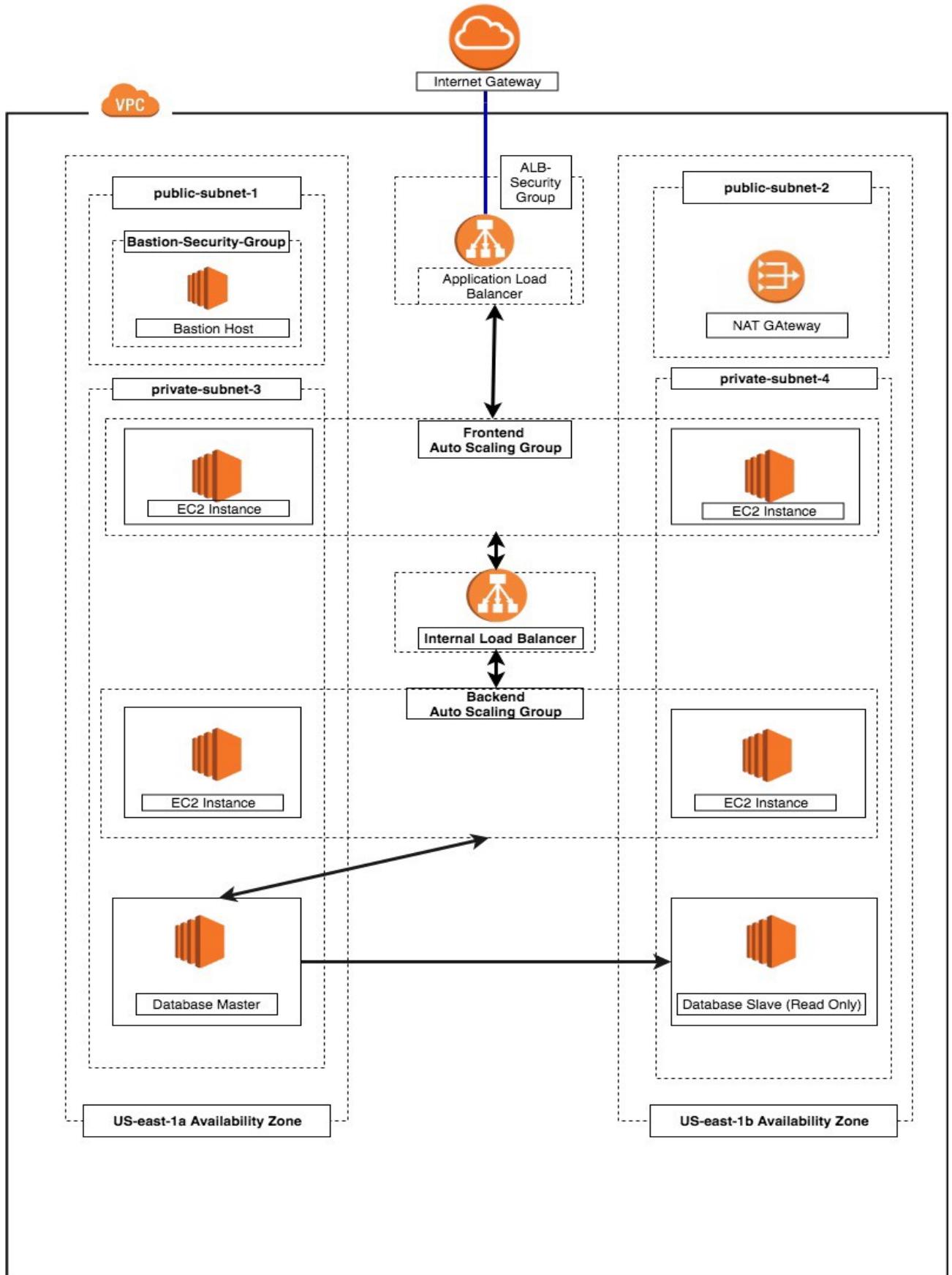


Challenge 1: 3-Tier environment setup:

A three-tier architecture is a software architecture pattern where the application is broken down into three logical tiers: the presentation layer, the business logic layer and the data storage layer. This architecture is used in a client-server application such as a web application that has the frontend, the backend and the database. Each of these layers or tiers does a specific task and can be managed independently of each other.

I have used AWS (Amazon Web services) as a cloud platform that provides different cloud computing services to the customers.

I have tried to build a highly available and fault tolerant infrastructure:



1. Setup the Virtual Private Cloud (VPC): It is a virtual network we can create and manage our AWS resource in a more secure and scalable manner.

A screenshot of the AWS VPC Create VPC wizard. The page title is "Create VPC". The form fields are as follows:

- Name tag: Test-VPC
- IPv4 CIDR block*: 10.0.0.0/24
- IPv6 CIDR block:
 - No IPv6 CIDR Block (selected)
 - Amazon provided IPv6 CIDR block
 - IPv6 CIDR owned by me
- Tenancy: Default

* Required

Buttons at the bottom: Cancel, Create

A screenshot of the AWS VPC Dashboard. The left sidebar shows navigation options like New VPC Experience, VPC Dashboard, and various sub-options under VIRTUAL PRIVATE CLOUD (Your VPCs, Subnets, Route Tables, Internet Gateways, Egress Only Internet Gateways, DHCP Options Sets, Elastic IPs, Managed Prefix Lists, Endpoints, Endpoint Services, NAT Gateways, Peering Connections, and SECURITY). The main content area displays a table of VPCs:

