



# **Immersion Day**

*Creating an Elastic Load Balancer*

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**August 2019**

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## Overview

This lab will walk the user through creating an ELB to load balance traffic across several EC2 nodes in a single Availability Zone.

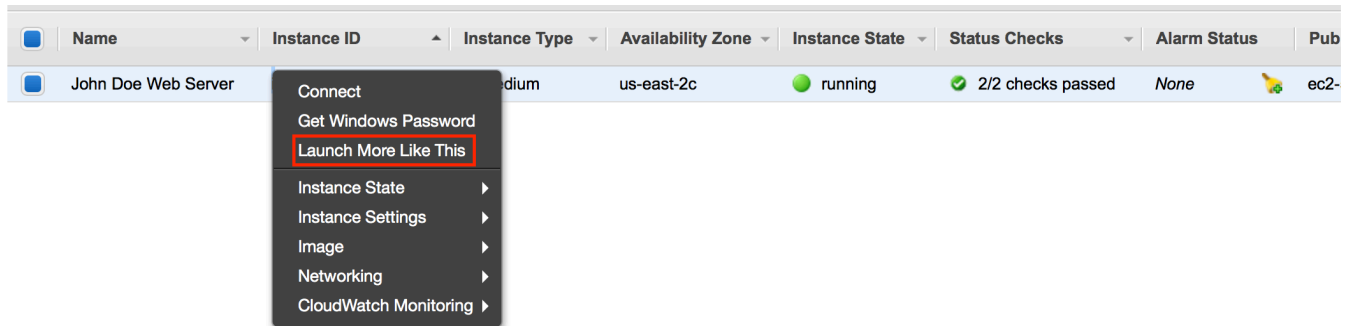


This lab has a prerequisite of Immersion Day – Getting Started with EC2 and assumes that you have already launched your first web server. This lab will demonstrate configuring a farm of web servers from the Immersion Day – Getting Started with EC2 lab to use ELB for its load balancing needs.

## Launch a Second Web Server

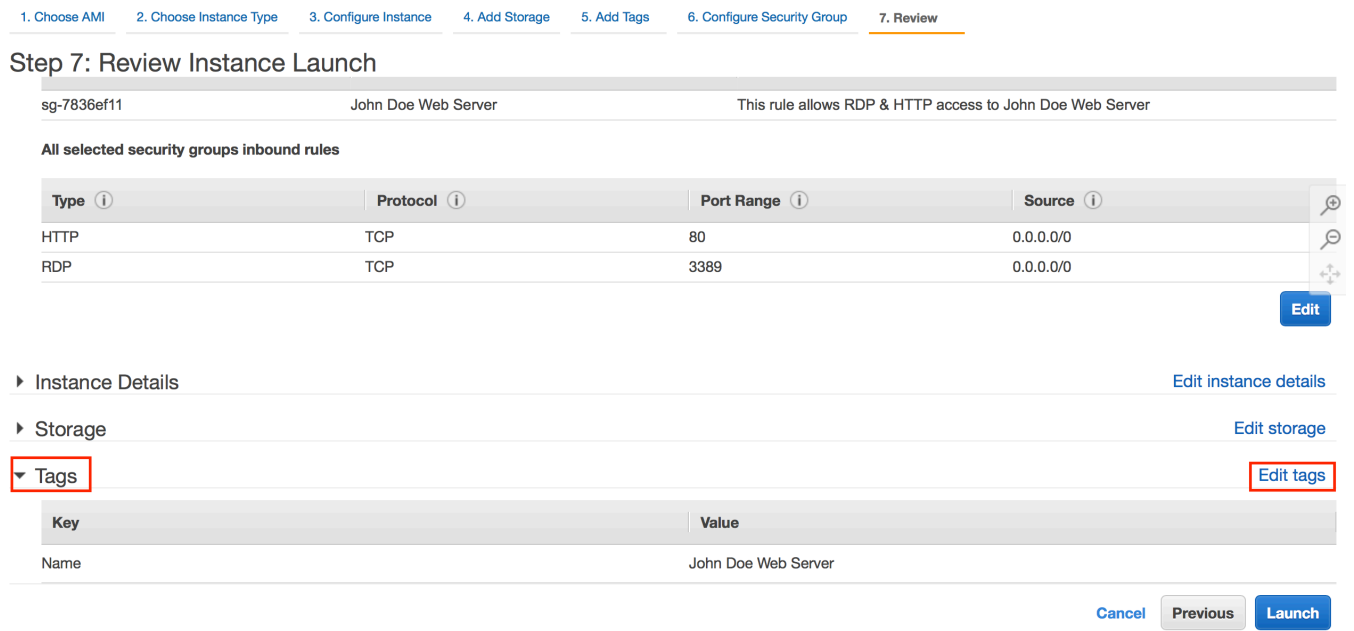
Let's launch another web server, similar to our existing web server instance.

