



PROJECT

AWS – DEPLOY HIGHLY AVAILABLE, SCALABLE, FAULT TOLERANT AND RESILIENT WEB APPLICATION & INTEGRATE MANAGED RDS DATABASE

(NETWORKING & CONTENT DELIVERY)

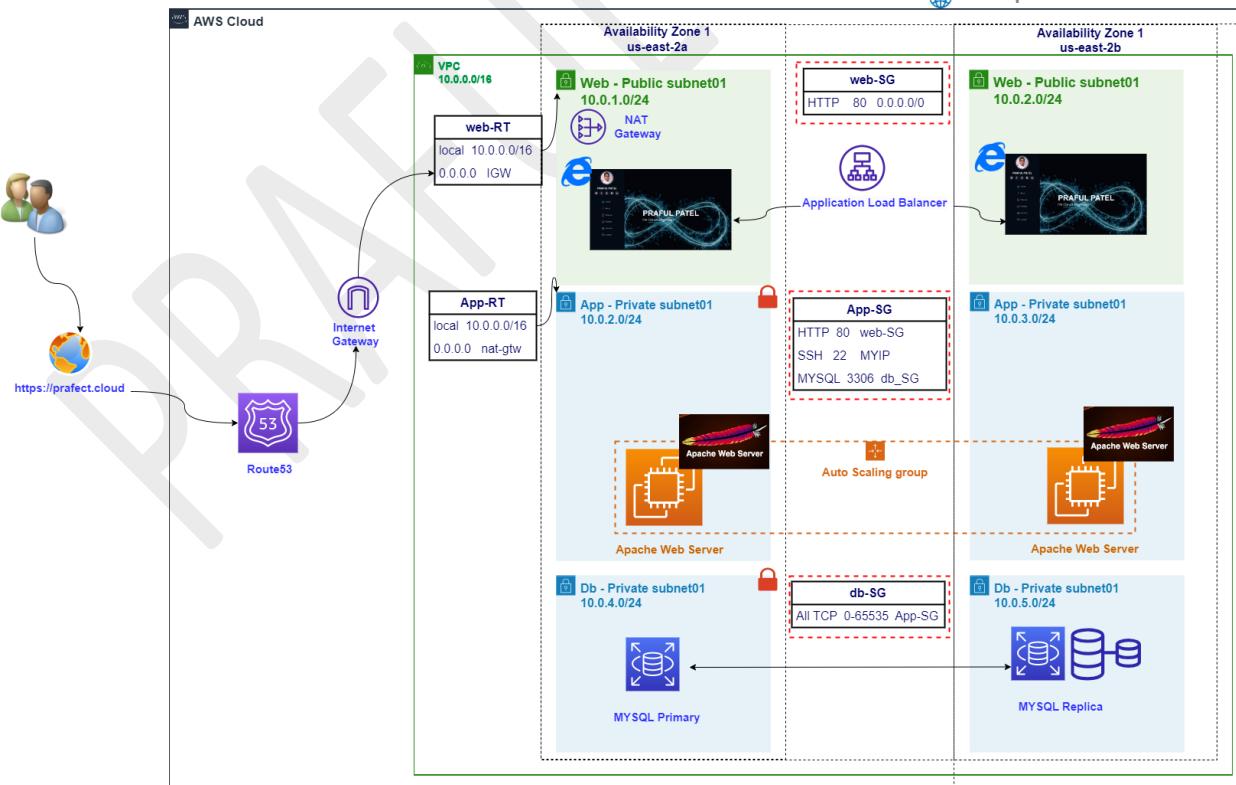
By: PRAFUL PATEL

HIGHLY AVAILABLE THREE TIER WEB APPLICATION

Prefect.cloud

Way To Go, Cloud Is Future!

Designed By: PRAFUL PATEL

<https://github.com/prafulpatel16>www.prafect.cloud



➤ **Project:**

An IT services provider company called **PRAFECT.CLOUD**, is engaged into providing software development solutions. Currently, they have a requirement to deploy on-premises to cloud migrated application on aws has to build and provision on AWS platform with managed relational database.

They are going to launch a personal portfolio web application on aws cloud platform. It assumes that more than 10000 users may access their web application to view the portfolio web application. The business users have an expectation of having a web application up and running all the time without any delay or single point of failure on the servers. The systems should be capable enough to handle the load and traffic in all circumstances and requires to scale up when the traffic or load crosses the certain threshold $>40\%$ on each individual servers, and it should also be scaled in when the load reaches below to the specified cpu $>40\%$ threshold.

➤ **Project Description:**

Web Servers: apache web server

Application source code: php/html web application

This project demonstrates an experience of web application deployment through using aws EC2 machines which can scale out and scale in using elastic load balancer, auto scaling and target group services.

➤ **Solution:**

This project needs to be deployed on highly available environment where web application should be scale out and scale in as per the traffic and load on the web servers. The web application should be always up and running always without any single point of failure. It needs to use aws service using application load balancer, auto scaling, target groups and launch template through which it can be made the web application always scale out and scale in as per the needs. There will be two public servers(EC2 machines) will be running initially which will be placed behind an application load balancer and it should be scaled out when certain cpu load $\geq 40\%$ reaches to any of the web server machines, where it should be scaled out using auto scaling group and target group should be configured. VPC services should consist more than public subnet that web application machine should be placed behind a public server, and behind private server the DB instance should be placed.

For Web server perspective, this server should be running on apache web servers and the application source code of php/html packages should be installed and configured.

