Elastic Load Balancing

Developer Guide

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What Is Elastic Load Balancing?

Amazon Web Services (AWS) provides Elastic Load Balancing to automatically distribute incoming web traffic across multiple Amazon Elastic Compute Cloud (Amazon EC2) instances. With Elastic Load Balancing, you can add and remove EC2 instances as your needs change without disrupting the overall flow of information. If one EC2 instance fails, Elastic Load Balancing automatically reroutes the traffic to the remaining running EC2 instances. If the failed EC2 instance is restored, Elastic Load Balancing restores the traffic to that instance. Elastic Load Balancing offers clients a single point of contact, and it can also serve as the first line of defense against attacks on your network. You can offload the work of encryption and decryption to Elastic Load Balancing, so your servers can focus on their main task.

When you use Elastic Load Balancing to manage traffic to your application, you get the following benefits:

- Distribution of requests to Amazon EC2 instances (servers) in multiple Availability Zones so that the risk of overloading one single instance is minimized. And if an entire Availability Zone goes offline, Elastic Load Balancing routes traffic to instances in other Availability Zones.
- Continuous monitoring of the health of Amazon EC2 instances registered with the load balancer so that requests are sent only to the *healthy* instances. If an instance becomes *unhealthy*, Elastic Load Balancing stops sending traffic to that instance and spreads the load across the remaining healthy instances.
- Support for end-to-end traffic encryption on those networks that use secure (HTTPS/SSL) connections.
- The ability to take over the encryption and decryption work from the Amazon EC2 instances, and manage it centrally on the load balancer.
- Support for the sticky session feature, which is the ability to "stick" user sessions to specific Amazon EC2 instances.
- Association of the load balancer with your domain name. Because the load balancer is the only computer that is exposed to the Internet, you don't have to create and manage public domain names for the instances that the load balancer manages. You can point the instance's domain records at the load balancer instead and scale as needed (either adding or removing capacity) without having to update the records with each scaling activity.
- When used in an Amazon Virtual Private Cloud (Amazon VPC), support for creation and management of security groups associated with your load balancer to provide additional networking and security options.
- Supports use of both the Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6).

Pricing

As with all Amazon Web Services, you pay only for what you use. For Elastic Load Balancing, you pay for each hour or portion of an hour that the service is running, and you pay for each gigabyte of data that is transferred through your load balancer. For current pricing information for Elastic Load Balancing, go to Elastic Load Balancing Pricing.

Free Tier

If you are a *new* AWS customer, you are eligible to use the free usage tier for twelve months following your AWS sign-up date. The free tier includes 750 hours per month of Amazon EC2 Micro Instance usage, and 750 hours per month of Elastic Load Balancing, plus 15 GB of data processing. For information about the free usage tier, go to AWS Free Usage Tier.

How Elastic Load Balancing Works

Elastic Load Balancing (ELB) consists of two components: the load balancers and the controller service. The load balancers monitor the traffic and handle requests that come in through the Internet. The controller service monitors the load balancers, adding and removing load balancers as needed and verifying that the load balancers are functioning properly.

You have to create your load balancer before you can start using it. Elastic Load Balancing automatically generates a unique Domain Name System (DNS) name for each load balancer instance you create. For example, if you create a load balancer named `myLB` in the us-east-1a, your load balancer might have a DNS name such as `myLB-1234567890.us-east-1.elb.amazonaws.com`. Clients can request access your load balancer by using the ELB generated DNS name.

If you'd rather use a user-friendly domain name, such as `www.example.com`, instead of the load balancer DNS name, you can create a custom domain name and then associate the custom domain name with the load balancer DNS name. When a request is placed to your load balancer using the custom domain name that you created, it resolves to the load balancer DNS name.

When a client makes a request to your application using either your load balancer's DNS name or the custom domain name, the DNS server returns one or more IP addresses. The client then makes a connection to your load balancer at the provided IP address. When Elastic Load Balancing scales, it updates the DNS record for the load balancer. The DNS record for the load balancer has the time-to-live (TTL) set to 60 seconds. This setting ensures that IP addresses can be re-mapped quickly to respond to events that cause Elastic Load Balancing to scale up or down.

When you create a load balancer, you must configure it to accept incoming traffic and route requests to your EC2 instances. The controller ensures that load balancers are operating with the correct configuration.

After you create your load balancer, you have to register the EC2 instances that you want to load balance with the load balancer. Your load balancer monitors and routes the incoming traffic to the registered instances. The instances are registered with the load balancer using the IP addresses associated with the instances.

Your load balancer also monitors the health of the registered instances and ensures that the traffic goes to healthy instances. When the load balancer detects an unhealthy instance, it stops routing the traffic to that instance and resumes the routing when the instance has been restored to a healthy state. Elastic Load Balancing performs health checks on all your registered instances using the configuration you provide, regardless of whether the instance is in a healthy or unhealthy state.

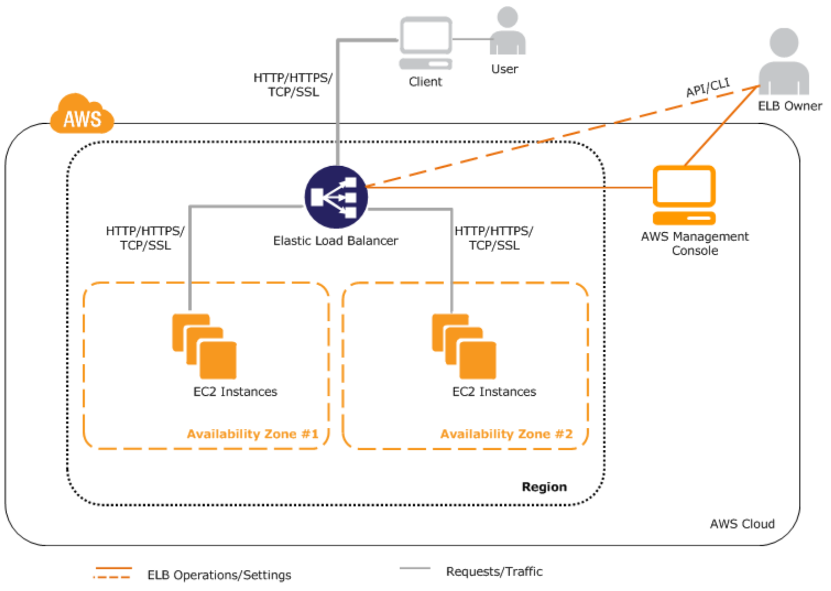
Amazon Elastic Compute Cloud (Amazon EC2) provides the ability to launch your instances in multiple Availability Zones. You can configure your load balancer to load balance incoming application traffic across multiple instances in a single Availability Zone or across multiple instances in several Availability Zones in the same region. For example, if you choose to load balance multiple instances across two Availability Zones, and all the instances in the first Availability Zone become unhealthy, the load balancer will route traffic to the healthy instances in the other Availability Zone. When you use multiple Availability Zones, it is important to keep approximately the same capacity in each Availability Zone registered with the load balancer.

Using Auto Scaling with Elastic Load Balancing makes it easy to increase or decrease your back-end capacity to meet varying traffic levels. For example, you could set a condition declaring that when the number of healthy instances behind a load balancer goes down to two, two or more instances are launched. Or, you could set a condition to monitor the latency of the load balancer, and when the latency exceeds certain time period, such as three seconds, capacity is increased. You can also use the AWS Management Console to register or deregister instances used by the load balancer as the capacity requirements of your application change over time.

Amazon Route 53 is AWS's highly available and cost-effective DNS service. You can use Amazon Route 53 to associate the custom domain name of your load balancer with the load balancer DNS name. Using Amazon Route 53's Alias records will provide performance improvements because the clients will need only to make a single request to resolve the domain name. Also, queries to Alias records are free of charge.

Architectural Overview of Elastic Load Balancing

The following diagram shows how the various components of the Elastic Load Balancing work together. The remainder of this section provides a step-by-step view of the flow of events that take place when a client requests a URL served by your applications.



This example assumes that you have created a load balancer, created a custom domain name and associated your load balancer with the domain name using a CNAME entry in DNS, and have registered your instances with it.

1. The client sends a URL request to DNS servers to access your application. The DNS server responds with a DNS name. For example, `myLB-1234567890.us-east-1.elb.amazonaws.com`.
2. The client looks for the resolution of the DNS name sent by the DNS server. The DNS entry is controlled by Amazon because your application instances are under the `amazonaws.com` domain. The Amazon DNS servers return one or more IP addresses.
3. The client then opens a connection to the machine at the provided IP address. The instance at this address is the load balancer you created.
4. The load balancer checks the health states of all the registered EC2 application instances within the selected Availability Zones and will begin routing traffic to instances that have met the healthy threshold defined in the health check configuration.
5. The load balancer routes the client request to the healthy EC2 application instance identified in the previous step. At this point, the client is communicating with one of your EC2 instances through your

load balancer. The load balancer listeners can be configured to use either HTTP, HTTPS, TCP, or SSL protocols for both front-end connection (client to load balancer) and back-end connection (load balancer to back-end instance).

Supported Platforms

Elastic Load Balancing supports load balancing your Amazon EC2 instances launched within the following platforms:

- **EC2-Classic** — Instances launched in EC2-Classic run in a flat network that you share with other customers. To load balance your EC2 instances launched in EC2-Classic, you must create your load balancer in EC2-Classic. For more information about Amazon EC2, see What is Amazon EC2? in the *Amazon Elastic Compute Cloud User Guide.*
- **EC2-VPC** — Instances launched in EC2-VPC run in an virtual private cloud (VPC) that is logically isolated from other virtual networks in the AWS cloud. You create your VPC by assigning classless inter-domain routing (CIDR) range of your choice (for example, 10.0.0.0/16). To load balance your EC2 instances launched in a VPC, you must create your load balancer in the same VPC as your EC2 instances. For more information about Amazon VPC, see What is Amazon VPC in the *Amazon Virtual Private Cloud User Guide*.

  If your AWS account comes with a default virtual private cloud (default VPC), your EC2 instances and load balancer are launched within the default VPC, by default. For more information on default VPCs and subnets, see Your Default VPC and Subnets.

For information about how you can tell which platform your AWS account supports, see Supported Platforms in the *Amazon Compute Cloud User Guide*.

Elastic Load Balancing Concepts

Topics

This topic introduces you to Elastic Load Balancing basics you need to understand before you create your load balancer.

Load Balancer

A load balancer is the destination to which all requests intended for your load balanced application should be directed. Each load balancer can distribute requests to multiple EC2 instances. A load balancer is represented by a DNS name and a set of ports. Load balancers can span multiple Availability Zones within an EC2 Region, but they cannot span multiple regions.

To create or work with a load balancer in a specific region, use the corresponding regional service endpoint. For information about regions and endpoints supported by Elastic Load Balancing, go to Regions and Endpoints.

Elastic Load Balancing automatically generates a DNS name for each load balancer instance you create. Typically, the DNS name includes the name of the AWS region in which the load balancer is created. For example, if you create a load balancer named `myLB` in the us-east-1a, your load balancer might have a DNS name such as `myLB-1234567890.us-east-1.elb.amazonaws.com`. For information on what happens when you request connection to your load balancer, see Architectural Overview of Elastic Load Balancing (p. 3).

If you'd rather use a user-friendly domain name, such as `www.example.com`, instead of the load balancer DNS name, you can create a custom domain name and then associate the custom domain name with the load balancer DNS name. When a request is placed to your load balancer using the custom domain name that you created, it resolves to the load balancer DNS name.

For more information on creating and using a custom domain name for your load balancer, see Configure Custom Domain Name for Your Load Balancer (p. 147).

When you create your load balancer, you must configure it to accept incoming traffic by specifying the configurations for your load balancer listeners. A *listener* is a process that listens for connections from incoming requests. It is configured with a protocol and a port number for front-end (load balancer) and back-end (back-end instance) connections. For more information on the ports and protocols supported by Elastic Load Balancing, see Listener Configurations for Elastic Load Balancing (p. 47).

Availability Zones and Regions

You can set up your Elastic Load Balancing to distribute incoming requests across EC2 instances in a single Availability Zone or multiple Availability Zones within a region. Your load balancer does not distribute traffic across regions.

For critical applications, we recommend that you distribute incoming traffic across more than one Availability Zone. To distribute traffic across multiple Availability Zones, launch your Amazon EC2 instances in all the Availability Zones you plan to use and then register the instances with your load balancer.

When you register your EC2 instances, Elastic Load Balancing provisions load balancer nodes in all the Availability Zones that has the registered instances. The load balancer node continuously monitors the health of all the registered instances and routes traffic to the healthy instances. If a load balancer node detects unhealthy or de-registered instances, it stops routing traffic to those instances. Instead, it sends requests to the remaining healthy instances.

You can always expand or shrink the availability of your instances after your initial set up. To expand the availability of your application, launch instances in an additional Availability Zone, register the new instances with your load balancer, and then add the new Availability Zone. After you've added the new Availability Zone, the load balancer begins to route traffic equally amongst all the enabled Availability Zones. To shrink the availability of your instances, remove an Availability Zone that was enabled for your load balancer. After you've removed the Availability Zone, the load balancer will stop routing the traffic to the disabled Availability Zone and continue to route traffic to the registered and healthy instances in the enabled Availability Zones.

For information see Add or Remove Availability Zones for Your Load Balanced Application (p. 95).

Request Routing

Before a client sends a request to your load balancer, it first resolves the load balancer's domain name with the Domain Name System (DNS) servers. The DNS server uses DNS round robin to determine which load balancer node in a specific Availability Zone will receive the request.

The selected load balancer node then sends the request to healthy instances within the same Availability Zone. To determine the healthy instances, the load balancer node uses either the round robin (for TCP connections) or the least outstanding request (for HTTP/HTTPS connections) routing algorithm. The least outstanding request routing algorithm favors back-end instances with the fewest connections or outstanding requests.

By default, the load balancer node routes traffic to back-end instances within the same Availability Zone. To ensure that your back-end instances are able to handle the request load in each Availability Zone, it is important to have approximately *equivalent* numbers of instances in each zone. For example, if you have ten instances in Availability Zone us-east-1a and two instances in us-east-1b, the traffic will still be equally distributed between the two Availability Zones. As a result, the two instances in us-east-1b will have to serve the same amount of traffic as the ten instances in us-east-1a. As a best practice, we recommend that you keep an equivalent or nearly equivalent number of instances in each of your Availability Zones. So in the example, rather than having ten instances in us-east-1a and two in us-east-1b, you could distribute your instances so that you have six instances in each Availability Zone.

If you want the request traffic to be routed evenly across all back-end instances, regardless of the Availability Zone that they may be in, enable cross-zone load balancing on your load balancer. Cross-zone load balancing allows each load balancer node to route requests across multiple Availability Zones, ensuring that all zones receive an equal amount of request traffic. Cross-zone load balancing reduces the need to maintain equivalent numbers of back-end instances in each zone, and improves the application's ability to handle the loss of one or more back-end instances. However, we still recommend that you maintain approximately equivalent numbers of instances in each Availability Zone for higher fault tolerance. The traffic between Elastic Load Balancing and your EC2 instances in another Availability Zone will not incur any EC2 data transfer charges.

For environments where clients cache DNS lookups, incoming requests may prefer one of the Availability Zones. Using cross-zone load balancing, this imbalance in request load will be spread across all available back-end instances in the region, reducing the impact of misbehaving clients on the application.

Routing traffic to EC2 instances in EC2-Classic

To allow communication between Elastic Load Balancing and your back-end instances launched in EC2-Classic, create a security group ingress rule that applies to all of your back-end instances. The security group rule can either allow ingress traffic from all IP addresses (the 0.0.0.0/0 CIDR range) or allow ingress traffic only from Elastic Load Balancing. To ensure that your back-end EC2 instances can receive traffic only from Elastic Load Balancing, enable network ingress for the Elastic Load Balancing security group on all of your back-end EC2 instances. For more information about configuring security groups for EC2 instances launched in EC2-Classic, see Manage Security Groups in Amazon EC2-Classic (p. 99).

Routing traffic to EC2 instances in Amazon VPC

If you are planning on deploying your load balancer within Amazon Virtual Private Cloud (Amazon VPC), be sure to configure the security group rules and network ACLs to allow traffic to be routed between the subnets in your VPC. If your rules are not configured correctly, instances in other subnets may not be reachable by load balancer nodes in a different subnet. For more information on deploying load balancer within Amazon VPC, see Elastic Load Balancing in Amazon VPC (p. 109). For information on configuring security groups for your load balancer deployed in VPC, see Manage Security Groups in Amazon VPC (p. 129).

For a procedure on enabling or disabling cross-zone load balancing for your load balancer, see Enable or Disable Cross-Zone Load Balancing for Your Load Balancer (p. 152)

Configuring EC2 Instances for Load Balancing

After you've created your load balancer, you have to register your EC2 instances with the load balancer. Your EC2 instances can be within a single Availability Zone or span multiple Availability Zones within a region. Elastic Load Balancing routinely performs health check on all the registered EC2 instances and automatically distributes all incoming requests to the DNS name of your load balancer across your registered, healthy EC2 instances. For more information on the health check of your EC2 instances, see Health Check (p. 7).

Make sure to install webserver, such as Apache or Internet Information Services (IIS), on all the EC2 instances you plan to register with your load balancer.

Stop and Start EC2 Instances

The instances are registered with the load balancer using the IP addresses associated with the instances. When an instance is stopped and then started, the IP address associated with your instance changes. This prevents the load balancer from routing traffic to your restarted instance. When you stop and then start your registered EC2 instances, we recommend that you de-register your stopped instance from your load balancer, and then register the restarted instance. Failure to do so may prevent the load balancer from performing health checks and routing the traffic to the restarted instance. For procedures associated with de-registering and then registering your instances with your load balancer, see Deregister and Register Amazon EC2 Instances (p. 139).

Setting Keepalive On Your EC2 Instances

For HTTP and HTTPS listeners, we recommend that you enable the keep-alive option in your EC2 instances. This may be done in your web server settings and/or in the kernel settings for your back-end instance. Keep-alive option will allow the load balancer to re-use connections to your backend for multiple client requests. This reduces the load on your web server and improves the throughput of the load balancer. The keep-alive timeout should be at least 60 seconds to ensure that the load balancer is responsible for closing the connection to your instance.

Health Check

To discover the availability of your EC2 instances, the load balancer periodically sends pings, attempts connections, or sends requests to test the EC2 instances. These tests are called *health checks*. Each registered EC2 instance must respond to the target of the health check with an HTTP status code `200` to be considered healthy by your load balancer. If the response includes a body, then your application must either set the Content-Length header to a value greater than or equal to zero, or specify Transfer-Encoding with a value set to 'chunked'.

Your load balancer ensures that traffic is routed only to the healthy instances. When the load balancer receives any other HTTP status code other than `200`, it stops routing traffic to that instance. It resumes routing traffic when the instance has been restored to a healthy state.

Elastic Load Balancing performs health checks on all your registered instances using the configuration that you provide, regardless of whether the instance is in a healthy or unhealthy state.

Your load balancer performs health checks on your instances using the protocol, port, URL, timeout, and interval specified when you configured your load balancer. For example, you can configure a health check for your instances as follows - Your load balancer to send request to http://**`node IP address`**:80/*`index.html`* every 5 seconds. Allow 3 seconds for the web server to respond. If the load balancer does not get any response after 2 attempts, take the node out of service. If the load balancer gets 2 successful responses, put the node back in service. Instances that are in service at the time of health check are marked healthy and the instances that are out of service at the time of health check are marked unhealthy.

For information on configuring a health check for the EC2 instances registered with your load balancer, see Configure Health Check for Your Amazon EC2 Instances (p. 24).

Your registered instances can fail the health check for several reasons. The most common reasons for failing a health check are where EC2 instances close connections to your load balancer or where the response from the EC2 instances times out. For information on potential causes and steps you can take to resolve failed health check issues, see Troubleshooting Elastic Load Balancing: Health Check Configuration (p. 240).

Connection Draining

Connection draining causes the ELB load balancer to stop sending new requests to a deregistering instance or an unhealthy instance, while keeping the existing connections open. This allows the load balancer to complete in-flight requests made to the deregistering or unhealthy instances.

Connection draining is a load balancer attribute and applies to all listeners for the load balancer. You can enable or disable connection draining for your load balancer at any time. You can check if connection draining is enabled for your load balancer by using the DescribeLoadBalancerAtrributes action, the `elb-describe-lb-attributes` command, or by using the AWS Management Console and clicking the **Instances** tab in the bottom pane of the selected load balancer.

When you enable connection draining for your load balancer, you can set a maximum time for the load balancer to continue serving in-flight requests to the deregistering instance before the load balancer closes the connection. The load balancer forcibly closes connections to the deregistering instance when the maximum time limit is reached.

While the in-flight requests are being served, the load balancer reports the instance state of the deregistering instance as `InService: Instance deregistration currently in progress`. The load balancer reports the instance state as `OutOfService: Instance is not currently registered with the LoadBalancer` when the deregistering instance has completed serving all in-flight requests or when the maximum timeout limit is reached, whichever comes first.

When an instance becomes unhealthy the load balancer reports the instance state as `OutOfService`. If there are in-flight requests made to the unhealthy instance, they get completed. The maximum timeout limit does not apply for the connections to the unhealthy instance.

You can check the instance state of a deregistering instance or an unhealthy instance by using the DescribeInstanceHealth action, or the `elb-describe-instance-health` command.

If your instances are part of an Auto Scaling group and if connection draining is enabled for your load balancer, Auto Scaling will wait for the in-flight requests to complete or for the maximum timeout to expire, whichever comes first, before terminating instances due to a scaling event or health check replacement. For information about using Elastic Load Balancing with Auto Scaling, see Use Elastic Load Balancing to Load Balance Your Auto Scaling Group.

For tutorials on how to enable or disable connection draining attribute for your load balancer, see Enable or Disable Connection Draining for Your Load Balancer (p. 158).

Idle Connection Timeout

For each request a client makes through a load balancer, the load balancer maintains two connections. One connection is with the client and the other connection is to the back-end instance. For each connection, the load balancer manages an idle timeout that is triggered when no data is sent over the connection for a specified time period. After this time period has elapsed, if no data has been sent or received, the load balancer closes the connection.

By default, Elastic Load Balancing maintains a 60-second idle timeout setting for the connections to the client and the back-end instance. You can change the idle timeout setting for your load balancer at any time.

If you use HTTP and HTTPS listeners, we recommend that you enable the keep-alive option for your EC2 instances. You can enable keep-alive in your web server settings and/or in the kernel settings for your EC2 instance. Keep-alive, when enabled, allows the load balancer to re-use connections to your back-end instance, which reduces the CPU utilization on your instances. To ensure that the load balancer is responsible for closing the connections to your back-end instance, make sure that the value set on your instance for the keep-alive time is greater than the idle timeout setting on your load balancer.

For a tutorial on configuring the idle timeout settings for your load balancer, see Configure Idle Connection Timeout (p. 165).

Sticky Sessions

By default, a load balancer routes each request independently to the application instance with the smallest load. However, you can use the *sticky session* feature (also known as session affinity), which enables the load balancer to bind a user's session to a specific application instance. This ensures that all requests coming from the user during the session will be sent to the same application instance.

The key to managing the *sticky session* is determining how long your load balancer should consistently route the user's request to the same application instance. If your application has its own session cookie, then you can set Elastic Load Balancing to create the session cookie to follow the duration specified by the application's session cookie. If your application does not have its own session cookie, then you can set Elastic Load Balancing to create a session cookie by specifying your own stickiness duration. You can associate stickiness duration for only HTTP/HTTPS load balancer listeners.

- For more information about creating cookies that allow duration-based session stickiness, see Duration-Based Session Stickiness (p. 184).
- For more information about creating cookies that allow application-specific session stickiness, see Application-Controlled Session Stickiness (p. 188).

An application instance must always receive and send two cookies: A cookie that defines the stickiness duration and a special Elastic Load Balancing cookie named AWSELB, that has the mapping to the application instance.

HTTP Methods

The HTTP method (also called the *verb*) specifies the action to be performed on the resource receiving an HTTP request. The standard methods for HTTP requests are defined in RFC 2616, Hypertext Transfer Protocol-HTTP/1.1. Standard methods include GET, POST, PUT, HEAD, and OPTIONS. Some web applications require (and sometimes also introduce) new methods that are extensions of HTTP/1.1 methods. These HTTP extensions can be non-standard. Some common examples of HTTP extended methods include (but are not limited to) PATCH, REPORT, MKCOL, PROPFIND, MOVE, and LOCK. Elastic Load Balancing accepts all standard and non-standard HTTP methods.

When a load balancer receives an HTTP request, it performs checks for malformed requests and for the length of the method. The total method length in an HTTP request to a load balancer must not exceed 127 characters. If the HTTP request passes both the checks, the load balancer sends the request to the back-end EC2 instance. If the method field in the request is malformed, the load balancer responds with a HTTP 400: BAD_REQUEST (p. 238) error message. If the length of the method in the request exceeds 127 characters, the load balancer responds with a HTTP 405: METHOD_NOT_ALLOWED (p. 238) error message.

The back-end EC2 instance processes a valid request by implementing the method contained in the request and then sending a response back to the client. Your back-end instance must be configured to handle both supported and unsupported methods.

HTTPS Support

HTTPS Support is a feature that allows you to use the SSL/TLS protocol for encrypted connections (also known as *SSL offload*). This feature enables traffic encryption between the clients that initiate HTTPS sessions with your load balancer and also for connections between the load balancer and your back-end instances.

To enable HTTPS support for your load balancer, you'll have to install an SSL server certificate on your load balancer. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances.

For more information, see Using HTTP/HTTPS Protocol with Elastic Load Balancing (p. 48). For information about creating a load balancer that uses HTTPS, see Create a HTTPS/SSL Load Balancer (p. 71).

Proxy Protocol

The Proxy Protocol header helps you identify the IP address of a client when you use a load balancer configured for TCP/SSL connections. Because load balancers intercept traffic between clients and your back-end instances, the access logs from your back-end instance contain the IP address of the load balancer instead of the originating client. When Proxy Protocol is enabled, the load balancer adds a human-readable format header that contains the connection information, such as the source IP address, destination IP address, and port numbers of the client. The header is then sent to the back-end instance as a part of the request. You can parse the first line of the request to retrieve your client's IP address and the port number.

The Proxy Protocol line is a single line that ends with a carriage return and line feed (`"\r\n"`). It takes the following form:

```
PROXY_STRING + single space + INET_PROTOCOL + single space + CLIENT_IP + single
 space + PROXY_IP + single space + CLIENT_PORT + single space + PROXY_PORT +
"\r\n"
```

The following is an example of the IPv4 Proxy Protocol.

```
PROXY TCP4 198.51.100.22  203.0.113.7  35646  80\r\n
```

The Proxy Protocol line for IPv6 takes an identical form, except it begins with `TCP6` and the address is in IPv6 format.

The following is an example of the IPv6 Proxy Protocol.

```
PROXY TCP6 2001:DB8::21f:5bff:febf:ce22:8a2e 2001:DB8::12f:8baa:eafc:ce29:6b2e
 35646  80\r\n
```

If the client connects with IPv6, the address of the proxy in the header will be the public IPv6 address of your load balancer. This IPv6 address matches the IP address that is resolved from your load balancer's DNS name that is prefixed with either `ipv6` or `dualstack`. If the client connects with IPv4, the address of the proxy in the header will be the private IPv4 address of the load balancer and will therefore not be resolvable through a DNS lookup outside the Amazon Elastic Compute Cloud (Amazon EC2) network.

For information about enabling the Proxy Protocol header, see Enable or Disable Proxy Protocol Support (p. 169).

Tagging

You can categorize and track your Amazon Web Services resources, such as EC2 instances, load balancers, or Auto Scaling groups by using tags. To categorize your load balancers in Elastic Load Balancing you assign a tag to each load balancer. Tags contain metadata that describes useful categories, such as a purpose, owner, or environment. A tag consists of a key and a value, both of which you define. For example, you could define a key=value pair, such as “department=digital-media” or “project=lima,” and assign it to a load balancer. You can then use the tags to track the load balancers designated for project lima or for your digital-media department. We recommend that you use a consistent set of tag keys to make it easier to track metadata associated with your load balancers.

You can tag your load balancers to organize your AWS bill and see how costs are allocated. To do this, sign up to get your AWS account bill with tag key values included. Then, to see the cost of running your load balancers, organize your billing information according to load balancers with the same tag key values. For example, if you use the "department=digital-media" tag, you can track the cost of running load balancers assigned to the digital-media department. For more information about cost allocation, see Use Cost Allocation Tags for Custom Billing Reports in the *AWS Account Billing and Cost Management User Guide*.

Tag Restrictions

The following basic restrictions apply to tags:

- Maximum number of tags per load balancer—10.
- Maximum key length—128 Unicode characters.
- Maximum value length—256 Unicode characters.
- Tag keys and values are case sensitive. Allowed characters are letters, space, and numbers representable in UTF-8, plus the following special characters: + - = . _ : / @

  Note
  If you need to use characters outside this set, you can standard base-64 encode your tag.
- Tag keys and values must not contain leading or trailing spaces.
- Do not use `aws:` as a prefix in your tag names because it is reserved for AWS use.

  Note
  Tags containing the prefix `aws:` have been created by AWS. These tags cannot be edited or deleted, and they do not count toward your limit of 10 tags per load balancer.

You can create a load balancer with tags, or you can add tags to an existing load balancer. You can remove load balancer tags at any time. When you delete your load balancer, the tags assigned to that load balancer are deleted.

For information on creating load balancer with tags, see Create a HTTPS/SSL Load Balancer (p. 71).

For information on adding tags to or removing tags from an existing load balancer, see Add or Remove Tags (p. 191).

X-Forwarded Headers

The HTTP requests and HTTP responses use header fields to send information about the HTTP message. Header fields are colon-separated name-value pairs that are separated by a carriage return (CR) and a line feed (LF). A standard set of HTTP header fields is defined in RFC 2616, Message Headers. There are also non-standard HTTP headers available that are widely used by the applications. Some of the non-standard HTTP headers have a `X-Forwarded` prefix. Elastic Load Balancing supports the following `X-Forwarded` headers:

X-Forwarded-For

The `X-Forwarded-For` request header helps you identify the IP address of a client when you use HTTP/HTTPS load balancer. Because load balancers intercept traffic between clients and servers, your server access logs contain only the IP address of the load balancer. To see the IP address of the client, use the `X-Forwarded-For` request header. Elastic Load Balancing stores the IP address of the client in the `X-Forwarded-For` request header and passes the header along to your server.

The `X-Forwarded-For` request header takes the following form:

```
X-Forwarded-For: clientIPAddress
```

The following example is an `X-Forwarded-For` request header for a client with an IP address of `203.0.113.7`.

```
X-Forwarded-For: 203.0.113.7
```

The following example is an `X-Forwarded-For` request header for a client with an IPv6 address of `2001:DB8::21f:5bff:febf:ce22:8a2e`.

```
X-Forwarded-For: 2001:DB8::21f:5bff:febf:ce22:8a2e
```

If the request goes through multiple proxies, then the *`clientIPAddress`* in the `X-Forwarded-For` request header is followed by IP addresses of each successive proxy that passes along the request before the request reaches your load balancer. Thus, the right-most value is the IP address of the most recent proxy (for your load balancer) and the left-most value is the IP address of the originating client. In such cases, the `X-Forwarded-For` request header takes the following form:

```
X-Forwarded-For: OriginatingClientIPAddress, proxy1-IPAddress, proxy2-IPAddress
```

X-Forwarded-Proto

The `X-Forwarded-Proto` request header helps you identify the protocol (HTTP or HTTPS) that a client used to connect to your server. Your server access logs contain only the protocol used between the server and the load balancer; they contain no information about the protocol used between the client and the load balancer. To determine the protocol used between the client and the load balancer, use the `X-Forwarded-Proto` request header. Elastic Load Balancing stores the protocol used between the client and the load balancer in the `X-Forwarded-Proto` request header and passes the header along to your server.

Your application or website can use the protocol stored in the `X-Forwarded-Proto` request header to render a response that redirects to the appropriate URL.

The `X-Forwarded-Proto` request header takes the following form:

```
X-Forwarded-Proto: originatingProtocol
```

The following example contains an `X-Forwarded-Proto` request header for a request that originated from the client as an HTTPS request:

```
X-Forwarded-Proto: https
```

X-Forwarded-Port

The `X-Forwarded-Port` request header helps you identify the port a HTTP/HTTPS load balancer uses to connect to the client.

Accessing Elastic Load Balancing

You can create, access and manage your load balancer using any *one* of the following Elastic Load Balancing interfaces:

- **AWS Management Console**— The AWS Management Console provides a web-based interface you can use to access Elastic Load Balancing. You can use the console to make requests to an API.
- **AWS Command Line Interface—**Amazon Web Services (AWS) provides a command line interface that support the broader set of AWS services, including Elastic Load Balancing. The AWS Command Line Interface (AWS CLI) can be used to control and automate AWS services on Windows, Mac, and Linux. AWS also offers the AWS Tools for Windows PowerShell for those who script in the PowerShell environment.
- **Query API**— Elastic Load Balancing provides a Query API you can use to programmatically access Elastic Load Balancing functionality. Query requests are HTTP or HTTPS requests that use the HTTP verbs GET or POST and a Query parameter named Action or Operation. Calling an API using a Query request is the most direct way to access a web service, but requires that your application handle low-level details such as generating the hash to sign the request, and error handling. The benefit of using a Query request is that you have access to the complete functionality of an API.
- **AWS SDKs**— The AWS SDKs provide functions that wrap an API and take care of many of the connection details, such as calculating signatures, handling request retries, and error handling. With AWS SDKs, you can get started in minutes with a single, downloadable package that includes the library, code samples, and reference documentation. You can access Elastic Load Balancing programmatically using the SDKs in Java, .NET, PHP, or Ruby.
- **SOAP API**— You can access the Elastic Load Balancing web service using the SOAP web services messaging protocol. This interface is described by a Web Services Description Language (WSDL) document that defines the operations and security model for the particular service. The WSDL references an XML schema document, which strictly defines the data types that might appear in SOAP requests and responses. For information on using the SOAP API, see Appendix B: Using the SOAP API (p. 258)

For information about installing and configuring Elastic Load Balancing interfaces, see Setting Up Elastic Load Balancing Interfaces (p. 16)

Regions and Endpoints for Elastic Load Balancing

By default, the AWS SDKs and console for Elastic Load Balancing reference the US West (Oregon) Region and the Elastic Load Balancing command line interface (CLI) and the Elastic Load Balancing Query requests reference the US East (Northern Virginia) Region. You can change the default region and set it to the region of your choice at any time. For information on configuring the default region for Elastic Load Balancing, see Setting Up Elastic Load Balancing Interfaces (p. 16) and follow the instructions for changing the default region for your interface.

As Elastic Load Balancing expands availability to new regions, new endpoints for these regions are also available to use in your own HTTP requests, the AWS SDKs, and the console. For a current list of supported regions and endpoints, see Regions and Endpoints.

Elastic Load Balancing Limits

Your AWS account comes with default limits on resources for Elastic Load Balancing and other Amazon Web Services. Unless otherwise noted, each limit is per region. There is a default limit of 20 load balancers per region per account. You can go to AWS Service Limits and select `Elastic Load Balancing Limits` or any other service listed on the page to see its default limits.

You can request an increase for the number of load balancers for your account by performing the following steps:

1. Go to AWS Support Center page, sign in, if necessary, and click **Open a new case**.
2. Under **Regarding**, select **Service Limit Increase**.
3. Under **Limit Type**, select `Elastic Load Balancers`, fill in all of the necessary fields in the form, and click the button at the bottom of the page for your desired method of contact.

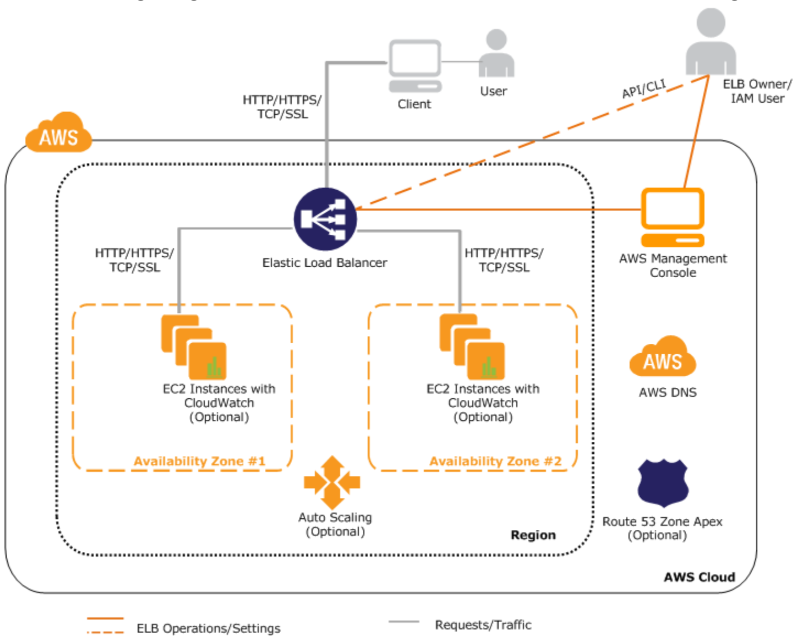
Related Services

Elastic Load Balancing works with the following AWS products to provide solutions to help your load balancer improve availability and scalability of your applications.

AWS Product	Solutions
Amazon EC2	Runs your back-end application instances.
Auto Scaling	Creates capacity groups of instances that can grow or shrink on demand. For more information, see Auto Scaling Developer Guide.
Amazon CloudWatch	Collects the data provided by your load balancer and presents it as readable, near real-time metrics. These metrics can be used to monitor the health state of your instances. You can create an Amazon CloudWatch alarm to send notification to an Auto Scaling policy if an individual metric goes outside of what you consider an acceptable range. For more information on using Amazon CloudWatch with your load balancer, see Monitor Your Load Balancer Using Amazon CloudWatch (p. 201). For information on Amazon CloudWatch, see Amazon CloudWatch Developer Guide.
Amazon Route 53	Provides secure and reliable routing to your application instances. Route 53 automatically routes queries to the nearest DNS server in a global network of DNS servers, resulting in low latency. You can use Route 53 to translate friendly domain names like www.example.com into IP addresses like 192.0.2.1. For information on using Amazon Route 53 to create a custom domain name for your load balancer, see Configure Custom Domain Name for Your Load Balancer (p. 147). For information on Amazon Route 53, see Amazon Route 53 Developer Guide.

AWS Product	Solutions
AWS Identity and Access Management (IAM)	Manages digital server certificates to use with your load balancer. Your load balancer uses server certificates to terminate and then decrypt requests before sending them to the back-end instances. Use IAM to upload the server certificate to your load balancer. For information on creating and uploading server certificate, see Creating and Uploading Server Certificates. Manages users and user permissions in AWS. IAM provides central control over users and security credentials. Use IAM to create multiple users who can use AWS products, each with individual security credentials, all controlled by a single AWS account. For information on specifying user permissions for Elastic Load Balancing resources, see Controlling User Access to Your Load Balancer (p. 229). For information on AWS Identity and Access Management, see Using IAM.

The following diagram shows how the various services in AWS integrate with Elastic Load Balancing.



Next Steps

- You might want to test drive Elastic Load Balancing by creating a basic load balancer and registering your EC2 instances with the newly created load balancer. Get Started with Elastic Load Balancing (p. 21) provides information on creating a basic load balancer using the AWS Management Console.
- You might want to explore some common user scenarios for Elastic Load Balancing. Before you do this, you must install the tools and interfaces that you plan to use to access your load balancer. For information on installing the command line interfaces and using the Query API, go to Get Set Up with Elastic Load Balancing Interfaces.
- For detailed instructions on using Elastic Load Balancing in Amazon EC2, see Elastic Load Balancing in Amazon EC2-Classic (p. 69).
- For detailed instructions on using Elastic Load Balancing in Amazon Virtual Private Cloud(VPC), see Elastic Load Balancing in Amazon VPC (p. 109).

Setting Up Elastic Load Balancing Interfaces

You can create, access, and manage your load balancers using any *one* of the Elastic Load Balancing interfaces: the AWS Management Console, the AWS Command Line Interface, the Query API, the SOAP API, or the SDK for Elastic Load Balancing.

Before you can use Elastic Load Balancing, you'll need to sign up for Amazon Web Services (AWS) account. Signing up allows you to access Elastic Load Balancing and other services in AWS that you might need, such as Amazon EC2, Amazon CloudWatch, Amazon Route 53, AWS Identity and Access Management (IAM), and Auto Scaling.

After signing up, you'll need to install and configure the Elastic Load Balancing interface you want to use to create, access, and manage your Elastic Load Balancing resources.

Topics

Sign Up for Amazon Web Services(AWS)

When you create an AWS account, we automatically sign up your account for all AWS services. You pay only for the services that you use.

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

To sign up for an AWS account

1. Go to http://aws.amazon.com and click the **Sign Up** button.
2. Follow the on-screen instructions.

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

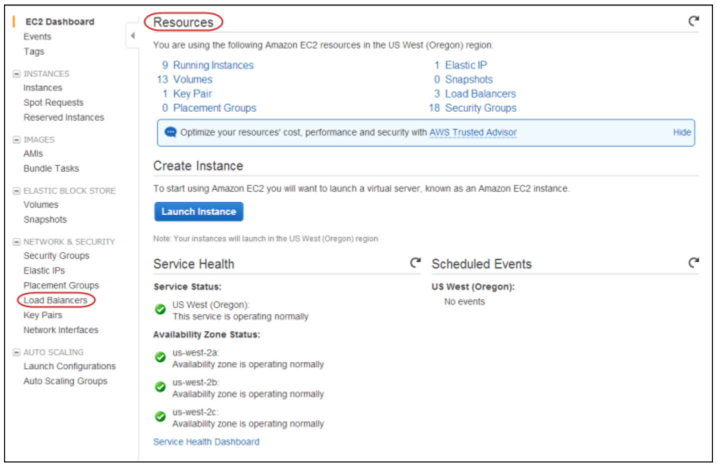
Sign in to Elastic Load Balancing Using the AWS Management Console

The AWS Management Console is a point-and-click web-based interface you can use to access Elastic Load Balancing and other AWS products. You can use the console to make requests to Elastic Load Balancing and other AWS APIs.

Elastic Load Balancing resources can be accessed using the EC2 console in the AWS Management Console.

To sign in to the Elastic Load Balancing using the EC2 console

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the left navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.



You are using the following Amazon EC2 resources in the US West (Oregon) region:

Optimize your resources' cost, performance and security with AWS Trusted Advisor

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

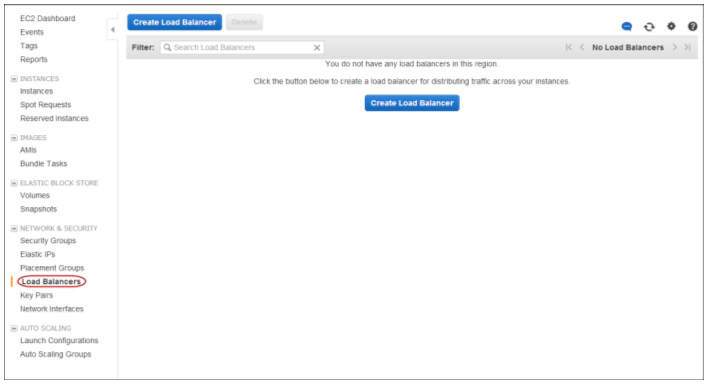
Note: Your instances will launch in the US West (Oregon) region

Service Status:
US West (Oregon):
This service is operating normally

Availability Zone Status:
us-west-2a:
Availability zone is operating normally
us-west-2b:
Availability zone is operating normally
us-west-2c:
Availability zone is operating normally

US West (Oregon):
No events

3. If this is the first time you are accessing Elastic Load Balancing or you do not have any load balancers in the selected region, your Elastic Load Balancing wizard might look something like the following:

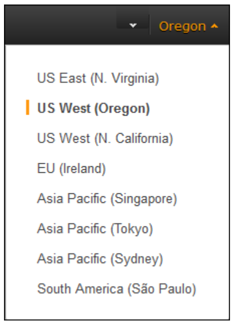


You do not have any load balancers in this region.

Click the button below to create a load balancer for distributing traffic across your instances.

4. The load balancers you create is tied to a region you specify and are not replicated across regions. For more information, see Regions and Endpoints for Elastic Load Balancing (p. 13).

The AWS Management Console selects a region for you by default. The default region is displayed in the navigation bar. If necessary, change the region. From the navigation bar, select the region that meets your needs.



Using AWS Command Line Interface

Amazon Web Services (AWS) provides a command line interface (CLI) that supports the broader set of AWS services, including Elastic Load Balancing. The AWS Command Line Interface (AWS CLI) can be used to control and automate AWS services on Windows, Mac, and Linux.

The AWS CLI is the recommended CLI tool for Elastic Load Balancing.

For more information about AWS CLI and for instructions on installing the AWS CLI tools, step through the following sections in the *AWS Command Line Interface User Guide*.

- What Is the AWS Command Line Interface? provides introduction to the AW CLI.
- Getting Set Up with the AWS Command Line Interface provides instructions on installing and configuring the AWS CLI.

For details about the AWS CLI commands for Elastic Load Balancing, see AWS CLI elb.

Note
The prior Elastic Load Balancing Command Line Interface (ELB CLI) is still available, but not recommended. New features released after ELB CLI version 1.0.35.0 (dated 7/24/14) will be included in AWS CLI. For a list of the ELB CLI versions and the functionality the ELB CLI versions support, see Elastic Load Balancing API Tools.

Use Query Requests to Call Elastic Load Balancing APIs

Elastic Load Balancing provides APIs that you can call by submitting a Query Request. Query requests are HTTP or HTTPS requests that use the HTTP verb GET or POST and a Query parameter named *Action* or *Operation* that specifies the API you are calling. Action is used throughout this documentation, although Operation is also supported for backward compatibility with other Amazon Web Services (AWS) Query APIs.

Calling the API using a Query request is the most direct way to access the web service, but requires that your application handle low-level details such as generating the hash to sign the request, and error handling. The benefit of calling the service using a Query request is that you are assured of having access to the complete functionality of the API.

Note
The Query interface used by AWS is similar to REST, but does not adhere completely to the REST principles.

Signing Query Requests

Query requests travel over the Internet using either HTTP or HTTPS, and are vulnerable to being intercepted and altered in transit. To prevent this and ensure that the incoming request is both from a valid AWS account and unaltered, AWS requires all requests to be signed.

To sign a Query request, you calculate a digital signature using a cryptographic hash function over the text of the request and your AWS secret key. A cryptographic hash is a one-way function that returns unique results based on the input. The input to the hash function includes the text of your request and your secret access key. The hash function returns a hash value that you include in the request as your signature.

When Elastic Load Balancing receives the request, it re-calculates the signature using the request text and the secret key that matches the AWS access key in the request. If the two signatures match, Elastic Load Balancing knows that the query has not been altered and that the request originated from your account. This is one reason why it is important to safeguard your private key. Any malicious user who obtains it would be able to make AWS calls, and incur charges, on your account.

For additional security, you should transmit your requests using Secure Sockets Layer (SSL) by using HTTPS. SSL encrypts the transmission, protecting your request or the response from being viewed in transit. For more information about securing your Query requests, see Making Secure Requests to Amazon Web Services.

The signature format that AWS uses has been refined over time to increase security and ease of use. Elastic Load Balancing supports Signature Version 2 and Signature Version 4. If you are creating new applications that use Elastic Load Balancing, then we recommend using Signature Version 4 for signing your query requests.

For information about how to create the signature using Signature Version 4, see Signature Version 4 Signing Process in the *AWS General Reference*.

For information about how to create the signature using Signature Version 2, see Signature Version 2 Signing Process in the *AWS General Reference*.

Use the AWS SDKs

AWS SDKs make it easier for developers to build applications that tap into cost-effective, scalable, and reliable AWS infrastructure services. With AWS SDKs, you can get started in minutes with a single, downloadable package that includes the library, code samples, and reference documentation. You can access Elastic Load Balancing programmatically using the SDKs in Java, .NET, PHP, or Ruby.

The following table lists the available SDKs and third-party libraries you can use to access Elastic Load Balancing programmatically.

Type of Access	Description
AWS SDKs	AWS provides the following SDKs: • AWS SDK for Java Documentation • AWS SDK for .NET Documentation • AWS SDK for PHP Documentation • AWS SDK for Ruby Documentation
Third-Party Libraries	Developers in the AWS developer community also provide their own libraries, which you can find at the following AWS developer centers: • AWS Java Developer Center • AWS PHP Developer Center • AWS Python Developer Center • AWS Ruby Developer Center • AWS Windows and .NET Developer Center

Next Steps

To get a hands-on introduction to creating your load balancer, see Get Started with Elastic Load Balancing (p. 21).

For information on scenarios specific to load balancers in Amazon EC2, see Elastic Load Balancing in Amazon EC2-Classic (p. 69).

For information on scenarios specific to load balancers in Amazon VPC, see Elastic Load Balancing in Amazon VPC (p. 109).

For information on using the various features supported by Elastic Load Balancing, see Managing Load Balancers (p. 131).

Get Started with Elastic Load Balancing

After you have read What Is Elastic Load Balancing? (p. 1), and you have decided to load balance your Amazon Elastic Compute Cloud (Amazon EC2) instances, it's time to get started with basic load balancing tasks. Your first task will be to create a load balancer.

You can create your load balancer in EC2-Classic or Amazon VPC platforms. For more information, see Supported Platforms (p. 4).

If you are creating a load balancer in EC2-Classic, see Create a Basic Load Balancer in EC2-Classic (p. 21).

If you are creating a load balancer in EC2-VPC, see Create a Basic Load Balancer in EC2-VPC (p. 29).

If you are creating your load balancer in default VPC, see Create a Basic Load Balancer in Default VPC (p. 39).

Create a Basic Load Balancer in EC2-Classic

This getting started tutorial walks you through the process for creating a basic ELB load balancer to load balance your EC2 instances that are launched in EC2-Classic platform.

The following step-by-step instructions will help you create a basic load balancer using the AWS Management Console, a point-and-click web-based interface. Before you get started with the console, be sure you've done the following:

- Sign up for Amazon Web Services (AWS). If you haven't signed up for AWS yet, complete the steps listed in Sign Up for Amazon Web Services(AWS) (p. 16).

  Note
  If you are a *new* AWS customer, you are eligible to use the free usage tier for twelve months following your AWS sign-up date. The free tier includes 750 hours per month of Amazon EC2 Micro Instance usage, and 750 hours per month Elastic Load Balancing plus 15GB of data processing. For more information on what is available on the free tier, go to AWS Free Usage Tier.

- Launch Amazon EC2 instances with HTTP access on port 80. You'll be registering these instances with your load balancer. For more information about launching Amazon EC2 instances, see Launching and Using Instances in the *Amazon Cloud Compute User Guide*.
- Install a webserver, such as Apache or Internet Information Services (IIS), on the EC2 instances you plan to register with the load balancer.

Make sure to create your load balancer in the same region your EC2 instances are launched in.

The following steps outline how to create a basic load balancer in EC2-Classic.

1. Configure the listeners for your load balancer by specifying the ports and protocols to use for the front-end connection (client to load balancer) and the back-end connection (load balancer to back-end instance).
2. Configure a health check for your Amazon EC2 back-end instances.
3. Register your Amazon EC2 instances with the load balancer.
4. Review settings and create your load balancer.
5. Verify that your load balancer is created.
6. [Optional] Delete your load balancer.

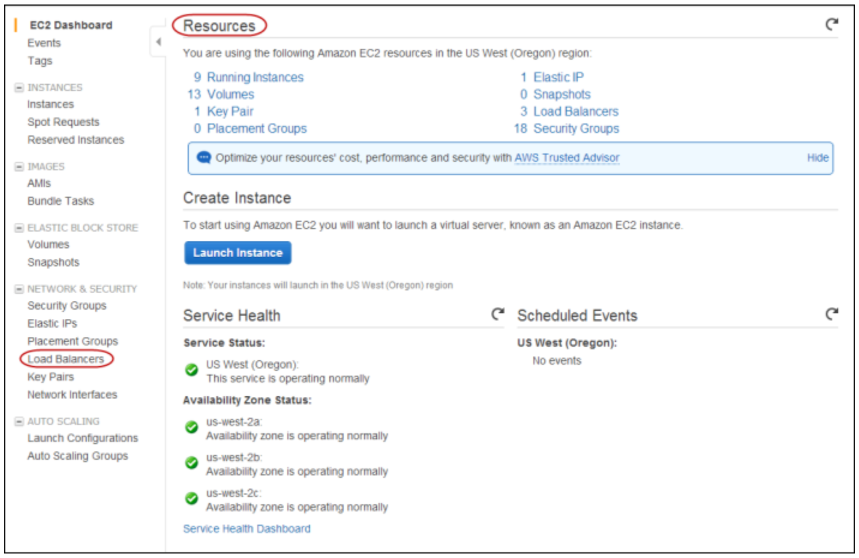
Important
The load balancer you're about to create will be live (and not running in a sandbox). If you are not signed up for free usage tier, you will incur the standard Elastic Load Balancing usage fees for the load balancer until you terminate it. The total charges will be minimal (typically less than a dollar), if you complete the Getting Started in one sitting and delete your load balancer when you are finished. For more information about Elastic Load Balancing usage rates, go to the Elastic Load Balancing Pricing page.

Configure Listeners for Your Load Balancer

To configure listeners for your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. Start the **Create Load Balancer** wizard:

   a. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.



Resources

You are using the following Amazon EC2 resources in the US West (Oregon) region:

9 Running Instances	1 Elastic IP
13 Volumes	0 Snapshots
1 Key Pair	3 Load Balancers
0 Placement Groups	18 Security Groups

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Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Note: Your instances will launch in the US West (Oregon) region

Service Health

Service Status:

US West (Oregon):
This service is operating normally

Availability Zone Status:

us-west-2a:
Availability zone is operating normally

us-west-2b:
Availability zone is operating normally

us-west-2c:
Availability zone is operating normally

Scheduled Events

US West (Oregon):
No events

b. On the **Load Balancers** page, click **Create Load Balancer**.

3. On the **Define Load Balancer** page, make the following selections:

   a. In the **Load Balancer name:** field, enter a name for your load balancer (e.g., **`my-test-load-balancer`**).

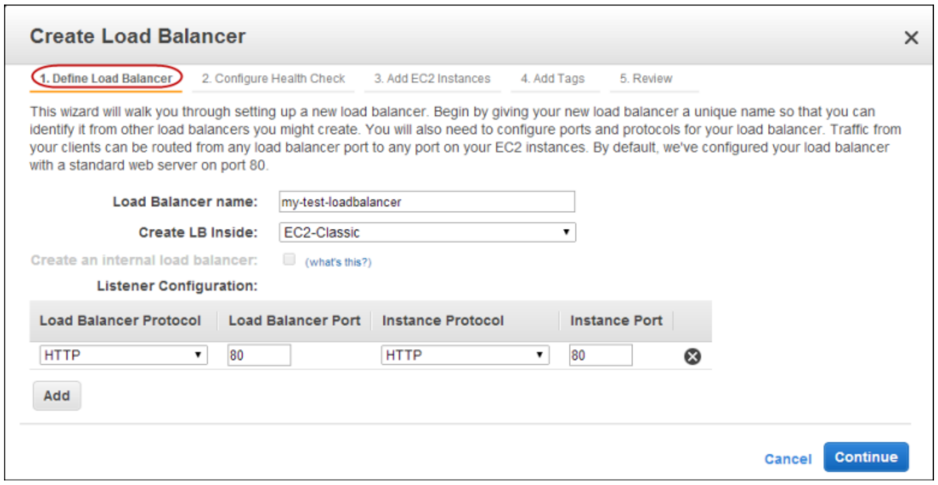
      The load balancer name you choose must be unique within your set of load balancers, must have a maximum of 32 characters, and must only contain alphanumeric characters or hyphens.

   b. Leave **Create LB inside:** field set to `EC2-Classic` for this tutorial.

      Note
      In this tutorial, you are creating a load balancer for your EC2 instances launched within Amazon EC2. If you want to create a load balancer for your EC2 instances inside Amazon Virtual Private Cloud (Amazon VPC), see Create a Basic Load Balancer in EC2-VPC (p. 29)

   c. Leave **Listener Configuration:** fields set to the default values for this example.

      Important
      The default settings require that your Amazon EC2 HTTP servers are active and accepting requests on port 80.



This wizard will walk you through setting up a new load balancer. Begin by giving your new load balancer a unique name so that you can identify it from other load balancers you might create. You will also need to configure ports and protocols for your load balancer. Traffic from your clients can be routed from any load balancer port to any port on your EC2 instances. By default, we've configured your load balancer with a standard web server on port 80.

Load Balancer name: my-test-loadbalancer

Create LB Inside: EC2-Classic

Create an internal load balancer: (what's this?)

Listener Configuration:

Load Balancer Protocol	Load Balancer Port	Instance Protocol	Instance Port
HTTP	80	HTTP	80

4. Click **Continue** to configure health check for your Amazon EC2 instances.

Configure Health Check for Your Amazon EC2 Instances

Elastic Load Balancing routinely checks the health of each load-balanced Amazon EC2 instance based on the configurations that you specify. If Elastic Load Balancing finds an unhealthy instance, it stops sending traffic to the instance and reroutes traffic to healthy instances.

To configure a health check for your Amazon EC2 instances

1. On the **Configure Health Check** page of the **Create Load Balancer** wizard, set the following configurations:

   a. Leave **Ping Protocol** set to its default value of `HTTP`.

   b. Leave **Ping Port** set to its default value of `80`.

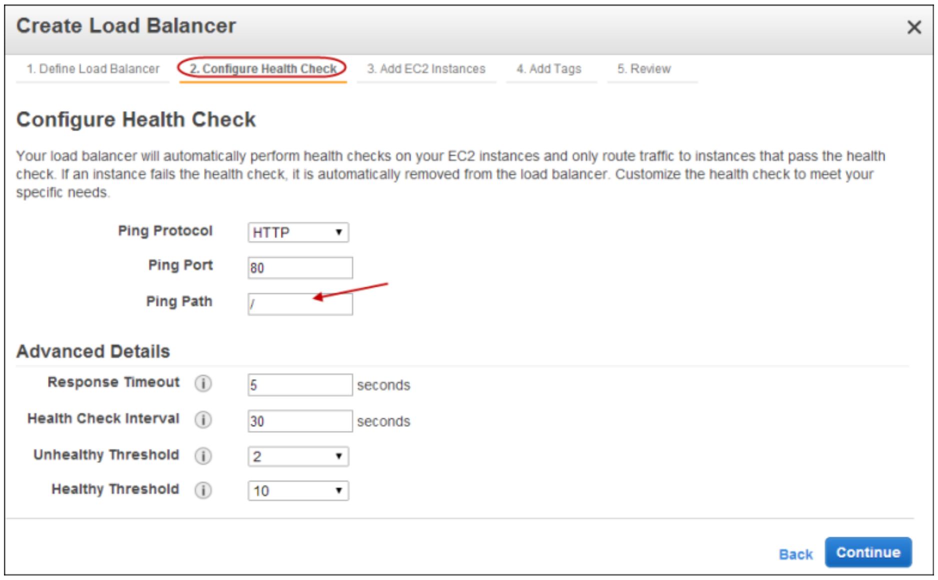
      Elastic Load Balancing pings the port you choose (in this example, port 80) to send health check queries to your Amazon EC2 instances.

      Important
      Your Amazon EC2 instances must accept incoming traffic on the ping port. This example assumes that each of your instances has a working webserver that accepts incoming traffic on port 80.

   c. In the **Ping Path** field, replace the default value with a single forward slash ("/").

      Elastic Load Balancing sends health check queries to the path you specify in **Ping Path**. This example uses a single forward slash so that Elastic Load Balancing sends the query to your webserver's default home page, whether that default page is named `index.html`, `default.html`, or a different name.

   d. Leave the fields in the **Advanced Details** pane set to their default values.



Configure Health Check

Your load balancer will automatically perform health checks on your EC2 instances and only route traffic to instances that pass the health check. If an instance fails the health check, it is automatically removed from the load balancer. Customize the health check to meet your specific needs.

Ping Protocol	HTTP
Ping Port	80
Ping Path	/

Advanced Details

Response Timeout	5 seconds
Health Check Interval	30 seconds
Unhealthy Threshold	2
Healthy Threshold	10

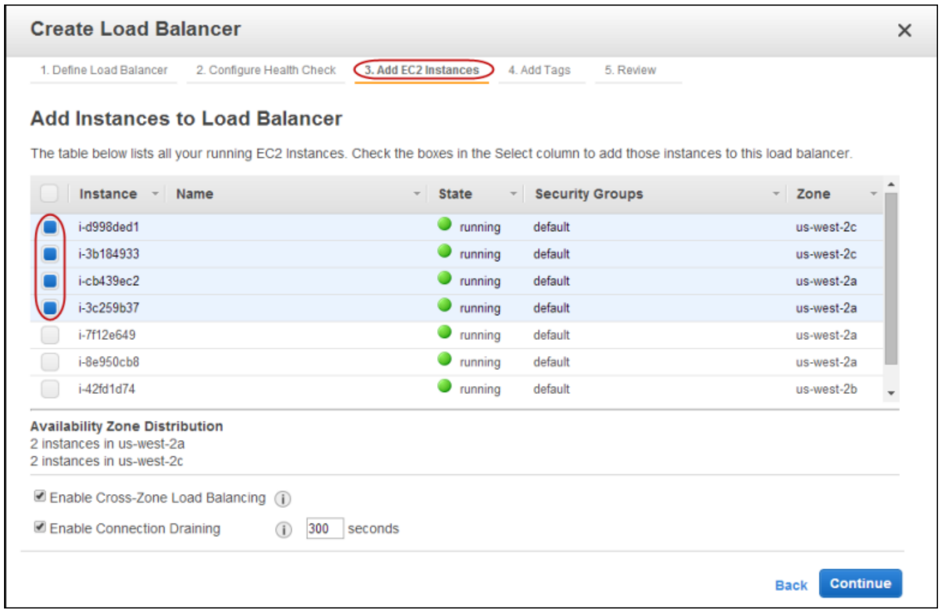
2. Click **Continue** to register your Amazon EC2 instances with your load balancer.

Register Amazon EC2 Instances

Now that you've made your configuration choices you're ready to register your EC2 instances.

To register your Amazon EC2 instances

1. On the **Add EC2 Instances** page, in the **Add Instances to Load Balancer** table, select the boxes in the **Instance** column to register instances with your load balancer.
2. Keep **Enable Cross-Zone Load Balancing** and **Enable Connection Draining** boxes set to the default settings for this tutorial.



Add Instances to Load Balancer

The table below lists all your running EC2 instances. Check the boxes in the Select column to add those instances to this load balancer.

	Instance	Name	State	Security Groups	Zone
✓	i-d998ded1		running	default	us-west-2c
✓	i-3b184933		running	default	us-west-2c
✓	i-cb439ec2		running	default	us-west-2a
✓	i-3c259b37		running	default	us-west-2a
	i-7f12e649		running	default	us-west-2a
	i-8e950cb8		running	default	us-west-2a
	i-42fd1d74		running	default	us-west-2b

Availability Zone Distribution
2 instances in us-west-2a
2 instances in us-west-2c

☑ Enable Cross-Zone Load Balancing
☑ Enable Connection Draining 300 seconds

3. Click **Continue**.
4. For this tutorial, skip the step for adding tags and click **Continue** to review your settings and then create your load balancer.

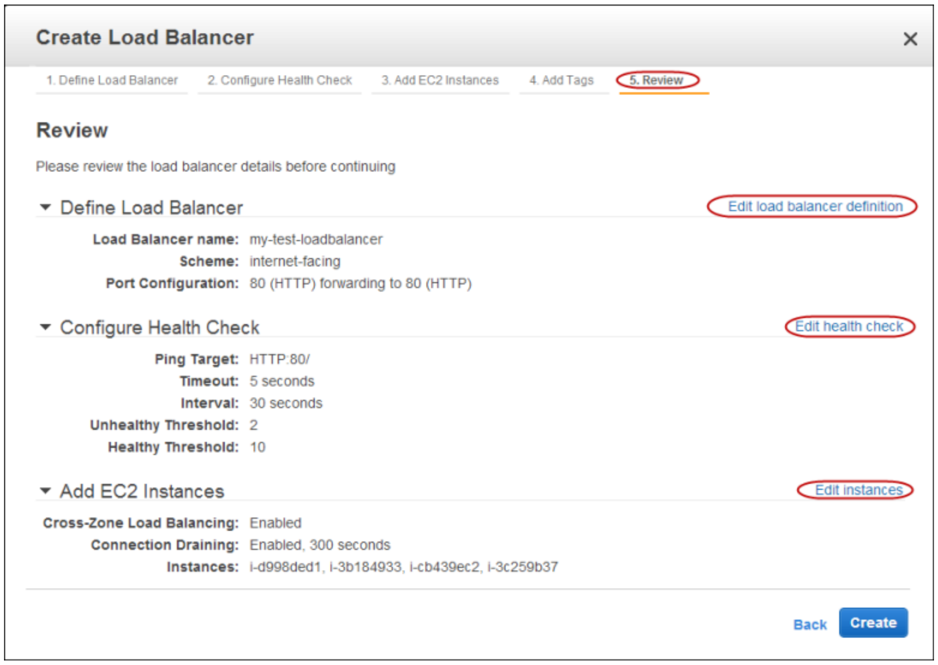
Review Settings and Create Your Load Balancer

Now that you've registered your EC2 instances with your load balancer it's time to review the settings you have selected.

To review your settings

1. On the **Review** page of the **Create Load Balancer** wizard, check your settings. You can make changes by clicking the edit link for each setting.

   Note
   You can modify some of the settings even after you've created your load balancer. For example, you can modify the port configurations, health check configurations, and add or remove EC2 instances from your load balancer. For more information, see Managing Load Balancers (p. 131).



Review

Please review the load balancer details before continuing

Define Load Balancer

Load Balancer name: my-test-loadbalancer
Scheme: internet-facing
Port Configuration: 80 (HTTP) forwarding to 80 (HTTP)

Configure Health Check

Ping Target: HTTP:80/
Timeout: 5 seconds
Interval: 30 seconds
Unhealthy Threshold: 2
Healthy Threshold: 10

Add EC2 Instances

Cross-Zone Load Balancing: Enabled
Connection Draining: Enabled, 300 seconds
Instances: i-d998ded1, i-3b184933, i-cb439ec2, i-3c259b37

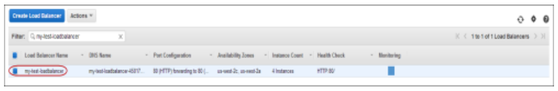
2. Click **Create** to create your load balancer.

Verify the Creation of Your Load Balancer

Now that you've created your load balancer, you're ready to verify its settings.

To verify creation of your load balancer

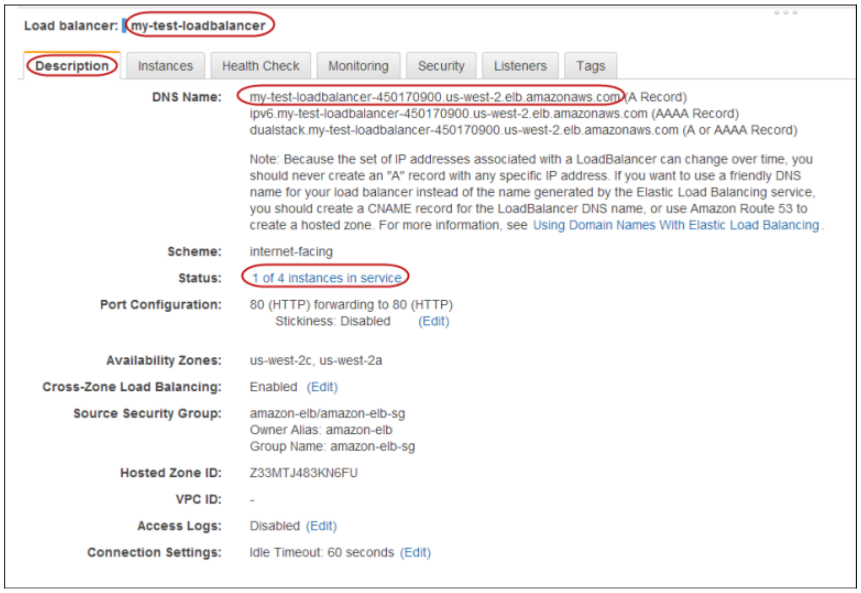
1. The **Create Load Balancer** wizard displays the status of your newly created load balancer. Click **Close** after confirming that your load balancer was successfully created.
2. Your new load balancer now appears in the load balancer list page. Select your load balancer.



Filter: my-test-loadbalancer

Load Balancer Name	DNS Name	Port Configuration	Availability Zones	Instance Count	Health Check	Monitoring
my-test-loadbalancer	my-test-loadbalancer-45017...	80 (HTTP) forwarding to 80 (...	us-west-2c, us-west-2a	4 Instances	HTTP:80/	

3. The bottom pane displays the details of your load balancer. Verify that the descriptions match your specifications.



Load balancer: my-test-loadbalancer

DNS Name:	my-test-loadbalancer-450170900.us-west-2.elb.amazonaws.com (A Record) ipv6.my-test-loadbalancer-450170900.us-west-2.elb.amazonaws.com (AAAA Record) dualstack.my-test-loadbalancer-450170900.us-west-2.elb.amazonaws.com (A or AAAA Record) Note: Because the set of IP addresses associated with a LoadBalancer can change over time, you should never create an "A" record with any specific IP address. If you want to use a friendly DNS name for your load balancer instead of the name generated by the Elastic Load Balancing service, you should create a CNAME record for the LoadBalancer DNS name, or use Amazon Route 53 to create a hosted zone. For more information, see Using Domain Names With Elastic Load Balancing.
Scheme:	internet-facing
Status:	1 of 4 instances in service
Port Configuration:	80 (HTTP) forwarding to 80 (HTTP) Stickiness: Disabled (Edit)
Availability Zones:	us-west-2c, us-west-2a
Cross-Zone Load Balancing:	Enabled (Edit)
Source Security Group:	amazon-elb/amazon-elb-sg Owner Alias: amazon-elb Group Name: amazon-elb-sg
Hosted Zone ID:	Z33MTJ483KN6FU
VPC ID:	-
Access Logs:	Disabled (Edit)
Connection Settings:	Idle Timeout: 60 seconds (Edit)

If the description in the **Status** row indicates that some of your instances are not in service, its probably because your instances are still in the registration process. For more information, see Troubleshooting Elastic Load Balancing: Registering Instances (p. 241).