1. Right click your web server and choose **Launch More Like This**. As it implies, this feature will launch another web server similar to the existing web server.



(Please note that launch more like this does not clone the instance. It only replicates configuration details so any webserver configuration on the instance will need to be supplied via AMI or user data. For more details, please check the reference in the end of the document )

2. On the next screen, scroll down to the **Tags** section and click **Edit Tags**.



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3. Change the **Value** of the **Name** tag to something different than the first instance, like

#### Step 5: Add Tags

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 EC2 resources.

Key (127 characters maximum)	Value (255 characters maximum)
Name	John Doe Web Server 2

[Add another tag](#) (Up to 50 tags maximum)

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Configure Security Group](#)

[Your name] Webserver 2. Click **Next: Configure Security Group**

4. Click the **Review and Launch** button to continue to the next screen where you'll launch the additional server.

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

#### Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: ☐ Create a new security group  
☒ Select an existing security group

Security Group ID	Name	Description	Actions
<input type="checkbox"/> sg-a7ca3ace	default	default VPC security group	<a href="#">Copy to new</a>
<input type="checkbox"/> sg-826e91eb	ElasticMapReduce-master	Master group for Elastic MapReduce created on 2016-10-07T00:40:09.889Z	<a href="#">Copy to new</a>
<input type="checkbox"/> sg-856e91ec	ElasticMapReduce-slave	Slave group for Elastic MapReduce created on 2016-10-07T00:40:09.889Z	<a href="#">Copy to new</a>
<input checked="" type="checkbox"/> sg-7836ef11	John Doe Web Server	This rule allows RDP & HTTP access to John Doe Web Server	<a href="#">Copy to new</a>
<input type="checkbox"/> sg-8f2cf5e6	launch-wizard-1	launch-wizard-1 created 2016-12-12T13:07:17.312-08:00	<a href="#">Copy to new</a>

Inbound rules for sg-a7ca3ace (Selected security groups: sg-7836ef11)

Type	Protocol	Port Range	Source
All traffic	All	All	sg-a7ca3ace (default)

[Cancel](#) [Previous](#) [Review and Launch](#)

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1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

#### Step 7: Review Instance Launch

**⚠ Your instance configuration is not eligible for the free usage tier**  
To launch an instance that's eligible for the free usage tier, check your AMI selection, instance type, configuration options, or storage devices. Learn more about [free usage tier](#) eligibility and usage restrictions.

[Don't show me this again](#)

**⚠ Improve your instances' security. Your security group, John Doe Web Server, is open to the world.**  
Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only. You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. [Edit security groups](#)

#### AMI Details

[Edit AMI](#)



**Windows\_Server-2012-R2\_RTM-English-64Bit-Base-2016.11.23 - ami-e999c38c**

Microsoft Windows Server 2012 R2 RTM 64-bit Locale English AMI provided by Amazon

Root Device Type: ebs Virtualization type: hvm

If you plan to use this AMI for an application that benefits from Microsoft License Mobility, fill out the [License Mobility Form](#). [Don't show me this again](#)

#### Instance Type

[Edit instance type](#)

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
---------------	------	-------	--------------	-----------------------	-------------------------	---------------------

[Cancel](#)

[Previous](#)

[Launch](#)

5. Click on **Launch** to launch your additional instance. Like your first instance, this newly launched instance will take a few minutes to boot and configure itself.

6. Please select the existing key pair that you created and click Launch Instances.

#### Select an existing key pair or create a new key pair



A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Choose an existing key pair

Select a key pair

JohnDoe-keypair

☒ I acknowledge that I have access to the selected private key file (JohnDoe-keypair.pem), and that without this file, I won't be able to log into my instance.

[Cancel](#)

[Launch Instances](#)

## Creating an Elastic Load Balancer

- Once the second web server has passed its status checks, confirm the web server is operational by browsing to its web site using its public DNS. You'll see both instances listed in your console as shown below.