For networking and security perspective, web application server will have to be accessed and allowed publicly available so internet gateway needs to be provisioned and assigned to the public ip.

For security concerns and avoiding cyber threats it has to configure some security group and assign and appropriate routes and rules based on requirement. Also web serve should be allowed to access from SSH at port 22 for system administration perspective, and it should allow to be accessible at custom TCP: Port 8080 from everywhere.

For DB server perspective, this needs to be behind a private subnet so it should not allow from external world so certain settings like publicly available should be disabled. Also it has to strictly define some rules from security groups so that no one can access and abuse the db server. DB credentials should be defined while provisioning a db server and pass through safe mechanism.

OS and application packages requirements are provided separately which needs to be provisioned and be ready before go on live session.

➤ **Project Cost Estimation:**

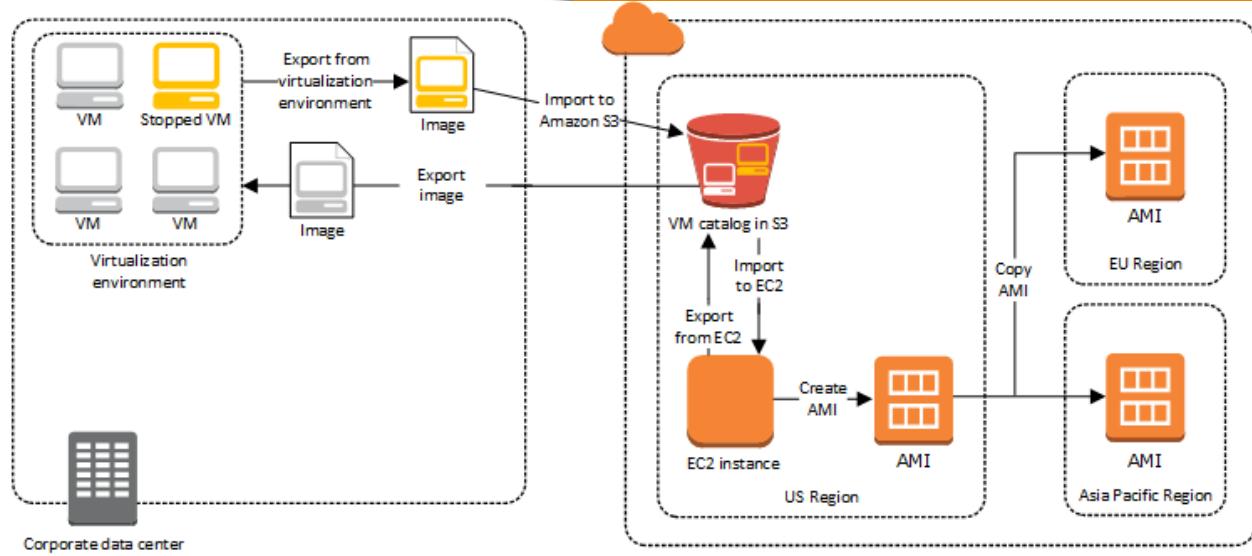
(Note: This cost is Not any actual cost, it's just an estimation based on high level requirement. Price may be vary based on adding and removing services based on requirement.)

➤ **Strategy**

○ **On-Premise to AWS Migration**

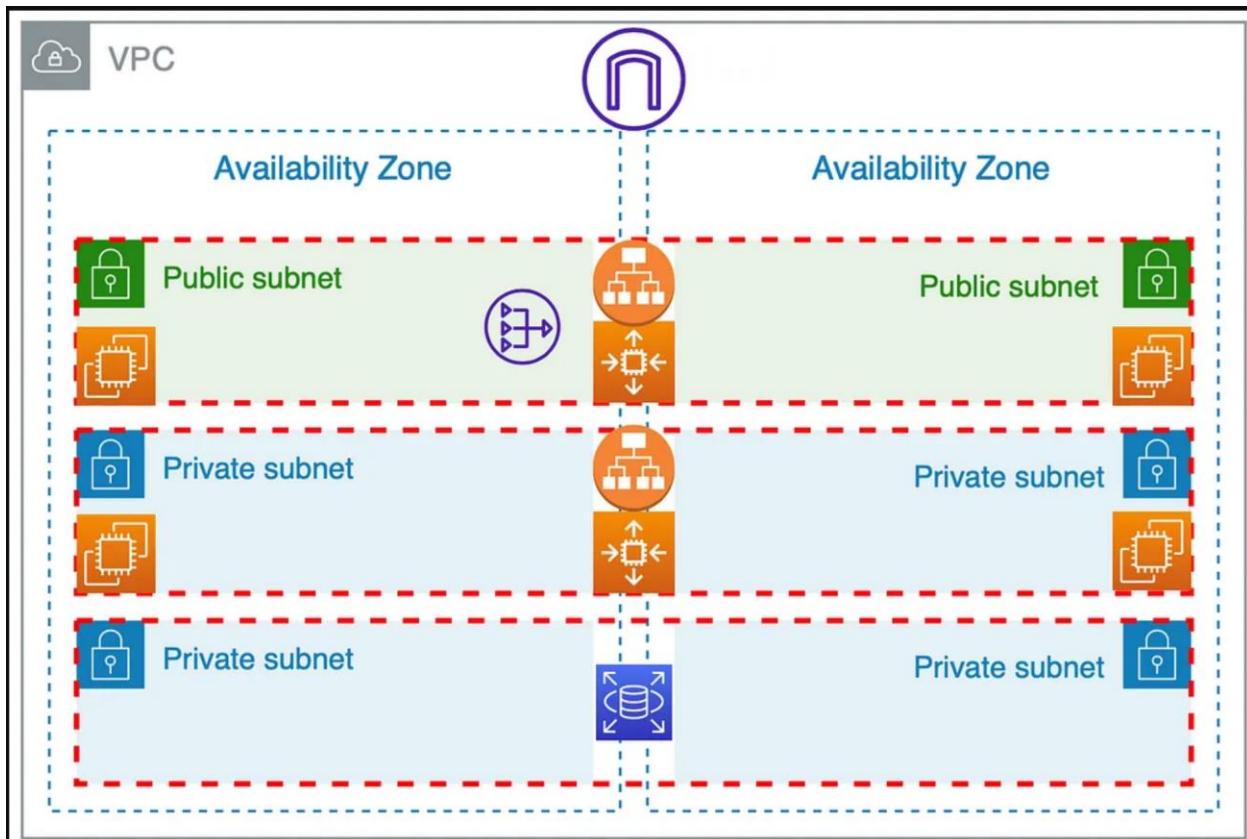
There are seven common migration strategies when moving applications to the cloud, including:

