you also don't need an internet gateway, a NAT device, or a virtual private gateway.

You are not required to configure Amazon PrivateLink, but it's recommended. For more information about Amazon PrivateLink and VPC endpoints, see [What is Amazon PrivateLink?](#) in the *Amazon PrivateLink Guide*.

## Topics

- [Create an interface VPC endpoint](#)
- [Create a VPC endpoint policy](#)

## Create an interface VPC endpoint

Create an endpoint for Application Auto Scaling using the following service name:

```
com.amazonaws.region.application-autoscaling
```

For more information, see [Access an Amazon service using an interface VPC endpoint](#) in the *Amazon PrivateLink Guide*.

You do not need to change any other settings. Application Auto Scaling calls other Amazon services using either service endpoints or private interface VPC endpoints, whichever are in use.

## Create a VPC endpoint policy

You can attach a policy to your VPC endpoint to control access to the Application Auto Scaling API. The policy specifies:

- The principal that can perform actions.
- The actions that can be performed.
- The resource on which the actions can be performed.

The following example shows a VPC endpoint policy that denies everyone permission to delete a scaling policy through the endpoint. The example policy also grants everyone permission to perform all other actions.

```
{
  "Statement": [
    {
      "Action": "*",
      "Effect": "Allow",
      "Resource": "*",
      "Principal": "*"
    },
    {
      "Action": "application-autoscaling:DeleteScalingPolicy",
      "Effect": "Deny",
      "Resource": "*",
      "Principal": "*"
    }
  ]
}
```

For more information, see [VPC endpoint policies](#) in the *Amazon PrivateLink Guide*.

## Application Auto Scaling and data protection

The Amazon [shared responsibility model](#) applies to data protection in Application Auto Scaling. As described in this model, Amazon is responsible for protecting the global infrastructure that runs all of the Amazon Web Services Cloud. You are responsible for maintaining control over your content that is hosted on this infrastructure. You are also responsible for the security configuration and management tasks for the Amazon Web Services that you use. For more information about data privacy, see the [Data Privacy FAQ](#).

For data protection purposes, we recommend that you protect Amazon Web Services account credentials and set up individual users with Amazon IAM Identity Center or Amazon Identity and Access Management (IAM). That way, each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with Amazon resources. We require TLS 1.2 and recommend TLS 1.3.
- Set up API and user activity logging with Amazon CloudTrail.
- Use Amazon encryption solutions, along with all default security controls within Amazon Web Services.



- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing sensitive data that is stored in Amazon S3.
- If you require FIPS 140-2 validated cryptographic modules when accessing Amazon through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see [Federal Information Processing Standard \(FIPS\) 140-2](#).

We strongly recommend that you never put confidential or sensitive information, such as your customers' email addresses, into tags or free-form text fields such as a **Name** field. This includes when you work with Application Auto Scaling or other Amazon Web Services using the console, API, Amazon CLI, or Amazon SDKs. Any data that you enter into tags or free-form text fields used for names may be used for billing or diagnostic logs. If you provide a URL to an external server, we strongly recommend that you do not include credentials information in the URL to validate your request to that server.

## Identity and Access Management for Application Auto Scaling

Amazon Identity and Access Management (IAM) is an Amazon Web Service that helps an administrator securely control access to Amazon resources. IAM administrators control who can be *authenticated* (signed in) and *authorized* (have permissions) to use Application Auto Scaling resources. IAM is an Amazon Web Service that you can use with no additional charge.

To use Application Auto Scaling, you need an Amazon Web Services account and your security credentials for signing into your account. For more information, see [Set up to start using Application Auto Scaling](#).

For complete IAM documentation, see the [IAM User Guide](#).

### Access control

You can have valid credentials to authenticate your requests, but unless you have permissions you cannot create or access Application Auto Scaling resources. For example, you must have permissions to create scaling policies, configure scheduled scaling, and so on.

The following sections provide details on how an IAM administrator can use IAM to help secure your Amazon resources, by controlling who can perform Application Auto Scaling API actions.

### Topics

- [How Application Auto Scaling works with IAM](#)

- [Amazon managed policies for Application Auto Scaling](#)
- [Service-linked roles for Application Auto Scaling](#)
- [Application Auto Scaling identity-based policy examples](#)
- [Troubleshooting access to Application Auto Scaling](#)
- [Permissions validation for API calls on target resources](#)

## How Application Auto Scaling works with IAM

### Note

In December 2017, there was an update for Application Auto Scaling, enabling several service-linked roles for Application Auto Scaling integrated services. Specific IAM permissions *and* an Application Auto Scaling service-linked role (or a service role for Amazon EMR auto scaling) are required so that users can configure scaling.

Before you use IAM to manage access to Application Auto Scaling, learn what IAM features are available to use with Application Auto Scaling.

### IAM features you can use with Application Auto Scaling

IAM feature	Application Auto Scaling support
<a href="#">Identity-based policies</a>	Yes
<a href="#">Policy actions</a>	Yes
<a href="#">Policy resources</a>	Yes
<a href="#">Policy condition keys (service-specific)</a>	Yes
<a href="#">Resource-based policies</a>	No
<a href="#">ACLs</a>	No
<a href="#">ABAC (tags in policies)</a>	Partial
<a href="#">Temporary credentials</a>	Yes

IAM feature	Application Auto Scaling support
<a href="#">Service roles</a>	Yes
<a href="#">Service-linked roles</a>	Yes

To get a high-level view of how Application Auto Scaling and other Amazon Web Services work with most IAM features, see [Amazon Web Services that work with IAM](#) in the *IAM User Guide*.

## Application Auto Scaling identity-based policies

Supports identity-based policies	Yes
----------------------------------	-----

Identity-based policies are JSON permissions policy documents that you can attach to an identity, such as an IAM user, group of users, or role. These policies control what actions users and roles can perform, on which resources, and under what conditions. To learn how to create an identity-based policy, see [Creating IAM policies](#) in the *IAM User Guide*.

With IAM identity-based policies, you can specify allowed or denied actions and resources as well as the conditions under which actions are allowed or denied. You can't specify the principal in an identity-based policy because it applies to the user or role to which it is attached. To learn about all of the elements that you can use in a JSON policy, see [IAM JSON policy elements reference](#) in the *IAM User Guide*.

## Identity-based policy examples for Application Auto Scaling

To view examples of Application Auto Scaling identity-based policies, see [Application Auto Scaling identity-based policy examples](#).

### Actions

Supports policy actions	Yes
-------------------------	-----

In an IAM policy statement, you can specify any API action from any service that supports IAM. For Application Auto Scaling, use the following prefix with the name of the API action: `application-autoscaling:`. For example: `application-autoscaling:RegisterScalableTarget`,

`application-autoscaling:PutScalingPolicy`, and `application-autoscaling:DeregisterScalableTarget`.

To specify multiple actions in a single statement, separate them with commas as shown in the following example.

```
"Action": [  
    "application-autoscaling:DescribeScalingPolicies",  
    "application-autoscaling:DescribeScalingActivities"
```

You can specify multiple actions using wildcards (\*). For example, to specify all actions that begin with the word `Describe`, include the following action.

```
"Action": "application-autoscaling:Describe*"
```

For a list of Application Auto Scaling actions, see [Actions defined by Amazon Application Auto Scaling](#) in the *Service Authorization Reference*.

## Resources

Supports policy resources

Yes

In an IAM policy statement, the `Resource` element specifies the object or objects that the statement covers. For Application Auto Scaling, each IAM policy statement applies to the scalable targets that you specify using their Amazon Resource Names (ARNs).