<input type="checkbox"/>	Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status
<input type="checkbox"/>	John Doe Web Server	i-062ef25652624ef41	t2.medium	us-east-2c	<span style="color: green;">●</span> running	<span style="color: green;">✔</span> 2/2 checks passed	None
<input type="checkbox"/>	John Doe Web Server 2	i-0cc759b74162d8df3	t2.medium	us-east-2c	<span style="color: green;">●</span> running	<span style="color: green;">✔</span> 2/2 checks passed	None

## Create an ELB

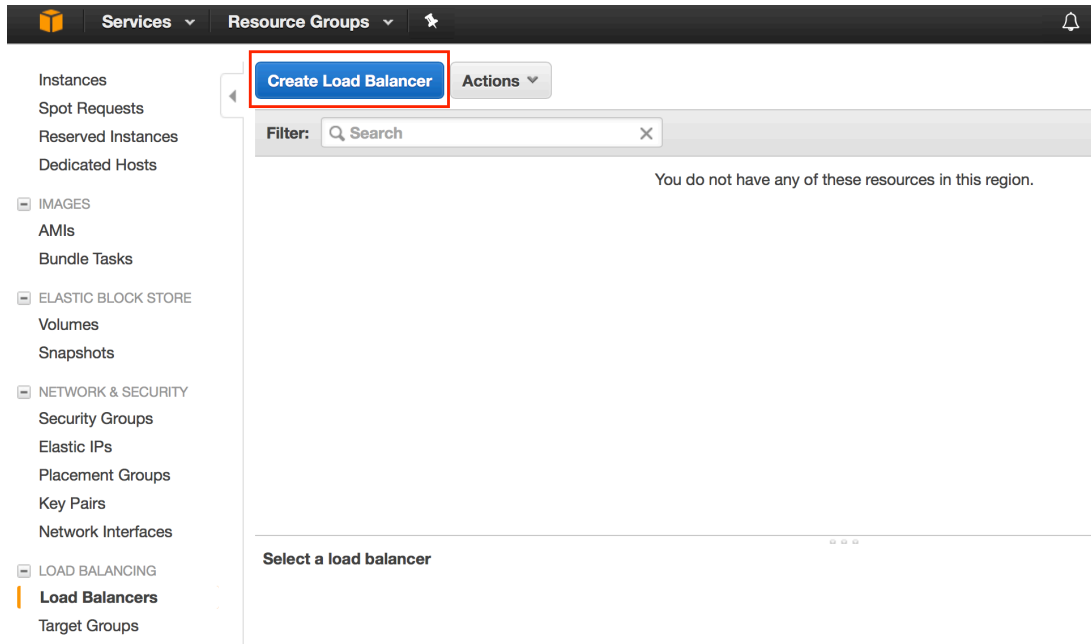
You now have two web servers, but you need a load balancer in front of these servers to give your users a single location for accessing both servers and to balance user requests across your web server farm.

- Click on the **Load Balancers** link in the EC2 Console.

The screenshot shows the AWS Management Console interface. On the left, the navigation menu is visible with categories like Instances, IMAGES, ELASTIC BLOCK STORE, NETWORK & SECURITY, and LOAD BALANCING. Under the 'LOAD BALANCING' category, the 'Load Balancers' link is highlighted with a red rectangle. The main content area shows a table of EC2 instances, including 'John Doe Web Server' and 'John Doe Web Server 2', both in a 'running' state. Above the table are buttons for 'Launch Instance', 'Connect', and 'Actions'. Below the table, there is a prompt to 'Select an instance above'.

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### Creating an Elastic Load Balancer

