

## AWS: Use of an Elastic Load Balancer

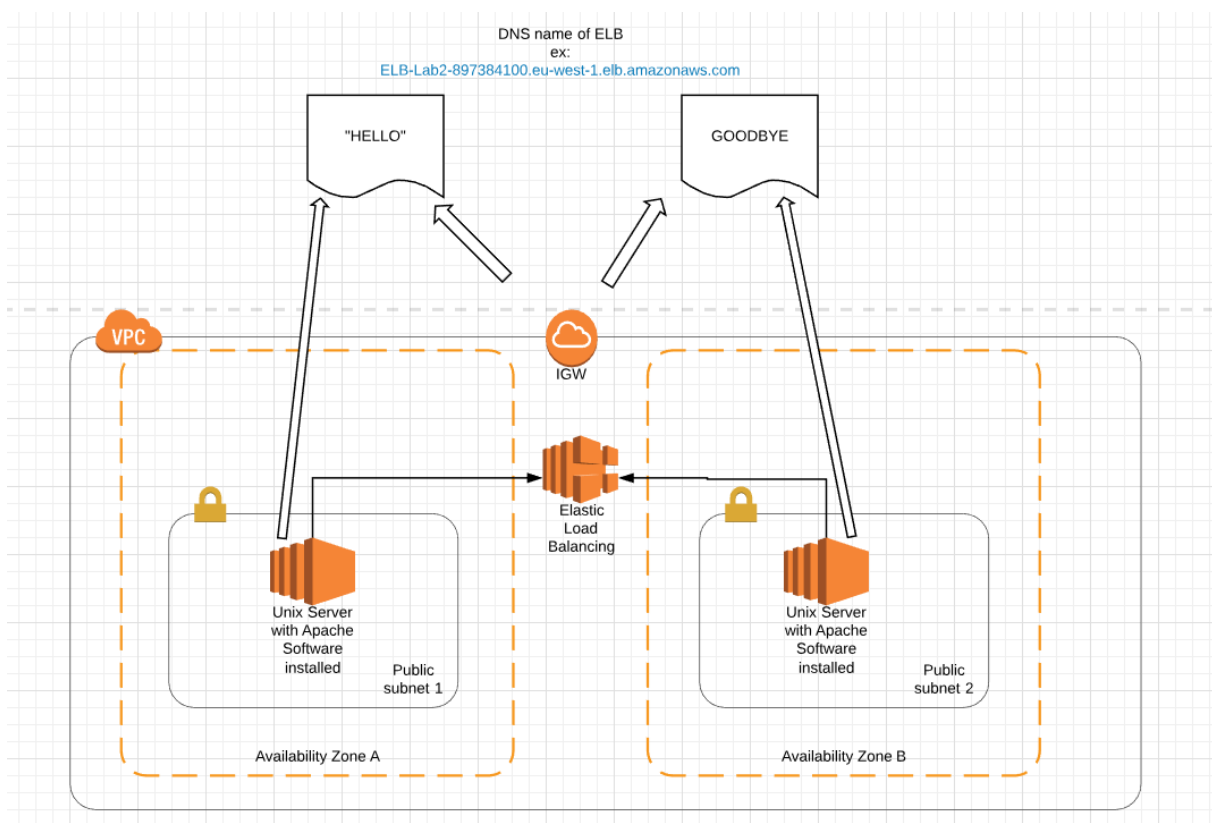
### Goal :

Create an architecture, with 2 instances in 2 different subnets.

Each EC2 is an Apache Web Server, with a different content, managed by an ELB.

On the Web Brower, according to the refresh, we will the content of one Server or the content of the other.

Architecture looks like as below:



### Step 1: Create the VPC with the 2 Subnets

- **VPC -> Start VPC Wizard**

Select VPC Configuration: VPC with a Single Public Subnet

## Step 2: VPC with a Single Public Subnet

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**IPv4 CIDR block:**\*  (65531 IP addresses available)

**IPv6 CIDR block:** ☒ No IPv6 CIDR Block  
☐ Amazon provided IPv6 CIDR block

**VPC name:**

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**Public subnet's IPv4 CIDR:**\*  (251 IP addresses available)

**Availability Zone:**\*  ▼

**Subnet name:**

You can add more subnets after AWS creates the VPC.