The ARN resource format for scalable targets:

```
arn:aws-cn:application-autoscaling:region:account-id:scalable-target/unique-identifier
```

For example, you can indicate a specific scalable target in your statement using its ARN as follows. The unique ID (1234abcd56ab78cd901ef1234567890ab123) is a value assigned by Application Auto Scaling to the scalable target.

```
"Resource": "arn:aws:application-autoscaling:us-east-1:123456789012:scalable-  
target/1234abcd56ab78cd901ef1234567890ab123"
```

You can specify all instances that belong to a specific account by replacing the unique identifier with a wildcard (\*) as follows.

```
"Resource": "arn:aws:application-autoscaling:us-east-1:123456789012:scalable-target/*"
```

To specify all resources, or if a specific API action does not support ARNs, use a wildcard (\*) as the Resource element as follows.

```
"Resource": "*"
```

For more information, see [Resource types defined by Amazon Application Auto Scaling](#) in the *Service Authorization Reference*.

## Condition keys

Supports service-specific policy condition keys	Yes
---	-----

You can specify conditions in the IAM policies that control access to Application Auto Scaling resources. The policy statement is effective only when the conditions are true.

Application Auto Scaling supports the following service-defined condition keys that you can use in identity-based policies to determine who can perform Application Auto Scaling API actions.

- `application-autoscaling:scalable-dimension`
- `application-autoscaling:service-namespace`

To learn which Application Auto Scaling API actions you can use a condition key with, see [Actions defined by Amazon Application Auto Scaling](#) in the *Service Authorization Reference*. For more information about using Application Auto Scaling condition keys, see [Condition keys for Amazon Application Auto Scaling](#).

To view the global condition keys that are available to all services, see [Amazon global condition context keys](#) in the *IAM User Guide*.

## Resource-based policies

Supports resource-based policies	No
----------------------------------	----

Other Amazon services, such as Amazon Simple Storage Service, support resource-based permissions policies. For example, you can attach a permissions policy to an S3 bucket to manage access permissions to that bucket.

Application Auto Scaling does not support resource-based policies.

## Access Control Lists (ACLs)

Supports ACLs	No
---------------	----

Application Auto Scaling does not support Access Control Lists (ACLs).

## ABAC with Application Auto Scaling

Supports ABAC (tags in policies)	Partial
----------------------------------	---------

Attribute-based access control (ABAC) is an authorization strategy that defines permissions based on attributes. In Amazon, these attributes are called *tags*. You can attach tags to IAM entities (users or roles) and to many Amazon resources. Tagging entities and resources is the first step of ABAC. Then you design ABAC policies to allow operations when the principal's tag matches the tag on the resource that they are trying to access.

ABAC is helpful in environments that are growing rapidly and helps with situations where policy management becomes cumbersome.

To control access based on tags, you provide tag information in the [condition element](#) of a policy using the `aws:ResourceTag/key-name`, `aws:RequestTag/key-name`, or `aws:TagKeys` condition keys.

ABAC is possible for resources that support tags, but not everything supports tags. Scheduled actions and scaling policies don't support tags, but scalable targets support tags. For more information, see [Tagging support for Application Auto Scaling](#).

For more information about ABAC, see [What is ABAC?](#) in the *IAM User Guide*. To view a tutorial with steps for setting up ABAC, see [Use attribute-based access control \(ABAC\)](#) in the *IAM User Guide*.

## Using temporary credentials with Application Auto Scaling

Supports temporary credentials	Yes
--------------------------------	-----

Some Amazon Web Services don't work when you sign in using temporary credentials. For additional information, including which Amazon Web Services work with temporary credentials, see [Amazon Web Services that work with IAM](#) in the *IAM User Guide*.

You are using temporary credentials if you sign in to the Amazon Web Services Management Console using any method except a user name and password. For example, when you access Amazon using your company's single sign-on (SSO) link, that process automatically creates temporary credentials. You also automatically create temporary credentials when you sign in to the console as a user and then switch roles. For more information about switching roles, see [Switching to a role \(console\)](#) in the *IAM User Guide*.

You can manually create temporary credentials using the Amazon CLI or Amazon API. You can then use those temporary credentials to access Amazon. Amazon recommends that you dynamically generate temporary credentials instead of using long-term access keys. For more information, see [Temporary security credentials in IAM](#).

### Service roles

Supports service roles	Yes
------------------------	-----

If your Amazon EMR cluster uses automatic scaling, this feature allows Application Auto Scaling to assume a [service role](#) on your behalf. Similar to a service-linked role, a service role allows the service to access resources in other services to complete an action on your behalf. Service roles appear in your IAM account and are owned by the account. This means that an IAM administrator can change the permissions for this role. However, doing so might break the functionality of the service.

Application Auto Scaling supports service roles only for Amazon EMR. For documentation for the EMR service role, see [Using automatic scaling with a custom policy for instance groups](#) in the *Amazon EMR Management Guide*.

**Note**

With the introduction of service-linked roles, several legacy service roles are no longer required, for example, for Amazon ECS and Spot Fleet.

## Service-linked roles

Supports service-linked roles	Yes
-------------------------------	-----

A service-linked role is a type of service role that is linked to an Amazon Web Service. The service can assume the role to perform an action on your behalf. Service-linked roles appear in your Amazon Web Services account and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.

For information about Application Auto Scaling service-linked roles, see [Service-linked roles for Application Auto Scaling](#).

## Amazon managed policies for Application Auto Scaling

An Amazon managed policy is a standalone policy that is created and administered by Amazon. Amazon managed policies are designed to provide permissions for many common use cases so that you can start assigning permissions to users, groups, and roles.

Keep in mind that Amazon managed policies might not grant least-privilege permissions for your specific use cases because they're available for all Amazon customers to use. We recommend that you reduce permissions further by defining [customer managed policies](#) that are specific to your use cases.

You cannot change the permissions defined in Amazon managed policies. If Amazon updates the permissions defined in an Amazon managed policy, the update affects all principal identities (users, groups, and roles) that the policy is attached to. Amazon is most likely to update an Amazon managed policy when a new Amazon Web Service is launched or new API operations become available for existing services.

For more information, see [Amazon managed policies](#) in the *IAM User Guide*.

## Contents



- [Amazon managed policy granting access to AppStream 2.0 and CloudWatch](#)
- [Amazon managed policy granting access to Aurora and CloudWatch](#)
- [Amazon managed policy granting access to Amazon Comprehend and CloudWatch](#)
- [Amazon managed policy granting access to DynamoDB and CloudWatch](#)
- [Amazon managed policy granting access to Amazon ECS and CloudWatch](#)
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- [Amazon managed policy granting access to SageMaker and CloudWatch](#)
- [Amazon managed policy granting access to EC2 Spot Fleet and CloudWatch](#)
- [Amazon managed policy granting access to your custom resources and CloudWatch](#)
- [Application Auto Scaling updates to Amazon managed policies](#)

## Amazon managed policy granting access to AppStream 2.0 and CloudWatch

**Policy name:** [AWSApplicationAutoscalingAppStreamFleetPolicy](#)

You can't attach `AWSApplicationAutoscalingAppStreamFleetPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Amazon AppStream and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_AppStreamFleet` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: `appstream:DescribeFleets`
- Action: `appstream:UpdateFleet`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to Aurora and CloudWatch

**Policy name:** [AWSApplicationAutoscalingRDSClusterPolicy](#)

You can't attach `AWSApplicationAutoscalingRDSClusterPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Aurora and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_RDSCluster` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: `rds:AddTagsToResource`
- Action: `rds:CreateDBInstance`
- Action: `rds>DeleteDBInstance`
- Action: `rds:DescribeDBClusters`
- Action: `rds:DescribeDBInstance`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to Amazon Comprehend and CloudWatch