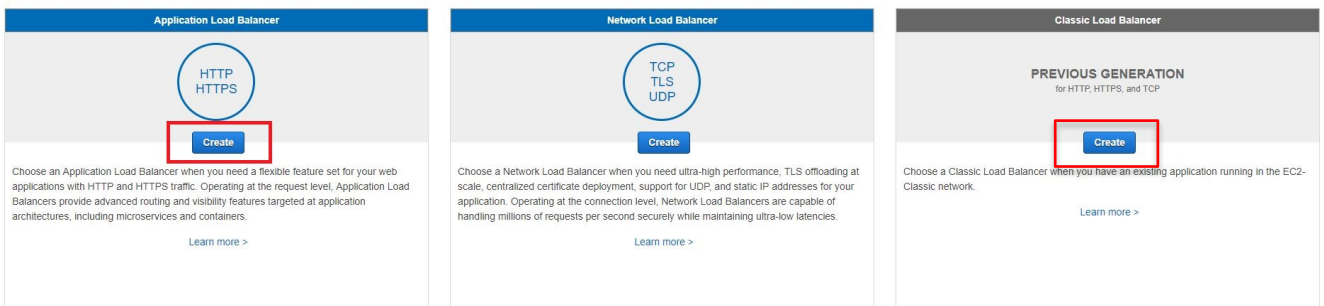


2. Click on **Create Load Balancer** button.

3. We will be creating a Application Load Balancer today, so please select that option and click **Continue** to proceed to the next step.

Select load balancer type

Elastic Load Balancing supports three types of load balancers: Application Load Balancers, Network Load Balancers (new), and Classic Load Balancers. Choose the load balancer type that meets your needs. [Learn more about which load balancer is right for you](#)



4. For the load balancer name, type a name like [YourName]-ELB, keep scheme as “internet-facing”, and IP address type as “ipv4”. Verify that HTTP is selected for the load balancer protocol with load balancer port 80. Select the VPC and subnet where the web server is running in, then click **Next: Assign Security Groups**.

*Note: Please note that spaces are not allowed in the ELB name.*



# Immersion Day

## Creating an Elastic Load Balancer

1. Configure Load Balancer 2. Configure Security Settings 3. Configure Security Groups 4. Configure Routing 5. Register Targets 6. Review

### Step 1: Configure Load Balancer

#### Basic Configuration

To configure your load balancer, provide a name, select a scheme, specify one or more listeners, and select a network. The default configuration is an Internet-facing load balancer in the selected network with a listener that receives HTTP traffic on port 80.

Name

Scheme ☒ Internet-facing ☐ Internal

IP address type

#### Listeners

A listener is a process that checks for connection requests, using the protocol and port that you configured.

Load Balancer Protocol	Load Balancer Port
HTTP	80

[Add listener](#)

#### Availability Zones

Specify the Availability Zones to enable for your load balancer. The load balancer routes traffic to the targets in these Availability Zones only. You can specify only one subnet per Availability Zone. You must specify subnets from at least two Availability Zones to increase the availability of your load balancer.

VPC

Availability Zones

- ☒ us-west-2a  IPv4 address
- ☒ us-west-2b  IPv4 address
- ☒ us-west-2c  IPv4 address

[Cancel](#) [Next: Configure Security Settings](#)

- On the next screen, it shows the load balancer is not using secure listener. In production environment it is recommended to use HTTPS protocol for front-end connection. In this lab, we will skip that part. Click **Next: Configure Security Groups**.
- On the next screen we'll create a new security group for our ELB. Name your security group something like **[Your Name] ELB SG**, and allow HTTP traffic to be passed to your instances by creating a rule of type **HTTP** for port 80, then click **Next: Configure Routing**.

1. Configure Load Balancer 2. Configure Security Settings 3. Configure Security Groups 4. Configure Routing 5. Register Targets 6. Review

### Step 3: Configure Security Groups

A security group is a set of firewall rules that control the traffic to your load balancer. On this page, you can add rules to allow specific traffic to reach your load balancer. First, decide whether to create a new security group or select an existing one.

Assign a security group: ☒ Create a new security group ☐ Select an existing security group

Security group name:

Description:

Type	Protocol	Port Range	Source
HTTP	TCP	80	Custom 0.0.0.0/0::0

[Add Rule](#)

[Cancel](#) [Previous](#) [Next: Configure Routing](#)

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### Creating an Elastic Load Balancer

- On the next screen you will configure the target group and health check. Name the target group like something **[Your Name]targetgroup**, then select target type as Instance. Keep Protocols and Port as default(HTTP & 80) Verify health checks protocol is HTTP and Path is /. Then click **Next:Register Targets**.

*Note: Please note that spaces are not allowed in the Target group name.*

#### Step 4: Configure Routing

Your load balancer routes requests to the targets in this target group using the protocol and port that you specify, and performs health checks on the targets using these health check settings. Note that each target group can be associated with only one load balancer.

