



Deploying your first Java Application to AWS-4 (Load Balancer)

Mini Lab | Digital Summit '18

Miracle Innovation Labs

Miracle Software Systems, Inc.

Deploying your first Java Application to AWS-4 (Load Balancer)

Introduction

The goal of this document is to create a Load Balancer in AWS and distribute the traffic between the two EC2 instances which are already serving the traffic on port 80.

This guide was prepared by [Miracle's Innovation Labs](#).

Pre-Requisites

All attendees must have their workstation (with Internet) to participate in the workshop (both PC and MAC are compatible). The following pre-requisites will help you to make the workshop experience easier,

- AWS Account

Note: Before you begin with this document, please get 2 EC2 instances up and running with the provided sample application deployed on to them.

Technology Involved

- AWS
- Java
- Apache Tomcat
- PuTTY (for Windows)
- Git

Lab Steps

In this workshop, we will be showing you how to create classic load balancer which will distribute the traffic in Round Robin process. If in case an instance is out of service then the load balancer will send traffic to healthy instances. You need minimum 2 EC2 instances for running same application on each.

Note: Two Instances should not be in the same Availability zone.

As of now, you have only one instance in your AWS Account. So, you need one more EC2 instance to do the below procedure. Please follow the document Deploying your first Java Application to AWS-2(AWS EC2) to launch EC2 instance, to install Tomcat and you can find “Deployment of your .war file” procedure in Deploying your first Java Application to AWS-3(AWS EC2).

We have two instances named as tomcat and tomcat2 as shown below.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4
tomcat2	i-0c7dc4ae80f346bbe	t2.micro	us-east-1a	running	2/2 checks ...	None	ec2-34-228-80-99.com...	34.2...
MyTomcatAn...	i-0940d0a5cbd37d860	t2.micro	us-east-1b	stopped		None	-	-
tomcat	i-0e0e693d1ce922b72	t2.micro	us-east-1d	running	2/2 checks ...	None	ec2-54-234-133-75.co...	54.2...

Instance: i-0e0e693d1ce922b72 (tomcat)		Public DNS: ec2-54-234-133-75.compute-1.amazonaws.com	
Description			
Instance ID	i-0e0e693d1ce922b72	Public DNS (IPv4)	ec2-54-234-133-75.compute-1.amazonaws.com
Instance state	running	IPv4 Public IP	54.234.133.75
Instance type	t2.micro	IPv6 IPs	-
Elastic IPs		Private DNS	ip-172-31-86-21.ec2.internal
Availability zone	us-east-1d	Private IPs	172.31.86.21
Security groups	launch-wizard-86, default, view inbound	Secondary private IPs	

In this document, tomcat is in **us-east-1a** Availability Zone and tomcat2 is in **us-east-1d** Availability Zone. The availability zones might vary from account to account. So, please select the instances that were created already.

Instance #1

The screenshot shows the AWS Management Console interface. In the left-hand navigation pane, the 'Instances' section is selected. The main content area displays a list of EC2 instances. The instance named 'tomcat' with ID 'i-0e0e693d1ce922b72' is highlighted with a red box. Below the list, the details for this instance are shown. The 'Description' tab is active, displaying the instance's configuration. Key details are highlighted with red boxes: the instance name 'tomcat', the instance ID 'i-0e0e693d1ce922b72', the availability zone 'us-east-1d', and the public IPv4 address '100.24.4.112'.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4
tomcat2	i-0c7dc4ae80f346bbe	t2.micro	us-east-1a	running	2/2 checks ...	None	ec2-34-228-80-99.com...	34.2...
MyTomcatAn...	i-0940d0a5cbd37d860	t2.micro	us-east-1b	stopped		None	-	-
tomcat	i-0e0e693d1ce922b72	t2.micro	us-east-1d	running	Initializing	None	ec2-100-24-4-112.com...	100.2...