**Policy name:** [AWSApplicationAutoscalingComprehendEndpointPolicy](#)

You can't attach `AWSApplicationAutoscalingComprehendEndpointPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Amazon Comprehend and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_ComprehendEndpoint` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: comprehend:UpdateEndpoint
- Action: comprehend:DescribeEndpoint
- Action: cloudwatch:DescribeAlarms
- Action: cloudwatch:PutMetricAlarm
- Action: cloudwatch>DeleteAlarms

## Amazon managed policy granting access to DynamoDB and CloudWatch

**Policy name:** [AWSApplicationAutoscalingDynamoDBTablePolicy](#)

You can't attach `AWSApplicationAutoscalingDynamoDBTablePolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call DynamoDB and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_DynamoDBTable` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: dynamodb:DescribeTable
- Action: dynamodb:UpdateTable
- Action: cloudwatch:DescribeAlarms
- Action: cloudwatch:PutMetricAlarm
- Action: cloudwatch>DeleteAlarms

## Amazon managed policy granting access to Amazon ECS and CloudWatch

**Policy name:** [AWSApplicationAutoscalingECSServicePolicy](#)

You can't attach `AWSApplicationAutoscalingECSServicePolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Amazon ECS and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_ECSService` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: `ecs:DescribeServices`
- Action: `ecs:UpdateService`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to ElastiCache and CloudWatch

**Policy name:** [AWSApplicationAutoscalingElastiCacheRGPolicy](#)

You can't attach `AWSApplicationAutoscalingElastiCacheRGPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call ElastiCache and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_ElastiCacheRG` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on the specified resources:

- Action: `elasticache:DescribeReplicationGroups` on all resources
- Action: `elasticache:ModifyReplicationGroupShardConfiguration` on all resources
- Action: `elasticache:IncreaseReplicaCount` on all resources
- Action: `elasticache:DecreaseReplicaCount` on all resources
- Action: `elasticache:DescribeCacheClusters` on all resources
- Action: `elasticache:DescribeCacheParameters` on all resources
- Action: `cloudwatch:DescribeAlarms` on all resources
- Action: `cloudwatch:PutMetricAlarm` on the resource `arn:*:cloudwatch:*:*:alarm:TargetTracking*`
- Action: `cloudwatch>DeleteAlarms` on the resource `arn:*:cloudwatch:*:*:alarm:TargetTracking*`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to Amazon Keyspaces and CloudWatch

**Policy name:** [AWSApplicationAutoscalingCassandraTablePolicy](#)

You can't attach `AWSApplicationAutoscalingCassandraTablePolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Amazon Keyspaces and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_CassandraTable` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on the specified resources:

- Action: `cassandra:Select` on the resource `arn:*:cassandra:*:*:/keyspace/system/table/*`
- Action: `cassandra:Select` on the resource `arn:*:cassandra:*:*:/keyspace/system_schema/table/*`
- Action: `cassandra:Select` on the resource `arn:*:cassandra:*:*:/keyspace/system_schema_mcs/table/*`
- Action: `cassandra:Alter` on the resource `arn:*:cassandra:*:*:"*"`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to Lambda and CloudWatch

**Policy name:** [AWSApplicationAutoscalingLambdaConcurrencyPolicy](#)

You can't attach `AWSApplicationAutoscalingLambdaConcurrencyPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Lambda and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_LambdaConcurrency` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: `lambda:PutProvisionedConcurrencyConfig`
- Action: `lambda:GetProvisionedConcurrencyConfig`
- Action: `lambda>DeleteProvisionedConcurrencyConfig`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to Amazon MSK and CloudWatch

**Policy name:** [AWSApplicationAutoscalingKafkaClusterPolicy](#)

You can't attach `AWSApplicationAutoscalingKafkaClusterPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Amazon MSK and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_KafkaCluster` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: `kafka:DescribeCluster`
- Action: `kafka:DescribeClusterOperation`
- Action: `kafka:UpdateBrokerStorage`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to Neptune and CloudWatch

**Policy name:** [AWSApplicationAutoscalingNeptuneClusterPolicy](#)

You can't attach `AWSApplicationAutoscalingNeptuneClusterPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Neptune and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_NeptuneCluster` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on the specified resources:

- Action: `rds:AddTagsToResource` on resources with the prefix *autoscaled-reader* in the Amazon Neptune database engine (`"Condition":{"StringEquals":{"rds:DatabaseEngine":"neptune"}}`)
- Action: `rds:ListTagsForResource` on all resources
- Action: `rds:CreateDBInstance` on resources with the prefix *autoscaled-reader* in all DB clusters (`"Resource":"arn:*:rds:*:*:db:autoscaled-reader*", "arn:aws:rds:*:*:cluster:*"`) in the Amazon Neptune database engine (`"Condition":{"StringEquals":{"rds:DatabaseEngine":"neptune"}}`)
- Action: `rds:DescribeDBInstances` on all resources
- Action: `rds:DescribeDBClusters` on all resources
- Action: `rds:DescribeDBClusterParameters` on all resources
- Action: `rds>DeleteDBInstance` on the resource `arn:*:rds:*:*:db:autoscaled-reader*`
- Action: `cloudwatch:DescribeAlarms` on all resources
- Action: `cloudwatch:PutMetricAlarm` on the resource `arn:*:cloudwatch:*:*:alarm:TargetTracking*`
- Action: `cloudwatch>DeleteAlarms` on the resource `arn:*:cloudwatch:*:*:alarm:TargetTracking*`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to SageMaker and CloudWatch

**Policy name:** [AWSApplicationAutoscalingSageMakerEndpointPolicy](#)

You can't attach `AWSApplicationAutoscalingSageMakerEndpointPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call SageMaker and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_SageMakerEndpoint` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on the specified resources:

- Action: `sagemaker:DescribeEndpoint` on all resources
- Action: `sagemaker:DescribeEndpointConfig` on all resources
- Action: `sagemaker:DescribeInferenceComponent` on all resources
- Action: `sagemaker:UpdateEndpointWeightsAndCapacities` on all resources
- Action: `sagemaker:UpdateInferenceComponentRuntimeConfig` on all resources
- Action: `cloudwatch:DescribeAlarms` on all resources
- Action: `cloudwatch:PutMetricAlarm` on the resource `arn:*:cloudwatch:*:*:alarm:TargetTracking*`
- Action: `cloudwatch>DeleteAlarms` on the resource `arn:*:cloudwatch:*:*:alarm:TargetTracking*`

## Amazon managed policy granting access to EC2 Spot Fleet and CloudWatch

Policy name: [AWSApplicationAutoscalingEC2SpotFleetRequestPolicy](#)

You can't attach `AWSApplicationAutoscalingEC2SpotFleetRequestPolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call Amazon EC2 and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_EC2SpotFleetRequest` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: `ec2:DescribeSpotFleetRequests`
- Action: `ec2:ModifySpotFleetRequest`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

## Amazon managed policy granting access to your custom resources and CloudWatch

Policy name: [AWSApplicationAutoScalingCustomResourcePolicy](#)



You can't attach `AWSApplicationAutoScalingCustomResourcePolicy` to your IAM identities (users or roles). This policy is attached to a service-linked role that allows Application Auto Scaling to call your custom resources that are available through API Gateway and CloudWatch and perform scaling on your behalf.

### Permission details

The `AWSServiceRoleForApplicationAutoScaling_CustomResource` service-linked role permissions policy allows Application Auto Scaling to complete the following actions on all related resources ("Resource": "\*"):

- Action: `execute-api:Invoke`
- Action: `cloudwatch:DescribeAlarms`
- Action: `cloudwatch:PutMetricAlarm`
- Action: `cloudwatch>DeleteAlarms`

### Application Auto Scaling updates to Amazon managed policies

View details about updates to Amazon managed policies for Application Auto Scaling since this service began tracking these changes. For automatic alerts about changes to this page, subscribe to the RSS feed on the Application Auto Scaling Document history page.