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP options set	Main Route table
Test-VPC	vpc-0e2c9358880d0d2ad	available	10.0.0.0/16	-	dopt-02d8fc6a	rtb-08e70c9e8713299e8
	vpc-500ea338	available	172.31.0....	-	dopt-02d8fc6a	rtb-d65b62be

Below the table, there is a detailed view for the VPC: vpc-0e2c9358880d0d2ad. The details include:

Description	CIDR Blocks	Flow Logs	Tags
VPC ID: vpc-0e2c9358880d0d2ad State: available IPv4 CIDR: 10.0.0.0/16 IPv6 CIDR: - Network ACL: acl-02c840bee45b8d478 DHCP options set: dopt-02d8fc6a Owner: 218995918442	Tenancy: default Default VPC: No IPv6 CIDR: - DNS resolution: Enabled DNS hostnames: Disabled Route table: rtb-08e70c9e8713299e8		

Feedback English (US) Privacy Policy Terms of Use

2. Setup the Internet Gateway: The Internet Gateway allows communication between the EC2 instances in the VPC and the internet.

eu-west-2.console.aws.amazon.com/vpc/home?region=eu-west-2#CreateInternetGateway:

Apps Services Resource Groups

VPC > Internet gateways > Create internet gateway

Create internet gateway Info

An internet gateway is a virtual router that connects a VPC to the internet. To create a new internet gateway specify the name for the gateway below.

Internet gateway settings	
Name tag Creates a tag with a key of 'Name' and a value that you specify. <input type="text" value="Test-IG"/>	
Tags - optional A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.	
Key <input type="text" value="Name"/>	Value - optional <input type="text" value="Test-IG"/>
<input type="button" value="Add new tag"/> You can add 49 more tags.	
<input type="button" value="Cancel"/> <input type="button" value="Create Internet gateway"/>	

eu-west-2.console.aws.amazon.com/vpc/home?region=eu-west-2#igws:

New VPC Experience Tell us what you think

VPC Dashboard New

Filter by VPC:

VIRTUAL PRIVATE CLOUD

- Your VPCs
- Subnets
- Route Tables
- Internet Gateways New**
- Egress Only Internet Gateways New
- DHCP Options Sets New
- Elastic IPs New
- Managed Prefix Lists New
- Endpoints
- Endpoint Services
- NAT Gateways New
- Peering Connections

SECURITY

- Network ACLs
- Security Groups New

Actions

Internet gateways (1/2) Info

Name	Internet gateway ID	State	VPC ID	Owner
Test-IG	igw-060ad3e982908fc04	Attached	vpc-0e2c9358880d0d2ad Test-VPC	21899591
-	igw-ccb047a4	Attached	vpc-50eea338	21899591

igw-060ad3e982908fc04 / Test-IG

Details

Details			
Internet gateway ID <input type="text" value="igw-060ad3e982908fc04"/>	State <input checked="" type="button" value="Attached"/>	VPC ID <input type="text" value="vpc-0e2c9358880d0d2ad Test-VPC"/>	Owner <input type="text" value="218995918442"/>

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3. Create 4 Subnets: The subnet is a way for us to group our resources within the VPC with their IP range. A subnet can be public or private. EC2 instances within a public subnet have public IPs and can directly access the internet while those in the

private subnet does not have public IPs and can only access the internet through a [NAT](#) gateway.

For our setup, we shall be creating the following subnets with the corresponding IP ranges.

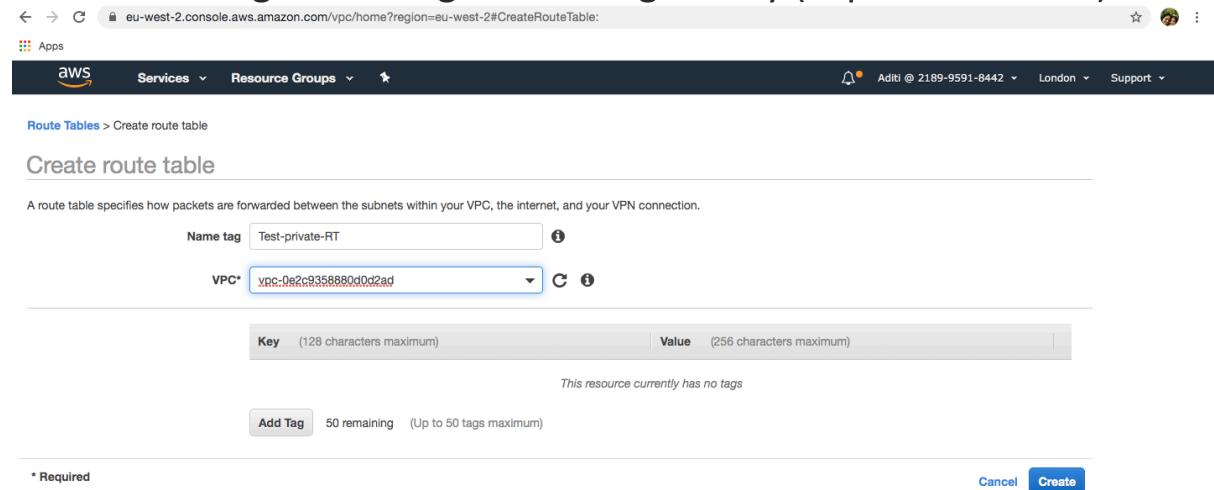
- test-public-subnet-1 | CIDR (10.0.0.0/24) | Availability Zone (eu-west-2a)
- test-public-subnet-2 | CIDR (10.0.2.0/24) | Availability Zone (eu-west-2b)
- test-private-subnet-3 | CIDR (10.0.3.0/24) | Availability Zone (eu-west-2a)
- test-private-subnet-4 | CIDR(10.0.4.0/24) | Availability Zone (eu-west-2b)