Instance: **i-0e0e693d1ce922b72 (tomcat)** Public DNS: ec2-100-24-4-112.compute-1.amazonaws.com

Description		Status Checks	Monitoring	Tags
Instance ID	i-0e0e693d1ce922b72			
Instance state	running			
Instance type	t2.micro			
Elastic IPs				
Availability zone	us-east-1d			
Security groups	launch-wizard-86, default, view inbound rules, view outbound rules			
Public DNS (IPv4)	ec2-100-24-4-112.compute-1.amazonaws.com			
IPv4 Public IP	100.24.4.112			
IPv6 IPs	-			
Private DNS	ip-172-31-86-21.ec2.internal			
Private IPs	172.31.86.21			
Secondary private IPs				

Running Tomcat server on tomcat Instance of port 80.

The screenshot shows a web browser window displaying the Apache Tomcat/9.0.13 homepage. The address bar shows the URL 'http://100.24.4.112:80/'. The page content includes the Apache logo, the text 'Apache Tomcat/9.0.13', and a green banner that reads 'If you're seeing this, you've successfully installed Tomcat. Congratulations!'.

Instance #2

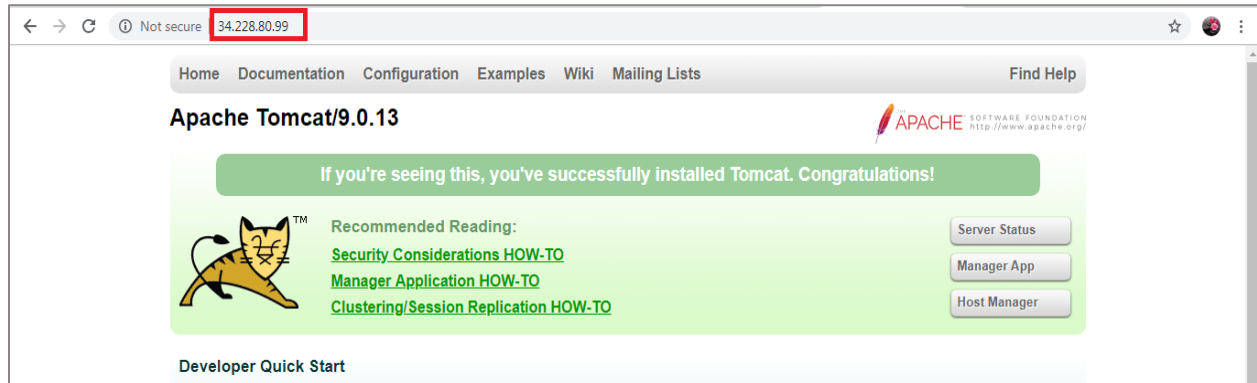
The screenshot shows the AWS Management Console interface. In the left-hand navigation pane, the 'Instances' section is selected. The main content area displays a list of EC2 instances. The instance named 'tomcat2' with ID 'i-0c7dc4ae80f346bbe' is highlighted with a red box. Below the list, the details for this instance are shown. The 'Description' tab is active, displaying the instance's configuration. Key details are highlighted with red boxes: the instance name 'tomcat2', the instance ID 'i-0c7dc4ae80f346bbe', the availability zone 'us-east-1a', and the public IPv4 address '34.228.80.99'.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4
tomcat2	i-0c7dc4ae80f346bbe	t2.micro	us-east-1a	running	2/2 checks ...	None	ec2-34-228-80-99.com...	34.2...
MyTomcatAn...	i-0940d0a5cbd37d860	t2.micro	us-east-1b	stopped		None	-	-
tomcat	i-0e0e693d1ce922b72	t2.micro	us-east-1d	running	2/2 checks ...	None	ec2-100-24-4-112.com...	100.2...