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**Service endpoints**

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**Enable DNS hostnames:**\* ☒ Yes ☐ No

**Hardware tenancy:**\*  ▼

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## Step 2: Add the second Public Subnet

- **Subnet -> Create Subnet**

In the correct VPC, and in a different AZ than the “Public Subnet 1”

Create Subnet Subnet Actions ▼

X

| <input type="checkbox"/>            | Name              | Subnet ID       | State     | VPC                           | IPv4 CIDR      | Available IP | IPv6 CIDR | Av  |
|-------------------------------------|-------------------|-----------------|-----------|-------------------------------|----------------|--------------|-----------|-----|
| <input type="checkbox"/>            |                   | subnet-8590a2de | available | vpc-1d1dc17b                  | 172.31.32.0/20 | 4091         |           | eu- |
| <input type="checkbox"/>            |                   | subnet-de65a196 | available | vpc-d81cc0be   RosettaHUB VPC | 172.30.1.0/24  | 250          |           | eu- |
| <input type="checkbox"/>            |                   | subnet-bc6da9f4 | available | vpc-1d1dc17b                  | 172.31.16.0/20 | 4091         |           | eu- |
| <input type="checkbox"/>            | Public subnet TP2 | subnet-0119aa67 | available | vpc-bee09dd8   TP2 VPC        | 10.0.0.0/24    | 249          |           | eu- |
| <input type="checkbox"/>            |                   | subnet-f49aa8af | available | vpc-d81cc0be   RosettaHUB VPC | 172.30.2.0/24  | 250          |           | eu- |
| <input type="checkbox"/>            |                   | subnet-600cfd06 | available | vpc-1d1dc17b                  | 172.31.0.0/20  | 4091         |           | eu- |
| <input checked="" type="checkbox"/> | Public subnet 1   | subnet-006ad866 | available | vpc-a3daa6c5   VPC_ELB        | 10.0.0.0/24    | 251          |           | eu- |

Create Subnet X

Use the CIDR format to specify your subnet's IP address block (e.g., 10.0.0.0/24). Note that block sizes must be between a /16 netmask and /28 netmask. Also, note that a subnet can be the same size as your VPC. An IPv6 CIDR block must be a /64 CIDR block.

**Name tag**  ⓘ

**VPC**  ⓘ

| VPC CIDRs | CIDR        | Status  | Status Reason |
|-----------|-------------|---|---------------|
|           | 10.0.0.0/16 | <span style="color: green;">●</span> associated |               |

**Availability Zone**  ⓘ

**IPv4 CIDR block**  ⓘ

### Step 3: Attach the 2<sup>nd</sup> subnet to the IGW, to be able to communicate with outside

By default, the Public Subnet just created is not connected to an Internet Gateway.

We have to configure it manually.

To do this:

- go to Route Table on the right Dashboard.
- Select the Route of our “VPC\_ELB”, which is not associated to a Subnet: “Explicit Associated With 0 Subnets” or Main to “yes”

VPC Dashboard

Filter by VPC:  
Select a VPC

Virtual Private Cloud

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

Security

- Network ACLs
- Security Groups

VPN Connections

- Customer Gateways
- Virtual Private Gateways

Create Route Table Delete Route Table Set As Main Table

Search Route Tables and their

| Name | Route Table ID | Explicitly Associated With | Main | VPC                           |
|------|----------------|----------------------------|------|-------------------------------|
|      | rtb-c6920ebf   | 1 Subnet                   | Yes  | vpc-bee09dd8   TP2 VPC        |
|      | rtb-3cca2845   | 0 Subnets                  | Yes  | vpc-1d1dc17b                  |
|      | rtb-f68e128f   | 1 Subnet                   | No   | vpc-bee09dd8   TP2 VPC        |
|      | rtb-20c92b59   | 0 Subnets                  | Yes  | vpc-d81cc0be   RosettaHUB VPC |
|      | rtb-9676e9ef   | 0 Subnets                  | Yes  | vpc-a3daa6c5   <b>VPC_ELB</b> |
|      | rtb-4e71ee37   | 1 Subnet                   | No   | vpc-a3daa6c5   VPC_ELB        |

rtb-9676e9ef

Summary Routes Subnet Associations Route Propagation Tags

Edit

View: All rules

| Destination | Target | Status | Propagated |
|-------------|--------|--------|------------|
| 10.0.0.0/16 | local  | Active | No         |