- Retain – keeping applications running as is and revisiting the migration at a later stage
- Retire – decommissioning applications that are no longer required
- Repurchase – switching from existing applications to a software-as-a-service (SaaS) solution
- **Rehost – moving applications as is (lift and shift), without making any changes to take advantage of cloud capabilities**
- Relocate – moving applications as is, but at a hypervisor level
- Replatform – moving applications as is, but introduce capabilities that take advantage of cloud-native features
- Refactor – re-architect the application to take full advantage of cloud-native features

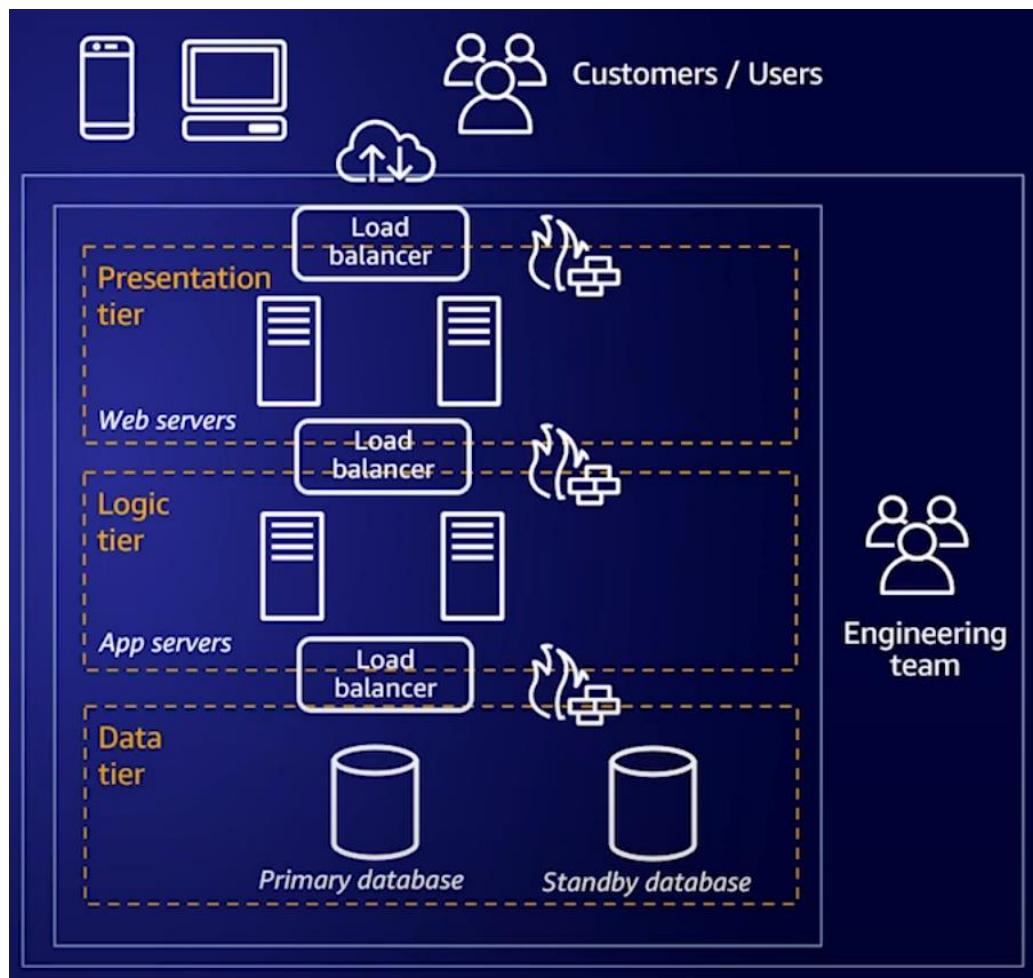


- Re-platform and modernize the web application on AWS Cloud

The solution is comprised of the following components:



3 – Tier application – components



► What is load balancing ?

Load balancing is the method of distributing network traffic equally across a pool of resources that support an application. Modern applications must process millions of users simultaneously and return the correct text, videos, images, and other data to each user in a fast and reliable manner. To handle such high volumes of traffic, most applications have many resource servers with duplicate data between them. A load balancer is a device that sits between the user and the server group and acts as an invisible facilitator, ensuring that all resource servers are used equally.