4. You can test your load balancer after you've verified that at least one of your EC2 instances is *InService*. To test your load balancer, copy the **DNS Name** value that is listed in the **Description** tab and paste it into the address field of an Internet-connected web browser. If your load balancer is working, you will see the default page of your HTTP server.

Congratulations! You've successfully created a basic load balancer. The load balancer is live and has started incurring the standard Elastic Load Balancing usage fees. You can either delete the load balancer now and incur minimal hourly (typically less than a dollar) charges, or you can continue using the load balancer.

Note
If you are a *new* AWS customer and are using the free usage tier, you can continue using the load balancer. Go to AWS Free Usage Tier to check the number of hours available to you.

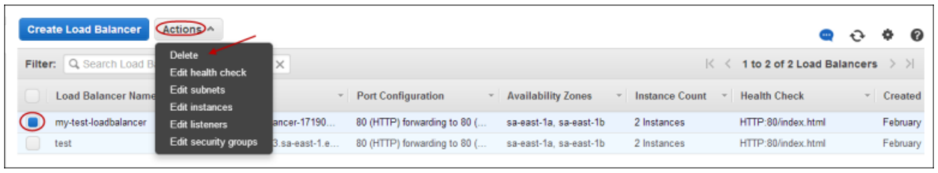
- For information on deleting your load balancer, see the following section.
- Elastic Load Balancing supports the load balancing of applications using HTTP, HTTPS (Secure HTTP), TCP, and SSL (Secure TCP) listener protocols. For a quick overview of the different configurations available for your load balancer, see Elastic Load Balancing Listener Configurations Quick Reference (p. 50).
- For information on some common Elastic Load Balancing user scenarios, and the tasks needed to accomplish efficient distribution of application loads among your Amazon EC2 instances, see Managing Load Balancers (p. 131).
- For information about Elastic Load Balancing usage rates, go to the Elastic Load Balancing product page.

Delete Your Load Balancer

As soon as your load balancer becomes available, you are billed for each hour or partial hour that you keep the load balancer running. After you've decided that you no longer need the load balancer, you can delete it.

To delete your load balancer

1. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
2. On the **Create Load Balancer** page, click the box next to the load balancer you want to delete.
3. Click **Actions** and in the **Actions** drop-down box, click **Delete**.



Load Balancer Name		Port Configuration	Availability Zones	Instance Count	Health Check	Created
my-test-loadbalancer	ancer-17190...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February
test	3.sa-east-1.e...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February

4. In the **Delete Load Balancer** dialog box, click **Yes, Delete**.

   Elastic Load Balancing deletes the load balancer. As soon as the load balancer is deleted, you stop incurring charges for that load balancer.

   Note
   Even after you delete a load balancer, the Amazon EC2 instances associated with the load balancer continue to run. You will continue to incur charges on the Amazon EC2 instances while they are running. For information on stopping your EC2 instances, go to Stopping and Starting Instances in the *Amazon EC2 User Guide*. For information on terminating your EC2 instances, go to Terminate Your Instance.

Create a Basic Load Balancer in EC2-VPC

Amazon Virtual Private Cloud (Amazon VPC) enables you to launch Amazon Web Services (AWS) resources, such as, ELB load balancers and Amazon EC2 instances, into a virtual network that you've defined. You can use a load balancer deployed in Amazon EC2-VPC to monitor and route traffic to your EC2 instances launched within a the same VPC.

This getting started tutorial walks you through the process for creating a basic ELB load balancer for your EC2 instances that are launched in EC2-VPC platform. The load balancer you create in this tutorial will be launched in the same VPC where your EC2 instances are launched.

Before you create your load balancer in a VPC, you must define your VPC by specifying IP addresses in the classless inter-domain routing (CIDR) range of your choice (for example, 10.0.0.0/16). Within this VPC, you launch your load balancer (and EC2 instances) that have private IP addresses from private IP address range of the VPC. Your VPC spans multiple Availability Zones within the region it is created.

You can also create *subnets* within your VPC. A subnet is a range of IP addresses in your VPC. You can use subnets to group your resources based on your security and operational needs. A subnet resides entirely within the Availability Zone and cannot span zones.

After you create your VPC and define your subnets, you can optionally add an Internet gateway to your subnet. An Internet gateway enables your resources to connect to the Internet through the Amazon EC2 network edge. If a subnet's traffic is routed to an Internet gateway, the subnet is known as a *public subnet*. If a subnet's traffic is not routed to an Internet gateway, the subnet is known as a *private subnet*. Use a public subnet for resources that must be connected to the Internet, and a private subnet for resources that need not be connected to the Internet.

If your AWS account comes with a default VPC, your Amazon EC2 instances will be launched in default VPC, by default. To load balance your EC2 instances launched in default VPC, you must create your load balancer in default VPC. For information on how you can tell whether your AWS account comes with default VPC, see Detecting Your Supported Platforms and Whether You Have a Default VPC. For information on creating a basic load balancer within a default VPC, see Create a Basic Load Balancer in Default VPC (p. 39).

The following step-by-step instructions will help you create a basic load balancer in EC2-VPC using the AWS Management Console, a point-and-click web-based interface. Before you get started with the console, be sure you've done the following:

- Sign up for Amazon Web Services (AWS). If you haven't signed up for AWS yet, go to http://aws.amazon.com and click the **Sign Up Now** button.

  Note
  If you are a *new* AWS customer, you are eligible to use the free usage tier for twelve months following your AWS sign-up date. The free tier includes 750 hours per month of Amazon EC2 Micro Instance usage, and 750 hours per month Elastic Load Balancing plus 15GB of data processing. For more information on what is available on the free tier, go to AWS Free Usage Tier.

- This tutorial uses a VPC with one public subnet to create a load balancer in a VPC public subnet that is connected to the Internet.

  Create an Amazon VPC and then create one public subnet in the VPC. If you haven't yet created a VPC and a public subnet, see Getting Started with Amazon VPC for step-by-step instructions for using VPC wizard to create a VPC with a single public subnet.

  Note
  You can skip Step 4: Assign an Elastic IP Address to Your Instance for this tutorial.

- Make a note of the VPC ID, subnet ID, and the security group associated with the VPC. You will need them later when you create your load balancer.

- If you have not already done so, launch Amazon EC2 instances with HTTP access on port 80 into your newly created VPC. For more information about launching Amazon EC2 instances, see Launching and Using Instances in the *Amazon Cloud Compute User Guide*.
- Install a webserver, such as Apache or Internet Information Services (IIS), on the EC2 instances you plan to register with the load balancer.

The following steps outline how to create a basic load balancer in EC2-VPC.

1. Configure the listeners for your load balancer by specifying the ports and protocols to use for the front-end connection (client to load balancer) and the back-end connection (load balancer to back-end instance).

   Specify the VPC in which you want to launch your load balancer.
2. Configure a health check for your Amazon EC2 back-end instances.
3. Select the subnet for your back-end instances.
4. Assign a security group to your load balancer.
5. Register your Amazon EC2 instances with the load balancer.
6. Review settings and create your load balancer.
7. Verify that your load balancer is created.
8. [Optional] Delete your load balancer.

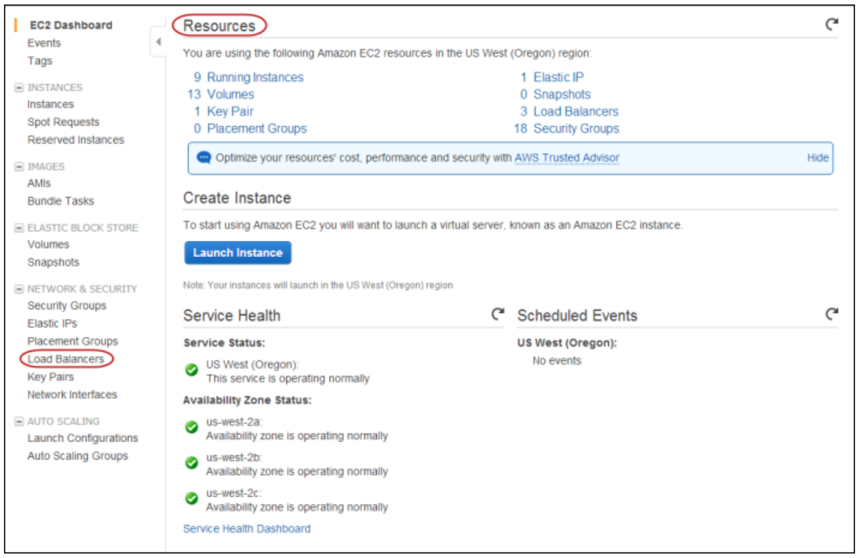
Important
The load balancer you're about to create will be live (and not running in a sandbox). If you are not signed up for the free usage tier, you will incur the standard Elastic Load Balancing usage fees for the load balancer until you terminate it. The total charges will be minimal (typically less than a dollar), if you complete the Getting Started in one sitting and delete your load balancer when you are finished. For more information about Elastic Load Balancing usage rates, go to the Elastic Load Balancing product page.

Configure Listeners for Your Load Balancer

To configure listeners for your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. Start the **Create Load Balancer** wizard:

   a. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.



You are using the following Amazon EC2 resources in the US West (Oregon) region:

Optimize your resources' cost, performance and security with AWS Trusted Advisor

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Note: Your instances will launch in the US West (Oregon) region

Service Status:

US West (Oregon):
This service is operating normally

Availability Zone Status:

us-west-2a:
Availability zone is operating normally

us-west-2b:
Availability zone is operating normally

us-west-2c:
Availability zone is operating normally

US West (Oregon):

No events

b. Click **Create Load Balancer**.

3. On the **Define Load Balancer** page, make the following selections:

   a. Enter a name for your load balancer (e.g., **`my-vpc-loadbalancer`**).

      The load balancer name you choose must be unique within your set of load balancers, must have a maximum of 32 characters, and must only contain alphanumeric characters or hyphens.

   b. Click the arrow in the **Create LB Inside** drop-down box and select the VPC ID you saved after you created your VPC.

   c. Leave the **Create an internal load balancer** box blank for this tutorial.

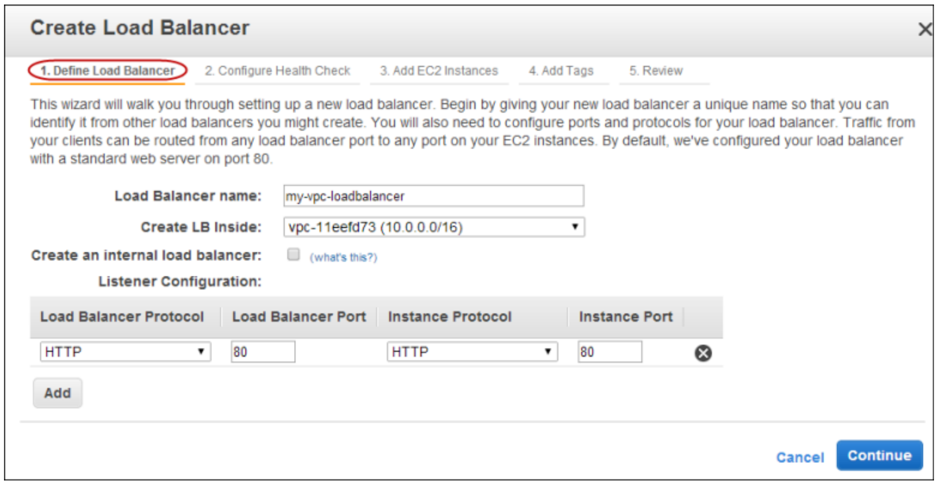
      Note

      In this tutorial, you are creating an Internet-facing load balancer in a public subnet. For more information about internal load balancer, see Internet-facing and Internal Load Balancers (p. 112)

   d. Leave **Listener Configuration** set to the default value for this tutorial.

      Important

      The default settings require that your Amazon EC2 webservers are active and accepting requests on port 80.



This wizard will walk you through setting up a new load balancer. Begin by giving your new load balancer a unique name so that you can identify it from other load balancers you might create. You will also need to configure ports and protocols for your load balancer. Traffic from your clients can be routed from any load balancer port to any port on your EC2 instances. By default, we've configured your load balancer with a standard web server on port 80.

Load Balancer name: my-vpc-loadbalancer
Create LB Inside: vpc-11eefd73 (10.0.0.0/16)
Create an internal load balancer: (what's this?)
Listener Configuration:

Load Balancer Protocol	Load Balancer Port	Instance Protocol	Instance Port
HTTP	80	HTTP	80

4. Click **Continue** to configure health check for your Amazon EC2 instances.

Configure Health Check for Your Amazon EC2 Instances

Elastic Load Balancing routinely checks the health of each load-balanced Amazon EC2 instance based on the configurations that you specify. If Elastic Load Balancing finds an unhealthy instance, it stops sending traffic to the instance and reroutes traffic to healthy instances.

To configure a health check for your Amazon EC2 instances

1. On the **Configure Health Check** page of the **Create a New Load Balancer** wizard, set the following configurations:

   a. Leave **Ping Protocol** set to its default value of `HTTP`.

   b. Leave **Ping Port** set to its default value of `80`.

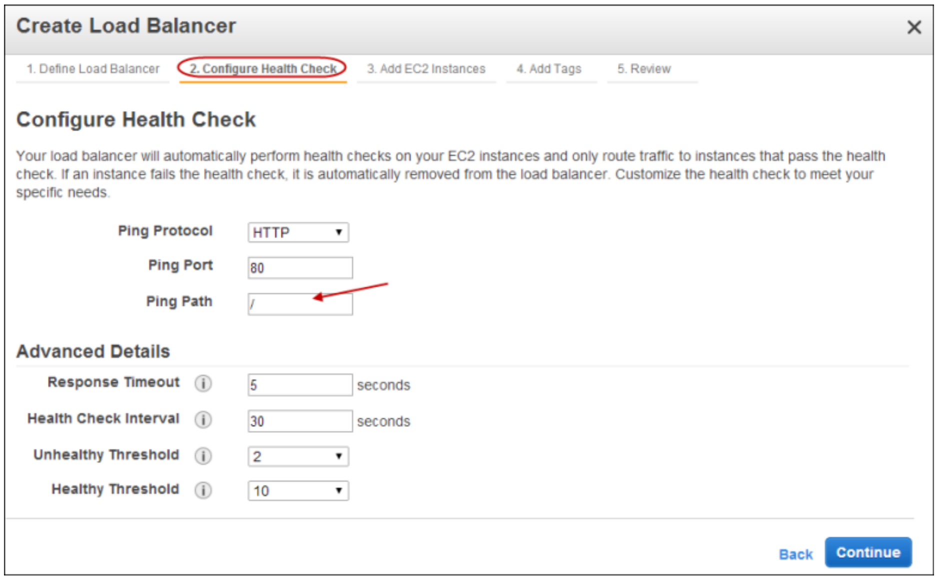
      Elastic Load Balancing pings the port you choose (in this example, port 80) to send health check queries to your Amazon EC2 instances.

      Important
      Your Amazon EC2 instances must accept incoming traffic on the ping port. This example assumes that each of your instances has a working webserver that accepts incoming traffic on port 80.

   c. In the **Ping Path** field, replace the default value with a single forward slash ("/").

      Elastic Load Balancing sends health check queries to the path you specify in **Ping Path**. This example uses a single forward slash so that Elastic Load Balancing sends the query to your webserver's default home page, whether that default page is named `index.html`, `default.html`, or a different name.

   d. Leave the **Advanced Options** set to their default values.



Configure Health Check

Your load balancer will automatically perform health checks on your EC2 instances and only route traffic to instances that pass the health check. If an instance fails the health check, it is automatically removed from the load balancer. Customize the health check to meet your specific needs.

Ping Protocol	HTTP
Ping Port	80
Ping Path	/

Advanced Details

Response Timeout	5 seconds
Health Check Interval	30 seconds
Unhealthy Threshold	2
Healthy Threshold	10

2. Click **Continue** to select the subnet in which you want to launch your load balancer instance.

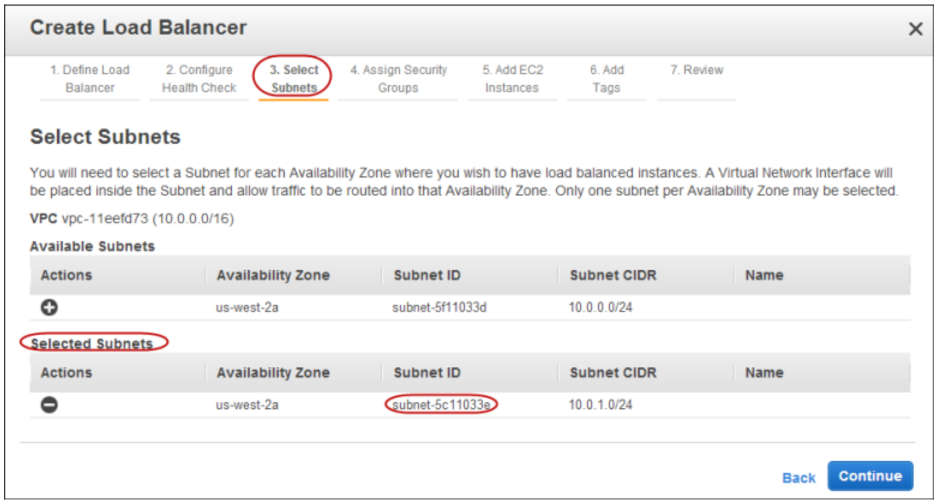
Select a Subnet for Your Back-end Instance

In this step, you select the subnet for your back-end instance.

To select your VPC subnet

- On the **Select Subnets** page, in the **Available Subnets** table, Click the button in the **Action** column to select the subnet ID you saved.

  Your selected subnet is displayed in the **Selected Subnets** table.



Select Subnets

You will need to select a Subnet for each Availability Zone where you wish to have load balanced instances. A Virtual Network Interface will be placed inside the Subnet and allow traffic to be routed into that Availability Zone. Only one subnet per Availability Zone may be selected.

VPC vpc-11eefd73 (10.0.0.0/16)

Available Subnets

Actions	Availability Zone	Subnet ID	Subnet CIDR	Name
⊕	us-west-2a	subnet-5f11033d	10.0.0.0/24	

Selected Subnets

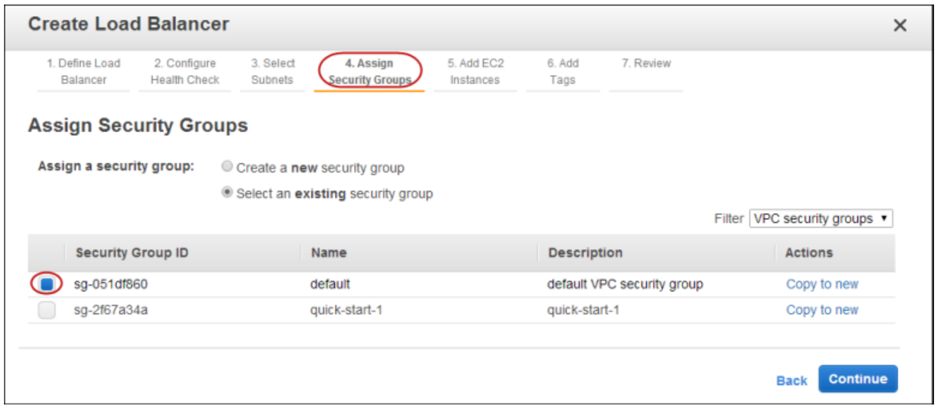
Actions	Availability Zone	Subnet ID	Subnet CIDR	Name
⊖	us-west-2a	subnet-5c11033e	10.0.1.0/24	

Assign a Security Group to Your Load Balancer

To select security group for your load balancer

1. If you use a pre-existing security group, ensure that it allows ingress to the ports that you configured the load balancer to use. If you create a security group in this step, the console will define these ports to be open for you. This tutorial uses the default security group associated with your virtual private cloud.

   On the **Assign Security Groups** page, select **Select an existing Security Groups**, and then select the default VPC security group.



Assign Security Groups

Assign a security group: ○ Create a **new** security group [✓ ● Select an **existing** security group]

Filter: VPC security groups

	Security Group ID	Name	Description	Actions
✓	sg-051df860	default	default VPC security group	Copy to new
	sg-2f67a34a	quick-start-1	quick-start-1	Copy to new

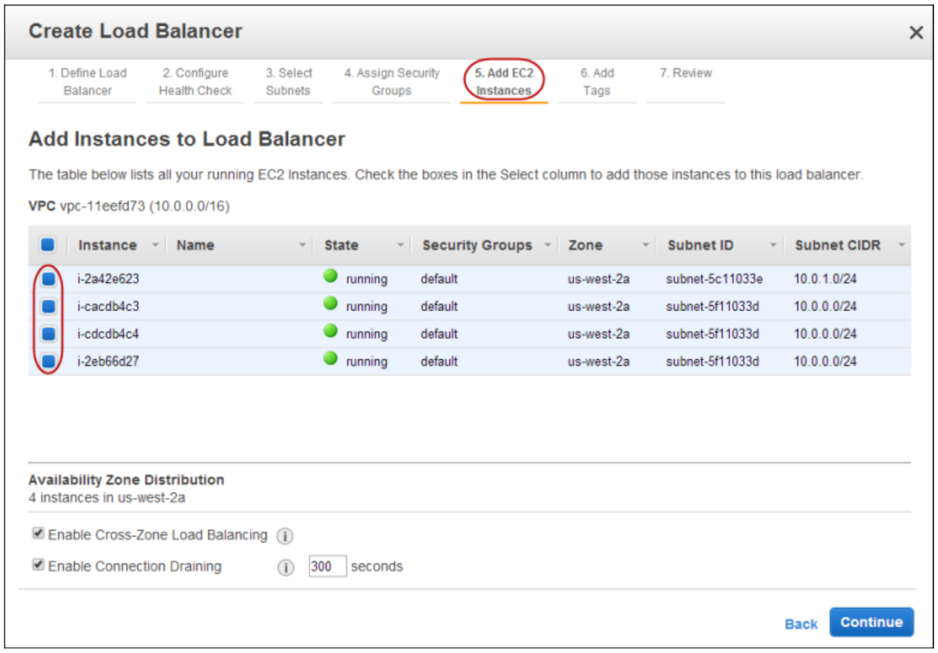
2. Click **Continue** to register EC2 instances with your load balancer.

Register Your Amazon EC2 Instances

Now that you've made your configuration choices you're ready to register your EC2 instances.

To register your EC2 instances launched within VPC with your load balancer

1. On the **Add EC2 Instances** page, in the **Add Instances to Load Balancer** table, select the boxes in the **Instance** column to register instances with your load balancer.
2. Keep **Enable Cross-Zone Load Balancing** and **Enable Connection Draining** boxes set to the default settings for this tutorial.


Create Load Balancer

1. Define Load Balancer · 2. Configure Health Check · 3. Select Subnets · 4. Assign Security Groups · 5. Add EC2 Instances · 6. Add Tags · 7. Review

Add Instances to Load Balancer

The table below lists all your running EC2 Instances. Check the boxes in the Select column to add those instances to this load balancer.

VPC vpc-11eefd73 (10.0.0.0/16)

	Instance	Name	State	Security Groups	Zone	Subnet ID	Subnet CIDR
✓	i-2a42e623		● running	default	us-west-2a	subnet-5c11033e	10.0.1.0/24
✓	i-cacdb4c3		● running	default	us-west-2a	subnet-5f11033d	10.0.0.0/24
✓	i-cdcdb4c4		● running	default	us-west-2a	subnet-5f11033d	10.0.0.0/24
✓	i-2eb66d27		● running	default	us-west-2a	subnet-5f11033d	10.0.0.0/24

Availability Zone Distribution
4 instances in us-west-2a

[✓] Enable Cross-Zone Load Balancing

[✓] Enable Connection Draining 300 seconds

Note
When you register a multi-homed instance (an instance that has an elastic network interface (ENI) attached) with your load balancer, the load balancer will route traffic to the primary IP address of the instance (eth0). For more information on using ENIs, go to Elastic Network Interfaces.

3. Click **Continue**.
4. For this tutorial, skip the step for adding tags. Click **Continue** to review your settings and then create your load balancer.

Review Settings and Create Your Load Balancer

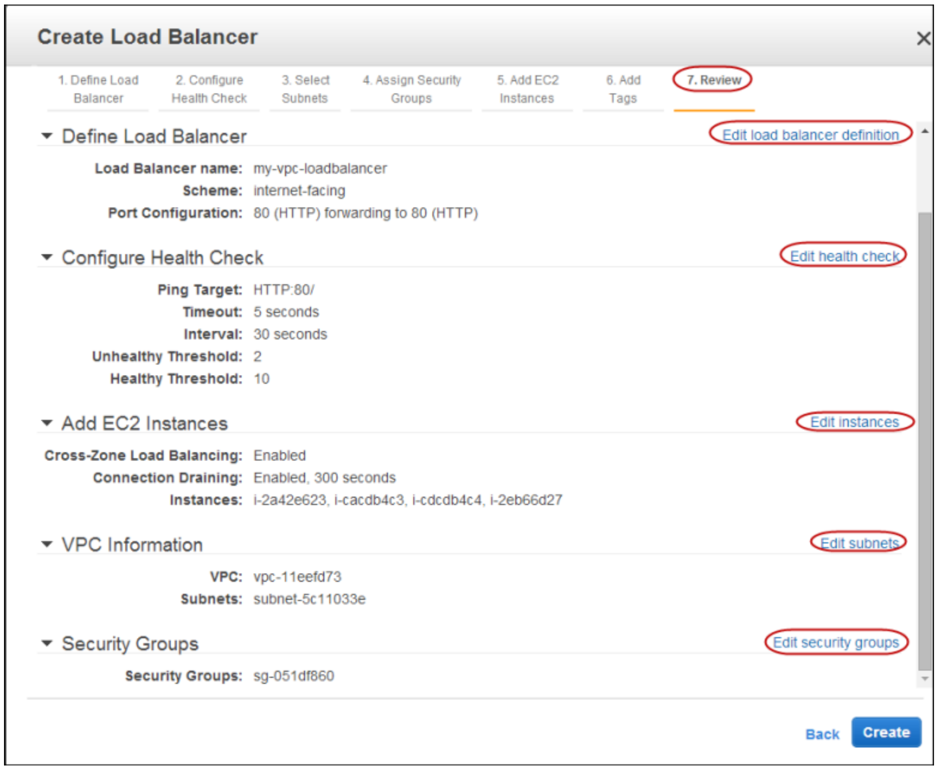
Now that you've registered your EC2 instances with your load balancer it's time to review the settings you have selected.

To review your settings

1. On the **Review** page of the **Create Load Balancer** wizard, check your settings. You can make changes by clicking the edit link for each setting.

   The description in the **Scheme** row indicates that the load balancer is `internet-facing`. This means that your load balancer is created in a public subnet.

   Note
   You can modify some of the settings even after you've created your load balancer. For example, you can modify the port configurations, health check configurations, and add or remove EC2 instances from your load balancer. For more information, see Managing Load Balancers (p. 131).



Define Load Balancer

Load Balancer name: my-vpc-loadbalancer
Scheme: internet-facing
Port Configuration: 80 (HTTP) forwarding to 80 (HTTP)

Configure Health Check

Ping Target: HTTP:80/
Timeout: 5 seconds
Interval: 30 seconds
Unhealthy Threshold: 2
Healthy Threshold: 10

Add EC2 Instances

Cross-Zone Load Balancing: Enabled
Connection Draining: Enabled, 300 seconds
Instances: i-2a42e623, i-cacdb4c3, i-cdcdb4c4, i-2eb66d27

VPC Information

VPC: vpc-11eefd73
Subnets: subnet-5c11033e

Security Groups

Security Groups: sg-051df860

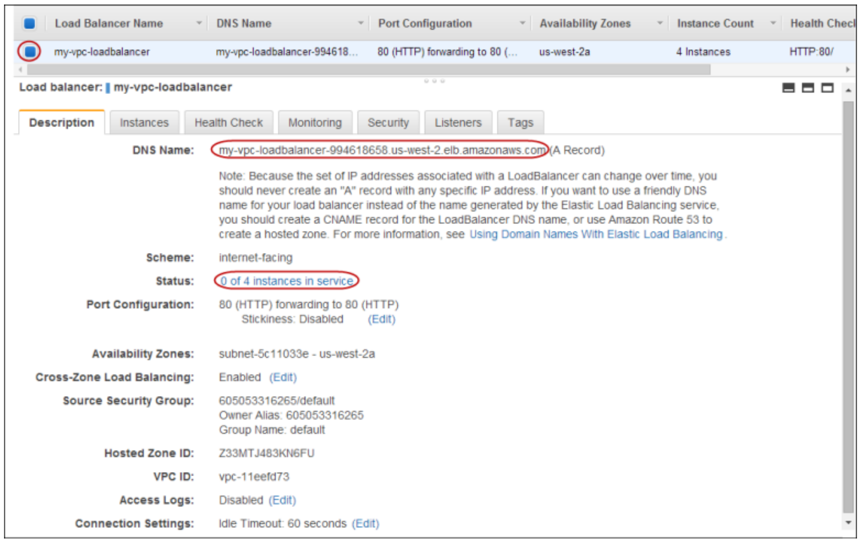
2. Click **Create** to create your load balancer.

Verify Creation of Your Load Balancer

Now that you've created your load balancer, you're ready to verify its settings.

To verify creation of your load balancer

1. The **Create Load Balancer** wizard displays the status of your newly created load balancer. Click **Close** after confirming that your load balancer was successfully created.
2. Your new load balancer now appears in the list. Select the check box next to your load balancer.
3. The bottom pane displays the description of your load balancer. Verify that the descriptions match your specifications.



	Load Balancer Name	DNS Name	Port Configuration	Availability Zones	Instance Count	Health Checl
	my-vpc-loadbalancer	my-vpc-loadbalancer-994618...	80 (HTTP) forwarding to 80 (...	us-west-2a	4 Instances	HTTP:80/

Load balancer: my-vpc-loadbalancer

DNS Name:	my-vpc-loadbalancer-994618658.us-west-2.elb.amazonaws.com (A Record) Note: Because the set of IP addresses associated with a LoadBalancer can change over time, you should never create an "A" record with any specific IP address. If you want to use a friendly DNS name for your load balancer instead of the name generated by the Elastic Load Balancing service, you should create a CNAME record for the LoadBalancer DNS name, or use Amazon Route 53 to create a hosted zone. For more information, see Using Domain Names With Elastic Load Balancing.
Scheme:	internet-facing
Status:	0 of 4 instances in service
Port Configuration:	80 (HTTP) forwarding to 80 (HTTP) Stickiness: Disabled (Edit)
Availability Zones:	subnet-5c11033e - us-west-2a
Cross-Zone Load Balancing:	Enabled (Edit)
Source Security Group:	605053316265/default Owner Alias: 605053316265 Group Name: default
Hosted Zone ID:	Z33MTJ483KN6FU
VPC ID:	vpc-11eefd73
Access Logs:	Disabled (Edit)
Connection Settings:	Idle Timeout: 60 seconds (Edit)

If the description in the **Status** row indicates that some of your instances are not in service, its probably because your instances are still in the registration process. For more information, see Troubleshooting Elastic Load Balancing: Registering Instances (p. 241).

4. You can test your load balancer after you've verified that at least one of your EC2 instances is *InService*. To test your load balancer, copy the **DNS Name** value that is listed in the **Description** tab and paste it into the address field of an Internet-connected web browser. If your load balancer is working, you will see the default page of your webserver.

Congratulations! You've successfully created a basic load balancer. The load balancer is live and has started incurring the standard Elastic Load Balancing usage fees. You can either delete the load balancer now and incur minimal hourly (typically less than a dollar) charges, or you can continue using the load balancer.

Note
If you are a *new* AWS customer and are using the free usage tier, you can continue using the load balancer. Go to AWS Free Usage Tier to check the number of hours available to you.

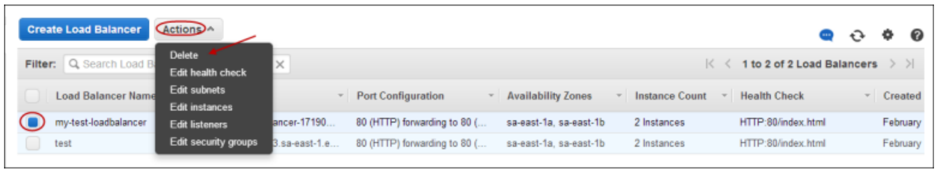
- For information on deleting your load balancer, see the following section.
- Elastic Load Balancing supports the load balancing of applications using HTTP, HTTPS (Secure HTTP), TCP, and SSL (Secure TCP) listener protocols. For a quick overview of the different configurations available for your load balancer, see Elastic Load Balancing Listener Configurations Quick Reference (p. 50).
- For information on some common Elastic Load Balancing user scenarios for Amazon VPC, and the tasks needed to accomplish efficient distribution of application loads among your Amazon EC2 instances in Amazon VPC, see Elastic Load Balancing in Amazon VPC (p. 109).
- For information about Elastic Load Balancing usage rates, go to the Elastic Load Balancing product page.

Delete Your Load Balancer

As soon as your load balancer becomes available, you are billed for each hour or partial hour that you keep the load balancer running. After you've decided that you no longer need the load balancer, you can delete it.

To delete your load balancer

1. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
2. On the **Create Load Balancer** page, click the box next to the load balancer you want to delete.
3. Click **Actions** and in the **Actions** drop-down box, click **Delete**.



Load Balancer Name		Port Configuration	Availability Zones	Instance Count	Health Check	Created
my-test-loadbalancer	ancer-17190...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February
test	3.sa-east-1.e...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February

4. In the **Delete Load Balancer** confirmation window, click **Yes, Delete**.

   Elastic Load Balancing deletes the load balancer. As soon as the load balancer is deleted, you stop incurring charges for that load balancer.

   Note
   Even after you delete a load balancer, the Amazon EC2 instances associated with the load balancer continue to run. You will continue to incur charges on the Amazon EC2 instances while they are running. For information on stopping your EC2 instances, go to Stopping and Starting Instances in the *Amazon EC2 User Guide*. For information on terminating your EC2 instances, go to Terminate Your Instance.

Create a Basic Load Balancer in Default VPC

An Amazon Virtual Private Cloud (Amazon VPC) is defined by specifying IP addresses in the classless inter-domain routing (CIDR) range (for example, 10.0.0.0/16). Within this VPC, you can create your AWS resources, such as ELB load balancers and EC2 instances. The load balancers created within the VPC have private IP addresses from private IP address range of the VPC. The VPC spans multiple Availability Zones within the region it is created.

You can also create *subnets* within a VPC. A subnet is a range of IP addresses in your VPC. You can use subnets to group your instances based on your security and operational needs. A subnet resides entirely within the Availability Zone and cannot span zones.

If your AWS account comes with a default VPC, by default, all your AWS resources, such as EC2 instances, will be created within the default VPC. For information on how you can tell whether your AWS account comes with a default VPC, see Detecting Your Supported Platforms and Whether You Have a Default VPC.

Your default VPC automatically creates a VPC and default subnets in each Availability Zone, among other components. For more information on default VPC set up, see Your Default VPC and Subnets. To load balance your EC2 instances launched in default VPC, you must create your load balancer in default VPC.

This getting started tutorial walks you through the process for creating a basic load balancer in default VPC.

The following step-by-step instructions will help you create a basic load balancer in default VPC using the AWS Management Console, a point-and-click web-based interface. Before you get started with the console, be sure you've done the following:

- Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.

  Note
  If you are a *new* AWS customer, you are eligible to use the free usage tier for twelve months following your AWS sign-up date. The free tier includes 750 hours per month of Amazon EC2 Micro Instance usage, and 750 hours per month Elastic Load Balancing plus 15GB of data processing. For more information on what is available on the free tier, go to AWS Free Usage Tier.

- If you have not already done so, launch your Amazon EC2 instances with HTTP access on port 80 into your default VPC using default subnets and default security group. For more information, see Launching an EC2 Instance into Your Default VPC.
- Install a webserver, such as Apache or Internet Information Services (IIS), on the EC2 instances you plan to register with the load balancer.

The following steps outline how to create a basic load balancer in default VPC.

1. Configure the listeners for your load balancer by specifying the ports and protocols to use for the front-end connection (client to load balancer) and the back-end connection (load balancer to back-end instance).
2. Configure a health check for your Amazon EC2 back-end instances.
3. Assign security groups to your load balancer.
4. Register your Amazon EC2 instances with the load balancer.
5. Review settings and create your load balancer.
6. Verify the creation of your load balancer.
7. [Optional] Delete your load balancer.

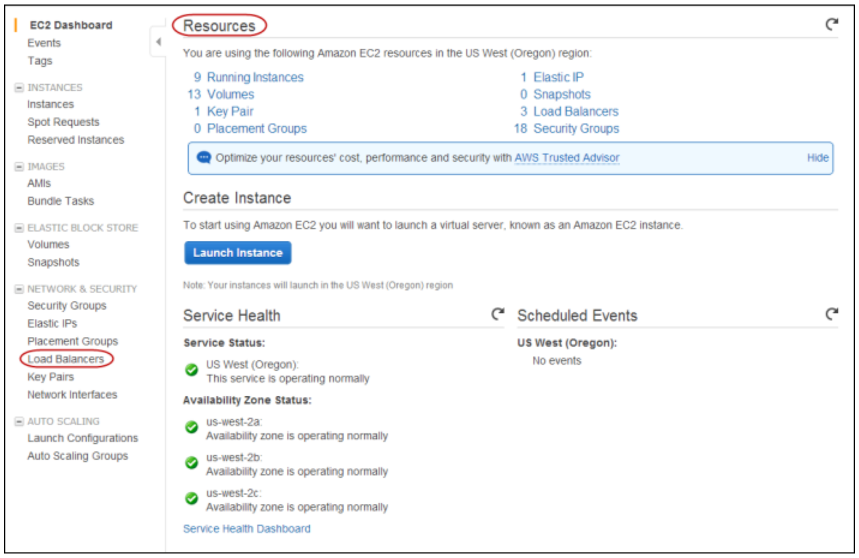
Important
The load balancer you're about to create will be live (and not running in a sandbox). If you are not signed up for the free usage tier, you will incur the standard Elastic Load Balancing usage fees for the load balancer until you terminate it. The total charges will be minimal (typically less than a dollar), if you complete the Getting Started in one sitting and delete your load balancer when you are finished. For more information about Elastic Load Balancing usage rates, go to the Elastic Load Balancing Pricing page.

Configure Listeners for Your Load Balancer

To configure listeners for your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. Start the **Create Load Balancer** wizard:

   a. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.



You are using the following Amazon EC2 resources in the US West (Oregon) region:

9 Running Instances	1 Elastic IP
13 Volumes	0 Snapshots
1 Key Pair	3 Load Balancers
0 Placement Groups	18 Security Groups

Optimize your resources' cost, performance and security with AWS Trusted Advisor

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Note: Your instances will launch in the US West (Oregon) region

Service Status:
US West (Oregon):
This service is operating normally

Availability Zone Status:
us-west-2a:
Availability zone is operating normally
us-west-2b:
Availability zone is operating normally
us-west-2c:
Availability zone is operating normally

US West (Oregon):
No events

   b. Click **Create Load Balancer**.

3. On the **Define Load Balancer** page, make the following selections:

   a. Enter a name for your load balancer (e.g., **`my-test-loadbalancer`**).

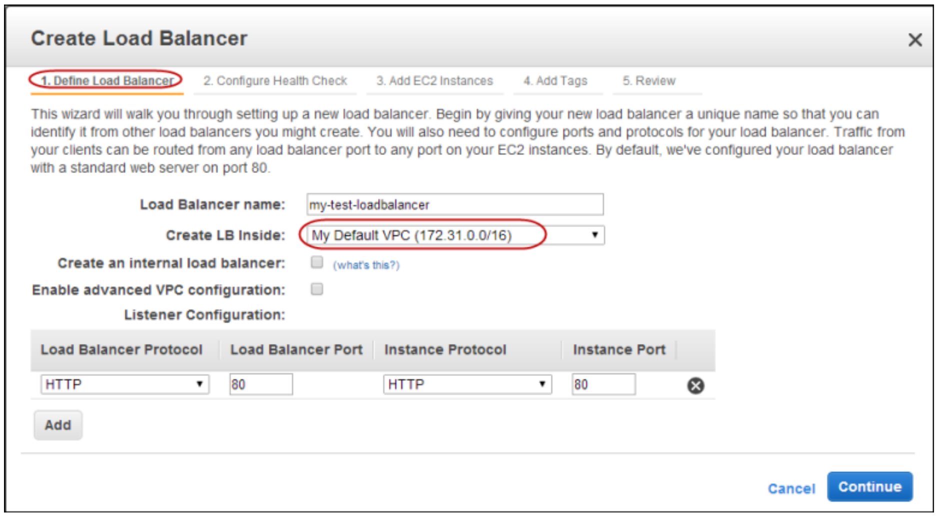
      The load balancer name you choose must be unique within your set of load balancers, must have a maximum of 32 characters, and must only contain alphanumeric characters or hyphens.
   b. Leave the entry in the **Create LB inside:** box set to the default VPC for this tutorial.
   c. Leave **Create an internal load balancer** box blank for this tutorial.

      Note
      In this tutorial, you are creating an Internet-facing load balancer in a public subnet. For more information about internal load balancer, see Internet-facing and Internal Load Balancers (p. 112)
   d. Leave the **Enable advanced VPC configuration:** box blank for this tutorial.

Note
Advanced VPC configuration option allows you to specify your own subnets. Select this option if you have created your own subnets and want to use them instead of the default subnets.

e. Leave **Listener Configuration** set to the default value for this tutorial.

Important
The default settings require that your Amazon EC2 HTTP servers are active and accepting requests on port 80.



This wizard will walk you through setting up a new load balancer. Begin by giving your new load balancer a unique name so that you can identify it from other load balancers you might create. You will also need to configure ports and protocols for your load balancer. Traffic from your clients can be routed from any load balancer port to any port on your EC2 instances. By default, we've configured your load balancer with a standard web server on port 80.

Load Balancer name:	my-test-loadbalancer
Create LB Inside:	My Default VPC (172.31.0.0/16)
Create an internal load balancer:	☐ (what's this?)
Enable advanced VPC configuration:	☐
Listener Configuration:	

Load Balancer Protocol	Load Balancer Port	Instance Protocol	Instance Port
HTTP	80	HTTP	80

4. Click **Continue** to configure the health check for your instances.

Configure Health Check for Your Amazon EC2 Instances

Elastic Load Balancing routinely checks the health of each load-balanced Amazon EC2 instance based on the configurations that you specify. If Elastic Load Balancing finds an unhealthy instance, it stops sending traffic to the instance and reroutes traffic to healthy instances.

To configure a health check for your Amazon EC2 instances

1. On the **Configure Health Check** page of the **Create Load Balancer** wizard, set the following configurations:

   a. Leave **Ping Protocol** set to its default value of `HTTP`.

   b. Leave **Ping Port** set to its default value of `80`.

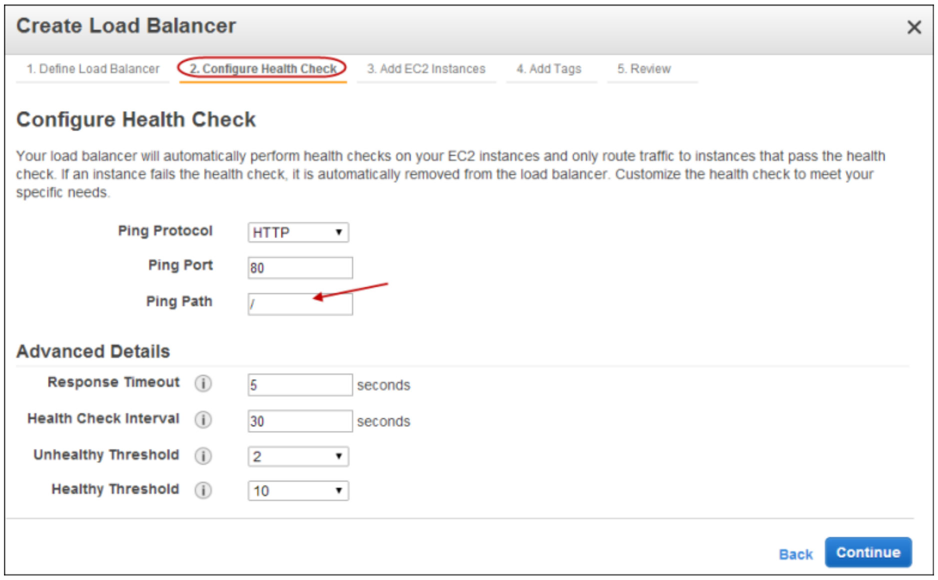
      Elastic Load Balancing pings the port you choose (in this example, port 80) to send health check queries to your Amazon EC2 instances.

      Important
      Your Amazon EC2 instances must accept incoming traffic on the ping port. This example assumes that each of your instances has a webserver installed and accepts incoming traffic on port 80.

   c. In the **Ping Path** field, replace the default value with a single forward slash ("/").

Elastic Load Balancing sends health check queries to the path you specify in **Ping Path**. This example uses a single forward slash so that Elastic Load Balancing sends the query to your webserver's default home page, whether that default page is named `index.html`, `de-fault.html`, or a different name.

d. Leave the **Advanced Options** set to their default values.



Configure Health Check

Your load balancer will automatically perform health checks on your EC2 instances and only route traffic to instances that pass the health check. If an instance fails the health check, it is automatically removed from the load balancer. Customize the health check to meet your specific needs.

Ping Protocol	HTTP
Ping Port	80
Ping Path	/

Advanced Details

Response Timeout	5 seconds
Health Check Interval	30 seconds
Unhealthy Threshold	2
Healthy Threshold	10

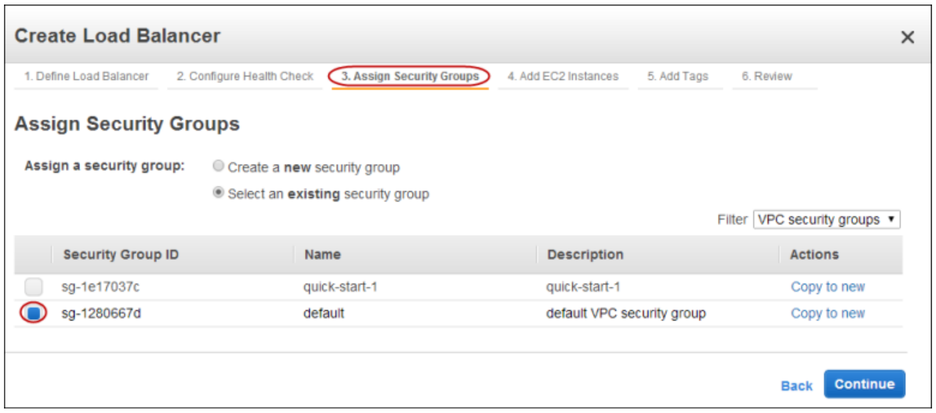
2. Click **Continue** to select security groups to assign to your load balancer.

Assign a Security Group to Your Load Balancer

To select a security group for your load balancer

1. This tutorial uses the default VPC security group associated with your default VPC.

   On the **Assign Security Groups** page, select **Choose from your existing Security Groups** and then select the default VPC security group.



Assign Security Groups

Assign a security group: Create a **new** security group [✓ Select an **existing** security group]

Filter VPC security groups

	Security Group ID	Name	Description	Actions
☐	sg-1e17037c	quick-start-1	quick-start-1	Copy to new
✓	sg-1280667d	default	default VPC security group	Copy to new

If you choose a non-default pre-existing security group, ensure that it allows ingress to the ports that you configured the load balancer to use. If you create a security group in this step, the console will define these ports to be open for you.

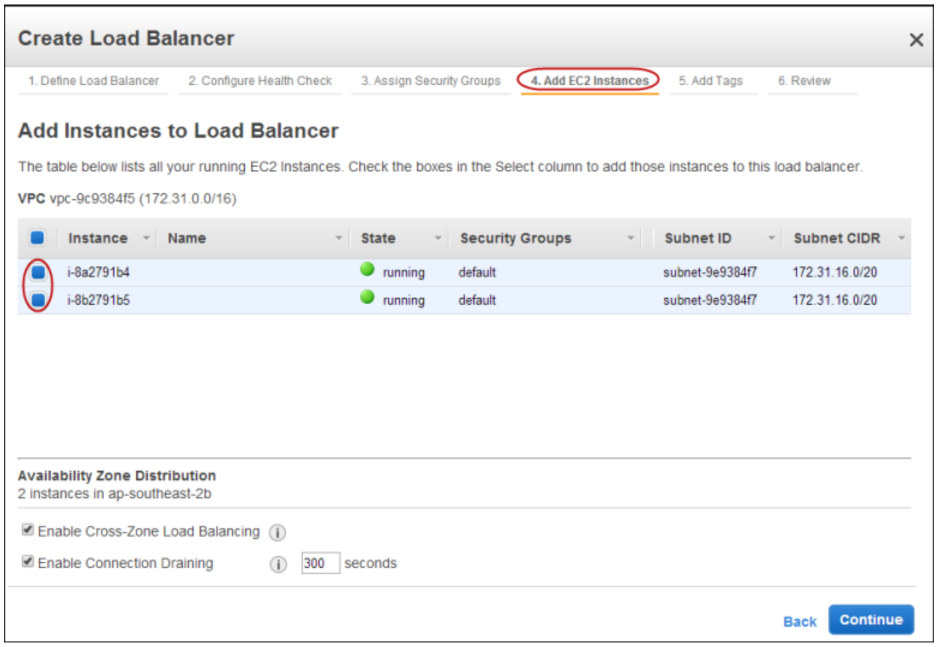
2. Click **Continue** to register your Amazon EC2 instances with your load balancer.

Register Your Amazon EC2 Instances

Now that you've made your configuration choices you're ready to register your EC2 instances with your load balancer.

To register your EC2 instances launched within the default VPC

1. On the **Add EC2 Instances** page, in the **Add Instances to Load Balancer** table, check the boxes in the **Instance** column to register instances to your load balancer.
2. Keep **Enable Cross-Zone Load Balancing** and **Enable Connection Draining** boxes set to the default settings for this tutorial.



Add Instances to Load Balancer

The table below lists all your running EC2 instances. Check the boxes in the Select column to add those instances to this load balancer.

VPC vpc-9c9384f5 (172.31.0.0/16)

	Instance	Name	State	Security Groups	Subnet ID	Subnet CIDR
	i-8a2791b4		running	default	subnet-9e9384f7	172.31.16.0/20
	i-8b2791b5		running	default	subnet-9e9384f7	172.31.16.0/20

Availability Zone Distribution
2 instances in ap-southeast-2b

✓ Enable Cross-Zone Load Balancing
✓ Enable Connection Draining 300 seconds

Note
When you register a multi-homed instance (an instance that has an elastic network interface (ENI) attached) with your load balancer, the load balancer will route traffic to the primary IP address of the instance (eth0). For more information on using ENIs, go to Elastic Network Interfaces.

3. Click **Continue**.
4. For this tutorial, skip the step for adding tags. Click **Continue** to review your settings and then create your load balancer.

Review Settings and Create Your Load Balancer

Now that you've registered your EC2 instances with your load balancer it's time to review the settings you have selected.

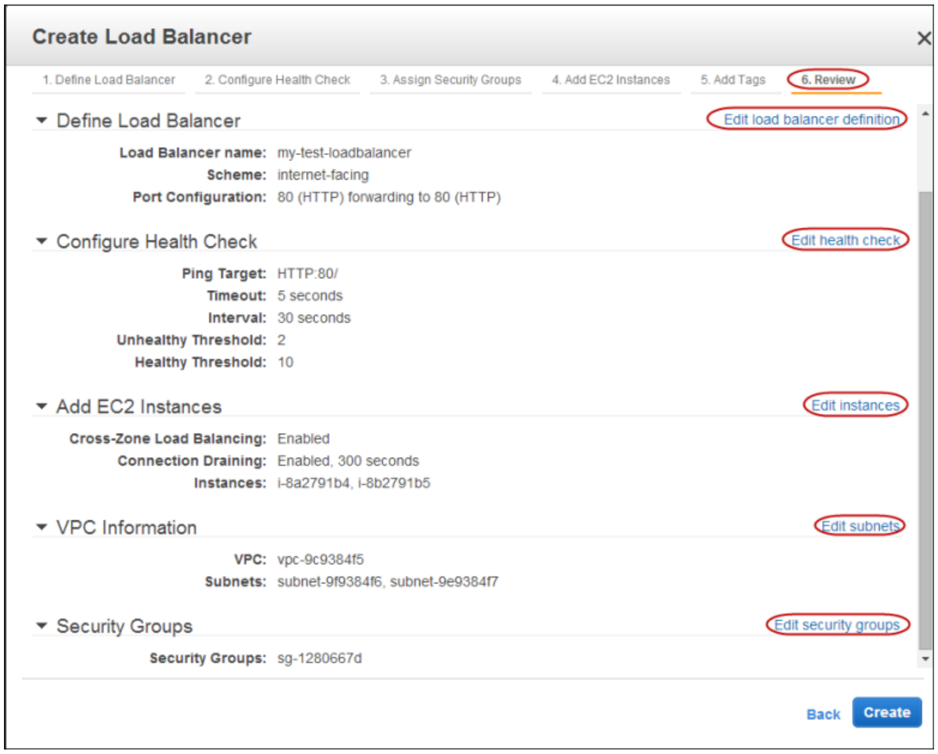
To review your settings

1. On the **Review** page of the **Create Load Balancer** wizard, check your settings. You can make changes by clicking the edit link for each setting.

   The description in the **Scheme** row indicates that the load balancer is `internet-facing`. This means that your load balancer has a publicly resolvable DNS name that resolves to public IP addresses.

   The VPC and subnets listed under **VPC Information** are the default VPC and default subnets automatically created for your AWS account.

   Note
   You can modify some of the settings even after you've created your load balancer. For example, you can modify the port configurations, health check configurations, and add or remove EC2 instances from your load balancer. For more information, see Elastic Load Balancing in Amazon VPC (p. 109).



Load Balancer name:	my-test-loadbalancer
Scheme:	internet-facing
Port Configuration:	80 (HTTP) forwarding to 80 (HTTP)
Ping Target:	HTTP:80/
Timeout:	5 seconds
Interval:	30 seconds
Unhealthy Threshold:	2
Healthy Threshold:	10
Cross-Zone Load Balancing:	Enabled
Connection Draining:	Enabled, 300 seconds
Instances:	i-8a2791b4, i-8b2791b5
VPC:	vpc-9c9384f5
Subnets:	subnet-9f9384f6, subnet-9e9384f7
Security Groups:	sg-1280667d

2. Click **Create** to create your load balancer.

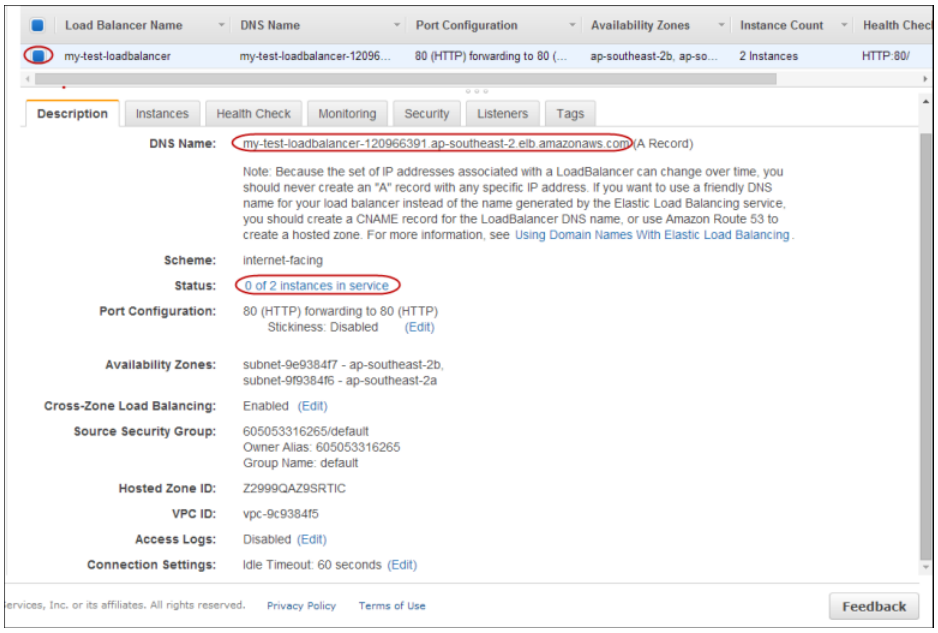
Verify Creation of Your Load Balancer

Now that you've created your load balancer, you're ready to verify its settings.

To verify your load balancer is created

1. The **Create Load Balancer** wizard displays the status of your newly created load balancer. Click **Close** after confirming that your load balancer was successfully created.
2. Your new load balancer now appears in the load balancer list. Select the check box next to your load balancer.

3. The bottom pane displays the description of the selected load balancer. Verify that the descriptions match your specifications.



	Load Balancer Name	DNS Name	Port Configuration	Availability Zones	Instance Count	Health Chec
●	my-test-loadbalancer	my-test-loadbalancer-12096...	80 (HTTP) forwarding to 80 (...	ap-southeast-2b, ap-so...	2 Instances	HTTP:80/

Description | Instances | Health Check | Monitoring | Security | Listeners | Tags

DNS Name:	my-test-loadbalancer-120966391.ap-southeast-2.elb.amazonaws.com (A Record) Note: Because the set of IP addresses associated with a LoadBalancer can change over time, you should never create an "A" record with any specific IP address. If you want to use a friendly DNS name for your load balancer instead of the name generated by the Elastic Load Balancing service, you should create a CNAME record for the LoadBalancer DNS name, or use Amazon Route 53 to create a hosted zone. For more information, see Using Domain Names With Elastic Load Balancing.
Scheme:	internet-facing
Status:	0 of 2 instances in service
Port Configuration:	80 (HTTP) forwarding to 80 (HTTP) Stickiness: Disabled (Edit)
Availability Zones:	subnet-9e9384f7 - ap-southeast-2b, subnet-9f9384f6 - ap-southeast-2a
Cross-Zone Load Balancing:	Enabled (Edit)
Source Security Group:	605053316265/default Owner Alias: 605053316265 Group Name: default
Hosted Zone ID:	Z2999QAZ9SRTIC
VPC ID:	vpc-9c9384f5
Access Logs:	Disabled (Edit)
Connection Settings:	Idle Timeout: 60 seconds (Edit)

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If the description in the **Status** row indicates that some of your instances are not in service, its probably because your instances are still in the registration process. For more information, see Troubleshooting Elastic Load Balancing: Registering Instances (p. 241).

4. You can test your load balancer after you've verified that at least one of your EC2 instances is *InService*. To test your load balancer, copy the **DNS Name** value that is listed in the **Description** tab and paste it into the address field of an Internet-connected web browser. If your load balancer is working, you will see the default page of your HTTP server.

Congratulations! You've successfully created a basic load balancer in default VPC. The load balancer is live and has started incurring the standard Elastic Load Balancing usage fees. You can either delete the load balancer now and incur minimal hourly (typically less than a dollar) charges, or continue using the load balancer.

Note

If you are a *new* AWS customer and are using the free usage tier, you can continue using the load balancer. Go to AWS Free Usage Tier to check the number of hours available to you.

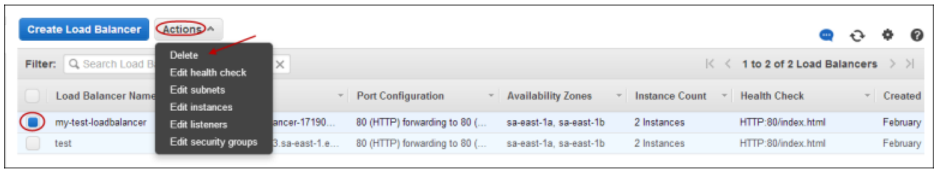
- For information on deleting your load balancer, see the following section.
- Elastic Load Balancing supports the load balancing of applications using HTTP, HTTPS (Secure HTTP), TCP, and SSL (Secure TCP) listener protocols. For a quick overview of the different configurations available for your load balancer, see Elastic Load Balancing Listener Configurations Quick Reference (p. 50).
- For information on some common Elastic Load Balancing user scenarios, and the tasks needed to accomplish efficient distribution of application loads among your Amazon EC2 instances in Amazon VPC, see Elastic Load Balancing in Amazon VPC (p. 109).
- For information about Elastic Load Balancing usage rates, go to the Elastic Load Balancing product page.

Delete Your Load Balancer

As soon as your load balancer becomes available, you are billed for each hour or partial hour that you keep the load balancer running. After you've decided that you no longer need the load balancer, you can delete it.

To delete your load balancer

1. On the Amazon EC2 console Getting Started page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
2. Select the check box next to the load balancer you want to delete, and then click **Delete**.



Load Balancer Name		Port Configuration	Availability Zones	Instance Count	Health Check	Created
my-test-loadbalancer	ancer-17190...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February
test	3.sa-east-1.e...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February

3. In the **Delete Load Balancer** window, click **Yes, Delete**.

   Elastic Load Balancing deletes the load balancer. As soon as the load balancer is deleted, you stop incurring charges for that load balancer.

   Note
   Even after you delete a load balancer, the Amazon EC2 instances associated with the load balancer continue to run. You will continue to incur charges on the Amazon EC2 instances while they are running. For information on stopping your EC2 instances, go to Stopping and Starting Instances in the *Amazon EC2 User Guide*. For information on terminating your EC2 instances, go to Terminate Your Instance.

Listener Configurations for Elastic Load Balancing

A typical web application communication goes through layers of hardware and software. Each layer provides a specific communication function. The control over the communication function is passed from one layer to the next, in sequence. The Open System Interconnection (OSI) defines a model framework for implementing a standard format for communication, called a *protocol*, in these layers. For detailed information about the layers of the OSI model, go to http://en.wikipedia.org/wiki/OSI_model.

When you use Elastic Load Balancing, you need to have a basic understanding of two layers: layer 4 and layer 7. Layer 4 is the transport layer that describes the Transmission Control Protocol (TCP) connection between the client and your back-end instance, through the load balancer. Layer 4 is the lowest level that is configurable for your load balancer. Layer 7 is the application layer that describes the use of Hypertext Transfer Protocol (HTTP) and HTTPS (secure HTTP) connections from clients to the load balancer and from the load balancer to your back-end instance.

You also need to have an understanding of the Secure Sockets Layer (SSL) protocol. The SSL protocol is primarily used to encrypt confidential data over insecure networks such as the Internet. The SSL protocol establishes a secure connection between a client and the back-end server and ensures that all the data passed between your client and your server is private and integral.

Listeners

Before you start using Elastic Load Balancing, you have to configure the *listeners* for your load balancer. A listener is a process that listens for connection requests. It is configured with a protocol and a port number for front-end (client to load balancer) and back-end (load balancer to back-end instance) connections.

Elastic Load Balancing supports the load balancing of applications using HTTP, HTTPS (secure HTTP), TCP, and SSL (secure TCP) protocols. The HTTPS uses the SSL protocol to establish secure connections over the HTTP layer. You can also use SSL protocol to establish secure connections over the TCP layer.

The acceptable ports for both HTTPS/SSL and HTTP/TCP connections are 25, 80, 443, and 1024-65535.

You can specify the protocols for the front-end connections (client to load balancer) and the back-end connections (load balancer to back-end instance) independently. The front-end connection and the back-end connection must be from the same layer. For example, if your front-end connection is using the TCP or SSL protocol then your back-end connection can either be TCP or SSL. If the front-end connection of your load balancer is using HTTP or HTTPS then your back-end connections can either be HTTP or HTTPS.

By default, your load balancer is set to use the HTTP protocol with port 80 for the front-end connection and the back-end connection. The default settings can be changed using the AWS Management Console, the Query API, the command line interface (CLI), or the SDKs.

Using TCP/SSL Protocol with Elastic Load Balancing

When you use TCP (layer 4) for both front-end and back-end connections, your load balancer will forward the request to the back-end instances without modification to the headers. Because load balancers intercept traffic between clients and your back-end instances, the access logs from your back-end instance contain the IP address of the load balancer instead of the originating client. You can enable Proxy Protocol, which adds a header containing the connection information, such as the source IP address, the destination IP address, and the port numbers of the client. The header is then sent to the back-end instance as a part of the request. You can parse the first line in the request to retrieve the connection information. For information about enabling Proxy Protocol, see Enable or Disable Proxy Protocol Support (p. 169).

If you use SSL (secure TCP) for your front-end connection, you will have to install an SSL server certificate on your load balancer. The load balancer uses the certificate to first terminate and then decrypt the requests before sending the requests to the back-end instances. With this configuration, you can also choose to configure ciphers for SSL negotiation between your client and the load balancer.

This configuration will not insert cookies for session stickiness or the X-Forwarded-* headers.

Using HTTP/HTTPS Protocol with Elastic Load Balancing

When you use HTTP (layer 7) for both front-end and back-end connections, your load balancer parses the headers in the request and terminates the connection before re-sending the request to the registered instance(s). This is the default configuration provided by Elastic Load Balancing.

When you use HTTP/HTTPS, the load balancer inserts or updates the X-Forwarded-For (p. 12) headers and can insert or update cookies for sticky sessions. For more information on sticky sessions, see Sticky Sessions (p. 9).

If you use HTTPS for your front-end listener, you must install an SSL server certificate on your load balancer. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances. With this configuration, you can also choose to configure ciphers for SSL negotiation between your client and the load balancer.

Not all HTTP extensions are supported in the load balancer. In some cases you will need to use a TCP listener if the load balancer is not able to terminate the request due to unexpected methods, response codes, or other non-standard HTTP 1.0/1.1 implementations.

Using SSL Server Certificates

If you use HTTPS or SSL for your front-end listener, you must install an SSL certificate on your load balancer. The load balancer uses the certificate to terminate the connection and then decrypt requests from clients before sending them to the back-end instances.

The SSL protocol uses an X.509 certificate (SSL server certificate) to authenticate both the client and the back-end application. The X.509 certificate is a digital form of identification issued by a certificate authority (CA) and contains identification information, a validity period, a public key, a serial number, and the digital signature of the issuer.

Before you can install the SSL certificate on your load balancer, you must create the certificate, get the certificate signed by a CA, and then upload the certificate using the AWS Identity and Access Management (AWS IAM) service.

The SSL certificate comes with a validity period. You must replace the certificate after its validity period ends.

For information on SSL certificates see SSL Certificate for Elastic Load Balancing (p. 61).

Using SSL Negotiation Configuration with Elastic Load Balancing

If you choose HTTPS/SSL for your front-end connection, you can either use the predefined SSL negotiation configuration provided by Elastic Load Balancing or create a custom SSL negotiation configuration based on your specific requirements.

Elastic Load Balancing provides security policies that have predefined SSL negotiation configurations. These configurations are used for SSL negotiation when a connection is established between a client and your load balancer. The SSL negotiation configurations provide compatibility with a broad range of clients and use high-strength cryptographic algorithms called *ciphers*. However, some use cases might require all data on the network to be encrypted and allow only specific ciphers. Some security compliance standards (such as PCI, SOX, and so on) might require a specific set of protocols and ciphers from clients to ensure that the security standards are met. In such cases, Elastic Load Balancing provides options for selecting different configurations for protocols and ciphers, based on your specific requirements. Depending on the number of nodes, your ciphers and protocols should take effect within 30 seconds.

For information about the predefined SSL negotiation configurations used by Elastic Load Balancing, see SSL Negotiation Configurations for Elastic Load Balancing (p. 54). For information on how to configure the ciphers and protocols, see Step 2: Configure SSL Security Policy (p. 74).

Advantages of Using the HTTPS/SSL Protocol with Elastic Load Balancing

Elastic Load Balancing provides SSL support for connections between clients and the load balancer and also for connections between the load balancer and your back-end application instances. Support for an end-to-end HTTPS/SSL connection enables traffic encryption on those network segments that initiate HTTPS/SSL connections.

There are several advantages to using HTTPS/SSL connections with your load balancer:

- The SSL server certificate used to terminate client connections can be managed centrally on the load balancer, rather than on every individual application instance.
- The work of encrypting and decrypting SSL traffic moves from the application instance to the load balancer.
- The load balancer can ensure session affinity or "sticky sessions" by terminating the incoming HTTPS request and then re-encrypting the content to send to the back-end application instance.
- All of the features available for HTTP can be used with HTTPS connections.

Using Back-End Server Authentication with Elastic Load Balancing

If want to use an SSL protocol but do not want to terminate the connection on your load balancer, you can use a TCP protocol for connection from the client to your load balancer, use the SSL protocol for connection from the load balancer to your back-end application, and install certificates on all the back-end instances handling requests.

If you choose to use an HTTPS/SSL connection for your back end, you can enable authentication on your back-end instance. This authentication can be used to ensure that back-end instances accept only encrypted communication and to ensure that the back-end instance has the correct certificates.

You can install any certificate you want on your back-end instances, including a self-signed certificate.

For a quick reference to the listener configurations supported by Elastic Load Balancing, see Elastic Load Balancing Listener Configurations Quick Reference (p. 50).

Elastic Load Balancing Listener Configurations Quick Reference

The following table summarizes the listener settings that you can use to configure your load balancer.

HTTP/HTTPS Load Balancing

Use Case	Front-End Protocol	Front-End Optional Configuration	Back-End Protocol	Back-End Optional Configuration	Notes
Basic HTTP load balancer.	HTTP	NA	HTTP	NA	• Default setting. • Supports X-Forwarded-For (p. 12) header. • Supports Sticky Sessions (p. 9).