Target group

Target group ⓘ New target group ▼

Name ⓘ JohnDoeTargetGroup

Target type ⓘ  
☒ Instance  
☐ IP  
☐ Lambda function

Protocol ⓘ HTTP ▼

Port ⓘ 80

Health checks

Protocol ⓘ HTTP ▼

Path ⓘ /

▼ Advanced health check settings

Port ⓘ  
☒ traffic port  
☐ override

Healthy threshold ⓘ 5

Unhealthy threshold ⓘ 2

Timeout ⓘ 5 seconds

Interval ⓘ 30 seconds

Success codes ⓘ 200

Cancel Previous **Next: Register Targets**

- Select both your Web Servers you created and click **Add to registered** to add them to your ELB and click **Next:Review**.

#### Step 5: Register Targets

Register targets with your target group. If you register a target in an enabled Availability Zone, the load balancer starts routing requests to the targets as soon as the registration process completes and the target passes the initial health checks.

##### Registered targets

To deregister instances, select one or more registered instances and then click Remove.

Remove

<input type="checkbox"/>	Instance	Name	Port	State	Security groups	Zone
<input type="checkbox"/>	i-bbb62bb1	John Doe Web Server	80	running	default	us-west-2b
<input type="checkbox"/>	i-03d10a07e2e8cd26c	John Doe Web Server 2	80	running	OpenVPN	us-west-2b

##### Instances

To register additional instances, select one or more running instances, specify a port, and then click Add. The default port is the port specified for the target group. If the instance is already registered on the specified port, you must specify a different port.

**Add to registered** on port 80

Search Instances X

<input type="checkbox"/>	Instance	Name	State	Security groups	Zone	Subnet ID	Subnet CIDR
<input checked="" type="checkbox"/>	i-bbb62bb1	John Doe Web Server	running	default	us-west-2b	subnet-55ced3d	172.31.32.0/20
<input checked="" type="checkbox"/>	i-03d10a07e2e8cd26c	John Doe Web Server 2	running	OpenVPN	us-west-2b	subnet-55ced3d	172.31.32.0/20

Cancel Previous **Next: Review**

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### Creating an Elastic Load Balancer

#### 9. Review your ELB settings and click **Create** (followed by clicking **Close**).

**Step 6: Review**  
Review and load balancer details before continuing

▼ Load balancer Edit

Name JohnDoeALB  
Scheme Internet-facing  
Listeners Port:80 - Protocol:HTTP  
IP address type ipv4  
VPC vpc-54cecd3c  
Subnets subnet-57cecd3f, subnet-55cecd3d, subnet-56cecd3e  
Tags

▼ Security groups Edit

Security groups Joe Doe ALB SG

▼ Routing Edit

Target group New target group  
Target group name JohnDoeTargetGroup  
Port 80  
Target type instance  
Protocol HTTP  
Health check protocol HTTP  
Path /  
Health check port traffic port  
Healthy threshold 5  
Unhealthy threshold 2  
Timeout 5  
Interval 30  
Success codes 200

▼ Targets Edit

Instances i-bbb62bb1 (John Doe Web Server):80, i-03d10a07e2e8c26c (John Doe Web Server 2):80

Cancel Previous **Create**

#### 10. AWS is now creating your ELB. It will take a couple of minutes to establish your load balancers, attach your web servers, and pass a couple of health checks. **Click** on your load balancer, once the State is showing active, **Click** target Groups *and* then select Targets tab, you should see both of your web servers are healthy.

INSTANCES  
Instances  
Launch Templates  
Spot Requests  
Reserved Instances  
Dedicated Hosts  
Scheduled Instances  
Capacity Reservations

IMAGES  
AMIs  
Bundle Tasks

ELASTIC BLOCK STORE  
Volumes  
Snapshots  
Lifecycle Manager

NETWORK & SECURITY  
Security Groups  
Elastic IPs  
Placement Groups  
Key Pairs  
Network Interfaces

LOAD BALANCING  
Load Balancers  
**Target Groups**

AUTO SCALING  
Launch Configurations  
Auto Scaling Groups

Create target group Actions

search: johndoe Add filter

Name	Port	Protocol	Target type	Load Balanc	VPC ID	Monitoring
JohnDoeTargetGroup	80	HTTP	instance	JohnDoe-A...	vpc-54cecd3c	

Target group: JohnDoeTargetGroup

Description Targets Health checks Monitoring Tags

The load balancer starts routing requests to a newly registered target as soon as the registration process completes and the target passes the initial health checks. If demand on your targets increases, you can register additional targets. If demand on your targets decreases, you can deregister targets.