► Benefits of load balancing:

- **Application availability**
 - Runs application servers without any downtime
 - Automatic disaster recovery to backup sites
 - Performs health checks and prevents downtime
- **Application Scalability**

- Prevents traffic bottlenecks at any one server
- Predicts application traffic so that you can add or remove different servers, if needed
- Adds redundancy to your system so that you can scale with confidence

- **Application Scalability**

- Monitor traffic and block malicious content
- Automatically redirect attack traffic to multiple backend servers to minimize impact
- Route traffic through a group of network firewalls for additional security

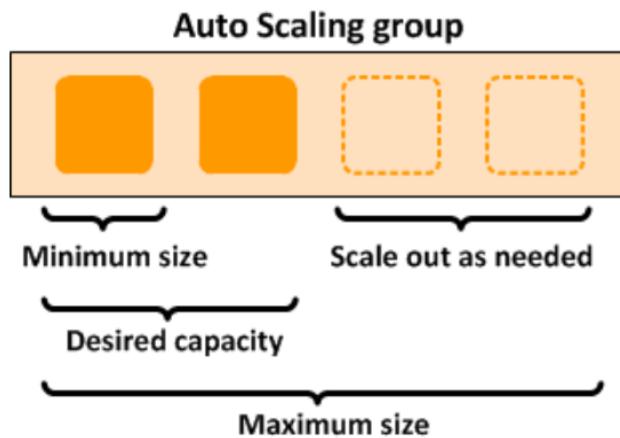
- **Application Performance**

- Distribute the load evenly between server to improve app performance
- Redirect client requests to geographically closer server to reduce latency
- Ensure the reliability and performance of physical and virtual computing resources

► **What is Auto Scaling ?**

Amazon EC2 Auto Scaling helps you ensure that you have the correct number of Amazon EC2 instances available to handle the load for your application.

You create collections of EC2 instances, called *Auto Scaling groups*. You can specify the minimum number of instances in each Auto Scaling group, and Amazon EC2 Auto Scaling ensures that your group never goes below this size. You can specify the maximum number of instances in each Auto Scaling group, and Amazon EC2 Auto Scaling ensures that your group never goes above this size. If you specify the desired capacity, either when you create the group or at any time thereafter, Amazon EC2 Auto Scaling ensures that your group has this many instances. If you specify scaling policies, then Amazon EC2 Auto Scaling can launch or terminate instances as demand on your application increases or decreases.



❖ **Challenges or Improvement Tasks to be implemented:**

- ▶ Challenge 1: Reproduce core components – 3tier app
 - ✓ Solution 1: Core components
 - Compute & storage: web and app servers
 - Database – primary & standby
 - Network – connectivity, load balancers, DNS

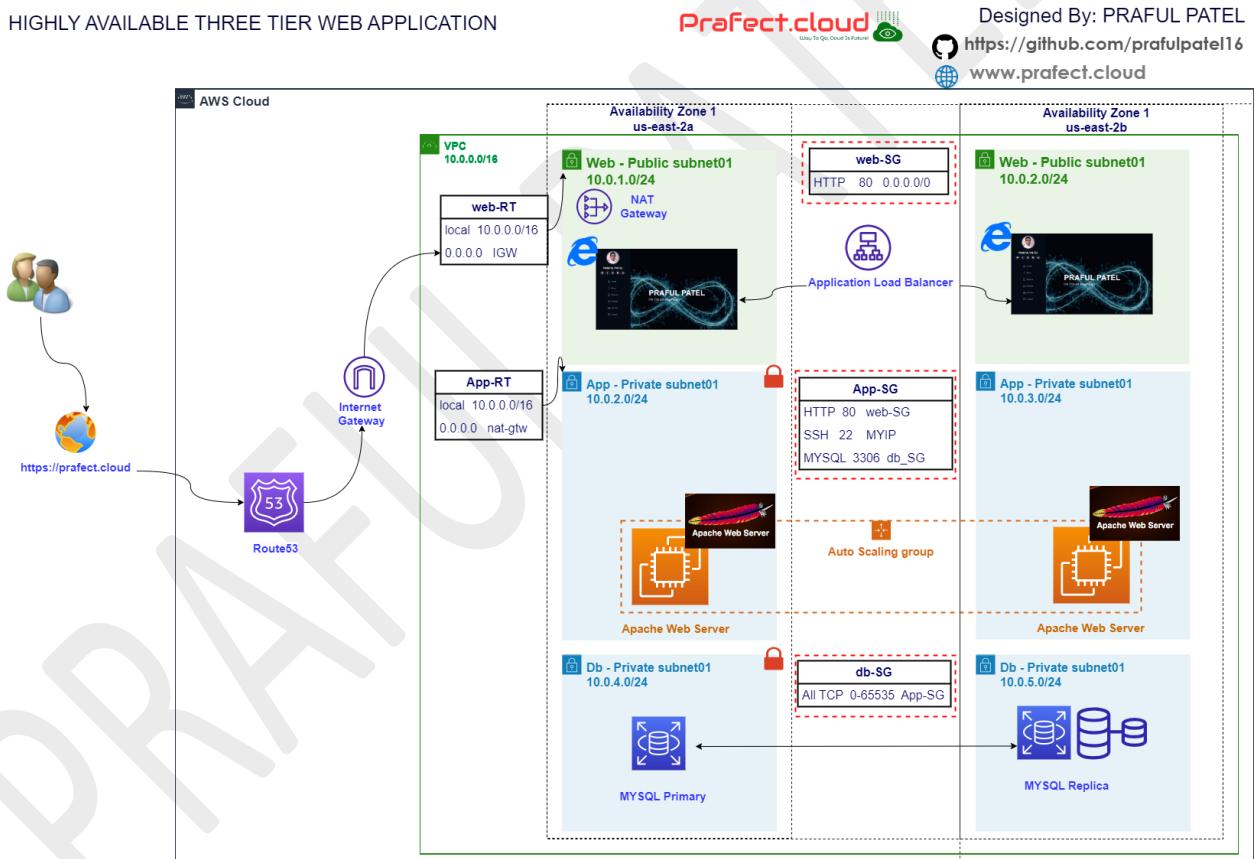
- ▶ Challenge 2: Serve to local customers, later global expansion
 - ✓ Solution 2: Core components
 - Regions
 - Availability zones
 - VPCs