Use Case	Front-End Protocol	Front-End Optional Configuration	Back-End Protocol	Back-End Optional Configuration	Notes
Secure website or application using Elastic Load Balancing to offload SSL decryption.	HTTPS	SSL Negotiation Configurations (p. 54)	HTTP	NA	• Supports Sticky Sessions (p. 9). • Supports X-Forwarded-For (p. 12) header. • Requires SSL Certificate (p. 61) installed on the load balancer.
Secure website or application using end-to-end encryption with Elastic Load Balancing providing X-Forward headers and sticky sessions.	HTTPS	SSL Negotiation Configurations (p. 54)	HTTPS	Back-end authentication	• Supports Sticky Sessions (p. 9). • Supports X-Forwarded-For (p. 12) header. • Requires SSL Certificate (p. 61) installed on the load balancer and on the registered instances.

The following quick reference table shows you the listener configuration options for typical TCP/SSL load balancer use cases.

TCP/SSL Load Balancing

Use Case	Front-End Protocol	Front-End Optional Configuration	Back-End Protocol	Back-End Optional Configuration	Notes
Basic TCP load balancer.	TCP	NA	TCP	NA	• Basic TCP load balancing. • Supports Proxy Protocol (p. 10) header.

Use Case	Front-End Protocol	Front-End Optional Configuration	Back-End Protocol	Back-End Optional Configuration	Notes
Secure website or application using Elastic Load Balancing to offload SSL decryption.	SSL	SSL Negotiation Configurations (p. 54)	TCP	NA	• Supports Proxy Protocol (p. 10) header. • Requires SSL Certificate (p. 61) installed on the load balancer.
Secure website or application using end-to-end encryption with Elastic Load Balancing.	SSL	SSL Negotiation Configurations (p. 54)	SSL	Back-end authentication	• Supports Proxy Protocol (p. 10) header. • Requires SSL Certificate (p. 61) installed on the load balancer and on the registered instances.

Next Steps

For configuring listeners:

- To learn how to set up a basic HTTP/TCP load balancer using the AWS Management Console, see Get Started with Elastic Load Balancing (p. 21).
- For information on how to set up an HTTPS/SSL load balancer with cipher settings and back-end authentication, see Create a HTTPS/SSL Load Balancer (p. 71).
- For information on how to set up a basic HTTP/TCP load balancer within Amazon VPC, see Elastic Load Balancing in Amazon VPC (p. 109).
- For information on adding a listener to an existing load balancer, see Adding a Listener to your Load Balancer (p. 131).
- For information on deleting a listener from an existing load balancer, see Delete a Listener from Your Load Balancer (p. 137).

For performing Elastic Load Balancing tasks:

- If you haven't already, install the tools you plan to use for performing Elastic Load Balancing tasks. For information on installing the command line interface or the Query API, see Setting Up Elastic Load Balancing Interfaces (p. 16).
- For information on using the various features supported by Elastic Load Balancing, see Managing Load Balancers (p. 131).

- For detailed descriptions of the Elastic Load Balancing API operations, see the Elastic Load Balancing API Reference.
- For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

SSL Negotiation Configurations for Elastic Load Balancing

Elastic Load Balancing uses an Secure Socket Layer (SSL) negotiation configuration, known as a Security Policy, to negotiate SSL connections between a client and the load balancer. A security policy is a combination of SSL Protocols, SSL Ciphers, and the Server Order Preference option. For more information about configuring SSL connection for your load balancer, see Listener Configurations for Elastic Load Balancing (p. 47).

SSL Protocols

Secure Sockets Layer (SSL) and Transport Layer Security (TLS) are cryptographic protocols that are used to encrypt confidential data over insecure networks such as the Internet. The TLS protocol is the newer version of the SSL protocol. In this section, we refer to both SSL and TLS protocols as SSL protocol.

The SSL protocol establishes a secure connection between a client and a server and ensures that all the data passed between the client and your load balancer is private.

Elastic Load Balancing supports the following versions of the SSL protocol:

- TLS 1.2
- TLS 1.1
- TLS 1.0
- SSL 3.0
- SSL 2.0

SSL Ciphers

SSL cipher is an encryption algorithm that uses encryption keys to create a coded message. SSL protocols use several cipher algorithms to encrypt data over the Internet. For information about SSL ciphers and SSL protocols supported by Elastic Load Balancing, see SSL Security Policy Table (p. 55).

Server Order Preference

Elastic Load Balancing supports the *Server Order Preference* for negotiating connections between the client and the load balancer. During the SSL connection negotiation process, the client and the load balancer present a list of ciphers and protocols that they each support, in order of preference. Normally, the first cipher on the client's list that matches any one of the load balancer's ciphers is selected for the SSL connection. If the load balancer is configured to support the Server Order Preference, then the load balancer gets to select the first cipher in its list that matches any one of the ciphers in the client's list. Server Order Preference ensures that the load balancer determines which cipher is used for SSL connection. For information about the order of ciphers used by Elastic Load Balancing, see SSL Security Policy Table (p. 55).

- SSL Security Policies (p. 55)
- SSL Security Policy Table (p. 55)

SSL Security Policies

Elastic Load Balancing provides you with the following Security Policy options to configure settings for SSL negotiations for your load balancer:

- **Predefined Security Policy—**A list of predefined SSL negotiation configurations with enabled ciphers and protocols. The naming convention of the predefined security policy includes version information based on the year and month that the predefined security policy was released. For example, the predefined security policy `ELBSecurityPolicy-2014-01` indicates that this policy was released in the first (*01*) month of the year `2014`. Some older policies do not follow the versioned naming convention.

  As new configurations become available, Elastic Load Balancing will release the newer versions of predefined policies. You can use the latest version of the predefined security policy and then update your configuration whenever a new version is released.

  Elastic Load Balancing currently provides you with the following four predefined security policies:
  - ELBSecurityPolicy-2014-01
  - ELBSecurityPolicy-2011-08
  - ELBSample-ELBDefaultNegotiationPolicy or ELBSample-ELBDefaultCipherPolicy
  - ELBSample-OpenSSLDefaultNegotiationPolicy or ELBSample-OpenSSLDefaultCipherPolicy

  For information about the SSL protocols, SSL ciphers, and SSL option enabled for the predefined security policies, see SSL Security Policy Table (p. 55).
- **Custom Security Policy—**A list of ciphers and protocols that you specify to create a custom negotiation configuration. Some security compliance standards (such as PCI, SOX, and so on) might require a specific set of protocols and ciphers to ensure that the security standards are met. In such cases, create a custom security policy to meet those standards. If you enable *Server Order Preference* option in your custom security policy, the order of ciphers listed in the following section will be used to negotiate connections between client and the load balancer. If you do not enable *Server Order Preference* option in your custom security policy, the order of ciphers presented by the client will be used to negotiate connections between the client and the load balancer. For information about the protocols and ciphers supported by Elastic Load Balancing, see SSL Security Policy Table (p. 55).

You can choose an SSL Security Policy for your load balancer using the AWS Management Console, the command line interface (CLI), the Query API, or the SDKs. For information on choosing a security policy or creating a custom security policy, see Configure SSL Security Policy (p. 74).

SSL Security Policy Table

The following table lists the predefined security policies, descriptions of each policy, SSL Protocols, SSL Ciphers, and the Server Order Preference that are enabled for that policy. The SSL Ciphers in the following table are listed in the order of preference that the load balancer will use to negotiate SSL connections. The order of ciphers used by the load balancer cannot be changed. If the policy is enabled for Server

Order Preference, the load balancer will use the order of ciphers specified in the table to negotiate connections between the client and load balancer. If the policy is not enabled for Server Order Preference, the load balancer will use the order presented by the client to negotiate connection between the client and the load balancer.
The ' ♦' in the following table indicates that the protocol, server order preference, or the cipher is enabled for the policy.

Security Policy	**ELBSecurity Policy-2014-01**	**ELBSecurity Policy-2011-08**	**ELBSample-ELBDefault Negotiation Policy or ELBSample-ELBDefault Cipher Policy**	**ELBSample-OpenSSLDefault Cipher Policy or ELBSample-OpenSSLDefault Negotiation Policy**
Policy Description	Default configuration. Recommended.	SSL negotiation configurations for SSL/HTTP listeners as of 2011-08.	Deprecated. An older version released in August 2011.	Deprecated. An older version released in August 2011.
SSL Protocols				
Protocol-SSLv2				
Protocol-SSLv3	♦	♦	♦	♦
Protocol-TLSv1	♦	♦	♦	♦
Protocol-TLSv1.1	♦			
Protocol-TLSv1.2	♦			
SSL Options				
Server Order Preference	♦			
SSL Ciphers				
ECDHE-ECDSA-AES128-GCM-SHA256	♦			
ECDHE-RSA-AES128-GCM-SHA256	♦			
ECDHE-ECDSA-AES128-SHA256	♦			
ECDHE-RSA-AES128-SHA256	♦			
ECDHE-ECDSA-AES128-SHA	♦			
ECDHE-RSA-AES128-SHA	♦			
ECDHE-ECDSA-AES256-GCM-SHA384	♦			
ECDHE-RSA-AES256-GCM-SHA384	♦			
ECDHE-ECDSA-AES256-SHA384	♦			

Security Policy	ELBSecurity Policy-2014-01	ELBSecurity Policy-2011-08	ELBSample-ELBDefault Negotiation Policy or ELBSample-ELBDefault Cipher Policy	ELBSample-OpenSSLDefault Cipher Policy or ELBSample-OpenSSLDefault Negotiation Policy
ECDHE-RSA-AES256-SHA384	♦			
ECDHE-RSA-AES256-SHA	♦			
ECDHE-ECDSA-AES256-SHA	♦			
AES128-GCM-SHA256	♦			
AES128-SHA256	♦			
AES128-SHA	♦	♦	♦	♦
AES256-GCM-SHA384	♦			
AES256-SHA256	♦			
AES256-SHA	♦	♦	♦	♦
DHE-RSA-AES128-SHA	♦	♦		♦
DHE-DSS-AES128-SHA	♦	♦		♦
CAMELLIA128-SHA		♦		♦
EDH-RSA-DES-CBC3-SHA		♦		♦
DES-CBC3-SHA		♦	♦	♦
ECDHE-RSA-RC4-SHA	♦			
RC4-SHA	♦	♦	♦	♦
ECDHE-ECDSA-RC4-SHA				
DHE-DSS-AES256-GCM-SHA384				
DHE-RSA-AES256-GCM-SHA384				
DHE-RSA-AES256-SHA256				
DHE-DSS-AES256-SHA256				
DHE-RSA-AES256-SHA		♦		♦
DHE-DSS-AES256-SHA		♦		♦
DHE-RSA-CAMELLIA256-SHA		♦		♦
DHE-DSS-CAMELLIA256-SHA		♦		♦
CAMELLIA256-SHA		♦		♦
EDH-DSS-DES-CBC3-SHA		♦		♦
DHE-DSS-AES128-GCM-SHA256				

Security Policy	ELBSecurity Policy-2014-01	ELBSecurity Policy-2011-08	ELBSample-ELBDefault Negotiation Policy or ELBSample-ELBDefault Cipher Policy	ELBSample-OpenSSLDefault Cipher Policy or ELBSample-OpenSSLDefault Negotiation Policy
DHE-RSA-AES128-GCM-SHA256				
DHE-RSA-AES128-SHA256				
DHE-DSS-AES128-SHA256				
DHE-RSA-CAMELLIA128-SHA		♦		♦
DHE-DSS-CAMELLIA128-SHA		♦		♦
ADH-AES128-GCM-SHA256				
ADH-AES128-SHA				
ADH-AES128-SHA256				
ADH-AES256-GCM-SHA384				
ADH-AES256-SHA				
ADH-AES256-SHA256				
ADH-CAMELLIA128-SHA				
ADH-CAMELLIA256-SHA				
ADH-DES-CBC3-SHA				
ADH-DES-CBC-SHA				
ADH-RC4-MD5				
ADH-SEED-SHA				
DES-CBC-SHA				♦
DHE-DSS-SEED-SHA				♦
DHE-RSA-SEED-SHA				♦
EDH-DSS-DES-CBC-SHA				♦
EDH-RSA-DES-CBC-SHA				♦
IDEA-CBC-SHA				
RC4-MD5			♦	♦
SEED-SHA				♦
DES-CBC3-MD5				
DES-CBC-MD5				
Deprecated SSL Ciphers				

Security Policy	ELBSecurity Policy-2014-01	ELBSecurity Policy-2011-08	ELBSample-ELBDefault Negotiation Policy or ELBSample-ELBDefault Cipher Policy	ELBSample-OpenSSLDefault Cipher Policy or ELBSample-OpenSSLDefault Negotiation Policy
RC2-CBC-MD5				
PSK-AES256-CBC-SHA				♦
PSK-3DES-EDE-CBC-SHA				♦
KRB5-DES-CBC3-SHA				♦
KRB5-DES-CBC3-MD5				♦
PSK-AES128-CBC-SHA				♦
PSK-RC4-SHA				♦
KRB5-RC4-SHA				♦
KRB5-RC4-MD5				♦
KRB5-DES-CBC-SHA				♦
KRB5-DES-CBC-MD5				♦
EXP-EDH-RSA-DES-CBC-SHA				♦
EXP-EDH-DSS-DES-CBC-SHA				♦
EXP-ADH-DES-CBC-SHA				
EXP-DES-CBC-SHA				♦
EXP-RC2-CBC-MD5				♦
EXP-KRB5-RC2-CBC-SHA				♦
EXP-KRB5-DES-CBC-SHA				♦
EXP-KRB5-RC2-CBC-MD5				♦
EXP-KRB5-DES-CBC-MD5				♦
EXP-ADH-RC4-MD5				
EXP-RC4-MD5				♦
EXP-KRB5-RC4-SHA				♦
EXP-KRB5-RC4-MD5				♦

Note
Deprecated SSL Ciphers: If you had previously enabled these ciphers in a custom policy or the `ELBSample-OpenSSLDefaultCipherPolicy`, we recommend that you update your security policy to the latest version.

For procedures for updating the SSL negotiation configuration for your HTTPS/SSL listener, see Update SSL Negotiation Configuration of Your Load Balancer (p. 145).

SSL Certificate for Elastic Load Balancing

If you use HTTPS or SSL for your front-end listener, you must install an SSL certificate on your load balancer. The load balancer uses the certificate to terminate the connection and then decrypt requests from clients before sending them to the back-end instances.

The SSL protocol uses an X.509 certificate (SSL server certificate) to authenticate both the client and the back-end application. The X.509 certificate is a digital form of identification issued by a certificate authority (CA) and contains identification information, a validity period, a public key, a serial number, and the digital signature of the issuer.

Before you can install the SSL certificate on your load balancer, you must create the certificate, get the certificate signed by a CA, and then upload the certificate using the AWS Identity and Access Management (IAM) service.

The SSL certificate comes with a validity period. You must replace the certificate after its validity period ends. To replace the certificate you must create and upload the new certificate by following the same steps you used when you created your certificate for the first time.

All your SSL certificates are managed by IAM. By default, IAM allows 10 SSL server certificates per AWS account. If you try to upload a new server certificate after reaching this limit, you'll get an error. You can request for more certificates using this form - IAM Limit Increase Contact Us Form.

In this section we walk you through the following steps for creating SSL server certificate and then uploading the SSL certificate using the AWS IAM service. By the end of this section your SSL certificate will be ready to be installed on your load balancer.

1. Install and configure OpenSSL
2. Create a private key
3. Create a Certificate Signing Request
4. Submit the Certificate Signing Request to a Certificate Authority
5. Upload the Signed Certificate using IAM
6. Verify the Certificate Object
7. Sample Certificates

Install and Configure OpenSSL

Creating and uploading a certificate requires a tool that supports the SSL and TLS protocols. OpenSSL is an open-source tool that provides the basic cryptographic functions necessary to create an RSA token and sign it with your private key. If you don't already have OpenSSL installed, follow the instructions in this section.

To install and configure OpenSSL on LINUX and UNIX

1. Go to OpenSSL: Source, Tarballs (http://www.openssl.org/source/).
2. Download the latest source and build the package.
3. Before you use OpenSSL commands, you must configure the operating system so that it has information about the location of the OpenSSL install point.

   At the command line, set the OpenSSL_HOME variable to the location of the OpenSSL installation:

   ```
   export OpenSSL_HOME = path-to-your-OpenSSL-installation
   ```

4. Set the path to the OpenSSL installation:

   ```
   export PATH=$PATH:$ OpenSSL_HOME/bin
   ```

To install and configure OpenSSL on Windows

1. Go to OpenSSL: Binary Distributions (http://www.openssl.org/related/binaries.html).
2. Click **OpenSSL for Windows**.

   A new page displays with links to the Windows downloads.
3. If it is not already installed on your system, select the **Microsoft Visual C++ 2008 Redistributables** link appropriate for your environment and click **Download**. Follow the instructions provided by the **Microsoft Visual C++ 2008 Redistributable Setup Wizard**.
4. After you have installed the Microsoft Visual C++ 2008 Redistributables, select the appropriate version of the OpenSSL binaries for your environment and save the file locally. The **OpenSSL Setup Wizard launches**.
5. Follow the instructions described in the **OpenSSL Setup Wizard**. Save the OpenSSL binaries to a folder in your working directory.
6. Before you use OpenSSL commands, you must configure the operating system so that it has information about the location of the OpenSSL install point.

   Open a **Command Prompt** window.
7. Set the OpenSSL_HOME variable to the location of the OpenSSL installation:

   ```
   set OpenSSL_HOME= path-to-your-OpenSSL-installation
   ```

8. Set the `OpenSSL_CONFIG` variable to the location of the configuration file in your OpenSSL installation:

   ```
   set OpenSSL_CONFIG= path-to-your-OpenSSL-installation\bin\openssl.cfg
   ```

9. Set the path to the OpenSSL installation:

```
set Path=%Path%;%OpenSSL_HOME%\bin
```

Note
Any changes you make to Windows environment variables in a **Command Prompt** window are valid only for the current command line session. You can make persistent changes to the environment variables by setting them as system properties. The exact procedures depend on what version of Windows you're using. (For example, in Windows 7, open **Control Panel > System and Security > System**. Then choose **Advanced system settings** > **Advanced tab** > **Environment Variables**). For more information, see the Windows documentation.

Create a Private Key

You need a unique private key to create your Certificate Signing Request (CSR).

To create a private key

- At the command line, use the `openssl genrsa` command and the following syntax:

```
openssl genrsa 2048 > your-private-key-file-name.pem
```

For *`private-key-file-name`*, specify your own file name. In the example, 2048 represents 2048-bit encryption. AWS also supports 1024-bit and 4096-bit encryption. We recommend you create an RSA key that is 2048 bits.

Be sure to store your private key in a secure place. There is no way to get back your private key if it is lost.

Create a Certificate Signing Request

The next step is to create a Certificate Signing Request (CSR). This is a file that you can send to a certificate authority (CA) to apply for a server certificate.

To create a CSR

Use the openssl req command to create a CSR and the following syntax:

```
openssl req -new -key private-key.pem -out csr.pem
```

The output will look similar to the following example:

```
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank.
For some fields there will be a default value.
If you enter '.', the field will be left blank.
```

The following table can help you create your certificate request.

Name	Description	Example
Country Name	The two-letter ISO abbreviation for your country.	US = United States
State or Province	The name of the state or province where your organization is located. This name cannot be abbreviated.	Washington
Locality Name	The name of the city where your organization is located.	Seattle
Organization Name	The full legal name of your organization. Do not abbreviate your organization name.	Example Corp
Organizational Unit	Optional, for additional organization information.	Marketing
Common Name	The fully qualified domain name for your CNAME. You will receive a certificate name check warning if this is not an exact match.	www.yourdomain.com
Email address	The server administrator's email address	someone@yourdomain.com

Note
The Common Name field is often misunderstood and is completed incorrectly. The common name is typically your host plus domain name. It will look like "www.company.com" or "company.com". You need to create a CSR using your correct common name.

Submit CSR to Certificate Authority

Your CSR contains information identifying you. To apply for a server certificate, send your CSR to a certificate authority (CA). The CA might require other credentials or proofs of identity.

If the request for a certificate is successful, the CA returns a public (identity) certificate and possibly a chain certificate that is digitally signed.

AWS does not recommend a specific CA. For a partial listing of available CAs, see Third-Party Certificate Authorities.

Upload the Signed Certificate

When you receive your server certificate from the certificate authority (CA), it might be in a format that is not supported by IAM. Typically you receive a public certificate, one or more intermediate certificates and a root certificate. The intermediate certificates and the root certificate can come bundled in a file or as separate files. The file names may vary depending on the type of SSL certificate you purchase and the certificate authority.

To upload your certificate using AWS IAM, you need the following three files:

1. Private key in PEM format

The key file you generated for creating Certificate Signing Request (CSR). If the key is not in PEM format, use OpenSSL as in the following example to convert the private key to PEM format:

```
openssl  rsa  -in your-private-key-filename  -outform PEM
```

Your PEM formatted private key must look similar to the sample private key in Sample Certificates (p. 67).

2. Public certificate in PEM format

This is the certificate you receive from the CA. Your public certificate is the domain-specific file. Your public certificate also must be in PEM format. If it is not, use the following OpenSSL command to convert your public certificate to PEM format:

```
openssl x509 -inform PEM -in your-public-certificate-filename
```

Your PEM formatted public certificate must look similar to the sample public certificate in Sample Certificates (p. 67).

3. Certificate chain in PEM Format

This file is a concatenation of all the intermediate certificates and the root certificate one after the other. The certificate chain lets an end user's browser build a certificate chain to a root certificate it trusts. As a result, the browser can implicitly trust your certificate.

If you are uploading a self-signed certificate and it's not important that browsers implicitly accept the certificate, you can skip this step and upload just the public certificate and private key.

Typically, both intermediate and root certificates are provided by a CA in a bundled file with the proper chained order. If a certificate bundle is not available or not available in the required order, you can create your own certificate chain file.

To create your own certificate chain file, include the intermediate certificates and optionally, the root certificate, one after the other without any blank lines. If you are including the root certificate, your certificate chain must start with intermediate certificates and end with the root certificate. Use the intermediate certificates that were provided by your CA. Any intermediaries that are not involved in the chain of trust path must not be included.

Your certificate chain must be in PEM format. If it is not, use the following OpenSSL command to convert your certificate chain to PEM format:

```
openssl x509 -inform PEM -in your-certificate-chain-filename
```

Your PEM formatted certificate chain must look similar to the sample certificate chain in Sample Certificates (p. 67).

After you have all your files in the X.509 PEM format, you use the AWS command line interface for IAM to upload it. For more information, see the AWS Command Line Interface User Guide.

To upload a server certificate

- Use the aws iam upload-server-certificate command by specifying the following options:
  - `server-certificate-name` = *`name-of-your-server-certificate`*

    You cannot use the name of an expired certificate.

- `certificate-body` = *`encoded-certificate-body`*

  The contents of the public certificate in PEM-encoded format
- `private-key` = *`encoded-private-key`*

  The contents of the private key in PEM-encoded format.

  Note
  The private key cannot be retrieved after you are finished uploading it.
- [optional] `certificate-chain` = *`concatenation of the intermediate and root certificates`*

  The contents of the certificate chain in PEM-encoded format.
- [optional] `path` = /

  Note
  The `path` is optional. If it is not included, the path defaults to /. For more information about paths, go to Identifiers for IAM Entities in *Using IAM*.

Your command looks similar to the following example:

```
aws iam upload-server-certificate --server-certificate-name  >your-certific
ate-name --certificate-body  file://encoded-public-certificate file --private-
key file://encoded-private-key file --certificate-chain file://encoded-cer
tificate-chain
```

Note
When you specify a file as a parameter (for example, for the `certificate-body`, `private-key`, and the `certificate-chain` parameters), you must include `file://` as part of the file name.

When you upload your certificates, IAM validates the certificates with the following criteria:

- Certificates must follow the X.509 PEM format.
- The current date must be between the certificate's start and end date.
- Public and private certificate files must contain only a single certificate.
- The private key must match the public key that is in the certificate.
- The private key must be an RSA private key in PEM format, where the PEM header is BEGIN RSA PRIVATE KEY and the footer is END RSA PRIVATE KEY (as shown in Sample Certificates (p. 67)).
- The private key cannot be encrypted with a password.
- The certificate chain must include all of your CA's intermediary certificates that lead to the root certificate, and optionally ends with your CA's root certificate. Typically, both intermediary and root certificates are provided by a CA in a bundled file with the proper chained order. If a certificate bundle is not available or not available in the required order, you can create your own file similar to the sample certificate chain in Sample Certificates (p. 67). Use the intermediary certificates that were provided by your CA. Any intermediaries that are not involved in the chain of trust path must not be included.

  After you upload your certificate chain to AWS, you can use SSL Checker to verify it.

  Note
  o The order of intermediate certificates should be documented by the CA. AWS does not recommend any one CA. For a listing of some CAs, see Third-Party Certificate Authorities.
  o Although the root certificate is optional, you can include it so that you can run full chain of trust verifications, such as SSL Checker.

If you have certificates that result in an error when you upload them, ensure that they meet the criteria, and then try uploading them again.

Verify Server Certificate

After the server certificate is uploaded, you can verify that the information is stored in IAM. Each certificate object has a unique Amazon Resource Name (ARN) and ID. You can request these details for a specific certificate object by referencing the name of the certificate object.

To view the certificate object's ARN and ID

Use the aws iam get-server-certificate command to verify the certificate object:

```
aws iam get-server-certificate --server-certificate-name your-certificate-name
```

The response includes the server certificate Amazon Resource Name (ARN) and GUID.

```
arn:aws:iam::55555555555:server-certificate/production/myCert
ASCACexampleKEZUQ4K
```

The first line is the Amazon Resource Name (ARN) and the second line is the GUID. Make a note of the ARN. You need it to install the certificate on your load balancer. For more information on installing the server certificate on your load balancer, see Configure Listeners.

Sample Certificates

The following certificates show the valid format that IAM accepts for server certificates and their associated private key and certificate chain.

The server certificate associates your public key with your identity. When you submit your Certificate Signing Request (CSR) to a certificate authority (CA), a server certificate is returned to you by the CA. The following is a sample server certificate:

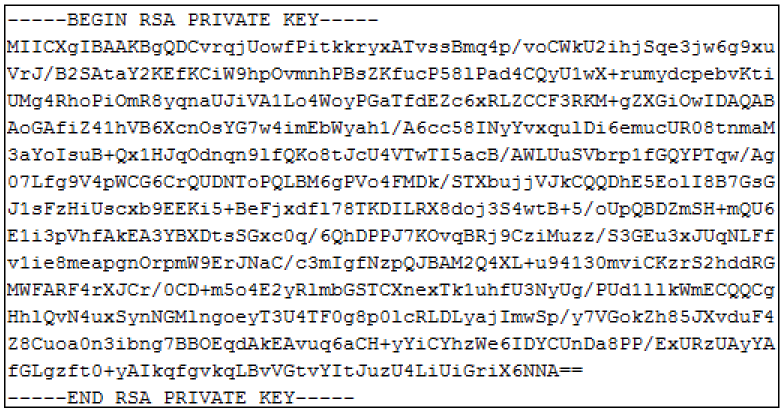
Sample server certificate

```
-----BEGIN CERTIFICATE-----
MIIE+TCCA+GgAwIBAgIQU306HIX4KsioTW1s2A2krTANBgkqhkiG9w0BAQUFADCB
tTELMAkGA1UEBhMCVVMxFzAVBgNVBAoTDlZlcmlTaWduLCBJbmMuMR8wHQYDVQQL
ExZWZXJpU2lnbiBUcnVzdCBOZXR3b3JrMTswOQYDVQQLEzJUZXJtcyBvZiB1c2Ug
YXQgaHR0cHM6Ly93d3cudmVyaXNpZ24uY29tL3JwYSoAYykwOTEvMC0GA1UEAxMm
VmVyaVNpZ24gQ2xhc3MgMyBTZWN1cmUgU2VydmVyIENBIC0gRzIwHhcNMTAxMDA4
MDAwMDAwWhcNMTMxMDA3MjM1OTU5WjBqMQswCQYDVQQGEwJVUzETMBEGA1UECBMK
V2FzaGluZ3RvbjEQMA4GA1UEBxQHU2VhdHRsZTEYMBYGA1UEChQPQW1hem9uLmNv
bSBJbmMuMRowGAYDVQQDFBFpYW0uYW1hem9uYXdzLmNvbTCBnzANBgkqhkiG9w0B
AQEFAAOBjQAwgYkCgYEA3Xb0EGea2dB8QGEUwLcEpwvGawEkUdLZmGL1rQJZdeeN
3vaF+ZTm8Qw5Adk2Gr/RwYXtpx04xvQXmNm+9YmksHmCZdruCrW1eN/P9wBfqMMZ
X964CjVov3NrF5AuxU8jgtw0yu//C3hWnOuIVGdg76626ggOoJSaj48R2n0MnVcC
AwEAAaOCAdEwggHNMAkGA1UdEwQCMAAwCwYDVR0PBAQDAgWgMEUGA1UdHwQ+MDww
OqA4oDaGNGh0dHA6Ly9TVlJTZWN1cmUtRzItY3JsLnZlcmlzaWduLmNvbS9TVlJT
ZWN1cmVHMi5jcmwwRAYDVR0gBD0wOzA5BgtghkgBhvhFAQcXAzAqMCgGCCsGAQUF
BwIBFhxodHRwczovL3d3dy52ZXJpc2lnbi5jb20vcnBhMB0GA1UdJQQWMBQGCCsG
AQUFBwMBBggrBgEFBQcDAjAfBgNVHSMEGDAWgBSl7wsRzsBBA6NKZZBIshzgVy19
```

```
RzB2BggrBgEFBQcBAQRqMGgwJAYIKwYBBQUHMAGGGGh0dHA6Ly9vY3NwLnZlcmlz
aWduLmNvbTBABggrBgEFBQcwAoY0aHR0cDovL1NWUlNlY3VyZS1HMi1haWEudmVy
aXNpZ24uY29tL1NWUlNlY3VyZUcyLmNlcjBuBggrBgEFBQcBDARiMGChXqBcMFow
WDBWFglpbWFnZS9naWYwITAfMAcGBSsOAwIaBBRLa7kolgYMu9BSOJsprEsHiyEF
GDAmFiRodHRwOi8vbG9nby52ZXJpc2lnbi5jb20vdnNsb2dvMS5naWYwDQYJKoZI
hvcNAQEFBQADggEBALpFBXeG782QsTtGwEE9zBcVCuKjrsl3dWK1dFiq3OP4y/Bi
ZBYEywBt8zNuYFUE25Ub/zmvmpe7p0G76tmQ8bRp/4qkJoiSesHJvFgJ1mksr3IQ
3gaE1aN2BSUIHxGLn9N4F09hYwwbeEZaCxfgBiLdEIodNwzcvGJ+2LlDWGJOGrNI
NM856xjqhJCPxYzk9buuCl1B4Kzu0CTbexz/iEgYV+DiuTxcfA4uhwMDSe0nynbn
1qiwRk450mCOnqH4ly4P4lXo02t4A/DI1I8ZNct/Qfl69a2Lf6vc9rF7BELT0e5Y
R7CKx7fc5xRaeQdyGj/dJevm9BF/mSdnclS5vas=
-----END CERTIFICATE-----
```

The private key allows you to decrypt messages that are encrypted with your public key. The following figure is a sample private key:

Sample private key



```
-----BEGIN RSA PRIVATE KEY-----
MIICXgIBAAKBgQDCvrqjUowfPitkkryxATvssBmq4p/voCWkU2ihjSqe3jw6g9xu
VrJ/B2SAtaY2KEfKCiW9hpOvmnhPBsZKfucP58lPad4CQyU1wX+rumydcpebvKti
UMg4RhoPiOmR8yqnaUJiVA1Lo4WoyPGaTfdEZc6xRLZCCF3RKM+gZXGiOwIDAQAB
AoGAfiZ41hVB6XcnOsYG7w4imEbWyah1/A6cc58INyYvxqulDi6emucUR08tnmaM
3aYoIsuB+Qx1HJqOdnqn9lfQKo8tJcU4VTwTI5acB/AWLUuSVbrp1fGQYPTqw/Ag
O7Lfg9V4pWCG6CrQUDNToPQLBM6gPVo4FMDk/STXbujjVJkCQQDhE5EolI8B7GsG
J1sFzHiUscxb9EEKi5+BeFjxdfl78TKDILRX8doj3S4wtB+5/oUpQBDZmSH+mQU6
E1i3pVhfAkEA3YBXDtsSGxc0q/6QhDPPJ7KOvqBRj9CziMuzz/S3GEu3xJUqNLFf
v1ie8meapgnOrpmW9ErJNaC/c3mIgfNzpQJBAM2Q4XL+u94130mviCKzrS2hddRG
MWFARF4rXJCr/OCD+m5o4E2yRlmbGSTCXnexTk1uhfU3NyUg/PUd1l1kWmECQQCg
Hh1QvN4uxSynNGMlngoeyT3U4TF0g8p0lcRLDLyajImwSp/y7VGokZh85JXvduF4
Z8Cuoa0n3ibng7BBOEqdAkEAvuq6aCH+yYiCYhzWe6IDYCUnDa8PP/ExURzUAyYA
fGLgzft0+yAIkqfgvkqLBvVGtvYItJuzU4LiUiGriX6NNA==
-----END RSA PRIVATE KEY-----
```

Sample certificate chain

The certificate chain includes all intermediary certificates that lead to the root certificate, as shown in the following example. Intermediaries that are not involved in the trust path must not be included. If included, the chain must end with your CA's root certificate. Typically, both intermediary and root certificates are provided by a CA in a bundled file with the proper chained order.

```
-----BEGIN CERTIFICATE-----
Intermediate certificate 2
-----END CERTIFICATE-----
-----BEGIN CERTIFICATE-----
Intermediate certificate 1
-----END CERTIFICATE-----
-----BEGIN CERTIFICATE-----
Optional: Root certificate
-----END CERTIFICATE-----
```

Elastic Load Balancing in Amazon EC2-Classic

Amazon Web Services (AWS) lets you launch your instances in either Amazon EC2-Classic or Amazon Virtual Private Cloud (Amazon VPC). If want to load balance your EC2 instances launched in EC2-Classic, you must create your load balancer in EC2-classic platform.

This section covers information that is specific to your instances and load balancers launched in EC2-Classic and provides procedural instruction and examples. For information on your load balancers and instances created within Amazon VPC, see Elastic Load Balancing in Amazon VPC (p. 109).

Before you can start using a load balancer, you must create one. You create your load balancer by configuring listeners, configuring the health check, and by registering your back-end instances with your load balancer. You configure a listener by specifying the protocol and the port number for front-end (client to load balancer) and back-end (load balancer to back-end instances) connections. You can configure multiple listeners for your load balancer. For more information about the listener configurations supported by Elastic Load balancing, see Listener Configurations for Elastic Load Balancing (p. 47).

When you create your load balancer, by default, your load balancer is set to use the HTTP protocol with port 80 for the front-end connection and the back-end connection. If you want to create a load balancer using the default setting, see Create a Basic Load Balancer in EC2-Classic (p. 21).

Elastic Load Balancing provides Secure Sockets Layer (SSL) negotiation configurations, known as Security Policy, to negotiate connections between the clients and the load balancer. If you choose HTTPS/SSL for your front-end connection, you can either use the predefined security policy or use custom security policy. When you use HTTPS or SSL for your front-end connection, you must install SSL certificate on your load balancer. The load balancer uses the certificate to terminate the connection and then decrypt requests from clients before sending them to the back-end instances. You can optionally choose to enable authentication on your back-end instance. For detailed instructions on creating a HTTPS/SSL load balancer in Amazon EC2, see Create a HTTPS/SSL Load Balancer (p. 71).

As the traffic to your instances increases, you might consider expanding your EC2 instances to run in an additional Availability Zone. For detailed instructions on expanding to additional Availability Zones, see Add Availability Zone (p. 95).

When the traffic to your instances decreases, you might consider scaling down the availability of your instances by disabling some Availability Zones. For detailed instructions on disabling your Availability Zones, see Remove Availability Zone (p. 97).

Elastic Load Balancing provides a special Amazon EC2 source security group that you can use to ensure that a back-end Amazon EC2 instance receives traffic only from Elastic Load Balancing. For information on locking the incoming traffic between your load balancer and your back-end instances , see Manage Security Groups in Amazon EC2-Classic (p. 99).

After you create your load balancer, Elastic Load Balancing returns a public DNS name that combines your load balancer's name and region. This base public DNS name returns only IPv4 records.

Elastic Load Balancing supports both Internet Protocol version 6 (IPv6) and Internet Protocol version 4 (IPv4).

Note
IPv6 support is currently not available for load balancers in Amazon VPC (EC2-VPC).

Clients can connect to your load balancer using either IPv4 or IPv6 (in EC2-Classic). However, communication between the load balancer and its back-end instances uses only IPv4. You might want to use the dualstack-prefixed DNS name to enable IPv6 support for communications between client and the load balancers so that clients are able to access the load balancer using either IPv4 or IPv6 as their individual connectivity needs dictate. For more information on enabling IPv6 support, see Use IPv6 with Elastic Load Balancing (p. 107).

Create a HTTPS/SSL Load Balancer

This example walks you through the process of creating a HTTPS load balancer with SSL negotiation configurations and with back-end application instance authentication. You can optionally add tags.

Before you get started, be sure you've met the following preconditions:

- Sign up for Amazon Web Services (AWS). If you haven't signed up for AWS yet, complete the steps listed in Sign Up for Amazon Web Services(AWS) (p. 16).
- For this example, we use Availability Zone us-east-1a. In Availability Zone us-east-1a, launch the instances you intend to register with your load balancer. For more information about launching Amazon EC2 instances, see Launching and Using Instances.
- Install a webserver, such as Apache or Internet Information Services (IIS), on the EC2 instances you plan to register with the load balancer.
- The instances to be registered with your load balancer must respond to the target of the health check with an HTTP status code 200. For information about Elastic Load Balancing health check, see Health Check (p. 7).
- If you plan to enable the keep-alive option on your EC2 instances, we recommend that you set the keep-alive settings to at least the idle timeout settings of your load balancer. If you want to ensure that the load balancer is responsible for closing the connections to your back-end instance, make sure that the value set on your instance for the keep-alive time is greater than the idle timeout setting on your load balancer. For information about load balancer idle timeout, see Idle Connection Timeout (p. 8).
- To enable HTTPS support for our listeners, you must install SSL certificate on your load balancer. Before you can install the SSL certificate, you must first create and then upload the SSL certificate using IAM. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances. For information on how to create an SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61).

  All your SSL server certificates are managed by IAM. By default, IAM allows 10 SSL server certificates per AWS account. If you try to upload a new server certificate after reaching this limit, you'll get an error. You can request for more certificates using this form - IAM Limit Increase Contact Us Form.

The following sections include instructions for creating an HTTPS/SSL load balancer using the AWS Management Console or the AWS Command Line Interface (AWS CLI).

- Using the AWS Management Console (p. 71)
- Using the AWS Command Line Interface (p. 81)

  Important: Elastic Load Balancing CLI has been replaced by AWS Command Line Interface (AWS CLI), a unified tool to manage multiple AWS services. New features released after ELB CLI version 1.0.35.0 (dated 7/24/14) will be included in the AWS CLI only. We recommend that you start using the AWS CLI.
  For a list of the functionality supported in previous ELB CLI versions, see Elastic Load Balancing API Tools.

Using the AWS Management Console

The following step-by-step instructions will help you create an HTTPS/SSL load balancer using the AWS Management Console. Before you begin, make sure to:

Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.

Topics

Step 1: Configure Listeners

A *listener* is a process that listens for connection requests. It is configured with a protocol and a port number for front-end (client to load balancer) and back-end (load balancer to back-end instance) connections. For information about the ports, protocols and the listener configurations supported by Elastic Load Balancing, see Listener Configurations for Elastic Load Balancing (p. 47).

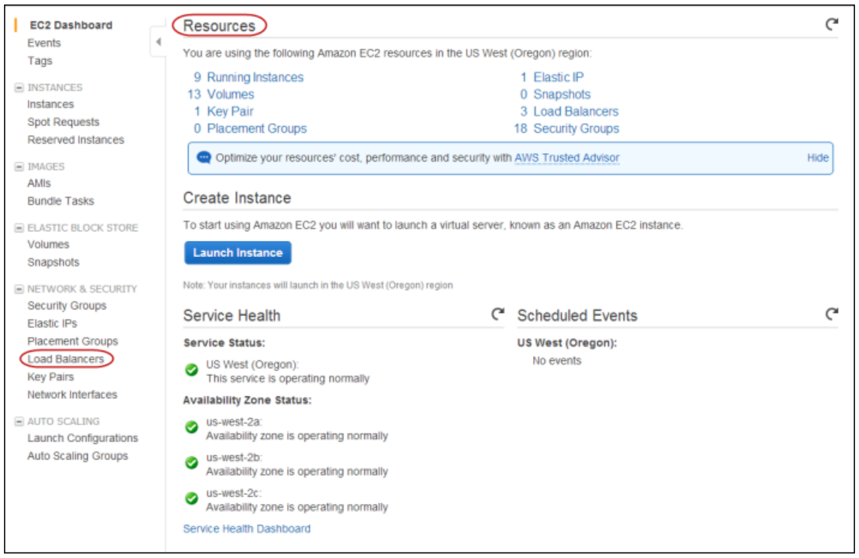
In this example, you configure two listeners for your load balancer by specifying the ports and protocols to use for front-end connection (client to load balancer) and back-end connection (load balancer to back-end instance). The first listener accepts HTTP requests on port 80 and sends the request to the back-end application instances on port 80 using HTTP. The second listener accepts HTTPS requests on port 443 and sends the request to back-end application instances using HTTPS on port 443.

Since the second listener uses HTTPS for the front-end connection, you will have to install SSL sever certificate on your load balancer. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances. Before you can install the SSL certificate on your load balancer, you must create the certificate, get the certificate signed by a Certificate Authority (CA), and then upload the certificate using the AWS Identity and Access Management (AWS IAM) service. For information about creating and uploading SSL certificates, see SSL Certificate for Elastic Load Balancing (p. 61)

To configure listeners for your load balancer

1. Start the **Create Load Balancer** wizard:

   a. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.



You are using the following Amazon EC2 resources in the US West (Oregon) region:

9 Running Instances
13 Volumes
1 Key Pair
0 Placement Groups
1 Elastic IP
0 Snapshots
3 Load Balancers
18 Security Groups

Optimize your resources' cost, performance and security with AWS Trusted Advisor

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Note: Your instances will launch in the US West (Oregon) region

Service Health

Service Status:

US West (Oregon):
This service is operating normally

Availability Zone Status:

us-west-2a:
Availability zone is operating normally

us-west-2b:
Availability zone is operating normally

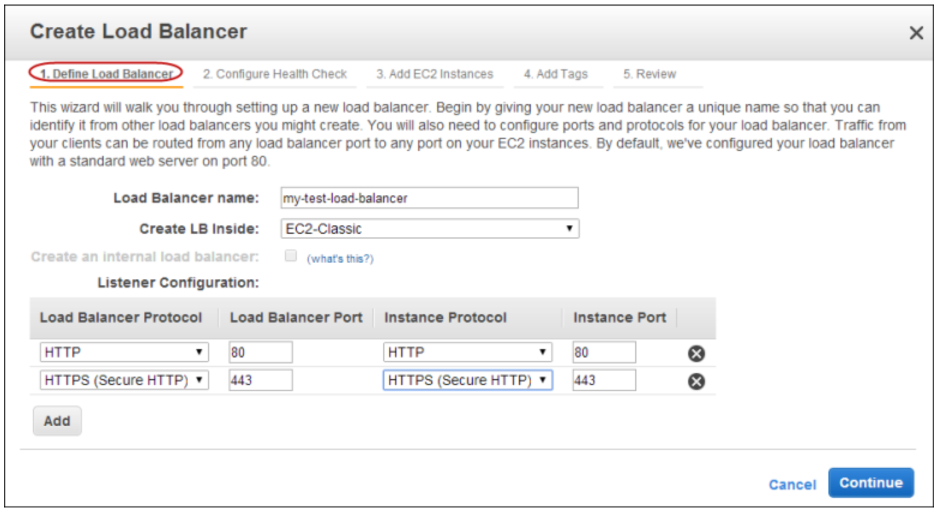
us-west-2c:
Availability zone is operating normally

Scheduled Events

US West (Oregon):
No events

   b. On the **Load Balancers** page, click **Create Load Balancer**.

2. On the **Define Load Balancer** page, enter a name for your load balancer (e.g., `my-test-loadbal-ancer`).
3. Leave the **Listener Configuration** set to the default value for the first listener.
4. Leave the **Create LB Inside:** box set to **EC2-Classic** for this tutorial.
5. Click **Add** to add a second listener.
6. Select **HTTPS (Secure HTTP)** from the drop-down box in the **Load Balancer Protocol** box. This populates the **Load Balancer Port** box. Select **HTTPS (Secure HTTP)** from the drop-down box in the **Instance Protocol** box. This populates the **Instance Port** box.



This wizard will walk you through setting up a new load balancer. Begin by giving your new load balancer a unique name so that you can identify it from other load balancers you might create. You will also need to configure ports and protocols for your load balancer. Traffic from your clients can be routed from any load balancer port to any port on your EC2 instances. By default, we've configured your load balancer with a standard web server on port 80.

Load Balancer name: my-test-load-balancer
Create LB Inside: EC2-Classic
Create an internal load balancer: (what's this?)
Listener Configuration:

Load Balancer Protocol	Load Balancer Port	Instance Protocol	Instance Port
HTTP	80	HTTP	80
HTTPS (Secure HTTP)	443	HTTPS (Secure HTTP)	443

7. Click **Continue** to upload your SSL certificate.
8. **To use a previously uploaded certificate**

   a. On the **Select Certificate** page, in the **Certificate Type:** field, select **Choose from an existing SSL Certificate**.
   b. Click the **Certificate Name:** dialog box and select your certificate.
   c. Click **Continue**.
   d. Skip the next step and see Step 2: Configure SSL Security Policy (p. 74) for instructions on configuring SSL ciphers.

9. **To upload a signed certificate**

   On the **Select Certificate** page, in the **Certificate Type:** field, select **Upload a new SSL Certificate**.

   Before you upload, check if your certificate meets the criteria described in Upload the Signed Certificate (p. 64)

   Note
   If your certificate does not meet the criteria, you might get an error when you upload it. Create a new SSL certificate and upload the certificate using IAM. For instructions on creating and uploading the SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61).

   If your certificate meets the criteria, step through the following instructions to continue uploading your SSL certificate.

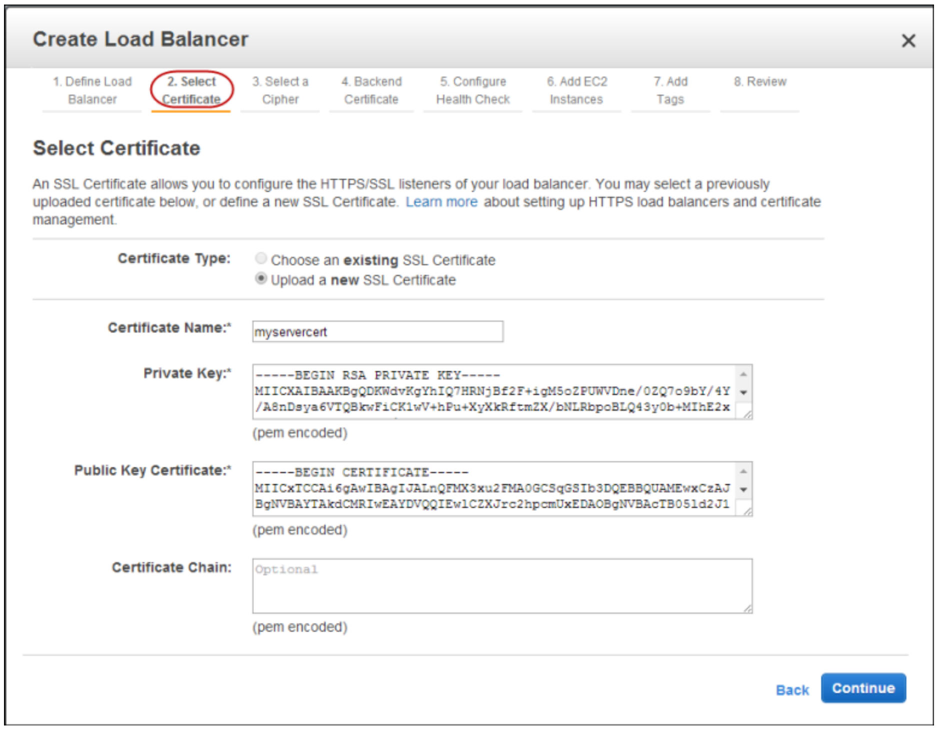
   a. Enter the name of the certificate to upload.
   b. Copy and paste the contents of the private key file (PEM-encoded) in the **Private Key** box.

Note
The private key cannot be retrieved after you are finished uploading it.

c. Copy and paste the contents of the public key certificate file (PEM-encoded) in the **Public Key Certificate** box.

d. Copy and paste the contents of the certificate chain file (PEM-encoded) in the **Certificate Chain** box.

Note
You can skip this step if you are using a self-signed certificate and it's not important that browsers implicitly accept the certificate.



Select Certificate

An SSL Certificate allows you to configure the HTTPS/SSL listeners of your load balancer. You may select a previously uploaded certificate below, or define a new SSL Certificate. Learn more about setting up HTTPS load balancers and certificate management.

Certificate Type: Choose an **existing** SSL Certificate [✓ Upload a **new** SSL Certificate]

Certificate Name:* myservercert

Private Key:*

```
-----BEGIN RSA PRIVATE KEY-----
MIICXAIBAAKBgQDKWdvKgYhIQ7HRNjBf2F+igM5oZPUWVDne/0ZQ7o9bY/4Y
/A8nDsya6VTQBkwFiCK1wV+hPu+XyXkRftmZX/bNLRbpoBLQ43y0b+MIhE2x
```

(pem encoded)

Public Key Certificate:*

```
-----BEGIN CERTIFICATE-----
MIICxTCCAi6gAwIBAgIJALnQFMX3xu2FMA0GCSqGSIb3DQEBBQUAMEwxCzAJ
BgNVBAYTAkdCMRIwEAYDVQQIEw1CZXJrc2hpcmUxEDAOBgNVBAcTB051d2J1
```

(pem encoded)

Certificate Chain: Optional

(pem encoded)

10. Click **Continue** to configure SSL ciphers for the HTTPS/SSL listeners.
11. See Step 2: Configure SSL Security Policy (p. 74) for instructions on configuring SSL ciphers.

Step 2: Configure SSL Security Policy

Elastic Load Balancing provides you with security policies that have predefined SSL negotiation configurations you can use for your load balancer. You can either select one of the predefined security policies, or you can create your own custom security policy by specifying the SSL protocols, ciphers, and, optionally, enabling the server order preference.

Note
If you do not associate any security policy with your load balancer, Elastic Load Balancing will, by default, associate the latest version of the predefined security policy with your load balancer.

For more information about the security policies, see SSL Negotiation Configurations for Elastic Load Balancing (p. 54). For information about the current configuration for all security policies, see SSL Security Policy Table (p. 55).

On the **Select a Cipher** page, the predefined security policy **ELBSecurityPolicy-2014-01** is selected by default for your SSL/HTTPS listener. This is the recommended setting. This policy uses server order preference (the order listed in the SSL Security Policy Table (p. 55)) to negotiate SSL connections.

To keep the recommended predefined security policy

- On the **Select a Cipher** page, make sure that **ELBSecurity-Policy-2014-01** is selected, and click **Continue** to configure back-end server authentication.

To select a different policy from the predefined security policy list

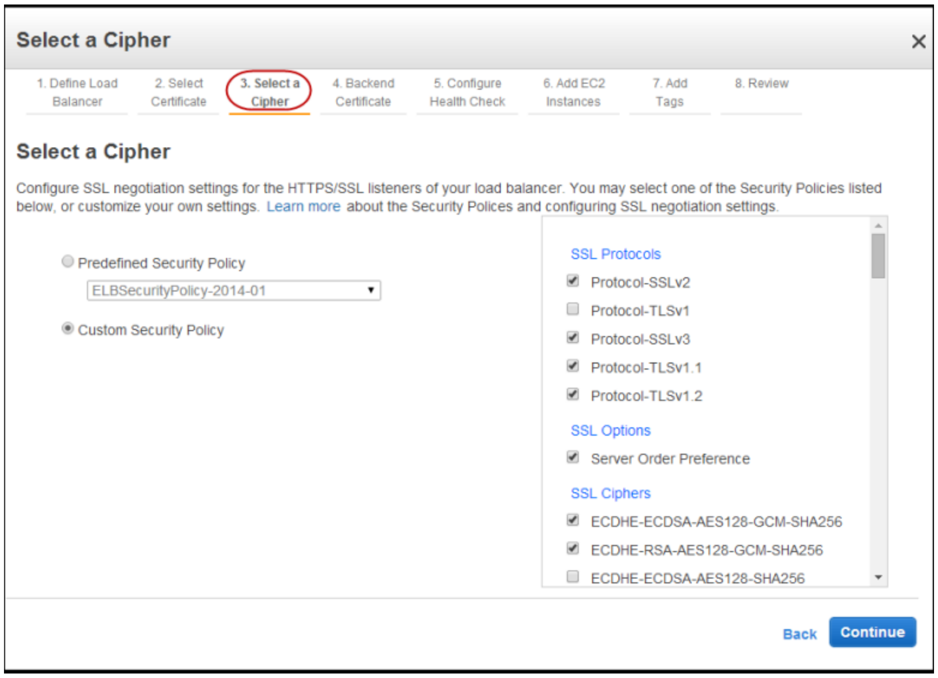
1. On the **Select a Cipher** page, select **Predefined Security Policy**.
2. In the security policy drop-down list, select a policy.
3. Click **Continue** to configure back-end server authentication.

To create your own security policy

1. On the **Select a Cipher** page, select **Custom Security Policy**.
2. Under **SSL Protocols**, select one or more protocols to enable.
3. Under **SSL Options**, select **Server Order Preference** if you want to use the order listed in the SSL Security Policy Table (p. 55) for SSL negotiation.
4. Under **SSL Ciphers**, select one or more ciphers to enable.

   Note
   You must enable at least one protocol and one cipher for SSL negotiation to take place. The DSA and RSA ciphers are specific to the signing algorithm and are used to create the SSL certificate. If you already have your SSL certificate, make sure to enable the cipher that was used to create your certificate.

   The following screen shot shows a custom configuration with **Server Order Preference** enabled.



Select a Cipher

Configure SSL negotiation settings for the HTTPS/SSL listeners of your load balancer. You may select one of the Security Policies listed below, or customize your own settings. Learn more about the Security Polices and configuring SSL negotiation settings.

( ) Predefined Security Policy: ELBSecurityPolicy-2014-01
(●) Custom Security Policy

SSL Protocols
- [✓] Protocol-SSLv2
- [ ] Protocol-TLSv1
- [✓] Protocol-SSLv3
- [✓] Protocol-TLSv1.1
- [✓] Protocol-TLSv1.2

SSL Options
- [✓] Server Order Preference

SSL Ciphers
- [✓] ECDHE-ECDSA-AES128-GCM-SHA256
- [✓] ECDHE-RSA-AES128-GCM-SHA256
- [ ] ECDHE-ECDSA-AES128-SHA256

5. Click **Continue** to configure back-end server authentication.

6. See Step 3: Configure Back-end Server Authentication (p. 76) for instructions on configuring back-end server authentication.

Step 3: Configure Back-end Server Authentication

If you have HTTPS/SSL on the back-end connection, you can choose to enable authentication on your back-end instance. This authentication can be used to ensure that back-end instances accept only encrypted communication and to ensure that the back-end instance has the correct certificates.

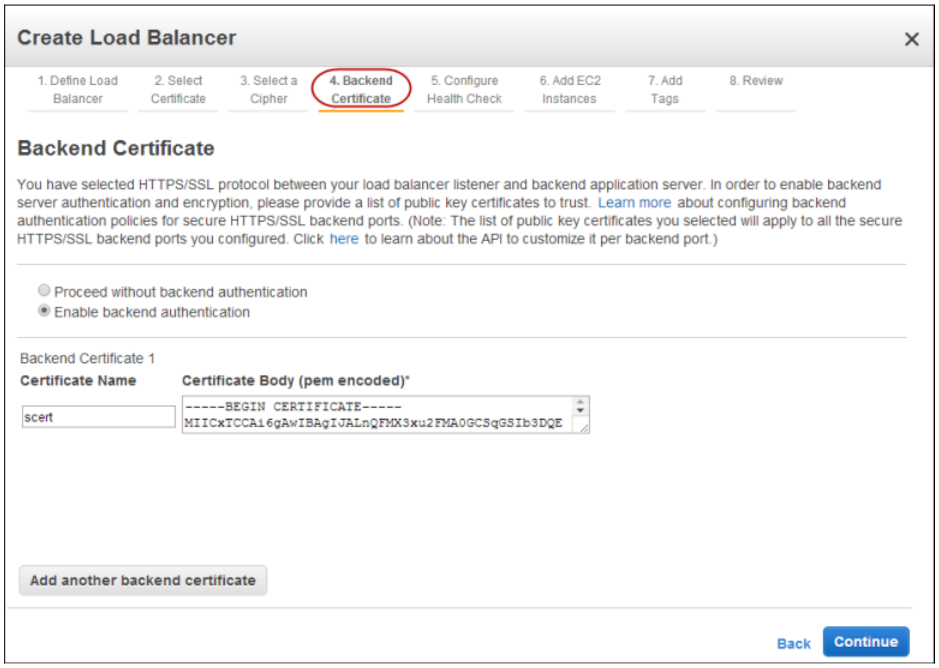
On the **Backend Certificate** page, select from the following options:

To not configure back-end server authentication

- Select **Proceed without backend authentication** and go to step 2.

To configure back-end server authentication

1. Select **Enable backend authentication**.
   a. Enter the name of the public key certificate in the **Certificate Name** box, and then copy and paste the contents of the certificate (PEM-encoded) in the **Certificate body** box.
   b. Click **Add another Backend Certificate** to add multiple certificates.



Backend Certificate

You have selected HTTPS/SSL protocol between your load balancer listener and backend application server. In order to enable backend server authentication and encryption, please provide a list of public key certificates to trust. Learn more about configuring backend authentication policies for secure HTTPS/SSL backend ports. (Note: The list of public key certificates you selected will apply to all the secure HTTPS/SSL backend ports you configured. Click here to learn about the API to customize it per backend port.)

○ Proceed without backend authentication
● Enable backend authentication

Backend Certificate 1

Certificate Name	Certificate Body (pem encoded)*
scert	-----BEGIN CERTIFICATE----- MIICxTCCAi6gAwIBAgIJALnQFMX3xu2FMA0GCSqGSIb3DQE

2. Click **Continue** to configure health check for your backend server.
3. See Step 4: Configure Health Check Settings (p. 77) for instructions on configuring health check for your back-end servers.

Step 4: Configure Health Check Settings

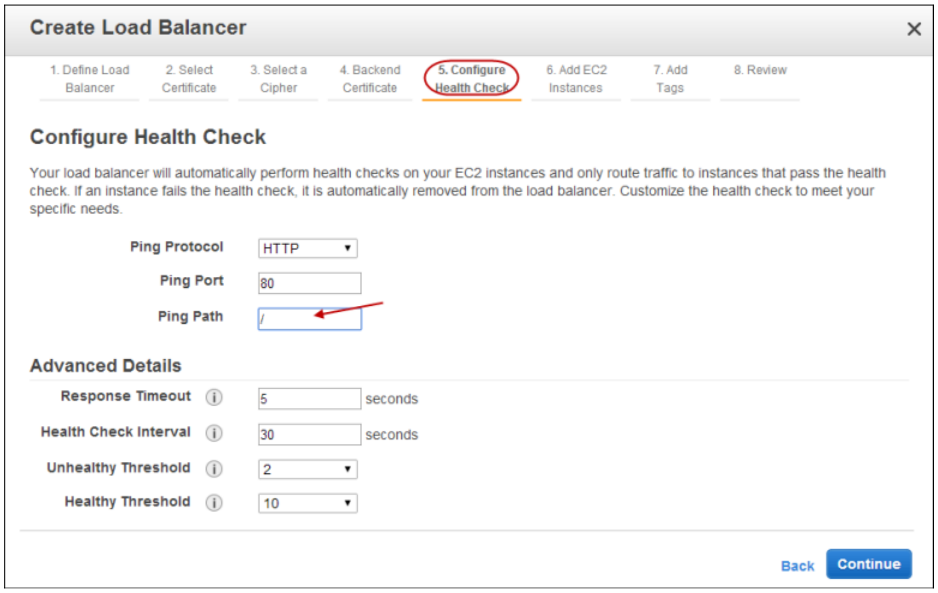
Elastic Load Balancing routinely checks the health of each registered Amazon EC2 instance based on the configurations that you specify. If Elastic Load Balancing finds an unhealthy instance, it stops sending traffic to the instance and reroutes traffic to healthy instances. For more information on configuring health check, see Health Check (p. 7).

To configure the health check

1. On the **Configure Health Check** page, configure the health check settings that your application requires.

   Elastic Load Balancing sends health check queries to the specified ping port and the ping path. Make sure that your EC2 instances accept traffic on the ping port you specify here.

   This example uses a single forward slash in the ping path field so that Elastic Load Balancing sends the query to your webserver's default home page, whether that default page is named `index.html`, `default.html`, or a different name.



Configure Health Check

Your load balancer will automatically perform health checks on your EC2 instances and only route traffic to instances that pass the health check. If an instance fails the health check, it is automatically removed from the load balancer. Customize the health check to meet your specific needs.

Ping Protocol	HTTP
Ping Port	80
Ping Path	/

Advanced Details

Response Timeout	5 seconds
Health Check Interval	30 seconds
Unhealthy Threshold	2
Healthy Threshold	10

2. Click **Continue** to register your Amazon EC2 instances.
3. See Step 5: Register Amazon EC2 Instances (p. 77) for instructions to register your EC2 instances.

Step 5: Register Amazon EC2 Instances

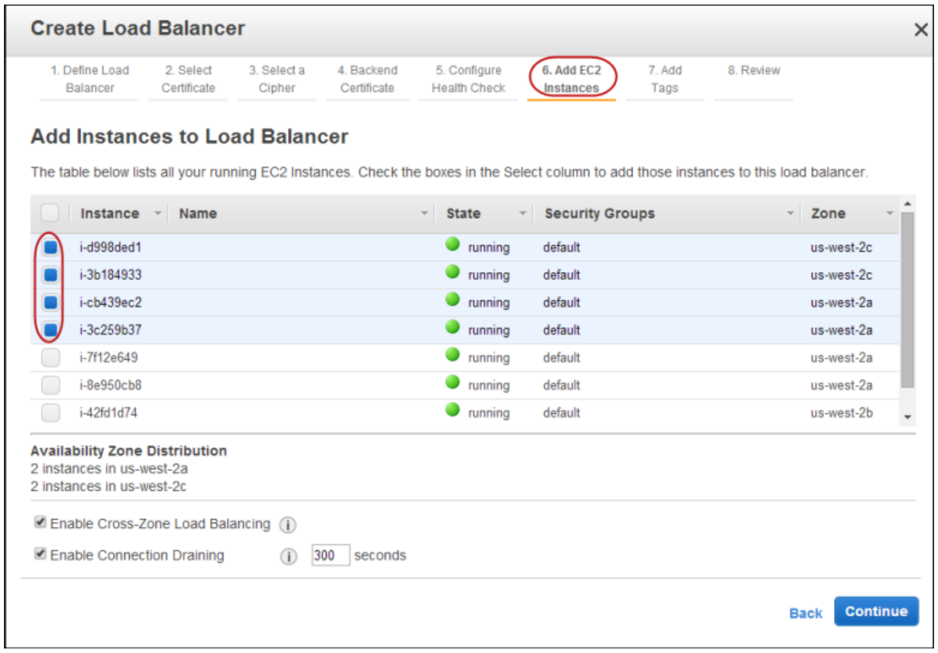
After you create your load balancer, you have to register your EC2 instances with the load balancer. Your EC2 instances can be within a single Availability Zone or span multiple Availability Zones within a region. For more information on configuring EC2 instances you plan to register with your load balancer, see Configuring EC2 Instances for Load Balancing (p. 7).

When you register EC2 instances using the console, the cross-zone load balancing and connection draining options are enabled by default. If you do not want either or both the options for your load balancer, you can disable them. If you are using the CLI or the Query API to register your instances, and you want to enable either or both these options, you must explicitly do so.

If cross-zone load balancing is enabled for your load balancer, Elastic Load Balancing routes the traffic evenly across all your registered EC2 instances. If connection draining is enabled for your load balancer, the load balancer allows all in-flight requests to instances to complete while the instances are deregistering. For more information about cross-zone load balancing see Request Routing (p. 6). For more information about connection draining, see Connection Draining (p. 8).

To add Amazon EC2 instances

1. On the **Add EC2 Instances** page, in the **Add Instances to Load Balancer** table, select the boxes in the **Instance** column to register instances with your load balancer.
2. Click the **Enable Cross-Zone Load Balancing** box if you want to change the default setting.
3. Click the **Enable Connection Draining** box if you want to change the default setting.



Add Instances to Load Balancer

The table below lists all your running EC2 Instances. Check the boxes in the Select column to add those instances to this load balancer.

	Instance	Name	State	Security Groups	Zone
✓	i-d998ded1		running	default	us-west-2c
✓	i-3b184933		running	default	us-west-2c
✓	i-cb439ec2		running	default	us-west-2a
✓	i-3c259b37		running	default	us-west-2a
	i-7f12e649		running	default	us-west-2a
	i-8e950cb8		running	default	us-west-2a
	i-42fd1d74		running	default	us-west-2b

Availability Zone Distribution
2 instances in us-west-2a
2 instances in us-west-2c

✓ Enable Cross-Zone Load Balancing
✓ Enable Connection Draining 300 seconds

4. Click **Continue** to add tags.
5. See Step 6: Add Tags (p. 78) for instructions on adding tags.

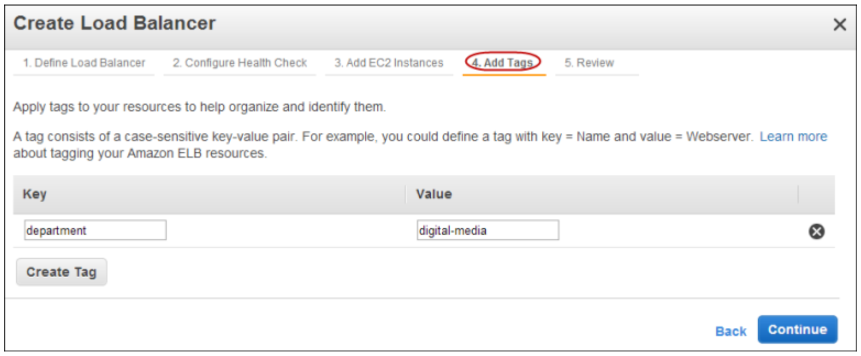
Step 6: Add Tags

You can optionally set tags for your load balancer. Tags help you to categorize your load balancers in different ways, for example, by purpose, owner, or environment. For more information, see Tagging (p. 11).

To add tags

If you do not want to assign tags to your load balancer at this time, click **Continue** to skip this step and go to step 4.

1. On the **Add Tags** page, specify a key and a value for the tag.
2. To add multiple tags, click **Create Tag** and continue to specify a key and a value for each tag.



Apply tags to your resources to help organize and identify them.

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. Learn more about tagging your Amazon ELB resources.

Key	Value
department	digital-media

3. When you are done, click **Continue** to review the details of your load balancer.
4. On the **Review** page, check your settings. You can make changes by clicking the edit link for each setting. After you've reviewed your load balancer settings, click **Create** to create your load balancer.
5. The **Create Load Balancer wizard** displays the status of your newly created load balancer. Click **Close** after confirming that your load balancer was successfully created.
6. See Step 7: Verify the Details of Your Load Balancer (p. 79) to verify that the load balancer is launched.

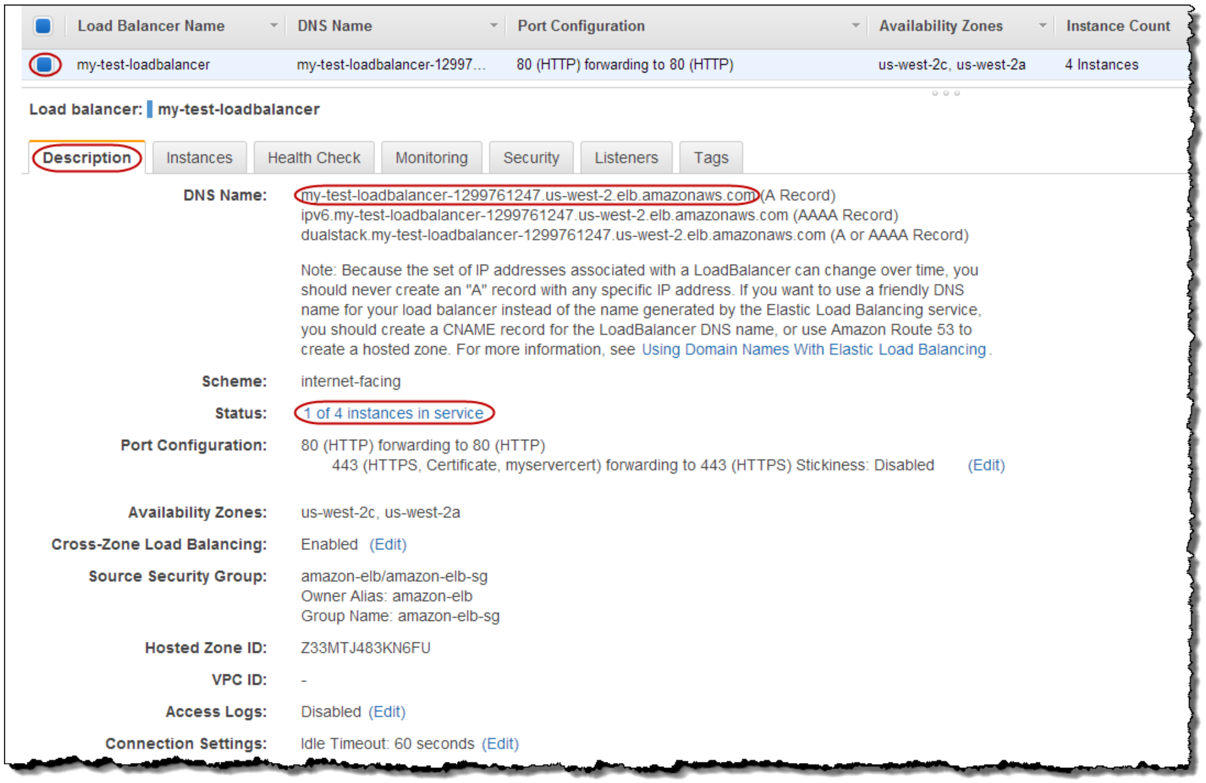
Step 7: Verify the Details of Your Load Balancer

Your newly created load balancer now appears in the load balancer page.