*No IGW*

- Add another Route

| Name | Route Table ID | Explicitly Associated With | Main | VPC                           |
|------|----------------|----------------------------|------|-------------------------------|
|      | rtb-20c92b59   | 0 Subnets                  | Yes  | vpc-d81cc0be   RosettaHUB VPC |
|      | rtb-9676e9ef   | 0 Subnets                  | Yes  | vpc-a3daa6c5   <b>VPC_ELB</b> |
|      | rtb-4e71ee37   | 1 Subnet                   | No   | vpc-a3daa6c5   VPC_ELB        |

rtb-9676e9ef

Summary Routes Subnet Associations Route Propagation Tags

Cancel Save

View: All rules

| Destination | Target       | Status | Propagated | Remove |
|-------------|--------------|--------|------------|--------|
| 10.0.0.0/16 | local        | Active | No         |        |
| 0.0.0.0/0   | igw-3886c35f | No     |            |        |

Add another route

- Check if “Public Subnet 2” is now correctly associated to IGW

PC Dashboard

Filter by VPC:  
Select a VPC

Virtual Private Cloud

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ndpoint Services

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earing Connections

ecurity

Create Subnet Subnet Actions

Search Subnets and their proj X

|                                     | Name                  | Subnet ID       | State     | VPC                    |
|-------------------------------------|-----------------------|-----------------|-----------|------------------------|
| <input type="checkbox"/>            | Public subnet TP2     | subnet-0119aa67 | available | vpc-bee09dd8   TP2 VPC |
| <input type="checkbox"/>            | Public subnet 1       | subnet-006ad866 | available | vpc-a3daa6c5   VPC_ELB |
| <input type="checkbox"/>            | Public Subnet TP2 AZ2 | subnet-c496158c | available | vpc-bee09dd8   TP2 VPC |
| <input checked="" type="checkbox"/> | Public Subnet 2       | subnet-9ecd4fd6 | available | vpc-a3daa6c5   VPC_ELB |
| <input type="checkbox"/>            |                       | subnet-8590a2de | available | vpc-1d1dc17b           |

subnet-9ecd4fd6 | Public Subnet 2

Summary Route Table Network ACL Flow Logs Tags

Edit

Route Table: rtb-9676e9ef

| Destination | Target       |
|-------------|--------------|
| 10.0.0.0/16 | local        |
| 0.0.0.0/0   | igw-3886c35f |

OK

#### **Step 4: Create the 1st Instance (in Public Subnet 1) with Apache Server**

In the AWS console:

- Services -> EC2
- Launch Instance
- Step 1: Choose an Amazon Machine Image (AMI) -> Amazon Linux AMI
- Step 2: Choose an Instance Type -> t2.micro
- Step 3: Configure Instance Details : as below

Do Not Forget to set the “Advanced Details” section, with following text, in order to install Apache:

```
#!/bin/bash
sudo yum update -y
sudo yum -y install httpd
sudo service httpd start
sudo bash -c 'echo HELLO MANU > /var/www/html/index.html'
sudo bash -c 'echo HOW ARE YOU? >> /var/www/html/index.html'
```

This code allows to install Apache.

### Step 3: Configure Instance Details

|                               |   |                 |                     |                   |
|-------------------------------|---|-----------------|---------------------|-------------------|
| Network                       | vpc-a3daa6c5  | VPC_ELB         | Create new VPC      |                   |
| Subnet                        | subnet-006ad866   | Public subnet 1 | eu-west-1a          | Create new subnet |
| 251 IP Addresses available    |   |                 |                     |                   |
| Auto-assign Public IP         | Enable  |                 |                     |                   |
| Placement group               | <input type="checkbox"/> Add instance to placement group.                                       |                 |                     |                   |
| IAM role                      | None  |                 | Create new IAM role |                   |
| Shutdown behavior             | Stop  |                 |                     |                   |
| Enable termination protection | <input type="checkbox"/> Protect against accidental termination                                 |                 |                     |                   |
| Monitoring                    | <input type="checkbox"/> Enable CloudWatch detailed monitoring<br>Additional charges apply.     |                 |                     |                   |
| Tenancy                       | Shared - Run a shared hardware instance<br>Additional charges will apply for dedicated tenancy. |                 |                     |                   |
| T2 Unlimited                  | <input type="checkbox"/> Enable<br>Additional charges may apply                                 |                 |                     |                   |