- ▶ Challenge 3: Don't over provision resources
 - ✓ Solution 3: Select suitable Type of Workload resources
 - Instances
 - EC2
 - Containers
 - AWS ECS
 - AWS EKS
 - AWS Fargate
 - Serverless
 - AWS Lambda

- ▶ Challenge 4: Handle peak days / times
 - ✓ Solution 4: Auto scaling
 - Capacity groups
 - Scale tiers independently
 - Predefined, predictive, smart scaling

- Managed service

- ▶ Reduce outages
- ✓ Solution 5: Reduce planned and unplanned outages
 - Availability and managed services
 - Automatically failover between AZs
 - High availability with load balancing
 - Application Load balancer
 - Network Load balancer
 - Gateway Load balancer
 - Supports health checks
 - EC2 auto scaling



- ▶ The solution is comprised of the following components:
 - A VPC across two Availability Zones
 - Two public web subnets, two private app subnets, and two private DB subnets
 - An Internet Gateway attached to the VPC
 - A public route table routing internet traffic to the Internet Gateway
 - Two private route tables routing traffic internally within the VPC
 - A frontend web server application Elastic Load Balancing that routes traffic to the Apache Web Servers

- An Auto Scaling group that launches additional Apache Web Servers based on defined scaling policies. Each instance of the web server is based on a launch template, which defines the same configuration for each new web server.
- A hosted zone in Amazon Route 53 with a domain name that routes to the frontend web server Elastic Load Balancing
- An Auto Scaling group that launches additional Apache Web Application Servers based on defined scaling policies. Each instance of the Apache Web Application server is based on a launch template, which defines the same configuration and software components for each new application server
- A MySQL Amazon Relational Database Service (Amazon RDS) Multi-AZ deployment for MySQL RDS to store the contact management and role access tables

➤ **Tools & Technologies covered:**

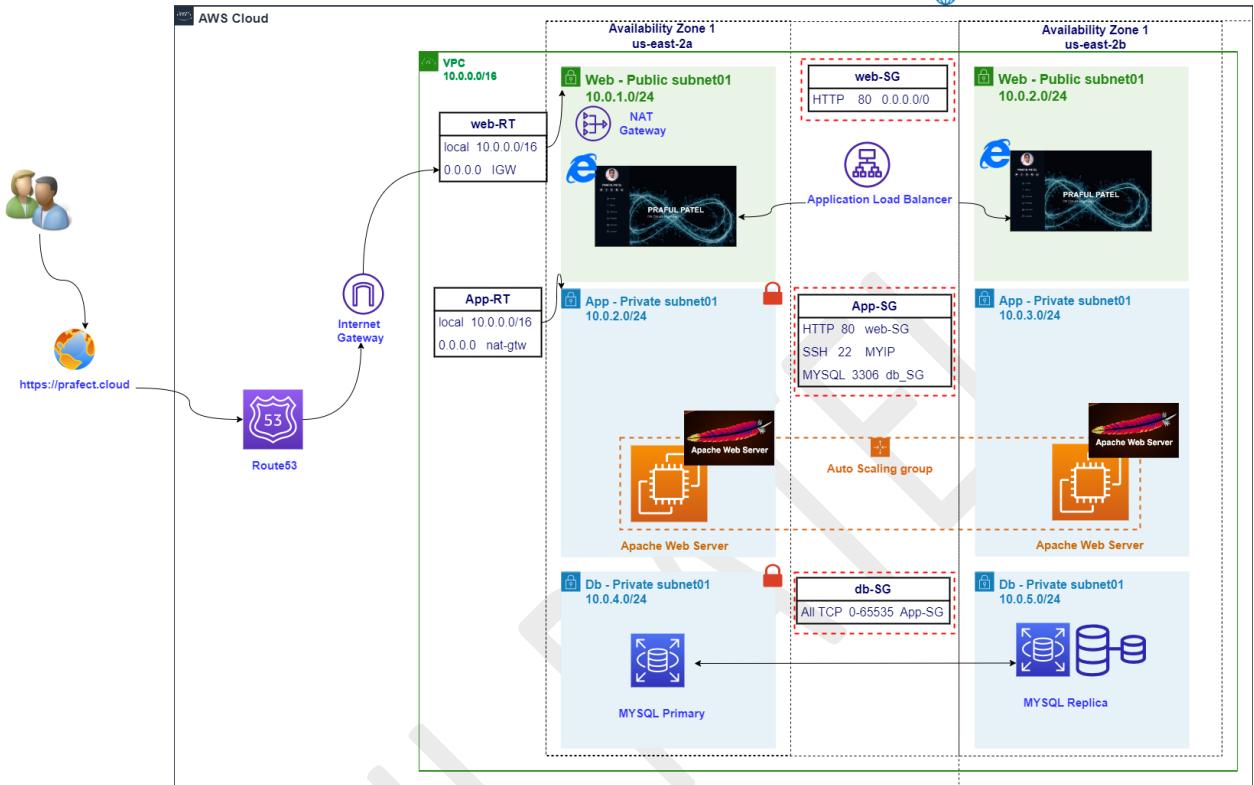
1. AWS cloud
2. VPC
 - o Subnets
 - o Internet Gateway
 - o NAT Gateway
 - o Route tables
 - o Security Groups
3. EC2 Machine
4. Application Load balancer
5. Auto scaling
6. Launch template
7. RDS Database - MySQL
8. MobaXterm SSH client