Instance: **i-0c7dc4ae80f346bbe (tomcat2)** Public DNS: ec2-34-228-80-99.compute-1.amazonaws.com

Description		Status Checks	Monitoring	Tags
Instance ID	i-0c7dc4ae80f346bbe			
Instance state	running			
Instance type	t2.micro			
Elastic IPs				
Availability zone	us-east-1a			
Security groups	launch-wizard-85, default, view inbound rules, view outbound rules			
Public DNS (IPv4)	ec2-34-228-80-99.compute-1.amazonaws.com			
IPv4 Public IP	34.228.80.99			
IPv6 IPs	-			
Private DNS	ip-172-31-26-143.ec2.internal			
Private IPs	172.31.26.143			
Secondary private IPs				

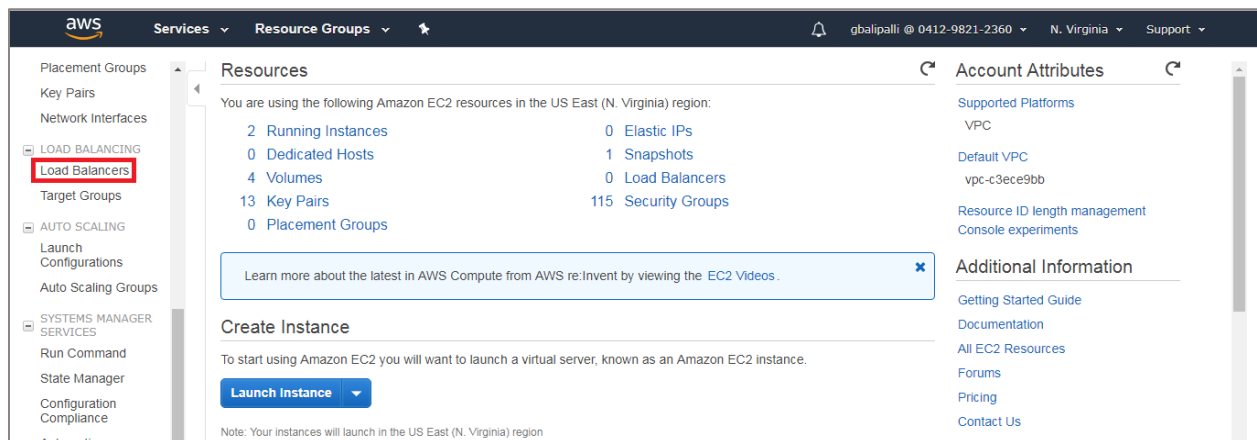
Running Tomcat server on tomcat2 Instance on port 80.



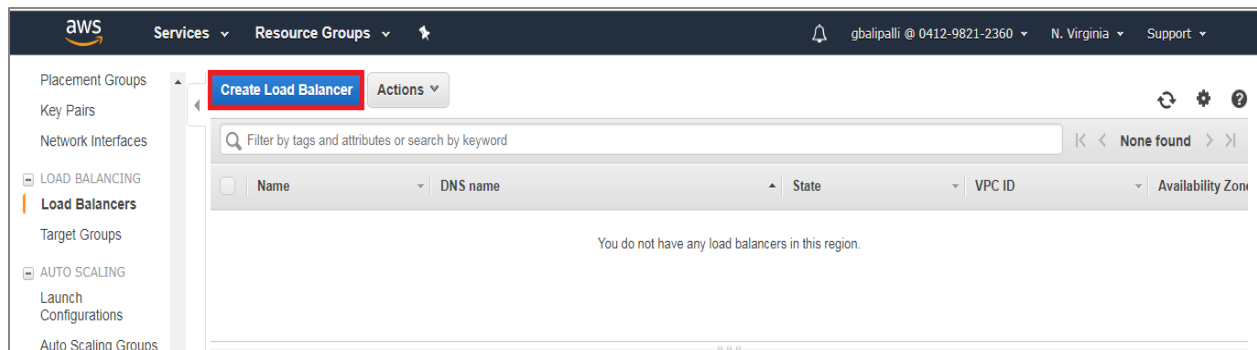
After completion of two EC2 instances with above mentioned points. Now, follow the below steps.