#### Network interfaces

| Device | Network Interface     | Subnet          | Primary IP  | Secondary IP addresses | IF |
|--------|-----------------------|-----------------|-------------|------------------------|----|
| eth0   | New network interface | subnet-006ad866 | Auto-assign | Add IP                 |    |

Add Device

#### Advanced Details

User data ☒ As text ☐ As file ☐ Input is already base64 encoded

```
#!/bin/bash
sudo yum update -y
sudo yum -y install httpd
sudo service httpd start
sudo bash -c 'echo HELLO MANU > /var/www/html/index.html'
sudo bash -c 'echo HOW ARE YOU? > /var/www/html/index.html'
```

- Step 4: Add Storage -> Next
- Step 5: Add Tags :

#### 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.  
A copy of a tag can be applied to volumes, instances or both.  
Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

| Key                                     | Value                    |
|---|--------------------------|
| (127 characters maximum)                | (255 characters maximum) |
| Name                                    | WebServer Apache 1       |
| Add another tag (Up to 50 tags maximum) |                          |

- Step 6: Configure Security Group : Add Rule, to allow set up your web server: port HTTP

### 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 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 name:

Description:

| Type | Protocol | Port Range | Source                  |
|------|----------|------------|-------------------------|
| SSH  | TCP      | 22         | Anywhere 0.0.0.0/0 ::/0 |
| HTTP | TCP      | 80         | Anywhere 0.0.0.0/0 ::/0 |

- Step 7: Review Instance Launch

Select an existing key pair or create a new one

And Launch Instances

### Step 5: Create the 2nd Instance (in Public Subnet 2) with Apache Server

Repeat the same steps than **Step 4**, but for the Public Subnet 2, and specify a different message printed on your web server, to differentiate when we will refresh

#### Step 3: Configure Instance Details

Network

Subnet      
251 IP Addresses available

Auto-assign Public IP

Placement group ☐ Add instance to placement group.

IAM role

Shutdown behavior

Enable termination protection ☐ Protect against accidental termination

Monitoring ☐ Enable CloudWatch detailed monitoring  
[Additional charges apply.](#)

Tenancy   
[Additional charges will apply for dedicated tenancy.](#)

T2 Unlimited ☐ Enable  
[Additional charges may apply](#)

▼ Network interfaces

| Device | Network Interface                                  | Subnet                                       | Primary IP                               | Secondary IP addresses                | IPv |
|--------|--|--|--|---------------------------------------|-----|
| eth0   | <input type="text" value="New network interface"/> | <input type="text" value="subnet-9ecd4fd6"/> | <input type="text" value="Auto-assign"/> | <input type="button" value="Add IP"/> |     |

▼ Advanced Details

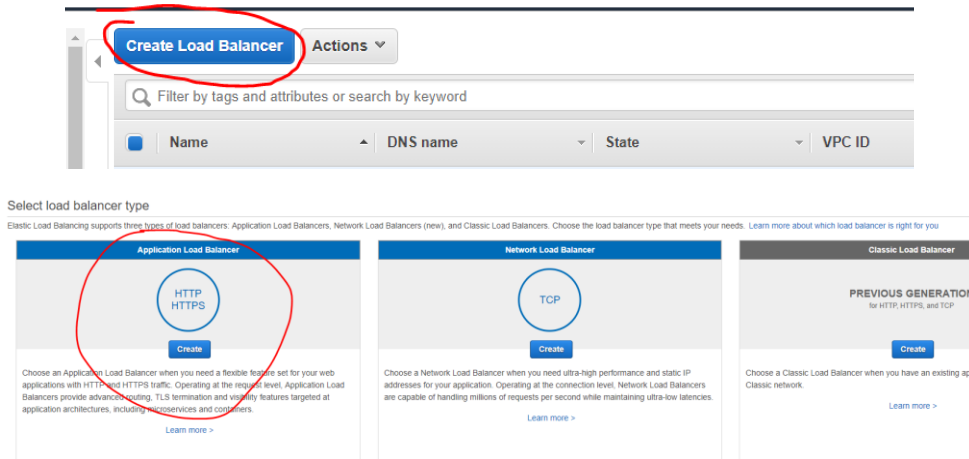
User data ☐ As text ☐ As file ☐ Input is already base64 encoded

```
#!/bin/bash
sudo yum update -y
sudo yum -y install httpd
sudo service httpd start
sudo bash -c 'echo Goodbye > /var/www/html/index.html'
sudo bash -c 'echo See you later >> /var/www/html/index.html'
```