➤ Architectural Diagram:

HIGHLY AVAILABLE THREE TIER WEB APPLICATION

PraFect.cloud 

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This High availability project will be completed following implementation phases.

➤ Project implementation Phases:

- Phase 1: Deploy networking infrastructure
- Phase 2: Deploy Launch Template
- Phase 3: Create elastic load balancer, auto scaling group, target group
- Phase 4: Verify that web application is accessible
- Phase 5: Test horizontal scaling, high availability of web application
- Phase 6: Deploy RDS DB managed MYSQL instance

➤ Implementation:

❖ Phase 1: Deploy networking components.

1. Create vpc

1. Name: prafect-vpc
2. CIDR: 10.0.0.0/16

2. Create web Subnets

1. Name: web-public01
 1. Availability zone: us-east-2a
 2. CIDR: 10.0.1.0/24
2. Name: web-public02
 1. Availability zone: us-east-2b

2. CIDR: 10.0.2.0/24

3. Create app Subnets

1. Name: app-private01
 1. Availability zone: us-east-2a
 2. CIDR: 10.0.3.0/24
2. Name: app-private02
 1. Availability zone: us-east-2b
 2. CIDR: 10.0.4.0/24

4. Create db Subnets

1. Name: db-private01
 1. Availability zone: us-east-2a
 2. CIDR: 10.0.5.0/24
2. Name: db-private02
 1. Availability zone: us-east-2b
 2. CIDR: 10.0.6.0/24

5. Create Internet Gateway

1. Name: web-igw
2. Attach to VPC: prafect-vpc

6. Create NAT Gateway

1. Name: prafect-NAT
2. Subnet: web-public01
3. Connectivity: Public
4. Elastic Ip: Allocate Elastic IP

7. Create Route table – web-RT

1. Name: Web-RT
2. Select the VPC: prarect-vpc
3. Subnet Associations
 1. Select – web-public01
 2. Select – web-public02
4. Routes – Add internet gateway as route from 0.0.0.0/0
 1. Destination: 0.0.0.0/0
 2. Target: Select internet gateway: web-igw

8. Create Route table – App-RT

1. Name: App-RT
2. Select the VPC: prafect-vpc
3. Subnet Associations
 1. Select – app-private01
 2. Select – app-private02
4. Routes – Add NAT 0.0.0.0/0
 1. Destination: 0.0.0.0/0
 2. Target: Select NAT gateway

9. Create security Groups

1. Create one security group for web traffic

1. Name: web-SG
2. VPC: prafect-vpc
3. Inbound rule:
 1. Type: HTTP
 2. Protocol: TCP

3. Port Range: 80
4. Source: 0.0.0.0/0

2. Create second security group for App traffic

1. Name: app-SG
2. VPC: prefect-vpc
3. Inbound rule 1:
 1. Type: HTTP
 2. Protocol: TCP
 3. Port Range: 80
 4. Source: anywhere : web-SG
4. Inbound rule 2:
 1. Type: MYSQL/Aurora
 2. Protocol: TCP
 3. Port Range: 3306
 4. Source: anywhere : db-SG
5. Inbound rule 3:
 1. Type: SSH (if need to access app instance by admin)
 2. Protocol: TCP
 3. Port Range: 22
 4. Source: anywhere : MYIP

3. Create third security group for db traffic

1. Name: db-SG
2. VPC: prefect-vpc
3. Inbound rule 1:
 1. Type: ALL TCP
 2. Protocol: TCP
 3. Port Range: 0-65635
 4. Source: anywhere : app-SG

❖ Phase 2: Deploy Launch Template

1. Create Launch Template: instances
2. Target Group name: app-TG
 1. Protocol: TCP
 2. Port: 80
 3. VPC: prefect-vpc
3. Health checks
 1. Health check protocol: HTTP
4. Advanced health check
 1. Port: Traffic port
 2. Healthy threshold: 3
 3. Unhealthy threshold: 3
 4. Timeout: 4
 5. Interval: 10 seconds

❖ Phase 3: Deploy Target Group

5. Choose target group: instances

6. Target Group name: app-TG
 1. Protocol: TCP
 2. Port: 80
 3. VPC: prefect-vpc
7. Health checks
 1. Health check protocol: HTTP
8. Advanced health check
 1. Port: Traffic port
 2. Healthy threshold: 3
 3. Unhealthy threshold: 3
 4. Timeout: 4
 5. Interval: 10 seconds

❖ **Phase 4: Deploy Application Load Balancer**

9. Create Launch template
10. Create Application Load Balancer
 1. Name: web-ALB
 2. Scheme: internet-facing
 3. Ip address: ipv4
 4. Network mapping:
 1. Select VPC: web-vpc
 2. Mappings: select: us-east-1a, us-east1b
 3. Security Groups: select: web-ALB-SG
 4. Listener:
 1. HTTP:80
 2. Default action: Target Group