Step #1 | Creating Load Balancer

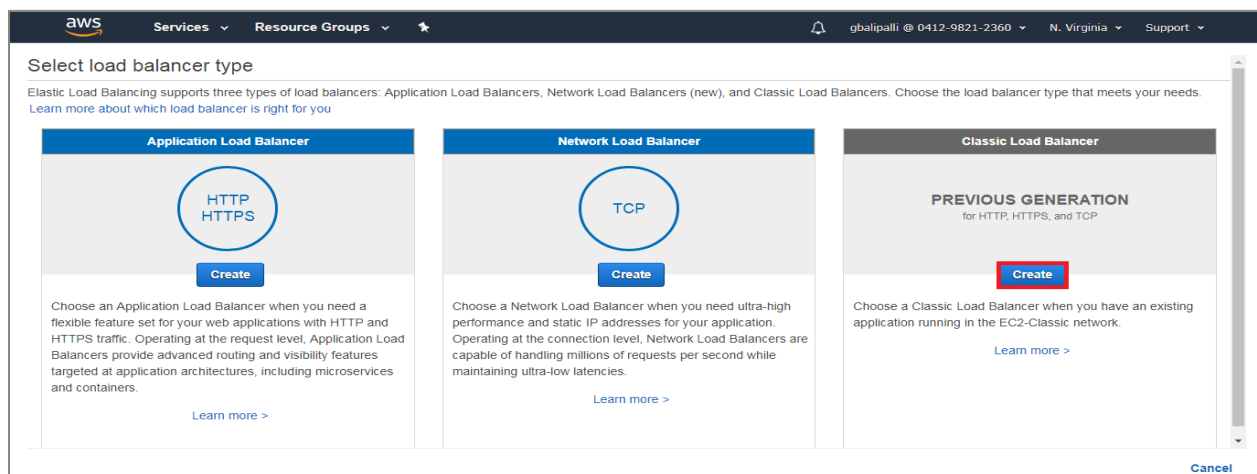
Select the **Load Balancers** option in the left corner of EC2 Dashboard.



Click on **Create Load Balancer** as shown below.



Select **Create** option in **Classic Load Balancer**.



You have to provide a basic configuration for your load balancer, such as a name, a network where you have created EC2 instances and configure a listener that accepts HTTP requests on port 80 and sends them to your instances on port 80 using HTTP.

Step 1: Define Load Balancer

Basic Configuration

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:

Create LB inside:

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

[Add](#)

[Cancel](#) [Next: Assign Security Groups](#)

In the above screenshot, Load Balancer name is **lb1**, network is **MyDefault VPC (172.31.0.0/16)** and you can leave the default listener configuration.

Assign Security Groups to your Load Balancer in a VPC, and select an existing Security Group.

Here, we are considering the default VPC Security Group. Now, click on **Next: Configure Security Settings**.

Step 2: Assign Security Groups

You have selected the option of having your Elastic Load Balancer inside of a VPC, which allows you to assign security groups to your load balancer. Please select the security groups to assign to this load balancer. This can be changed at any time.

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

Filter: VPC security groups

Security Group ID	Name	Description	Actions
<input type="checkbox"/> sg-cab73981	Adesa	Adesa_SG	Copy to new
<input type="checkbox"/> sg-7eab437	AutoScaling-Security-Group-1	AutoScaling-Security-Group-1 (2018-05-04 14:55:53.694+05:30)	Copy to new
<input type="checkbox"/> sg-b32b40f9	datapipelineec2	security group for EC2	Copy to new
<input checked="" type="checkbox"/> sg-4f6e2b3b	default	default VPC security group	Copy to new
<input type="checkbox"/> sg-743c213c	ECS-Cluster	ECS cluster security group	Copy to new
<input type="checkbox"/> sg-279be66d	ElasticMapReduce-master	Master group for Elastic MapReduce created on 2018-07-26T14:55:32.136Z	Copy to new
<input type="checkbox"/> sg-a99fe2e3	ElasticMapReduce-slave	Slave group for Elastic MapReduce created on 2018-07-26T14:55:32.136Z	Copy to new
<input type="checkbox"/> sg-75136e3f	ElasticMapReduceMaster	ElasticMapReduceMaster	Copy to new
<input type="checkbox"/> sg-ba017cf0	ElasticMapReduceSlave	ElasticMapReduceSlave	Copy to new

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

Click on **Next : Configure Health Check**.

aws Services Resource Groups

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

Step 3: Configure Security Settings

⚠ Improve your load balancer's security. Your load balancer is not using any secure listener.
If your traffic to the load balancer needs to be secure, use either the HTTPS or the SSL protocol for your front-end connection. You can go back to the first step to add/configure secure listeners under [Basic Configuration](#) section. You can also continue with current settings.