The screenshot shows the AWS VPC Subnets page. On the left, there's a sidebar with navigation links like 'VPC Dashboard', 'Subnets', 'Route Tables', etc. The main area has a table titled 'Subnets' with the following data:

Name	Subnet ID	State	VPC	IPv4 CIDR	Available IPv4	IPv6 CIDR	Availability Z.
Test-public-subnet-1	subnet-032f73b375e6e8fd0	available	vpc-0e2c9358880d0d2ad...	10.0.0.0/24	249	-	eu-west-2a
test-private-subnet-4	subnet-035846a7dddef3b82	available	vpc-0e2c9358880d0d2ad...	10.0.4.0/24	248	-	eu-west-2b
Test-private-subnet-3	subnet-09d3b08ba0d24fb3	available	vpc-0e2c9358880d0d2ad...	10.0.3.0/24	246	-	eu-west-2a
Test-public-subnet-2	subnet-0fa3bda5d2b75f15f	available	vpc-0e2c9358880d0d2ad...	10.0.2.0/24	248	-	eu-west-2b
	subnet-4d13001	available	vpc-50eea338	172.31.32.0/20	4091	-	eu-west-2b
	subnet-c70b98bd	available	vpc-50eea338	172.31.16.0/20	4090	-	eu-west-2a
	subnet-ee194f87	available	vpc-50eea338	172.31.0.0/20	4090	-	eu-west-2c

At the bottom of the table, it says 'Subnets: subnet-032f73b375e6e8fd0, subnet-035846a7dddef3b82, subnet-09d3b08ba0d24fb3, subnet-0fa3bda5d2b75f15f'.

4. Create Two Route Tables: Route tables is a set of rule that determines how data moves within our network. We need two route tables; private route table and public route table. The public route table will define which subnets that will have direct access to the internet (ie public subnets) while the private route table will define which subnet goes through the NAT gateway (ie private subnet).



The screenshot shows the AWS VPC console with the URL eu-west-2.console.aws.amazon.com/vpc/home?region=eu-west-2#CreateRouteTable. The page is titled "Create route table". It displays a form for creating a new route table. The "Name tag" field contains "Test-private-RT". The "VPC" dropdown is set to "vpc-0e2c9358880d0d2ad". Below the form, a note states "This resource currently has no tags". There are "Add Tag" and "Cancel" buttons, and a "Create" button highlighted in blue.

The public and the private subnet needs to be associated with the public and the private route table respectively.

To do that, we select the route table and then choose the **Subnet Association** tab.

The screenshot shows the AWS VPC Route Tables page. On the left sidebar, under 'Route Tables', 'Subnets' is expanded, showing 'Route Tables'. In the main content area, a table lists four route tables:

Name	Route Table ID	Explicit subnet association	Edge associations	Main	VPC ID	Owner
rtb-08e70c9e8713299e8	-	-	-	Yes	vpc-0e2c9358880d0d2ad...	21
test-private-RT	rtb-0ac0c6f5977496a8	2 subnets	-	No	vpc-0e2c9358880d0d2ad...	21
test-public-RT	rtb-0c89276488851c50c	2 subnets	-	No	vpc-0e2c9358880d0d2ad...	21
	rtb-d65b62be	-	-	Yes	vpc-50eea338	21

Below the table, for the selected route table 'rtb-0ac0c6f5977496a8', the 'Subnet Associations' tab is active, showing:

Subnet ID	IPv4 CIDR	IPv6 CIDR
subnet-09d3b08ba0d24fb...	10.0.3.0/24	-
subnet-035846a7dddef3b...	10.0.4.0/24	-

A note below states: 'The following subnets have not been explicitly associated with any route tables and are therefore associated with the main route table:'

Subnet ID	IPv4 CIDR	IPv6 CIDR
-----------	-----------	-----------

We also need to route the traffic to the internet through the **internet gateway** for our public route table.

To do that we select the public route table and then choose the **Routes** tab. The rule should be similar to the one shown below:

The screenshot shows the AWS VPC Route Tables page. On the left, the navigation menu includes 'Route Tables' under 'VIRTUAL PRIVATE CLOUD'. The main table lists four route tables, with 'test-public-RT' selected. The 'Routes' tab is active, displaying two routes:

Destination	Target	Status	Propagated
10.0.0.0/16	local	active	No
0.0.0.0/0	igw-060ad3e982908fc04	active	No

5. Create the NAT Gateway: The NAT gateway enables the EC2 instances in the private subnet to access the internet. The NAT Gateway is an AWS managed service for the NAT instance. To create the NAT gateway, navigate to the NAT Gateways page, and then click on the **Create NAT Gateway**.

We should note the Subnet ID for the **test-public-subnet-2**. This will be needed when creating the NAT gateway.

eu-west-2.console.aws.amazon.com/vpc/home?region=eu-west-2#CreateNatGateway:

Apps Services Resource Groups

Elastic IP address 18.133.205.100 (eipalloc-06097634b9f75de54) allocated.