Edit

Registered targets

Instance ID	Name	Port	Availability Zone	Status
i-0df8a61e8d51abe48	John Doe Web Server	80	us-west-2b	healthy ⓘ
i-04b6b0512a305b789	John Doe Web Server 2	80	us-west-2b	healthy ⓘ

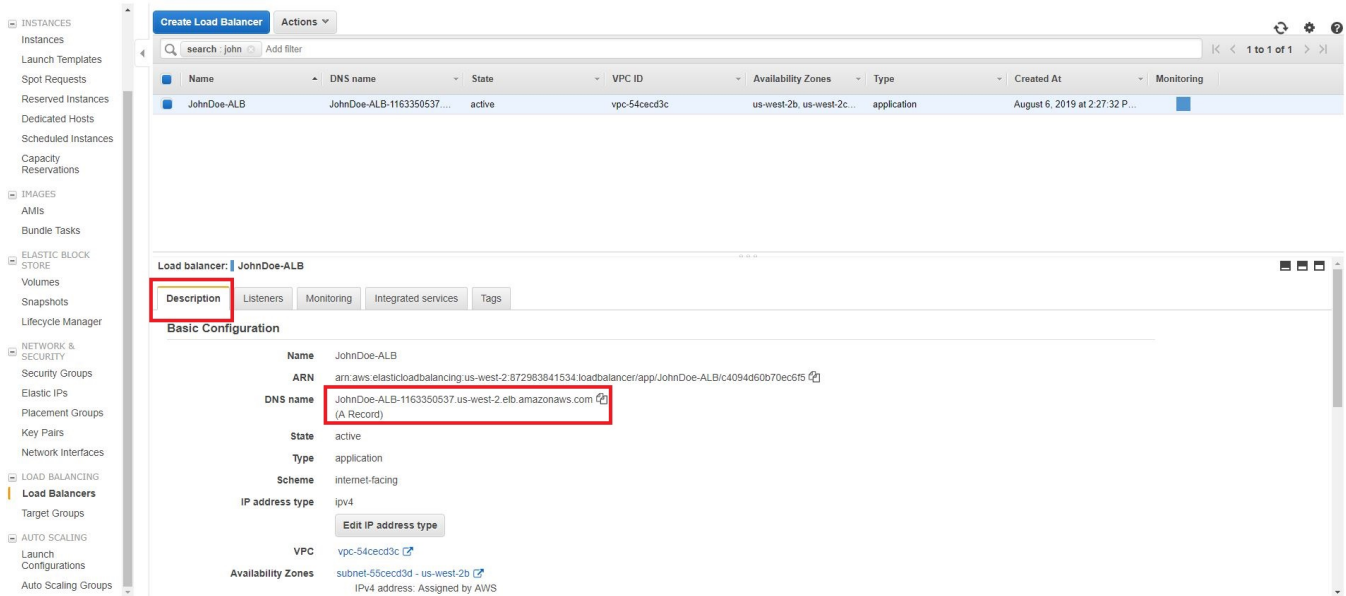
Availability Zones

Availability Zone	Target count	Healthy?
us-west-2b	2	Yes

#### 11. Switch back to Load Balancers, Under the Description tab, copy the ELB's DNS name.

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## Creating an Elastic Load Balancer



- Open the ELB URL in a new browser tab. Hit the browser refresh button and you should cycle through your web servers (you may need to do a “Shift-F5” or “Shift-Refresh” as some browsers like Chrome are pretty aggressive in locally caching web pages).

john DOE-alb-1163350537.us-west-2.elb.amazonaws.com



LOAD TEST		RDS	
Meta-Data		Value	
InstanceId		i-04b6b0512a305b789	
Availability Zone		us-west-2b	
Current CPU Load: 0%			

john DOE-alb-1163350537.us-west-2.elb.amazonaws.com



LOAD TEST		RDS	
Meta-Data		Value	
InstanceId		i-0df8a61e8d51abe48	
Availability Zone		us-west-2b	
Current CPU Load: 0%			

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Creating an Elastic Load Balancer

13. Congratulations, you've created a load balanced website.

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<sup>i</sup> <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/launch-more-like-this.html>