Cancel Previous **Next: Configure Health Check**

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Configure Health Checks for Your EC2 Instances.

Set the Ping Protocol as **HTTP** and Ping Port as **80**. Leave the default values for Ping Path as **/** and Advanced Details. Click on **Next: Add EC2 Instances**.

aws

Services

Resource Groups

gbalipalli @ 0412-9821-2360

N. Virginia

Support

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

Step 4: 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

Interval

30

seconds

Unhealthy threshold

2

Healthy threshold

10

Cancel

Previous

Next: Add EC2 Instances

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You have to register the EC2 Instances with your Load Balancer. So, please select the existing instances to register with your load balancer.

Here, adding tomcat and tomcat2 instances to our Load Balancer. Now, click on **Next: Add Tags**.

aws

Services

Resource Groups

gbalipalli @ 0412-9821-2360

N. Virginia

Support

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

Step 5: Add EC2 Instances

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-c3ece9bb (172.31.0.0/16)

	Instance	Name	State	Security groups	Zone	Subnet ID	Subnet CIDR
<input checked="" type="checkbox"/>	i-0e0e693d1ce922b72	tomcat	running	launch-wizard-86, default	us-east-1d	subnet-07900a28	172.31.80.0/20
<input checked="" type="checkbox"/>	i-0c7dc4ae80f346bbe	tomcat2	running	launch-wizard-85, default	us-east-1a	subnet-3dc8e876	172.31.16.0/20
<input type="checkbox"/>	i-0940d0a5cbd37d860	MyTomcatAndJenkins	stopped	MyTomcatAndJenkins_SG	us-east-1b	subnet-62d8463f	172.31.32.0/20

Availability Zone Distribution

1 instance in us-east-1a
1 instance in us-east-1d

☒ Enable Cross-Zone Load Balancing

☒ Enable Connection Draining 300 seconds

Cancel

Previous

Next: Add Tags

Feedback

English (US)

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Note: You can tag your Load Balancer (Optional).

Here, tagging our Load Balancer with key as **Name** and value as **lb1**. Now, click on **Review and Create**.

Note: You need to tag your load balancer

The screenshot shows the AWS Management Console interface for Step 6: Add Tags. The top navigation bar includes the AWS logo, Services, Resource Groups, and user information. The breadcrumb trail shows the steps: 1. Define Load Balancer, 2. Assign Security Groups, 3. Configure Security Settings, 4. Configure Health Check, 5. Add EC2 Instances, 6. Add Tags, and 7. Review. The main heading is 'Step 6: Add Tags' with a subtext 'Apply tags to your resources to help organize and identify them.' Below this, a note states: '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.' A table is displayed with two columns: 'Key' and 'Value'. The 'Key' column contains the text 'Name' and the 'Value' column contains the text 'lb1'. A 'Create Tag' button is located below the table. At the bottom right of the page, there are three buttons: 'Cancel', 'Previous', and 'Review and Create', with the 'Review and Create' button highlighted with a red box.

Re-check your configurations. Once you have confirmed with your configurations, Click on Create.