## Step 6: Create and Configure ELB

In the AWS console, on EC2 Dashboards, Select Load Balancers

- And Create Load Balancer



- And Configure as snapshot below, mainly the Availability Zones and the 2 Subnets:

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 list

**Name**  Load balancer names must only contain alphanumeric characters or hyphens, and not start with a hyphen.

**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**

**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 s

**VPC**

| Availability Zone                              | Subnet ID       | Subnet IPv4 CIDR | Name            |
|--|-----------------|------------------|-----------------|
| <input checked="" type="checkbox"/> eu-west-1a | subnet-006ad866 | 10.0.0.0/24      | Public subnet 1 |
| <input checked="" type="checkbox"/> eu-west-1b | subnet-9ecd4fd6 | 10.0.1.0/24      | Public Subnet 2 |

**Tags**

- Configure Security Groups

### 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

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

**Security group name:**

**Description:**

| Type       | Protocol | Port Range | Source |
|------------|----------|------------|--------|
| Custom TCP | TCP      | 80         | Custom |

**Add Rule**

- Configure Routing, as default:

#### 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.

##### Target group

Target group ⓘ
New target group ▼

Name ⓘ
ELB-TARGET

⚠ TargetGroup name cannot contain characters that are not letters, or digits

Protocol ⓘ
HTTP ▼

Port ⓘ
80

Target type ⓘ
instance ▼

Health checks

Protocol ⓘ
HTTP ▼

Path ⓘ
/

▶ Advanced health check settings

- Register Targets: Add our 2 instances in the target group

#### 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 check.

##### 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 |
|--------------------------|----------|------|------|-------|-----------------|------|
| No instances available.  |          |      |      |       |                 |      |

##### 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-03c82831167ccea33 | Web Server Apache 2 | running | launch-wizard-5 | eu-west-1b | subnet-9ecd4fd6 | 10.0.1.0/24 |
| <input checked="" type="checkbox"/> | i-0299955c0608b6760 | WebServer Apache 1  | running | launch-wizard-5 | eu-west-1a | subnet-006ad866 | 10.0.0.0/24 |

#### Step 8: Open in a new web Browser, the DNS of the ELB just created:

| <input type="checkbox"/>            | Name       | DNS name   | State  | VPC ID       | Availability Zones     | Type        |
|-------------------------------------|------------|--|--------|--------------|------------------------|-------------|
| <input checked="" type="checkbox"/> | ELB-Apache | ELB-Apache-868802268.eu-west-1.elb.amazonaws.com | active | vpc-a3daa6c5 | eu-west-1a, eu-west-1b | application |
| <input type="checkbox"/>            | ELB-Lab2   | ELB-Lab2-897384100.eu-west-1.elb.amazonaws.com   | active | vpc-bee09dd8 | eu-west-1a, eu-west-1b | application |

Load balancer: ELB-Apache

Description Listeners Monitoring Tags

Basic Configuration

Name: ELB-Apache ⓘ
Creation time: June 4, 2018 at 12:00:56 AM UTC+2

ARN: arn:aws:elasticloadbalancing:eu-west-1:531953625695:loadbalancer/app/ELB-Apache/cce23a52697aac17 ⓘ
Hosted zone: Z32O12XQLNTSW2

DNS name: ELB-Apache-868802268.eu-west-1.elb.amazonaws.com ⓘ (A Record)
State: active

Scheme: internet-facing
VPC: vpc-a3daa6c5

Type: application
IP address type: ipv4

Availability Zones: subnet-006ad866 - eu-west-1a, subnet-9ecd4fd6 - eu-west-1b
AWS WAF Web ACL: An error occurred while a request was made

Edit availability zones



Here we go:



After few refresh