VPC > NAT gateways > Create NAT gateway

Create NAT gateway Info

Create a NAT gateway and assign it an Elastic IP address.

NAT gateway settings

Name - optional
We automatically create a tag with a Name Key value.

The name can be up to 256 characters long.

Subnet
Select a public subnet in which to create the NAT gateway.

Elastic IP allocation ID
Assign an Elastic IP address to the NAT gateway.

Tags
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Feedback English (US)

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eu-west-2.console.aws.amazon.com/vpc/home?region=eu-west-2#NatGateways:

New VPC Experience Tell us what you think

VPC Dashboard New Filter by VPC: Select a VPC

VIRTUAL PRIVATE CLOUD
Your VPCs Subnets Route Tables Internet Gateways New Egress Only Internet Gateways New DHCP Options Sets New Elastic IPs New Managed Prefix Lists New Endpoints Endpoint Services **NAT Gateways** New Peering Connections

SECURITY
Network ACLs Security Groups New

NAT gateways (1/1) Info

Filter NAT gateways

Name	NAT gateway ID	State	State message	Elastic IP address	Private IP address
test-nat-gateway-01	nat-0482b3b3546a1c8f2	Available	-	18.133.72.87	10.0.2.22

nat-0482b3b3546a1c8f2 / test-nat-gateway-01

Details Monitoring Tags

Details

NAT gateway ID <input type="text" value="nat-0482b3b3546a1c8f2"/>	State <input checked="" type="radio"/> Available	State message -	Elastic IP address 18.133.72.87
Private IP address 10.0.2.221	Network interface ID eni-0d2fb38b5843dc61e	VPC vpc-0e2c9358880d0d2ad / Test-VPC	Subnet subnet-0fa3bda5d2b75f15f / Test-public-subnet-2
Created <input type="text" value="2020/08/21 14:40 GMT+1"/>	Deleted -		

https://eu-west-2.console.aws.amazon.com/vpc/home?region=eu-west-2#NatGateways

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Now that we have the NAT gateway, we are going to edit the private route table to make use of the NAT gateway to access the internet.

The screenshot shows the AWS VPC Route Tables page. On the left, there's a sidebar with navigation links for VPC Dashboard, Filter by VPC, Route Tables, Internet Gateways, Egress Only Internet Gateways, DHCP Options Sets, Elastic IPs, Managed Prefix Lists, Endpoints, Endpoint Services, NAT Gateways, Peering Connections, Security (Network ACLs, Security Groups), and Virtual Private Cloud. The main content area displays a table of route tables. One route table, 'test-private-...', is selected and shown in more detail. The 'Routes' tab is active, showing two routes: one to '10.0.0.0/16' target 'local' status 'active' propagated 'No', and another to '0.0.0.0/0' target 'nat-0482b3b3546a1c8f2' status 'active' propagated 'No'. At the bottom, there are links for Feedback, English (US), Privacy Policy, and Terms of Use.

6.Create Elastic Load Balancer: From our architecture, our frontend tier can only accept traffic from the elastic load balancer which connects directly with the internet gateway load balancer. The essence of the load balancer is to distribute load across the EC2 instances serving that application. If however, the application is using sessions, then the application needs to be rewritten such that sessions can be stored in either the Elastic Cache or the DynamoDB. To create the two load balancers needed in our architecture, we navigate to the **Load Balancer** page and click on **Create Load Balancer**.

Select **internet facing** for the load balancer that we will use to communicate with the frontend and **internal** for the one we will use for our backend.

eu-west-2.console.aws.amazon.com/ec2/v2/home?region=eu-west-2#SelectCreateELBWizard:

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](#)

Application Load Balancer



Create

Choose an Application Load Balancer when you need a flexible feature set for your web applications with HTTP and HTTPS traffic. Operating at the request level, Application Load Balancers provide advanced routing and visibility features targeted at application architectures, including microservices and containers.

[Learn more >](#)

Network Load Balancer



Create

Choose a Network Load Balancer when you need ultra-high performance, TLS offloading at scale, centralized certificate deployment, support for UDP, and static IP addresses for your application. Operating at the connection level, Network Load Balancers are capable of handling millions of requests per second securely while maintaining ultra-low latencies.

[Learn more >](#)

Classic Load Balancer

PREVIOUS GENERATION
for HTTP, HTTPS, and TCP

Create

Choose a Classic Load Balancer when you have an existing application running in the EC2-Classic network.

[Learn more >](#)

[Feedback](#) [English \(US\)](#)

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eu-west-2.console.aws.amazon.com/ec2/v2/home?region=eu-west-2#V2CreateELBWizard:type=application:

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	<input type="text" value="Test-InternetFacing-ELB"/>
Scheme	<input checked="" type="radio"/> internet-facing <input type="radio"/> Internal
IP address type	<input type="text" value="ipv4"/>

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
<input type="text" value="HTTP"/>	<input type="text" value="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.

[Feedback](#) [English \(US\)](#)

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eu-west-2.console.aws.amazon.com/ec2/v2/home?region=eu-west-2#V2CreateELBWizard:type=application:

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	Test-Internal-ELB
Scheme	<input checked="" type="radio"/> internet-facing <input type="radio"/> internal
IP address type	ipv4

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.