To verify the details of your load balancer,

1. Select the check box next to your load balancer.

   The bottom pane displays the description of your load balancer. Verify that the descriptions match your specifications.



Load Balancer Name	DNS Name	Port Configuration	Availability Zones	Instance Count
my-test-loadbalancer	my-test-loadbalancer-12997...	80 (HTTP) forwarding to 80 (HTTP)	us-west-2c, us-west-2a	4 Instances

Load balancer: my-test-loadbalancer

DNS Name: my-test-loadbalancer-1299761247.us-west-2.elb.amazonaws.com (A Record)
ipv6.my-test-loadbalancer-1299761247.us-west-2.elb.amazonaws.com (AAAA Record)
dualstack.my-test-loadbalancer-1299761247.us-west-2.elb.amazonaws.com (A or AAAA Record)

Note: Because the set of IP addresses associated with a LoadBalancer can change over time, you should never create an "A" record with any specific IP address. If you want to use a friendly DNS name for your load balancer instead of the name generated by the Elastic Load Balancing service, you should create a CNAME record for the LoadBalancer DNS name, or use Amazon Route 53 to create a hosted zone. For more information, see Using Domain Names With Elastic Load Balancing.

Scheme: internet-facing

Status: 1 of 4 instances in service

Port Configuration: 80 (HTTP) forwarding to 80 (HTTP)
443 (HTTPS, Certificate, myservercert) forwarding to 443 (HTTPS) Stickiness: Disabled (Edit)

Availability Zones: us-west-2c, us-west-2a

Cross-Zone Load Balancing: Enabled (Edit)

Source Security Group: amazon-elb/amazon-elb-sg
Owner Alias: amazon-elb
Group Name: amazon-elb-sg

Hosted Zone ID: Z33MTJ483KN6FU

VPC ID: -

Access Logs: Disabled (Edit)

Connection Settings: Idle Timeout: 60 seconds (Edit)

If the description in the **Status** row indicates that some of your instances are not in service, it's probably because your instances are still registering. For more information, see Troubleshooting Elastic Load Balancing: Registering Instances (p. 241).

2. You can test your load balancer after you've verified that at least one of your EC2 instances is *InService*. To test your load balancer, copy the **DNS Name** value that is listed in the **Description** tab and paste it into the address field of an Internet-connected web browser. If your load balancer is working, you will see the default page of your HTTP server.

Using the AWS Command Line Interface

The following step-by-step instructions will help you create an HTTPS/SSL load balancer using the AWS Command line Interface (AWS CLI).

Important
Elastic Load Balancing CLI has been replaced by AWS Command Line Interface (AWS CLI), a unified tool to manage multiple AWS services. New features released after ELB CLI version 1.0.35.0 (dated 7/24/14) will be included in the AWS CLI only. We recommend that you start using the AWS CLI.
For a list of the functionality supported in previous ELB CLI versions, see Elastic Load Balancing API Tools.

Before you get started make sure that you have installed and configured your AWS CLI environment.

Topics

Step 1: Configure Listeners

A *listener* is a process that listens for connection requests. It is configured with a protocol and a port number for front-end (client to load balancer) and back-end (load balancer to back-end instance) connections. For information about the ports, protocols and the listener configurations supported by Elastic Load Balancing, see Listener Configurations for Elastic Load Balancing (p. 47).

In this example, you configure two listeners for your load balancer by specifying the ports and protocols to use for front-end connection (client to load balancer) and back-end connection (load balancer to back-end instance). The first listener accepts HTTP requests on port 80 and sends the request to the back-end application instances on port 80 using HTTP. The second listener accepts HTTPS requests on port 443 and sends the request to back-end application instances using HTTPS on port 443.

Since the second listener uses HTTPS for the front-end connection, you will have to install SSL sever certificate on your load balancer. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances. Before you can install the SSL certificate on your load balancer, you must create the certificate, get the certificate signed by a Certificate Authority (CA), and then upload the certificate using the AWS Identity and Access Management (AWS IAM) service. For information about creating and uploading SSL certificates, see SSL Certificate for Elastic Load Balancing (p. 61)

You can optionally set tags for your load balancer. Tags help you to categorize your load balancers in different ways, for example, by purpose, owner, or environment. For more information, see Tagging (p. 11).

To configure listeners and optionally set tags for your load balancer

1. **Get the Amazon Resource Name (ARN) of your SSL server certificate**

   If you have not yet created and uploaded the SSL server certificate, see SSL Certificate for Elastic Load Balancing (p. 61), for instructions to do so. Make a note of the ARN of the certificate, and then go to step 2.

If you already have an SSL certificate and have uploaded it using IAM, use the AWS CLI command `get-server-certificate` to get the ARN of the certificate.

2. **Configure listeners and optionally add tags.**

   Enter the `create-load-balancer` command by specifying the following options:

   - `--listeners`
     - `LoadBalancerPort` = 80
     - `Protocol` = http
     - `InstancePort` = 80
     - `InstanceProtocol` = http
     - `LoadbalancerPort` = 443
     - `Protocol` = https
     - `InstancePort` = 443
     - `InstanceProtocol` = https
     - `SSLCertificateId` = *`arn:aws:iam::55555555555:server-certificate/production/myservercert`*
   - `--availability-zones` = us-east-1a
   - [optional] `--tag`
     - `Key`=department
     - `Value`=digital-media
   - `load-balancer-name` = *`my-test-loadbalancer`*

   Your command should look as in the following example.

```
aws elb create-load-balancer  --load-balancer-name  my-test-loadbalancer -
-listeners "Protocol=http,LoadBalancerPort=80,InstanceProtocol=http,Instan
cePort=80" "Protocol=https,LoadBalancerPort=443,InstanceProtocol=https,In
stancePort=443, SSLCertificateId=arn:aws:iam::55555555555:server-certific
ate/production/myservercert" --tag "Key=department,Value=digital-media" --
availability-zones us-east-1a
```

   Note
   Multiple values (listeners or tags) must be specified in the following format separated by a space:
   `--tags "Key=key1,Value=value1" "Key=key2,Value=value2"`

   Elastic Load Balancing returns the DNS name of your load balancer.

```
{
  "DNSName": "my-test-loadbalancer-012345678.us-east-1a.elb.amazonaws.com"

 }
```

3. Copy the DNS name in a safe place. You'll be using the DNS name to connect to the load balancer later in the procedure. You can also later map any other domain name (such as www.example.com) to your load balancer's DNS name using CNAME or some other technique.
4. If you have assigned the tags, verify that the tags are set for your load balancer.

   Enter the `describe-tags` command by specifying following option:

   - `load-balancer-name` = *`my-test-loadbalancer`*

Your command should look like the following example:

```
aws elb describe-tags  --load-balancer-name  my-test-loadbalancer
```

Elastic Load Balancing responds with the description of the tags set for your load balancer as in the following example:

```
{
    "TagDescriptions": [
        {
            "Tags": [
                {
                    "Value": "digital-media",
                    "Key": "department"
                }
            ],
            "LoadBalancerName": "my-test-loadbalancer"
        }
    ]
}
```

5. See Step 2: Configure SSL Security Policy (p. 84) for instructions on configuring SSL ciphers.

Step 2: Configure SSL Security Policy

Elastic Load Balancing provides you with security policies that have predefined SSL negotiation configurations you can use for your load balancer. You can either select one of the predefined security policies, or you can create your own custom security policy by specifying the SSL protocols, ciphers, and, optionally, enabling the server order preference. For more information about the security policies, see SSL Negotiation Configurations for Elastic Load Balancing (p. 54).

Note
When you create your load balancer, by default, Elastic Load Balancing associates the latest version of the predefined security policy with your load balancer. We highly recommend that you use the default setting provided by Elastic Load Balancing to negotiate SSL connection.

To verify that your newly created load balancer is associated with the predefined security policy

- Enter the describe-load-balancers command with the following option:
  - *load-balancer-name* = `my-test-loadbalancer`

  Your command should look like in the following example.

```
aws elb describe-load-balancers --load-balancer-name my-test-loadbalancer
```

  Elastic Load Balancing responds as in the following example.

```
{
    "LoadBalancerDescriptions": [
        {
            "Subnets": [],
            "CanonicalHostedZoneNameID": "Z3DZXE0Q79N41H",
            "CanonicalHostedZoneName": "my-test-loadbalancer-012345678.us-
east-1.elb.amazonaws.com",
            "ListenerDescriptions": [
                {
                    "Listener": {
                        "InstancePort": 443,
                      "SSLCertificateId": "arn:aws:iam::55555555555:server-
certificate/myservercert",
                        "LoadBalancerPort": 443,
                        "Protocol": "HTTPS",
                        "InstanceProtocol": "HTTPS"
                    },
                    "PolicyNames": [
                        "ELBSecurityPolicy-2014-01"
                    ]
                },
                {
                    "Listener": {
                        "InstancePort": 80,
                        "LoadBalancerPort": 80,
                        "Protocol": "HTTP",
                        "InstanceProtocol": "HTTP"
                    },
                    "PolicyNames": []
                }
            ],
            "HealthCheck": {
                "HealthyThreshold": 10,
                "Interval": 30,
                "Target": "HTTP:80/",
                "Timeout": 5,
                "UnhealthyThreshold": 2
            },
            "BackendServerDescriptions": [],
            "Instances": [],
            "DNSName": "my-test-loadbalancer-012345678.us-east-
1.elb.amazonaws.com",
            "SecurityGroups": [],
            "Policies": {
                "LBCookieStickinessPolicies": [],
                "AppCookieStickinessPolicies": [],
                "OtherPolicies": [
                    "ELBSecurityPolicy-2014-01"
                ]
            },
            "LoadBalancerName": "my-test-loadbalancer",
            "CreatedTime": "2014-03-19T03:24:02.650Z",
            "AvailabilityZones": [
                "us-east-1a"
            ],
            "Scheme": "internet-facing",
            "SourceSecurityGroup": {
                "OwnerAlias": "amazon-elb",
                "GroupName": "amazon-elb-sg"
            }
        }
    ]
}
```

You can see that `ELBSecurityPolicy-2014-01` is enabled for the load balancer port 443. This is the latest version of the predefined security policy provided by Elastic Load Balancing. For information about the current configuration of the predefined security policy associated with your load balancer and of all the other security policies, see SSL Security Policy Table (p. 55).

This section walks you through the process of changing the default setting and associating your newly created load balancer with either one of the other predefined security policies or a custom security policy.

Skip this step if you want your load balancer to be associated with the latest version of the predefined security policy.

The following steps outline how to configure SSL security policy for your load balancer:

1. Get the list of predefined security policies provided by Elastic Load Balancing.
2. Create a SSL negotiation policy either by specifying one of the listed security policies or by creating a custom security policy by specifying SSL protocols, ciphers and option.
3. Verify that the policy is created.
4. Enable the policy by setting the policy for the load balancer port.
5. Verify that the policy is set for the load balancer port.

This example walks you through the process of creating a **SSLNegotiationPolicyType** policy to use **ELBSecurityPolicy-2011-08**.

This example also includes instruction for creating a custom security policy. You can skip step 1 if you want to create a custom security policy.

To configure SSL security policy

1. Enter the describe-load-balancer-policies command, as in the following example, to list all the security policies provided by Elastic Load Balancing.

   ```
   aws elb describe-load-balancer-policies
   ```

   The response includes the names of all the security policies provided by Elastic Load Balancing. All the security policy types are **SSLNegotiationPolicyType** and are used for SSL/HTTPS listeners.

   The **ELBSecurityPolicy-2011-08** policy uses *Server Order Preference* to negotiate SSL connections. For information about the current configuration for all the listed Security Policies, see SSL Security Policy Table (p. 55).

2. Enter the create-load-balancer-policy command using the following options to create a SSL negotiation policy either using the recommended security policy **ELBSecurityPolicy-2011-08**, or the custom security policy.
   In this example, you create a **MySSLNegotiationPolicy** of the type **SSLNegotiationPolicyType** for your load balancer **my-test-loadbalancer**.
   Use the following options to create a SSL negotiation policy using the security policy - ELB-SecurityPolicy-2011-08:

   - *`policy-name`* = *`MySSLNegotiationPolicy`*
   - *`policy-type-name`* = `SSLNegotiationPolicyType`
   - *`policy-attributes`*
     - *`AttributeName`* = `Reference-Security-Policy`
     - *`AttributeValue`* = `ELBSecurityPolicy-2011-08`
   - *`load-balancer-name`* = *`my-test-loadbalancer`*

   Your command should look like the following example:

   ```
   aws elb create-load-balancer-policy --load-balancer-name my-test-loadbalancer

     --policy-name MySSLNegotiationPolicy  --policy-type-name SSLNegotiation
   Policy
   Type --policy-attributes AttributeName=Reference-Security-Policy,Attribute
   Value=
   ELBSecurityPolicy-2011-08
   ```

   Or, use the following options to create a custom security policy by enabling the protocols and ciphers that meet your requirements:

   > **Note**
   > You must enable at least one protocol and one cipher. You only need to set to `true` the attributes that you want enabled.
   > The DSA and RSA ciphers are specific to the signing algorithm and are used to create the SSL certificate. If you already have your SSL certificate, make sure to enable the cipher that was used to create your certificate.
   > Your custom policy name must not contain the prefixes - `ELBSecurityPolicy-` and `ELB-Sample-`. These prefixes are used by Elastic Load Balancing for its predefined security

policy names. If Elastic Load Balancing reads this prefix in your custom security policy name, it will throw an error.

- *policy-name* = *MySSLNegotiationPolicy*
- *policy-type-name* = SSLNegotiationPolicyType
- *attributes*
  - *AttributeName* = ProtocolSSLv3
  - *AttributeValue* = true
  - *AttributeName* = ProtocolTLSv1.1
  - *AttributeValue* = true
  - *AttributeName* = DHE-RSA-AES256-SHA256
  - *AttributeValue* = true
  - [optional] *AttributeName* = Server-Defined-Cipher-Order
  - [optional] *AttributeValue* = true

    Note
    Enable Server-Defined-Cipher-Order if you want to use Server Order Preference (the order listed in the SSL Security Policy Table (p. 55)) for SSL negotiation.
- *load-balancer-name* = *my-test-loadbalancer*

Your command should look like in the following example.

```
aws elb create-load-balancer-policy --load-balancer-name my-test-loadbalancer

 --policy-name MySSLNegotiationPolicy  --policy-type-name SSLNegotiationPoli
cyType
 --policy-attributes AttributeName=Protocol-SSLv3,AttributeValue=true
 AttributeName=Protocol-TLSv1.1,AttributeValue=true AttributeName=DHE-RSA-
AES256-SH
A256,AttributeValue=true AttributeName=Server-Defined-Cipher-Order,Attrib
uteValue=true
```

3. Enter the describe-load-balancer-policies command with the following options to verify that the policy is created.

   - *load-balancer-name* = my-test-loadbalancer
   - *--policy-names* = *MySSLNegotiationPolicy*

   Your command should look like in the following example.

```
aws elb describe-load-balancer-policies --load-balancer-name my-test-load
balancer  --policy-name MySSLNegotiationPolicy
```

   The response includes the description of the MySSLnegotiationPolicy.
4. Enter the set-load-balancer-policies-of-listener command with the following options to enable your newly created policy on the load balancer port 443:

   - *load-balancer-port* = 443
   - *policy-names* = *MySSLNegotiationPolicy*
   - *load-balancer-name* = my-test-loadbalancer

Your command should look like in the following example.

```
aws elb set-load-balancer-policies-of-listener --load-balancer-name my-test-
loadbalancer --load-balancer-port 443 --policy-names MySSLNegotiationPolicy
```

5. Enter the describe-load-balancers command with the following option to verify that the new policy is enabled for the load balancer port.

   - `load-balancer-name` = `my-test-loadbalancer`

   Your command should look like in the following example.

```
aws elb describe-load-balancers --load-balancer-name my-test-loadbalancer
```

   Elastic Load Balancing responds as in the following example.

```
{
    "LoadBalancerDescriptions": [
        {
            "Subnets": [],
            "CanonicalHostedZoneNameID": "Z3DZXE0Q79N41H",
            "CanonicalHostedZoneName": "my-test-loadbalancer-34503258.us-
east-1a.elb.amazonaws.com",
            "ListenerDescriptions": [
                {
                    "Listener": {
                        "InstancePort": 443,
                      "SSLCertificateId": "arn:aws:iam::55555555555:server-
certificate/myservercert",
                        "LoadBalancerPort": 443,
                        "Protocol": "HTTPS",
                        "InstanceProtocol": "HTTPS"
                    },
                    "PolicyNames": [
                        "MySSLNegotiationPolicy"
                    ]
                },
                {
                    "Listener": {
                        "InstancePort": 80,
                        "LoadBalancerPort": 80,
                        "Protocol": "HTTP",
                        "InstanceProtocol": "HTTP"
                    },
                    "PolicyNames": []
                }
            ],
            "HealthCheck": {
                "HealthyThreshold": 10,
                "Interval": 30,
                "Target": "HTTP:80/",
                "Timeout": 5,
                "UnhealthyThreshold": 2
            },
            "BackendServerDescriptions": [],
            "Instances": [],
            "DNSName": "my-test-loadbalancer-012345678.us-east-
1.elb.amazonaws.com",
            "SecurityGroups": [],
            "Policies": {
                "LBCookieStickinessPolicies": [],
                "AppCookieStickinessPolicies": [],
                "OtherPolicies": [
                    "ELBSecurityPolicy-2014-01",

                    "MySSLNegotiationPolicy"
                ]
            },
            "LoadBalancerName": "my-test-loadbalancer",
            "CreatedTime": "2014-03-19T03:24:02.650Z",
            "AvailabilityZones": [
                "us-east-1a"
            ],
            "Scheme": "internet-facing",
            "SourceSecurityGroup": {
                "OwnerAlias": "amazon-elb",
                "GroupName": "amazon-elb-sg"
            }
        }
    ]
}
```

You can see that *`MySSLNegotiationPolicy`* is enabled for the load balancer port 443.

6. See Step 3: Configure Backend Server Authentication (p. 90) for instructions on configuring back-end server authentication.

Step 3: Configure Backend Server Authentication

If you have HTTPS/SSL on the back-end connection, you can choose to enable authentication on your back-end instance. This authentication can be used to ensure that back-end instances accept only encrypted communication and to ensure that the back-end instance has the correct certificates.

Skip this step if you do not want to enable the back-end server authentication.

In this example, you enable the back-end server authentication by creating a public key policy that uses a public key for authentication. You then use the public key policy to create a back-end server authentication policy. Finally, you enable the back-end server authentication by setting the back-end server authentication policy with the back-end server port. In this example, the back-end server is listening with SSL/HTTPS protocol set to instance port 443.

The value of the public key policy is the public key of the certificate that the back-end servers will present to the load balancer. You can retrieve the public key using OpenSSL.

To configure back-end server authentication

1. Enter the `openssl x509` command to retrieve the public key.

```
openssl x509 -in PublicKey -pubkey -noout
```

2. Enter the create-load-balancer-policy> command, as in the following example, to create a public key policy.

```
aws elb create-load-balancer-policy --load-balancer-name my-test-loadbalancer
 --policy-name MyPublicKeyPolicy --policy-type-name PublicKeyPolicyType --
policy-attributes "name=PublicKey,value=
```

```
MIICiTCCAfICCQD6m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UEBhMC
VVMxCzAJBgNVBAgTAldBMRAwDgYDVQQHEwdTZWF0dGxlMQ8wDQYDVQQKEwZBbWF6
b24xFDASBgNVBAsTC0lBTSBDb25zb2xlMRIwEAYDVQQDEwlUZXN0Q2lsYWMxHzAd
BgkqhkiG9w0BCQEWEG5vb25lQGFtYXpvbi5jb20wHhcNMTEwNDI1MjA0NTIxWhcN
MTIwNDI0MjA0NTIxWjCBiDELMAkGA1UEBhMCVVMxCzAJBgNVBAgTAldBMRAwDgYD
VQQHEwdTZWF0dGxlMQ8wDQYDVQQKEwZBbWF6b24xFDASBgNVBAsTC0lBTSBDb25z
b2xlMRIwEAYDVQQDEwlUZXN0Q2lsYWMxHzAdBgkqhkiG9w0BCQEWEG5vb25lQGFt
YXpvbi5jb20wgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAMaK0dn+a4GmWIWJ
21uUSfwfEvySWtC2XADZ4nB+BLYgVIk60CpiwsZ3G93vUEIO3IyNoH/f0wYK8m9T
rDHudUZg3qX4waLG5M43q7Wgc/MbQITxOUSQv7c7ugFFDzQGBzZswY6786m86gpE
Ibb3OhjZnzcvQAaRHhdlQWIMm2nrAgMBAAEwDQYJKoZIhvcNAQEFBQADgYEAtCu4
nUhVVxYUntneD9+h8Mg9q6q+auNKyExzyLwaxlAoo7TJHidbtS4J5iNmZgXL0Fkb
FFBjvSfpJIlJ00zbhNYS5f6GuoEDmFJl0ZxBHjJnyp378OD8uTs7fLvjx79LjSTb
NYiytVbZPQUQ5Yaxu2jXnimvw3rrszlaEXAMPLE=
```

```
"
```

Note
To specify a public key value for the *`policy-attributes`* argument, remove the first and last lines of the public key (the line containing "`-----BEGIN PUBLIC KEY-----`" and the line containing "`-----END PUBLIC KEY-----`"). The AWS CLI does not accept white space characters inside the value for the *`policy-attributes`* argument.

3. Enter the create-load-balancer-policy> command as in the following example, to create a back-end server authentication policy by referring to `MyPublicKeyPolicy`. You can refer to multiple public

key policies. When multiple public key policies are used, the load balancer will try all the keys one by one for authentication. If one of the public keys matches the server certificate, authentication passes.

```
aws elb create-load-balancer-policy  my-test-loadbalancer --policy-name My
BackendServerAuthenticationPolicy --policy-type-name BackendServerAuthentic
ationPolicyType --policy-attributes "name=PublicKeyPolicyName,value=MyPub
licKeyPolicy"
```

4. Enter the set-load-balancer-policies-for-backend-server command as in the following example to set `MyBackendServerAuthenticationPolicy` to the instance (back-end server) port.

```
aws elb set-load-balancer-policies-for-backend-server  --load-balancer-name
 my-test-loadbalancer --instance-port 443 --policy-names MyBackendServerAu
thenticationPolicy
```

5. Enter the describe-load-balancer-policies command as in the following example, to list all the policies created for `my-test-loadbalancer`.

```
 aws elb describe-load-balancer-policies --load-balancer-name my-test-load
balancer
```

6. Enter the describe-load-balancer-policies command as in the following example, to view details of `MyBackendServerAuthenticationPolicy`.

```
 aws elb describe-load-balancer-policies --load-balancer-name my-test-load
balancer --policy-names MyBackendServerAuthenticationPolicy
```

7. See Step 4: Configure Health Check (p. 92) for instructions on configuring health check for your application instances.

Step 4: Configure Health Check

Elastic Load Balancing routinely checks the health of each registered Amazon EC2 instance based on the configurations that you specify. If Elastic Load Balancing finds an unhealthy instance, it stops sending traffic to the instance and reroutes traffic to healthy instances. For more information on Elastic Load Balancing health check, see Health Check (p. 7).

When you create your load balancer, Elastic Load balancing configures the health check of your back-end instances with default settings. You can change the default health check configurations at any time. In this example, you configure the health check settings for your back-end instances.

Skip this step if you want to leave the health check configuration of your back-end instances set to default settings.

To configure health check settings for your back-end instance

1. Enter the configure-health-check command as in the following example.

   ```
   aws elb configure-health-check --load-balancer-name my-test-loadbalancer -
   -health-check Target=HTTP:80/png,Interval=30,Un
   healthyThreshold=2,HealthyThreshold=2,Timeout=3
   ```

   Elastic Load Balancing returns the following:

   ```
   {
       "HealthCheck": {
           "HealthyThreshold": 2,
           "Interval": 30,
           "Target": "HTTP:80/png",
           "Timeout": 3,
           "UnhealthyThreshold": 2
       }
   ```

2. See Step 5: Register EC2 Instances (p. 93) for instructions to register your EC2 instances.

Step 5: Register EC2 Instances

After you create your load balancer, you have to register your EC2 instances with the load balancer. Your EC2 instances can be within a single Availability Zone or span multiple Availability Zones within a region. For more information on configuring EC2 instances you plan to register with your load balancer, see Configuring EC2 Instances for Load Balancing (p. 7).

In this example, you register your newly created load balancer with your Amazon EC2 instances.

Important
You should only register instances that are in the *Pending* or *Running* state and are not in a Virtual Private Cloud (VPC). If you are using Elastic Load Balancing in a VPC, see Elastic Load Balancing in Amazon VPC (p. 109).

To register Amazon EC2 instances

1. Enter the register-instances-with-load-balancer command as in the following example.

```
aws elb register-instances-with-load-balancer  --load-balancer-name my-test-
loadbalancer   --instances i-4f8cf126 i-0bb7ca62
```

   Elastic Load Balancing returns the following:

```
{
    "Instances": [
        {
            "InstanceId": "i-4f8cf126"
        },
        {
            "InstanceId": "i-0bb7ca62"
        }
    ]
}
```

2. See Step 6: Verify Instances (p. 94) to verify that the load balancer is launched.

Step 6: Verify Instances

In this example, you check the state of your newly registered Amazon EC2 instances. Your load balancer is usable as soon as any one of your registered EC2 instance is in *InService* state.

1. **To check the state of your newly registered Amazon EC2 instances**

   Enter the describe-instance-health command as in the following example.

   ```
   aws elb describe-instance-health  --load-balancer-name my-test-loadbalancer
    --instances i-4f8cf126 i-0bb7ca62
   ```

   Elastic Load Balancing returns the following:

   ```
   {
       "InstanceStates": [
           {
               "InstanceId": "i-4f8cf126",
               "ReasonCode": "N/A",
               "State": "InService",
               "Description": "N/A"
           },
           {
               "InstanceId": "i-0bb7ca62",
               "ReasonCode": "Instance",
               "State": "OutOfService",
               "Description": "Instance registration is still in progress"
           }
       ]
   }
   ```

2. If the **State** field of some or all of your instances display *OutOfService*, it's probably because your instances are still registering. For more information, see Troubleshooting Elastic Load Balancing: Registering Instances (p. 241).
3. You can test your load balancer after you have verified that at least one of your EC2 instances is *InService*. To test your load balancer, copy the **DNS Name** of your load balancer that you got after you completed the Step 1: Configure Listeners (p. 81) task, and paste it into the address field of an Internet-connected web browser. If your load balancer is working, you will see the default page of your HTTP server.

Add or Remove Availability Zones for Your Load Balanced Application

Elastic Load Balancing provides you with option to add or remove Availability Zones for your load balancer at any time. After you add an Availability Zone, the load balancer starts routing traffic to the instances in the added zone. When you remove an Availability Zone from your load balancer, the load balancer stops routing traffic to the instances in the removed Availability Zone. For more information, see Availability Zones and Regions (p. 5).

This section walks you through the process for adding or removing Availability Zones for your load balancer.

Topics

- Add Availability Zone (p. 95)
- Remove Availability Zone (p. 97)

Add Availability Zone

In this tutorial, you expand your EC2 application to run in an additional Availability Zone (`us-east-1b`). To do so, you first register the instances in the Availability Zone `us-east-1b` with the load balancer.

Preconditions:

- You have deployed a load balancer in Availability Zone us-east-1a as in Create a HTTPS/SSL Load Balancer (p. 71).
- In Availability Zone us-east-1b, you have launched the instances you intend to register with your load balancer.

The following sections include instructions for adding an Availability Zone to your load balancer using the AWS Management Console, command line interface (CLI), or the Query API.

Topics

- Using the AWS Management Console (p. 95)
- Using the Command Line Interface (p. 96)
- Using Query API (p. 97)

Using the AWS Management Console

It is important to first register the instances in the new Availability Zone with your load balancer *before* adding the Availability Zone.

To add Availability Zone to your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer. Click the **Instances** tab.
5. **Register the instances launched in the new Availability Zone with your load balancer**

   a. In the **Instances** pane, click **Edit Instances**.

   b. In the **Add and Remove Instances** page, select the instances you just launched in `us-east-1b`.
   c. Click **Save**. The newly registered instances appear in the instance list.

6. **Enable the new Availability Zone**

   a. In the bottom pane, make sure your newly added Availability Zone appears in the list. Click **Edit Availability Zones**.
   b. In the **Add and Remove Availability Zones** page, make sure your new Availability Zone `us-east-1b` is selected. If not, select it now.
   c. Click **Save**.

Using the Command Line Interface

It is important to register instances in the new Availability Zone with your load balancer *before* adding the Availability Zone. After you add the Availability Zone, the load balancer begins to route traffic to all the enabled Availability Zones.

1. **To add a new Availability Zone to your load balancer**

   Enter the `elb-register-instances-with-lb` command as in the following example by specifying your load balancer name and the instance IDs of the instances launched in the new Availability Zone.

   ```
   elb-register-instances-with-lb  MyLoadBalancer  --headers --instances i-
   3a8cf324, i-2603ca33
   ```

   Elastic Load Balancing returns the following:

   ```
   INSTANCE  INSTANCE-ID
   INSTANCE  i-3a8cf324
   INSTANCE  i-2603ca33
   INSTANCE  i-4f8cf126
   INSTANCE  i-0bb7ca62
   ```

2. Enter the `elb-describe-instance-health` command as in the following example to verify if the instances are registered with the load balancer.

   ```
   PROMPT> elb-describe-instance-health  MyLoadBalancer  --headers --instances
    i-3a8cf324,i-2603ca33
   ```

   Elastic Load Balancing returns the following:

   ```
   INSTANCE  INSTANCE-ID STATE
   INSTANCE  i-3a8cf324 OutOfService
   INSTANCE  i-2603ca33 OutOfService
   ```

3. If the instance state shows that the instances are `OutOfService`, it means that Elastic Load Balancing is checking the health state of the instances. You can proceed to add the new Availability Zone while the health check is underway.

Enter the `elb-enable-zones-for-lb` command as in the following example.

```
elb-enable-zones-for-lb  MyLoadBalancer  --headers --availability-zones us-
east-1b
```

Elastic Load Balancing returns the following:

```
AVAILABILITY_ZONES  AVAILABILITY-ZONES
AVAILABILITY_ZONES  us-east-1a, us-east-1b
```

Using Query API

It is important to register instances in the new Availability Zone with your load balancer *before* adding the Availability Zone. After you add the Availability Zone, the load balancer begins to route traffic to all the enabled Availability Zones.

1. **To add a new Availability Zone to your load balancer**

   Call the `RegisterInstancesWithLoadBalancer` action with the following parameters:

   - *`LoadBalancerName`* = `MyLoadBalancer`
   - *`Instances`* = [`i-3a8cf324`, `i-2603ca33`]

2. Call the `DescribeInstanceHealth` action with the following parameters.

   - *`LoadBalancerName`* = `MyLoadBalancer`
   - Instances = `i-3a8cf324`, `i-2603ca33`

3. When the instances from the previous step are in the *OutOfService* state, you can proceed to the next step. Call the `EnableAvailabilityZonesForLoadBalancer` action with the following parameters:

   - *`LoadBalancerName`* = `MyLoadBalancer`
   - *`AvailabilityZones.member.1`* = `us-east-1b`

The operation returns the updated list of Availability Zones enabled for your load balancer.

Remove Availability Zone

When you remove an Availability Zone from your load balancer, the load balancer stops routing traffic to the removed zone. Some of the common use cases where you might want to remove an Availability Zone from your load balancer is when there are no healthy instances in the zone, when you are experiencing a temporary decrease in traffic, when you want to troubleshoot or update your instances in the zone, or when you want to permanently remove that zone from your load balancer.

In this tutorial, you remove the Availability Zone `us-east-1a` from your `MyLoadBalancer` load balancer.

Note
The instances launched in an Availability Zone will continue to be registered with your load balancer after you remove the Availability Zone from the load balancer. Follow the instructions in

Deregister and Register Amazon EC2 Instances (p. 139) if you want to deregister the instances after you have removed the Availability Zone.

This tutorial assumes that you have an HTTP load balancer enabled in Availability Zones `us-east-1a` and `us-east-1b`.

The following sections include instructions for removing an Availability Zone from your load balancer using the AWS Management Console, command line interface (CLI), or the Query API.

Using the AWS Management Console

To remove Availability Zone from your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer. Click the **Instances** tab.
5. In the **Instances** pane, in the **Edit Availability Zones** table, identify the row that lists the Availability Zone. , click .
6. In the **Actions** column of the identified row, click **Remove from Load Balancer**.

Using the Command Line Interface

To remove an availability zone from your load balancer,

- Enter the `elb-disable-zones-for-lb` command as in the following example.

```
elb-disable-zones-for-lb  MyLoadBalancer  --headers --availability-zones
us-east-1a
```

  Elastic Load Balancing returns an updated list of Availability Zones enabled for your load balancer.

```
AVAILABILITY_ZONES  AVAILABILITY-ZONES
AVAILABILITY_ZONES  us-east-1b
```

Using Query API

To remove an availability zone from your load balancer,

- Call the `DisableAvailabilityZonesForLoadBalancer` action with the following parameters:
  - *`LoadBalancerName`* = `MyLoadBalancer`
  - Availability Zones = `us-east-1a`

  The operation returns the updated list of Availability Zones enabled for your load balancer.

Manage Security Groups in Amazon EC2-Classic

A security group acts as a firewall that controls the traffic allowed into a group of instances. When you launch an Amazon EC2 instance, you can assign it to one or more security groups. For each security group, you can add rules that govern the allowed inbound traffic to instances in the group. All other inbound traffic is discarded. You can modify rules for a security group at any time. The new rules are automatically enforced for all existing and future instances in the group. For information on Amazon EC2 security groups, go to Using Security Groups.

Elastic Load Balancing provides a special Amazon EC2 source security group that you can use to ensure that a back-end Amazon EC2 instance receives traffic only from Elastic Load Balancing. This feature involves two security groups—the source security group and a security group that defines the ingress rules for your back-end instance. To lock down traffic between your load balancer and your back-end instances, add or modify a rule to your back-end security group that limits ingress traffic so that it can come only from the Amazon EC2 source security group provided by the Elastic load Balancing.

Locking down traffic between Elastic Load Balancing and back-end Amazon EC2 instance

Topics

In this section, we will walk you through the process for locking down the traffic between your load balancer and your back-end Amazon EC2 instances.

Before you continue, be sure you’ve read Security Group Concepts section in the *Amazon EC2 User Guide*.

The following table outlines the steps for locking down the traffic between your load balancer and the back-end instances. This will be followed by instructions for locking down traffic between your load balancer and your back-end instances using the AWS Management Console, the command line interface (CLI), or the Query API.

If you are planning on using the command line interface (CLI), be sure that you've installed the Amazon EC2 command line interface tool. For information on downloading and installing the tool, go to Setting Up the Amazon EC2 Command Line Tools section in the *Amazon EC2 User Guide*.

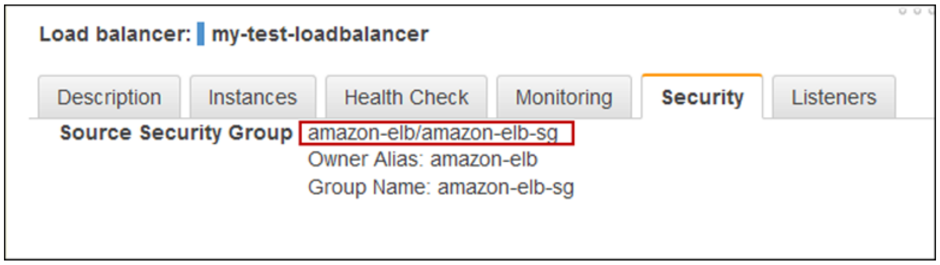
Steps for locking down the traffic between your load balancer and your back-end instance

1	Get the name of the source security group provided by Elastic Load Balancing for your load balancer.
2	Add a new rule in the security group associated with your Amazon EC2 back-end instances to allow inbound traffic from your load balancer.
3	Verify that the new rule has been added.
4	[optional] Remove the rules in your back-end instance's security group that are less restrictive.

Using the AWS Management Console

1. **To get the name of the source security group provided by Elastic Load Balancing for your load balancer,**

   a. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
   b. On the **Load Balancers** page, select your load balancer.
   c. The bottom pane displays the details of your load balancer.
   d. Click the **Security** tab.
   e. Copy the name displayed in the **Source Security Group** row. This is the source security group provided by Elastic Load Balancing for your load balancer.



Load balancer: my-test-loadbalancer

Source Security Group: amazon-elb/amazon-elb-sg
Owner Alias: amazon-elb
Group Name: amazon-elb-sg

2. **To add a rule in the security group of your Amazon EC2 back-end instances to allow incoming traffic from the Elastic Load Balancing source security group,**

   a. On the **Load Balancers** page, click **Instances** in the **Navigation** pane.
   b. On the **My Instances** page, select an instance registered with your load balancer.
   c. The bottom pane displays details of your instance. Make sure that the **Description** tab is selected.
   d. Make a note of the name of the security group displayed in the **Security Groups:** field. This is the security group associated with your back-end instance.
   e. Click **Security Groups** in the Navigation pane.
   f. On the **Security Groups** page, select the security group associated with your back-end instance.
   g. The bottom pane displays details of the security group.
   h. Click the **Inbound** tab. The bottom pane of the **Inbound** tab displays the rules that belong to the security group.
   i. Click **Edit** and then click **Add Rule**
   j. In the **Type** column, click the last dialog box and select the protocol type. The fields in the **Protocol** and **Port Range** columns gets populated.
   k. Click the **Source:** field and select `Custom IP`. In the empty box, type the source security group name of your load balancer. This should be the same name you used in step 1. In our example it's **amazon-elb/amazon-elb-sg**.
   l. Click **Save**.

3. The bottom pane of the **Inbound** tab displays the new rule.
4. [optional] If your security group has rules that are less restrictive than the rule you added in step 2, remove the less restrictive rule by clicking **Edit** and in the **Edit inbound rules** page, clicking the delete icon next in the row that has the less restrictive rule.

   Note
   If you want to connect directly to your back-end instances, do not delete inbound rules that allow you to do so. For example, you might have rules that allow inbound traffic on ports 22 (SSH) and 3389 (RDP).

Using the command line interface (CLI)

1. **To get the name of the source security group provided by Elastic Load Balancing for your load balancer,**
   Enter the `elb-describe-lbs` command. You must include the `--show-long` parameter to display the source security group name. For information on using additional parameters with this command, go to Elastic Load Balancing Quick Reference Card.

   The following example returns a description of the `MyLoadBalancer` load balancer.

   ```
   elb-describe-lbs MyLoadBalancer --show-long --headers
   ```

   The following is an example response.

   ```
   LOAD_BALANCER,NAME,DNS_NAME,CANONICAL_HOSTED_ZONE_NAME,CANONICAL_HOS
   TED_ZONE_NAME_ID,
   HEALTH_CHECK,AVAILABILITY_ZONES,SUBNETS,VPC_ID,INSTANCE_ID,LISTENER_DESCRIP
   TIONS,
   BACKEND_SERVER_DESCRIPTIONS,OTHER_POLICIES,SOURCE_SECURITY_GROUP,SECUR
   ITY_GROUPS,CREATED_TIME,SCHEME
   LOAD_BALANCER,MyLoadBalancer,MyLoadBalancer-91948427.us-east-1.elb.amazon
   aws.com
   ,MyLoadBalancer-91948427.us-east-1.elb.amazonaws.com,Z3DZXE0Q79N41H,"{inter
   val=6
   ,target=HTTP:80/,timeout=5,healthy-threshold=2,unhealthy-threshold=2}",us-
   east-1
   e,(nil),(nil),"i-f5ab7988, i-fbab7986","{protocol=HTTP,lb-port=80,instance-
   proto
   col=HTTP,instance-port=80,policies=},{protocol=HTTPS,lb-port=443,instance-
   protoc
   ol=HTTP,instance-port=80,cert-id=arn:aws:iam::803981987763:server-certific
   ate/sc
   ert,policies=AWSConsole-SSLNegotiationPolicy-MyLoadBalancer}",(nil),AWSCon
   sole-S
   SLNegotiationPolicy-MyLoadBalancer,"{owner-alias=example-elb,group-name=ex
   ample-elb-sg}"
   ,(nil),2012-09-28T17:57:27.580Z,internet-facing
   ```

   The response element includes a source security group data structure composed of an `owner-alias` and `group-name`. This is the source security group associated with your load balancer. Make a note of the `owner-alias` and `group-name`. You'll use it in the next step.

2. **To add a rule in the security group of your Amazon EC2 back-end instances to allow incoming traffic from the Elastic Load Balancing source security group,**

   You will be using the Amazon EC2 CLI commands for this step.

   a. [optional] If you do not know the name of the security group of your back-end instances, enter the `ec2-describe-group` command as in the following example.

      ```
      ec2-describe-group --headers
      ```

      The response element includes the details of all the security groups in your account. Make a note of the security group name associated with the back-end instance that you want to modify.

   b. Enter the `ec2-authorize` command to add a rule to the security group associated with your back-end instance.

In the following example, `ec2-authorize` limits incoming traffic for all back-end instances that belong to a security group named `MyTestSecurityGroup`.

```
ec2-authorize MyTestSecurityGroup -u amazon-elb -o amazon-elb-sg
```

For specifying additional parameters for ports and protocols, go to ec2-authorize in the *Amazon EC2 CLI Reference*.

3. **To verify that the security group associated with your back-end instance has the new rule that allows incoming traffic from the Elastic Load Balancing source security group,**

   Enter `ec2-describe-group` command as in the following example:

```
ec2-describe-group MyTestSecurityGroup  --headers
```

   The following is the example response that lists the newly added rule:

```
GROUP   Id      Owner   Name    Description
GROUP   sg-9cd8a3f4     000011112222    MyTestSecurityGroup  This is an ex
ample
PERMISSION      000011112222    MyTestSecurityGroup     ALLOWS  tcp     0
      0
FROM    USER    amazon-elb      NAME amazon-elb-sg      ID sg-843f59ed  in
gress
PERMISSION      000011112222    MyTestSecurityGroup     ALLOWS  tcp     3389
    3389
FROM    USER    amazon-elb      NAME amazon-elb-sg      ID sg-843f59ed  in
gress
PERMISSION      000011112222    MyTestSecurityGroup     ALLOWS  tcp     22
      22
FROM    CIDR    0.0.0.0/0       ingress
PERMISSION      000011112222    MyTestSecurityGroup     ALLOWS  tcp     80
      80
FROM    CIDR    0.0.0.0/0       ingress
```

4. [optional] If your security group has rules that are less restrictive than the rule you added in the previous step, use the `ec2-revoke` command to remove the less restrictive rules. For example, an existing rule might allow ingress traffic from the CIDR range 0.0.0.0/0 (all IPv4 addresses).

   The following example uses `ec2-revoke` to remove a rule that allows HTTP traffic from all IPv4 addresses from a security group named `MyTestSecurityGroup`.

```
ec2-revoke MyTestSecurityGroup -p 80 -s 0.0.0.0/0
```

Note
If you want to connect directly to your back-end instances, do not revoke ingress rules that allow you to do so. For example, you might have rules that allow ingress traffic on ports 22 (SSH) and 3389 (RDP).

Using the Query API

1. **To get the name of the source security group provided by Elastic Load Balancing for your load balancer,**

   a. Call the `DescribeLoadBalancers` action with the following parameter:

      - `LoadBalancerNames` = `MyLoadBalancer`

      The response should include the details of your load balancer. The information you get should be similar to the following example:

```
<DescribeLoadBalancersResponse xmlns="http://elasticloadbalancing.amazon
aws.com/doc/2012-06-01/">
  <DescribeLoadBalancersResult>
    <LoadBalancerDescriptions>
      <member>
        <SecurityGroups/>
        <LoadBalancerName>MyLoadBalancer</LoadBalancerName>
        <CreatedTime>2012-09-28T17:57:27.580Z</CreatedTime>
        <HealthCheck>
          <Interval>6</Interval>
          <Target>HTTP:80/</Target>
          <HealthyThreshold>2</HealthyThreshold>
          <Timeout>5</Timeout>
          <UnhealthyThreshold>2</UnhealthyThreshold>
        </HealthCheck>
        <ListenerDescriptions>
          <member>
            <PolicyNames/>
            <Listener>
              <Protocol>HTTP</Protocol>
              <LoadBalancerPort>80</LoadBalancerPort>
              <InstanceProtocol>HTTP</InstanceProtocol>
              <InstancePort>80</InstancePort>
            </Listener>
          </member>
          <member>
            <PolicyNames>
            <member>AWSConsole-SSLNegotiationPolicy-MyLoadBalancer</mem
ber>
            </PolicyNames>
            <Listener>
              <Protocol>HTTPS</Protocol>
              <LoadBalancerPort>443</LoadBalancerPort>
              <InstanceProtocol>HTTP</InstanceProtocol>
              <SSLCertificateId>arn:aws:iam::000011112222:server-certi
ficate/scert</SSLCertificateId>
              <InstancePort>80</InstancePort>
            </Listener>
          </member>
        </ListenerDescriptions>
        <Instances>
          <member>
            <InstanceId>i-f5ab7988</InstanceId>
          </member>
          <member>
```

```
            <InstanceId>i-fbab7986</InstanceId>
          </member>
        </Instances>
        <Policies>
          <AppCookieStickinessPolicies/>
          <OtherPolicies>
           <member>AWSConsole-SSLNegotiationPolicy-MyLoadBalancer</mem
ber>
          </OtherPolicies>
          <LBCookieStickinessPolicies/>
        </Policies>
        <AvailabilityZones>
          <member>us-east-1e</member>
        </AvailabilityZones>
        <CanonicalHostedZoneName>MyLoadBalancer-91948427.us-east-
1.elb.amazonaws
.com</CanonicalHostedZoneName>
        <CanonicalHostedZoneNameID>Z3DZXE0Q79N41H</CanonicalHostedZone
NameID>
        <Scheme>internet-facing</Scheme>
        <SourceSecurityGroup>
          <OwnerAlias>amazon-elb</OwnerAlias>
          <GroupName>amazon-elb-sg</GroupName>
        </SourceSecurityGroup>
       <DNSName>MyLoadBalancer-91948427.us-east-1.elb.amazonaws.com</DNS
Name>
        <BackendServerDescriptions/>
        <Subnets/>
      </member>
    </LoadBalancerDescriptions>
  </DescribeLoadBalancersResult>
  <ResponseMetadata>
    <RequestId>0d7f1256-0b10-11e2-b66c-d3e9bEXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancersResponse>
```

b. The response element includes a `SourceSecurityGroup` data structure composed of an `OwnerAlias` and `GroupName`. This is the security group provided by Elastic Load Balancing for your load balancer. Make a note of the details in the `SourceSecurityGroup` data structure. You'll use it in the next step.

2. **To add a rule in the security group of your Amazon EC2 back-end instances to allow incoming traffic from the Elastic Load Balancing source security group,**

   a. [optional] If you do not know the name of the security group of your back-end instances, call the `DescribeSecurityGroup` action to find out the name of the security group associated with your back-end instance.

      The response includes the details of all the security groups in your account. Make a note of the security group name associated with the back-end instance that you want to modify.

   b. Call the `AuthorizeSecurityGroupIngress` action with the following parameters :

      - `GroupName` = `MyTestSecurityGroup`
      - `IpPermissions.1.Groups.1.UserId` = `amazon-elb`
      - `IpPermissions.1.Groups.1.GroupName` = `amazon-elb-sg`

For information on specifying additional parameters for the ports and protocols, go to AuthorizeSecurityGroupIngress in the *Amazon EC2 API Reference*.

3. Verify that the security group associated with your back-end instance has the new rule that allows incoming traffic from the Elastic Load Balancing source security group.

   Call `DescribeSecurityGroups` with the following parameters:

   - `GroupName` = `MyTestSecurityGroup`

   The response should include the details of the security group including the newly added rule. The information you get should be similar to the following example:

```
<DescribeSecurityGroupsResponse xmlns="http://ec2.amazonaws.com/doc/2012-
03-01/">
  <requestId>a8a2955f-61db-4e5e-b138-e2be7EXAMPLE</requestId>
      <securityGroupInfo>
        <item>
          <ownerId>000011112222</ownerId>
          <groupId>sg-9cd8a3f4</groupId>
          <groupName>MyTestSecurityGroup </groupName>
          <groupDescription>This is an example </groupDescription>
          <ipPermissions>
            <item>
              <ipProtocol>tcp</ipProtocol>
              <fromPort>0</fromPort>
              <toPort>0</toPort>
              <groups>
                <item>
                  <userId>amazon-elb</userId>
                  <groupId>sg-843f59ed</groupId>
                  <groupName>amazon-elb-sg</groupName>
                </item>
              </groups>
              <ipRanges/>
            </item>
            <item>
              <ipProtocol>tcp</ipProtocol>
              <fromPort>3389</fromPort>
              <toPort>3389</toPort>
              <groups>
                <item>
                  <userId>amazon-elb</userId>
                  <groupId>sg-843f59ed</groupId>
                  <groupName>amazon-elb-sg</groupName>
                </item>
              </groups>
              <ipRanges/>
            </item>
            <item>
              <ipProtocol>tcp</ipProtocol>
              <fromPort>22</fromPort>
              <toPort>22</toPort>
              <groups/>
              <ipRanges>
                <item>
                  <cidrIp>0.0.0.0/0</cidrIp>
                </item>
              </ipRanges>
            </item>
            <item>
              <ipProtocol>tcp</ipProtocol>
              <fromPort>80</fromPort>
              <toPort>80</toPort>
              <groups/>
              <ipRanges>
                <item>
                  <cidrIp>0.0.0.0/0</cidrIp>
                </item>
              </ipRanges>
            </item>
      </securityGroupInfo>
    </DescribeSecurityGroupsResponse>
```

4. [optional] If your security group has rules that are less restrictive than the rule you added in the previous step, use the `RevokeSecurityGroupIngress` action to remove the less restrictive rules. For example, an existing rule might allow ingress traffic from the CIDR range 0.0.0.0/0 (all IPv4 addresses).

   The following example calls the `RevokeSecurityGroupIngress` action with the following parameters to remove a rule that allows HTTP traffic from all IPv4 addresses from a security group named `MyTestSecurityGroup`.

   - `GroupName` = `MyTestSecurityGroup`
   - `IpPermissions.1.FromPort` = `80`
   - `IpPermissions.1.IpRanges.1.CidrIp` = `0.0.0.0/0`

   Note
   If you want to connect directly to your back-end instances, do not revoke ingress rules that allow you to do so. For example, you might have rules that allow ingress traffic on ports 22 (SSH) and 3389 (RDP).

Use IPv6 with Elastic Load Balancing

Elastic Load Balancing supports both Internet Protocol version 6 (IPv6) and Internet Protocol version 4 (IPv4). Clients can connect to your load balancer using either IPv4 or IPv6. Communication between the load balancer and its back-end instances uses only IPv4 (regardless of how the client communicates with your load balancer). This means that your back-end Amazon EC2 instances do not need native IPv6 support.

Elastic Load Balancing provides a public DNS name that combines your load balancer's name and Region. For example, a load balancer named myLB in the US-East Region might be represented by the DNS name myLB-1234567890.us-east-1.elb.amazonaws.com. This base public DNS name returns only IPv4 records.

In addition to the base public DNS name, Elastic Load Balancing provides two additional public DNS names. The first combines the string *ipv6* with the name of your load balancer and Region. This might look like ipv6.myLB-1234567890.us-east-1.elb.amazonaws.com. The ipv6-prefixed DNS name returns only IPv6 records. The second public DNS name combines the string *dualstack* with the name of your load balancer and Region. This might look like dualstack.myLB-1234567890.us-east-1.elb.amazonaws.com. The dualstack-prefixed DNS name returns both IPv4 and IPv6 records.

Most customers will want to use the dualstack-prefixed DNS name to enable IPv6 support for their load balancers. Because the dualstack-prefixed DNS name returns both IPv6 and IPv4 records, clients are able to access the load balancer using either IPv4 or IPv6 as their individual connectivity needs dictate. The ipv6-prefixed DNS name returns only IPv6 addresses, which means that clients with only IPv4 connectivity will not be able to reach the load balancer if they use the ipv6-prefixed DNS name.

Elastic Load Balancing supports X-Forwarded-For request headers for clients that connect using either IPv4 or IPv6. If a client connects using IPv6, Elastic Load Balancing inserts the IPv6 address of the client into the request header. For more information on X-Forwarded-For support, see Terminology and Key Concepts (p. 4).

Elastic Load Balancing allows you to map DNS names to your load balancer with IPv6 in much the same way as you map DNS names with IPv4. If you use a CNAME record to map your DNS name to your load balancer, you can continue to use that method. If you use an Amazon Route 53 hosted zone, you can use the same Elastic Load Balancing command to create a resource record for both IPv4 and IPv6.

Note
IPv6 support is currently not available for load balancers in Amazon VPC (EC2-VPC).

IPv6 and CNAME records for Elastic Load Balancing

If you use a CNAME record to map a DNS name such as www.example.com to your load balancer, you can use any of the three public DNS names as the alias in a CNAME record. For example, the following CNAME record maps www.example.com to a load balancer's IPv4 address.

```
www.example.com    CNAME    myLB-1234567890.us-east-1.elb.amazonaws.com
```

The following example maps www.example.com to a load balancer's IPv6 address.

```
www.example.com   CNAME    ipv6.myLB-1234567890.us-east-1.elb.amazonaws.com
```

To handle a mixture of IPv4 and IPv6 address resolution, use the dualstack prefix in your CNAME record.

```
www.example.com    CNAME    dualstack.myLB-1234567890.us-east-1.elb.amazonaws.com
```

IPv6 and Hosted Zones for Elastic Load Balancing

If you use an Amazon Route 53 hosted zone to map a domain name or zone apex to your load balancer, you can use the `elb-associate-route53-hosted-zone` command to create resource records that work with IPv4, IPv6, or both.

To create an IPv4 resource record, specify the value A for the *`--rr-type`* parameter. You can also omit this parameter because its default value is A.

```
elb-associate-route53-hosted-zone myLB --rr-name example.com --rr-type A --
hosted-zone-id Z123456789 --weight 100
```

To create an IPv6 resource record, specify the value AAAA for the *`--rr-type`* parameter.

```
elb-associate-route53-hosted-zone myLB --rr-name example.com --rr-type AAAA --
hosted-zone-id Z123456789 --weight 100
```

To create the equivalent of a dualstack resource record, create a resource record that specifies the value A for the *`--rr-type`* parameter and another resource record that specifies the value AAAA.

```
elb-associate-route53-hosted-zone myLB --rr-name example.com --rr-type A --
hosted-zone-id Z123456789 --weight 100
elb-associate-route53-hosted-zone myLB --rr-name example.com --rr-type AAAA --
hosted-zone-id Z123456789 --weight 100
```

For more information about using Amazon Route 53 with Elastic Load Balancing, see Option 2: Create an Amazon Route 53 Hosted Zone (p. 149).

Elastic Load Balancing in Amazon VPC

Amazon Virtual Private Cloud (Amazon VPC) lets you define a virtual networking environment in a private, isolated section of the Amazon Web Services (AWS) cloud. Within this virtual private cloud, you can launch AWS resources such as, ELB load balancers and EC2 instances.

This section covers information that is specific to creating and managing your load balancers launched within Amazon VPC and provide procedural instruction and examples.

To use load balancers to monitor and route traffic to your EC2 instances launched within VPC, you must create your load balancer within the same VPC as your EC2 instances.

Before you can create your load balancer within a VPC, you must first create a VPC. You define your Amazon VPC by assigning IP address in the classless inter-domain routing (CIDR) range of your choice (for example, 10.0.0.0/16). For more information on CIDR and what '/16' means, see Classless Inter-Domain Routing.

You can create a VPC that spans multiple Availability Zones then add one or more subnets in each Availability Zone. A subnet in Amazon VPC is a subdivision within an Availability Zone defined by a segment of the IP address range of the VPC. A subnet resides entirely within the Availability Zone it was created in. You launch your EC2 instances and load balancers into a subnet you select.

You create a subnet by specifying the CIDR block for the subnet. The CIDR block of a subnet can be the same as the CIDR block for the VPC (for a single subnet in the VPC), or a subset (to enable multiple subnets). When you add a new subnet to your VPC, you can optionally set up the routing and security you want for the subnet.

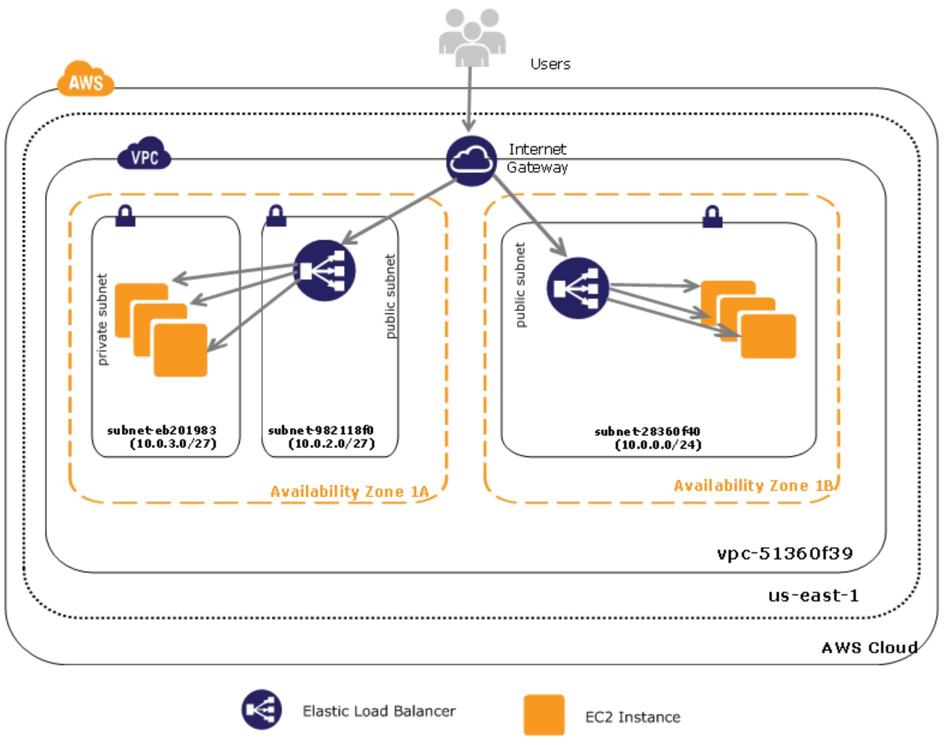
To enable communication between the Internet and the load balancer in your subnet, you must create and attach an Internet gateway (IGW) to your VPC. An Internet gateway enables your load balancer within the subnet to connect to the Internet through the Amazon EC2 network edge. Communication between the clients and your load balancer and also between the load balancer and your back-end instances uses Internet Protocol version 4 (IPv4). Internet Protocol version 6 (IPv6) is currently not available for load balancers in Amazon VPC.

Understanding Public and Private Subnets

Each subnet you create is automatically associated with a route table. The route table controls the routing for the internet. By default, the subnet is associated with a main route table that enables communication within the VPC. You can change the association of the route table for your subnet at any time. To enable a subnet to communicate with the Internet, you must associate the subnet's route table with the Internet gateway.

If a subnet's traffic is routed to an Internet gateway, the subnet is known as a *public* subnet. If a subnet's traffic is not routed to an Internet gateway, the subnet is known as a *private* subnet. Use a public subnet for load balancer that must be connected to the Internet, and a private subnet for load balancer that need not be connected to the Internet.

The following figure shows an example of Elastic Load Balancing within Amazon VPC.



In this example, the Availability Zone 1A has load balancer in its own subnet and the EC2 instances in another subnet. The load balancer is in a public subnet. It means that the traffic from the subnet is routed to the Internet gateway which allows the load balancer to communicate with the Internet. The EC2 instances are in a private subnet. It means that the traffic from the subnet is not routed to the Internet gateway. The EC2 instances in the private subnet cannot communicate with the Internet.

In Availability Zone 1B, the load balancer and the EC2 instances are both in the same public subnet. The traffic from the subnet is routed to the Internet gateway. Both the load balancer and EC2 instances can communicate with the Internet. You can configure your VPC architecture either way, depending on your specific security and routing requirements.

If you are planning on creating more than one subnets in your VPC, be sure to configure the security group rules and network ACLs to allow traffic to be routed between the subnets in your VPC. If your rules are not configured correctly, instances in other subnets may not be reachable by load balancer nodes in a different subnet.

VPC Security Groups for Your Load Balancer

A security group acts as a virtual firewall that controls the traffic allowed into an instance. You create security group by adding a set of rules that control the inbound traffic to instances, and a separate set of rules that control the outbound traffic. There is a significant difference between the way the security groups function on Amazon VPC and Amazon EC2. In Amazon EC2, Elastic Load Balancing provides a special Amazon EC2 source security group that you can use to ensure that a back-end Amazon EC2 instance receives traffic only from the ELB load balancers. You cannot modify the source security group. Within Amazon VPC, you have control over the security groups assigned to your load balancer. Having control over your load balancer's security groups allows you to choose the ports and protocols to accept. For example, in Amazon VPC you can open Internet Control Message Protocol (ICMP) connections for the load balancer to respond to ping requests (however, ping requests will not be forwarded to any registered instances). When creating your load balancer if you don't specify a particular security group, your load balancer automatically belongs to the VPC's default security group.

See Also

- What is Default VPC? (p. 111)
- Internet-facing and Internal Load Balancers (p. 112)
- Configure Amazon VPC for Elastic Load Balancing (p. 114)

What is Default VPC?

If your AWS account comes with a default virtual private cloud (default VPC), your instances are launched within the default VPC, by default, unless you specify a subnet from a nondefault VPC. For more information, see Detecting Your Supported Platforms and Whether You Have a Default VPC.

A default VPC combines the benefits of the advanced networking features provided by Amazon VPC platform (EC2-VPC) with the ease of use of the Amazon Elastic Compute Cloud platform (EC2-Classic).

Your default VPC automatically comes with a default subnet in each Availability Zone, an Internet Gateway connected to your default VPC, and a default security group associated with your default VPC, among other default configurations. For more information on default VPC and Subnets, see Your Default VPC and Subnets.

When you launch your EC2 instances within default VPC without specifying a subnet, it is automatically launched into a default subnet in your default VPC. By default, we select an Availability Zone for you and launch the instance into the corresponding subnet for that Availability Zone. Alternatively, you can select the Availability Zone for your instance by selecting its corresponding default subnet.

To load balance your EC2 instances launched in default VPC, you have to create your load balancers within your default VPC. When you create a load balancer within default VPC, Elastic Load Balancing automatically creates a security group by defining the ports specified for the load balancer to be opened.

If you are using the AWS Management Console to create your load balancer with default VPC, you can choose the default VPC security group associated with your default VPC, choose any other pre-existing security group associated with your AWS account, or modify the existing security group to create a new one. If you choose a non-default pre-existing security group, ensure that it allows ingress to the ports that you configured the load balancer to use. If you choose to create a security group, the console will define these ports to be open for you.

The security group you create using the AWS Management Console is associated with your load balancer. You cannot delete the security group as long as it is associated with a load balancer.

If you are using the Elastic Load Balancing command line interface (CLI) or the Query API to create your load balancer within your default VPC, a default security group; default_elb_*`special number`* will be created for 0.0.0.0/0 with the ports specified for the load balancer. Currently, Elastic Load Balancing does not support the option to choose a security group to associate with your load balancer when you use either the CLI or the Query API.

A security group created for your load balancer within default VPC using either the CLI or the Query API is associated with your AWS account. Only one security group will be created per AWS account. Subsequent calls to create new load balancers will re-use the same security group. If you add listeners to an existing load balancer, you will need to review the security groups that are applied to the load balancer; otherwise, traffic may not reach the load balancer. If you create a load balancer that uses this default security group and the new load balancer has a different listener configuration, you will need to review and update the security groups that are applied to the load balancer.

If you are using the CLI to create a load balancer for your EC2 instances in default VPC, you can see the security group associated with your load balancer by using the `-show-long` option with `elb-describe-lbs` command. The load balancer security group is listed as `SOURCE_SECURITY_GROUP` in the CLI output and the query response. This security group can be used to limit ingress to your instance from only the selected security group.

Whether you are using the console, CLI, or the Query API, if you update the listeners of your load balancer within default VPC, the security groups associated with the load balancer will not change. If you delete your load balancer, the security group will not be deleted automatically.

For information on creating a basic load balancer for your EC2 instances within default VPC, see Create a Basic Load Balancer in Default VPC (p. 39).

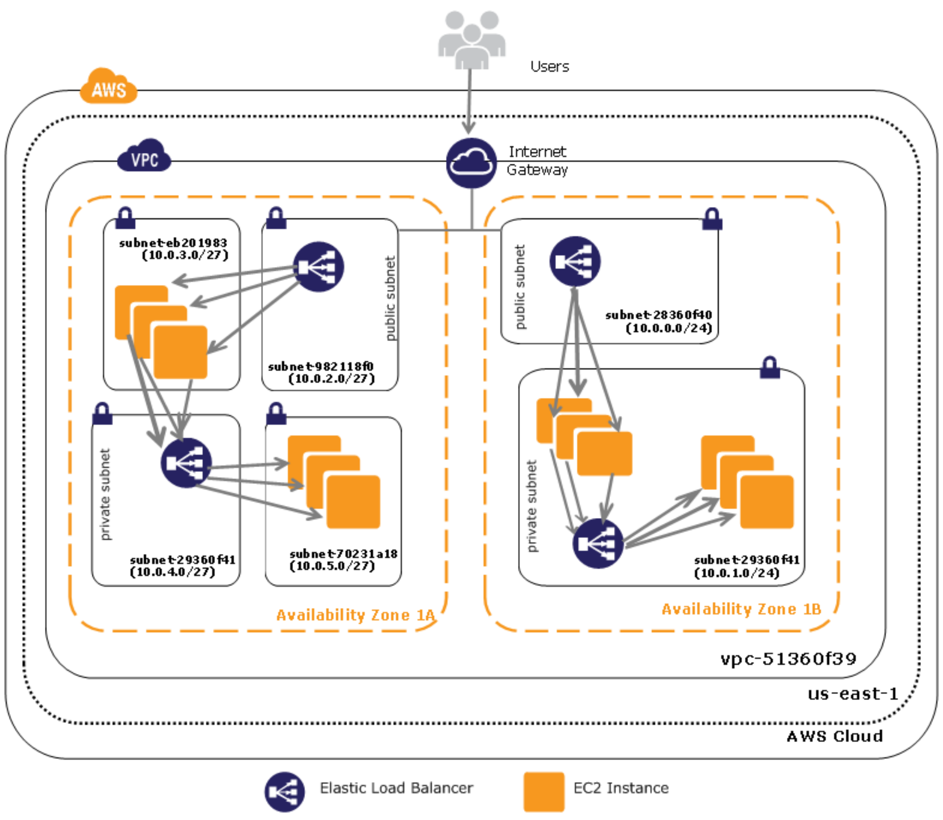
Internet-facing and Internal Load Balancers

When you create your load balancer in VPC, you can make your load balancer internal (private) or Internet-facing (public). When you make your load balancer internal, a DNS name will be created, and it will contain the private IP address of the load balancer. Internal load balancer is not exposed to the internet. When you make your load balancer Internet-facing, a DNS name will be created with the public IP address. The DNS records are publicly resolvable in both cases.

By combining both internal and Internet-facing load balancers, you can balance requests between multiple tiers of your application. For example, let us say you have web servers at your front-end that takes requests from the internet and passes it on to your back-end application instances. You can create an internal load balancer in your VPC and then place your back-end application instances behind the internal load balancer. You can create an Internet-facing load balancer with the DNS name and public IP address and place it in front of your web server. Your web server will take requests coming from the Internet-facing load balancer and will make requests to the internal load balancer, using private IP addresses that are resolved from the internal load balancer's DNS name. The internal load balancer will route requests to the back-end application instances, which are also using private IP addresses and only accept requests from the internal load balancer. With this multi-tier architecture, all your infrastructure can use private IP addresses and security groups so that the only part of your architecture that has public IP address is the Internet-facing load balancer.

For an Internet-facing load balancer to be connected to the Internet, the load balancer must reside in a subnet that is connected to the Internet using the Internet gateway. The application instances behind the load balancer do not need to be in the same subnet as the load balancer.

The following diagram shows Elastic Load Balancing within Amazon VPC combining both Internet-facing and internal load balancers.


Users
AWS
VPC
Internet Gateway
subnet-eb201983 (10.0.3.0/27)
public subnet
subnet-982118f0 (10.0.2.0/27)
private subnet
subnet-29360f41 (10.0.4.0/27)
subnet-70231a18 (10.0.5.0/27)
Availability Zone 1A
public subnet
subnet-28360f40 (10.0.0.0/24)
private subnet
subnet-29360f41 (10.0.1.0/24)
Availability Zone 1B
vpc-51360f39
us-east-1
AWS Cloud
Elastic Load Balancer
EC2 Instance

Configure Amazon VPC for Elastic Load Balancing

To create and use ELB load balancers within Amazon VPC, you have to first configure your VPC environment by creating a VPC, creating one or more subnets, and then launch your instances in the subnets.

Here are some tips on configuring your VPC and subnets for Elastic Load Balancing.

- Create your Amazon VPC with an Internet Gateway in the region where you want to launch your instances and load balancer.
- If you are a new customer or if you are using the region you have not previously used, you are likely to get a default VPC, by default. You can either use the default VPC or create your own.
- Create subnets in each Availability Zone in which you want to launch your instances. Depending on your use case, your security and operational requirements, the subnets where you want to launch your instances can either be a private subnet or a public subnet.