Change	Description	Date
Application Auto Scaling adds permissions to its SageMaker service-linked role	This policy now grants permissions to the service to call the SageMaker <code>DescribeInferenceComponent</code> and <code>UpdateInferenceComponentRuntimeConfig</code> API actions to support compatibility for the auto scaling of SageMaker resources for an upcoming integration. The policy also now restricts the CloudWatch <code>PutMetricAlarm</code> and	November 13, 2023

Change	Description	Date
	DeleteAlarms API actions to CloudWatch alarms that are used with target tracking scaling policies.	
Application Auto Scaling adds Neptune policy	Application Auto Scaling added a new managed policy for Neptune. This policy is attached to a service-linked role that allows Application Auto Scaling to call Neptune and CloudWatch and perform scaling on your behalf.	October 6, 2021
Application Auto Scaling adds ElastiCache for Redis policy	Application Auto Scaling added a new managed policy for ElastiCache. This policy is attached to a service-linked role that allows Application Auto Scaling to call ElastiCache and CloudWatch and perform scaling on your behalf.	August 19, 2021
Application Auto Scaling started tracking changes	Application Auto Scaling started tracking changes for its Amazon managed policies.	August 19, 2021

## Service-linked roles for Application Auto Scaling

Application Auto Scaling uses [service-linked roles](#) for the permissions that it requires to call other Amazon services on your behalf. A service-linked role is a unique type of Amazon Identity and Access Management (IAM) role that is linked directly to an Amazon service. Service-linked roles provide a secure way to delegate permissions to Amazon services because only the linked service can assume a service-linked role.

## Contents

- [Overview](#)
- [Permissions required to create a service-linked role](#)
- [Create service-linked roles \(automatic\)](#)
- [Create service-linked roles \(manual\)](#)
- [Edit the service-linked roles](#)
- [Delete the service-linked roles](#)
- [Supported Regions for Application Auto Scaling service-linked roles](#)
- [Service-linked role ARN reference](#)

## Overview

For services that integrate with Application Auto Scaling, Application Auto Scaling creates service-linked roles for you. There is one service-linked role for each service. Each service-linked role trusts the specified service principal to assume it. For more information, see [Amazon services that you can use with Application Auto Scaling](#).

Application Auto Scaling includes all of the necessary permissions for each service-linked role. These managed permissions are created and managed by Application Auto Scaling, and they define the allowed actions for each resource type. For details about the permissions that each role grants, see [Amazon managed policies for Application Auto Scaling](#).

The following sections describe how to create and manage Application Auto Scaling service-linked roles. Start by configuring permissions to allow an IAM entity (such as a user, group, or role) to create, edit, or delete a service-linked role.

## Permissions required to create a service-linked role

Application Auto Scaling requires permissions to create a service-linked role the first time any user in your Amazon Web Services account calls `RegisterScalableTarget` for a given service. Application Auto Scaling creates a service-linked role for the target service in your account, if the role does not exist already. The service-linked role grants permissions to Application Auto Scaling so that it can call the target service on your behalf.

For automatic role creation to succeed, users must have permission for the `iam:CreateServiceLinkedRole` action.

```
"Action": "iam:CreateServiceLinkedRole"
```

The following is an identity-based policy that grants permission to create a service-linked role for Spot Fleet. You can specify the service-linked role in the policy's `Resource` field as an ARN, and the service principal for your service-linked role as a condition, as shown. For the ARN for each service, see [Service-linked role ARN reference](#).

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "iam:CreateServiceLinkedRole",
      "Resource": "arn:aws-cn:iam::*:role/aws-service-role/ec2.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_EC2SpotFleetRequest",
      "Condition": {
        "StringLike": {
          "iam:AWSServiceName": "ec2.application-autoscaling.amazonaws.com"
        }
      }
    }
  ]
}
```

### Note

The `iam:AWSServiceName` IAM condition key specifies the service principal to which the role is attached, which is indicated in this example policy as *ec2.application-autoscaling.amazonaws.com*. Do not try to guess the service principal. To view the service principal for a service, see [Amazon services that you can use with Application Auto Scaling](#).

## Create service-linked roles (automatic)

You don't need to manually create a service-linked role. Application Auto Scaling creates the appropriate service-linked role for you when you call `RegisterScalableTarget`. For example, if you set up automatic scaling for an Amazon ECS service, Application Auto Scaling creates the `AWSServiceRoleForApplicationAutoScaling_ECSService` role.

## Create service-linked roles (manual)

To create the service-linked role, you can use the IAM console, Amazon CLI, or IAM API. For more information, see [Creating a service-linked role](#) in the *IAM User Guide*.

### To create a service-linked role (Amazon CLI)

Use the following [create-service-linked-role](#) CLI command to create the Application Auto Scaling service-linked role. In the request, specify the service name "prefix".

To find the service name prefix, refer to the information about the service principal for the service-linked role for each service in the [Amazon services that you can use with Application Auto Scaling](#) section. The service name and the service principal share the same prefix. For example, to create the Amazon Lambda service-linked role, use `lambda.application-autoscaling.amazonaws.com`.

```
aws iam create-service-linked-role --aws-service-name prefix.application-  
autoscaling.amazonaws.com
```

## Edit the service-linked roles

With the service-linked roles created by Application Auto Scaling, you can edit only their descriptions. For more information, see [Editing a service-linked role](#) in the *IAM User Guide*.

## Delete the service-linked roles

If you no longer use Application Auto Scaling with a supported service, we recommend that you delete the corresponding service-linked role.

You can delete a service-linked role only after first deleting the related Amazon resources. This protects you from inadvertently revoking Application Auto Scaling permissions to your resources. For more information, see the [documentation](#) for the scalable resource. For example, to delete an Amazon ECS service, see [Deleting a service](#) in the *Amazon Elastic Container Service Developer Guide*.

You can use IAM to delete a service-linked role. For more information, see [Deleting a service-linked role](#) in the *IAM User Guide*.

After you delete a service-linked role, Application Auto Scaling creates the role again when you call `RegisterScalableTarget`.


## Supported Regions for Application Auto Scaling service-linked roles

Application Auto Scaling supports using service-linked roles in all of the Amazon Regions where the service is available.

### Service-linked role ARN reference

Service	ARN
AppStream 2.0	arn:aws-cn:iam:: <i>012345678910</i> :role/aws-service-role/appstream.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_AppStreamFleet
Aurora	arn:aws-cn:iam:: <i>012345678910</i> :role/aws-service-role/rds.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_RDSCluster
Comprehend	arn:aws-cn:iam:: <i>012345678910</i> :role/aws-service-role/comprehend.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_ComprehendEndpoint
DynamoDB	arn:aws-cn:iam:: <i>012345678910</i> :role/aws-service-role/dynamodb.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_DynamoDBTable
ECS	arn:aws-cn:iam:: <i>012345678910</i> :role/aws-service-role/ecs.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_ECSService
ElastiCache	arn:aws-cn:iam:: <i>012345678910</i> :role/aws-service-role/elasticache.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_ElastiCacheRG
Keyspaces	arn:aws-cn:iam:: <i>012345678910</i> :role/aws-service-role/cassandra.application-autoscaling.amazonaws.com/

Service	ARN
	<code>AWSServiceRoleForApplicationAutoScaling_CassandraTable</code>
Lambda	<code>arn:aws-cn:iam:: 012345678910 :role/aws-service-role/lambda.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_LambdaConcurrency</code>
MSK	<code>arn:aws-cn:iam:: 012345678910 :role/aws-service-role/kafka.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_KafkaCluster</code>
Neptune	<code>arn:aws-cn:iam:: 012345678910 :role/aws-service-role/neptune.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_NeptuneCluster</code>
SageMaker	<code>arn:aws-cn:iam:: 012345678910 :role/aws-service-role/sagemaker.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_SageMakerEndpoint</code>
Spot Fleets	<code>arn:aws-cn:iam:: 012345678910 :role/aws-service-role/ec2.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_EC2SpotFleetRequest</code>
Custom resources	<code>arn:aws-cn:iam:: 012345678910 :role/aws-service-role/custom-resource.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_CustomResource</code>

 **Note**

You can specify the ARN of a service-linked role for the RoleARN property of an [AWS::ApplicationAutoScaling::ScalableTarget](#) resource in your Amazon CloudFormation

stack templates, even if the specified service-linked role doesn't yet exist. Application Auto Scaling automatically creates the role for you.

## Application Auto Scaling identity-based policy examples

By default, a brand new user in your Amazon Web Services account has no permissions to do anything. An IAM administrator must create and assign IAM policies that give an IAM identity (such as a user or role) permission to perform Application Auto Scaling API actions.

To learn how to create an IAM policy using the following example JSON policy documents, see [Creating policies on the JSON tab](#) in the *IAM User Guide*.

### Contents

- [Permissions required for Application Auto Scaling API actions](#)
- [Permissions required for API actions on target services and CloudWatch](#)
- [Permissions for working in the Amazon Web Services Management Console](#)

## Permissions required for Application Auto Scaling API actions

The following policies grant permissions for common use cases when calling Application Auto Scaling API. Refer to this section when writing identity-based policies. Each policy grants permissions to all or some of the Application Auto Scaling API actions. You also need to make sure that end users have permissions for the target service and CloudWatch (see the next section for details).

The following identity-based policy grants permissions to all Application Auto Scaling API actions.

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