Cancel Next: Configure Security Settings

Under the Availability Zone, for the **internet facing Load Balancer, we will select the two **public subnets** while for our **internal Load Balancer**, we will select the two **private subnet**.**

eu-west-2.console.aws.amazon.com/ec2/v2/home?region=eu-west-2#V2CreateELBWizard:type=application:

Step 1: Configure Load Balancer

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	vpc-0e2c9358880d0d2ad (10.0.0.0/16) Test-VPC
Availability Zones	<input checked="" type="checkbox"/> eu-west-2a subnet-032f73b375e6e8fd0 (Test-public-subnet-1)
IPv4 address	Assigned by AWS
	<input checked="" type="checkbox"/> eu-west-2b subnet-0fa3bda5d2b75f15f (Test-public-subnet-2)
	IPv4 address Assigned by AWS

eu-west-2.console.aws.amazon.com/ec2/v2/home?region=eu-west-2#V2CreateELBWizard:type=application:

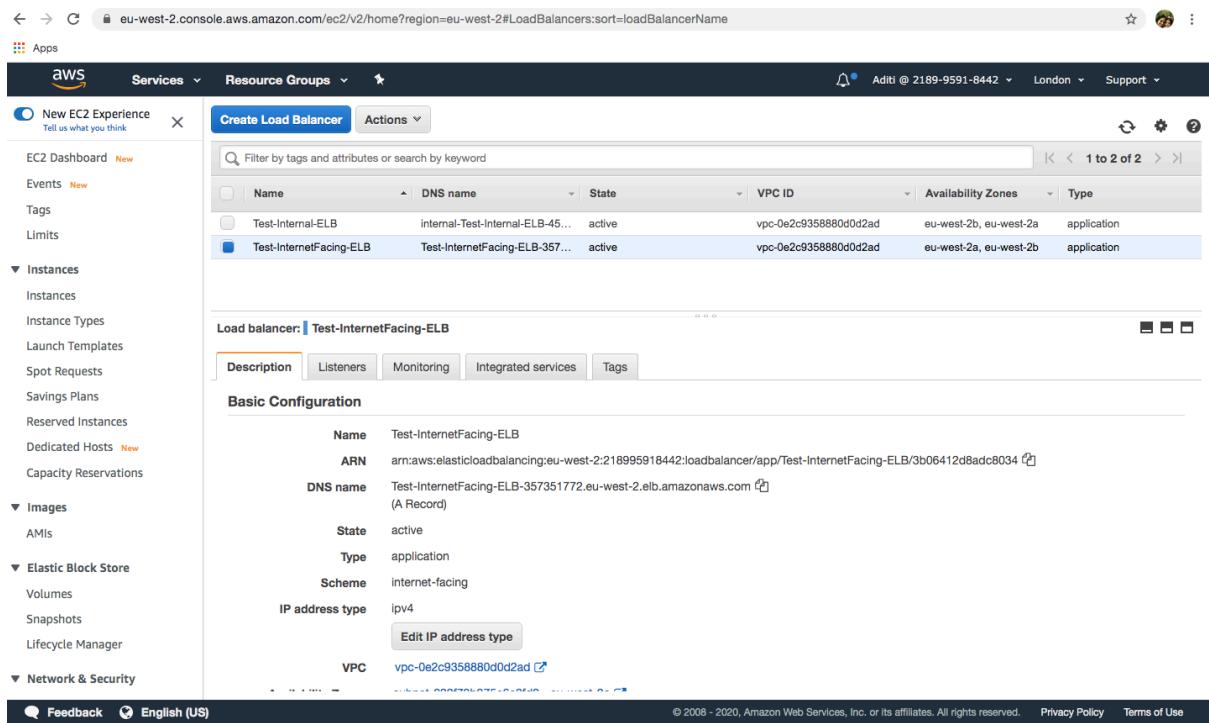
Step 1: Configure Load Balancer

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	vpc-0e2c9358880d0d2ad (10.0.0.0/16) Test-VPC
Availability Zones	<input checked="" type="checkbox"/> eu-west-2a subnet-09d3b08baf0d24fb3 (Test-private-subnet-3)
IPv4 address	Assigned by AWS
	<input checked="" type="checkbox"/> eu-west-2b subnet-035846a7dddef3b82 (test-private-subnet-4)
	IPv4 address Assigned by AWS

Under the Security Group, we **only need** to allow ports that the application needs. For instance, we need to allow **HTTP port 80 and/or HTTPS port 443** on our **internet facing load balancer**. For the **internal load balancer**, we only open the port that the backend runs on (eg: port 3000) and make such port **only open to the security group of the frontend**. This will allow only the frontend to have access to that port within our architecture.



The screenshot shows the AWS EC2 Load Balancers console. On the left, there's a navigation sidebar with options like EC2 Dashboard, Instances, Images, Elastic Block Store, and Network & Security. The main area displays a table of load balancers:

Name	DNS name	State	VPC ID	Availability Zones	Type
Test-Internal-ELB	internal-Test-Internal-ELB-45...	active	vpc-0e2c9358880d0d2ad	eu-west-2b, eu-west-2a	application
Test-InternetFacing-ELB	Test-InternetFacing-ELB-357...	active	vpc-0e2c9358880d0d2ad	eu-west-2a, eu-west-2b	application

Below the table, the details for the selected load balancer, "Test-InternetFacing-ELB", are shown. The "Basic Configuration" section includes fields for Name, ARN, DNS name, State, Type, Scheme, IP address type, and VPC. The DNS name is listed as "Test-InternetFacing-ELB-357351772.eu-west-2.elb.amazonaws.com (A Record)".