The screenshot shows the AWS Management Console interface for Step 7: Review. The top navigation bar is the same as in the previous screenshot. The breadcrumb trail shows the steps: 1. Define Load Balancer, 2. Assign Security Groups, 3. Configure Security Settings, 4. Configure Health Check, 5. Add EC2 Instances, 6. Add Tags, and 7. Review. The main heading is 'Step 7: Review' with a subtext 'Please review the load balancer details before continuing'. The page is divided into three sections: 'Define Load Balancer', 'Configure Health Check', and 'Add EC2 Instances'. The 'Define Load Balancer' section shows: Load Balancer name: lb1, Scheme: internet-facing, Port Configuration: 80 (HTTP) forwarding to 80 (HTTP). The 'Configure Health Check' section shows: Ping Target: HTTP:80/, Timeout: 5 seconds, Interval: 30 seconds, Unhealthy threshold: 2, Healthy threshold: 10. The 'Add EC2 Instances' section shows: Cross-Zone Load Balancing: Enabled, Connection Draining: Enabled, 300 seconds, Instances: i-0e0e693d1ce922b72 (tomcat), i-0c7dc4ae80f346bbe (tomcat2). At the bottom right of the page, there are three buttons: 'Cancel', 'Previous', and 'Create', with the 'Create' button highlighted with a red box.

After creating the Load Balancer, it will show the message as shown below. Now, click on **Close**.

Services
Resource Groups

gbalipalli @ 0412-9821-2360
N. Virginia
Support

Successfully created load balancer
 Load balancer lb1 was successfully created.
 Note: It may take a few minutes for your instances to become active in the new load balancer.

Close

You can see the list of created Load Balancers in your Load Balancer dashboard.

Services
Resource Groups

gbalipalli @ 0412-9821-2360
N. Virginia
Support

 Placement Groups
 Key Pairs
 Network Interfaces
 LOAD BALANCING
Load Balancers
 Target Groups
 AUTO SCALING
 Launch Configurations
 Auto Scaling Groups
 SYSTEMS MANAGER SERVICES
 Run Command
 State Manager
 Configuration Compliance
 Automations
 Patch Compliance
 Patch Baselines
 SYSTEMS MANAGER SHARED RESOURCES
 Managed Instances

Create Load Balancer

Actions

 Filter by tags and attributes or search by keyword

Name	DNS name	State	VPC ID	Availability Zone
lb1	lb1-17461077.us-east-1.elb.amazonaws.com		vpc-c3ece9bb	us-east-1a, us-east-1b

Load balancer: lb1

Description

Instances

Health check

Listeners

Monitoring

Tags

Migration

Basic Configuration

Name	lb1	Creation time	December 11, 2018 at 3:29:47 AM UTC+5:30
* DNS name	lb1-17461077.us-east-1.elb.amazonaws.com (A Record)	Hosted zone	Z35SXDOTRQ7X7K
Type	Classic (Migrate Now)	Status	0 of 2 instances in service
Scheme	internet-facing	VPC	vpc-c3ece9bb
Availability Zones	subnet-07900a28 - us-east-1d, subnet-2958af3c - us-east-1f		

Whenever the Status of Load Balancer becomes 2 of 2 instances in service, that means LB is available.

The screenshot shows the AWS Management Console interface. On the left is a navigation menu with categories like INSTANCES, IMAGES, and ELASTIC BLOCK STORE. The main content area displays the 'Load balancer: lb1' configuration page. The 'Basic Configuration' tab is active, showing details for the load balancer 'lb1'. The DNS name is 'lb1-17461077.us-east-1.elb.amazonaws.com', which is highlighted with a red box. Other details include the creation time (December 11, 2018), hosted zone (Z35SXDOTRQ7X7K), status (2 of 2 instances in service, highlighted with a red box), VPC (vpc-c3ece9bb), and availability zones (subnet-07900a28 and subnet-3358af3c).

Copy the DNS name of your Load Balancer and paste it in your browser. Now your application traffic is served by your Load Balancer as shown below.

The screenshot shows a web browser window with the address bar displaying 'lb1-17461077.us-east-1.elb.amazonaws.com'. The page content is the Apache Tomcat/9.0.13 homepage. It features a green banner with the text 'If you're seeing this, you've successfully installed Tomcat. Congratulations!'. Below this, there is a section for 'Recommended Reading' with links to 'Security Considerations HOW-TO', 'Manager Application HOW-TO', and 'Clustering/Session Replication HOW-TO'. On the right side, there are buttons for 'Server Status', 'Manager App', and 'Host Manager'.

For any questions regarding the lab please feel free to reach out to innovation@miraclesoft.com. We hope you enjoyed this workshop!