```
}
```

The following identity-based policy grants permissions to all Application Auto Scaling API actions that are required to configure scaling policies and not scheduled actions.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "application-autoscaling:RegisterScalableTarget",
        "application-autoscaling:DescribeScalableTargets",
        "application-autoscaling:DeregisterScalableTarget",
        "application-autoscaling:PutScalingPolicy",
        "application-autoscaling:DescribeScalingPolicies",
        "application-autoscaling:DescribeScalingActivities",
        "application-autoscaling>DeleteScalingPolicy"
      ],
      "Resource": "*"
    }
  ]
}
```

The following identity-based policy grants permissions to all Application Auto Scaling API actions that are required to configure scheduled actions and not scaling policies.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "application-autoscaling:RegisterScalableTarget",
        "application-autoscaling:DescribeScalableTargets",
        "application-autoscaling:DeregisterScalableTarget",
        "application-autoscaling:PutScheduledAction",
        "application-autoscaling:DescribeScheduledActions",
        "application-autoscaling:DescribeScalingActivities",
        "application-autoscaling>DeleteScheduledAction"
      ],
      "Resource": "*"
    }
  ]
}
```

```
]
}
```

## Permissions required for API actions on target services and CloudWatch

To successfully configure and use Application Auto Scaling with the target service, end users must be granted permissions for Amazon CloudWatch and for each target service for which they will configure scaling. Use the following policies to grant the minimum permissions required to work with target services and CloudWatch.

### Contents

- [AppStream 2.0 fleets](#)
- [Aurora replicas](#)
- [Amazon Comprehend document classification and entity recognizer endpoints](#)
- [DynamoDB tables and global secondary indexes](#)
- [ECS services](#)
- [ElastiCache replication groups](#)
- [Amazon EMR clusters](#)
- [Amazon Keyspaces tables](#)
- [Lambda functions](#)
- [Amazon Managed Streaming for Apache Kafka \(MSK\) broker storage](#)
- [Neptune clusters](#)
- [SageMaker endpoints](#)
- [Spot Fleets \(Amazon EC2\)](#)
- [Custom resources](#)

### AppStream 2.0 fleets

The following identity-based policy grants permissions to all AppStream 2.0 and CloudWatch API actions that are required.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
```

```

        "Action": [
            "appstream:DescribeFleets",
            "appstream:UpdateFleet",
            "cloudwatch:DescribeAlarms",
            "cloudwatch:PutMetricAlarm",
            "cloudwatch>DeleteAlarms"
        ],
        "Resource": "*"
    }
]
}

```

## Aurora replicas

The following identity-based policy grants permissions to all Aurora and CloudWatch API actions that are required.

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "rds:AddTagsToResource",
        "rds:CreateDBInstance",
        "rds>DeleteDBInstance",
        "rds:DescribeDBClusters",
        "rds:DescribeDBInstances",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}

```

## Amazon Comprehend document classification and entity recognizer endpoints

The following identity-based policy grants permissions to all Amazon Comprehend and CloudWatch API actions that are required.

```

{

```

```

"Version": "2012-10-17",
"Statement": [
  {
    "Effect": "Allow",
    "Action": [
      "comprehend:UpdateEndpoint",
      "comprehend:DescribeEndpoint",
      "cloudwatch:DescribeAlarms",
      "cloudwatch:PutMetricAlarm",
      "cloudwatch>DeleteAlarms"
    ],
    "Resource": "*"
  }
]
}

```

## DynamoDB tables and global secondary indexes

The following identity-based policy grants permissions to all DynamoDB and CloudWatch API actions that are required.

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "dynamodb:DescribeTable",
        "dynamodb:UpdateTable",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}

```

## ECS services

The following identity-based policy grants permissions to all ECS and CloudWatch API actions that are required.

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

## ElastiCache replication groups

The following identity-based policy grants permissions to all ElastiCache and CloudWatch API actions that are required.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "elasticache:ModifyReplicationGroupShardConfiguration",
        "elasticache:IncreaseReplicaCount",
        "elasticache:DecreaseReplicaCount",
        "elasticache:DescribeReplicationGroups",
        "elasticache:DescribeCacheClusters",
        "elasticache:DescribeCacheParameters",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}
```

## Amazon EMR clusters

The following identity-based policy grants permissions to all Amazon EMR and CloudWatch API actions that are required.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "elasticmapreduce:ModifyInstanceGroups",
        "elasticmapreduce:ListInstanceGroups",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}
```

## Amazon Keyspaces tables

The following identity-based policy grants permissions to all Amazon Keyspaces and CloudWatch API actions that are required.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "cassandra:Select",
        "cassandra:Alter",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}
```

```
}
```

## Lambda functions

The following identity-based policy grants permissions to all Lambda and CloudWatch API actions that are required.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "lambda:PutProvisionedConcurrencyConfig",
        "lambda:GetProvisionedConcurrencyConfig",
        "lambda>DeleteProvisionedConcurrencyConfig",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}
```

## Amazon Managed Streaming for Apache Kafka (MSK) broker storage

The following identity-based policy grants permissions to all Amazon MSK and CloudWatch API actions that are required.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "kafka:DescribeCluster",
        "kafka:DescribeClusterOperation",
        "kafka:UpdateBrokerStorage",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ]
    }
  ]
}
```

```

    ],
    "Resource": "*"
  }
]
}

```

## Neptune clusters

The following identity-based policy grants permissions to all Neptune and CloudWatch API actions that are required.

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "rds:AddTagsToResource",
        "rds:CreateDBInstance",
        "rds:DescribeDBInstances",
        "rds:DescribeDBClusters",
        "rds:DescribeDBClusterParameters",
        "rds>DeleteDBInstance",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}

```

## SageMaker endpoints

The following identity-based policy grants permissions to all SageMaker and CloudWatch API actions that are required.