Under the **Configure Routing**, we need to configure our Target Group to have the **Target type of instance**. We will give the **Target Group** a name that will enable us to identify it. This will be needed when we will create our **Auto Scaling Group**. For example, we can name the Target Group of our frontend to be **Test-Frontend-TG**

7. Auto Scaling Group: We can simply create like two EC2 instances and directly attach these EC2 instances to our load balancer. The

problem with that is that our application will no longer scale to accommodate traffic or shrink when there is no traffic to save cost. With Auto Scaling Group, we can achieve this feat. Auto Scaling Group is can automatically adjust the size of the EC2 instances serving the application based on need. This is what makes it a good approach rather than directly attaching the EC2 instances to the load balancer.

To create an Auto Scaling Group, navigate to the **Auto Scaling Group** page, Click on the **Create Auto Scaling Group** button.

- a. Auto Scaling Group needs to have a common configuration that instances within it **MUST** have. This common configuration is made possible with the help of the **Launch Configuration**. In our Launch configuration, under the Choose AMI, the best practice is to choose the AMI which contains the application and its dependencies bundled together. We can also create your custom AMI in AWS. I have used a custom AMI.

eu-west-2.console.aws.amazon.com/ec2autoscaling/home?region=eu-west-2#/lc/create

Services ▾ Resource Groups ▾

New EC2 Experience Tell us what you think

EC2 Dashboard New

Events New

Tags

Limits

INSTANCES

- Instances
- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts New
- Scheduled Instances
- Capacity Reservations

IMAGES

- AMIs

ELASTIC BLOCK STORE

- Volumes
- Snapshots
- Lifecycle Manager

Feedback English (US)

Instead of using launch configurations to create your EC2 Auto Scaling groups, we recommend that you use launch templates to make sure that you're getting the latest features from EC2. Start using launch templates.

Search by AMI ID

My AMIs

Apache-Server-Frontend-AMI
ami-019aaad9fb665ed32
architecture: x86_64 virtualization: hvm

MySQLServer-Backend-AMI
ami-0cd66ced7f73c7947
architecture: x86_64 virtualization: hvm

Cortex3_20200513_1589380486-7893c21e-ae95-4a33-8767-6feb7734f8dd-ami-051833d87dd93bf66.4
ami-01d07d4207f8c5c66
architecture: x86_64 virtualization: hvm

TheHive3_20200706_1594045093-b7e97799-e635-4fa4-fad0cc2b7d03-ami-0d20abdf5d469b09.4
ami-02b8ff196bf81f9b9
architecture: x86_64 virtualization: hvm

Cortex3_20200706_1594045368-7893c21e-ae95-4a33-8767-6feb7734f8dd-ami-0dccfc73ee3ceec6c.4
ami-038e97861a9a8a65
architecture: x86_64 virtualization: hvm

Choose an AMI

Instance type Info

Instance type Choose instance type

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- b. Choose the appropriate instance type. For a demo, I recommend you choose t2.micro (free tier eligible) so that you do not incur charges.