  Instances launched in a private subnet cannot communicate with the Internet. If you want your instances in private subnet to have outbound internet access only, place a network address translation (NAT) instance in a public subnet. A NAT instance enables instances in the private subnet to initiate outbound traffic to the Internet, but prevents them from receiving inbound traffic.
- You can optionally create a separate subnet for your load balancer. Your instances do not need to be in the same subnet that has your load balancer. If you plan to place your load balancer and your back-end instances in separate subnets, make sure to configure the security group rules and network ACLs to allow traffic to be routed between the subnets in your VPC. If your rules are not configured correctly, instances in other subnets may not be reachable by the load balancer in a different subnet.

  To ensure that your load balancer can scale properly, make sure that the subnet in which you plan to place your load balancer has CIDR block of at least a /27 bitmask (e.g., 10.0.0.0/27) and also has at least 20 free IP addresses. When you create your load balancer and place it in a subnet, this defines the subnet that traffic must enter to forward the request to registered instances.

  Important
  If you are creating an Internet-facing load balancer, make sure to place your load balancer in a public subnet. After you create the public subnet, make sure to associate the route table of your public subnet with the Internet gateway to enable your load balancer in the subnet to connect with the Internet.

The most common VPC scenarios are documented in the Scenarios for Amazon VPC. Each of these scenarios has a link to a detailed explanation of the scenario. At the end of the section is a section called **Implementing the Scenario** that gives you instructions on how to create a VPC for that scenario. You can follow the instructions from the scenario that best suits your use case to create your VPC environment.

If your scenario is not listed in the Scenarios for Amazon VPC section, you can create your VPC environment by stepping through the instructions in the following sections of the *Amazon Virtual Private Cloud User Guide*.

Description	Documentation
Learn about Amazon VPC	What is Amazon VPC?
Create VPC	Your VPC
Learn about subnets and creating subnets	Subnets in Your VPC

Description	Documentation
Learn about creating security groups and network ACLs	Security in Your VPC
Learn about NAT instance	NAT Instances
Learn about route tables	Route Tables
Learn about Internet gateways	Adding an Internet Gateway to Your VPC
Launch EC2 instances in your subnet	Launching an Instance into Your Subnet
You can also launch EC2 dedicated instances in your subnet.	Using EC2 Dedicated Instances

When you have completed creating your VPC environment, be sure to make a note of the VPC ID, subnet ID, and the security group associated with your VPC. You will need them later when you create your load balancer. And also make sure to launch your instances in the subnets.

Next Steps

- To learn how to create a TCP load balancer in Amazon VPC, see Create a Basic Load Balancer in EC2-VPC (p. 29)
- To learn how to create TCP load balancer in default VPC, see Create a Basic Load Balancer in Default VPC (p. 39)
- To learn how to create an internal load balancer, see Create a Basic Internal Load Balancer in Amazon VPC (p. 115)
- To learn how to attach a subnet to your load balancer, see Attach Your Load Balancer to a Subnet (p. 125)
- To learn how to detach a subnet from your load balancer, Detach Your Load Balancer from a Subnet (p. 127)
- To learn how to manage security groups for your load balancer in VPC, see Manage Security Groups in Amazon VPC (p. 129)

Create a Basic Internal Load Balancer in Amazon VPC

You can make your load balancer internal (private) or Internet-facing (public) when creating it within a VPC. When you make your load balancer internal, a DNS name will be created, and it will contain the private IP address of the load balancer. Internal load balancer is not exposed to the internet. When you make your load balancer Internet-facing, a DNS name will be created with the public IP address. The DNS records are publicly resolvable in both cases. For information on using both internal and Internet-facing load balancer to support multiple tier architecture, see Internet-facing and Internal Load Balancers (p. 112).

This topic uses an example to walk you through the process for creating a basic internal load balancer within your VPC and registering your EC2 instances with the newly created internal load balancer. This example uses default configurations for security group, listener protocols and ports, and for the health check. If you want to create an Internet-facing load balancer, see Create a Basic Load Balancer in EC2-VPC (p. 29).

When you create your internal load balancer, you can optionally assign tags for your load balancer. Tags help you to categorize your load balancers in different ways, for example, by purpose, owner, or environment. For more information, see Tagging (p. 11).

If you have not yet created your VPC environment for using an internal load balancer, create one before you proceed further. For information about creating a VPC environment, see Configure Amazon VPC for Elastic Load Balancing (p. 114).

The following task list gives you a general overview of what you'll need to create a basic internal load balancer in Amazon VPC. Then you'll step through detailed procedures for each part of the creation process.

Creating a Basic Internal Load Balancer in VPC

1	Configure the listeners for your load balancer by specifying the ports and protocols to use for front-end connection (client to load balancer) and back-end connection (load balancer to back-end instance).
2	Configure a health check for your Amazon EC2 back-end instances.
3	Select the subnets in which to launch your load balancer.
4	Select security groups to assign to your load balancer.
5	Add Amazon EC2 instances to your load balancer.
6	[optional] Add tags to your load balancer.
7	Review settings.
8	Create your load balancer.

You can choose to create your load balancer in EC2-VPC using the AWS Management Console, the AWS command line interface (AWS CLI), or the Query API.

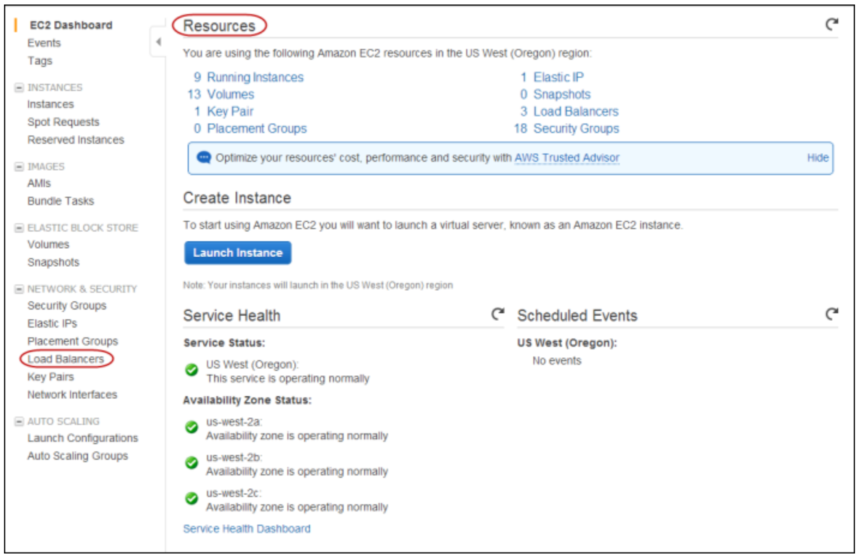
Topics

Using the AWS Management Console

To create a basic internal load balancer in VPC

1. Start the **Create Load Balancer** wizard:

    a. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.



Resources

You are using the following Amazon EC2 resources in the US West (Oregon) region:

9 Running Instances	1 Elastic IP
13 Volumes	0 Snapshots
1 Key Pair	3 Load Balancers
0 Placement Groups	18 Security Groups

Optimize your resources' cost, performance and security with AWS Trusted Advisor

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Note: Your instances will launch in the US West (Oregon) region

Service Health

Service Status:

US West (Oregon):
This service is operating normally

Availability Zone Status:

us-west-2a:
Availability zone is operating normally

us-west-2b:
Availability zone is operating normally

us-west-2c:
Availability zone is operating normally

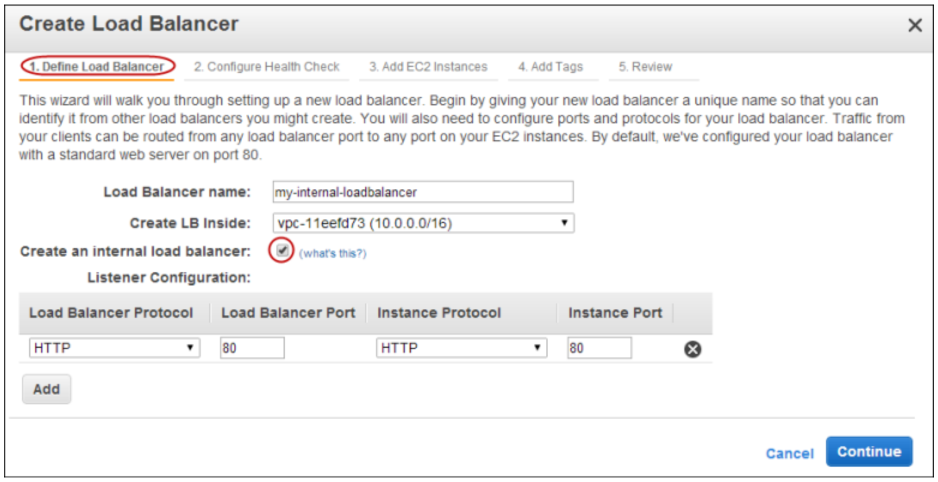
Scheduled Events

US West (Oregon):
No events

b. On the **Load Balancers** page, click **Create Load Balancer**.

2. On the **Define Load Balancer** page, enter a name for your Amazon VPC load balancer (e.g., my-internal-loadbalancer).

   The load balancer name you choose must be unique within your set of load balancers, must have a maximum of 32 characters, and must only contain alphanumeric characters or hyphens.
3. Click the **Create LB inside** dialog box and select the Amazon VPC in which you want to create your load balancer.
4. If it is not already selected, click **Create an internal load balancer** box.
5. Leave the **Listener Configuration** set to the default value.



This wizard will walk you through setting up a new load balancer. Begin by giving your new load balancer a unique name so that you can identify it from other load balancers you might create. You will also need to configure ports and protocols for your load balancer. Traffic from your clients can be routed from any load balancer port to any port on your EC2 instances. By default, we've configured your load balancer with a standard web server on port 80.

Load Balancer name: my-internal-loadbalancer

Create LB Inside: vpc-11eefd73 (10.0.0.0/16)

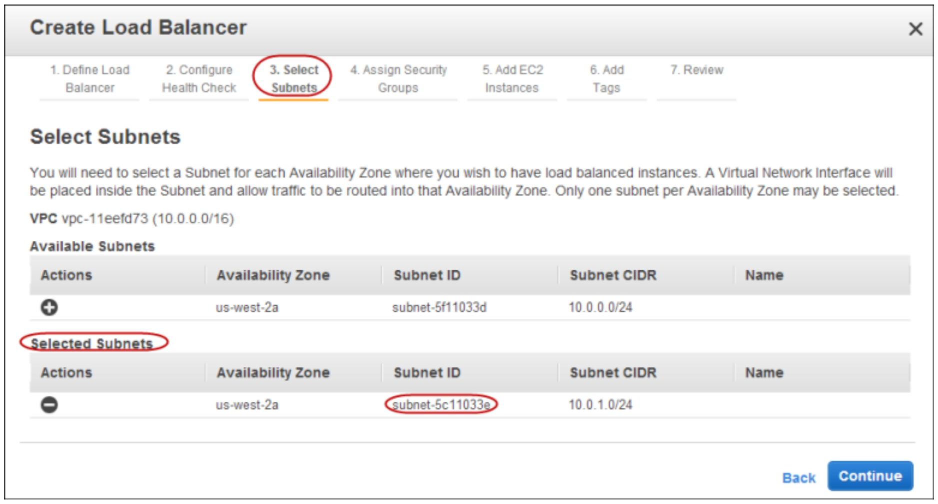
Create an internal load balancer: ✓

Listener Configuration:

Load Balancer Protocol	Load Balancer Port	Instance Protocol	Instance Port
HTTP	80	HTTP	80

6. Click **Continue** to configure the health check for your instances.
7. On the **Configure health Check** page, configure the health check settings that your application requires.
8. Click **Continue** to select the subnet in which you want to launch your load balancer instance.
9. On the **Select Subnets** page, in the **Available Subnets** table, click the button in the **Action** column to select a subnet in which to create your internal load balancer.

Your selected subnets are displayed in the **Selected Subnets** table.



Select Subnets

You will need to select a Subnet for each Availability Zone where you wish to have load balanced instances. A Virtual Network Interface will be placed inside the Subnet and allow traffic to be routed into that Availability Zone. Only one subnet per Availability Zone may be selected.

VPC vpc-11eefd73 (10.0.0.0/16)

Available Subnets

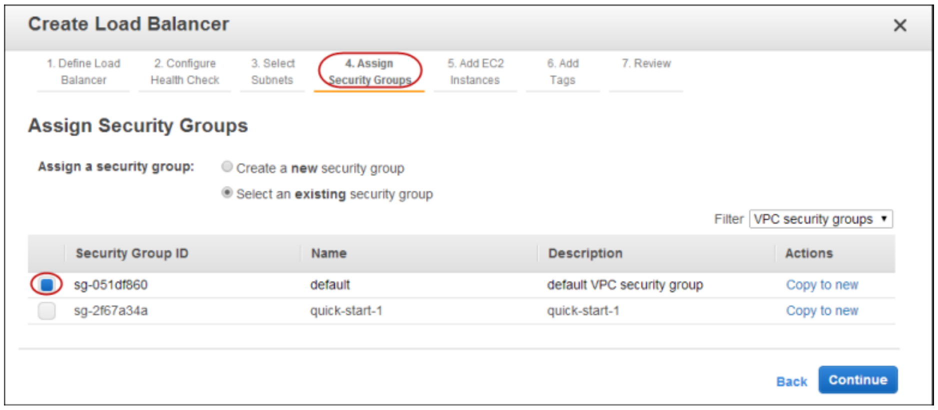
Actions	Availability Zone	Subnet ID	Subnet CIDR	Name
⊕	us-west-2a	subnet-5f11033d	10.0.0.0/24	

Selected Subnets

Actions	Availability Zone	Subnet ID	Subnet CIDR	Name
⊖	us-west-2a	subnet-5c11033e	10.0.1.0/24	

10. Click **Continue** to select a security group to assign to your load balancer.
11. This tutorial uses the default security group associated with your virtual private cloud.

    On the **Assign Security Groups** page, click **Select an existing security group** and then select the default VPC security group.
12. If you use a pre-existing security group, ensure that it allows ingress to the ports that you configured the load balancer to use. If you create a security group in this step, the console will define these ports to be open for you.



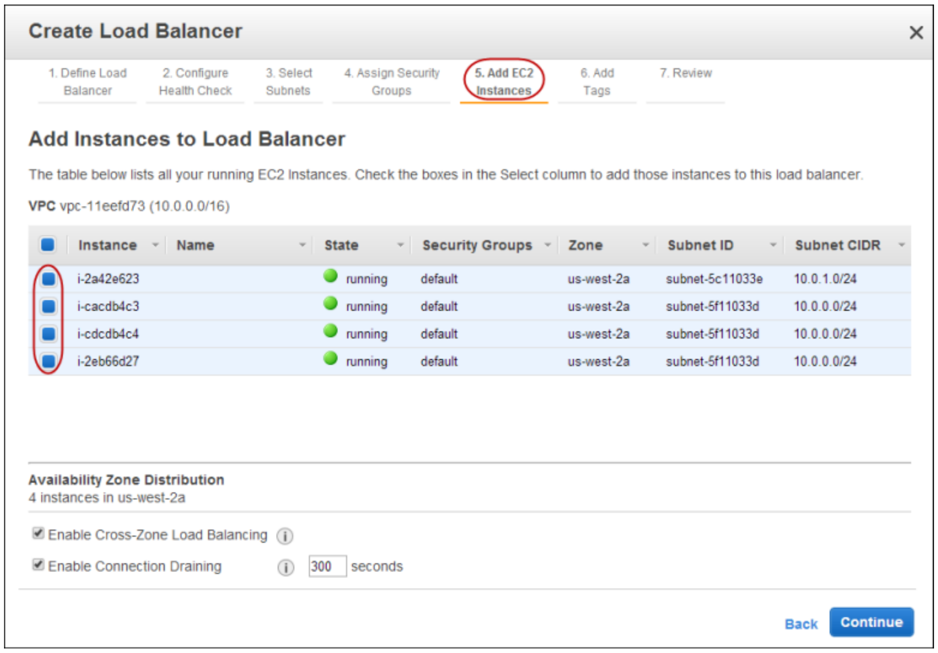
Assign Security Groups

Assign a security group: ( ) Create a **new** security group [✓ Select an **existing** security group]

Filter: VPC security groups

	Security Group ID	Name	Description	Actions
☑	sg-051df860	default	default VPC security group	Copy to new
☐	sg-2f67a34a	quick-start-1	quick-start-1	Copy to new

13. Click **Continue** to register EC2 instances with your load balancer.
14. On the **Add EC2 Instances** page, in the **Add Instances to Load Balancer** table, select the boxes in the **Instance** column to register instances with your load balancer.



Create Load Balancer

1. Define Load Balancer | 2. Configure Health Check | 3. Select Subnets | 4. Assign Security Groups | 5. Add EC2 Instances | 6. Add Tags | 7. Review

Add Instances to Load Balancer

The table below lists all your running EC2 Instances. Check the boxes in the Select column to add those instances to this load balancer.

VPC vpc-11eefd73 (10.0.0.0/16)

	Instance	Name	State	Security Groups	Zone	Subnet ID	Subnet CIDR
✓	i-2a42e623		running	default	us-west-2a	subnet-5c11033e	10.0.1.0/24
✓	i-cacdb4c3		running	default	us-west-2a	subnet-5f11033d	10.0.0.0/24
✓	i-cdcdb4c4		running	default	us-west-2a	subnet-5f11033d	10.0.0.0/24
✓	i-2eb66d27		running	default	us-west-2a	subnet-5f11033d	10.0.0.0/24

Availability Zone Distribution
4 instances in us-west-2a

✓ Enable Cross-Zone Load Balancing

✓ Enable Connection Draining 300 seconds

Back Continue

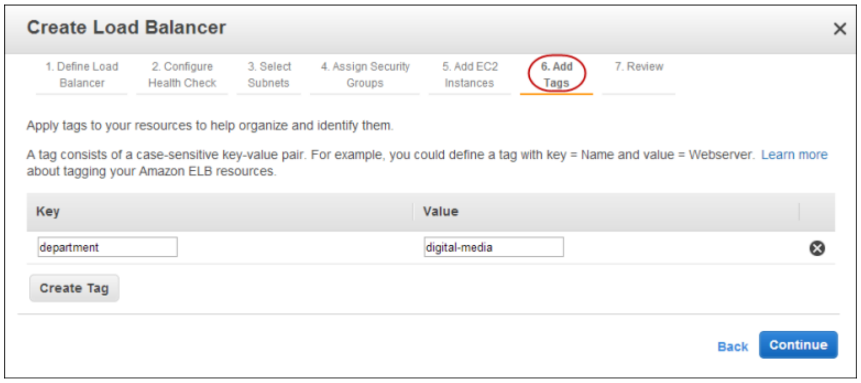
Note

When you register a multi-homed instance (an instance that has an elastic network interface (ENI) attached) with your load balancer, the load balancer will route traffic to the primary IP address of the instance (eth0). For more information on using ENIs, go to Elastic Network Interfaces.

When you stop and then start your back-end EC2 instances associated with your load balancer, we recommend that you de-register your stopped instance from your load balancer, and then re-register the restarted instance. Failure to do so may prevent the load balancer from routing the traffic to the restarted instance. For procedures associated with de-registering and then registering your instances with your load balancer, see Deregister and Register Amazon EC2 Instances (p. 139).

15. Click **Continue** to set tags for your load balancer.
16. Skip this step if you do not want to assign tags to your load balancer at this time and click **Continue** to review the details of your load balancer.

    On the **Add Tags** page, specify a key and a value for the tag.
17. To add multiple tags, click **Create Tag** and continue to specify key and value for the tags.



Create Load Balancer

1. Define Load Balancer | 2. Configure Health Check | 3. Select Subnets | 4. Assign Security Groups | 5. Add EC2 Instances | 6. Add Tags | 7. Review

Apply tags to your resources to help organize and identify them.

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. Learn more about tagging your Amazon ELB resources.

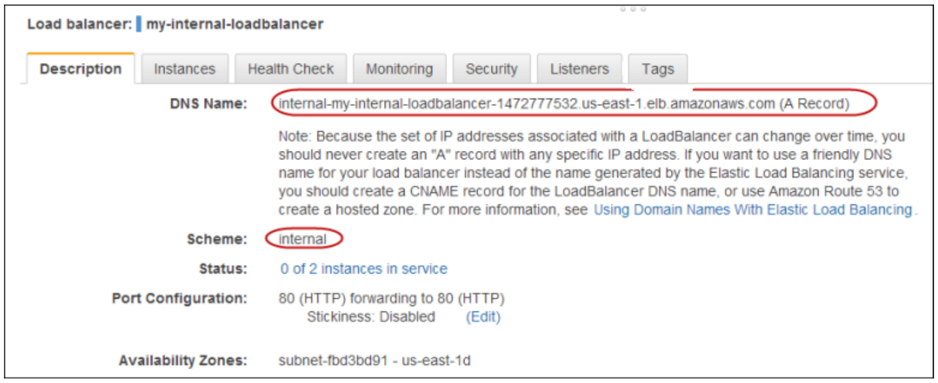
Key	Value
department	digital-media

Create Tag

Back Continue

18. After you are done adding tags for your load balancer, click **Continue** to review the details of your load balancer.

19. On the **Review** page of the **Create Load Balancer** wizard, check your settings. You can make changes by clicking the edit link for each setting.
20. Click **Create** to create your load balancer.
21. The **Create Load Balancer** wizard displays the status of your newly created load balancer. Click **Close** after confirming that your load balancer was successfully created.
22. Your new load balancer is listed in the load balancer page. Select the check box next to your load balancer.
23. The bottom pane displays the description of your load balancer. Verify that the descriptions match your specifications. Note that the DNS name and the description in the row titled **Scheme**, both indicate that your newly created load balancer is **internal**.



DNS Name: internal-my-internal-loadbalancer-1472777532.us-east-1.elb.amazonaws.com (A Record)

Note: Because the set of IP addresses associated with a LoadBalancer can change over time, you should never create an "A" record with any specific IP address. If you want to use a friendly DNS name for your load balancer instead of the name generated by the Elastic Load Balancing service, you should create a CNAME record for the LoadBalancer DNS name, or use Amazon Route 53 to create a hosted zone. For more information, see Using Domain Names With Elastic Load Balancing.

Scheme: internal

Status: 0 of 2 instances in service

Port Configuration: 80 (HTTP) forwarding to 80 (HTTP)
Stickiness: Disabled (Edit)

Availability Zones: subnet-fbd3bd91 - us-east-1d

Using the AWS Command Line Interface

Important
Elastic Load Balancing CLI has been replaced by AWS Command Line Interface (AWS CLI), a unified tool to manage multiple AWS services. New features released after ELB CLI version 1.0.35.0 (dated 7/24/14) will not be included in the ELB CLI but will be included in AWS CLI. We recommend that you start using the AWS CLI.
For a list of the functionality supported in previous ELB CLI versions, see Elastic Load Balancing API Tools.

Before you get started make sure that you have installed and configured your AWS CLI environment. For more information, see Getting Set Up with the AWS Command Line Interface.

By default, Elastic Load Balancing creates an Internet-facing load balancer with a publicly resolvable DNS name that resolves to public IP addresses. You can choose to create an internal load balancer with a DNS name that resolves to private IP addresses.

This example walks you through the process for creating a basic HTTP internal load balancer on Amazon VPC and registers Amazon EC2 instances with the newly created VPC load balancer. This example uses a default security group that is open to the Internet on port 80.

To create a basic internal load balancer in EC2-VPC

1. Enter the create-load-balancer command as in the following example.

```
aws elb create-load-balancer --load-balancer-name my-internal-loadbalancer
 --listeners Protocol=HTTP,LoadBalancerPort=80,InstanceProtocol=HTTP,Instan
cePort=80
 --subnets subnet-4e05f721 --scheme internal --security-groups sg-b9ffedd5
 --tag "Key=department,Value=digital-media"
```

Note
Use `--scheme` option to create an internal load balancer. You need not specify this option if you're creating an Internet-facing (public) load balancer.
`--tag` is an optional parameter. Do not use this option if you do not want to assign tags to your load balancer at this time.

2. Elastic Load Balancing returns the following:

```
{
    "DNSName": "internal-my-internal-loadbalancer-786501203.us-east-
1.elb.amazonaws.com"
}
```

To register your Amazon EC2 instances with your VPC load balancer

You should only register instances that are in the *Pending* or *Running* state and are in an Amazon VPC.

- Enter the register-instances-with-load-balancer command as in the following example.

```
aws elb register-instances-with-load-balancer  --load-balancer-name my-in
ternal-loadbalancer   --instances i-4f8cf126 i-0bb7ca62
```

Elastic Load Balancing returns the following:

```
{
    "Instances": [
        {
            "InstanceId": "i-4f8cf126"
        },
        {
            "InstanceId": "i-0bb7ca62"
        }
    ]
}
```

Note
When you register a multi-homed instance (an instance that has an elastic network interface (ENI) attached) with your load balancer, the load balancer will route traffic to the primary IP address of the instance (eth0). For more information on using ENIs, go to Elastic Network Interfaces.

When you stop and then start your back-end EC2 instances associated with your load balancer, we recommend that you de-register your stopped instance from your load balancer, and then re-register the restarted instance. Failure to do so may prevent the load balancer from routing the traffic to the restarted instance. For procedures associated with de-registering and then registering your instances with your load balancer, see Deregister and Register Amazon EC2 Instances (p. 139).

To verify that an internal load balancer was created

1. Enter the describe-load-balancers command as in the following example.

```
aws elb describe-load-balancers --load-balancer-name my-internal-loadbalancer
```

2. Elastic Load Balancing returns the following:

```
{
    "LoadBalancerDescriptions": [
        {
            "Subnets": [
                "subnet-4e05f721"
            ],
            "CanonicalHostedZoneNameID": "Z3DZXE0Q79N41H",
            "VPCId": "vpc-5ba9473e",
            "ListenerDescriptions": [
                {
                    "Listener": {
                        "InstancePort": 80,
                        "LoadBalancerPort": 80,
                        "Protocol": "HTTP",
                        "InstanceProtocol": "HTTP"
                    },
                    "PolicyNames": []
                }
            ],
            "HealthCheck": {
                "HealthyThreshold": 10,
                "Interval": 30,
                "Target": "TCP:80",
                "Timeout": 5,
                "UnhealthyThreshold": 2
            },
            "BackendServerDescriptions": [],
            "Instances": [
              {
                "InstanceId": "i-4f8cf126"
               },
              {
                 "InstanceId": "i-0bb7ca62"
              }
            ],
           "DNSName": "internal-my-internal-loadbalancer-786501203.us-east-
1.elb.amazonaws.com",
            "SecurityGroups": [
                "sg-b9ffedd5"
            ],
            "Policies": {
                "LBCookieStickinessPolicies": [],
                "AppCookieStickinessPolicies": [],
                "OtherPolicies": []
            },
            "LoadBalancerName": "my-internal-loadbalancer",
            "CreatedTime": "2014-05-22T20:32:19.920Z",
            "AvailabilityZones": [
                "us-east-1"
            ],
            "Scheme": "internal",
            "SourceSecurityGroup": {
                "OwnerAlias": "803981987763",
                "GroupName": "ELB Security Group"
            }
        }
    ]
}
```

Note that both the DNS name and the entry in the `Scheme` field indicate that the load balancer is internal.

Using the Query API

By default, Elastic Load Balancing creates an Internet-facing load balancer with a publicly resolvable DNS name that resolves to public IP addresses. You can choose to create an internal load balancer with a DNS name that resolves to private IP addresses.

This example walks you through the process for creating a basic HTTP internal load balancer on Amazon VPC and registers Amazon EC2 instances with the newly created VPC load balancer. This example uses a default security group.

To create a basic internal load balancer in EC2-VPC

1. Use the CreateLoadBalancer action and specify the following parameters:
   - *`Subnets`* = `subnet-450f512c`
   - *`Scheme`* = `internal`

     Note
     Use this parameter to create an internal load balancer. You need not specify this parameter if you're creating an Internet-facing load balancer.
   - *`Listener`*
     - *`Protocol`* = `HTTP`
     - *`InstanceProtocol`* = `HTTP`
     - *`InstancePort`* = `80`
     - *`LoadBalancerPort`* = `80`
   - *`LoadBalancerName`* = *`my-internal-loadbalancer`*

     The load balancer name you choose must be unique within your set of load balancers, must have a maximum of 32 characters, and must only contain alphanumeric characters or hyphens.
   - *`SecurityGroups`* = `sg-b9ffedd5`
   - *`Tags.member.1.Key`* = *`department`*

     `Tags.member.1.Value` = *`digital-media`*

2. The operation returns the DNS name of your load balancer. You can then map any other domain name (such as www.example.com) to your load balancer's DNS name using CNAME or some other technique.

To register your Amazon EC2 instances with your VPC load balancer

You should only register instances that are in the *Pending* or *Running* state and are in an Amazon Virtual Private Cloud (VPC).

- Use the RegisterInstancesWithLoadBalancer action and specify the following parameters:
  - *`LoadBalancerName`* = *`my-internal-loadbalancer`*
  - *`Instances.member.1`* = `i-4f8cf126`

Instances.member.2 = `i-0bb7ca62`

Note
When you register a multi-homed instance (an instance that has an elastic network interface (ENI) attached) with your load balancer, the load balancer will route traffic to the primary IP address of the instance (eth0). For more information on using ENIs, go to Elastic Network Interfaces.

When you stop and then start your back-end EC2 instances associated with your load balancer, we recommend that you de-register your stopped instance from your load balancer, and then re-register the restarted instance. Failure to do so may prevent the load balancer from routing the traffic to the restarted instance. For procedures associated with de-registering and then registering your instances with your load balancer, see Deregister and Register Amazon EC2 Instances (p. 139).

To verify that an internal load balancer was created

1. Enter the DescribeLoadBalancers action and specify the following parameter:
   - *LoadBalancerName* = *my-internal-loadbalancer*

2. The operation returns the description of your load balancer. The description in the `Scheme` field indicates that your newly created load balancer is **internal**.

For detailed descriptions of the Elastic Load Balancing API actions, see Elastic Load Balancing API Reference.

Attach Your Load Balancer to a Subnet

Topics

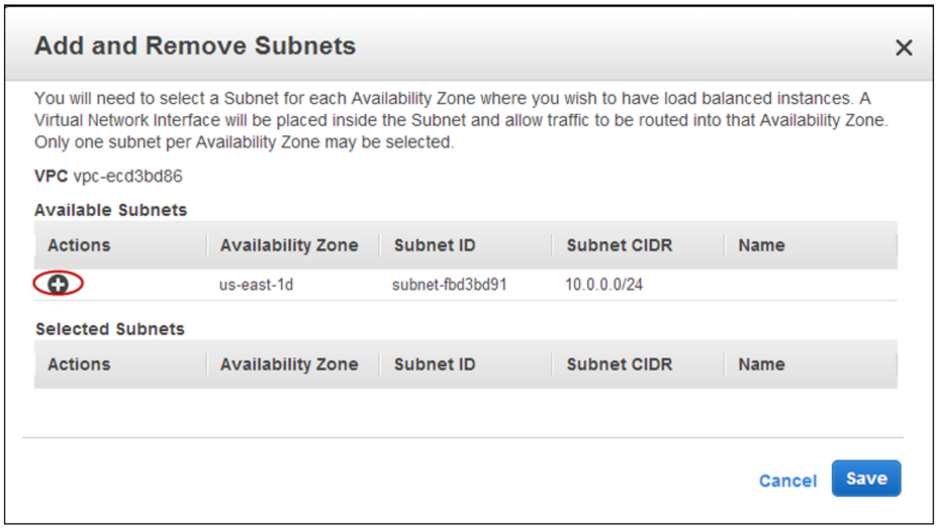
This example walks you through the process of attaching a subnet to an existing load balancer using either the AWS Management Console, the Query API, or the command line interface (CLI).

Before you get started, be sure you've created your Amazon VPC with an Internet gateway and created subnets in each Availability Zone in which you want to load balance your instances. For information on creating an Amazon VPC and subnets for Elastic Load Balancing, see Elastic Load Balancing in Amazon VPC (p. 109).

Using AWS Management Console

To attach your load balancer to a subnet

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select the load balancer that you created for your Amazon VPC.
4. The bottom pane displays the details of your load balancer.
5. Click the **Instances** tab.
6. Click **Edit Availability Zones**.
7. The **Add and Remove Subnets** page is displayed.



Add and Remove Subnets

You will need to select a Subnet for each Availability Zone where you wish to have load balanced instances. A Virtual Network Interface will be placed inside the Subnet and allow traffic to be routed into that Availability Zone. Only one subnet per Availability Zone may be selected.

VPC vpc-ecd3bd86

Available Subnets

Actions	Availability Zone	Subnet ID	Subnet CIDR	Name
⊕	us-east-1d	subnet-fbd3bd91	10.0.0.0/24	

Selected Subnets

Actions	Availability Zone	Subnet ID	Subnet CIDR	Name

8. In the **Available Subnets** table, click the button in the **Action** column to select your subnet. You can select only one subnet per Availability Zone.
9. The selected subnet is displayed in the **Selected Subnets** table.
10. Click **Save** to attach the subnet to your load balancer.

Using the Query API

To attach your load balancer to a subnet

1. Call `AttachLoadBalancerToSubnets` with the following parameters:

   - *`Subnets`* = `subnet-4e05f721`
   - *`LoadBalancerName`* = `MyVPCLoadBalancer`

2. The operation returns the subnet ID of the attached subnet.

For detailed descriptions of the Elastic Load Balancing API actions, see the Elastic Load Balancing API Reference.

Using the Command Line Interface

To attach your load balancer to a subnet

1. Enter the command `elb-attach-lb-to-subnets` as in the following example.

```
PROMPT> elb-attach-lb-to-subnets  MyVPCLoadBalancer --subnets subnet-450f512c
```

2. The operation returns the subnet ID of the attached subnet.

For detailed descriptions of the Elastic Load Balancing commands, see Elastic Load Balancing Quick Reference Card.

Detach Your Load Balancer from a Subnet

Topics

This example walks you through the process of detaching a subnet from your load balancer using either the AWS Management Console, the Query API, or the command line interface (CLI).

Using AWS Management Console

To detach your load balancer from subnet

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. Select the load balancer that you created for your Amazon VPC.
4. The bottom pane displays the details of your load balancer.
5. Click the **Instances** tab.
6. Click **Edit Availability Zones**.
7. On the **Add and Remove Subnets** page, in the **Selected Subnets** table, click the button in the **Actions** column to select the subnet you want to detach.
8. The detached subnet becomes available and is displayed in the **Available Subnets** table.
9. Click **Save** to detach the subnet from your load balancer.

Using the Query API

To detach your load balancer from a subnet

1. Call `DetachLoadBalancerFromSubnets` with the following parameters:
   - *`Subnets`* = `subnet-450f512c`
   - *`LoadBalancerName`* = `MyVPCLoadBalancer`
2. The operation returns a list of subnet IDs the load balancer is now attached to.

For detailed descriptions of the Elastic Load Balancing API actions, see the Elastic Load Balancing API Reference.

Using the Command Line Interface

To detach your load balancer from a subnet

1. Enter the command `elb-detach-lb-from-subnets` as in the following example.

```
PROMPT> elb-detach-lb-from-subnets  MyVPCLoadBalancer --subnets subnet-
450f5127
```

2. The command returns a list of subnet IDs the load balancer is now attached to.

For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

Manage Security Groups in Amazon VPC

Topics

A security group acts as a virtual firewall that controls the traffic allowed into an instance. When you launch an instance in an Amazon Virtual Private Cloud, you can assign the instance to up to five VPC security groups. The groups act at the instance level, not the subnet level. Therefore, each instance in a subnet in your Amazon VPC could belong to a different set of security groups. If you don't specify a particular security group at launch time, the instance automatically belongs to the VPC's default security group.

For each security group you create, you add *rules* that control the inbound traffic to instances, and a separate set of rules that control the outbound traffic. The security groups you've created for Amazon EC2 (i.e., EC2 security groups) are not available to use in your VPC. You must create a separate set of security groups to use in your Amazon VPC (i.e., VPC security groups). The rules you create for a VPC security group can't reference a EC2 security group in your account, and vice versa. Also, VPC security groups have additional capabilities not available to EC2 security groups.

For information on Amazon VPC security groups, go to Security Groups for Your VPC.

This section walks you through the process to update or reset the VPC security group assigned to your existing load balancer in Amazon VPC. You can use the AWS Management Console, the Query API or the command line interface (CLI) to update or reset the VPC security group.

Using the AWS Management Console

To update a security group assigned to your load balancer

1. In the AWS Management Console, click the Amazon EC2 tab.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select the load balancer that you created for your VPC.
4. The bottom pane displays the details of your load balancer.
5. Click the **Security** tab.
6. In the **Security Groups** pane, click **Edit**.
7. On the **Edit security groups** page, select your new security group and click **Save**.

Using the Query API

To assign a security group to an existing load balancer

1. Call `ApplySecurityGroupsToLoadBalancer` with the following parameters:
   - *`SecurityGroups`* = *`sg-53fae93f`*
   - *`LoadBalancerName`* = `MyVPCLoadBalancer`
2. The operation returns the security group ID of the assigned security group.

For detailed descriptions of the Elastic Load Balancing API actions, see Elastic Load Balancing API Reference.

Using the Command Line Interface

To assign a security group to your existing load balancer in Amazon VPC

Enter the command `elb-apply-security-groups-to-lb` as in the following example.

```
PROMPT>elb-apply-security-groups-to-lb  MyVPCLoadBalancer --security-groups sg-
53fae93f
```

The operation returns the security group ID of the assigned security group.

For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

Managing Load Balancers

This section covers information about the Elastic Load Balancing features you are most likely to use to manage your load balancers launched either in EC2-Classic or in ELB-VPC platforms, and provides procedural instruction and examples.

Topics

Add a Listener to Your Load Balancer

Topics

Elastic Load Balancing supports the load balancing of applications using HTTP, HTTPS (Secure HTTP), TCP, and SSL (Secure TCP) protocols. You can specify the protocols for the front-end connections (client to load balancer) and the back-end connections (load balancer to back-end instance) independently. You choose configurations for the front-end and the back-end connections when you create your load balancer. By default, your load balancer is set to use HTTP for both the connections. The Elastic Load Balancing

Listener Configurations Quick Reference (p. 50) table provides information on different configurations, along with the use case best suited for that configuration.

This section describes how to add a new listener on your existing load balancer. Before you get started, be sure you've done the following:

- Created a load balancer with Elastic Load Balancing. For information on how to set up an HTTPS/SSL load balancer with the AWS Management Console, command line interfaces (CLI), or Query API, see Create a HTTPS/SSL Load Balancer (p. 71). To learn how to set up a HTTP/TCP load balancer with the AWS Management Console, go to the Get Started with Elastic Load Balancing (p. 21).
- Installed the Elastic Load Balancing tools that you plan to use to perform load balancing tasks. You can add or delete listeners on your existing load balancer using the AWS Management Console, command line interface (CLI), or the Query API. For information on installing the CLI or the Query API, see Setting Up Elastic Load Balancing Interfaces (p. 16).
  - For detailed descriptions of the Elastic Load Balancing Query API actions, see Elastic Load Balancing API Reference.
  - For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

The following sections include instructions for adding a listener to your existing load balancer using the AWS Management Console, command line interface (CLI), or the Query API. In this example, you configure a new listener for your existing load balancer `MyLoadBalancer` that accepts HTTPS requests on port 443 for the front-end connection and HTTP requests on port 80 for the back-end connection.

Topics

Using the AWS Management Console

To add a new listener to your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click the **Listeners** tab.
6. In the **Listeners** pane, click **Edit**.
7. In the **Edit Listeners** page, click **Add**.
8. In the **Load Balancer Protocol** column, click the dialog box and select **HTTPS (Secure HTTP)** from the drop-down box. This populates the box in the **Load Balancer Port** column. In the **Instance Protocol** column, click the dialog box and select **HTTPS** from the drop-down box. The box in the **Instance Port** column gets populated.
9. The Elastic Load Balancing service provides you with security policies that have predefined SSL negotiation configurations used for negotiating SSL connections between the client and the load balancer. You can select one of the predefined security policies, or **Custom** to create your own security policy.

For more information about the Security Policies, see SSL Negotiation Configurations for Elastic Load Balancing (p. 54). For information about the current configuration for all Security Policies, see SSL Security Policy Table (p. 55).

By default, Elastic Load Balancing pre-selects **ELBSecurityPolicy-2014-01** for your HTTPS/SSL listener. This is the recommended setting. This policy uses server order preference (the order listed in the SSL Security Policy Table (p. 55)) to negotiate SSL connections.

a. To specify a Security Policy, in the **Cipher** column, click **Change**.
b. On the **Select a Cipher** page, select a Security Policy from the following options:

To keep the recommended setting,

- On the **Select Cipher** page, make sure that **Predefined Security Policy** is selected and the drop-down pane is showing **ELBSecurityPolicy-2014-01**. Click **Save** and then go to step 8.

To select a policy from the predefined security policy list,

a. On the **Select a Cipher** page, select **Predefined Security Policy**.
b. In the security policy drop-down pane, select a policy.
c. Click **Save** and then go to step 8.

To create your own security policy,

a. Select **Custom**.
b. Under **SSL Protocols**, select one or more protocols to enable or disable.
c. Under **SSL Options**, select **Server Order Preference** if you want to use the order listed in the SSL Security Policy Table (p. 55) for SSL negotiation.
d. Under **SSL Ciphers**, select one or more ciphers to enable or disable.

Note
You must enable at least one protocol and one cipher for SSL negotiation to take place.
The DSA and RSA ciphers are specific to the signing algorithm and are used to create the SSL certificate. If you already have your SSL certificate, make sure to enable the cipher that was used to create your certificate.

e. Click **Save**.

10. To enable HTTPS support for your listeners, you must install an SSL server certificate on your load balancer. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances.

If you already have certificate installed on your load balancer and want to continue using it, skip the following steps for installing a new one and go to step 13.

If you do not have an SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61) for instructions on creating and uploading SSL certificates and then complete the following steps to install the certificate on your load balancer.

To install an SSL server certificate, in the **SSL Certificate** column, click **Change**.

11. **To use a previously uploaded certificate**

    a. On the **Select Certificate** page, in the **Certificate Type:** field, select **Choose from an existing SSL Certificate**.
    b. Click the **Certificate Name:** dialog box and select your certificate.
    c. Click **Save** and then go to step 13.

12. **To upload a signed certificate**

    On the **Select Certificate** page, in the **Certificate Type:** field, select **Upload a new SSL Certificate**.

    Before you upload, check if your certificate meets the criteria described in Upload the Signed Certificate (p. 64)

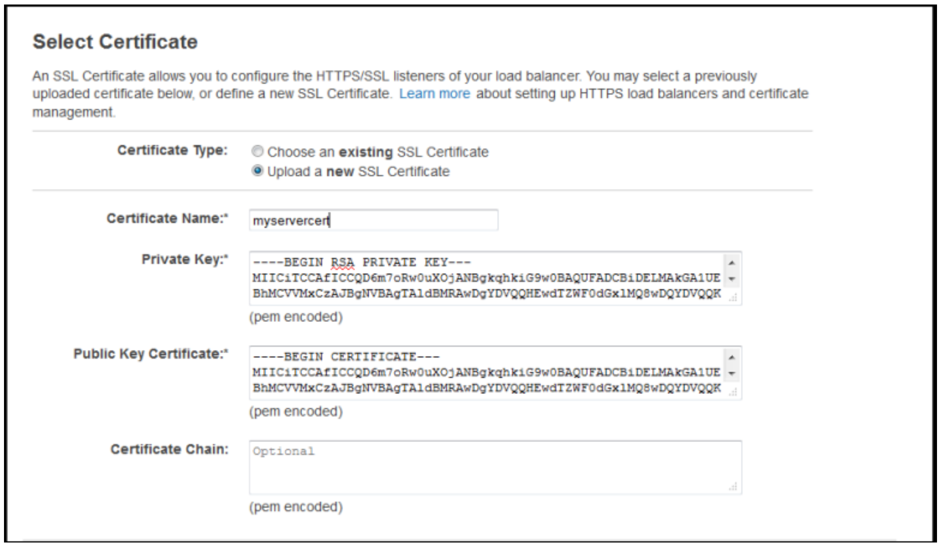
    Note
    If your certificate does not meet the criteria, you might get an error when you upload it. Create a new SSL certificate and upload the certificate using IAM. For instructions on creating and uploading the SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61).

    If your certificate meets the criteria, step through the following instructions to continue uploading your SSL certificate.

    a. Enter the name of the certificate to upload.
    b. Copy and paste the contents of the private key file (PEM-encoded) in the **Private Key** box.

       Note
       The private key cannot be retrieved after you are finished uploading it.
    c. Copy and paste the contents of the public key certificate file (PEM-encoded) in the **Public Key Certificate** box.
    d. Copy and paste the contents of the certificate chain file (PEM-encoded) in the **Certificate Chain** box.

       Note
       You can skip this step if you are using a self-signed certificate and it's not important that browsers implicitly accept the certificate.



Select Certificate

An SSL Certificate allows you to configure the HTTPS/SSL listeners of your load balancer. You may select a previously uploaded certificate below, or define a new SSL Certificate. Learn more about setting up HTTPS load balancers and certificate management.

Certificate Type: Choose an **existing** SSL Certificate [✓ Upload a **new** SSL Certificate]

Certificate Name:* myservercert

Private Key:*

```
----BEGIN RSA PRIVATE KEY---
MIICiTCCAfICCQD6m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UE
BhMCVVMxCzAJBgNVBAgTAldBMRAwDgYDVQQHEwdTZWF0dGx1MQ8wDQYDVQQK
```

(pem encoded)

Public Key Certificate:*

```
----BEGIN CERTIFICATE---
MIICiTCCAfICCQD6m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UE
BhMCVVMxCzAJBgNVBAgTAldBMRAwDgYDVQQHEwdTZWF0dGx1MQ8wDQYDVQQK
```

(pem encoded)

Certificate Chain: Optional

(pem encoded)

13. In the **Edit Listeners** page, click **Save** to add the listener you just configured.

Click **Add** to add additional listeners.

Using the Command Line Interface

To enable HTTPS support for your listeners, you must install an SSL server certificate on your load balancer. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances. If you do not have an SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61) for instructions on creating and uploading SSL certificates.

To add a new listener to your load balancer

1. Get the Amazon Resource Name (ARN) of your SSL certificate.
2. Enter the command `elb-create-lb-listeners` as in the following example.

```
PROMPT> elb-create-lb-listeners MyLoadBalancer --listener "protocol=HTTPS,lb-
port=443,instance-port=80,instance-protocol=HTTP, cert-
id=arn:aws:iam::55555555555:server-certificate/production/myCert"
```

3. Enter the command `elb-describe-lbs` as in the following example to view the updated details of your load balancer `MyLoadBalancer`.

```
PROMPT> elb-describe-lbs MyLoadBalancer
```

   The operation returns a list of updated configurations of your load balancer.

Using the Query API

To enable HTTPS support for your listeners, you must install an SSL server certificate on your load balancer. The load balancer uses the certificate to terminate and then decrypt requests before sending them to the back-end instances. Elastic Load Balancing uses AWS Identity and Access Management (IAM) to upload your certificate to your load balancer. If you do not have an SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61) for instructions on creating and uploading SSL certificates.

To add a new listener to your load balancer

1. Get the Amazon Resource Name (ARN) of your SSL certificate.
2. Call `CreateLoadBalancerListeners` with the following parameters:

   - *`Listener`*
     - *`Protocol`* = `HTTPS`
     - *`InstanceProtocol`* = `HTTP`
     - *`InstancePort`* = `80`
     - *`LoadBalancerPort`* = `443`
     - *`SSLCertificateId`* = **`arn:aws:iam::55555555555:server-certificate/production/myCert`**
   - *`LoadBalancerName`* = **`MyLoadBalancer`**

3. Call `DescribeLoadBalancers` as in the following example to view the updated configuration information of your load balancer.

- *`LoadBalancerName`* = **`MyLoadBalancer`**

The operation returns a list of updated configurations of your load balancer.

For detailed descriptions of this Elastic Load Balancing API action, see CreateLoadBalancerListeners in the Elastic Load Balancing API Reference.

Delete a Listener from Your Load Balancer

Topics

This section describes how to delete a listener from your existing load balancer. Before you get started, be sure you've done the following:

- Created a load balancer with Elastic Load Balancing. For information on how to set up a HTTPS/SSL load balancer with the AWS Management Console, command line interface (CLI), or Query API, see Create a HTTPS/SSL Load Balancer (p. 71). To learn how to set up a HTTP/TCP load balancer with the AWS Management Console, see Get Started with Elastic Load Balancing (p. 21).
- Installed the Elastic Load Balancing tool that you plan to use to perform load balancing tasks. You can add or delete listeners on your existing load balancer using the AWS Management Console, the command line interface (CLI), or the Query API. For information on installing the CLI, or the Query API, see Setting Up Elastic Load Balancing Interfaces (p. 16).
  - For detailed descriptions of the Elastic Load Balancing Query API actions, see Elastic Load Balancing API Reference.
  - For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

The following sections include instructions for deleting a listener from the specified port of your existing load balancer using the AWS Management Console, command line interface (CLI), or the Query API. In this example, you delete a listener from port 80 of your load balancer `MyLoadBalancer`.

Using the AWS Management Console

To delete a listener from your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click the **Listeners** tab.
6. In the **Listeners** pane, click **Edit**.
7. In the **Edit Listeners** page, click the delete icon next to the listener you want to delete.
8. Click **Save**.

Using the Command Line Interface

To delete a listener from your load balancer

1. Enter the command `elb-delete-lb-listeners` as in the following example.

```
PROMPT> elb-delete-lb-listeners MyLoadBalancer lb-ports 80
```

2. Enter the command `elb-describe-lbs` as in the following example to view the updated details of your load balancer `MyLoadBalancer`.

   ```
   PROMPT> elb-describe-lbs MyLoadBalancer
   ```

   The operation returns a list of updated configurations of your load balancer.

Using the Query API

To delete a listener from your load balancer

Call `DeleteLoadBalancerListeners` with the following parameters:

- *`LoadBalancerPorts`* = **`80`**
- *`LoadBalancerName`* = **`MyLoadBalancer`**

Call `DescribeLoadBalancers` as in the following example to view the updated configuration information of your load balancer.

- *`LoadBalancerName`* = `MyLoadBalancer`

The operation returns a list of updated configurations of your load balancer.

For detailed descriptions of this Elastic Load Balancing API action, see the DeleteLoadBalancerListeners in the Elastic Load Balancing API Reference.

Deregister and Register Amazon EC2 Instances

Elastic Load Balancing registers your EC2 instance with your load balancer using the associated IP address. When your EC2 instance launched in EC2-Classic is stopped and then started, the IP address associated with your instance changes. Your load balancer does not recognize the new IP address. When you stop and then start your registered EC2 instance launched in EC2-Classic, you must deregister your stopped instance from your load balancer, and then reregister the restarted instance. Failure to do so may prevent the load balancer from routing the traffic to the restarted instance.

If you have launched your instance in EC2-VPC, by default, the IP address associated with your instance does not change when you stop and then start the instance. However, when you stop and then start your EC2-VPC instance, your load balancer might take sometime to recognize that the stopped instance has started. During this time your load balancer is not connected to the restarted instance. We recommend that you reregister your restarted instance with the load balancer. For information on reregistering your instance, see Registering Your Amazon EC2 Instances with Your Load Balancer (p. 140).

In this example you deregister your stopped back-end instance from load balancer, and then register your restarted instance with the load balancer.

Before you get started, be sure you've done the following:

- Stop one of your back-end Amazon EC2 instance. For more information, go to Stopping and Starting Instances.

The following sections include instructions for deregistering and registering your back-end instances using the AWS Management Console, the Query API, or the command line interface.

De-Registering Your Amazon EC2 Instances from Your Load Balancer

Using AWS Management Console

To deregister your back-end instance from your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. In the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click **Instances** tab.
6. In the **Instances** table, in the **Actions** column, click **Remove from Load Balancer** in the row of the instance that you want to deregister.

Using the Query API

To deregister your back-end instance from your load balancer

- Call `DeregisterInstancesFromLoadBalancer` with the following parameters:
  - *`Instances`* = **`i-4e05f721`**
  - *`LoadBalancerName`* = **`MyLoadBalancer`**

The operation returns an updated list of remaining instances registered with the load balancer.

For detailed descriptions of this Elastic Load Balancing API action, see DeregisterInstancesFromLoad-Balancer in the Elastic Load Balancing API Reference.

Using the Command Line Interface

To de-register your back-end instance from your load balancer

- Enter the command `elb-deregister-instances-from-lb` as in the following example.

```
PROMPT> elb-deregister-instances-from-lb MyLoadBalancer --instances i-4e05f721
```

The operation returns an updated list of remaining instances registered with the load balancer.

For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

Registering Your Amazon EC2 Instances with Your Load Balancer

If you haven't done so yet, you should now restart the instance that you stopped in the previous step.

Using AWS Management Console

To register your back-end instance with your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. In the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click **Instances** tab.
6. In the **Instances** pane, click **Edit Instances**.
7. In the **Add or Remove Instances** table, in the **Instance** column, select the instance you want to your load balancer.
8. Click **Save** to register your instances.

Using the Query API

To register your back-end instance with your load balancer

Call `RegisterInstancesWithLoadBalancer` with the following parameters:

- *`Instances`* = **`i-802ffe77b`**
- *`LoadBalancerName`* = **`MyLoadBalancer`**

The operation returns an updated list of instances registered with the load balancer.

For detailed descriptions of this Elastic Load Balancing API action, see RegisterInstancesWithLoadBalancer in the Elastic Load Balancing API Reference.

Using the Command Line Interface

To register your back-end instance from your load balancer

Enter the command `elb-register-instances-with-lb` as in the following example.

```
PROMPT> elb-register-instances-with-lb MyLoadBalancer --instances i-802ffe77b
```

The operation returns an updated list of instances registered with the load balancer.

For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

Update an SSL Certificate for a Load Balancer

If you are using HTTPS/SSL protocol for your listeners, you might have an SSL server certificate installed on your load balancer. Your SSL certificate comes with a validity period. You must replace the certificate after its validity period ends. To replace the certificate you must create and upload the new certificate by following the same steps you used when you created your certificate for the first time. This section describes how to update an SSL certificate for your HTTPS/SSL load balancer. Before you get started, be sure you've done the following:

- Created a new SSL server certificate to replace the expired server certificate and have uploaded it using the AWS Identity and Access Management (IAM). For information on how to create and upload an SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61).

  All your SSL server certificates are managed by AWS Identity and Access management (IAM). By default, IAM allows 10 server certificates per AWS account. If you try to upload a new server certificate after reaching this limit, you'll get an error. You can request for more certificates using this form - IAM Limit Increase Contact Us Form.
- Installed the Elastic Load Balancing tools that you plan to use to perform load balancing tasks. You can update your SSL certificate installed on your HTTPS/SSL load balancer using the AWS Management Console, the Elastic Load Balancing command line interface (CLI), the AWS command line interface, or the Query API. For information on installing the CLI, or the Query API, see Setting Up Elastic Load Balancing Interfaces (p. 16).
  - For detailed descriptions of the Elastic Load Balancing Query API actions, see Elastic Load Balancing API Reference.
  - For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

The following sections include instructions for updating an SSL certificate using the AWS Management Console, the command line interface (CLI), or the Query API.

Topics

Using the AWS Management Console

To update an SSL certificate for an HTTPS load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click the **Listeners** tab.
6. In the **Listeners** pane, click **Change** in the **SSL Certificate** column of the certificate you want to update.
7. On the **Select Certificate** page, select **Choose from an existing SSL Certificates** if you have already uploaded your SSL certificate using IAM. Click the **Certificate Name:** dialog box and select your certificate. Click **Save**.
8. Or, select **Upload a new SSL Certificate** if you have an SSL certificate and want to upload it.

   Before you upload, ensure that your certificate meets the criteria described in Upload the Signed Certificate (p. 64)

   If your certificate does not meet the criteria listed in this step, you might get an error when you upload it. Create a new SSL certificate and upload the certificate using AWS Identity and Access Management (IAM). For instructions on creating and uploading the SSL certificate, see SSL Certificate for Elastic Load Balancing (p. 61).

   Step through the following instructions to continue uploading your SSL certificate.

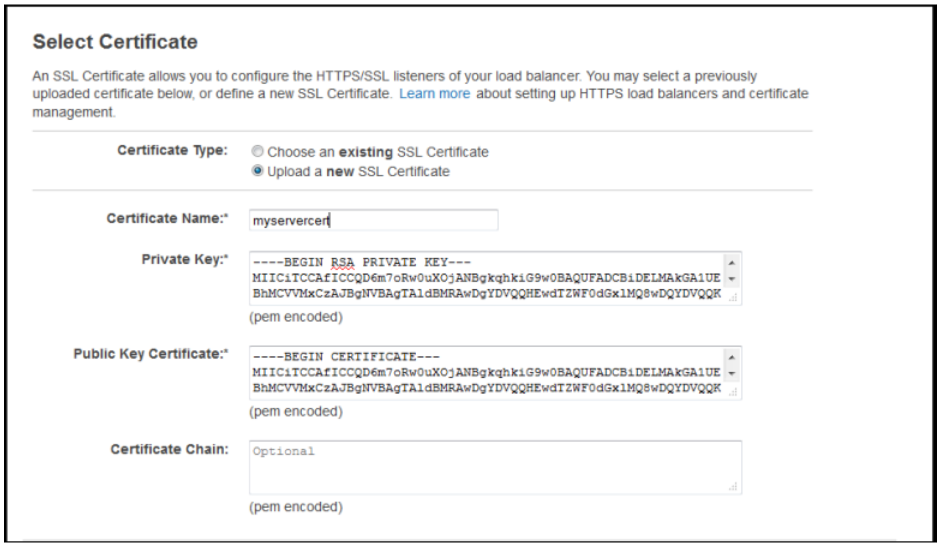
   a. Enter the name of the certificate to upload.
   b. Copy and paste the contents of the private key file (PEM-encoded) in the **Private Key** box.

      Note
      The private key cannot be retrieved after you are finished uploading it.

   c. Copy and paste the contents of the public key certificate file (PEM-encoded) in the **Public Key Certificate** box.
   d. You can skip this step if you are using a self-signed certificate and it's not important that browsers implicitly accept the certificate.

      If you are not using self-signed certificate, copy and paste the contents of the public key certificate chain file (PEM-encoded) in the **Certificate Chain** box.

      Note
      The certificate chain must be ordered such that the root certificate is the last certificate in the chain. If you use a certificate chain in a different order, you will receive an error.



Select Certificate

An SSL Certificate allows you to configure the HTTPS/SSL listeners of your load balancer. You may select a previously uploaded certificate below, or define a new SSL Certificate. Learn more about setting up HTTPS load balancers and certificate management.

Certificate Type: Choose an **existing** SSL Certificate [✓ Upload a **new** SSL Certificate]

Certificate Name:* myservercert

Private Key:*

```
----BEGIN RSA PRIVATE KEY---
MIICiTCCAfICCQD6m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UE
BhMCVVMxCzAJBgNVBAgTAldBMRAwDgYDVQQHEwdTZWF0dGx1MQ8wDQYDVQQK
```

(pem encoded)

Public Key Certificate:*

```
----BEGIN CERTIFICATE---
MIICiTCCAfICCQD6m7oRw0uXOjANBgkqhkiG9w0BAQUFADCBiDELMAkGA1UE
BhMCVVMxCzAJBgNVBAgTAldBMRAwDgYDVQQHEwdTZWF0dGx1MQ8wDQYDVQQK
```

(pem encoded)

Certificate Chain: Optional

(pem encoded)

9. Click **Save**.

Using the Query API

To update an SSL certificate for an HTTPS load balancer

1. If you have an SSL certificate and have uploaded it using the AWS Identity and Access Management (IAM), use the IAM action GetServerCertificate to get the ARN of the certificate, and then go to step 3.
2. If you have an SSL certificate and want to upload it, step through the instructions described in Upload the Signed Certificate (p. 64).

   Make a note of the ARN of the certificate.
3. Call SetLoadBalancerListenerSSLCertificate to replace the expired certificate with the new one.

   - *LoadBalancerName* = *test-lb*
   - *LoadBalancerPort* = *443*
   - *SSLCertificateId* = *arn:aws:iam::322191361670:server-certificate/newCert*

Using the Command Line Interface

To update an SSL certificate for an HTTPS load balancer

1. If you have an SSL certificate and have uploaded it using the AWS Identity and Access Management (IAM), use the AWS CLI command `get-server-certificate` to get the ARN of the certificate, and then go to step 3.
2. If you have an SSL certificate and want to upload it, step through the instructions described in Upload the Signed Certificate (p. 64).

   Make a note of the ARN of the certificate.

3. Enter the command `elb-set-lb-listener-ssl-cert` with an HTTPS listener, as in the following example.

```
PROMPT> elb-set-lb-listener-ssl-cert  test-lb --lb-port 443 --cert-id
arn:aws:iam::322191361670:server-certificate/newCert
```

Update SSL Negotiation Configuration of Your Load Balancer

Elastic Load Balancing service provides you with security policies that have predefined SSL negotiation configurations used for negotiating SSL connections between the client and the load balancer. If you are using a HTTPS/SSL protocol for your listener, it is likely that you are either using one of the predefined security policies, or using your own custom security policy for negotiating SSL connections between the client and your load balancer.

For more information about the security policies, see SSL Negotiation Configurations for Elastic Load Balancing (p. 54). For information about the current configuration for all the security policies provided by Elastic Load Balancing, see SSL Security Policy Table (p. 55).

If you have an existing load balancer with an SSL negotiation configuration that does not use the latest protocols and ciphers, we recommend that you upgrade your load balancer to the latest version of the ELBSecurityPolicy-*YYYY-MM*. If you prefer not to use any of the predefined security policies, you can create a custom configuration. We strongly recommend that you first test the new security policies before you upgrade your load balancer configuration.

Note
If you have created a HTTPS/SSL listener without associating any security policy, Elastic Load Balancing will, by default, associate the latest version of the ELBSecurityPolicy-*YYYY-MM* with your load balancer.
When you update the SSL negotiation configuration for your load balancer, be sure to associate a security policy with your load balancer.

This section steps you through the process for updating the SSL negotiation configuration of your load balancer.

Prerequisites

Before you get started, be sure that you have done the following:

- Created a HTTPS/SSL load balancer with Elastic Load Balancing. For information on how to set up an HTTPS/SSL load balancer with the AWS Management Console, the command line interface (CLI), or the Query API, see Create a HTTPS/SSL Load Balancer (p. 71).
- Installed the Elastic Load Balancing tools that you plan to use to perform this task. You can update the SSL negotiation configuration enabled on your HTTPS/SSL load balancer port using the AWS Management Console, the Elastic Load Balancing command line interface (CLI), the AWS command line interface, or the Query API. For information on installing the CLI, or the Query API, see Setting Up Elastic Load Balancing Interfaces (p. 16).
  - For detailed descriptions of the Elastic Load Balancing Query API actions, go to Elastic Load Balancing API Reference.
  - For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

The following section includes instructions for updating the SSL negotiation configuration for the HTTPS/SSL listener on your load balancer using the AWS Management Console. For instructions on updating the SSL negotiation configuration using the command line interface, see Step 2: Configure SSL Security Policy (p. 84).

To update SSL negotiation configuration for an HTTPS/SSL load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.

2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click the **Listeners** tab.
6. Click **Change** in the **Cipher** column of the listener you want to update.
7. On the **Select Cipher** page, select a security policy from the following options:

   To select a policy from the predefined security policy list

   1. Select **Predefined Security Policy**.
   2. In the security policy drop-down list, select a policy.
   3. Click **Save**.

   To create your own security policy

   1. Select **Custom**.
   2. Under **SSL Protocols**, select one or more protocols to enable.
   3. Under **SSL Options**, select **Server Order Preference** if you want to use the order listed in the SSL Security Policy Table (p. 55) for SSL negotiation.
   4. Under **SSL Ciphers**, select one or more ciphers to enable.

      Note
      You must enable at least one protocol and one cipher for SSL negotiation to take place. The DSA and RSA ciphers are specific to the signing algorithm and are used to create the SSL certificate. If you already have your SSL certificate, make sure to enable the cipher that was used to create your certificate.
   5. Click **Save**.

Configure Custom Domain Name for Your Load Balancer

Topics

Each Elastic Load Balancing instance that you create has an automatically created Domain Name System (DNS) name. Typically, the DNS name includes the name of the AWS region in which the load balancer is created. For example, if you create a load balancer named myLB in the US-East region, your load balancer might have a DNS name such as myLB-1234567890.us-east-1.elb.amazonaws.com. You just have to paste the DNS name generated by Elastic Load Balancing into the address field of an Internet-connected web browser to connect to your load balancer.

If you'd rather use a user-friendly domain name, such as www.example.com, instead of the load balancer DNS name, you can create a custom domain name and then associate the custom domain name with the load balancer DNS name. When a request is placed to your load balancer using the custom domain name that you created, it resolves to the load balancer DNS name.

To use a custom domain name for your load balancer instance, you'll have to first register your domain name with a DNS service provider.

When you register a domain name, you reserve not only the domain name itself, but also an entire set of subdomain names. For example, if you register example.com as your custom domain name, you can create subdomain names such as foo.bar.example.com, foo.myLB.example.com, and so on. This set of a domain and its subdomain names is called a zone. A domain name that you reserve, such as example.com, is called the zone apex because it sits at the top of the zone's hierarchy.

Associating Your Custom Domain Name with Your Load Balancer Name

After you register your custom domain name, you have two ways to associate your custom domain name with the load balancer DNS name.

- **Option 1:** Create a canonical name (CNAME) record for your zone with your existing domain name provider.

  To associate your custom domain name with your load balancer, first create a canonical name (CNAME) record for your zone with your existing domain name provider.

  A CNAME record specifies that a domain name is an alias of another CNAME domain name. For example, the following CNAME record associates an alias, www.foo.example.com, with a canonical name, the DNS name of an Elastic Load Balancing instance.

```
www.foo.example.com CNAME myLB-1234567890.us-east-1.elb.amazonaws.com
```

  For more information on CNAME records, go to the Wikipedia article http://en.wikipedia.org/wiki/CNAME_record.

  The creation of CNAME records is a simple process. Many domain name registrars provide self-service tools that you can use to create the CNAME record yourself. However, you can't use a CNAME record to associate your zone apex with your Elastic Load Balancing instance. DNS rules prohibit the creation of a CNAME record at the zone apex (e.g., example.com). For example, if you own the example.com domain name, you can use a CNAME record for the foo.example.com subdomain name, but not for the example.com zone apex.

You can use the next option if you want to associate a zone apex with your load balancer DNS name.

- **Option 2:** Create a domain using Amazon Route 53 as the DNS service Amazon Route 53 stores information about your domain in a hosted zone. A hosted zone is an Amazon Route 53 concept that is similar to a zone file on a DNS name server. Like a zone file, a hosted zone contains information about your domain name, including the subdomain names within the domain and mappings between names and IP addresses. For more information about Amazon Route 53, go to What is Route 53 and How Does it Work?

  Use this option to associate a zone apex with your load balancer DNS name. You'll use Amazon Route 53 to create a hosted zone for your domain (for example, example.com), and then create alias resource record sets. An alias resource record set contains a pointer to a resource record set that contains your DNS resource records. For example, an alias resource record set for your domain, *example.com*, can point to the DNS name of your Elastic Load Balancing load balancer instance *myLB-1234567890.us-east-1.elb.amazonaws.com*. After you create a hosted zone, you can also create alias resource record sets to associate subdomain names with your Elastic Load Balancing instance.

  DNS Failover: When you use Route 53 to create and associate a custom domain name with your load balancer you have an option to enable DNS failover for your load balancer. If DNS failover is enabled, Route 53 responds to the queries to your alias record set, *example.com* based on the health checks of the associated primary and secondary load balancer instances.

  If you plan to enable DNS failover for your load balancers, see Configure DNS Failover for Your Load Balancer (p. 180).

This section describes how to associate your Elastic Load Balancing instance with a custom domain name using Option 1 or Option 2.

Prerequisite

Before you start associating a load balancer DNS name with a custom domain name, you first need to create a load balancer. For information on creating a basic load balancer, see Get Started with Elastic Load Balancing (p. 21) For information on creating a load balancer with custom settings, see Create a HTTPS/SSL Load Balancer (p. 71).

> **Note**
> The time-to-live (TTL) for an Elastic Load Balancing DNS entry is set to 60 seconds. This setting ensures that IP addresses can be re-mapped quickly to respond to events that cause Elastic Load Balancing to scale up or down.

Option 1: Create a CNAME Record for your subdomain and load balancer

1. Register your custom domain name with your DNS provider. For a list of registrar websites you can use to register your domain name, go to ICANN. Wait for your registrar to notify you that your domain name is successfully registered.
2. Create a subdomain name to associate with your load balancer DNS name. For example, if your custom domain name is example.com, you can create a subdomain name such as foo.mylb.example.com.
3. Retrieve the public DNS name of your load balancer. You can use AWS Management Console, the Elastic Load Balancing Query API, or the Elastic Load Balancing command line interface (CLI) to retrieve your load balancer DNS name.

   To use the AWS Management Console to retrieve the public DNS name of your load balancer

   a. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
   b. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
   c. On the **Load Balancers** page, select your load balancer.
   d. The bottom pane displays the details of your load balancer.
   e. Make a note of the DNS name of your load balancer.

4. **To use the Elastic Load Balancing Query API to retrieve the public DNS name of your load balancer**

   a. Call DescribeLoadBalancers with the following parameter:

   ```
   LoadBalancerName = your load balancer name
   ```

   The operation returns the DNS name of your load balancer along with other details.
   b. Make a note of the DNS name.

5. **To use the Elastic Load Balancing CLI to retrieve the public DNS name of your load balancer**

   a. You'll need to install the Elastic Load Balancing CLI tool before you can use the following command. If you haven't yet installed the tool, go to Appendix A: Using the Elastic Load Balancing Command Line Interface (p. 251) for instructions on downloading and installing the CLI tool.
   b. Enter the command `elb-describe-lbs`, as in the following example.