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [

```



```

        "sagemaker:DescribeEndpoint",
        "sagemaker:DescribeEndpointConfig",
        "sagemaker:DescribeInferenceComponent",
        "sagemaker:UpdateEndpointWeightsAndCapacities",
        "sagemaker:UpdateInferenceComponentRuntimeConfig",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
    ],
    "Resource": "*"
}
]
}

```

## Spot Fleets (Amazon EC2)

The following identity-based policy grants permissions to all Spot Fleet and CloudWatch API actions that are required.

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "ec2:DescribeSpotFleetRequests",
        "ec2:ModifySpotFleetRequest",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch>DeleteAlarms"
      ],
      "Resource": "*"
    }
  ]
}

```

## Custom resources

The following identity-based policy grants permission for the API Gateway API executing action. This policy also grants permissions to all CloudWatch actions that are required.

```

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

```

```
"Statement": [  
  {  
    "Effect": "Allow",  
    "Action": [  
      "execute-api:Invoke",  
      "cloudwatch:DescribeAlarms",  
      "cloudwatch:PutMetricAlarm",  
      "cloudwatch>DeleteAlarms"  
    ],  
    "Resource": "*"   
  }  
]
```

## Permissions for working in the Amazon Web Services Management Console

There is no standalone Application Auto Scaling console. Most services that integrate with Application Auto Scaling have features that are dedicated to helping you configure scaling with their console.

In most cases, each service provides Amazon managed (predefined) IAM policies that define access to their console, which includes permissions to the Application Auto Scaling API actions. For more information, refer to the documentation for the service whose console you want to use.

You can also create your own custom IAM policies to give users fine-grained permissions to view and work with specific Application Auto Scaling API actions in the Amazon Web Services Management Console. You can use the example policies in the previous sections; however, they are designed for requests that are made with the Amazon CLI or an SDK. The console uses additional API actions for its features, so these policies may not work as expected. For example, to configure step scaling, users might require additional permissions to create and manage CloudWatch alarms.

### Tip

To help you work out which API actions are required to perform tasks in the console, you can use a service such as Amazon CloudTrail. For more information, see the [Amazon CloudTrail User Guide](#).

The following identity-based policy grants permissions to configure scaling policies for Spot Fleet. In addition to the IAM permissions for Spot Fleet, the console user that accesses fleet scaling

settings from the Amazon EC2 console must have the appropriate permissions for the services that support dynamic scaling.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "application-autoscaling:*",
        "ec2:DescribeSpotFleetRequests",
        "ec2:ModifySpotFleetRequest",
        "cloudwatch:DeleteAlarms",
        "cloudwatch:DescribeAlarmHistory",
        "cloudwatch:DescribeAlarms",
        "cloudwatch:DescribeAlarmsForMetric",
        "cloudwatch:GetMetricStatistics",
        "cloudwatch:ListMetrics",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch:DisableAlarmActions",
        "cloudwatch:EnableAlarmActions",
        "sns:CreateTopic",
        "sns:Subscribe",
        "sns:Get*",
        "sns:List*"
      ],
      "Resource": "*"
    },
    {
      "Effect": "Allow",
      "Action": "iam:CreateServiceLinkedRole",
      "Resource": "arn:aws-cn:iam::*:role/aws-service-role/ec2.application-autoscaling.amazonaws.com/AWSServiceRoleForApplicationAutoScaling_EC2SpotFleetRequest",
      "Condition": {
        "StringLike": {
          "iam:AWSServiceName": "ec2.application-autoscaling.amazonaws.com"
        }
      }
    }
  ]
}
```

This policy allows console users to view and modify scaling policies in the Amazon EC2 console, and to create and manage CloudWatch alarms in the CloudWatch console.

You can adjust the API actions to limit user access. For example, replacing `application-autoscaling:*` with `application-autoscaling:Describe*` means that the user has read-only access.

You can also adjust the CloudWatch permissions as required to limit user access to CloudWatch features. For more information, see [Permissions required to use the CloudWatch console](#) in the *Amazon CloudWatch User Guide*.

## Troubleshooting access to Application Auto Scaling

If you encounter `AccessDeniedException` or similar difficulties when working with Application Auto Scaling, consult the information in this section.

### I am not authorized to perform an action in Application Auto Scaling

If you receive an `AccessDeniedException` when calling an Amazon API operation, it means that the Amazon Identity and Access Management (IAM) credentials that you are using do not have the required permissions to make that call.

The following example error occurs when the `mateojackson` user tries to view details about a scalable target, but does not have `application-autoscaling:DescribeScalableTargets` permission.