❖ **Phase 5: Deploy Auto Scaling Group**

11. Name: web-ASG
12. Launch template: web-template
13. Network:
 1. VPC: web-vpc
 2. Availability Zones: us-east-1a, us-east-1b
 3. Load Balancing: Attach to and existing load balancer
 4. Choose Target Group: web-TG
 5. Health Check: ELB: 300 seconds
 6. Group Size:
 1. Units
 2. Desired Capacity: 2
 3. Minimum Capacity: 2
 4. Maximum Capacity:4
 7. Scaling Policies:
 1. Name: Target Tracking Policy
 2. Metric Type: Average CPU Utilization
 3. Target Value: 50
 4. Warm up: 300 seconds

❖ **Phase 6: Verify that web application is accessible**

- 1. Go to application load balancer

- o 2. Access the ALB DNS and access the web application

❖ **Phase 7: Deploy RDS DB managed MYSQL instance**

- o **Create DB instance group**

- Go to Subnet groups
- Create DB subnet group
 - Name: db-subnetgroup
 - Vpc: prefect-vpc
 - Add subnets:
 - Availability Zone: us-east-2a, us-east-2b
 - Subnets: db-private01, db-private02
 - Create

- o **Create DB instance – MYSQL**

- **Create database**
- Standard create
- Engine options: MySQL
- Engine version: 5.7.39
- Template: Dev/Test
- Availability: Single DB Instance
- Settings:
 - DB instance: mysql
 - Credentials: master username: admin
 - Password: Passw0rd!
- Connectivity:
 - VPC: prefect-vpc
 - DBsubnet group: dbsubnet
 - Public class: No
- Existing SG group: db-SG
- Database Authentication: Password authentication

➤ **Pre-requisite:**

- 1) AWS Free Tier
- 2) Web Application source code
- 3) Webserver installation script file
- 4) SSH Client

➤ **Implementation in an Action:**

Create VPC

CIDR: 10.0.0.0/16

VPC settings

Resources to create [Info](#)
Create only the VPC resource or the VPC and other networking resources.

VPC only 1 VPC and more

Name tag - optional
Creates a tag with a key of 'Name' and a value that you specify.

2

IPv4 CIDR block [Info](#)
 IPv4 CIDR manual input 3 IPAM-allocated IPv4 CIDR block

IPv4 CIDR 4

IPv6 CIDR block [Info](#)
 No IPv6 CIDR block 5 IPAM-allocated IPv6 CIDR block
 Amazon-provided IPv6 CIDR block
 IPv6 CIDR owned by me

Tenancy [Info](#)
 6

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.

Key	Value - optional
<input type="text" value="Name"/>	<input type="text" value="prefect-vpc"/> 7

[Add new tag](#)
You can add 49 more tags.

Cancel Create VPC 8

Create Web-public subnets

1. Create Subnets

1. Name: web-public01
 1. Availability zone: us-east-2a
 2. CIDR: 10.0.1.0/24
2. Name: web-public02
 1. Availability zone: us-east-2b
 2. CIDR: 10.0.2.0/24

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Subnet 1 of 2

Subnet name
Create a tag with a key of 'Name' and a value that you specify.

1 web-public01

The name can be up to 256 characters long.

Availability Zone [Info](#)
Choose the zone in which your subnet will reside, or let Amazon choose one for you.

2 US East (Ohio) / us-east-2a

IPv4 CIDR block [Info](#)

3 10.0.1.0/24

Tags - optional

Key	Value - optional
4 Name	5 web-public01

Add new tag

You can add 49 more tags.

Remove

Subnet 2 of 2

Subnet name
Create a tag with a key of 'Name' and a value that you specify.

4 web-public01

The name can be up to 256 characters long.

Availability Zone [Info](#)
Choose the zone in which your subnet will reside, or let Amazon choose one for you.

5 US East (Ohio) / us-east-2b

IPv4 CIDR block [Info](#)

6 10.0.2.0/24

Tags - optional

Key	Value - optional
-----	------------------

VPC dashboard EC2 Global View [New](#) Filter by VPC: Select a VPC

Virtual private cloud Your VPCs Subnets Route tables Internet gateways Egress-only internet gateways DHCP option sets

You have successfully created 2 subnets: subnet-08ac1353d5fa03389, subnet-063a9789f581f151d

Subnets (2) Info

Name	Subnet ID	State	VPC	IPv4 CIDR	IPv6 CIDR	Available IPv4 a
7 web-public02	subnet-063a9789f581f151d	8 Available	vpc-024a44812f7630f8a pr...	10.0.2.0/24	-	251
9 web-public01	subnet-08ac1353d5fa03389	10 Available	vpc-024a44812f7630f8a pr...	10.0.1.0/24	-	251

Create App-private subnets

1. Create Subnets

1. Name: app-private01
 1. Availability zone: us-east-2a
 2. CIDR: 10.0.2.0/24
2. Name: app-private02
 1. Availability zone: us-east-2b
 2. CIDR: 10.0.3.0/24

Create subnet

VPC

Subnet settings

Subnet 1 of 2

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
app-private01 ①

The name can be up to 256 characters long.

Availability Zone Info
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
US East (Ohio) / us-east-2a ②

IPv4 CIDR block Info
Q 10.0.3.0/24 ③

Tags - optional

Key	Value - optional
Q Name	Q app-private01

Add new tag
You can add 49 more tags.

Subnet 2 of 2

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
app-private02 ①

The name can be up to 256 characters long.