   ```
   PROMPT> elb-describe-lbs your load balancer name
   ```

   The command returns the DNS name of your load balancer along with other details.
   c. Make a note of the DNS name.

6. Create a CNAME record to associate your custom subdomain name with your load balancer DNS name, as in the following example:

   Note
   Ask the company that provides your DNS name services (your domain name registrar) to create a CNAME record for your zone. Many domain name registrars provide self-service tools that you can use to create the CNAME record yourself.

```
www.foo.mylb.example.com CNAME myLB-1234567890.us-east-1.elb.amazonaws.com
```

Option 2: Create an Amazon Route 53 hosted zone

1. Register your custom domain name with your DNS provider. For a list of registrar websites you can use to register your domain name, go to ICANN. Wait for your registrar to notify you that your domain name is successfully registered.
2. Create a hosted zone for your custom domain name using Amazon Route 53. For detailed instructions, go to Creating a Hosted Zone in *Amazon Route 53 Developer Guide*.

As with other AWS products, there are no contracts or minimum commitments for using Amazon Route 53—you pay only for the hosted zones that you configure and the number of queries that Route 53 answers. For more information, see Route 53 Pricing.

3. For each hosted zone you create, Route 53 automatically creates four name server (NS) records. These four name servers are called the delegation set. Before the Domain Name System will start to route queries for your domain to Route 53 name servers, you must update your registrar's or your DNS service's name server records, to point to the Route 53 name servers.

   Follow the instructions in Getting the Name Servers for a Hosted Zone to get the four name servers assigned to your hosted zone.

   Follow the instructions in Name Server (NS) Records to update your registrar's or your DNS service's name server records, to point to the Route 53 assigned name servers.

4. Create an alias resource record set you will use to associate your zone apex with your Elastic Load Balancing instance DNS name. To create the alias resource record set you can use the Amazon Route 53 console, Amazon Route 53 API, or the Elastic Load Balancing command line interface (CLI).

   To use Amazon Route 53 console or Amazon Route 53 Query API

   For detailed instructions on using the Amazon Route 53 console or the Amazon Route 53 Query API to create an alias resource record set, go to Creating Alias Resource Record Sets in the *Amazon Route 53 Developer Guide*.

   To use the Elastic Load Balancing command line interface

   a. Before you get started, be sure you’ve installed the Elastic Load Balancing CLI tools. For more information, see Appendix A: Using the Elastic Load Balancing Command Line Interface (p. 251) for instructions on downloading and installing the CLI tools. For detailed descriptions of the Elastic Load Balancing commands, see the Elastic Load Balancing Quick Reference Card.

   b. Enter the `elb-associate-route53-hosted-zone` command, as in the following example, to associate a zone apex with an Elastic Load Balancing instance.

      This command creates an association between your zone apex and your Elastic Load Balancing instance by adding an alias resource record set to your hosted zone. The following example creates an association between example.com and a load balancer named myLoadBalancer.

```
elb-associate-route53-hosted-zone myLoadBalancer --rr-name example.com
--hosted-zone-id Z123456789 --weight 100
```

      For the `hosted-zone-id` parameter, use the hosted zone ID of your custom domain name rather than the Elastic Load Balancing hosted zone ID. For instructions on getting the hosted zone ID of your custom domain name, go to Listing the Hosted Zones for an AWS Account.

      For more information about the *`weight`* parameter, go to Setting Up Weighted Resource Record Sets in the *Amazon Route 53 API Reference Guide*.

      Note
      You might have to wait several minutes for your changes to propagate to all Amazon Route 53 DNS servers. For information on how to check the status of your change, go to Checking the Status of Your Change in the *Amazon Route 53 Developer Guide*.

   c. You can also use `elb-associate-route53-hosted-zone` to create aliases for subdomains that are part of your hosted zone. The following example associates the subdomain foo.bar.example.com your Amazon Route 53 hosted zone with ID number Z123456789.

```
elb-associate-route53-hosted-zone myLoadBalancer --rr-name foo.bar.ex
ample.com --hosted-zone-id Z123456789 --weight 100
```

Note
The `elb-associate-route53-hosted-zone` command works only with AWS secret key authentication. Unlike other Elastic Load Balancing CLI commands, this Elastic Load Balancing command does not work with X.509 certificate and RSA private key credentials.

Disassociating Your Custom Domain Name From Your Load Balancer Name

You can disassociate your custom domain name from a load balancer instance by first deleting the resource record sets in your hosted zone and then deleting the hosted zone.

1. **Delete the alias resource record sets in your Amazon Route 53 hosted zone**

   You can use Amazon Route 53 console, Amazon Route 53 API, or the Elastic Load Balancing command line interface (CLI) to delete alias resource record sets in your hosted zone.

   ### Using the Amazon Route 53 Console

   - For information on using Amazon Route 53 console, go to Creating, Changing, and Deleting Resource Record Sets in the *Amazon Route 53 Developer Guide*.

   ### Using the Amazon Route 53 Query API

   - For information on using Amazon Route 53 Query API, scroll down to the **Creating, Changing, and Deleting Resource Record Sets Using the Route 53 API** section in the Creating, Changing, and Deleting Resource Record Sets topic in the *Amazon Route 53 Developer Guide*.

   ### Using the Elastic Load Balancing command line interface

   - Enter the `elb-disassociate-route53-hosted-zone` command.

     This command removes the association between your zone apex or subdomain and your Elastic Load Balancing instance by deleting an alias resource record set from your hosted zone. The following example removes an association between example.com and a load balancer named myLB. The *`hosted-zone-id`* parameter is your custom hosted zone ID.

   ```
   elb-disassociate-route53-hosted-zone myLB --rr-name example.com --hosted-
   zone-id Z123456789 --weight 100
   ```

   Note
   The *`weight`* parameter value must match the value you used to create the resource record set specified in the *`rr-name`* parameter. If you don't remember the original weight value, use the Amazon Route 53 `ListResourceRecordSets` action to retrieve the value. For more information, go to ListResourceRecordSets in the *Amazon Route 53 API Reference*

Guide. For more information about the `weight` parameter, go to Setting Up Weighted Resource Record Sets in the *Amazon Route 53 API Reference Guide*.

Note
The `elb-disassociate-route53-hosted-zone` command works only with AWS secret key authentication. Unlike other Elastic Load Balancing CLI commands, this new Elastic Load Balancing command does not work with X.509 certificate and RSA private key credentials.

2. **Delete the hosted zone associated with your load balancer DNS name**

   You can use the Amazon Route 53 console or the Amazon Route 53 Query API to delete the hosted zone associated with your load balancer DNS name. For more information, go to Deleting a Hosted Zone in the *Amazon Route 53 Developer Guide*.

Enable or Disable Cross-Zone Load Balancing for Your Load Balancer

Elastic Load Balancing provides you with an option to either enable or disable cross-zone load balancing for your load balancer.

With cross-zone load balancing, your load balancer nodes route traffic to the back-end instances across all Availability Zones. For more information, see Availability Zones and Regions (p. 5).

This section walks you through the process for enabling or disabling the cross-zone load balancing for your load balancer.

Topics

Enable Cross-Zone Load Balancing

You can enable cross-zone load balancing for your load balancer using the AWS Management Console, the Elastic Load Balancing command line interface (CLI) or the Elastic Load Balancing Query API.

To enable cross-zone load balancing using the AWS Management Console

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the **Create Load Balancer** page, select your load balancer.
5. The bottom pane displays the details of your load balancer.
6. Click **(Edit)** in the **Cross-Zone Load Balancing: Disabled** row.
7. In the **Configure Cross-Zone Load Balancing** dialog box, select **Enable**.
8. Click **Save**.

To enable cross-zone load balancing using the CLI

You need to modify the `crosszoneloadbalancing` attribute of your load balancer by setting the attribute value to `true`.

1. Enter the `elb-modify-lb-attributes` command using the following options:

   - Load balancer name = *`MyLoadBalancer`*
   - `crosszoneloadbalancing`
     - `enabled=true`

   Your command should look like the following example:

   ```
   elb-modify-lb-attributes MyLoadBalancer  --crosszoneloadbalancing "en
   abled=true"
   ```

   Elastic Load Balancing responds as in the following example.

   ```
   OK-Modifying LoadBalancer Attributes
   ```

2. Enter `elb-describe-lb-attributes` command as in the following example to verify that the cross-zone load balancing is enabled for your load balancer. Use the following option:

   - Load balancer name = *`MyLoadBalancer`*

   Your command should look like the following example.

   ```
   elb-describe-lb-attributes MyLoadBalancer  --headers
   ```

   Elastic Load balancing responds as in the following example.

   ```
   CrossZoneLoadBalancing  VALUE
   CrossZoneLoadBalancing  true
   ```

You have successfully enabled Cross-Zone Load Balancing.

To enable Cross-Zone load balancing using the Query API

You need to modify the `CrossZoneLoadBalancing` attribute of your load balancer by setting the attribute value to `true`.

1. Use the `ModifyLoadBalancerAttributes` action with the following parameters:

   - `LoadBalancerName` = *`MyLoadBalancer`*
   - `CrossZoneLoadBalancingEnabled` = `true`

   Your request should look like the following example:

   ```
   https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=MyLoadBalancer
    &LoadBalancerAttributes.CrossZoneLoadBalancing.Enabled=true
   ```

```
&Version=2012-06-01
&Action=ModifyLoadBalancerAttributes
&AUTHPARAMS
```

If your request was successful, you should get a response similar to the following example.

```
<ModifyLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <ModifyLoadBalancerAttributesResult/>
  <ResponseMetadata>
    <RequestId>9f646d88-1507-11e3-a983-c5f2EXAMPLE</RequestId>
  </ResponseMetadata>
</ModifyLoadBalancerAttributesResponse>
```

2. Use the `DescribeLoadBalancerAttributes` action with the following parameter to verify that the cross-zone load balancing is enabled for your load balancer.

   - LoadBalancerName = *`MyLoadBalancer`*

   Your request should look like the following example.

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=MyLoadBalancer

&Version=2012-06-01
&Action=DescribeLoadBalancerAttributes
&AUTHPARAMS
```

   If your request is successful, you should get a response similar to the following example.

```
<DescribeLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <DescribeLoadBalancerAttributesResult>
    <LoadBalancerAttributes>
      <CrossZoneLoadBalancing>
        <Enabled>true</Enabled>
      </CrossZoneLoadBalancing>
    </LoadBalancerAttributes>
  </DescribeLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>3f42b4fe-1506-11e3-bcfd-3188aEXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancerAttributesResponse>
```

You have successfully enabled cross-zone load balancing for your load balancer.

Disable Cross-Zone Load Balancing

You can disable the cross-zone load balancing option for your load balancer at any time.

To disable cross-zone load balancing for your load balancer, you need to modify the `CrossZoneLoad-Balancing` attribute of your load balancer by setting the attribute value to `false`.

This section shows you how to disable the cross-zone load balancing for your load balancer using the AWS Management Console, the command line interface (CLI), or the Query API.

To disable cross-zone load balancing using the AWS Management Console

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the **Create Load Balancer** page, select your load balancer.
5. The bottom pane displays the details of your load balancer.
6. Click **(Edit)** in the **Cross-Zone Load Balancing: Enabled** row.
7. In the **Configure Cross-Zone Load Balancing** dialog box, select **Disable**.
8. Click **Save**.

To disable cross-zone load balancing using the CLI

1. Enter the `elb-modify-lb-attributes` command using the following options:

   - Load balancer name = *`MyLoadBalancer`*
   - `crosszoneloadbalancing`
     - `enabled=false`

   Your command should look like the following example:

   ```
   elb-modify-lb-attributes MyLoadBalancer  --crosszoneloadbalancing "en
   abled=false"
   ```

   Elastic Load Balancing responds as in the following example:

   ```
   OK-Modifying LoadBalancer Attributes
   ```

2. Enter `elb-describe-lb-attributes` command as in the following example to verify that the Cross-Zone load balancing is disabled for your load balancer. Use the following option:

   - Load balancer name = *`MyLoadBalancer`*

   Your command should look like the following example:

   ```
   elb-describe-lb-attributes MyLoadBalancer  --headers
   ```

   Elastic Load balancing responds similar to the following example:

   ```
   CrossZoneLoadBalancing  VALUE
   CrossZoneLoadBalancing  false
   ```

You have successfully disabled cross-zone load balancing for your load balancer.

To disable cross-zone load balancing using the Query API

1. Use the `ModifyLoadBalancerAttributes` action with the following parameters:

   - `LoadBalancerName` = *`MyLoadBalancer`*
   - `CrossZoneLoadBalancingEnabled` = `false`

   Your request should look similar to the following example:

   ```
   https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=MyLoadBalancer
    &LoadBalancerAttributes.CrossZoneLoadBalancing.Enabled=false
   &Version=2012-06-01
   &Action=ModifyLoadBalancerAttributes
   &AUTHPARAMS
   ```

   If your request was successful, you should get a response similar to the following example:

   ```
   <ModifyLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
   cing.amazonaws.com/doc/2012-06-01/">
     <ModifyLoadBalancerAttributesResult/>
     <ResponseMetadata>
       <RequestId>9f646d88-1507-11e3-a983-c5f2EXAMPLE</RequestId>
     </ResponseMetadata>
   </ModifyLoadBalancerAttributesResponse>
   ```

2. Use the `DescribeLoadBalancerAttributes` action with the following parameter to verify that the Cross-Zone load balancing is disabled for your load balancer.

   - LoadBalancerName = *`MyLoadBalancer`*

   Your request should look like the following example.

   ```
   https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=MyLoadBalancer

   &Version=2012-06-01
   &Action=DescribeLoadBalancerAttributes
   &AUTHPARAMS
   ```

   If your request is successful, you should get a response similar to the following example:

   ```
   <DescribeLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
   cing.amazonaws.com/doc/2012-06-01/">
     <DescribeLoadBalancerAttributesResult>
       <LoadBalancerAttributes>
         <CrossZoneLoadBalancing>
           <Enabled>false</Enabled>
         </CrossZoneLoadBalancing>
       </LoadBalancerAttributes>
     </DescribeLoadBalancerAttributesResult>
     <ResponseMetadata>
       <RequestId>3f42b4fe-1506-11e3-bcfd-3188aEXAMPLE</RequestId>
     </ResponseMetadata>
   </DescribeLoadBalancerAttributesResponse>
   ```

You have successfully disabled cross-zone load balancing for your load balancer.

Enable or Disable Connection Draining for Your Load Balancer

You have the option to either enable or disable connection draining on your load balancer. Connection draining causes the load balancer to stop sending new requests to the back-end instances when the instances are deregistering or when instances become unhealthy, while ensuring that in-flight requests continue to be served. For more information, see Connection Draining (p. 8).

This section walks you through the process for enabling or disabling connection draining for your load balancer.

Enable Connection Draining

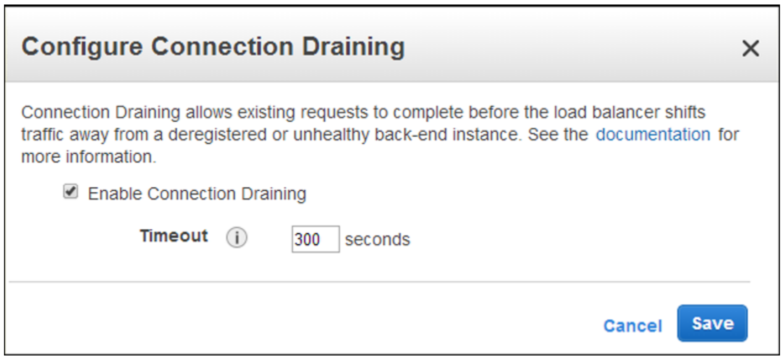
When you enable connection draining, you can specify a maximum time for the load balancer to keep the connections alive before reporting the instance as deregistered. If you do not specify the maximum timeout period, by default, the load balancer will close connections to the deregistering instance after 300 seconds.

The maximum timeout value can be set between 1 and 3600 seconds.

You can enable the connection draining on your load balancer using the AWS Management Console, the Elastic Load Balancing command line interface (CLI), or the Query API.

To enable connection draining using the AWS Management Console

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the load balancer page, select your load balancer.
5. The bottom pane displays the details of your load balancer. Click the **Instances** tab.
6. Click **(Edit)** in the **Connection Draining: Disabled** row.
7. In the **Configure Connection Draining** dialog box, select **Enable Connection Draining**.
8. [optional] Click the **Timeout** dialog box and enter a value for maximum time limit.


Configure Connection Draining

Connection Draining allows existing requests to complete before the load balancer shifts traffic away from a deregistered or unhealthy back-end instance. See the documentation for more information.

☑ Enable Connection Draining

Timeout 300 seconds

9. Click **Save**.

Enable Connection Draining Using the Elastic Load Balancing CLI

To enable connection draining, you must modify the `connection-draining` attribute of your load balancer by setting the attribute value to `true` and by optionally specifying a connection timeout value.

Before you get started, make sure you have installed the latest version of the Elastic Load Balancing CLI. To install the latest CLI, see Elastic Load Balancing API Tools.

1. Enter the command `elb-modify-lb-attributes` using the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - `connection-draining`
     - `enabled=true`
     - [optional] `timeout=`*`300`*

   Your command should look like the following example:

   ```
   elb-modify-lb-attributes my-test-loadbalancer  --connection-draining "en
   abled=true, timeout=300"  --headers
   ```

   Elastic Load Balancing responds as in the following example.

   ```
   CONNECTION_DRAINING  CONNECTION_DRAINING_ENABLED  CONNECTION_DRAINING_TIMEOUT
   CONNECTION_DRAINING   true                           300
   ```

2. Enter `elb-describe-lb-attributes` command as in the following example to verify that the connection draining is enabled for your load balancer. Use the following option:

   - Load balancer name = *`my-test-loadbalancer`*

   Your command should look like the following example.

   ```
   elb-describe-lb-attributes my-test-loadbalancer  --headers
   ```

   Elastic Load balancing responds as in the following example.

   ```
   CROSS_ZONE_LOADBALANCING  CROSSZONE_LOADBALANCING_ENABLED
   CROSS_ZONE_LOADBALANCING  false
   ACCESS_LOG  ACCESSLOG_ENABLED
   ACCESS_LOG  false
   CONNECTION_DRAINING  CONNECTION_DRAINING_ENABLED  CONNECTION_DRAINING_TIMEOUT

   CONNECTION_DRAINING    true                           300
   ```

You have successfully enabled connection draining for your load balancer.

To enable connection draining for your load balancer using the Query API

To enable connection draining, you must modify the `ConnectionDraining` attribute of your load balancer by setting the attribute value to `true` and by optionally specifying a connection timeout value.

1. Use the `ModifyLoadBalancerAttributes` action with the following parameters:

- LoadBalancerName = *`my-test-loadbalancer`*
- `ConnectionDraining`
  - `Enabled=true`
  - [optional] `Timeout=`*`300`*

Your request should look like the following example:

```
https://elasticloadbalancing.sa-east-1.amazonaws.com/?LoadBalancerAttrib
utes.AccessLog.Enabled=true
&LoadBalancerAttributes.ConnectionDraining.Timeout=300
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
&Action=ModifyLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<ModifyLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <ModifyLoadBalancerAttributesResult>
    <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
    <LoadBalancerAttributes>
     <ConnectionDraining>
       <Enabled>true</Enabled>
       <Timeout>300</Timeout>
      </ConnectionDraining>
    </LoadBalancerAttributes>
  </ModifyLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>020744c8-9d97-11e3-919a-33887EXAMPLE</RequestId>
  </ResponseMetadata>
</ModifyLoadBalancerAttributesResponse>
```

2. Use the `DescribeLoadBalancerAttributes` action with the following parameter to verify that connection draining is enabled for your load balancer.

   - LoadBalancerName = *`my-test-loadbalancer`*

   Your request should look like the following example.

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=my-test-load
balancer
&Version=2012-06-01
&Action=DescribeLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<DescribeLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <DescribeLoadBalancerAttributesResult>
    <LoadBalancerAttributes>
      <AccessLog>
```

```
        <Enabled>false</Enabled>
      </AccessLog>
      <CrossZoneLoadBalancing>
        <Enabled>false</Enabled>
      </CrossZoneLoadBalancing>
      <ConnectionDraining>
        <Enabled>true</Enabled>
        <Timeout>60</Timeout>
     </ConnectionDraining>
    </LoadBalancerAttributes>
  </DescribeLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>64e7b49d-41fb-11e3-962d-c57EXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancerAttributesResponse>
```

You have successfully enabled connection draining for your load balancer.

Disable Connection Draining

You can disable the connection draining if you want your load balancer to immediately close connections to the registered instances when the instances are deregistering or become unhealthy. With connection draining attribute disabled, any in-flight requests made to the deregistering or unhealthy instances will not be completed.

You can disable connection draining on your load balancer using the AWS Management Console, the Elastic Load Balancing command line interface (CLI), or the Query API.

To disable connection draining using the AWS Management Console

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the **Create Load Balancer** page, select your load balancer.
5. The bottom pane displays the details of your load balancer. Click the **Instances** tab.
6. Click **(Edit)** in the **Connection Draining: Enabled** row.
7. In the **Configure Connection Draining** dialog box, click **Enable Connection Draining** to disable.
8. Click **Save**.

Disable Connection Draining Using the Elastic Load Balancing CLI

To disable connection draining, you must modify the `connection-draining` attribute of your load balancer by setting the attribute value to `false`.

Before you get started, make sure you have installed the latest version of the Elastic Load Balancing CLI. To install the latest CLI, see Elastic Load Balancing API Tools.

1. Enter the command `elb-modify-lb-attributes` using the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - `connection-draining`

    - `enabled=false`

   Your command should look like the following example:

```
elb-modify-lb-attributes my-test-loadbalancer  --connection-draining "en
abled=false"  --headers
```

   Elastic Load Balancing responds as in the following example.

```
CONNECTION_DRAINING  CONNECTION_DRAINING_ENABLED  CONNECTION_DRAINING_TIMEOUT
CONNECTION_DRAINING  false                              300
```

2. Enter the `elb-describe-lb-attributes` command as in the following example to verify that the connection draining is disabled for your load balancer. Use the following option:

   - Load balancer name = *`my-test-loadbalancer`*

   Your command should look like the following example.

```
elb-describe-lb-attributes my-test-loadbalancer  --headers
```

   Elastic Load balancing responds as in the following example.

```
CROSS_ZONE_LOADBALANCING  CROSSZONE_LOADBALANCING_ENABLED
CROSS_ZONE_LOADBALANCING  false
ACCESS_LOG  ACCESSLOG_ENABLED
ACCESS_LOG  false
CONNECTION_DRAINING   CONNECTION_DRAINING_ENABLED  CONNECTION_DRAINING_TIMEOUT

CONNECTION_DRAINING    false                              300
```

You have successfully disabled connection draining for your load balancer.

Disable Connection Draining For Your Load Balancer Using the Query API

To disable the connection draining, you must modify the `ConnectionDraining` attribute of your load balancer by setting the attribute value to `false`.

1. Use the `ModifyLoadBalancerAttributes` action with the following parameters:

   - LoadBalancerName = *`my-test-loadbalancer`*
   - `ConnectionDraining`
     - `Enabled=false`

   Your request should look like the following example:

```
https://elasticloadbalancing.sa-east-1.amazonaws.com/?LoadBalancerAttrib
utes.AccessLog.Enabled=false
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
```

```
&Action=ModifyLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<ModifyLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <ModifyLoadBalancerAttributesResult>
    <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
    <LoadBalancerAttributes>
     <ConnectionDraining>
       <Enabled>false</Enabled>
       <Timeout>300</Timeout>
      </ConnectionDraining>
    </LoadBalancerAttributes>
  </ModifyLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>020744c8-9d97-11e3-919a-33887EXAMPLE</RequestId>
  </ResponseMetadata>
</ModifyLoadBalancerAttributesResponse>
```

2. Use the `DescribeLoadBalancerAttributes` action with the following parameter to verify that connection draining is disabled for your load balancer.

   • LoadBalancerName = *`my-test-loadbalancer`*

   Your request should look like the following example.

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=my-test-load
balancer
&Version=2012-06-01
&Action=DescribeLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<DescribeLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <DescribeLoadBalancerAttributesResult>
    <LoadBalancerAttributes>
      <AccessLog>
        <Enabled>false</Enabled>
      </AccessLog>
      <CrossZoneLoadBalancing>
        <Enabled>false</Enabled>
      </CrossZoneLoadBalancing>
      <ConnectionDraining>
        <Enabled>false</Enabled>
        <Timeout>60</Timeout>
     </ConnectionDraining>
    </LoadBalancerAttributes>
  </DescribeLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>64e7b49d-41fb-11e3-962d-c57EXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancerAttributesResponse>
```

You have successfully disabled connection draining for your load balancer.

Configure Idle Connection Timeout

By default, Elastic Load Balancing sets the idle timeout to 60 seconds for the connections to the client and the back-end instance. You can change the idle timeout setting for the connections at any time. For information on idle timeout, see Idle Connection Timeout (p. 8).

The idle timeout setting on your load balancer can be any value from 1 second to 3600 seconds.

If you have enabled the keep-alive option on your back-end instances, and if you want to ensure that load balancer is responsible for closing connections, we recommend that you change the keep-alive setting on your back-end instances to a value greater than the idle timeout setting on your load balancer.

This section walks you through the process for configuring the idle timeout setting on your load balancer using the AWS Management Console, the Elastic Load Balancing command line interface (ELB CLI), or the Query API.

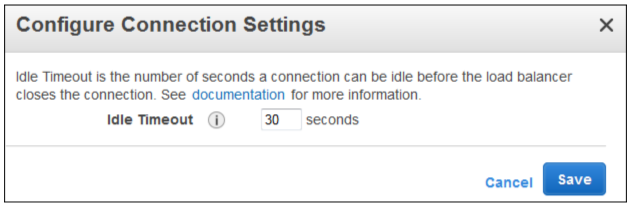
Topics

Using the AWS Management Console

This console provides an easy way to set the idle timeout on your load balancer.

To configure idle timeout setting for your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the load balancer page, select your load balancer.
5. The bottom pane displays the details of your load balancer.
6. Click **(Edit)** in the **Connection Settings:** row.
7. In the **Configure Connection Settings** dialog box, enter a value for **Idle Timeout**.


Configure Connection Settings

Idle Timeout is the number of seconds a connection can be idle before the load balancer closes the connection. See documentation for more information.

Idle Timeout: 30 seconds

8. Click **Save**.

Using the Elastic Load Balancing Command Line Interface

Before you get started, make sure you installed the latest version of the ELB CLI. To install the latest version of ELB CLI, see Elastic Load Balancing API Tools.

To configure idle timeout setting for your load balancer

1. Enter the command `elb-modify-lb-attributes` using the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - `connection-settings`
     - `idletimeout` = *`30`*

   Your command should look like the following example:

   ```
   elb-modify-lb-attributes my-test-loadbalancer  --connection-settings "idle
   timeout=30"  --headers
   ```

   Elastic Load Balancing responds as in the following example:

   ```
   CONNECTION_SETTINGS  CONNECTION_SETTINGS_IDLE_TIMEOUT
   CONNECTION_SETTINGS  30
   ```

2. Enter the `elb-describe-lb-attributes` command as in the following example to verify that the idle timeout setting is updated for your load balancer. Use the following option:

   - Load balancer name = *`my-test-loadbalancer`*

   Your command should look like the following example:

   ```
   elb-describe-lb-attributes my-test-loadbalancer  --headers
   ```

   Elastic Load Balancing responds as in the following example:

   ```
   CROSS_ZONE_LOADBALANCING  CROSSZONE_LOADBALANCING_ENABLED
   CROSS_ZONE_LOADBALANCING  true
   ACCESS_LOG  ACCESSLOG_ENABLED
   ACCESS_LOG  false
   CONNECTION_DRAINING  CONNECTION_DRAINING_ENABLED  CONNECTION_DRAINING_TIMEOUT
   CONNECTION_DRAINING  false                         300
   CONNECTION_SETTINGS  CONNECTION_SETTINGS_IDLE_TIMEOUT
   CONNECTION_SETTINGS  30
   ```

Using the Query API

To configure idle timeout setting, you must modify the `ConnectionSettings` attribute of your load balancer by specifying the `IdleTimeout` value.

To configure idle timeout setting for your load balancer

1. Use the ModifyLoadBalancerAttributes action by specifying the following parameters:

   - `LoadBalancerName` = *`my-test-loadbalancer`*
   - `ConnectionSettings`
     - `IdleTimeout` = *`30`*

Your request should look like the following example:

```
https://elasticloadbalancing.us-east-1.amazonaws.com/? LoadBalancerAttrib
utes.ConnectionSettings.IdleTimeout=30
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
&Action=ModifyLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<ModifyLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <ModifyLoadBalancerAttributesResult>
    <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
    <LoadBalancerAttributes>
       <ConnectionSettings>
          <IdleTimeout>30</IdleTimeout>
       </ConnectionSettings>
    </LoadBalancerAttributes>
  </ModifyLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>020744c8-9d97-11e3-919a-33887EXAMPLE</RequestId>
  </ResponseMetadata>
</ModifyLoadBalancerAttributesResponse>
```

2. Use the DescribeLoadBalancerAttributes action as in the following example to verify that the idle connection timeou r't setting is updated for your load balancer. Use the following parameter:

   - `LoadBalancerName` = *`my-test-loadbalancer`*

   Your request should look like the following example:

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=my-test-load
balancer
&Version=2012-06-01
&Action=DescribeLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<DescribeLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <DescribeLoadBalancerAttributesResult>
  <LoadBalancerAttributes>
    <ConnectionSettings>
      <IdleTimeout>30</IdleTimeout>
    </ConnectionSettings>
    <AccessLog>
      <Enabled>false</Enabled>
    </AccessLog>
    <CrossZoneLoadBalancing>
      <Enabled>true</Enabled>
    </CrossZoneLoadBalancing>
    <ConnectionDraining>
      <Enabled>false</Enabled>
      <Timeout>300</Timeout>
    </ConnectionDraining>
  </LoadBalancerAttributes>
</DescribeLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>64e7b49d-41fb-11e3-962d-c57EXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancerAttributesResponse>
```

Enable or Disable Proxy Protocol Support

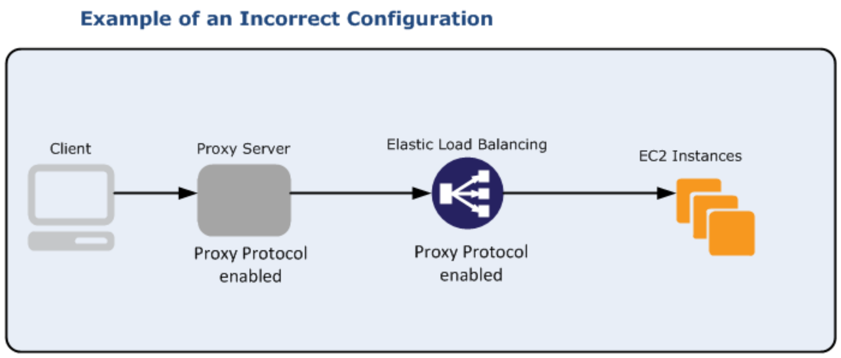
By default, when you use Transmission Control Protocol (TCP) or Secure Sockets Layer (SSL) for both front-end and back-end connections, your load balancer forwards the request to the back-end instances without modifying the request headers. If you enable Proxy Protocol, a human-readable header gets prepended to the request header with connection information such as the source IP address, destination IP address, and port numbers. The header is then sent to the back-end instance as part of the request.

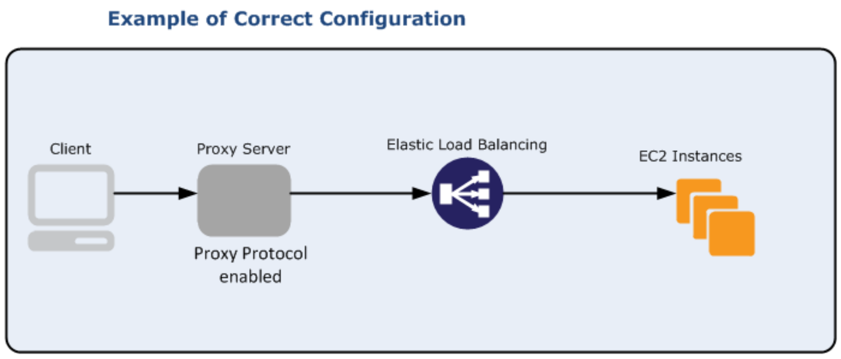
Proxy Protocol is an Internet protocol used for carrying connection information from the source requesting the connection to the destination for which the connection was requested. Elastic Load Balancing uses Proxy Protocol version 1, which uses a human-readable header format.

Proxy Protocol can only be enabled on ports using either SSL or TCP protocols. You can use Proxy Protocol to capture your client's source IP when you are using a non-HTTP protocol, or when you are using HTTPS and not terminating the SSL connection on your load balancer.

If you have a Proxy Protocol enabled proxy server in front of your load balancer, then you must *not* enable Proxy Protocol on your load balancer. If the Proxy Protocol is enabled on both the proxy server and the load balancer, the load balancer will add *another* header to the request that already has a header from the proxy server. Depending on how your back-end instance is configured, this *duplication* might result in errors.

The following diagrams illustrate the incorrect and correct configurations for enabling Proxy Protocol when you have a proxy server in front of your load balancer.





This section walks you through the process for enabling Proxy Protocol and then associating it with your back-end instance using either the Elastic Load Balancing command line interface (CLI) or the Query API. At present, the Elastic Load Balancing console does not support enabling Proxy Protocol.

Prerequisites for Enabling Proxy Protocol

Before you begin, be sure that you complete the following steps:

- Create a basic load balancer by specifying either an SSL or a TCP protocol for both front-end and back-end listeners. For more information, see Get Started with Elastic Load balancing.
- Confirm that your back-end instances can process the Proxy Protocol information.
- If you plan to use the Elastic Load Balancing command line interface (CLI), install the command line tools. For more information, see Installing the Command Line Interface.

  For information on using the Elastic Load Balancing Query APIs, see Use Query Requests to Call Elastic Load Balancing APIs (p. 19)

Topics

Enable Proxy Protocol Using the Command Line Interface

To enable Proxy Protocol, you need to create a policy of the type `ProxyProtocolPolicyType` and then set the policy to the back-end instance port.

In this walkthrough, you will create a new policy `EnableProxyProtocol` of the type `ProxyProtocolPolicyType` for a load balancer named `my-test-loadbalancer`, set the newly created policy to the back-end instance on port `80`, and verify that the policy is enabled.

To create a policy

1. Enter the command `elb-describe-lb-policies` to list all the policies supported by Elastic Load Balancing.

```
elb-describe-lb-policy-types  --headers
```

2. Elastic Load Balancing responds with the names and descriptions of the supported policy types.

```
POLICY_TYPE  NAME                                          DESCRIPTION
POLICY_TYPE  PublicKeyPolicyType                              ...

POLICY_TYPE  AppCookieStickinessPolicyType                    ...
POLICY_TYPE  LBCookieStickinessPolicyType                     ...
POLICY_TYPE  SSLNegotiationPolicyType                         ...

POLICY_TYPE  BackendServerAuthenticationPolicyType            ...
POLICY_TYPE  ProxyProtocolPolicyType                          ...
```

   Use the policy type `ProxyProtocolPolicyType` to create a new policy `EnableProxyProtocol`.

3. Enter the `elb-create-lb-policy` command to create a new policy.

```
elb-create-lb-policy my-test-loadbalancer --policy-name EnableProxyProtocol
 --policy-type ProxyProtocolPolicyType  --attribute "name=ProxyProtocol,
value=true"
```

4. Elastic Load Balancing responds as in the following example.

```
   OK-Creating LoadBalancer Policy
```

To enable the policy

1. Enter the command `elb-set-lb-policies-for-backend-server` to set the newly created policy to the back-end instance port.

   Note
   The `elb-set-lb-policies-for-backend-server` command replaces the current set of policies associated with your instance port. Every time you use this command to enable the policies, use the `--policy-names` option to list all the policies you want to enable.

```
elb-set-lb-policies-for-backend-server my-test-loadbalancer --instance-port
 80 --policy-names EnableProxyProtocol, MyPolicyName2, MyPolicyName3
```

2. Elastic Load Balancing responds as in the following example.

```
OK-Setting Policies
```

To verify that the Proxy Protocol is enabled

1. Enter the `elb-describe-lbs` command to verify that the Proxy Protocol is enabled.

```
elb-describe-lbs my-test-loadbalancer --headers --show-long
```

2. Elastic Load Balancing responds as in the following example.

```
LOAD_BALANCER,NAME,DNS_NAME,CANONICAL_HOSTED_ZONE_NAME,CANONICAL_HOS
TED_ZONE_NAM
E_ID,HEALTH_CHECK,AVAILABILITY_ZONES,SUBNETS,VPC_ID,INSTANCE_ID,LISTEN
ER_DESCRIP
TIONS,BACKEND_SERVER_DESCRIPTIONS,OTHER_POLICIES,SOURCE_SECURITY_GROUP,SE
CURITY_
GROUPS,CREATED_TIME,SCHEME
LOAD_BALANCER,my-test-loadbalancer,my-test-loadbalancer-1086370712.us-east-
1.elb
.amazonaws.com,my-test-loadbalancer-1086370712.us-east-1.elb.amazon
aws.com,Z3DZX
E0Q79N41H,"{interval=30,target=HTTP:80/install.php,timeout=5,healthy-
threshold=1
0,unhealthy-threshold=2}",us-east-1e,(nil),(nil),"i-48bb5d38, i-78bc5a08,
i-98e2
04e8, i-ccbb5dbc","{protocol=HTTP,lb-port=80,instance-protocol=HTTP,instance-
por
t=80,policies=},{protocol=HTTPS,lb-port=443,instance-protocol=HTTP,instance-
port
=80,cert-id=arn:aws:iam::803981987763:server-certificate/scert,policies=AWSCon
sole-SSLNegotiationPolicy-my-test-loadbalancer}","{instance-
port=80,policies=Enabl
eProxyProtocol}","AWSConsole-SSLNegotiationPolicy-my-test-loadbalancer, En
ablePr
oxyProtocol","{owner-alias=amazon-elb,group-name=amazon-elb-sg}",(nil),2013-
01-2
4T20:51:35.710Z,internet-facing
```

The description `{instance-port=80,policies=EnableProxyProtocol}` in the `OTHER_POLICIES` field confirms that the policy is associated with the instance port.

Disable the Policy

At any time you can disable the policies associated with your back-end instance and then enable them at a later time. Skip this step if you want to continue associating the Proxy Protocol policy with your back-end instance.

Use the `elb-set-lb-policies-for-backend-server` command to disable the Proxy Protocol policy by not specifying the Proxy Protocol policy name with the `--policy-names` option.

To disable the Proxy Protocol policy

1. Enter the command `elb-set-lb-policies-for-backend-server` to disable the Proxy Protocol policy.

   Note
   The `elb-set-lb-policies-for-backend-server` command replaces the current set of policies associated with your instance port. Every time you use this command to disable policies, use the `--policy-names` option to list the policy names you want to enable and omit the policy names you want to disable.

   If you do not have any other policies to enable for the `instance port 80`, use an empty string with `--policy-names` option as shown in the following example:

   ```
   elb-set-lb-policies-for-backend-server my-test-loadbalancer --instance-port
    80 --policy-names
   ```

   If you want to enable policies other than the Proxy Protocol policy for the `instance port 80`, use `--policy-names` option to list the other policies.

   ```
   elb-set-lb-policies-for-backend-server my-test-loadbalancer --instance-port
    80 --policy-names MyPolicyName2, MyPolicyName3
   ```

2. Elastic Load Balancing responds as in the following example.

   ```
   OK-Setting Policies
   ```

To verify that the Proxy Protocol policy is disabled

1. Enter `elb-describe-lbs` command to verify if the policy is disabled.

```
elb-describe-lbs my-test-loadbalancer --headers --show-long
```

2. Elastic Load Balancing responds as in the following example.

```
LOAD_BALANCER,NAME,DNS_NAME,CANONICAL_HOSTED_ZONE_NAME,CANONICAL_HOS
TED_ZONE_NAM
E_ID,HEALTH_CHECK,AVAILABILITY_ZONES,SUBNETS,VPC_ID,INSTANCE_ID,LISTEN
ER_DESCRIP
TIONS,BACKEND_SERVER_DESCRIPTIONS,OTHER_POLICIES,SOURCE_SECURITY_GROUP,SE
CURITY_
GROUPS,CREATED_TIME,SCHEME
LOAD_BALANCER,my-test-loadbalancer,my-test-loadbalancer-1086370712.us-east-
1.elb
.amazonaws.com,my-test-loadbalancer-1086370712.us-east-1.elb.amazon
aws.com,Z3DZX
E0Q79N41H,"{interval=30,target=HTTP:80/install.php,timeout=5,healthy-
threshold=1
0,unhealthy-threshold=2}",us-east-1e,(nil),(nil),"i-48bb5d38, i-78bc5a08,
i-98e2
04e8, i-ccbb5dbc","{protocol=HTTP,lb-port=80,instance-protocol=HTTP,instance-
por
t=80,policies=},{protocol=HTTPS,lb-port=443,instance-protocol=HTTP,instance-
port
=80,cert-id=arn:aws:iam::803981987763:server-certificate/scert,policies=AWSCon
so
le-SSLNegotiationPolicy-my-test-loadbalancer}",(nil),"AWSConsole-SSLNegoti
ationP
olicy-my-test-loadbalancer, EnableProxyProtocol","{owner-alias=amazon-
elb,group-
name=amazon-elb-sg}",(nil),2013-01-24T20:51:35.710Z,internet-facing
```

The **(nil)** in the `OTHER_POLICIES` field indicates that `EnableProxyProtocol` is not associated with any instance port.

Enable Proxy Protocol Using the Query API

To enable Proxy Protocol, you need to create a policy of the type `ProxyProtocolPolicyType` and then set the policy to the back-end instance port.

In this walkthrough, you will create a new policy `EnableProxyProtocol` of the type `ProxyProtocol-PolicyType` for a load balancer named `my-test-loadbalancer`, set the newly-created policy to the back-end instance on port `80`, and verify that the policy is enabled.

For information on making a query request, see Use Query Requests to Call Elastic Load Balancing APIs (p. 19)

To create a policy

1. Call the DescribeLoadBalancerPolicyTypes action to list all the policies supported by Elastic Load Balancing.

   Your request should look similar to the following example:

```
https://elasticloadbalancing.amazonaws.com/?Version=2012-06-01
&Action=DescribeLoadBalancerPolicyTypes
&AUTHPARAMS
```

2. The response includes the names and descriptions of the supported policy types. The following example is a partial response.

```
<DescribeLoadBalancerPolicyTypesResponse  xmlns="http://elasticloadbalanc
ing.amazonaws.com/doc/2012-06-01/">
<DescribeLoadBalancerPolicyTypesResult>
  <PolicyTypeName>SSLNegotiationPolicyType</PolicyTypeName>
       < . . . .>
   <PolicyTypeName>BackendServerAuthenticationPolicyType</PolicyTypeName>
      < . . . .>
   <PolicyTypeName>PublicKeyPolicyType</PolicyTypeName>
     < . . . .>
   <PolicyTypeName>AppCookieStickinessPolicyType</PolicyTypeName>
   < . . . .>
   <PolicyTypeName>LBCookieStickinessPolicyType</PolicyTypeName>
     < . . . .>
   <PolicyTypeName>ProxyProtocolPolicyType</PolicyTypeName>
     < . . . .>
</DescribeLoadBalancerPolicyTypesResult>
 <ResponseMetadata>
    <RequestId>94a1d9fd-e01b-11e2-bff8-276f19bc1b97</RequestId>
  </ResponseMetadata>
</ DescribeLoadBalancerPolicyTypesResponse >
```

Use `ProxyProtocolPolicyType` to create a new policy `EnableProxyProtocol`.

3. Call the CreateLoadBalancerPolicy action to create a new policy `EnableProxyProtocol` by specifying the following parameters:

   - *`Load Balancer name`* = `my-test-loadbalancer`
   - *`Policy name`* = `EnableProxyProtocol`
   - *`Policy type`* = `ProxyProtocolPolicyType`
   - *`PolicyAttributeName`* = `ProxyProtocol`
   - *`PolicyAttributeValue`* = `true`

   Your request should look similar to the following example:

```
https://elasticloadbalancing.amazonaws.com/?PolicyAttributes.member.1.Attrib
uteName=ProxyProtocol
&PolicyAttributes.member.1.AttributeValue=true
&PolicyTypeName=ProxyProtocolPolicyType
&LoadBalancerName=my-test-loadbalancer
&PolicyName=EnableProxyProtocol
&Version=2012-06-01
&Action=CreateLoadBalancerPolicy
&AUTHPARAMS
```

4. If your request was successful, you should get a confirmation like the following example:

```
<CreateLoadBalancerPolicyResponse xmlns="http://elasticloadbalancing.amazon
aws.com/doc/2012-06-01/">
  <CreateLoadBalancerPolicyResult/>
  <ResponseMetadata>
    <RequestId>2f5856c5-dddf-11e2-a79c-e97dcEXAMPLE</RequestId>
  </ResponseMetadata>
</CreateLoadBalancerPolicyResponse>
```

To enable the policy

1. Call the SetLoadBalancerPoliciesForBackendServer action with the following parameters:

   Note
   The `SetLoadBalancerPoliciesForBackendServer` action replaces the current set of policies associated with your instance port. Every time you use this action to enable the policies, use the `Policy Names` parameter to list all the policies you want to enable.

   - *`Load Balancer name`* = `my-test-loadbalancer`
   - *`Back-end instance port number`* = `80`
   - *`Policy names`* = `EnableProxyProtocol`

     `Policy names` = *`MyPolicyName2`*

     `Policy names` = *`MyPolicyName3`*

   Your request should look similar to the following example:

```
https://elasticloadbalancing.amazonaws.com/?InstancePort=80
&PolicyNames.member.1=EnableProxyProtocol
&PolicyNames.member.2=MyPolicyName2
&PolicyNames.member.3=MyPolicyName3
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
&Action=SetLoadBalancerPoliciesForBackendServer
&AUTHPARAMS
```

2. If your request was successful, you should get a confirmation like the following example:

```
<SetLoadBalancerPoliciesForBackendServerResponse xmlns="http://elasticload
balancing.amazonaws.com/doc/2012-06-01/">
  <SetLoadBalancerPoliciesForBackendServerResult/>
  <ResponseMetadata>
    <RequestId>0eb9b381-dde0-11e2-8d78-6ddbaEXAMPLE</RequestId>
  </ResponseMetadata>
</SetLoadBalancerPoliciesForBackendServerResponse>
```

To verify that Proxy Protocol policy is enabled

1. Call the DescribeLoadBalancers action with the following parameter:

   - *`Load Balancer name`* = `my-test-loadbalancer`

Your request should look similar to the following example:

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerNames.member.1=my-
test-loadbalancer
&Version=2012-06-01
&Action=DescribeLoadBalancers
&AUTHPARAMS
```

2. The response includes details about your load balancer. The information you get should be similar to the following example:

```
<DescribeLoadBalancersResponse xmlns="http://elasticloadbalancing.amazon
aws.com/doc/2012-06-01/">
  <DescribeLoadBalancersResult>
    <LoadBalancerDescriptions>
      <member>
        <SecurityGroups/>
        <CreatedTime>2013-01-24T20:51:35.710Z</CreatedTime>
        <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
        <HealthCheck>
          . . . .
        </HealthCheck>
        <ListenerDescriptions>
         . . . .
        </ListenerDescriptions>
        <Instances>
          . . . .
        </Instances>
        <Policies>
          <AppCookieStickinessPolicies/>
          <OtherPolicies>
          <member>AWSConsole-SSLNegotiationPolicy-my-test-loadbalancer</mem
ber>
            <member>EnableProxyProtocol</member>
          </OtherPolicies>
          <LBCookieStickinessPolicies/>
        </Policies>
          . . . .
          . . . .
        <BackendServerDescriptions>
          <member>
            <PolicyNames>
              <member>EnableProxyProtocol</member>
            </PolicyNames>
            <InstancePort>80</InstancePort>
          </member>
        </BackendServerDescriptions>
        <Subnets/>
      </member>
    </LoadBalancerDescriptions>
  </DescribeLoadBalancersResult>
  <ResponseMetadata>
    <RequestId>d0463294-e331-11e2-9776-c3fEXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancersResponse>
```

The descriptions in the `BackendServerDescriptions` field confirms that the policy is associated with the instance port.

Disable the Policy

At any time you can disable the policies associated with your backend instance and then enable them at a later time. Skip this step if you want to continue associating the Proxy Protocol policy with your back-end instance.

Use the `SetLoadBalancerPoliciesForBackendServer` action to disable the Proxy Protocol policy by not specifying the Proxy Protocol policy name with the `Policy Names` parameter.

Note
The `SetLoadBalancerPoliciesForBackendServer` action replaces the current set of policies associated with your instance port. Every time you use this action to disable policies, use the `Policy Names` parameter to list the policy names you want to enable and omit the policy names you want to disable.

To disable the Proxy Protocol policy

1. Call the SetLoadBalancerPoliciesForBackendServer action by specifying the following parameters. If you do not have any other policies to enable for the `instance port 80`, use an empty string with the `Policy Names` parameter.

   - *`Load Balancer name`* = `my-test-loadbalancer`
   - *`Back-end instance port number`* = `80`
   - *`Policy Names`* =

   Your request should look similar to the following example:

```
https://elasticloadbalancing.amazonaws.com/?InstancePort=80
&PolicyNames=
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
&Action=SetLoadBalancerPoliciesForBackendServer
&AUTHPARAMS
```

   If you want to enable policies other than the Proxy Protocol policy for the `instance port 80`, list those policies using the `Policy Names` parameter, as in the following example:

   - *`Load Balancer name`* = `my-test-loadbalancer`
   - *`Back-end instance port number`* = `80`
   - *`Policy names`* = *`MyPolicyName2`*

     `Policy names` = *`MyPolicyName3`*

   Your request should look similar to the following example:

```
https://elasticloadbalancing.amazonaws.com/?InstancePort=80
&PolicyNames.member.1=MyPolicyName2
&PolicyNames.member.2=MyPolicyName3
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
&Action=SetLoadBalancerPoliciesForBackendServer
&AUTHPARAMS
```

2. If your request was successful, you should get a confirmation like the following example:

```
<SetLoadBalancerPoliciesForBackendServerResponse xmlns="http://elasticload
balancing.amazonaws.com/doc/2012-06-01/">
  <SetLoadBalancerPoliciesForBackendServerResult/>
  <ResponseMetadata>
    <RequestId>0eb9b381-dde0-11e2-8d78-6ddbaEXAMPLE</RequestId>
  </ResponseMetadata>
</SetLoadBalancerPoliciesForBackendServerResponse>
```

To verify that the Proxy Protocol policy is disabled

1. Call the DescribeLoadBalancers action with the following parameter:

   - `Load Balancer name` = `my-test-loadbalancer`

   Your request should look similar to the following example:

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerNames.member.1=my-
test-loadbalancer
&Version=2012-06-01
&Action=DescribeLoadBalancers
&AUTHPARAMS
```

2. The response includes details about the load balancer. The information you get should be similar to the following example:

```
<DescribeLoadBalancersResponse xmlns="http://elasticloadbalancing.amazon
aws.com/doc/2012-06-01/">
  <DescribeLoadBalancersResult>
    <LoadBalancerDescriptions>
      <member>
        <SecurityGroups/>
        <CreatedTime>2013-01-24T20:51:35.710Z</CreatedTime>
        <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
        <HealthCheck>
          . . . .
        </HealthCheck>
        <ListenerDescriptions>
         . . . .
        </ListenerDescriptions>
        <Instances>
          . . . .
        </Instances>
        <Policies>
          <AppCookieStickinessPolicies/>
          <OtherPolicies>
          <member>AWSConsole-SSLNegotiationPolicy-my-test-loadbalancer</mem
ber>
            <member>EnableProxyProtocol</member>
          </OtherPolicies>
          <LBCookieStickinessPolicies/>
        </Policies>
```

```
          . . . .
          . . . .
        <BackendServerDescriptions/>
        <Subnets/>
      </member>
    </LoadBalancerDescriptions>
  </DescribeLoadBalancersResult>
  <ResponseMetadata>
    <RequestId>d0463294-e331-11e2-9776-c3fEXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancersResponse>
```

The empty `BackendServerDescriptions` field confirms that the instance port is not associated with any policy.

Configure DNS Failover for Your Load Balancer

You can provide high availability and redundancy for your applications running behind Elastic Load Balancing by enabling Amazon Route 53 Domain Name System (DNS) failover for your load balancers. Amazon Route 53 is a DNS service that provides reliable routing to your infrastructure. When DNS failover is enabled, Route 53 uses a health-checking feature to determine the availability of the applications running behind the load balancers. If there are no healthy EC2 instances registered with the load balancer or if the load balancer itself is unhealthy, Route 53 will route traffic away from the unhealthy load balancer, and to the other available healthy load balancers.

For information on Amazon Route 53, see What is Route 53 and How Does it Work?.

We will use an example to illustrate how Route 53 DNS failover works with your load balancers. Suppose you have a web application for www.example.com, and you want to have redundant applications running behind two load balancers residing in two different regions, US East (Northern Virginia) Region and US West (Oregon) Region. You want the traffic for www.example.com to be primarily routed to the load balancer in US East, and use the load balancer in US West as a backup during failures. In this example, if you use Route 53 DNS failover, you can specify how you want the DNS service to route queries to your domain name, www.example.com. When you enable DNS failover, you must specify your primary and your secondary (backup) load balancers. Enabling the failover routing mechanism tells Route 53 to direct traffic to a primary load balancer, if available, or otherwise reroute the traffic to a secondary load balancer.

To configure DNS failover, you will need to associate your domain name, www.example.com, with your load balancers. Each load balancer has an automatically generated DNS name, such as myLB-1234567890.us-east-1.elb.amazonaws.com. Using Route 53, you will create records for your domain name, www.example.com, pointing to the load balancer DNS name, myLB-1234567890.us-east-1.elb.amazonaws.com.

In this section we walk you through the process of enabling Amazon Route 53 DNS failover for your load balancers running in two different regions.

Prerequisites

Before you can enable DNS failover for your load balancers, you first need to create your load balancers. Be sure to create a primary and a secondary load balancer, preferably in two separate regions. For information on creating a basic load balancer, see Get Started with Elastic Load Balancing (p. 21).

If you do not already have a custom domain name, register your domain name with your DNS provider. For a list of registrar websites you can use to register your domain name, go to ICANN.org. Wait for your registrar to notify you that your domain name is successfully registered.

Use the Console to Configure DNS Failover for Your Load Balancers

The following steps outline how to configure DNS failover for your load balancers using the Route 53 console.

1. Create a hosted zone for your custom domain name.
2. Update the DNS Name Server Records to Point to Route 53 Name Servers.
3. Create alias record sets for your primary and secondary load balancers.

Create an Amazon Route 53 Hosted Zone for Your Custom Domain Name

The hosted zone contains information about your domain name, including the subdomain names and mappings.

Follow the instructions in Creating a Hosted Zone in the *Amazon Route 53 Developer Guide* to create a hosted zone for your custom domain name, www.example.com.

As with other AWS products, there are no contracts or minimum commitments for using Amazon Route 53—you pay only for the hosted zones that you configure and the number of queries that Route 53 answers. For more information, see Route 53 Pricing.

Update the DNS Name Server Records to Point to Route 53 Name Servers

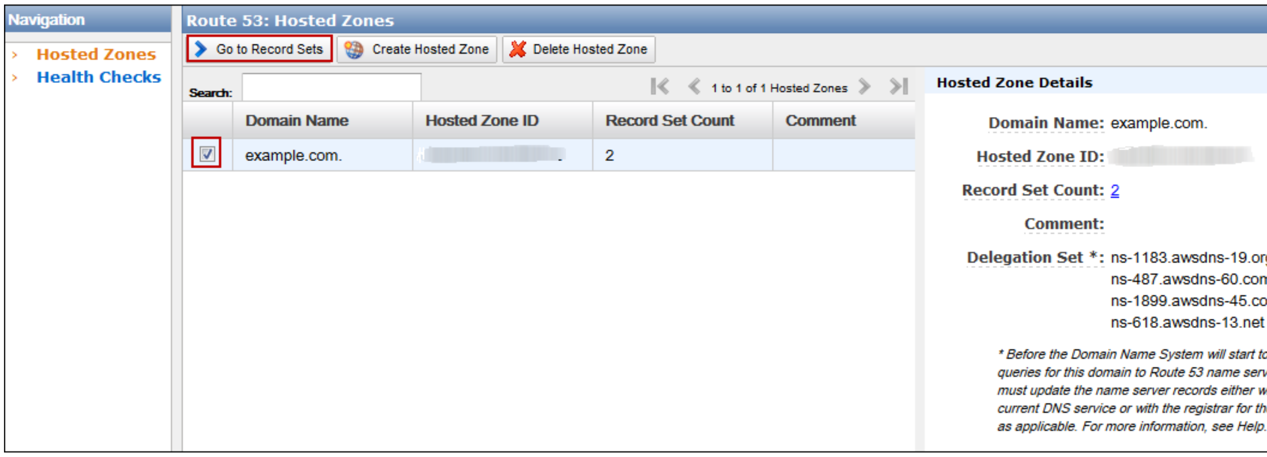
For each hosted zone you create, Route 53 automatically creates four name server (NS) records. Before the DNS will start to route queries for your domain to Route 53 name servers, you must update your registrar's or your DNS service's name server records, to point to the Route 53 name servers.

1. Follow the instructions in Getting the Name Servers for a Hosted Zone to get the name servers assigned to your hosted zone.
2. Follow the instructions in Name Server (NS) Records to update your registrar's or your DNS service's name server records to point to the Route 53 assigned name servers.

Create Alias Resource Records Sets and Enable DNS Failover

After you have created a hosted zone for your domain, you need to create primary and secondary alias resource record sets to tell the DNS how you want traffic to be routed for your domain.

1. Open the Amazon Route 53 console at https://console.aws.amazon.com/route53/.
2. Click the row of your hosted zone, and click **Go to Record Sets**.



Domain Name	Hosted Zone ID	Record Set Count	Comment
example.com.	[redacted]	2	

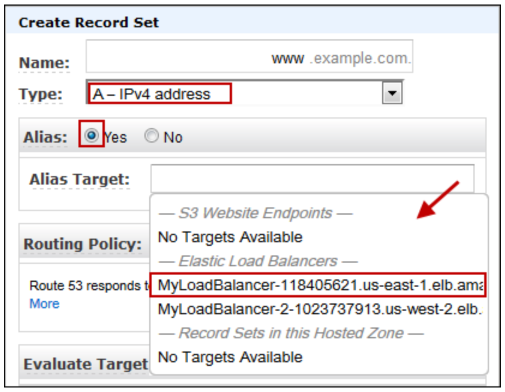
Hosted Zone Details

Domain Name: example.com.
Hosted Zone ID: [redacted]
Record Set Count: 2
Comment:
Delegation Set *: ns-1183.awsdns-19.or
ns-487.awsdns-60.com
ns-1899.awsdns-45.co
ns-618.awsdns-13.net

** Before the Domain Name System will start to*
queries for this domain to Route 53 name serv
must update the name server records either w
current DNS service or with the registrar for th
as applicable. For more information, see Help.

3. Click **Create Record Set**.
4. In the **Name** box, type the domain name for this record set, or use the default value.
5. In the **Type** box, select **A - Ipv4 address**.
6. For **Alias**, click **Yes**

7. Click the **Alias Target** field, and choose your primary load balancer from the list.



Create Record Set

Name: www .example.com.

Type: A – IPv4 address

Alias: [✓ Yes] No

Alias Target:

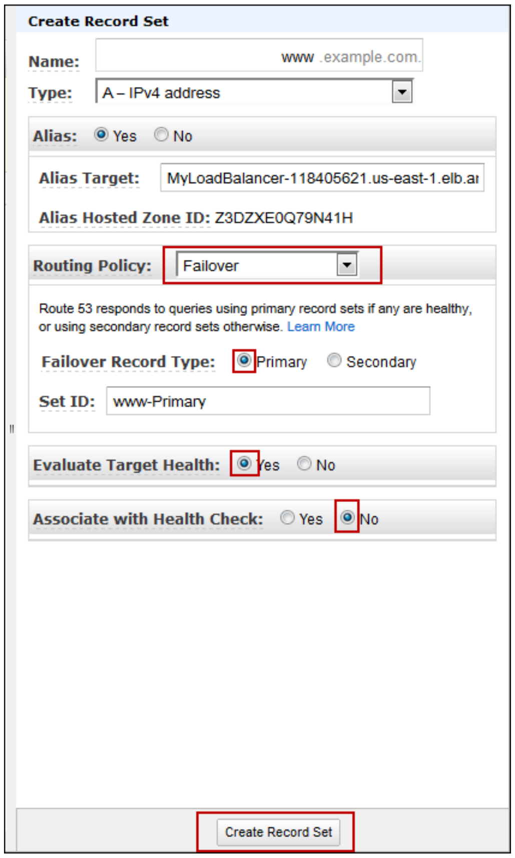
— S3 Website Endpoints —
No Targets Available
— Elastic Load Balancers —
MyLoadBalancer-118405621.us-east-1.elb.ama
MyLoadBalancer-2-1023737913.us-west-2.elb.
— Record Sets in this Hosted Zone —
No Targets Available

Routing Policy:

Route 53 responds t
More

Evaluate Target

8. The value of **Alias Hosted Zone ID** appears automatically based on the value that you selected or entered for **Alias Target**.
9. In the **Routing Policy:** drop-down box, select **Failover**.
10. For **Failover Record Type:**, select **Primary**.
11. For **Set ID:** enter an ID for the record set or use the default value.
12. For **Evaluate Target Health**, select **Yes**.
13. For **Associate with Health Check**, select **No**.
14. Click **Create Record Set**.



Create Record Set

Name: www .example.com.

Type: A – IPv4 address

Alias: [✓ Yes] No

Alias Target: MyLoadBalancer-118405621.us-east-1.elb.ar

Alias Hosted Zone ID: Z3DZXE0Q79N41H

Routing Policy: Failover

Route 53 responds to queries using primary record sets if any are healthy, or using secondary record sets otherwise. Learn More

Failover Record Type: [✓ Primary] Secondary

Set ID: www-Primary

Evaluate Target Health: [✓ Yes] No

Associate with Health Check: Yes [✓ No]

15. Follow the same steps to create another alias record set for your secondary load balancer, with the following exceptions:

    - In the **Alias Target** field, choose your secondary load balancer from the list.
    - For **Failover Record Type:**, select **Secondary**.
    - For **Evaluate Target Health**, select **Yes** if you want Route 53 to evaluate the health of the secondary load balancer. If the secondary load balancer is unhealthy, Route 53 will route back to the primary load balancer. If **Evaluate Target Health** is set to **No**, Route 53 will assume that the secondary load balancer is healthy and route traffic to the secondary load balancer whenever the primary load balancer is unhealthy.

For information on how to set up advanced DNS failover configurations, see Managing Resource Availability with Route 53 DNS Failover in the *Amazon Route 53 Developer Guide*.

Sticky Sessions

By default, a load balancer routes each request independently to the application instance with the smallest load. However, you can use the sticky session feature (also known as session affinity) which enables the load balancer to bind a user's session to a specific application instance. This ensures that all requests coming from the user during the session will be sent to the same application instance.

You can use sticky sessions for only HTTP/HTTPS load balancer listeners.

The key to managing the sticky session is determining how long should your load balancer consistently route the user's request to the same application instance. If your application has its own session cookie, then you can set Elastic Load Balancing to create the session cookie to follow the duration specified by the application's session cookie. If your application does not have its own session cookie, then you can set Elastic Load Balancing to create a session cookie by specifying your own stickiness duration.

Topics

Duration-Based Session Stickiness

The load balancer uses a special load-balancer-generated cookie to track the application instance for each request. When the load balancer receives a request, it first checks to see if this cookie is present in the request. If so, the request is sent to the application instance specified in the cookie. If there is no cookie, the load balancer chooses an application instance based on the existing load balancing algorithm. A cookie is inserted into the response for binding subsequent requests from the same user to that application instance. The stickiness policy configuration defines a cookie expiration, which establishes the duration of validity for each cookie. The cookie is automatically updated after its duration expires.

If an application instance fails or becomes unhealthy, the load balancer stops routing request to that instance, instead chooses a new instance based on the existing load balancing algorithm. The request is routed to the new instance as if there is no cookie and the session is no longer sticky.

In this example, you create a stickiness policy and then use it to enable sticky sessions for a load balancer that has load balancer-generated HTTP cookies. Before you get started, make sure you have a HTTP/HTTPS load balancer. For information on how to set up a HTTPS/SSL load balancer with the AWS Management Console, command line interface (CLI), or Query API, see Create a HTTPS/SSL Load Balancer (p. 71). For information on how to set up a HTTP load balancer using the AWS Management Console, see Get Started with Elastic Load Balancing (p. 21).

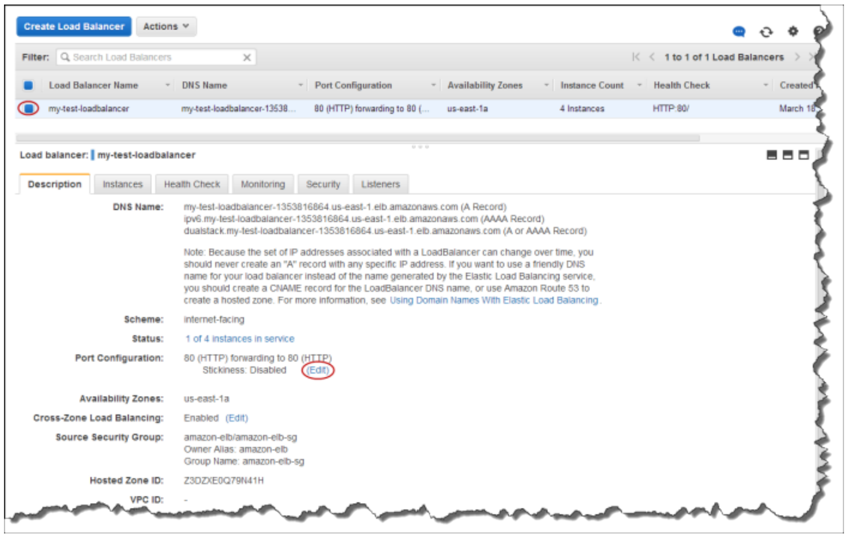
The following sections walk you through the steps for enabling duration-based sticky sessions for your load balancer using the AWS Management Console, the Elastic Load Balancing Command Line Interface (ELB CLI), or the Query API.

Topics

Using the AWS Management Console

To enable duration-based sticky sessions for a load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click **(edit)** in the **Port Configuration:** row.

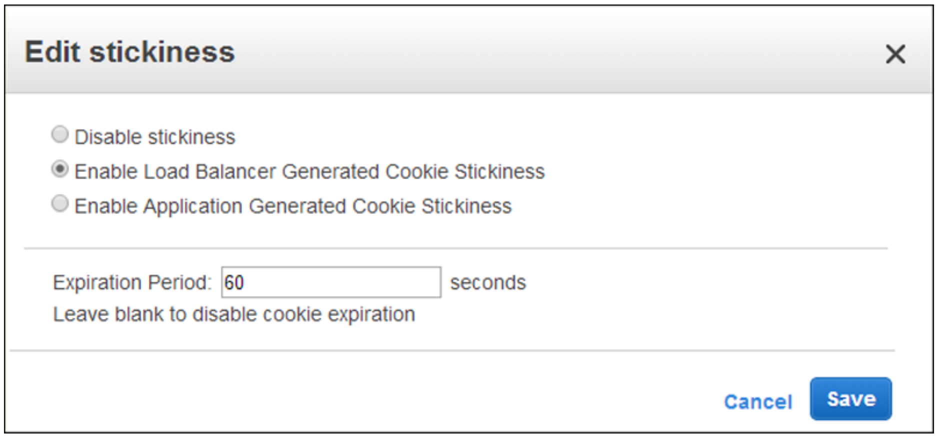


Load Balancer Name	DNS Name	Port Configuration	Availability Zones	Instance Count	Health Check	Created
my-test-loadbalancer	my-test-loadbalancer-13538...	80 (HTTP) forwarding to 80 (...	us-east-1a	4 Instances	HTTP:80/	March 18

Load balancer: my-test-loadbalancer

DNS Name:	my-test-loadbalancer-1353816864.us-east-1.elb.amazonaws.com (A Record) ipv6.my-test-loadbalancer-1353816864.us-east-1.elb.amazonaws.com (AAAA Record) dualstack.my-test-loadbalancer-1353816864.us-east-1.elb.amazonaws.com (A or AAAA Record) Note: Because the set of IP addresses associated with a LoadBalancer can change over time, you should never create an "A" record with any specific IP address. If you want to use a friendly DNS name for your load balancer instead of the name generated by the Elastic Load Balancing service, you should create a CNAME record for the LoadBalancer DNS name, or use Amazon Route 53 to create a hosted zone. For more information, see Using Domain Names With Elastic Load Balancing.
Scheme:	internet-facing
Status:	1 of 4 instances in service
Port Configuration:	80 (HTTP) forwarding to 80 (HTTP) Stickiness: Disabled (Edit)
Availability Zones:	us-east-1a
Cross-Zone Load Balancing:	Enabled (Edit)
Source Security Group:	amazon-elb/amazon-elb-sg Owner Alias: amazon-elb Group Name: amazon-elb-sg
Hosted Zone ID:	Z3DZXE0Q79N41H
VPC ID:	-

6. On the **Edit Stickiness** page, click **Enable Load Balancer Generated Cookie Stickiness**.
7. In the **Expiration Period** box, enter the cookie expiration period. This example creates a cookie stickiness policy with a cookie expiration period of 60 seconds.



Edit stickiness

○ Disable stickiness
● Enable Load Balancer Generated Cookie Stickiness
○ Enable Application Generated Cookie Stickiness

Expiration Period: 60 seconds
Leave blank to disable cookie expiration

8. Click **Save**. The **Port Configuration**row in the **Description** pane shows that the stickiness policy enabled for the load balancer.

Using the Command Line Interface

Before you get started, make sure you have installed the latest version of the Elastic Load Balancing CLI. To install the latest CLI, see Elastic Load Balancing API Tools.