```
An error occurred (AccessDeniedException) when calling the DescribeScalableTargets operation: User: arn:aws-cn:iam::123456789012:user/mateojackson is not authorized to perform: application-autoscaling:DescribeScalableTargets
```

If you receive this or similar errors, then you must contact your administrator for assistance.

An administrator for your account will need to make sure that you have permissions to access all of the API actions that Application Auto Scaling uses to access resources in the target service and CloudWatch. There are different permissions required depending on which resources you are working with. Application Auto Scaling also requires permission to create a service-linked role the first time that a user configures scaling for a given resource.

## I'm an administrator and my IAM policy returned an error or isn't working as expected

In addition to Application Auto Scaling actions, your IAM policies must grant permissions to call the target service and CloudWatch. If a user or application doesn't have these additional permissions, their access might be unexpectedly denied. To write IAM policies for users and applications in your accounts, consult the information in [Application Auto Scaling identity-based policy examples](#).

For information about how validation is performed, see [Permissions validation for API calls on target resources](#).

Note that some permission issues can also be due to an issue with creating the service-linked roles used by Application Auto Scaling. For information about creating these service-linked roles, see [Service-linked roles for Application Auto Scaling](#).

## Permissions validation for API calls on target resources

Making authorized requests to Application Auto Scaling API actions requires that the API caller has permissions to access Amazon resources in the target service and in CloudWatch. Application Auto Scaling validates permissions for requests associated with both the target service and CloudWatch before proceeding with the request. To accomplish this, we issue a series of calls to validate the IAM permissions on target resources. When a response is returned, it is read by Application Auto Scaling. If the IAM permissions do not allow a given action, Application Auto Scaling fails the request and returns an error to the user containing information about the missing permission. This ensures that the scaling configuration that the user wants to deploy functions as intended, and that a useful error is returned if the request fails.

As an example of how this works, the following information provides details about how Application Auto Scaling performs permissions validations with Aurora and CloudWatch.

When a user calls the `RegisterScalableTarget` API against an Aurora DB cluster, Application Auto Scaling performs all of the following checks to verify that the user has the required permissions (in bold).

- **`rds:CreateDBInstance`**: To determine whether the user has this permission, we send a request to the `CreateDBInstance` API operation, attempting to create a DB instance with invalid parameters (empty instance ID) in the Aurora DB cluster that the user specified. For an authorized user, the API returns an `InvalidParameterValue` error code response after it

audits the request. However, for an unauthorized user, we get an `AccessDenied` error and fail the Application Auto Scaling request with a `ValidationException` error to the user that lists the missing permissions.

- **rds:DeleteDBInstance:** We send an empty instance ID to the `DeleteDBInstance` API operation. For an authorized user, this request results in an `InvalidParameterValue` error. For an unauthorized user, it results in `AccessDenied` and sends a validation exception to the user (same treatment as described in the first bullet point).
- **rds:AddTagsToResource:** Because the `AddTagsToResource` API operation requires an Amazon Resource Name (ARN), it is necessary to specify a "dummy" resource using an invalid account ID (12345) and dummy instance ID (non-existing-db) to construct the ARN (`arn:aws:rds:us-east-1:12345:db:non-existing-db`). For an authorized user, this request results in an `InvalidParameterValue` error. For an unauthorized user, it results in `AccessDenied` and sends a validation exception to the user.
- **rds:DescribeDBCluster:** We describe the cluster name for the resource being registered for auto scaling. For an authorized user, we get a valid describe result. For an unauthorized user, it results in `AccessDenied` and sends a validation exception to the user.
- **rds:DescribeDBInstance:** We call the `DescribeDBInstance` API with a `db-cluster-id` filter that filters on the cluster name that was provided by the user to register the scalable target. For an authorized user, we are permitted to describe all of the DB instances in the DB cluster. For an unauthorized user, this call results in `AccessDenied` and sends a validation exception to the user.
- **cloudwatch:PutMetricAlarm:** We call the `PutMetricAlarm` API without any parameters. Because alarm name is missing, the request results in `ValidationError` for an authorized user. For an unauthorized user, it results in `AccessDenied` and sends a validation exception to the user.
- **cloudwatch:DescribeAlarms:** We call the `DescribeAlarms` API with the maximum number of records value set to 1. For an authorized user, we expect information on one alarm in the response. For an unauthorized user, this call results in `AccessDenied` and sends a validation exception to the user.
- **cloudwatch>DeleteAlarms:** Similar to `PutMetricAlarm` above, we provide no parameters to `DeleteAlarms` request. Because an alarm name is missing from the request, this call fails with `ValidationError` for an authorized user. For an unauthorized user, it results in `AccessDenied` and sends a validation exception to the user.

Whenever any one of these validation exceptions occur, it is logged. You can take steps to manually identify which calls failed validation by using Amazon CloudTrail. For more information, see the [Amazon CloudTrail User Guide](#).

### Note

If you receive alerts for Application Auto Scaling events using CloudTrail, these alerts will include the Application Auto Scaling calls to validate user permissions by default. To filter out these alerts, use the `invokedBy` field, which will contain `application-autoscaling.amazonaws.com` for these validation checks.

## Compliance validation for Application Auto Scaling

To learn whether an Amazon Web Service is within the scope of specific compliance programs, see [Amazon Web Services in Scope by Compliance Program](#) and choose the compliance program that you are interested in. For general information, see [Amazon Web Services Compliance Programs](#).

You can download third-party audit reports using Amazon Artifact. For more information, see [Downloading Reports in Amazon Artifact](#).

Your compliance responsibility when using Amazon Web Services is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. Amazon provides the following resources to help with compliance:

- [Security and Compliance Quick Start Guides](#) – These deployment guides discuss architectural considerations and provide steps for deploying baseline environments on Amazon that are security and compliance focused.
- [Amazon Compliance Resources](#) – This collection of workbooks and guides might apply to your industry and location.
- [Evaluating Resources with Rules](#) in the *Amazon Config Developer Guide* – The Amazon Config service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- [Amazon Security Hub](#) – This Amazon Web Service provides a comprehensive view of your security state within Amazon. Security Hub uses security controls to evaluate your Amazon resources and to check your compliance against security industry standards and best practices. For a list of supported services and controls, see [Security Hub controls reference](#).

## Resilience in Application Auto Scaling

The Amazon global infrastructure is built around Amazon Regions and Availability Zones.

Amazon Regions provide multiple physically separated and isolated Availability Zones, which are connected with low-latency, high-throughput, and highly redundant networking.

With Availability Zones, you can design and operate applications and databases that automatically fail over between zones without interruption. Availability Zones are more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

For more information about Amazon Regions and Availability Zones, see [Amazon global infrastructure](#).

## Infrastructure security in Application Auto Scaling

As a managed service, Application Auto Scaling is protected by Amazon global network security. For information about Amazon security services and how Amazon protects infrastructure, see [Amazon Cloud Security](#). To design your Amazon environment using the best practices for infrastructure security, see [Infrastructure Protection](#) in *Security Pillar Amazon Well-Architected Framework*.

You use Amazon published API calls to access Application Auto Scaling through the network. Clients must support the following:

- Transport Layer Security (TLS). We require TLS 1.2 and recommend TLS 1.3.
- Cipher suites with perfect forward secrecy (PFS) such as DHE (Ephemeral Diffie-Hellman) or ECDHE (Elliptic Curve Ephemeral Diffie-Hellman). Most modern systems such as Java 7 and later support these modes.

Additionally, requests must be signed by using an access key ID and a secret access key that is associated with an IAM principal. Or you can use the [Amazon Security Token Service](#) (Amazon STS) to generate temporary security credentials to sign requests.



# Quotas for Application Auto Scaling

Your Amazon Web Services account has default quotas, formerly referred to as limits, for each Amazon service. Unless otherwise noted, each quota is Region-specific. You can request increases for some quotas, and other quotas cannot be increased.

To view the quotas for Application Auto Scaling, open the [Service Quotas console](#). In the navigation pane, choose **Amazon services** and select **Application Auto Scaling**.

To request a quota increase, see [Requesting a Quota Increase](#) in the *Service Quotas User Guide*. If the quota is not yet available in Service Quotas, use the [Application Auto Scaling limits form](#). Make sure that you specify the type of resource with your request for an increase, for example, Amazon ECS or DynamoDB.

Your Amazon Web Services account has the following quotas related to Application Auto Scaling.

## Default quotas per Region per account

Item	Default	Adjustable
Maximum number of scalable targets per resource type	Default quotas vary depending on resource type.  Up to 5000 Amazon DynamoDB scalable targets, 3000 ECS scalable targets, 1500 Amazon Keyspaces scalable targets, and 500 scalable targets each for all other resource types.	Yes
Maximum number of scaling policies per scalable target	50  Includes both step scaling policies	No

Item	Default	Adjustable