eu-west-2.console.aws.amazon.com/ec2autoscaling/home?region=eu-west-2#/lc/create

Services ▾ Resource Groups ▾

New EC2 Experience Tell us what you think

EC2 > Launch configurations > Create launch configuration

Create launch configuration Info

Launch configuration name

Name Test-Frontend-LC1

Amazon machine image (AMI) Info

AMI Apache-Server-Frontend-AMI

Instance type Info

Instance type t2.micro (1 vCPUs, 1 GiB, EBS Only) Choose instance type

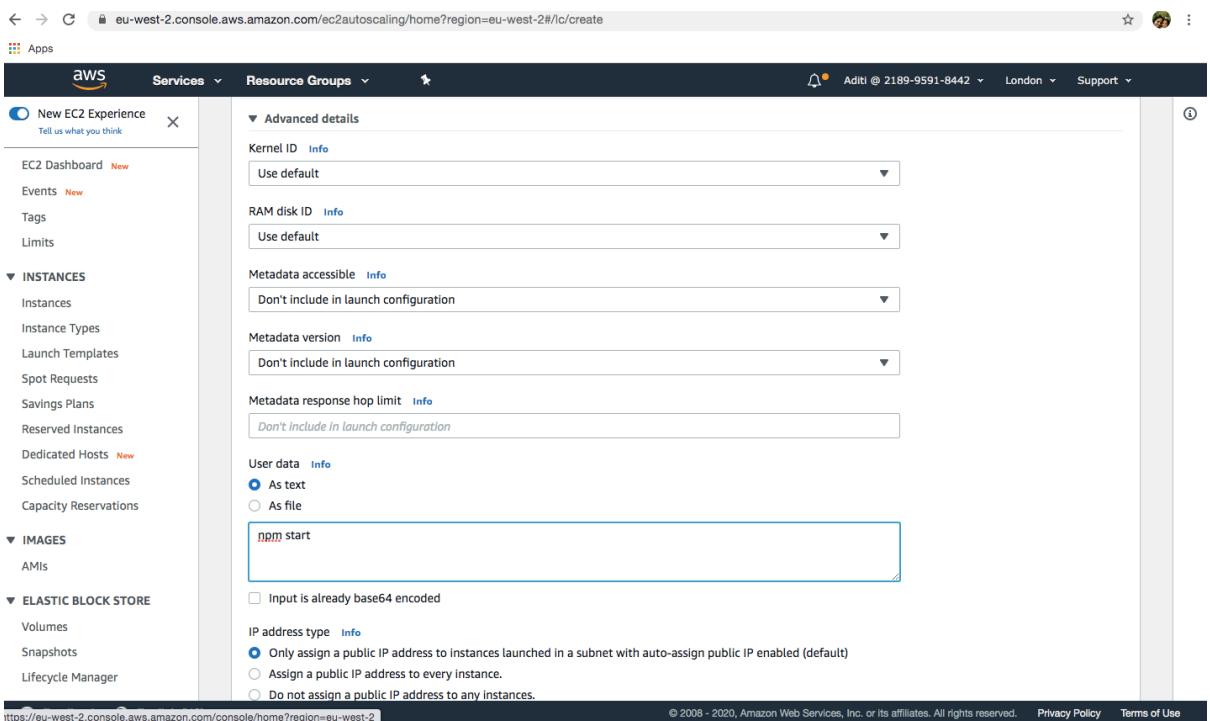
Additional configuration - optional

Purchasing option Info

Request Spot Instances

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- c. Under the Configure details, give the Launch Configuration a name, eg **Test-Frontend-LC**. Also, under the **Advance Details** dropdown, the **User data** is provided for you to type in a command that is needed to install dependencies and start the application.



- d. Again under the security group, we want to only allow the ports that are necessary for our application.
- e. Review the Configuration and Click on **Create Launch Configuration** button. Go ahead and create a new key pair. Ensure you download it before proceeding.

The screenshot shows the AWS EC2 Launch Configurations page. A blue banner at the top states: "The old launch configurations console will no longer be available after 8/31/2020." The main table lists three launch configurations:

Name	AMI ID	Instance type	Spot price	Creation time
Test-Backend-LC	ami-0cd66cedf7d...	t2.micro	-	Mon Aug 24 2020 ...
Test-Frontend-LC1	ami-019aadb9fb...	t2.micro	-	Mon Aug 24 2020 ...
Test-Frontend-LC	ami-019aadb9fb...	t2.micro	-	Mon Aug 24 2020 ...

Below the table, the details for the selected launch configuration, "Test-Frontend-LC1", are shown:

AMI ID	Instance type	IAM instance profile
ami-019aadb9fb665ed32	t2.micro	-
Kernel ID	Key name	Monitoring
-	EC2 Learning	false
EBS optimized	Security groups	Spot price
false	sg-05da4a98e00437a68	-
Create time	DAM click ID	ID address type

- f. Now we have our Launch Configuration, we can finish up with the creating our Auto Scaling Group.

The screenshot shows the AWS Auto Scaling Groups creation wizard, Step 1: Choose launch template or configuration. The left sidebar shows the navigation path: EC2 > Auto Scaling groups > Create Auto Scaling group.

The main area displays the "Choose launch template or configuration" section. It includes a summary of steps completed so far:

- Step 1: Choose launch template or configuration
- Step 2: Configure settings
- Step 3 (optional): Configure advanced options
- Step 4 (optional): Configure group size and scaling policies
- Step 5 (optional): Add notifications
- Step 6 (optional): Add tags
- Step 7: Review

The "Launch configuration" section is expanded, showing the selected launch configuration "Test-Frontend-LC" with its details:

Launch configuration	AMI ID	Date created
Test-Frontend-LC	ami-019aadb9fb665ed32	Mon Aug 24 2020 22:25:47 GMT+0100 (British Summer Time)
Security groups	Instance type	Key pair name
sg-0b880d5466f4e39fb	t2.micro	-

eu-west-2.console.aws.amazon.com/ec2autoscaling/home?region=eu-west-2#/create

The screenshot shows the 'Configure settings' step of the wizard. On the left sidebar, there are sections for Instances, Images, and Elastic Block Store. The main area has tabs for Step 1 (Choose launch template or configuration), Step 2 (Configure settings), Step 3 (optional) Configure advanced options, Step 4 (optional) Configure group size and scaling policies, Step 5 (optional) Add notifications, Step 6 (optional) Add tags, and Step 7 Review.

Network

For most applications, you can use multiple Availability Zones and let EC2 Auto Scaling balance your instances across the zones. The default VPC and default subnets are suitable for getting started quickly.

VPC

vpc-0e2c9358880d0d2ad (Test-VPC)
10.0.0.0/16

Create a VPC

Subnets

Select subnets

eu-west-2a | subnet-09d3b08ba0d24fb3 (Test-private-subnet-3)
10.0.3.0/24

eu-west-2b | subnet-035846a7dddef3b82 (test-private-subnet-4)
10.0.4.0/24

Create a subnet

Buttons: Cancel, Previous, Skip to review, Next

eu-west-2.console.aws.amazon.com/ec2autoscaling/home?region=eu-west-2#/create

The screenshot shows the 'Configure settings' step of the wizard. The left sidebar is identical to the previous screenshot. The main area has tabs for Step 2 (Configure settings), Step 3 (optional) Configure advanced options, Step 4 (optional) Configure group size and scaling policies, Step 5 (optional) Add notifications, Step 6 (optional) Add tags, and Step 7 Review.