To enable duration-based sticky sessions for a load balancer

1. Enter the `elb-create-lb-cookie-stickiness-policy` command to create a load-balancer-generated cookie stickiness policy with a cookie expiration period of 60 seconds. Use the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - Policy name = *`MyLoadBalancerPolicy`*
   - Cookie expiration period = `60`

   Your command should look like the following example:

   ```
   elb-create-lb-cookie-stickiness-policy  my-test-loadbalancer --policy-name
     MyLoadBalancerPolicy --expiration-period 60
   ```

   Elastic Load Balancing responds as in the following example:

   ```
   OK-Creating LB Stickiness Policy
   ```

2. Enter the `elb-set-lb-policies-of-listener` command to enable session stickiness for a load balancer using the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - Load balancer port = `80`
   - Policy name = *`MyLoadBalancerPolicy`*

   Your command should look like the following example:

   ```
   elb-set-lb-policies-of-listener my-test-loadbalancer --lb-port 80 --policy-
   names MyLoadBalancerPolicy
   ```

   Elastic Load Balancing responds as in the following example:

   ```
   OK-Setting Policies
   ```

Using the Query API

To enable duration-based sticky sessions for a load balancer

1. Use the CreateLBCookieStickinessPolicy action with the following parameters to create a load-balancer-generated cookie stickiness policy with a cookie expiration period of 60 seconds.

   - *`LoadBalancerName`* = *`my-test-loadbalancer`*
   - *`PolicyName`* = *`MyLoadBalancerPolicy`*
   - *`CookieExpirationPeriod`* = `60`

2. Use the SetLoadBalancerPoliciesOfListener action with the following parameters to enable session stickiness for a load balancer using the *`MyLoadBalancerPolicy`* policy.

   - *`LoadBalancerName`* = *`my-test-loadbalancer`*
   - *`LoadBalancerPort`* = `80`
   - *`PolicyNames`* = *`MyLoadBalancerPolicy`*

Application-Controlled Session Stickiness

The load balancer uses a special cookie to associate the session with the original server that handled the request, but follows the lifetime of the application-generated cookie corresponding to the cookie name specified in the policy configuration. The load balancer only inserts a new stickiness cookie if the application response includes a new application cookie. The load balancer stickiness cookie does not update with each request. If the application cookie is explicitly removed or expires, the session stops being sticky until a new application cookie is issued.

If an application instance fails or becomes unhealthy, the load balancer stops routing request to that instance, instead chooses a new healthy application instance based on the existing load balancing algorithm. The load balancer will treat the session as now "stuck" to the new healthy instance and continue routing requests to that instance even if the failed application instance comes back. However, it is up to the new application instance whether and how to respond to a session which it has not previously seen.

In this example, you configure a load balancer for session stickiness when the life of the session follows that of an application-generated cookie. Before you get started, make sure you have a HTTP/HTTPS load balancer. For information on how to set up a HTTPS/SSL load balancer with the AWS Management Console, command line interface (CLI), or Query API, see Create a HTTPS/SSL Load Balancer (p. 71). For information on how to set up a HTTP load balancer using the AWS Management Console, see Get Started with Elastic Load Balancing (p. 21).

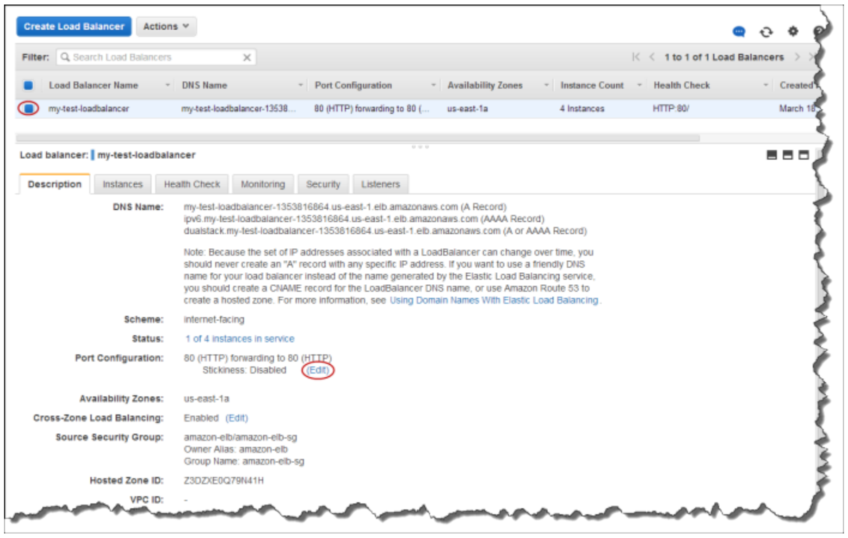
The following sections walk you through the steps for enabling application-controlled sticky sessions for your load balancer using the AWS Management Console, the Command Line Interface (CLI), or the Query API.

Topics

Using the AWS Management Console

To Enable Application-Controlled Session Stickiness

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select your load balancer.
4. The bottom pane displays the details of your load balancer.
5. Click **(edit)** in the **Port Configuration:** row.



Load Balancer Name	DNS Name	Port Configuration	Availability Zones	Instance Count	Health Check	Created
my-test-loadbalancer	my-test-loadbalancer-13538...	80 (HTTP) forwarding to 80 (...	us-east-1a	4 Instances	HTTP:80/	March 18

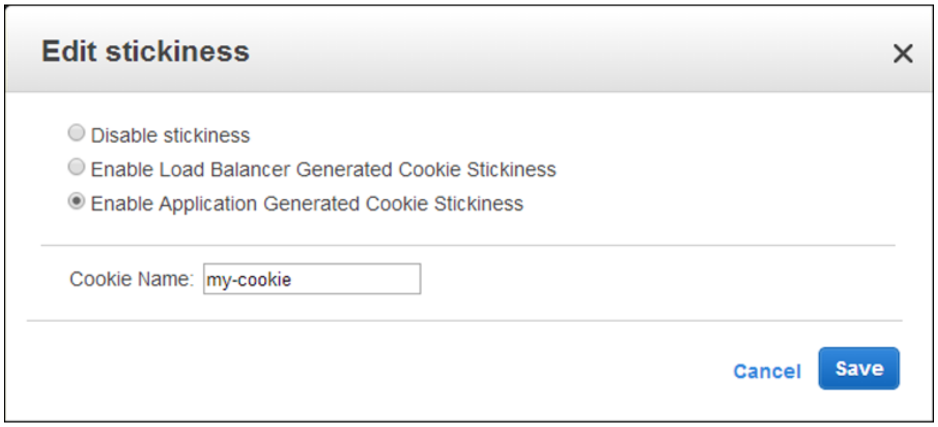
Load balancer: my-test-loadbalancer

DNS Name: my-test-loadbalancer-1353816864.us-east-1.elb.amazonaws.com (A Record)
ipv6.my-test-loadbalancer-1353816864.us-east-1.elb.amazonaws.com (AAAA Record)
dualstack.my-test-loadbalancer-1353816864.us-east-1.elb.amazonaws.com (A or AAAA Record)

Note: Because the set of IP addresses associated with a LoadBalancer can change over time, you should never create an "A" record with any specific IP address. If you want to use a friendly DNS name for your load balancer instead of the name generated by the Elastic Load Balancing service, you should create a CNAME record for the LoadBalancer DNS name, or use Amazon Route 53 to create a hosted zone. For more information, see Using Domain Names With Elastic Load Balancing.

Scheme: internet-facing
Status: 1 of 4 instances in service
Port Configuration: 80 (HTTP) forwarding to 80 (HTTP)
Stickiness: Disabled (Edit)
Availability Zones: us-east-1a
Cross-Zone Load Balancing: Enabled (Edit)
Source Security Group: amazon-elb/amazon-elb-sg
Owner Alias: amazon-elb
Group Name: amazon-elb-sg
Hosted Zone ID: Z3DZXE0Q79N41H
VPC ID: -

6. On the **Edit Stickiness** page, click **Enable Application Generated Cookie Stickiness**.
7. In the **Cookie Name** box, enter the name for your cookie, for example `my-cookie`.
8. Click **Save**.


Edit stickiness

- Disable stickiness
- Enable Load Balancer Generated Cookie Stickiness
- [✓ Enable Application Generated Cookie Stickiness]

Cookie Name: my-cookie

9. The **Port Configuration**row in the **Description** pane shows the newly created cookie stickiness policy.

Using the Command Line Interface

Before you get started, make sure you have installed the latest version of the Elastic Load Balancing CLI. To install the latest CLI, see Elastic Load Balancing API Tools.

To Enable Application-Controlled Session Stickiness

1. Enter the `elb-create-app-cookie-stickiness-policy` command to create an application-generated cookie stickiness policy. Use the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - Policy name = *`my-app-cookie-lb-policy`*
   - Cookie name = *`my-cookie`*

Your command should look like the following example:

```
elb-create-app-cookie-stickiness-policy  my-test-loadbalancer --policy-name
  my-app-cookie-lb-policy --cookie-name my-cookie
```

Elastic Load Balancing responds as in the following example:

```
OK-Creating App Stickiness Policy
```

2. Enter the `elb-set-lb-policies-of-listener` command to enable session stickiness for a load balancer using the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - Load balancer port = `80`
   - Policy name = *`my-app-cookie-lb-policy`*

   Your command should look like the following example:

```
elb-set-lb-policies-of-listener my-test-loadbalancer --lb-port 80 --policy-
names my-app-cookie-lb-policy
```

   Elastic Load Balancing responds as in the following example:

```
OK-Setting Policies
```

Using the Query API

To Enable Application-Controlled Session Stickiness

1. Use the CreateAppCookieStickinessPolicy action with the following parameters to create an application-generated cookie stickiness policy.

   - *`LoadBalancerName`* = *`my-test-loadbalancer`*
   - *`PolicyName`* = *`my-app-cookie-lb-policy`*
   - *`CookieName`* = *`my-cookie`*

2. Use the SetLoadBalancerPoliciesOfListener action with the following parameters to enable session stickiness.

   - *`LoadBalancerName`* = *`my-test-loadbalancer`*
   - *`LoadBalancerPort`* = `80`
   - *`PolicyNames`* = *`my-app-cookie-lb-policy`*

Add or Remove Tags

You can add or remove tags from your load balancer at any time. Tags help you to categorize your load balancers in different ways, for example, by purpose, owner, or environment. For more information, see Tagging (p. 11).

This section walks you through the process for adding or removing tags from your load balancer.

Topics

Add Tags

You can add one or more tags to each load balancer. A load balancer can have a maximum of 10 user-created tags. Tag keys must be unique for each load balancer. If you add a tag with a key that is already associated with the load balancer, this action will update the value of that key.

You can add tags to your load balancer using the AWS Management Console, the AWS command line interface (AWS CLI) command, or the Query API.

- Using the AWS Management Console (p. 192)
- Using the Query API (p. 193)
- Using the AWS Command Line Interface (p. 192)

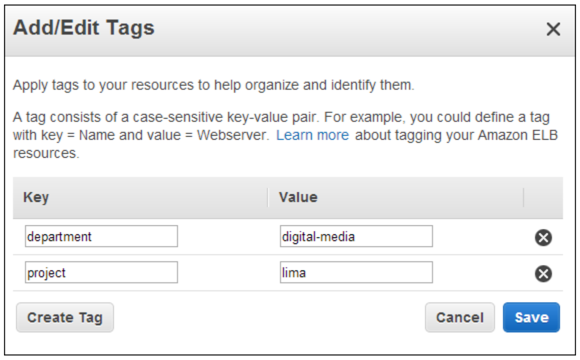
Important: Elastic Load Balancing CLI has been replaced by AWS Command Line Interface (AWS CLI), a unified tool to manage multiple AWS services. New features released after ELB CLI version 1.0.35.0 (dated 7/24/14) will be included in the AWS CLI only. We recommend that you start using the AWS CLI.
For a list of the functionality supported in previous ELB CLI versions, see Elastic Load Balancing API Tools.

Using the AWS Management Console

This section walks you through the process of adding tags to your load balancer by using the AWS Management Console.

To add tags

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the load balancer page, select your load balancer.
5. The bottom pane displays the details of your load balancer. Click the **Tags** tab.
6. The **Tags** pane displays the tags currently assigned to your load balancer. Click **Add/Edit Tags**.
7. In the **Add/Edit Tags** dialog box, click **Create Tag** and specify a key and a value for each tag.



Add/Edit Tags

Apply tags to your resources to help organize and identify them.

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. Learn more about tagging your Amazon ELB resources.

Key	Value
department	digital-media
project	lima

8. After you are done adding all the tags, click **Save**.

Using the AWS Command Line Interface

Before you get started make sure that you have installed and configured your AWS CLI environment. For more information, see Getting Set Up with the AWS Command Line Interface.

To add tags

1. Enter the `add-tags` command using the following options:

   - `load-balancer-name` = *`my-test-loadbalancer`*
   - `tags`
     - `Key` = *`project`*
     - `Value` = *`lima`*

   Your command should look like the following example:

```
aws elb add-tags --load-balancer-name my-test-loadbalancer --tag
Key=project,Value=lima
```

   Note
   Multiple tags must be specified in the following format separated by a space:

```
--tags “Key=key1,Value=value1” “Key=key2,Value=value2”
```

2. Enter the `describe-tags` command using the following option to verify that the new tags are set for your load balancer.

   - `load-balancer-name` = *`my-test-loadbalancer`*

   Your command should look like the following example:

   ```
   aws elb describe-tags  --load-balancer-name  my-test-loadbalancer
   ```

   Elastic Load Balancing responds as in the following example:

   ```
   {
       "TagDescriptions": [
           {
               "Tags": [
                   {
                       "Value": "lima",
                       "Key": "project"
                   },
                   {
                       "Value": "digital-media",
                       "Key": "department"
                   }
               ],
               "LoadBalancerName": "my-test-loadbalancer"
           }
       ]
   }
   ```

Using the Query API

This section walks you through the process of adding tags to your load balancer by using the Query API.

To add tags

1. Use the AddTags action with the following parameters:

   - `LoadBalancerName` = *`my-test-loadbalancer`*
   - `Tags`
     - `Tags.member.1.Key` = *`project`*
     - `Tags.member.1.Value` = *`lima`*

   Your request should look like the following example:

   ```
   https://elasticloadbalancing.amazonaws.com/?Tags.member.1.Key=project
   &Action=AddTags
   &LoadBalancerNames.member.1=my-test-loadbalancer
   &Tags.member.1.Value=lima
   &Version=2012-06-01
   &AUTHPARAMS
   ```

If your request is successful, you should get a response similar to the following example:

```
<AddTagsResponse xmlns="http://elasticloadbalancing.amazonaws.com/doc/2012-
06-01/">
  <AddTagsResult/>
  <ResponseMetadata>
    <RequestId>360e81f7-1100-11e4-b6ed-0f30EXAMPLE</RequestId>
  </ResponseMetadata>
</AddTagsResponse>
```

2. Use the DescribeTags action using the following parameter to verify that the new tags are set for your load balancer.

   - `LoadBalancerName` = *`my-test-loadbalancer`*

   Your request should look like the following example:

```
https://elasticloadbalancing.amazonaws.com/?Action=DescribeTags
&LoadBalancerNames.member.1=my-test-loadbalancer
&Version=2012-06-01
&AUTHPARAMS
```

   If your request is successful, you should get a response similar to the following example:

```
<DescribeTagsResponse xmlns="http://elasticloadbalancing.amazon
aws.com/doc/2012-06-01/">
  <DescribeTagsResult>
    <TagDescriptions>
      <member>
        <Tags>
            <Value>lima</Value>
            <Key>project</Key>
          </member>
          <member>
            <Value>digital-media</Value>
            <Key>department</Key>
          </member>
        </Tags>
        <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
      </member>
    </TagDescriptions>
  </DescribeTagsResult>
  <ResponseMetadata>
    <RequestId>4a04b664-106d-11e4-bdd7-db8fEXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeTagsResponse>
```

Remove Tags

You can remove tags set for your load balancer at any time using the AWS Management Console, the AWS Command Line Interface (AWS CLI) command, or the Query API.

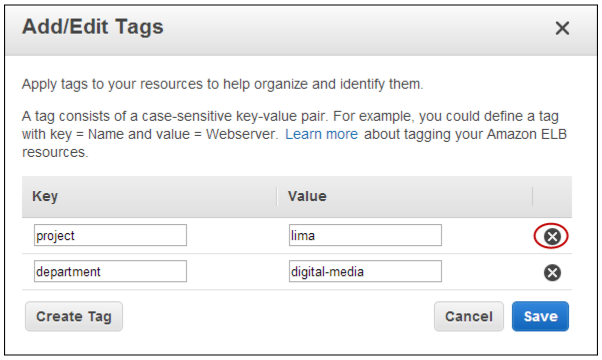
Topics

Using the AWS Management Console

This section walks you through the process of adding tags to your load balancer by using the AWS Management Console.

To remove tags

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the load balancer page, select your load balancer.
5. The bottom pane displays the details of your load balancer. Click the **Tags** tab.
6. The **Tags** pane displays the tags currently assigned to your load balancer. Click **Add/Edit Tags**.
7. In the **Add/Edit Tags** dialog box, click the remove icon of the tag you want to remove.


Add/Edit Tags

Apply tags to your resources to help organize and identify them.

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. Learn more about tagging your Amazon ELB resources.

Key	Value
project	lima
department	digital-media

8. After you are done removing the tags, click **Save**.

Using the AWS Command Line Interface

Before you get started make sure that you have installed and configured your AWS CLI environment. For more information, see Getting Set Up with the AWS Command Line Interface.

To remove tags

1. Enter the `remove-tags` command using the following options:

   - `load-balancer-name` = *`my-test-loadbalancer`*
   - `tag` = *`project`*

   Note
   This command takes only the name of the key to be removed. You need not mention the key value.

   Your command should look like the following example:

```
aws elb remove-tags  --load-balancer-name  my-test-loadbalancer --tag project
```

2. Enter the `describe-tags` command using the following option to verify that the tag is removed.

   - `load-balancer-name` = *`my-test-loadbalancer`*

   Your command should look like the following example:

```
aws elb describe-tags  --load-balancer-name  my-test-loadbalancer
```

   Elastic Load Balancing responds as in the following example:

```
{
    "TagDescriptions": [
        {
            "Tags": [
                {
                    "Value": "digital-media",
                    "Key": "department"
                }
            ],
            "LoadBalancerName": "my-test-loadbalancer"
        }
    ]
}
```

Using the Query API

This section walks you through the process of removing tags from your load balancer by using the Query API.

To remove tags

1. Use the RemoveTags using the following options:

   - `LoadBalancerName` = *`my-test-loadbalancer`*
   - `Tags.member.1.Key` = *`project`*

   Note
   This action takes only the name of the key to be removed. You need not mention the key value.

   Your request should look like the following example:

```
https://elasticloadbalancing.amazonaws.com/?Tags.member.1.Key=project
&LoadBalancerNames.member.1=my-test-loadbalancer
&Action=RemoveTags
&Version=2012-06-01
&AUTHPARAMS
```

   If your request is successful, you should get a response similar to the following example:

```
<RemoveTagsResponse xmlns="http://elasticloadbalancing.amazonaws.com/doc/2012-
06-01/">
  <RemoveTagsResult/>
  <ResponseMetadata>
    <RequestId>8104fcb9-10ff-11e4-bdd7-db8f2EXAMPLE</RequestId>
  </ResponseMetadata>
</RemoveTagsResponse>
```

2. Use the DescribeTags action using the following parameter to verify that the tag is removed.

   - `LoadBalancerName` = *`my-test-loadbalancer`*

   Your request should look like the following example:

```
https://elasticloadbalancing.amazonaws.com/?Action=DescribeTags
&LoadBalancerNames.member.1=my-test-loadbalancer
&Version=2012-06-01
&AUTHPARAMS
```

   If your request is successful, you should get a response similar to the following example:

```
<DescribeTagsResponse xmlns="http://elasticloadbalancing.amazon
aws.com/doc/2012-06-01/">
  <DescribeTagsResult>
    <TagDescriptions>
      <member>
        <Tags>
          <member>
            <Value>digital-media</Value>
            <Key>department</Key>
          </member>
        </Tags>
        <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
      </member>
    </TagDescriptions>
  </DescribeTagsResult>
  <ResponseMetadata>
    <RequestId>ef9ed23b-1101-11e4-b327-ab5aaEXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeTagsResponse>
```

Delete Your Load Balancer

In this example, you stop using Elastic Load Balancing on a currently load balanced EC2 fleet. You delete the load balancer, which automatically deregisters the associated instances from the load balancer. As soon as the load balancer is deleted, you stop incurring charges for that load balancer.

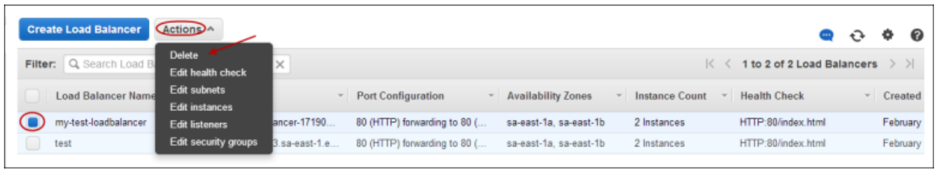
Note
Even after you delete the load balancer and the associated EC2 instances are deregistered, the EC2 instances continue to run. You will continue to incur charges on the Amazon EC2 instances while they are running. For information on stopping your EC2 instances, go to Stopping and Starting Instances in the *Amazon EC2 User Guide*. For information on terminating your EC2 instances, go to Terminate Your Instance.

The following sections include instructions for deleting your load balancer using the AWS Management Console, the Query API, or the command line interface (CLI). If you plan on using either the Query API or the CLI, be sure that you've installed the tools. For information on installing the CLI or the Query API, see Setting Up Elastic Load Balancing Interfaces (p. 16).

Using the AWS Management Console

To delete your load balancer

1. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
2. On the **Load Balancers** page, select the check box next to the load balancer you want to delete, and then click **Delete**.



Load Balancer Name		Port Configuration	Availability Zones	Instance Count	Health Check	Created
my-test-loadbalancer	ancer-17190...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February
test	3.sa-east-1.e...	80 (HTTP) forwarding to 80 (...	sa-east-1a, sa-east-1b	2 Instances	HTTP:80/index.html	February

3. In the **Delete Load Balancer** windows, click **Yes, Delete**.

Using the Query API

To delete a load balancer

- Call `DeleteLoadBalancer` with *`LoadBalancerName`* = `my-test-loadbalancer`.

The operation returns an empty response.

Using the Command Line Interface

To delete a load balancer

- Use the `elb-delete-lb` command as in the following example.

```
PROMPT>  elb-delete-lb  my-test-loadbalancer
```

Elastic Load Balancing returns the following:

```
Warning: Deleting a LoadBalancer can lead to service disruption to any cus
tomers connected to the load balancer. Are you sure you want to delete this
 load balancer? [Ny]
```

Enter Y to delete the LoadBalancer

Elastic Load Balancing returns the following:

```
OK-Deleting LoadBalancer
```

Monitoring and Logging

Elastic Load Balancing captures the following information about your load balancer:

- **CloudWatch Metrics**— Elastic Load Balancing publishes data points to Amazon CloudWatch about your load balancers and your back-end application instances. CloudWatch allows you to retrieve statistics about those data points as an ordered set of time-series data, known as *metrics*. You can use CloudWatch to monitor the metrics from your load balancers and back-end instances to verify that your system is performing as expected. For example, you can request statistics of all the unhealthy EC2 instances behind a load balancer launched in a specific Availability Zone or you can request statistics of the number of connections that were not successfully established between the load balancers and the back-end instances.
- **Access Logs**—The Elastic Load Balancing access logs capture detailed information for all requests made to your load balancer and stores them as log files in an Amazon S3 bucket that you specify. Each log contains details such as the time a request was received, client's IP address, latencies, request path, and server responses. You can use Elastic Load Balancing access logs to analyze traffic patterns and to troubleshoot your back-end applications.
- **Elastic Load Balancing API Calls**— You can use AWS CloudTrail to keep track of all the Elastic Load Balancing API calls made by or on behalf of your AWS account. CloudTrail stores the information as log files in an Amazon S3 bucket that you specify. You can use the logs collected by CloudTrail to monitor activity of your load balancers and determine what request was made to the load balancer, the source IP address the request was made from, who made the request, when it was made, and so on.

This section covers information about using the monitoring and logging features of Elastic Load Balancing to monitor your load balancers, to analyze the traffic patterns, and to troubleshoot your load balancers and your back-end instances. This section also provides procedural instruction and examples.

Topics

Monitor Your Load Balancer Using Amazon CloudWatch

Topics

Elastic Load Balancing publishes data points to Amazon CloudWatch about your load balancers and your back-end application instances. CloudWatch allows you to retrieve statistics about those data points as an ordered set of time-series data, known as *metrics*. Think of a metric as a variable to monitor, and the data points represent the values of that variable over time. Each data point has an associated time stamp and (optionally) a unit of measurement. For example, total number of healthy EC2 instances behind a load balancer over a specified time period can be a metric.

Amazon CloudWatch provides statistics based on the metric data points published by Elastic Load Balancing. Statistics are metric data aggregations over specified periods of time. The following statistics are available: Minimum (min), Maximum (max), Sum, Average, and Count. When you request statistics, the returned data stream is identified by the metric name and a dimension. A dimension is a name/value pair that helps you to uniquely identify a metric. For example, you can request statistics of all the healthy EC2 instances behind a load balancer launched in a specific Availability Zone.

One purpose for monitoring metrics in Amazon CloudWatch is to verify that your system is performing as expected. If a metric goes outside what you consider an acceptable range, you can create a CloudWatch alarm. A CloudWatch alarm watches over a specified metric and initiates an action if the metric goes outside of the specified range. An action can be a notification sent to you.

For more information on Amazon CloudWatch, see What is Amazon CloudWatch.

This section provides information about the metrics that Elastic Load Balancing sends to Amazon CloudWatch. This section also explains how to view and use the metrics, and how you can set alarms when a metric meets a condition that you specify.

Available Metrics

Elastic Load Balancing sends metrics for all of the load balancers associated with your AWS account to Amazon CloudWatch. By default, CloudWatch uses these metrics to provide detailed monitoring of your load balancers. You do not need to specifically enable detailed monitoring.

Elastic Load Balancing Metrics

The following Elastic Load Balancing metrics are available from Amazon CloudWatch.

Elastic Load Balancing only reports when requests are flowing through the load balancer. If there are no requests or data for a given metric, the metric will not be reported to CloudWatch. If there are requests flowing through the load balancer, Elastic Load Balancing will measure and send metrics for that load balancer in 60-second intervals.
Note: The Statistic value available through Amazon CloudWatch, such as `Min` or `Count` are not always applicable to every metric. However, they are all available through the console, API, and the command line interface (CLI). For each metric, be aware of the Preferred Statistic for all the Elastic Load Balancing metrics to track useful information.

Metric	Description
`HealthyHostCount`	The count of the number of healthy instances in each Availability Zone. Hosts are declared healthy if they meet the threshold for the number of consecutive health checks that are successful. Hosts that have failed more health checks than the value of the unhealthy threshold are considered unhealthy. If cross-zone is enabled, the count of the number of healthy instances is calculated for all Availability Zones. **Preferred statistic:** `average`
`UnHealthyHostCount`	The count of the number of unhealthy instances in each Availability Zone. Hosts that have failed more health checks than the value of the unhealthy threshold are considered unhealthy. If cross-zone is enabled, the count of the number of unhealthy instances is calculated for all Availability Zones. Instances may become unhealthy due to connectivity issues, health checks returning non-200 responses (in the case of HTTP or HTTPS health checks), or timeouts when performing the health check. **Preferred statistic:** `average`
`RequestCount`	The count of the number of completed requests that were received and routed to the back-end instances. **Preferred statistic:** `sum`
`Latency`	Measures the time elapsed in seconds after the request leaves the load balancer until the response is received. **Preferred statistic:** `average`
`HTTPCode_ELB_4XX`	The count of the number of HTTP 4XX client error codes generated by the load balancer when the listener is configured to use HTTP or HTTPS protocols. Client errors are generated when a request is malformed or is incomplete. **Preferred statistic:** `sum`
`HTTPCode_ELB_5XX`	The count of the number of HTTP 5XX server error codes generated by the load balancer when the listener is configured to use HTTP or HTTPS protocols. This metric does not include any responses generated by back-end instances. The metric is reported if there are no back-end instances that are healthy or registered to the load balancer, or if the request rate exceeds the capacity of the instances or the load balancers. **Preferred statistic:** `sum`

`HTTPCode_Backend_2XX`
`HTTPCode_Backend_3XX`
`HTTPCode_Backend_4XX`
`HTTPCode_Backend_5XX`
	The count of the number of HTTP response codes generated by back-end instances. This metric does not include any response codes generated by the load balancer.
	The 2XX class status codes represent successful actions. The 3XX class status code indicates that the user agent requires action. The 4XX class status code represents client errors. The 5XX class status code represents back-end server errors.
	Preferred statistic: `sum`

Metric	Description
`BackendConnectionErrors`	The count of the number of connections that were not successfully established between the load balancer and the registered instances. Because the load balancer will retry when there are connection errors, this count can exceed the request rate. **Preferred statistic:** `sum`
`SurgeQueueLength`	A count of the total number of requests that are pending submission to a registered instance. **Preferred statistic:** `max`
`SpilloverCount`	A count of the total number of requests that were rejected due to the queue being full. **Preferred statistic:** `sum`

Dimensions for Elastic Load Balancing Metrics

To refine the metrics returned by a query, you can use the dimensions for Elastic Load Balancing that are listed in the table in this section. For example, with the *HealthyHostCount* metric, you can use the dimensions *LoadBalancerName* and *AvailabilityZone* to get the average number of healthy instances behind the specified load balancer within the specified Availability Zone for a given period of time. Alternatively, it may be useful to track the minimum number of healthy hosts or the maximum number of unhealthy hosts to better understand how the health and the count of backend instances change over time.

Elastic Load Balancing data can be aggregated along any of the following dimensions shown in the following table.

Dimension	Description
`LoadBalancerName`	Limits the metric data to Amazon EC2 instances that are connected to the specified load balancer.
`AvailabilityZone`	Limits the metric data to load balancers in the specified *Availability Zone*.

How Elastic Load Balancing Statistics Are Measured

Elastic Load Balancing is made up of load balancer nodes that forward traffic to your back-end instances. Each load balancer node is designated to route traffic to instances within a single Availability Zone and each load balancer node reports metrics for the designated Availability Zone.
For all CloudWatch metrics, `min` and `max` represent the `min` and `max` as reported by individual load balancer nodes. For example, say there are 2 load balancer nodes. Node 1 reports a `HealthyHostCount` with a `min` of 2, a `max` of 10, and an `average` of 6. Load balancer node 2 reports a `HealthyHostCount` with a `min` of 1, `max` of 5, and an `average` of 3. This means that the `min` in CloudWatch will be 1, the `max` will be 10, and the `average` will be around 4.

The `sum` is the aggregate value reported across all load balancer nodes during the given time period. Because the metrics include multiple reports per period, `sum` is only applicable to metrics that are aggregated across all load balancer nodes, such as `RequestCount`, `HTTPCode_ELB_4XX`, `HTTPCode_ELB_5XX`, `HTTPCode_Backend_2XX,3XX,4XX,5XX`, `BackendConnectionErrors`, and `SpilloverCount`.

The `count` is the number of samples measured. Because the metrics are gathered based on sampling intervals and events, the `count` is typically not useful. For instance, in the healthy/unhealthy host metrics, `count` is based on the number of health check samples collected by the load balancer nodes, not the number of healthy/unhealthy hosts. For latency metrics, count is the number of samples that each load balancer node reports, not the actual value of latency reported.

The following table describes how to evaluate the statistics for the CloudWatch metrics sent by Elastic Load Balancing.

Statistics for Elastic Load Balancing Metrics

Metric Name	Statistics Details
`HealthyHostCount` `UnHealthyHostCount`	This metric should be used with `AvailabilityZone` dimension. **Preferred statistic:** `average` The `average` statistic indicates the average number of healthy or unhealthy instances as seen by the load balancer nodes. To get the total healthy or unhealthy instances, calculate the average value for each Availability Zone (AZ). `Min` and `max` represent the least and the most number of instances that were in the healthy or unhealthy state during the specified interval. Because some load balancer nodes may see an instance as unhealthy for a brief period while other nodes see the instance as healthy, the `min` and `max` can be misleading. `Sum` is not a meaningful statistic for this measure. `Count` is the number of samples reported by all nodes and is not a useful measure for troubleshooting issues. **Example:** Say that your load balancer has 4 back-end instances with 2 instances in AZ-1 and 2 instances in AZ-2. AZ-1 has 1 unhealthy instance and 1 healthy instance, and AZ-2 has 2 healthy and 0 unhealthy instances. The AZ dimension will report an average of 1 healthy and 1 unhealthy instance in AZ-1, and an average of 2 healthy and 0 unhealthy instances in AZ-2. The regional (load balancer) dimension would report an average of 1.5 healthy instances in AZ-1 and in AZ-2 and 0.5 unhealthy instances in AZ-1 and AZ-2.
`RequestCount`	This metric is typically used with the `LoadBalancerName` dimension to view the total requests for a load balancer. The metrics can also be used to measure the number of requests that were routed to an Availability Zone (which may or may not be the same Availability Zone that serviced the request for the back end). **Preferred statistic:** `sum` `Sum` is the only meaningful statistic for this measure. `Min, max,` and `average` are not meaningful because all return a value of 1. `Count` is the number of samples reported by all load balancer nodes and typically equals the `sum` for the period. **Example:** Say your load balancer has 4 back-end instances with 2 instances in AZ-1 and 2 instances in AZ-2. 100 requests are sent to the load balancer; 60 requests are sent to AZ-1 with each instance receiving 30 requests. 40 requests are sent to AZ-2 with each instance receiving 20 requests. The AZ dimension will report a sum of 60 requests in AZ-1 and 40 requests in AZ-2. The regional (load balancer) dimension reports a sum of 100 requests. Instances in AZ-1 would each see a request count of 30; instances in AZ-2 would each see a request count of 20.

Metric Name	Statistics Details
`Latency`	Latency can be viewed for all requests or for requests routed to a single Availability Zone. **Preferred statistic:** `average` The `average` provides the most useful diagnostic because it is the average of all requests that were sent to the back end. `Max` can be useful to determine if some requests are taking substantially longer than the average. `Min` is typically not a useful measure, because it is the request/response with the lowest total time elapsed. `Count` is approximately equal to the `sum` of the RequestCount metric, because it is the number of samples taken. **Example:** Say your load balancer has 4 back-end instances with 2 instances in AZ-1 and 2 instances in AZ-2. Requests sent to 1 instance in AZ-1 have a higher latency. The latency metric reported for AZ-1 will have a higher value than the latency metric for AZ-2.
`HTTPCode_ELB_4XX`	This metric is typically used with the `LoadBalancerName` dimension to view the total number of HTTP 4XX errors generated by all the load balancer nodes. The metrics can also be used to measure the number of errors for requests that were routed to an Availability Zone (which may or may not be the same Availability Zone that serviced the request for the back-end). **Preferred statistic:** `sum` `Sum` is the only meaningful statistic for this measure. `Min, max,` and `average` are not meaningful and all return a value of 1. `Count` is the number of samples reported by all load balancer nodes and typically equals the `sum` for the period. **Example:** Say that your load balancer has AZ-1 and AZ-2 enabled. Client requests include a malformed request URL. Client HTTP errors would likely increase in all Availability Zones. The regional (load balancer) metric would be the sum of the values for each Availability Zone.
`HTTPCode_ELB_5XX`	This metric is typically used with the `LoadBalancerName` dimension to view the total number of HTTP 5XX errors generated by all the load balancer nodes. The metrics can also be used to measure the number of errors for requests that were routed to an Availability Zone (which may or may not be the same Availability Zone that serviced the request for the back end). **Preferred statistic:** `sum` `Sum` is the only meaningful statistic for this measure. `Min, max,` and `average` are not meaningful statistics for this measure and all return a value of 1. `Count` is the number of samples reported by all load balancer nodes and typically equals the `sum` for the period. **Example:** Say that your load balancer has AZ-1 and AZ-2 enabled. Instances in AZ-1 are experiencing high latency and are slow to respond to requests. As a result the load balancer nodes' surge queue in AZ-1 fills up, resulting in spillovers and returns a 503 error to clients. (see SpilloverCount metric in this table). Assuming AZ-2 continues to respond normally, the regional (load balancer) `sum` of HTTPCode_ELB_5XX equals the `sum` for AZ-1.

Metric Name	Statistics Details

`HTTPCode_Backend_2XX`
`HTTPCode_Backend_3XX`
`HTTPCode_Backend_4XX`
`HTTPCode_Backend_5XX`
	This metric is typically used with the `LoadBalancerName` dimension to view the total number of HTTP response codes generated by back-end instances registered to a load balancer. The metrics can also be used to measure the number of errors for requests that were routed to an Availability Zone (which may or may not be the same Availability Zone that serviced the request for the back end).
	Preferred statistic: `sum`
	`Sum` is the only meaningful statistic for this measure.
	`Min, max,` and `average` are not meaningful statistics for this measure and all return a value of 1.
	`Count` is the number of samples reported by all load balancer nodes and typically equals the `sum` for the period.
	Example: Say that your load balancer has 4 back-end instances with 2 instances in AZ-1 and 2 instances in AZ-2. Requests sent to 1 instance in AZ-1 result in an HTTP 500 response. The metric reported for AZ-1 will include these error responses, while the value in AZ-2 will not include these error responses. The regional (load balancer) total would be equal to the total for AZ-1.

`BackendConnectionErrors`	This metric can be viewed for all back-end instances or the back-end instances in a single Availability Zone. **Preferred statistic:** `sum` `Sum` represents the total connection errors seen by all load balancer nodes for the given period of time. `Sum` is the only meaningful statistic for this measure. `Average, min,` and `max` are reported per load balancer node and are not typically useful. The difference between `min` and `max` or peak to average or average to trough may be useful to determine if a single load balancer node is an outlier. `Count` is the number of samples reported by all load balancer nodes and will typically equal the sum for the period. **Example:** Say that your load balancer has 4 back-end instances with 2 instances in AZ-1 and 2 instances in AZ-2. Attempts to connect to 1 instance in AZ-1 result in an increase in the back end connection errors. The metric reported for AZ-1 will include these connection errors for the failed attempts, while the value in AZ-2 will not include these errors. The regional (load balancer) total would be equal to the total for AZ-1.

Metric Name	Statistics Details
`SurgeQueueLength`	This metric can be used to monitor the surge queue size for a single Availability Zone or for the region (the overall load balancer). **Preferred statistic:** `max` `Max` is the most useful statistic because it represents the peak of requests that were queued. The maximum value is 1,024. If any load balancer node has a full queue of 1,024 requests there will likely be spillovers (see the SpilloverCount metric in this table). `Average` represents the number of requests that were in the queue on average across all load balancer nodes for a given period of time. `Average` can be useful in combination with `min` and `max` to determine the range of queuing by load balancer nodes. `Sum` is not a useful statistic, because it is the total of all recorded samples across all load balancer nodes. `Min` is not typically useful because it represents the lowest value observed for any load balancer node for any sample. `Count` is not a meaningful statistic for this measure. **Example:** Say that your load balancer has AZ-1 and AZ-2 enabled. Instances in AZ-1 are experiencing high latency and are slow to respond to requests. As a result the load balancers' surge queue in AZ-1 fills up, with clients likely experiencing increased response times. If this continues, the load balancer will have spillovers (see Spillover metrics in this table). Assuming AZ-2 continues to respond normally, the regional (load balancer) max will be the same as the max for AZ-1, while AZ-2 will have a small value (or no metric) for the same period.
`SpilloverCount`	This metric is typically used with the `LoadBalancerName` dimension to view the total spillovers for the load balancer. This metric can also be used to measure the number of rejected requests that were routed to an Availability Zone. **Preferred statistic:** `sum` `Sum` represents the total of all load balancer nodes reports for the given period of time. `Sum` is the only meaningful statistic for this measure. `Average, min,` and `max` are reported per load balancer node and are not typically useful for the spillover metric. `Min` is not typically useful because it represents the lowest value observed for any load balancer node for any sample. `Count` is not a meaningful statistic for this measure. **Example:** Say that your load balancer has AZ-1 and AZ-2 enabled. Instances in AZ-1 are experiencing high latency and are slow to respond to requests. As a result the load balancers' surge queue in AZ-1 fills up, resulting in load balancer spillovers. The spillover metric will be incremented. Assuming AZ-2 continues to respond normally, the regional (load balancer) sum will be the same as the sum for AZ-1, while AZ-2 will have a small value (or no metric) for the same period.

View Metrics

You can view the CloudWatch metrics for your Elastic Load Balancing load balancers directly in the EC2 console's **Load Balancer** page. The load balancer metrics are displayed as monitoring graphs. The following metrics are available in the EC2 console:

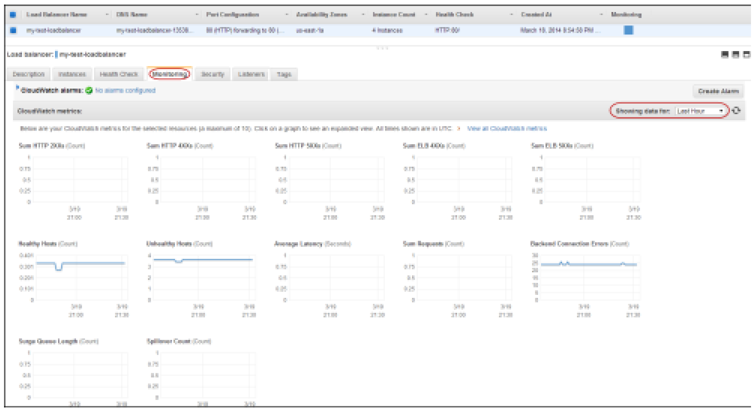
- Average Latency
- Sum Requests
- Sum ELB HTTP 4XXs
- Sum ELB HTTP 5XXs
- Sum HTTP 2XXs
- Sum HTTP 4XXs
- Sum HTTP 5XXs

To view the metrics from your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select the check box next to your load balancer.

   The bottom pane displays the details of your load balancer.
4. Click the **Monitoring** tab.

   The bottom pane displays the graphs of metrics sent by Elastic Load Balancing for the selected load balancer.
5. If you want to filter the results by time, select the time range in the **Showing data for** drop-down box.



6. Click on an individual graph to get a larger view of the individual metric.

The `my-test-loadbalancer` load balancer used in this example is inactive and is used for display purposes only. The monitoring graphs will show data points if the load balancer is active and receiving requests.

You can also view metrics for your load balancer using the Amazon CloudWatch console, command line interface (CLI), or the Query API. For information on using the CloudWatch console to view metrics, see

Viewing Your AWS Metrics with Amazon CloudWatch. To view metrics using the command line interface, use the mon-list-metrics command. To view metrics using the Query API, use the ListMetrics action.

Create Alarms

An alarm watches a single metric over a time period you specify. Depending on the value of the metric relative to a threshold that you define, the alarm can send one or more notifications to an Amazon Simple Notification Service (Amazon SNS) topic. Amazon SNS is a web service that enables applications, end users, and devices to instantly send and receive notifications. For more information, see Get Started with Amazon SNS.

An alarm will send notifications to Amazon SNS when the specified metric reaches the defined range and remains in that range for a specified period of time. An alarm has three possible states:

- *OK*—This is the state the alarm is in when the value of the metric remains within the range you've specified.
- *ALARM*—This is the state the alarm goes to when the value of the metric goes out of the range you've specified and remains outside of the range for a specified time duration.
- *INSUFFICIENT_DATA*—When the alarm is in this state, it either means that the metric is not yet available or not enough data is available for the metric to determine the alarm state.

Whenever the state of an alarm changes, Amazon CloudWatch uses Amazon SNS to send a notification to the email addresses that you specify.

You can create alarms for your load balancer using either the Elastic Load Balancing wizard in the EC2 console or the Amazon CloudWatch console. This section walks you through the steps for creating an alarm using the Elastic Load Balancing wizard. For information on creating a load balancer alarm using the Amazon CloudWatch console, see Send Email Based on Load Balancer Alarm.

To create an alarm for your load balancer

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console page, in the **EC2 Dashboard** pane, under **NETWORK & SECURITY**, click **Load Balancers**.
3. On the **Load Balancers** page, select the check box next to the load balancer for which you want to create an alarm.

   The bottom pane displays the details of your load balancer.
4. On the **Monitoring** tab in the bottom pane, click **Create Alarm**.
5. In the **Create Alarm** dialog box, set the criteria for your alarm. In this example, we'll set an alarm if the load balancer's latency is above 120 seconds for 1 consecutive period of 5 minutes.
6. The check box next to **Send a notification to** is selected by default.

   If you've already created a SNS topic and want to use it, select your topic from the drop-down box. Skip the next step.

   If you do not have a SNS topic, click **create topic**.
7. **To create SNS topic**

   a. In the **Send a notification to:** box, enter a name for your topic.
   b. In the **With these recipients** box, enter the email addresses of the recipients you want to notify. You can enter up to 10 email addresses, each separated by a comma.

> **Note**
> If your email recipients have not yet been subscribed to the SNS topic, each email recipient will receive an email from Amazon SNS with a link to confirm their subscription to the SNS topic. If they do not confirm subscription, they will not receive future email Alarm notifications.

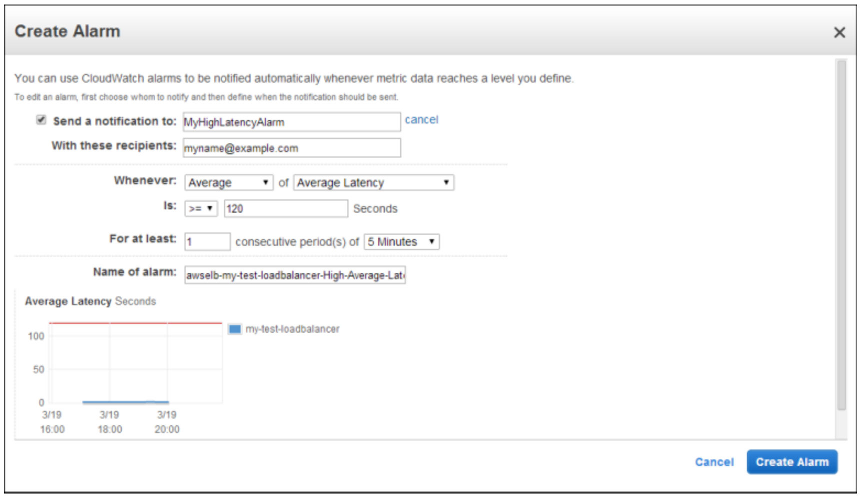
8. Configure the threshold for your alarm.

   a. In the **Whenever** boxes, select **Average** and **Average Latency**.
   b. In the **Is** boxes, define the threshold for the alarm by selecting **>** and entering `120`.
   c. In the **For at least** boxes, enter `1` and then select **5 minutes**, or you can define your own evaluation period.

      > **Note**
      > A shorter period creates a more sensitive alarm. A longer period can mitigate brief spikes in a metric.

   d. In **Name this alarm**, a name is automatically generated for you. Enter a new name if you want to change it.

      > **Important**
      > You cannot modify the name after you create the alarm.



Create Alarm

You can use CloudWatch alarms to be notified automatically whenever metric data reaches a level you define.
To edit an alarm, first choose whom to notify and then define when the notification should be sent.

✓ Send a notification to:	MyHighLatencyAlarm
With these recipients:	myname@example.com
Whenever:	Average of Average Latency
Is:	>= 120 Seconds
For at least:	1 consecutive period(s) of 5 Minutes
Name of alarm:	awselb-my-test-loadbalancer-High-Average-Lat

9. Click **Create Alarm**.
10. The **Alarm created successfully** dialog box opens confirming successful creation of your alarm. Click **Close**.

After you create the alarm, you can use the **Monitoring** tab to view a summary of alarms that have been set for that load balancer. From there, you can also edit the alarm.

Access Logs

The Elastic Load Balancing access logs capture detailed information for all requests made to your load balancer. Each log contains details such as the time a request was received, client's IP address, latencies, request path, and server responses. You can use Elastic Load Balancing access logs to analyze traffic patterns and to troubleshoot your back-end applications.

This topic provides you with an overview of Elastic Load Balancing access logs and describes how to enable or disable access logs for your load balancer.

Access logging is an optional feature of Elastic Load Balancing. This feature is disabled by default. You must explicitly enable your load balancer to capture and deliver the logs. After you enable this feature, Elastic Load Balancing captures the logs and stores them in an Amazon Simple Storage Service (Amazon S3) bucket you specify. You can either use an existing bucket or create a new one. You can disable the log delivery at any time.

There is no additional charge for access logs. You will incur storage costs for Amazon S3, but will not be charged for the bandwidth used by Elastic Load Balancing to send log files to Amazon S3. For details on the storage costs, see Amazon S3 Pricing.

Access Log File

Elastic Load Balancing publishes a log file from each load balancer node at the interval you specify. You can specify an interval of either 5 minutes or 60 minutes when you enable the access log for your load balancer. By default, Elastic Load Balancing publishes the log at a 60 minute interval. The logs are emitted at the specified interval starting at each hour. For example, if the interval is set for 5 minutes, the logs will be emitted every 5 minutes starting at each hour, that is, 1:05, 1:10, 1:15, and so on. The actual log delivery is delayed up to 5 minutes if the interval is set to 5 minutes, and it is delayed up to 15 minutes if the interval is set to 60 minutes. You can modify the publishing interval at any time.

The load balancer can deliver multiple logs for the same period. This usually happens if the site has high traffic, multiple load balancer nodes, and a short log publishing interval.

Elastic Load Balancing creates log file names in the following format:

```
{Bucket}/{Prefix}/AWSLogs/{AWS AccountID}/elasticloadbalancing/{Re
gion}/{Year}/{Month}/{Day}/{AWS Account ID}_elasticloadbalancing_{Region}_{Load
 Balancer Name}_{End Time}_{Load Balancer IP}_{Random String}.log
```

The following is an example of a log file name:

```
S3://mylogsbucket/myapp/prod/AWSLogs/123456789012/elasticloadbalancing/us-east-
1/2014/02/15/123456789012_elasticloadbalancing_us-east-1_my-test-loadbalan
cer_20140215T2340Z_172.160.001.192_20sg8hgm.log
```

The following table describes the format of the log file name using the values from the previous example:

Parameter	Description	Example value
Bucket	Name of the S3 bucket that you have created.	`mylogsbucket`

Parameter	Description	Example value
Prefix	Prefix (logical hiearchy) that you created in the S3 bucket. If there is no prefix specified, the log is placed at the root level.	`myapp/prod`
AWS Account ID	The AWS account number associated with the load balancer. Value is automatically populated by the system.	`123456789012`
Region	Region where your load balancer and your S3 bucket is located. This is automatically populated by the system.	`us-east-1`
Year/Month/Day	Date the log was delivered. Value is automatically populated by the system.	`2014/02/15`
Load Balancer Name	The name of the load balancer from which the log is collected. This is automatically populated by the system.	`my-test-loadbalancer`
End Time	Timestamp (UTC) of the end of the logging interval (e.g., an end time of 20140215T2340Z contains entries for requests made between 23:35 and 23:40 for logs emitted every 5 minutes).	`20140215T2340Z`
Load Balancer IP	IP address of the load balancer node that handled the request. For an internal load balancer, this is a private IP address. Value is automatically populated by the system.	`172.160.001.192`
Random String	System-generated random string.	`20sg8hgm`

You can store your log files in your bucket for as long as you want, but you can also define Amazon S3 lifecycle rules to archive or delete log files automatically. For more information, see Object Lifecycle Management in the *Amazon Simple Storage Service Developer Guide*.

Access Log Entry

The access log file can have one or more log entries. Each log entry contains the details of a single request made to the load balancer. Elastic Load Balancing logs all requests sent to the load balancer, including requests that never made it to the back-end instances. For example, if a client sends a malformed request, or there are no healthy instances to respond, then the requests would still be logged.

Each entry in the log file follows the following format:

```
timestamp elb client:port backend:port request_processing_time backend_pro
cessing_time response_processing_time elb_status_code backend_status_code re
ceived_bytes sent_bytes "request"
```

All the fields in the log entry are space delimited. The following example shows a log entry:

```
2014-02-15T23:39:43.945958Z my-test-loadbalancer 192.168.131.39:2817 10.0.0.0.1
 0.000073 0.001048 0.000057 200 200 0 29 "GET http://www.example.com:80/HTTP/1.1"
```

The following table describes the fields of a log entry using the values from the previous example:

Field name	Description	Example field value
timestamp	Time (UTC) that the response was sent back to client. Uses ISO 8601 format.	`2014-02-15T23:39:43.945958Z`
elb	Name of the load balancer	`my-test-loadbalancer`
client:port	IP address and the port of the requesting client.	`192.168.131.39:2817`
backend:port	IP address of the registered instance that processed this request.	`10.0.0.0.1`
request_processing_time	Total time elapsed (in seconds) from the time the load balancer receives the request and sends the request to a registered instance	`0.000073`
backend_processing_time	Total time elapsed (in seconds) from the time the load balancer sends the request to a registered instance and the instance begins sending the response headers.	`0.001048`
response_processing_time	Total time elapsed (in seconds) from the time the load balancer receives the response header from the registered instance and starts sending the response to the client. This processing time includes both queuing time at the load balancer and the connection acquisition time from the load balancer to the backend.	`0.000057`
elb_status_code	Status code of the response from the load balancer (HTTP only)	`200`
backend_status_code	Status code of the response from the registered instance (HTTP only)	`200`

Field name	Description	Example field value
received_bytes	Size of the request (bytes) received from the client (requester). For HTTP requests, the bytes received account for the request body and do not include headers. For TCP, the bytes include the headers.	`0`
sent_bytes	Size of the response (bytes) sent back to the client (requester). For HTTP responses, the bytes sent account for the response body and do not include headers. For TCP, the bytes include the headers.	`29`
"request"	The request line from the client enclosed in double quotes and logged in the following format: HTTP Method + Protocol://Host header:port + Path + HTTP version. For TCP requests, the URL will not be populated but instead show three dashes, each separated by a space and enclosed in quotes, for example,"- - -"	`"GET http://www.example.com:80/HTTP/1.1"`

- To enable access logs for your load balancer, see Enable Access Logs (p. 215)
- To disable access logs for your load balancer, see Disable Access Logs (p. 219)

Log Processing

Depending on your website traffic, your load balancer may generate large gigabytes of log files. Since line-by-line processing may not be feasible to process such large volumes of data, you might have to use analytical tools that provide parallel processing solutions. You can use any one of the following analytical tools to analyze and process the access logs generated by your load balancer:

Amazon Elastic MapReduce (Amazon EMR)

Amazon EMR allows you to quickly and efficiently process vast amounts of data, such as Elastic Load Balancing access logs. Amazon EMR runs Apache Hadoop on Amazon EC2 instances. Hadoop is a framework that distributes a computational task to multiple computers that work in parallel, allowing you to quickly process vast amounts of data. For instructions on using Amazon EMR to query and analyze the logs generated by your load balancer, see Analyze Elastic Load Balancing Access Log Data.

Partner Solutions

You can also analyze your access logs using integrated solutions offered by our following partners:

- Splunk
- Sumo Logic

Enable Access Logs

This section walks you through the following steps to enable access logs for your load balancer:

1. Enable access logs for your load balancer.
2. Verify that the access logs are enabled for the load balancer.

You can enable access logs for your load balancer using the AWS Management Console, the Elastic Load Balancing command line interface (CLI), or the Query API.

Topics

Enable Access Logs Using the AWS Management Console

After you have identified your load balancer, you must specify the name of your Amazon S3 bucket where you want the load balancer to store the logs. When you enable access logs using the console, Elastic Load Balancing provides you with an option for creating the bucket for you with necessary permissions for the load balancer to write to your bucket.

If you want to use an existing bucket or create your own bucket, first follow the instructions in Configure an Amazon S3 Bucket for Storing Access Logs (p. 222).

In this walkthrough, you enable your load balancer, `my-test-loadbalancer` to capture and deliver logs every 60 minutes (default interval) to the S3 bucket, `my-test-loadbalancer-log`, that is created by Elastic Load Balancing.

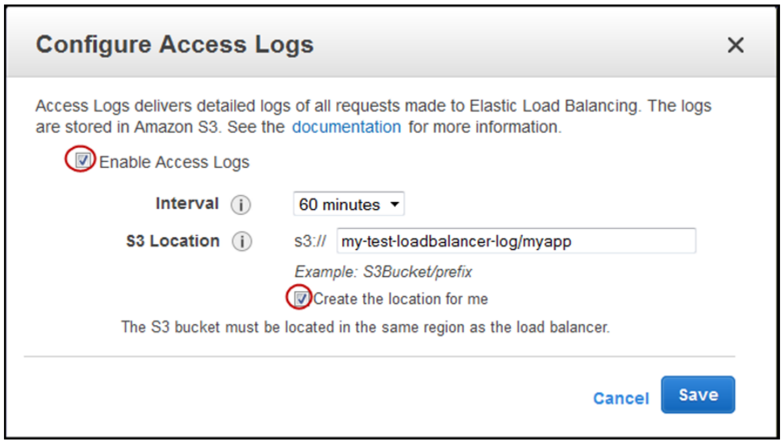
To enable access logs for your load balancer using the console

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the **Create Load Balancer** page, select your load balancer.
5. The bottom pane displays the details of your load balancer.
6. Click **(Edit)** in the **Access Logs: Disabled** row.
7. In the **Configure Access Logs** dialog box perform the following actions:

   a. Select **Enable Access Logs**.
   b. Leave the **Interval** dialog box set to the default setting.
   c. In the **S3 Location** field, enter the name of your S3 bucket, including the prefix (this example uses `my-test-loadbalancer-log/myapp`).

      Note
      If you want Elastic Load Balancing to create the bucket for you, make sure the bucket name you choose is unique across all existing bucket names in Amazon S3. You cannot change the name of a bucket after it is created. For more information on bucket naming rules and conventions, see Bucket restrictions and Limitations in the *Amazon Simple Storage Service Developer Guide*.

d. Select **Create the location for me** if you want Elastic Load Balancing to create the S3 bucket for you.


Configure Access Logs

Access Logs delivers detailed logs of all requests made to Elastic Load Balancing. The logs are stored in Amazon S3. See the documentation for more information.

[✓] Enable Access Logs

Interval: 60 minutes

S3 Location: s3:// my-test-loadbalancer-log/myapp

Example: S3Bucket/prefix

[✓] Create the location for me

The S3 bucket must be located in the same region as the load balancer.

e. Click **Save**.

Enable Access Logs Using the Elastic Load Balancing CLI

To enable access logs, you must modify the `accesslog` attribute of your load balancer by setting the attribute value to `true` and by specifying the other attributes, such as the Amazon S3 bucket name and the prefix.

Prerequisites

Before you get started, make sure you complete the following steps:

- Download and install the latest version of the Elastic Load Balancing CLI. For instructions to download and install the latest CLI, see Appendix A: Using the Elastic Load Balancing Command Line Interface (p. 251).
- Create or identify an Amazon S3 bucket and attach a bucket policy to your bucket. The bucket policy must grant permissions to Elastic Load Balancing to write to the Amazon S3 bucket you specify. Make sure that you do not grant any other permissions, other than the write permission, to Elastic Load Balancing. For instructions to create a bucket and attach a policy to your bucket, see Configure an Amazon S3 Bucket for Storing Access Logs (p. 222).

To enable access logs for your load balancer

1. Enter the command `elb-modify-lb-attributes` using the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - `accesslog`
     - `enabled=true`
     - `S3bucket-name=`*`my-test-loadbalancer-log`*
     - `S3bucket-prefix=`*`myapp`*
     - `emit-interval=60`

   Your command should look like the following example:

```
elb-modify-lb-attributes my-test-loadbalancer  --accesslog "enabled=true,
s3bucket-name=my-test-loadbalancer-log, s3bucket-prefix=myapp, emit-inter
val=60"  --headers
```

Elastic Load Balancing responds as in the following example.

```
ACCESS_LOG  ACCESSLOG_ENABLED  S3BUCKET_NAME            EMIT_INTERVAL
S3BUCKET_PREFIX
ACCESS_LOG  true               my-test-loadbalancer-log  60
myapp
```

2. Enter `elb-describe-lb-attributes` command as in the following example to verify that the access log is enabled for your load balancer. Use the following option:

   - Load balancer name = *my-test-loadbalancer*

   Your command should look like the following example.

```
elb-describe-lb-attributes my-test-loadbalancer  --headers
```

Elastic Load balancing responds as in the following example.

```
ACCESS_LOG  ACCESSLOG_ENABLED  S3BUCKET_NAME            EMIT_INTERVAL
S3BUCKET_PREFIX
ACCESS_LOG  true               my-test-loadbalancer-log  60
myapp
```

You have successfully enabled access logs for your load balancer.

Enable Access Logs Using the Query API

To enable access logs, you must modify the `AccessLog` attribute of your load balancer by setting the attribute value to `true` and by specifying the other attributes, such as the Amazon S3 bucket name and the prefix.

To enable access logs for your load balancer

1. Use the `ModifyLoadBalancerAttributes` action with the following parameters:

   - LoadBalancerName = *my-test-loadbalancer*
   - `AccessLog`
     - `Enabled=true`
     - `S3BucketName=`*my-test-loadbalancer-log*
     - `S3BucketPrefix=`*myapp*
     - `EmitInterval=60`

   Your request should look like the following example:

```
https://elasticloadbalancing.sa-east-1.amazonaws.com/?LoadBalancerAttrib
utes.AccessLog.Enabled=true
&LoadBalancerAttributes.AccessLog.S3BucketName=my-test-loadbalancer-log
&LoadBalancerAttributes.AccessLog.S3BucketPrefix=myapp
&LoadBalancerAttributes.AccessLog.EmitInterval=60
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
&Action=ModifyLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<ModifyLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <ModifyLoadBalancerAttributesResult>
    <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
    <LoadBalancerAttributes>
      <AccessLog>
        <Enabled>true</Enabled>
        <S3BucketName>my-test-loadbalancer-log</S3BucketName>
        <S3BucketPrefix>myapp</S3BucketPrefix>
        <EmitInterval>60</EmitInterval>
      </AccessLog>
    </LoadBalancerAttributes>
  </ModifyLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>020744c8-9d97-11e3-919a-33887EXAMPLE</RequestId>
  </ResponseMetadata>
</ModifyLoadBalancerAttributesResponse>
```

2. Use the `DescribeLoadBalancerAttributes` action with the following parameter to verify that access log is enabled for your load balancer.

   - LoadBalancerName = *`my-test-loadbalancer`*

   Your request should look like the following example.

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=my-test-load
balancer
&Version=2012-06-01
&Action=DescribeLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example:

```
<DescribeLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <DescribeLoadBalancerAttributesResult>
    <LoadBalancerAttributes>
      <AccessLog>
        <Enabled>true</Enabled>
        <S3BucketName>my-test-loadbalancer-log</S3BucketName>
        <S3BucketPrefix>myapp</S3BucketPrefix>
        <EmitInterval>60</EmitInterval>
      </AccessLog>
      <CrossZoneLoadBalancing>
        <Enabled>false</Enabled>
      </CrossZoneLoadBalancing>
    </LoadBalancerAttributes>
  </DescribeLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>64e7b49d-41fb-11e3-962d-c57EXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancerAttributesResponse>
```

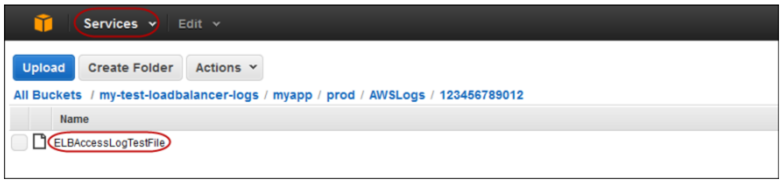
You have successfully enabled access logs for your load balancer.

Verify that Elastic Load Balancing Created a Test File in the Amazon S3 Bucket

After the access log is enabled for your load balancer, Elastic Load Balancing validates the Amazon S3 bucket and creates a test file. You can use the S3 console to verify that the test file is created in your Amazon S3 bucket.

To verify that Elastic Load Balancing has created a test file in the Amazon S3 bucket

1. From the navigation bar, click **Services**and select **S3**.
2. In the S3 console **All Buckets** list, select your S3 bucket.
3. Keep clicking through your bucket path until you see the test log file.


Services
Edit
Upload
Create Folder
Actions
All Buckets / my-test-loadbalancer-logs / myapp / prod / AWSLogs / 123456789012
Name
ELBAccessLogTestFile

Disable Access Logs

You can disable the access logs option for your load balancer at any time. After you disable this option, your Amazon S3 bucket will continue to keep your access logs until you delete the logs or the bucket. For information on managing your Amazon S3 bucket, see Working with Buckets in the *Amazon S3 Console User Guide*.

This section shows you how to disable the access log for your load balancer using the AWS Management Console, the Elastic Load Balancing command line interface (CLI), or the Query API.

To disable the access log for your load balancer using the console

1. Sign in to the AWS Management Console and open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the Amazon EC2 console **Resources** page, in the navigation pane, under **NETWORK & SECURITY**, click **Load Balancers** to start the Elastic Load Balancing wizard.
3. If necessary, change the region. From the navigation bar, select the region that has your load balancer.
4. On the **Load Balancers** page, select your load balancer.
5. The bottom pane displays the details of your load balancer.

6. Click **(Edit)** in the **Access Logs: Enabled** row.
7. In the **Configure Access Logs** dialog box, select **Disable Access Logs**.
8. Click **Save**.

To disable the access log for your load balancer using the Elastic Load Balancing CLI

You must modify the `accesslog` attribute of your load balancer by setting the attribute value to `false`.

1. Enter the command `elb-modify-lb-attributes` using the following options:

   - Load balancer name = *`my-test-loadbalancer`*
   - `accesslog`
     - `enabled=false`

   Your command should look like the following example:

   ```
   elb-modify-lb-attributes my-test-loadbalancer  --accesslog "enabled=false"
     --headers
   ```

   Elastic Load Balancing responds as in the following example.

   ```
   ACCESS_LOG  ACCESSLOG_ENABLED  S3BUCKET_NAME            EMIT_INTERVAL
   S3BUCKET_PREFIX
   ACCESS_LOG  false               my-test-loadbalancer-log  60
   myapp
   ```

2. Enter `elb-describe-lb-attributes` command as in the following example to verify that the access log is disabled for your load balancer. Use the following option:

   - Load balancer name = *`my-test-loadbalancer`*

   Your command should look like the following example.

   ```
   elb-describe-lb-attributes my-test-loadbalancer  --headers
   ```

   Elastic Load balancing responds as in the following example.

   ```
   ACCESS_LOG  ACCESSLOG_ENABLED  S3BUCKET_NAME            EMIT_INTERVAL
   S3BUCKET_PREFIX
   ACCESS_LOG  false               my-test-loadbalancer-log  60
   myapp
   ```

To disable the access log for your load balancer using the Query API

You must modify the `AccessLog` attribute of your load balancer by setting the attribute value to `false`.

1. Use the `ModifyLoadBalancerAttributes` action with the following parameters:

   - LoadBalancerName = *`my-test-loadbalancer`*
   - `AccessLog`

- `Enabled=false`

Your request should look like the following example.

```
https://elasticloadbalancing.sa-east-1.amazonaws.com/?LoadBalancerAttrib
utes.AccessLog.Enabled=false
&LoadBalancerName=my-test-loadbalancer
&Version=2012-06-01
&Action=ModifyLoadBalancerAttributes
&AUTHPARAMS
```

If your request is successful, you should get a response similar to the following example.

```
<ModifyLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <ModifyLoadBalancerAttributesResult>
    <LoadBalancerName>my-test-loadbalancer</LoadBalancerName>
    <LoadBalancerAttributes>
      <AccessLog>
        <Enabled>false</Enabled>
        <S3BucketName>my-test-loadbalancer-log</S3BucketName>
        <S3BucketPrefix>myapp</S3BucketPrefix>
        <EmitInterval>60</EmitInterval>
      </AccessLog>
    </LoadBalancerAttributes>
  </ModifyLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>020744c8-9d97-11e3-919a-33887EXAMPLE</RequestId>
  </ResponseMetadata>
</ModifyLoadBalancerAttributesResponse>
```

2. Use the `DescribeLoadBalancerAttributes` action with the following parameter to verify that access log is disabled for your load balancer.

   - LoadBalancerName = *`my-test-loadbalancer`*

   Your request should look like the following example.

```
https://elasticloadbalancing.amazonaws.com/?LoadBalancerName=my-test-load
balancer
&Version=2012-06-01
&Action=DescribeLoadBalancerAttributes
&AUTHPARAMS
```

   If your request is successful, you should get a response similar to the following example:

```
<DescribeLoadBalancerAttributesResponse xmlns="http://elasticloadbalan
cing.amazonaws.com/doc/2012-06-01/">
  <DescribeLoadBalancerAttributesResult>
    <LoadBalancerAttributes>
      <AccessLog>
        <Enabled>false</Enabled>
        <S3BucketName>my-test-loadbalancer-log</S3BucketName>
        <S3BucketPrefix>myapp</S3BucketPrefix>
        <EmitInterval>60</EmitInterval>
      </AccessLog>
      <CrossZoneLoadBalancing>
        <Enabled>false</Enabled>
      </CrossZoneLoadBalancing>
    </LoadBalancerAttributes>
  </DescribeLoadBalancerAttributesResult>
  <ResponseMetadata>
    <RequestId>64e7b49d-41fb-11e3-962d-c57EXAMPLE</RequestId>
  </ResponseMetadata>
</DescribeLoadBalancerAttributesResponse>
```

Configure an Amazon S3 Bucket for Storing Access Logs

This section walks you through the following steps for configuring Amazon S3 bucket for storing access logs:

- Create an Amazon S3 bucket.
- Attach a policy to the bucket.

Create an Amazon S3 Bucket

You can create an Amazon S3 bucket using the S3 console. If you already have an Amazon S3 bucket and want to use it to store the access logs, skip this step and go to Attach a Policy to Your Amazon S3 Bucket (p. 223) for granting permissions to Elastic Load Balancing to write logs to your Amazon S3 bucket.