	and target tracking policies.	
Maximum number of scheduled actions per scalable target	200	No
Maximum number of step adjustments per step scaling policy	20	No

Keep service quotas in mind as you scale out your workloads. For example, when you reach the maximum number of capacity units allowed by a service, scaling out will stop. If demand drops and the current capacity decreases, Application Auto Scaling can scale out again. To avoid reaching this capacity limit again, you can request an increase. Each service has its own default quotas for the maximum capacity of the resource. For information about the default quotas for other Amazon services, see [Service endpoints and quotas](#) in the *Amazon Web Services General Reference*.

## Document history

The following table describes important additions to the Application Auto Scaling documentation, beginning in January 2018. For notification about updates to this documentation, you can subscribe to the RSS feed.

Change	Description	Date
<a href="#">Guide changes</a>	Updated the <i>Maximum number of scalable targets per resource type</i> entry in the quotas documentation. See <a href="#">Quotas for Application Auto Scaling</a> .	January 16, 2024
<a href="#">Support for SageMaker inference components</a>	Use Application Auto Scaling to scale copies of an inference component.	November 29, 2023
<a href="#">Update to IAM service-linked role permissions</a>	Application Auto Scaling updates the <code>AWSApplicationAutoscalingSageMakerEndpointPolicy</code> policy. For more information, see <a href="#">Application Auto Scaling updates to Amazon managed policies</a> .	November 13, 2023
<a href="#">Support for SageMaker Serverless provisioned concurrency</a>	Use Application Auto Scaling to scale the provisioned concurrency of a serverless endpoint.	May 9, 2023
<a href="#">Categorize your scalable targets using tags</a>	You can now assign metadata to your Application Auto Scaling scalable targets in the form of tags. See <a href="#">Tagging</a>	March 20, 2023

[support for Application Auto Scaling.](#)

[Support for CloudWatch metric math](#)

You can now use metric math when you create target tracking scaling policies. With metric math, you can query multiple CloudWatch metrics and use math expressions to create new time series based on these metrics. See [Create a target tracking scaling policy for Application Auto Scaling using metric math.](#)

March 14, 2023

[Guide changes](#)

New topic in the *Application Auto Scaling User Guide* helps you get started using Amazon CloudShell with Application Auto Scaling. See [Use Amazon CloudShell to work with Application Auto Scaling from the command line.](#)

February 17, 2023

[Reasons for not scaling](#)

You can now retrieve the machine-readable reasons for Application Auto Scaling not scaling your resources using the Application Auto Scaling API. See [Scaling activities for Application Auto Scaling.](#)

January 4, 2023

[Guide changes](#)

Updated the *Maximum number of scalable targets per resource type* entry in the quotas documentation. See [Quotas for Application Auto Scaling](#).

May 6, 2022

[Add support for Amazon Neptune clusters](#)

Use Application Auto Scaling to scale the number of replicas in an Amazon Neptune DB cluster. For more information, see [Amazon Neptune and Application Auto Scaling](#). The topic [Application Auto Scaling updates to Amazon managed policies](#) has been updated to list a new managed policy for the integration with Neptune.

October 6, 2021

[Application Auto Scaling now reports changes to its Amazon managed policies](#)

Beginning August 19, 2021, changes to managed policies are reported in the topic [Application Auto Scaling updates to Amazon managed policies](#). The first change listed is the addition of permissions needed for ElastiCache for Redis.

August 19, 2021

### [Add support for ElastiCache for Redis replication groups](#)

Use Application Auto Scaling to scale the number of node groups and the number of replicas per node group for an ElastiCache for Redis replication group (cluster). For more information, see [ElastiCache for Redis and Application Auto Scaling](#).

August 19, 2021

### [Guide changes](#)

New IAM topics in the *Application Auto Scaling User Guide* help you troubleshoot access to Application Auto Scaling. For more information, see [Identity and Access Management for Application Auto Scaling](#). Also added new example IAM permissions policies for actions on target services and Amazon CloudWatch. For more information, see [Example policies for working with the Amazon CLI or an SDK](#).

February 23, 2021

### [Add support for local time zones](#)

You can now create scheduled actions in the local time zone. If your time zone observes daylight saving time, it automatically adjusts for Daylight Saving Time (DST). For more information, see [Scheduled scaling](#).

February 2, 2021

[Guide changes](#)

A new [tutorial](#) in the *Application Auto Scaling User Guide* helps you understand how to use target tracking scaling policies and scheduled scaling to increase the availability of your application when using Application Auto Scaling. Also, a new [topic](#) explains how to trigger a notification when CloudWatch has detected any problems that might require your attention.

October 15, 2020

[Add support for Amazon Managed Streaming for Apache Kafka cluster storage](#)

Use a target tracking scaling policy to scale out the amount of broker storage associated with an Amazon MSK cluster.

September 30, 2020

[Add support for Amazon Comprehend entity recognizer endpoints](#)

Use Application Auto Scaling to scale the number of inference units provisioned for your Amazon Comprehend entity recognizer endpoints.

September 28, 2020

[Add support for Amazon Keyspaces \(for Apache Cassandra\) tables](#)

Use Application Auto Scaling to scale the provisioned throughput (read and write capacity) of an Amazon Keyspaces table.

April 23, 2020

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<a href="#">New "Security" chapter</a>	A new <a href="#">Security</a> chapter in the <i>Application Auto Scaling User Guide</i> helps you understand how to apply the <a href="#">shared responsibility model</a> when using Application Auto Scaling. As part of this update, the user guide chapter "Authentication and Access Control" has been replaced by a new, more useful section, <a href="#">Identity and Access Management for Application Auto Scaling</a> .	January 16, 2020
<a href="#">Minor updates</a>	Various improvements and corrections.	January 15, 2020
<a href="#">Add notification functionality</a>	Application Auto Scaling now sends events to Amazon EventBridge and notifications to your Amazon Health Dashboard when certain actions occur. For more information, see <a href="#">Application Auto Scaling monitoring</a> .	December 20, 2019
<a href="#">Add support for Amazon Lambda functions</a>	Use Application Auto Scaling to scale the provisioned concurrency of a Lambda function.	December 3, 2019
<a href="#">Add support for Amazon Comprehend document classification endpoints</a>	Use Application Auto Scaling to scale the throughput capacity of an Amazon Comprehend document classification endpoint.	November 25, 2019



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<a href="#">Add AppStream 2.0 support for target tracking scaling policies</a>	Use target tracking scaling policies to scale the size of an AppStream 2.0 fleet.	November 25, 2019
<a href="#">Support for Amazon VPC endpoints</a>	You can now establish a private connection between your VPC and Application Auto Scaling. For migration considerations and instructions, see <a href="#">Application Auto Scaling and interface VPC endpoints</a> .	November 22, 2019
<a href="#">Suspend and resume scaling</a>	Added support for suspending and resuming scaling. For more information, see <a href="#">Suspending and resuming scaling for Application Auto Scaling</a> .	August 29, 2019
<a href="#">New section</a>	The <a href="#">Setting up</a> section has been added to the Application Auto Scaling documentation. Minor improvements and fixes have been made throughout the user guide.	June 28, 2019
<a href="#">Guide changes</a>	Improved Application Auto Scaling documentation in the <a href="#">Scheduled scaling</a> , <a href="#">Step scaling policies</a> , and <a href="#">Target tracking scaling policies</a> sections.	March 11, 2019

<a href="#">Add support for custom resources</a>	Use Application Auto Scaling to scale custom resources provided by your own applications or services. For more information, see our <a href="#">GitHub repository</a> .	July 9, 2018
<a href="#">Add support for SageMaker endpoint variants</a>	Use Application Auto Scaling to scale the number of endpoint instances provisioned for a variant.	February 28, 2018

The following table describes important changes to the Application Auto Scaling documentation before January 2018.

Change	Description	Date
Add support for Aurora Replicas	Use Application Auto Scaling to scale the desired count. For more information, see <a href="#">Using Amazon Aurora Auto Scaling with Aurora replicas</a> in the <i>Amazon RDS User Guide</i> .	November 17, 2017
Add support for scheduled scaling	Use scheduled scaling to scale resources at specific preset times or intervals. For more information, see <a href="#">Scheduled scaling for Application Auto Scaling</a> .	November 8, 2017
Add support for target tracking scaling policies	Use target tracking scaling policies to set up dynamic scaling for your application in just a few simple steps. For more information, see <a href="#">Target</a>	July 12, 2017

Change	Description	Date
	<a href="#">tracking scaling policies for Application Auto Scaling.</a>	
Add support for provisioned read and write capacity for DynamoDB tables and global secondary indexes	Use Application Auto Scaling to scale provisioned throughput (read and write capacity). For more information, see <a href="#">Managing throughput capacity with DynamoDB Auto Scaling</a> in the <i>Amazon DynamoDB Developer Guide</i> .	June 14, 2017
Add support for AppStream 2.0 fleets	Use Application Auto Scaling to scale the size of the fleet. For more information, see <a href="#">Fleet Auto Scaling for AppStream 2.0</a> in the <i>Amazon AppStream 2.0 Administration Guide</i> .	March 23, 2017
Add support for Amazon EMR clusters	Use Application Auto Scaling to scale the core and task nodes. For more information, see <a href="#">Using automatic scaling in Amazon EMR</a> in the <i>Amazon EMR Management Guide</i> .	November 18, 2016
Add support for Spot Fleets	Use Application Auto Scaling to scale the target capacity. For more information, see <a href="#">Automatic scaling for Spot fleet</a> in the <i>Amazon EC2 User Guide for Linux Instances</i> .	September 1, 2016

Change	Description	Date
Add support for Amazon ECS services	Use Application Auto Scaling to scale the desired count. For more information, see <a href="#">Service Auto Scaling</a> in the <i>Amazon Elastic Container Service Developer Guide</i> .	August 9, 2016