Load balancing - optional

Enable load balancing

Application Load Balancer or Network Load Balancer

Classic Load Balancer

Choose a target group for your load balancer

Select target group

Test-Frontend-TG

Create a target group

Health checks - optional

Health check type

EC2 Auto Scaling automatically replaces instances that fail health checks. If you enabled load balancing, you can enable ELB health checks in addition to the EC2 health checks that are always enabled.

EC2

ELB

Health check grace period

The amount of time until EC2 Auto Scaling performs the first health check on new instances after they are put into service.

300 seconds

Additional settings - optional

Buttons: Cancel, Previous, Skip to review, Next

- g. Under the Configure scaling policies, we want to add one instance when the CPU is greater than or equal to 80% and to scale down when the CPU is less than or equal to 50%.

eu-west-2.console.aws.amazon.com/ec2autoscaling/home?region=eu-west-2#/create

Apps

New EC2 Experience

EC2 Dashboard New

Events New

Tags

Limits

INSTANCES

- Instances
- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts New
- Scheduled Instances
- Capacity Reservations

IMAGES

- AMIs

ELASTIC BLOCK STORE

- Volumes
- Snapshots
- Lifecycle Manager

Feedback English (US)

Services Resource Groups

Step 2 Configure settings

Step 3 (optional) Configure advanced options

Step 4 (optional) Configure group size and scaling policies

Step 5 (optional) Add notifications

Step 6 (optional) Add tags

Step 7 Review

Group size - optional [Info](#)

Specify the size of the Auto Scaling group by changing the desired capacity. You can also specify minimum and maximum capacity limits. Your desired capacity must be within the limit range.

Desired capacity

Minimum capacity

Maximum capacity

Scaling policies - optional [Info](#)

Choose whether to use a scaling policy to dynamically resize your Auto Scaling group to meet changes in demand.

Target tracking scaling policy
Choose a desired outcome and leave it to the scaling policy to add and remove capacity as needed to achieve that outcome.

None

Scaling policy name

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eu-west-2.console.aws.amazon.com/ec2autoscaling/home?region=eu-west-2#/details

Apps

New EC2 Experience

The old Auto Scaling groups console will no longer be available after 8/31/2020.

Frontend-ASG, 1 Scaling policy created successfully

EC2 > Auto Scaling groups

Auto Scaling groups (1)

Create an Auto Scaling group

Name	Launch template/configuration	Instances	Status	Desired capacity	Min	Max
Frontend-ASG	Test-Frontend-LC1	0	Updating capacity	2	2	4

Feedback English (US)

Services Resource Groups

The screenshot shows the AWS EC2 Auto Scaling Groups page. On the left, there's a sidebar with options like New EC2 Experience, EC2 Dashboard, Events, Tags, Limits, Instances (with sub-options like Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Scheduled Instances, Capacity Reservations), Images (AMIs), and Elastic Block Store (Volumes, Snapshots, Lifecycle Manager). The main content area has a blue banner at the top with a 'Save Up to 90% on Compute' message. Below it, a green banner says 'Backend-ASG, 1 Scaling policy created successfully'. The main table lists two Auto Scaling groups:

Name	Launch template/configuration	Instances	Status	Desired capacity	Min	Max
Backend-ASG	Test-Backend-LC	0	Updating capacity	2	2	4
Frontend-ASG	Test-Frontend-LC1	3	-	2	2	4

At the bottom, there are links for Feedback, English (US), and a footer with copyright information.

8. Bastion Host: The bastion host is just an EC2 instance that sits in the public subnet. The best practice is to only allow SSH to this instance from your trusted IP. To create a bastion host, navigate to the EC2 instance page and create an EC2 instance in the **test-public-subnet-1** subnet within our VPC. We have to ensure that it has public IP.

eu-west-2.console.aws.amazon.com/ec2/v2/home?region=eu-west-2#LaunchInstanceWizard:

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances	<input type="text" value="1"/>	Launch into Auto Scaling Group
Purchasing option	<input type="checkbox"/> Request Spot Instances	
Network	vpc-0e2c9358880d0d2ad Test-VPC	<input type="button" value="Create new VPC"/>
Subnet	subnet-032f73b375e6e8fd0 Test-public-subnet-1	<input type="button" value="Create new subnet"/> 249 IP Addresses available
Auto-assign Public IP	<input type="button" value="Enable"/>	
Placement group	<input type="checkbox"/> Add instance to placement group	
Capacity Reservation	<input type="button" value="Open"/>	
IAM role	<input type="button" value="None"/> <input type="button" value="Create new IAM role"/>	
Shutdown behavior	<input type="button" value="Stop"/>	
Stop - Hibernate behavior	<input type="checkbox"/> Enable hibernation as an additional stop behavior	
Enable termination protection	<input type="checkbox"/> Protect against accidental termination	
Monitoring	<input type="checkbox"/> Enable CloudWatch detailed monitoring <small>Additional charges apply.</small>	

Buttons: Cancel, Previous, Review and Launch, Next: Add Storage

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eu-west-2.console.aws.amazon.com/ec2/v2/home?region=eu-west-2#LaunchInstanceWizard:

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:	<input checked="" type="radio"/> Create a new security group	<input type="radio"/> Select an existing security group		
Security group name:	<input type="text" value="Bastion-Host-SG"/>			
Description:	<input type="text" value="launch-wizard-4 created 2020-08-24T23:44:57.902+01:00"/>			
Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom	1.2.3.4/32
<input type="button" value="Add Rule"/>				

Buttons: Cancel, Previous, Review and Launch

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