1. Sign into the AWS Management Console and open the Amazon S3 console at https://console.aws.amazon.com/s3.
2. Click **Create Bucket**.
3. In the **Create a Bucket – Select a Bucket Name and Region** dialog box enter the following information:

   a. In the **Bucket Name:** field, enter a name for your bucket (this example uses `my-test-load-balancer-log`).

      Note
      Make sure the bucket name you choose is unique across all existing bucket names in Amazon S3. You cannot change the name of a bucket after it is created. For more information on bucket naming rules and conventions, see Bucket restrictions and Limitations in the *Amazon Simple Storage Service Developer Guide*.

   b. Click the **Region** dialog box, and select a region.

      Important
      Make sure to select the same region where you created your load balancer.

   c. Click **Create**.

Attach a Policy to Your Amazon S3 Bucket

After you've created or identified your Amazon S3 bucket, you must attach a policy for the bucket. Bucket policies are a collection of JSON statements written in the access policy language to define access permissions for your S3 bucket. Each statement includes information about a single permission and contains a series of elements. In this walkthrough, you will use the following elements to create a bucket policy that grants permissions to Elastic Load Balancing to write to your Amazon S3 bucket:

- **Effect**—Specifies whether to allow or deny access to the bucket.
- **Principal**—Specifies one or more people who are allowed or denied access. You must specify the principal by using the Account ID. In this policy, the principal is Elastic Load Balancing.

  The following table lists the Elastic Load Balancing Account IDs from all the regions. Make a note of the Elastic Load Balancing Account ID of the region where you have created your load balancer and your Amazon S3 bucket.

Region	Region Name	Elastic Load Balancing Account ID
`us-east-1`	US East (N.Virginia)	127311923021
`us-west-1`	US West (N.California)	027434742980
`us-west-2`	US West (Oregon)	797873946194
`eu-west-1`	EU (Ireland)	156460612806
`ap-northeast-1`	Asia Pacific (Tokyo)	582318560864
`ap-southeast-1`	Asia Pacific (Singapore)	114774131450
`ap-southeast-2`	Asia Pacific (Sydney)	783225319266
`sa-east-1`	South America (Sao Paulo)	507241528517
`cn-north-1`	China (Beijing)	638102146993
`us-gov-west-1`	AWS GovCloud (US)	048591011584

- **Action**—Defines the specific type of access allowed or denied (for example, read or write).
- **Resource**—Specifies the object the policy covers. The object for this policy is the Amazon S3 bucket. You specify the object using the Amazon Resource Name (ARN) format.

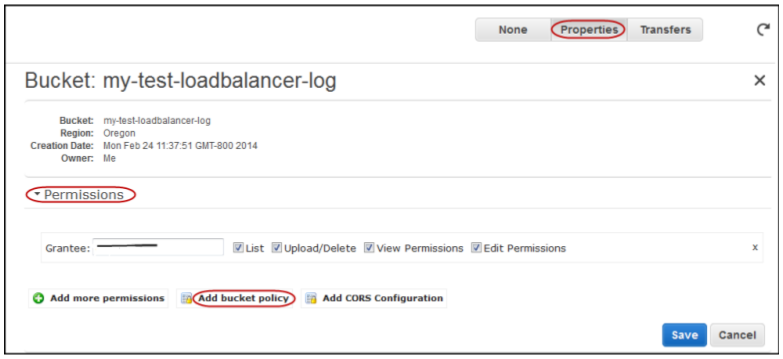
  If you are using an existing Amazon S3 bucket, make sure that the identified bucket and your load balancer are in the same region. The Amazon S3 bucket need not be associated with the same account as your load balancer.

  Caution
  If your bucket already has one or more policies attached to it, add the statements for the Elastic Load Balancing access log to that policy or policies. We recommend that you evaluate the resulting set of permissions to be sure that they are appropriate for the users who will be accessing the bucket.

For this walkthrough, you do not need to know the access policy language. Instead, you can use AWS Policy Generator tool to create the policy for your S3 bucket.

To attach policy statement to your bucket

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3.
2. Select the Amazon S3 bucket you just created.
3. Click the **Properties** tab.
4. Click **Permissions**.
5. In the **Permissions** pane, click **Add bucket policy**.



Bucket: my-test-loadbalancer-log

Bucket: my-test-loadbalancer-log
Region: Oregon
Creation Date: Mon Feb 24 11:37:51 GMT-800 2014
Owner: Me

Grantee: [redacted] ☑ List ☑ Upload/Delete ☑ View Permissions ☑ Edit Permissions

6. On the **Bucket Policy Editor** page, click **AWS Policy Generator**.

   Alternatively, you can copy the policy directly from the image in Step 10, paste the copied policy in the text area of the **Bucket Policy Editor** page, substitute the correct names of your bucket name, prefix, and your AWS account ID, and then skip to Step 11.
7. On the **AWS Policy Generator** page, enter the following details:

   a. Click the **Select Type of Policy** dialog box, and select **S3 Bucket Policy**.
   b. In the **Effect** field, select **Allow**.
   c. In the **Principal** field, enter the Elastic Load Balancing Account ID you just saved.
   d. Click the **Actions** dialog box, and select `PutObject`.
   e. In the **Amazon Resource Name (ARN)** field, enter the ARN of your Amazon S3 bucket in the following format:

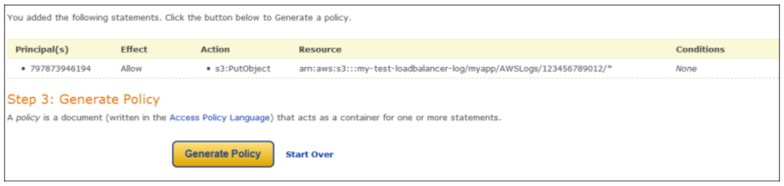
   ```
   arn:aws:s3:::yourS3bucketname/prefix/AWSLogs/yourAWSAccountID/*
   ```

   If you are using `us-gov-west-1` region, use the ARN format `arn:aws-us-gov:` instead of `arn:aws:`.

   The Account ID specified in the ARN (*`yourAWSAccountID`*) is the AWS Account ID that is associated with the load balancer. The Amazon S3 bucket (*`yourS3bucketname`*) can either belong to the same account as the load balancer or belong to a different account.

   Important
   Make sure to specify the AWS Account ID without the hyphens.

   f. Click **Add Statement**.
   g. Your policy statement is displayed. Your policy statement should look like the statement in the following image:



You added the following statements. Click the button below to Generate a policy.

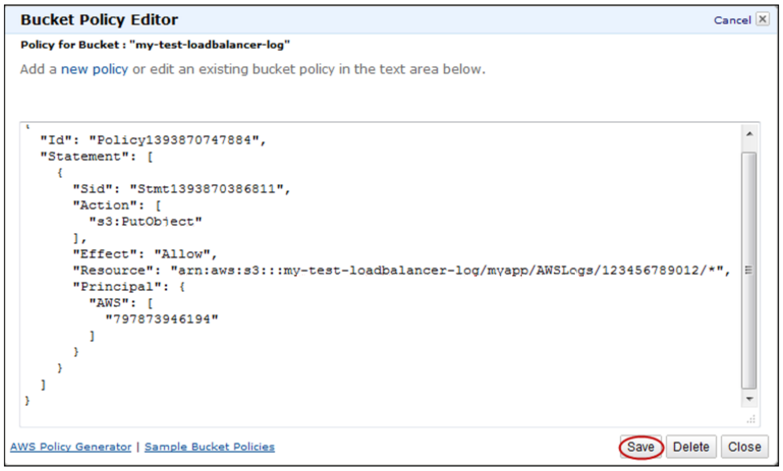
Principal(s)	Effect	Action	Resource	Conditions
• 797873946194	Allow	• s3:PutObject	arn:aws:s3:::my-test-loadbalancer-log/myapp/AWSLogs/123456789012/*	*None*

Step 3: Generate Policy

A *policy* is a document (written in the Access Policy Language) that acts as a container for one or more statements.

   h. Click **Generate Policy**.

8. On the **Policy JSON Document** page, select and copy the generated policy.
9. Click **Close** to close the policy document page.
10. Go back to the **Bucket Policy Editor** page and paste the copied policy in the text area.



Bucket Policy Editor

Policy for Bucket : "my-test-loadbalancer-log"

Add a new policy or edit an existing bucket policy in the text area below.

```
{
  "Id": "Policy1393870747884",
  "Statement": [
    {
      "Sid": "Stmt1393870386811",
      "Action": [
        "s3:PutObject"
      ],
      "Effect": "Allow",
      "Resource": "arn:aws:s3:::my-test-loadbalancer-log/myapp/AWSLogs/123456789012/*",
      "Principal": {
        "AWS": [
          "797873946194"
        ]
      }
    }
  ]
}
```

11. Click **Save** to save the policy. If the **Save** button is not enabled, press Enter.
12. On the S3 Console page, in the **Permissions** pane, click **Save** to attach the policy to your Amazon S3 bucket.

Logging Elastic Load Balancing API Calls Using AWS CloudTrail

You can use AWS CloudTrail to capture Elastic Load Balancing (ELB) API calls made by or on behalf of your Amazon Web Services (AWS) account. CloudTrail stores the information as log files in an Amazon S3 bucket that you specify. API calls are logged when you use the ELB API, the ELB CLI, the ELB console, or the AWS CLI. You can use the logs collected by CloudTrail to monitor activity of your ELB load balancers and determine what API call was made to the load balancer, the source IP address that made the API call, who made the call, when it was made, and so on.

To learn more about AWS CloudTrail, see the AWS CloudTrail User Guide.

> **Note**
> AWS CloudTrail only logs events for ELB API calls. If you want to monitor actions taken on your load balancer that are not part of the ELB API, such as when a client makes a request to your load balancer, then you will need to use Elastic Load Balancing's access log feature. For more information, see Access Logs (p. 211).

Configure CloudTrail Event Logging

AWS CloudTrail creates log entries in each supported region separately and stores them in the Amazon S3 bucket created for that region. For information on regions supported by CloudTrail, see Regions and Endpoints – CloudTrail

You can enable CloudTrail using the AWS Management Console, CLI, or API. When you enable CloudTrail logging, the CloudTrail service can create an Amazon S3 bucket for you to store your log files. If you would rather get one log file for all the supported regions, you can choose to aggregate the logs created across the regions to a single Amazon S3 bucket.

For information on creating a CloudTrail, see Creating and Updating Your Trail. For information on aggregating logs, see Aggregating CloudTrail Log Files to a Single Amazon S3 Bucket.

You can optionally configure CloudTrail to use Amazon SNS to notify you when a log file is created. CloudTrail will send notifications to you frequently, so we recommend that you use Amazon SNS in conjunction with an Amazon SQS queue and handle notifications programmatically.

There is no cost to use the CloudTrail service. However, standard rates for Amazon S3 apply as well as rates for Amazon SNS and Amazon SQS apply should you include that option. For pricing details, see the Amazon S3 Pricing, Amazon SNS Pricing, and Amazon SQS Pricing pages.

Elastic Load Balancing Event Entries in CloudTrail Log Files

AWS CloudTrail log files contain event information formatted using JSON. An event record represents a single AWS API call and includes information about the requested action, such as the user that requested the action, and the date and the time of the request.

CloudTrail log files include events for all AWS API calls for your AWS account, not just calls to the Elastic Load Balancing API. However, you can read the log files and scan for calls to the Elastic Load Balancing API using the `eventSource` element with the value `elasticloadbalancing.amazonaws.com`. If you would like to obtain a specific ELB API such as `CreateLoadBalancer`, then scan for calls in the `eventName` element.

The following example shows a CloudTrail log for a user who created a load balancer and then deleted that load balancer using the ELB CLI. The CLI is identified by the `userAgent` element. The requested

API calls (CreateLoadBalancer and DeleteLoadBalancer) are found in the `eventName` element for each record. Information about the user (`Alice`) can be found in the `userIdentity` element.

```
{
   Records: [
     eventVersion: "1.01",
     userIdentity:
     {
        type: "IAMUser",
        principalId: "60505EXAMPLE",
        arn: "arn:aws:iam::123456789012:user/Alice",
        accountId: "123456789012",
        accessKeyId: "AKIAIOSFODNN7EXAMPLE"
      },
        eventTime: "2014-04-01T15:31:48Z",
        eventSource: "elasticloadbalancing.amazonaws.com",
        eventName: "CreateLoadBalancer",
        awsRegion: "us-east-1",
        sourceIPAddress: "127.0.0.01",
        userAgent: "Amazon CLI/ElasticLoadBalancing API 2012-06-01",
        requestParameters:
            {
              loadBalancerName: "my-test-loadbalancer",
              listeners:
              [
                {
                  loadBalancerPort: 80,
                  protocol: "http",
                  instanceProtocol: "http",
                  instancePort: 80
                }
              ],
              availabilityZones:
              [
                  "us-east-1a"
              ]
            },
         responseElements:
            {
              dNSName: "my-test-loadbalancer-1234567890.elb.amazonaws.com"
            },
              requestID: "b9960276-b9b2-11e3-8a13-f1ef1EXAMPLE",
              eventID: "6f4ab5bd-2daa-4d00-be14-d92efEXAMPLE"
             }
     ]
   {
      eventVersion: "1.01",
      userIdentity:
      {
         type: "IAMUser",
         principalId: "60505EXAMPLE",
         arn: "arn:aws:iam::123456789012:user/Alice",
         accountId: "123456789012",
         accessKeyId: "AKIAIOSFODNN7EXAMPLE"
       },
         eventTime: "2014-04-01T16:30:30Z",
         eventSource: "elasticloadbalancing.amazonaws.com",
         eventName: "DeleteLoadBalancer",
         awsRegion: "us-east-1",
         sourceIPAddress: "127.0.0.02",
         userAgent: "Amazon CLI/ElasticLoadBalancing API 2012-06-01",
         requestParameters: {
         loadBalancerName: "my-test-loadbalancer"
       },
         responseElements: null,
         requestID: "f0f17bb6-b9ba-11e3-9b20-999fdEXAMPLE",
         eventID: "4f99f0e8-5cf8-4c30-b6da-3b69fEXAMPLE"
     },
. . . . additional entries
  ]
  }
```

For more information about the different elements and values in CloudTrail log files, see CloudTrail Event Reference in the *AWS CloudTrail User Guide*.

You can also use one of the Amazon partner solutions that integrate with CloudTrail to read and analyze your CloudTrail log files. For options, see the AWS partners page.

Controlling User Access to Your Load Balancer

When you sign up with Amazon Web Services (AWS), you are granted access to all AWS resources, including Elastic Load Balancing (ELB) and Amazon Elastic Cloud Compute (EC2). AWS uses your security credentials to identify you and to grant you access. If your organization needs to have multiple users and groups able to access AWS resources, then you must either create multiple accounts with AWS or use AWS Identity and Access Management (IAM) to create multiple users and groups under your AWS account. With IAM, you can centrally manage users, security credentials such as access keys, and permissions that control which AWS resources users and groups can access.

For example, you can use IAM to create users and groups under your AWS account (an IAM user can be a person, a system, or an application). Then you grant permissions to the users and groups to perform specific actions on the specified resources.

For general information about IAM, see, What is IAM?. For information on creating and managing users and groups, see IAM Users and Groups.

Using IAM Policy to Grant Permissions

By default, IAM users are not allowed to create or modify any Elastic Load Balancing resource. An Elastic Load Balancing resource can be one or more load balancers associated with your AWS account. After you create IAM users and groups, you can grant them permissions to access your load balancers by creating IAM policies. The IAM policies are attached to the IAM users or groups that require those permissions. When the policy is attached, it allows or denies the users permission to perform the specified tasks on the specified load balancers.

For example, you can create an IAM policy that allows only a group of managers to use `DeleteLoadBalancer` API action on all your load balancers or you can create an IAM policy that allows only a group of developers to use API actions on a specific load balancer. You can then attach the policy to the specific IAM group that requires these permissions.

IAM Policy Syntax

An IAM policy is a JSON document that consists of one of more statements. A statement has the following elements:

- **Effect:** The *effect* can be Allow or Deny. By default, IAM users don't have permission to use resources and API actions, so all requests are denied. An explicit allow overrides the default. An explicit deny overrides any allows.
- **Action:** The *action* is the specific API action for which you are granting or denying permission. To learn about specifying action, see Specifying ELB Actions in an IAM Policy (p. 230).
- **Resource:** The resource that's affected by the action. Some Elastic Load Balancing API actions allow you to include specific load balancer in your policy that can be created or modified by the action. To specify a load balancer in the statement, you need to use its Amazon Resource Name (ARN). For more information about specifying the arn value, see Specifying ELB Resources in an IAM Policy (p. 231). For more information about which API actions support specifying the load balancer ARN, see Elastic Load Balancing APIs Supporting Permissions (p. 231). If the API action does not support ARNs, use the * wildcard to specify that all load balancers can be affected by the action.
- **Condition:** Conditions are optional. They can be used to control when your policy will be in effect. For more information about specifying conditions for Elastic Load Balancing, see Specifying Condition Keys in an IAM Policy (p. 232).

The following example shows the structure of a statement in an IAM policy JSON document:

```
{
"Version": "2012-10-17",
  "Statement":[{
    "Effect":"effect",
    "Action":"action",
    "Resource":"resource-arn",
    "Condition":{
      "condition":{
        "key":"value"
        }
      }
    }
  ]
}
```

For examples of IAM policies that control access to your load balancers, see Example IAM Policies for Elastic Load Balancing (p. 233).

Allow or Deny Permissions in an IAM Policy

In the **Effect** element of your IAM policy statement, you can control user access to your load balancer by either allowing or denying permissions to use API actions specified in the **Action** element of your IAM policy statement.

Specifying ELB Actions in an IAM Policy

In the **Action** element of your IAM policy statement, you can specify any API action that Elastic Load Balancing offers. The action name must be prefixed with the lowercase string `elasticloadbalancing:`. For example: `elasticloadbalancing:DescribeLoadBalancers`.

To specify multiple actions in a single statement, enclose them in square brackets and separate them with a comma as follows:

```
"Action":["elasticloadbalancing:action1","elasticloadbalancing:action2"]
```

You can also specify multiple actions using the * wildcard. The following example specifies all ELB API action names that start with the word “`Create`”.

```
"Action":"elasticloadbalancing:Create*"
```

To specify all Elastic Load Balancing API actions, use the * wildcard as in the following example:

```
"Action":"elasticloadbalancing:*"
```

For a list of the API actions for ELB, see Actions in the *Elastic Load Balancing API Reference*.

Specifying ELB Resources in an IAM Policy

To specify a load balancer in the **Resource** element of the policy statement, you need to use its Amazon Resource Name (ARN). An ELB load balancer ARN consists of the following information:

`region`— The region for the load balancer. For list of regions supported by Elastic Load Balancing, see Regions and Endpoints.

`account-id`— The AWS account ID, with no hyphens (for example, 0123456789012).

`load-balancer-name`— Name of your load balancer. You can use the * wildcard to specify all load balancers that belong to a specific account.

An ELB load balancer ARN has the following syntax:

```
"Resource":"arn:aws:elasticloadbalancing:region:your-account-id:loadbalan
cer/your-load-balancer-name"
```

The following is an example of an ARN for a load balancer `MyTestLoadBalancer` in `us-east-1` region.

```
"Resource":"arn:aws:elasticloadbalancing:us-east-1:123456789012:loadbalan
cer/MyTestLoadBalancer"
```

You control user access to your load balancer by either allowing or denying permissions to use APIs specified in the **Action** element of your IAM policy statement.

Elastic Load Balancing APIs Supporting Permissions

Elastic Load Balancing currently supports setting permissions for a user or a group to use the following APIs with a specific load balancer:

ELB APIs Supporting Permissions	
`AddTags`	`ApplySecurityGroupsToLoadBalancer`
`AttachLoadBalancerToSubnets`	`ConfigureHealthCheck`
`CreateAppCookieStickinessPolicy`	`CreateLBCookieStickinessPolicy`
`CreateLoadBalancer`	`CreateLoadBalancerListeners`
`CreateLoadBalancerPolicy`	`DeleteLoadBalancer`
`DeleteLoadBalancerListeners`	`DeleteLoadBalancerPolicy`

ELB APIs Supporting Permissions	
`DeregisterInstancesFromLoadBalancer`	`DetachLoadBalancerFromSubnets`
`DisableAvailabilityZonesForLoadBalancer`	`EnableAvailabilityZonesForLoadBalancer`
`ModifyLoadBalancerAttributes`	`RegisterInstancesWithLoadBalancer`
`RemoveTags`	`SetLoadBalancerListenerSSLCertificate`
`SetLoadBalancerPoliciesForBackendServer`	`SetLoadBalancerPoliciesOfListener`

Elastic Load Balancing does not support setting permissions for a user or a group to use the following APIs with a specific load balancer:

- `DescribeInstanceHealth`
- `DescribeLoadBalancerAttributes`
- `DescribeLoadBalancerPolicyTypes`
- `DescribeLoadBalancers`
- `DescribeLoadBalancerPolicies`
- `DescribeTags`

You can continue to use the Describe APIs in the **Action** element of the policy statement to grant access to all ELB load balancers. However, if you use the Describe APIs in the **Action** element and also specify a load balancer ARN in the **Resource** element, the API call will fail.

The following example policy allows users to call `DescribeInstanceHealth` API on all load balancers.

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

Specifying Condition Keys in an IAM Policy

In an IAM policy statement, you have the option to specify conditions that control when it is in effect. Each condition contains one or more key-value pairs. AWS has defined the following keys you can use to specify conditions under which your IAM users and groups can use the load balancers.

Note
Key names are case sensitive.

- `aws:CurrentTime`— Use with date/time conditions to restrict access based on request time (see Date Conditions).
- `aws:EpochTime`— Use with date/time conditions to specify a date in epoch or UNIX time (see Date Conditions).
- `aws:MultiFactorAuthPresent`— Use to check whether the IAM user making the API request was authenticated using a multi-factor authentication (MFA) device.

- `aws:MultiFactorAuthAge`— Use to check how long ago (in seconds) the Multi-Factor Authentication (MFA) validated security credentials making the request were issued using multi-factor authentication (MFA). Unlike other keys, if MFA is not used, this key is not present (see Existence of Condition Keys, Numeric Conditions and Using Multi-Factor Authentication (MFA) Devices with AWS).
- `aws:SecureTransport`— Use to check whether the request was sent using SSL (see Boolean Conditions).
- `aws:SourceIp`— Use to check the requester's IP address (see IP Address). Note that if you use `aws:SourceIp`, and the request comes from an Amazon EC2 instance, the public IP address of the instance is evaluated.
- `aws:Referer`— Use to check the user making the HTTP request.
- `aws:UserAgent`— Use with string conditions to check the client application that made the request (see String Conditions).
- `aws:userid`— Use to check the user ID of the requester (see String Conditions).
- `aws:username`—Use to check the user name of the requester, if available (see String Conditions).

After you have decided how you want to control access to your load balancers, go to the IAM Console and follow the instructions in the Managing IAM Policies to create an IAM policy for Elastic Load Balancing. For information on testing the IAM policy you just created, see Testing IAM Policies.

Example IAM Policies for Elastic Load Balancing

This section shows several example IAM policy statements that you can use to control permissions that IAM users or IAM groups have to access your load balancer.

Example 1: Allows users to use only those API actions that support permissions with a specific load balancer

The following policy allows users to use all Describe APIs with all the load balancers associated with AWS account and allows users to use the supported API actions on the load balancer, `MyTestLoadBal-ancer` only.

```
{
"Version": "2012-10-17",
   "Statement":[{
      "Effect":"Allow",
      "Action":"elasticloadbalancing:Describe*",
      "Resource":"*"
      },
      {
      "Effect":"Allow",
      "Action": [
      "elasticloadbalancing:ApplySecurityGroupsToLoadBalancer",
      "elasticloadbalancing:AttachLoadBalancerToSubnets",
      "elasticloadbalancing:ConfigureHealthCheck",
      "elasticloadbalancing:Create*",
      "elasticloadbalancing:Delete*",
      "elasticloadbalancing:DeregisterInstancesFromLoadBalancer",
      "elasticloadbalancing:DetachLoadBalancerFromSubnets",
      "elasticloadbalancing:DisableAvailabilityZonesForLoadBalancer",
      "elasticloadbalancing:EnableAvailabilityZonesForLoadBalancer",
      "elasticloadbalancing:ModifyLoadBalancerAttributes",
      "elasticloadbalancing:RegisterInstancesWithLoadBalancer",
      "elasticloadbalancing:Set*"
      ],
      "Resource":"arn:aws:elasticloadbalancing:us-east-1:123456789012:loadbal
ancer/MyTestLoadBalancer"
      }
   ]
}
```

Example 2: Allow users to use only those API actions that support permissions with two load balancers

The following policy grants users permission to use only those API actions that support permissions with `MyTestLoadBalancer-1` and `MyTestLoadBalancer-2`.

```
{
"Version": "2012-10-17",
   "Statement":[{
      "Effect":"Allow",
      "Action":"elasticloadbalancing:Describe*",
      "Resource":"*"
      },
      {
      "Effect":"Allow",
      "Action": [
      "elasticloadbalancing:ApplySecurityGroupsToLoadBalancer",
      "elasticloadbalancing:AttachLoadBalancerToSubnets",
      "elasticloadbalancing:ConfigureHealthCheck",
      "elasticloadbalancing:Create*",
      "elasticloadbalancing:Delete*",
      "elasticloadbalancing:DeregisterInstancesFromLoadBalancer",
      "elasticloadbalancing:DetachLoadBalancerFromSubnets",
      "elasticloadbalancing:DisableAvailabilityZonesForLoadBalancer",
      "elasticloadbalancing:EnableAvailabilityZonesForLoadBalancer",
      "elasticloadbalancing:ModifyLoadBalancerAttributes",
      "elasticloadbalancing:RegisterInstancesWithLoadBalancer",
      "elasticloadbalancing:Set*"
      ],
      "Resource":[
     "arn:aws:elasticloadbalancing:us-east-1:123456789012:loadbalancer/MyTest
LoadBalancer-1",
     "arn:aws:elasticloadbalancing:us-east-1:123456789012:loadbalancer/MyTest
LoadBalancer-2"
      ]
        ]
      }
   ]
}
```

Example 3: Allow users to call multiple API actions on a specific load balancer

The following policy grants users to use only `RegisterInstancesWithLoadBalancer` and `DeregisterInstancesFromLoadBalancer` API actions on load balancer `MyTestLoadBalancer`.

```
{
"Version": "2012-10-17",
   "Statement":[{
      "Effect":"Allow",
      "Action":[
      "elasticloadbalancing:DeregisterInstancesFromLoadBalancer",
      "elasticloadbalancing:RegisterInstancesWithLoadBalancer"
      ],
     "Resource":"arn:aws:elasticloadbalancing: us-east-1:123456789012:loadbal
ancer/MyTestLoadBalancer”
      }
   ]
}
```

Example 4: Allow users to call multiple API actions on a specific load balancer using SSL

The following policy grants users to use only `RegisterInstancesWithLoadBalancer` and `Deregis-terInstancesFromLoadBalancer` API actions on load balancer `MyTestLoadBalancer` with an SSL request.

```
{
"Version": "2012-10-17",
   "Statement":[{
      "Effect":"Allow",
      "Action":[
      "elasticloadbalancing:DeregisterInstancesFromLoadBalancer",
      "elasticloadbalancing:RegisterInstancesWithLoadBalancer"
      ],
      "Condition":{"Bool":{"aws:SecureTransport":"true"}},
      "Resource":"arn:aws:elasticloadbalancing:us-east-1:123456789012:loadbal
ancer/MyTestLoadBalancer"
      }
   ]
}
```

Troubleshoot Elastic Load Balancing

The following tables list the troubleshooting resources that you'll find useful as you work with Elastic Load Balancing.

Troubleshooting Elastic Load Balancing: API Response

API Response
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OutofService: A Transient Error Occurred (p. 237)

Troubleshooting Elastic Load Balancing: HTTP Error Messages

HTTP Error Message
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Troubleshooting Elastic Load Balancing: Response Codes

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Response Code
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Troubleshooting Elastic Load Balancing: Health Check

Health Check Errors
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Troubleshooting Elastic Load Balancing : Registering Instances

Error Registering Instances
Taking too long to register back-end instances. (p. 241)
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Troubleshooting Elastic Load Balancing: API Response

This section provides information about the error messages returned by Elastic Load Balancing API, potential causes, and steps you can take to narrow down and resolve the issue.

CertificateNotFound: undefined

Cause 1: There is a delay in propagating the certificate to all the regions when it is created using the AWS Management Console. When the delay occurs, the error message is shown in the last step of the Create Load Balancer process.

Solution: Wait approximately 15 minutes and then try again. If the problem persists, contact the AWS Support Center.

Cause 2: If you are using the command line tools or API directly, you may receive this error if you provide a certificate Amazon Resource Name (ARN) that does not exist.

Solution: Use the Identity and Access Management (IAM) action GetServerCertificate to get the certificate ARN and verify that you provided the correct value for the ARN.

OutofService: A Transient Error Occurred

Cause: This error message usually indicates a transient internal problem within the Elastic Load Balancing service or the underlying network. This temporary issue may also occur when Elastic Load Balancing queries the health of the load balancer and its associated back-end instances.

Solution: Retry the API call. If the problem persists, contact the AWS Support Center.

Troubleshooting Elastic Load Balancing: Error Messages

This section provides information about the error messages returned by your load balancer, potential causes, and steps you can take to narrow down and resolve the issue.

HTTP 400: BAD_REQUEST

Description: Indicates that the client sent a bad request.

Cause: The client sent a malformed request that does not meet HTTP specifications.

Solution: Verify that the request coming from the client meets the HTTP specifications.

HTTP 405: METHOD_NOT_ALLOWED

Description: Indicates that the method length is not valid.

Cause: The length of the method in the request header exceeds 127 characters.

Solution: Check the length of the method.

HTTP 408: Request Timeout

Description: Indicates that the client cancelled the request or failed to send a full request.

Cause: A network interruption or a bad request construction, such as partially formed headers; specified content size doesn't match the actual content size transmitted; and so on.

Solution: Inspect the code that is making the request and try sending it directly to your registered instances (or a development / test environment) where you have more control over inspecting the actual request.

HTTP 502: Bad Gateway

Description: Indicates that the load balancer was unable to parse the response sent from a registered instance.

Cause: Malformed response from the instance or potentially an issue with the load balancer.

Solution: Verify that the response being sent from the instance conforms to HTTP specifications. Contact the AWS Support Center for further assistance.

HTTP 503: Service Unavailable or HTTP 504 Gateway Timeout

Description: Indicates that either the load balancer or the registered instances are causing error. The error can be caused by either one of more of the following:

- **Cause 1**: Insufficient capacity in the load balancer to handle the request.

  Solution: This should be a transient issue and should not last more than a few minutes. If it persists, contact the AWS Support Center for further assistance.

- **Cause 2**: Registered instances closing the connection to Elastic Load Balancing.

  Solution: Enable keep-alive settings on your EC2 instances and set the keep-alive timeout to greater than or equal to the idle timeout settings of your load balancer. For more information, see Idle Connection Timeout (p. 8).

- **Cause 3**: No registered instances.

  Solution: Register at least one instance in every Availability Zone that your load balancer is configured to respond in. Verify this by looking at the `HealthyHostCount` metrics in CloudWatch. If you cannot ensure that an instance is registered in each Availability Zone, we recommend enabling cross-zone load balancing. For more information, see Enable or Disable Cross-Zone Load Balancing for Your Load Balancer (p. 152).

- **Cause 4**: No healthy instances.

  Solution: Ensure that you have healthy instances in every Availability Zone that your load balancer is configured to respond in. Verify this by looking at the `HealthyHostCount` in CloudWatch.
- **Cause 5**: Connection to the client is closed (load balancer could not send a response)

  Solution: Verify that the client is not closing the connection before a response is sent by using a *packet sniffer* on the machine making the request.
- **Cause 6**: The instance's security group does not allow communication with load balancer.

  Solution: Ensure that your back-end instance's security group is configured to allow access your load balancer's instance port.

Troubleshooting Elastic Load Balancing: Response Codes

This section provides information about the response code metrics returned by Amazon CloudWatch for your load balancer, potential causes, and steps you can take to narrow down and resolve the issue.

What is Response Code Metrics?

Your load balancer emits metrics to Amazon CloudWatch for the HTTP response codes sent to clients, identifying the source of the errors as either the load balancer or the back-end instances. You can use the metrics returned by CloudWatch for your load balancer to troubleshoot Elastic Load Balancing. For information on using Amazon CloudWatch, list of available metrics for your load balancer, and for the procedure for viewing the available metrics, see Monitor Your Load Balancer Using Amazon CloudWatch (p. 201). The following metrics are available:

HTTPCode_ELB_4XX

Cause: Indicates a malformed or a cancelled request from the client.

Solution: See HTTP 400: BAD_REQUEST (p. 238).

Solution: See HTTP 405: METHOD_NOT_ALLOWED (p. 238).

Solution: See HTTP 408: Request Timeout (p. 238).

HTTPCode_ELB_5XX

Cause: Either the load balancer or the registered instance is causing the error or the load balancer is unable to parse the response.

Solution: See HTTP 502: Bad Gateway (p. 238).

Solution: See HTTP 503: Service Unavailable or HTTP 504 Gateway Timeout (p. 238).

HTTPCode_Backend_2XX

Cause: Indicates a normal, successful response from the registered instance(s).

Solution: None

HTTPCode_Backend_3XX

Cause: Indicates some type of redirect response sent from the registered instance(s).

Solution: View the access or error logs on your instance(s) to determine the cause. Send requests directly to the instance (bypass the load balancer) to view the responses.

HTTPCode_Backend_4XX

Cause: Indicates some type of client error response sent from the registered instance(s).

Solution: View the access or error logs on your instance(s) to determine the cause. Send requests directly to the instance (bypass the load balancer) to view the responses.

HTTPCode_Backend_5XX

Cause: Indicates some type of server error response sent from the registered instance(s).

Solution: View the access or error logs on your instance(s) to determine the cause. Send requests directly to the instance (bypass the load balancer) to view the responses.

Troubleshooting Elastic Load Balancing: Health Check Configuration

Your load balancer performs health checks on your instances using the protocol, URL, timeout, and interval specified when you configured your load balancer. For more information, see Health Check (p. 7). However, there are several reasons your health check can fail from the load balancer perspective. This section provides information about potential causes and steps you can take to narrow down and resolve the failed health check issues.

Registered instances failing load balancer health check

Your registered instances can fail the health check performed by your load balancer for one or more of the following reasons:

- **Problem**: Instance(s) closing the connection to the load balancer.

  Cause: Elastic Load Balancing terminates a connection if it is idle for more than 60 seconds. The idle connection is established when there is no read or write event taking place on both the sides of the load balancer (client to load balancer and load balancer to the back-end instance).

  Solution: Set the timeout settings on your registered instances to at least 60 seconds.
- **Problem**: Responses timing out.

  Cause: When the load balancer performs a health check, the instance may be under significant load and may take longer than your configured timeout interval to respond.

  Solution: Try adjusting the timeout on your health check settings.
- **Problem**: Non-200 response received.

  Cause: When the load balancer performs an HTTP/HTTPS health check, the instance must return a 200 HTTP code. Any other response code will be considered a failed health check.

  Solution: Search your application logs for responses sent to the health check requests.
- **Problem**: Failing public key authentication.

  Cause: If you are using an HTTPS or SSL load balancer with back-end authentication enabled, the public key authentication will fail if the public key on the certificate does not match the public key configured on the load balancer.

  Solution: Check if your SSL certificate needs to be updated. If your SSL certificate is current, try re-installing the certificate on your load balancer.

Stopped and started instances failing load balancer health check

EC2-Classic Instance

Problem: Stopped and started instances launched in EC2-Classic are failing load balancer health checks.

Cause: Elastic Load Balancing registers your load balancer with your EC2 instance using the associated IP address. When your EC2 instance launched in EC2-Classic is stopped and then restarted, the IP address associated with your instance changes. Your load balancer does not recognize the new IP address which prevents it from connecting with the instance.

Solution: Deregister the instance from the load balancer after you stop the instance and then register the instance with the load balancer after you start the instance. For the procedure for deregistering and then registering the instance, see Deregister and Register Amazon EC2 Instances (p. 139).

EC2-VPC Instance

Problem: Stopped and started instances launched in EC2-VPC are failing load balancer health checks.

Cause: When you stop and then start your EC2-VPC instance, it might take some time for the Elastic Load Balancing to recognize that the instance has restarted. During this time, the load balancer is not connected with the restarted instance.

Solution: Re-register the instance with the load balancer after the restart. For the procedure for registering the instance, see Registering Your Amazon EC2 Instances with Your Load Balancer (p. 140).

Troubleshooting Elastic Load Balancing: Registering Instances

When you register an instance with your load balancer, there are a number of steps that are taken before the load balancer will begin sending requests to your instance. This section provides information about potential causes and steps you can take to narrow down and resolve the issues your load balancer might encounter when registering your back-end instances.

Taking too long to register back-end instances.

Problem: Registering instances taking longer than expected to be `In Service`.

Cause: Your back-end instances might be failing health check. After the initial instance registration steps are completed (it can take up to approximately 30 seconds), the back-end instances go through the health checks. Your load balancer will not treat your back-end instances as `In Service` until it has successfully met the healthy threshold defined in your health check configuration.

Solution: Try the steps recommended in the preceding section Registered instances failing load balancer health check (p. 240).

Unable to register instance launched from a paid AMI.

Problem: Elastic Load Balancing not registering instances launched using a paid AMI.

Cause: Your instances might have been launched using a paid AMI from Amazon DevPay site.

Solution: Elastic Load Balancing does not support registering instances launched using paid AMI from Amazon DevPay site. If you want to use paid AMI, depending on your use case, you might find AWS Marketplace to be a good alternative. If you are already using a paid AMI from AWS Marketplace and are unable to register the instance launched from that paid AMI, contact the AWS Support Center for further assistance.

For more information on paid AMIs, see Paid AMIs in the *Amazon Elastic Compute Cloud User Guide*.

Elastic Load Balancing Resources

The following table lists resources that you'll find useful as you work with Elastic Load Balancing.

Resource	Description
Elastic Load Balancing	The primary web page for information about Elastic Load Balancing.
Elastic Load Balancing Pricing	The primary web page for Elastic Load Balancing pricing information.
Technical FAQ	The FAQ covers questions developers have asked about Elastic Load Balancing.
Release Notes	The release notes give a high-level overview of the current release. They specifically note any new features, corrections, and known issues.
Amazon EC2 Discussion Forums	Get help from the community of developers.
Contact Us	A central contact point for inquiries concerning AWS billing, account, events, abuse, etc.
Support Center	A central point to track and manage all support cases related to your AWS account.
AWS Support	The primary web page for information about AWS Premium Support, a one-on-one, fast-response support channel to help you build and run applications on AWS Infrastructure Services.
AWS Trusted Advisor	A cloud consultant service that is available to customers with Business-level and Enterprise-level support to help optimize the costs, security, and performance of your AWS environment

Document History

The following table describes the important changes to the *Elastic Load Balancing Developer Guide*.

- **API version**: 2012-06-01
- **Latest documentation update**: August 11, 2014

Feature	WSDL and CLI Download	Description	Release Date
Support for tagging your load balancer.	2014-08-11 WSDL	Added information about using tags to organize and manage your load balancers. For more information, see Tagging (p. 11). Starting with this release, Elastic Load Balancing CLI (ELB CLI) has been replaced by AWS Command Line Interface (AWS CLI), a unified tool to manage multiple AWS services. New features released after ELB CLI version 1.0.35.0 (dated 7/24/14) will be included in the AWS CLI only. If you are currently using the ELB CLI, we recommend that you start using the AWS Command Line Interface (AWS CLI) instead. For more information, see Using AWS Command Line Interface (p. 18).	August 11, 2014
Support for configuring idle connection timeout for your load balancer.	2014-07-24 WSDL	Added information about idle connection timeout and the steps for configuring idle timeout for your load balancer. For more information, see Idle Connection Timeout (p. 8).	July 24, 2014

Feature	WSDL and CLI Download	Description	Release Date
Support for granting IAM users and groups access to specific load balancers or API actions.	2014-03-20 WSDL	Added information about using IAM policy to grant IAM users and groups access to specific load balancer or API actions. For more information, see Controlling User Access to Your Load Balancer (p. 229).	May 12, 2014
Support for AWS CloudTrail	2014-03-20 WSDL	Added information about using AWS CloudTrail to capture API calls made by or on behalf of your AWS account using the ELB API, the ELB console, the ELB CLI, or the AWS CLI. For more information, see Logging Elastic Load Balancing API Calls Using AWS CloudTrail (p. 226).	April 04, 2014
Support for Connection Draining	2014-03-20 WSDL	Added information about connection draining. With this support you can enable your load balancer to stop sending new requests to the registered instance when the instance is deregistering or when the instance becomes unhealthy, while keeping the existing connections open. For more information, see Connection Draining (p. 8).	March 20, 2014
Support for Access Logs	2014-03-06 WSDL	Added information about Access Logs. With this support you can enable your load balancer to capture access logs and store them into an Amazon S3 bucket. For more information, see Access Logs (p. 211).	March 06, 2014
Support for TLSv1.1-1.2	2013-11-06 WSDL	Added information about TLSv1.1-1.2 protocol support for load balancers configured with HTTPS/SSL listeners. With this support, Elastic Load Balancing also updates the predefined SSL negotiation configurations. For information about the updated predefined SSL negotiation configurations, see SSL Negotiation Configurations for Elastic Load Balancing (p. 54). For information on how to update your current SSL negotiation configuration, see Update SSL Negotiation Configuration of Your Load Balancer (p. 145).	February 19, 2014

Feature	WSDL and CLI Download	Description	Release Date
Cross-Zone Load Balancing	2013-11-06 WSDL	Added information about enabling cross-zone load balancing for your load balancer. For information on cross-zone load balancing, see Request Routing (p. 6). For procedure on enabling or disabling the cross-zone load balancing, see Enable or Disable Cross-Zone Load Balancing for Your Load Balancer (p. 152)	November 06, 2013
Additional Amazon CloudWatch Metrics	2012-06-01 WSDL	Added information about the additional Amazon Cloudwatch metrics reported by Elastic Load Balancing. For information on all the metrics reported by Elastic Load Balancing and on how to use the metrics, see Monitor Your Load Balancer Using Amazon CloudWatch (p. 201).	October 28, 2013
Support for Proxy Protocol	2012-06-01 WSDL	Added information about Proxy Protocol support for load balancers configured for TCP/SSL connections. For more information, see Proxy Protocol (p. 10).	July 30, 2013
Support for DNS Failover	2012-06-01 WSDL	Added information about configuring Route 53 DNS failover for load balancers. For more information, see Configure DNS Failover for Your Load Balancer (p. 180).	June 03, 2013
HTTP Methods	2012-06-01 WSDL	Added information about the HTTP methods supported by Elastic Load Balancing. For more information, see HTTP Methods (p. 9).	May 20, 2013
Console support for viewing Amazon CloudWatch metrics and for creating alarms	2012-06-01 WSDL	Added information about viewing Amazon CloudWatch metrics and creating alarms for a specified load balancer using the Monitoring tab in the console. For more information, see Monitor Your Load Balancer Using Amazon CloudWatch (p. 201).	March 28, 2013
Load Balancing in Default VPC	2012-06-01 WSDL	Added information about default VPC and load balancing Amazon EC2 instances launched within the default VPC. For information on default VPC, see What is Default VPC? (p. 111). For information on creating a load balancer within a default VPC, see Create a Basic Load Balancer in Default VPC (p. 39).	March 11, 2013

Feature	WSDL and CLI Download	Description	Release Date
Internal Load Balancing in Amazon VPC	2012-06-01 WSDL	With this release, a load balancer in Amazon Virtual Private Cloud (Amazon VPC) can be made either internal or Internet-facing. An internal load balancer has a publicly resolvable DNS name that resolves to private IP addresses. An Internet-facing load balancer has a publicly resolvable DNS name that resolves to public IP addresses. For more information, see Create a Basic Internal Load Balancer in Amazon VPC (p. 115).	June 10, 2012
Console support for managing listeners, cipher settings, and SSL certificates	2011-11-15 WSDL	Added information about console support for managing listeners, certificates, and cipher settings for existing load balancers. For information on managing listeners and cipher settings, see Add a Listener to Your Load Balancer (p. 131) and Delete a Listener from Your Load Balancer (p. 137). For information on managing certificates, see Update an SSL Certificate for a Load Balancer (p. 141).	May 18, 2012
Moved Getting Started information	2011-11-15 WSDL	Folded the previously separate *Elastic Load Balancing Getting Started Guide* into this guide. For more information, see Get Started with Elastic Load Balancing (p. 21).	April 03, 2012
New listener configuration content	2011-11-15 WSDL	Added a section on choosing the listener configurations for your load balancer that work best for your use case. For more information, see Listener Configurations for Elastic Load Balancing (p. 47).	April 03, 2012
New troubleshooting content	2011-11-15 WSDL	Added a section on troubleshooting Elastic Load Balancing that provides information on issues you might encounter when using Elastic Load Balancing, discuss the causes, and the steps you can take to resolve the issue. For more information, see Troubleshoot Elastic Load Balancing (p. 236).	April 03, 2012
New content on adding and deleting listeners	2011-11-15 WSDL	Added documentation for adding a listener to your load balancer and for deleting a listener from your load balancer using the Query API or the command line tool. For more information, see Add a Listener to Your Load Balancer (p. 131) and Delete a Listener from Your Load Balancer (p. 137).	April 03, 2012

Feature	WSDL and CLI Download	Description	Release Date
Elastic Load Balancing in Amazon Virtual Private Cloud (Amazon VPC)	2011-11-15 WSDL	Updated the API version to 2011-11-15 and added documentation for using Elastic Load Balancing on Amazon VPC. For more information, see Elastic Load Balancing in Amazon VPC (p. 109).	November 21, 2011
New Content	2011-11-15 WSDL	Added new content for de-registering Amazon EC2 instances from your load balancer. For more information see, Deregister and Register Amazon EC2 Instances (p. 139).	November 21, 2011
New Content	2011-08-15 WSDL	Added documentation for monitoring the load balancer using Amazon CloudWatch. For more information see Monitor Your Load Balancer Using Amazon CloudWatch (p. 201).	October 17, 2011
Restructured content	2011-08-15 WSDL	Moved *Using Domain Names With Elastic Load Balancing* and *Using Ipv6 with Elastic Load Balancing* topics from *Using Elastic Load Balancing* section and placed it under *User Scenarios* section.	October 17, 2011
New features	2011-08-15 WSDL	Updated the API version to 2011-08-15 and added documentation for the new configurable SSL ciphers, back-end SSL, and back-end server authentication features. For more information, see Create a HTTPS/SSL Load Balancer (p. 71).	August 30, 2011
Restructured content	2011-04-05 WSDL	Consolidated the instructions for setting up a load balancer with HTTP support and with HTTPS support into Create a HTTPS/SSL Load Balancer (p. 71) section.	August 04, 2011
Document Update	2011-04-05 WSDL	Added instructions for installing the Elastic Load Balancing command line tool For more information, see Appendix A: Using the Elastic Load Balancing Command Line Interface (p. 251).	August 04, 2011
Zone Apex Domain Name	2011-04-05 WSDL	Updated the API version to 2011-04-05 and added documentation for the new zone apex domain names feature. For more information, see Configure Custom Domain Name for Your Load Balancer (p. 147).	May 24, 2011

Feature	WSDL and CLI Download	Description	Release Date
Application Instance Lock-down	2011-04-05 WSDL	Added documentation for the new Elastic Load Balancing security group for back-end application instance lock-down. For more information, see Manage Security Groups in Amazon EC2-Classic (p. 99).	May 24, 2011
Support for IPv6	2011-04-05 WSDL	Added documentation for the new Internet Protocol version 6 (IPv6) feature. For more information, see Use IPv6 with Elastic Load Balancing (p. 107).	May 24, 2011
Support for X-Forwarded-Proto and X-Forwarded-Port headers.	2010-07-01 WSDL	Added information about X-Forwarded-Proto and X-Forwarded-Port headers. The X-Forwarded-Proto header indicates the protocol of the originating request, and the X-Forwarded-Port header indicates the port of the originating request. The addition of these headers to requests enables customers to determine if an incoming request to their load balancer is encrypted, and the specific port on the load balancer that the request was received on. For more information, see X-Forwarded Headers (p. 11).	October 27, 2010
HTTPS Support	2010-07-01 WSDL	Added information about HTTPS support. With this release, you can leverage the SSL/TLS protocol for encrypting traffic and offload SSL processing from the application instance to the load balancer. This feature also provides centralized management of SSL server certificates at the load balancer, rather than managing certificates on individual application instances. For more information, see HTTPS Support (p. 10).	October 14, 2010
Support for AWS Identity and Access Management (IAM)	2010-07-01 WSDL	Added information about AWS Identity and Access Management (IAM). For more information, see Controlling User Access to Your Load Balancer (p. 229).	September 02, 2010
Support for the Asia Pacific (Singapore) Region.	2009-11-25 WSDL	Added Support for the Asia Pacific (Singapore) Region.	April 28, 2010
Sticky Sessions	2009-11-25 WSDL	Added information about creating session stickiness. For more information, see Sticky Sessions (p. 184).	April 07, 2010
AWS SDK for Java	2009-11-25 WSDL	Added support for Java SDK.	March 22, 2010

Feature	WSDL and CLI Download	Description	Release Date
Support for US-West (Northern California Region	2009-11-25 WSDL	Added support for US-West (Northern California Region.	December 02, 2009
AWS SDK for .NET	2009-05-15 WSDL	Added support for AWS SDK for .NET.	November 11, 2009
New service	2009-05-15 WSDL	Initial public beta release of Elastic Load Balancing.	May 18, 2009

Appendices

This Elastic Load Balancing Developer Guide appendix include the following sections.

Topics

Appendix A: Using the Elastic Load Balancing Command Line Interface

Important
Elastic Load Balancing CLI has been replaced by AWS Command Line Interface (AWS CLI), a unified tool to manage multiple AWS services. New features released after ELB CLI version 1.0.35.0 (dated 7/24/14) will be included in the AWS CLI only. We strongly recommend that you start using the AWS CLI.
For instructions on installing and configuring the AWS CLI, see Getting Set Up with the AWS Command Line Interface.

However, if you want to use the ELB CLI, follow the installation instructions in this section.

The ELB CLI wraps the API actions to provide multi-function commands. The CLI commands are written in Java and include shell scripts for both Windows and Linux/Unix/Mac OSX. The shell scripts are available as a self-contained ZIP file. There is no installation required, simply download and unzip it.

Process for Installing the Command Line Interface

Task 1: Download the Command Line Interface (p. 252)
Task 2: Set the JAVA_HOME Environment Variable (p. 252)
Task 3: Set the AWS_ELB_HOME Environment Variable (p. 253)
Task 4: Set the AWS_CREDENTIAL_FILE Environment Variable (p. 254)
Task 5: Set the Region (p. 255)

Note

As a convention, command line text is prefixed with a generic **`PROMPT>`** command line prompt. The actual command line prompt on your computer is likely to be different. We also use **`$`** to indicate a Linux/UNIX–specific command and **`C:\>`** for a Windows–specific command. Although we don't provide explicit instructions, the tool also works on the Mac OS X. (Commands on the Mac OS X resemble the Linux and UNIX commands.) The example output resulting from the command is shown immediately thereafter without any prefix.

Task 1: Download the Command Line Interface

The command line tool is available as a ZIP file on the Elastic Load Balancing API Tools. The tool is written in Java and includes shell scripts for both Windows and Linux/UNIX/Mac OSX. The ZIP file is self-contained; no installation is required. You just download it and unzip it.

Some additional setup is required before you can use the tool. These steps are discussed next.

Task 2: Set the JAVA_HOME Environment Variable

The Elastic Load Balancing command line tool reads an environment variable (`JAVA_HOME`) on your computer to locate the Java runtime. The command line tool requires Java version 5 or later to run. Either a JRE or JDK installation is acceptable.

To set the `JAVA_HOME` Environment Variable

1. If you do not have Java 1.5 or later installed, download and install it now. To view and download JREs for a range of platforms, including Linux/UNIX and Windows, go to http://java.oracle.com/.
2. Set `JAVA_HOME` to the full path of the directory that contains a subdirectory named `bin` that in turn contains the Java executable. For example, if your Java executable is in the `/usr/jdk/bin` directory, set `JAVA_HOME` to `/usr/jdk`. If your Java executable is in `C:\jdk\bin`, set `JAVA_HOME` to `C:\jdk`.

   Note

   If you are using Cygwin, you must use Linux/UNIX paths (e.g., /usr/bin instead of C:\usr\bin) for `AWS_ELB_HOME` and `AWS_CREDENTIAL_FILE`. However, `JAVA_HOME` should have a Windows path. Additionally, the value cannot contain any spaces, even if the value is quoted or the spaces are escaped.

   The following Linux/UNIX example sets `JAVA_HOME` for a Java executable in the `/usr/local/jre/bin` directory.

   ```
   $ export JAVA_HOME=/usr/local/jre
   ```

   The following Windows example uses **set** and **setx** to set `JAVA_HOME` for a Java executable in the `C:\java\jdk1.6.0_6\bin` directory. The **set** command defines `JAVA_HOME` for the current session and **setx** makes the change permanent.

   ```
   C:\> set JAVA_HOME=C:\java\jdk1.6.0_6
   C:\> setx JAVA_HOME C:\java\jdk1.6.0_6
   ```

   Note

   - The **setx** command does not use the = sign.
   - Don't include the bin directory in `JAVA_HOME`; that's a common mistake some users make. The command line tool won't work if you do.

- The value for `JAVA_HOME` cannot contain any spaces, even if the value is quoted or the spaces are escaped. If the value contains a space character, the command line tool will return an error when you add `JAVA_HOME` to your path in the next step.

3. Add your Java directory to your path before other versions of Java.

   On Linux and UNIX, you can update your `PATH` as follows:

   ```
   $ export PATH=$JAVA_HOME/bin:$PATH
   ```

   On Windows the syntax is slightly different:

   ```
   C:\> set PATH=%JAVA_HOME%\bin;%PATH%
   C:\> setx PATH %JAVA_HOME%\bin;%PATH%
   ```

4. On Linux or UNIX, verify your `JAVA_HOME` setting with the command **`$JAVA_HOME/bin/java -version`**.

   ```
   $ $JAVA_HOME/bin/java -version
   java version "1.5.0_09"
   Java(TM) 2 Runtime Environment, Standard Edition (build 1.5.0_09-b03)
   Java HotSpot(TM) Client VM (build 1.5.0_09-b03, mixed mode, sharing)
   ```

   The syntax is different on Windows, but the output is similar.

   ```
   C:\> %JAVA_HOME%\bin\java -version
   java version "1.5.0_09"
   Java(TM) 2 Runtime Environment, Standard Edition (build 1.5.0_09-b03)
   Java HotSpot(TM) Client VM (build 1.5.0_09-b03, mixed mode, sharing)
   ```

Task 3: Set the AWS_ELB_HOME Environment Variable

The command line tool depends on an environment variable (`AWS_ELB_HOME`) to locate supporting libraries. You'll need to set this environment variable before you can use the tool.

To set the `AWS_ELB_HOME` Environment Variable

1. Set `AWS_ELB_HOME` to the path of the directory into which you unzipped the command line tool. This directory is named `ElasticLoadBalancing-w.x.y.z` (w, x, y, and z are version/release numbers) and contains sub-directories named `bin` and `lib`.

   The following Linux/UNIX example sets `AWS_ELB_HOME` for a directory named `ElasticLoadBalancing-1.0.12.0` in the `/usr/local` directory.

   ```
   $ export AWS_ELB_HOME=/usr/local/ElasticLoadBalancing-1.0.12.0
   ```

   The following Windows example sets `AWS_ELB_HOME` for a directory named `ElasticLoadBalancing-1.0.12.0` in the `C:\CLIs` directory.

```
C:\> set AWS_ELB_HOME=C:\CLIs\ElasticLoadBalancing-1.0.12.0
C:\> setx AWS_ELB_HOME C:\CLIs\ElasticLoadBalancing-1.0.12.0
```

2. Add the tool's `bin` directory to your system `PATH`. The rest of this guide assumes that you've done this.

   On Linux and UNIX, you can update your `PATH` as follows:

   ```
   $ export PATH=$PATH:$AWS_ELB_HOME/bin
   ```

   On Windows the syntax is slightly different:

   ```
   C:\> set PATH=%PATH%;%AWS_ELB_HOME%\bin
   C:\> setx PATH %PATH%;%AWS_ELB_HOME%\bin
   ```

Task 4: Set the AWS_CREDENTIAL_FILE Environment Variable

After you sign up for AWS, you must create access keys for the account. Your access keys are your `AccessKeyId` and `SecretAccessKey`. You must provide your access keys to the command line tools so that they know that the commands that you issue come from your account. The command line tool reads your access keys from a credential file that you create on your local system.

You can either specify your access keys with the `--aws-credential-file` parameter every time you issue a command or you can create an environment variable that points to the credential file on your local system. If the environment variable is properly configured, you can omit the `--aws-credential-file` parameter when you issue a command. The following procedure describes how to create a credential file and a corresponding `AWS_CREDENTIAL_FILE` environment variable.

To create a credential file on your local system

1. Retrieve your access keys.

   Although you can retrieve the access key ID from the **Security Credentials** page, you cannot retrieve the secret access key. You'll need to create new access keys if the secret access key was lost or forgotten. You can create new access keys for the account by going to the Security Credentials page. In the **Access Keys** section, click **Create New Root Key**.
2. Write down your secret access key and access key ID, or save them.
3. Add your access key ID and secret access key to the file named `credential-file-path.template`:

   a. Open the file `credential-file-path.template` included in your command line interface (CLI) archive.
   b. Copy and paste your access key ID and secret access key into the file.
   c. Rename the file and save it to a convenient location on your computer.
   d. If you are using Linux, set the file permissions as follows:

   ```
   $ chmod 600 credential-file-name
   ```

4. Set the AWS_CREDENTIAL_FILE environment variable to the fully qualified path of the file you just created.

   The following Linux/UNIX example sets AWS_CREDENTIAL_FILE for myCredentialFile in the /usr/local directory.

   ```
   $ export AWS_CREDENTIAL_FILE=/usr/local/myCredentialFile
   ```

   The following Windows example sets AWS_CREDENTIAL_FILE for myCredentialFile.txt in the C:\aws directory.

   ```
   C:\> set AWS_CREDENTIAL_FILE=C:\aws\myCredentialFile.txt
   C:\> setx AWS_CREDENTIAL_FILE C:\aws\myCredentialFile.txt
   ```

Task 5: Set the Region

By default, the Elastic Load Balancing tools use the US East (Northern Virginia) Region(us-east-1) with the elasticloadbalancing.us-east-1.amazonaws.com service endpoint URL. If your instances are in a different region, you must specify the region where your instances reside. For example, if your instances are in EU (Ireland) Region, you must specify the eu-west1 Region by using the --region eu-west-1 parameter or by setting the AWS_ELB_URL environment variable.

This section describes how to specify a different Region by changing the service endpoint URL.

To specify a different region

1. To view available regions go to Regions and Endpoints in the *Amazon Web Services General Reference*.
2. If you want to change the service endpoint, set the AWS_ELB_URL environment variable.
   - The following Linux/UNIX example sets AWS_ELB_URL to the EU (Ireland) Region.

   ```
   $ export AWS_ELB_URL=https://elasticloadbalancing.eu-west-1.amazonaws.com
   ```

   - The following Windows example sets AWS_ELB_URL to the EU (Ireland) Region.

   ```
   C:\> set AWS_ELB_URL=https://elasticloadbalancing.eu-west-1.amazonaws.com

   C:\> setx AWS_ELB_URL https://elasticloadbalancing.eu-west-1.amazonaws.com
   ```

Verify if Elastic Load Balancing Command Line Interface(CLI) is Installed

To verify the installation and configuration of Elastic Load Balancing CLI

1. On your Linux or Windows workstation, open a new command prompt.
2. Type the command **`elb-cmd`**.

3. You should see output similar to the following:

```
Command Name                                Description

------------                                -----------
elb-apply-security-groups-to-lb         Apply VPC security groups to Load
Balancer.

elb-associate-route53-hosted-zone       Associate LoadBalancer DNS... a
Route53 resource record.

elb-attach-lb-to-subnets                Attach existing LoadBalancer to
Subnets in VPC.

elb-configure-healthcheck               Configure the parameters f...tered
 with a LoadBalancer.

elb-create-app-cookie-stickiness-policy Create an application-generated
stickiness policy.

elb-create-lb                           Create a new LoadBalancer.

elb-create-lb-cookie-stickiness-policy  Create an LB-generated stickiness
policy.

elb-create-lb-listeners                Create a new LoadBalancer listener.

elb-create-lb-policy                    Create a LoadBalancer poli...ed
LoadBalancerPolicyType.

elb-delete-lb                           Deletes an existing LoadBalancer.

elb-delete-lb-listeners                 Deletes a listener on an existing
LoadBalancer.

elb-delete-lb-policy                    Delete a LoadBalancer policy.

elb-deregister-instances-from-lb        Deregisters instances from a Load
Balancer.

elb-describe-instance-health            Describes the state of instances.

elb-describe-lb-policies              Describes the details of LoadBalancer
 Policies.

elb-describe-lb-policy-types          Describes the details of LoadBalancer
 PolicyTypes.

elb-describe-lbs                        Describes the state and properties
 of LoadBalancers.

elb-detach-lb-from-subnets              Detach existing LoadBalancer from
Subnets in VPC.

elb-disable-zones-for-lb                Remove availability zones from an
LoadBalancer.

elb-disassociate-route53-hosted-zone    Disassociate LoadBalancer ... a
```

```
Route53 resource record.

elb-enable-zones-for-lb                 Add availability zones to existing
 LoadBalancer.

elb-register-instances-with-lb        Registers instances to a LoadBalancer.

elb-set-lb-listener-ssl-cert           Set the SSL Certificate fo...ecified
 LoadBalancer port.

elb-set-lb-policies-for-backend-server  Set LoadBalancer policies for backend
 servers.

elb-set-lb-policies-of-listener         Set LoadBalancer policies for a 
port.

version                                 Prints the version of the CLI tool
 and the API.

    For help on a specific command, type '<commandname> --help'
```

This completes your installation and configuration of the Elastic Load Balancing command line interface tool. You're ready to start accessing Elastic Load Balancing using the command line interface (CLI). For descriptions of all the Elastic Load Balancing commands, see Elastic Load Balancing Quick Reference Card.

Appendix B: Using the SOAP API

Endpoints

For information about this product's regions and endpoints, go to Regions and Endpoints in the Amazon Web Services General Reference.

WSDL and Schema Definitions

You can access the Elastic Load Balancing web service using the SOAP web services messaging protocol. This interface is described by a Web Services Description Language (WSDL) document, which defines the operations and security model for the particular service. The WSDL references an XML Schema document, which strictly defines the data types that might appear in SOAP requests and responses. For more information on WSDL and SOAP, see Web Services References (p. 261).

Note
Elastic Load Balancing supports SOAP only through HTTPS.

All schemas have a version number. The version number appears in the URL of a schema file and in a schema's target namespace. This makes upgrading easy by differentiating requests based on the version number.

Programming Language Support

Because the SOAP requests and responses in Elastic Load Balancing follow current standards, nearly any programming language can be used.

Note
AWS provides libraries, sample code, tutorials, and other resources for software developers who prefer to build applications using language-specific APIs instead of Elastic Load Balancing's SoapRequestQuery. These libraries provide basic functions (not included in Elastic Load Balancing's SoapRequestQuery), such as request authentication, request retries, and error handling so you can get started more easily. Libraries and resources are available for the following languages:

- Java
- PHP
- Python
- Ruby
- Windows and .NET

For libraries and sample code in all languages, go to Sample Code & Libraries.

Request Authentication

Elastic Load Balancing complies with the current WS-Security standard, which requires you to hash and sign SOAP requests for integrity and non-repudiation. WS-Security defines profiles which are used to implement various levels of security. Secure SOAP messages use the BinarySecurityToken profile, consisting of an X.509 certificate with an RSA public key.

The following is the content of an insecure `RunInstances` operation (using EC2 as an example):

```
<Runinstances xmlns="http://ec2.amazonaws.com/doc/2009-05-05">
    <instancesSet>
        <item>
            <imageId>ami-60a54009</imageId>
            <minCount>1</minCount>
            <maxCount>3</maxCount>
        </item>
    </instancesSet>
    <groupSet/>
</RunInstances>
```

To secure the request, we add the BinarySecurityToken element.

The secure version of the request begins with the following:

```


<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">

  <SOAP-ENV:Header>
    <wsse:Security xmlns:wsse="http://docs.oasis-open.org/wss/2004/01/oasis-
200401-wss-wssecurity-secext-1.0.xsd">
      <wsse:BinarySecurityToken
      xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wsse
curity-utility-1.0.xsd"
      EncodingType="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
soap-message-security-1.0#Base64Binary"
     ValueType="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-X.509-
token-profile-1.0#X.509v3"
      wsu:Id="CertId-1064304">....many, many lines of base64 encoded
      X.509 certificate...</wsse:BinarySecurityToken>
      <ds:Signature xmlns:ds="http://www.w3.org/2000/09/xmldsig#">
        <ds:SignedInfo>
          <ds:CanonicalizationMethod Algorithm="http://www.w3.org/2001/10/xml-
exc-c14n#"></ds:CanonicalizationMethod>
         <ds:SignatureMethod Algorithm="http://www.w3.org/2000/09/xmldsig#rsa-
sha1"></ds:SignatureMethod>
          <ds:Reference URI="#id-17984263">
            <ds:Transforms>
              <ds:Transform Algorithm="http://www.w3.org/2001/10/xml-exc-
c14n#"></ds:Transform>
            </ds:Transforms>
            <ds:DigestMethod Algorithm="http://www.w3.org/2000/09/xmld
sig#sha1"></ds:DigestMethod>
            <ds:DigestValue>0pjZ1+TvgPf6uG7o+Yp3l2YdGZ4=</ds:DigestValue>
          </ds:Reference>
          <ds:Reference URI="#id-15778003">
            <ds:Transforms>
              <ds:Transform Algorithm="http://www.w3.org/2001/10/xml-exc-
c14n#"></ds:Transform>
            </ds:Transforms>
            <ds:DigestMethod Algorithm="http://www.w3.org/2000/09/xmld
sig#sha1"></ds:DigestMethod>
            <ds:DigestValue>HhRbxBBmc2OO348f8nLNZyo4AOM=</ds:DigestValue>
          </ds:Reference>
        </ds:SignedInfo>
       <ds:SignatureValue>bmVx24Qom4kd9QQtclxWIlgLk4QsQBPaKESi79x479xgbO9PEStXMi
HZuBAi9luuKdNTcfQ8UE/d
```

```
      jjHKZKEQRCOlLVy0Dn5ZL1RlMHsv+OzJzzvIJFTq3LQKNrzJzsNe</ds:SignatureValue>

        <ds:KeyInfo Id="KeyId-17007273">
          <wsse:SecurityTokenReference
              xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-
wss-wssecurity-utility-1.0.xsd" wsu:Id="STRId-22438818">
            <wsse:Reference URI="#CertId-1064304"
                            ValueType="http://docs.oasis-
open.org/wss/2004/01/oasis-200401-wss-X.509-token-profile-1.0#X.509v3">
            </wsse:Reference>
          </wsse:SecurityTokenReference>
        </ds:KeyInfo>
      </ds:Signature>
      <wsu:Timestamp
          xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
wssecurity-utility-1.0.xsd" wsu:Id="id-17984263">
        <wsu:Created>2006-06-09T10:57:35Z</wsu:Created>
        <wsu:Expires>2006-06-09T11:02:35Z</wsu:Expires>
      </wsu:Timestamp>
    </wsse:Security>
  </SOAP-ENV:Header>
```

If you are matching this against requests generated by Elastic Load Balancing supplied libraries, or those of another vendor, the following are the most important elements.

Elements

- **BinarySecurityToken—**Contains the X.509 certificate in base64 encoded PEM format
- **Signature—**Contains an XML digital signature created using the canonicalization, signature algorithm, and digest method
- **Timestamp—**Requests to Elastic Load Balancing are valid within 5 minutes of this value to help prevent replay attacks

The Response Structure

In response to a request, the Elastic Load Balancing service returns an XML data structure that conforms to an XML schema defined as part of the Elastic Load Balancing WSDL. The structure of a XML response is specific to the associated request.

The following is an example response (using EC2 as an example):

```

<RuninstancesResponse xmlns="http://ec2.amazonaws.com/doc/2009-05-05">
  <reservationId>r-47a5402e</reservationId>
  <ownerId>UYY3TLBUXIEON5NQVUUX6OMPWBZIQNFM</ownerId>
  <groupSet>
    <item>
      <groupId>default</groupId>
    </item>
  </groupSet>
  <instancesSet>
    <item>
       <InstanceId>i-2ba64342</InstanceId>
       <imageId>ami-60a54009</imageId>
       <InstanceState>
```

```
        <code>0</code>
    <name>pending</name>
      </InstanceState>
      <DNSName></DNSName>
    </item>
    <item>
      <InstanceId>i-2bc64242</InstanceId>
      <imageId>ami-60a54009</imageId>
      <InstanceState>
        <code>0</code>
    <name>pending</name>
      </InstanceState>
      <DNSName>ec2-67-202-51-176.compute-1.&api-domain;</DNSName>
    </item>
    <item>
      <InstanceId>i-2be64332</InstanceId>
      <imageId>ami-60a54009</imageId>
      <InstanceState>
        <code>0</code>
    <name>pending</name>
      </InstanceState>
      <DNSName>ec2-67-202-51-122.compute-1.&api-domain;</DNSName>
      <keyName>example-key-name</keyName>
      <instanceType>m1.small</instanceType>
      <launchTime>2007-08-07T11:54:42.000Z</launchTime>
    </item>
  </instancesSet>
</RunInstancesResponse>
```

Web Services References

For more information about using web services, go to any of the following resources:

- Web Service Description Language (WSDL)
- WS-Security BinarySecurityToken Profile

AWS Glossary

For the latest AWS terminology, see the AWS Glossary in the *AWS General Reference*.