Availability Zone Info
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
US East (Ohio) / us-east-2b ②

IPv4 CIDR block Info
Q 10.0.4.0/24 ③

Tags - optional

Key	Value - optional
Q Name	Q app-private02

Add new tag
You can add 49 more tags.

Create subnet ④

VPC dashboard

Subnets (2)

Name	Subnet ID	State	VPC	IPv4 CIDR	IPv6 CIDR	Available IPv4 a
app-private02	subnet-06c007c74f2f7740f	Available	vpc-024a44812f7630f8a pra...	10.0.4.0/24	-	251
app-private01	subnet-050cdc2ef3b68f4e6	Available	vpc-024a44812f7630f8a pra...	10.0.3.0/24	-	251

Create Data-private subnets

1. Create Subnets

1. Name: data-private01

1. Availability zone: us-east-2a
2. CIDR: 10.0.5.0/24

2. Name: data-private02

1. Availability zone: us-east-2b
2. CIDR: 10.0.6.0/24

The screenshot shows the AWS VPC Subnet creation interface. At the top, the navigation bar includes links for VPC, Route 53, EC2, S3, CloudFront, Certificate Manager, CloudWatch, Simple Notification Service, AWS FIS, and IAM.

The main page title is "Create subnet" with a "Info" link. Below it, there are two sections for creating subnets:

- Subnet 1 of 1:**
 - Subnet name:** data-private01 (highlighted with a red circle 2)
 - Availability Zone:** US East (Ohio) / us-east-2a (highlighted with a red circle 3)
 - IPv4 CIDR block:** 10.0.5.0/24 (highlighted with a red circle 4)
 - Tags - optional:** A tag named "Name" with value "data-private01" is listed.
- Subnet 2 of 2:**
 - Subnet name:** data-private02 (highlighted with a red circle 1)
 - Availability Zone:** US East (Ohio) / us-east-2b (highlighted with a red circle 2)
 - IPv4 CIDR block:** 10.0.6.0/24 (highlighted with a red circle 3)
 - Tags - optional:** A tag named "Name" with value "data-private02" is listed.

At the bottom right of the form, there are "Cancel" and "Create subnet" buttons. The "Create subnet" button is highlighted with a red circle 4.

All subnets created successfully

Name	Subnet ID	State	VPC	IPv4 CIDR	IPv6 CIDR	Available IPv4 a
app-private01	subnet-050cdc2ef5b68f4e6	Available	vpc-024a44812f7630f8a pr...	10.0.3.0/24	-	251
app-private02	subnet-06c007c74f2f7740f	Available	vpc-024a44812f7630f8a pr...	10.0.4.0/24	-	251
data-private01	subnet-0e897818fc46ee889	Available	vpc-024a44812f7630f8a pr...	10.0.5.0/24	-	251
data-private02	subnet-07f790de506475104	Available	vpc-024a44812f7630f8a pr...	10.0.6.0/24	-	251
web-public01	subnet-08ac1353d5fa03389	Available	vpc-024a44812f7630f8a pr...	10.0.1.0/24	-	251
web-public02	subnet-063a9789f581f151d	Available	vpc-024a44812f7630f8a pr...	10.0.2.0/24	-	251

Create Internet Gateway

1. Create Internet Gateway
 1. Name: web-igw
 2. Attach to VPC: web-vpc

Name	Internet gateway ID	State	VPC ID	Owner
-	igw-05bb23de610aca27f	Attached	vpc-05f3e3d6d1ff2c3fb	914141388779

1. Internet gateway settings

2. Tags - optional

3. Create Internet gateway

VPC dashboard > Internet gateways > igw-023bc1ddebab1a1be / web-igw

Details

Internet gateway ID: igw-023bc1ddebab1a1be State: Detached VPC ID: - Owner: 914141388779

Tags

Key	Value
Name	web-igw

Actions ▾

VPC > Internet gateways > Attach to VPC (igw-023bc1ddebab1a1be) [Info](#)

Attach an internet gateway to a VPC to enable the VPC to communicate with the internet. Specify the VPC to attach below.

Available VPCs
Attach the internet gateway to this VPC:

vpc-024a44812f7630f8a - prefect-vpc [Select a VPC](#)

AWS Command Line Interface command

Cancel **Attach internet gateway**

VPC dashboard > Internet gateways > igw-023bc1ddebab1a1be / web-igw

Details

Internet gateway ID: igw-023bc1ddebab1a1be State: Attached VPC ID: vpc-024a44812f7630f8a | prefect-vpc Owner: 914141388779

Tags

Key	Value
Name	web-igw

Actions ▾

Create Route Tables

1. Create Web Route table

1. Name: Web-RT
2. Select the VPC: web-vpc
3. Subnet Associations
 1. Select – web-public01
 2. Select – web-public02
4. Routes – Add internet gateway as route from 0.0.0.0/0
 1. Destination: 0.0.0.0/0
 2. Target: Select internet gateway: web-igw

[EC2](#) [VPC](#) [CloudWatch](#) [Simple Notification Service](#) [Route 53](#) [CloudFront](#) [AWS FIS](#) [IAM](#)

VPC > Route tables > Create route table

Create route table Info

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.
web-RT 1

VPC
The VPC to use for this route table.
vpc-0f032fa0af9e6357f (web-vpc) 2

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.

Key	Value - optional
<input type="text" value="Name"/>	<input type="text" value="web-RT"/> 3
Add new tag	
You can add up to 49 more tags.	

[Cancel](#) [Create route table](#)

Web subnet association

[EC2](#) [VPC](#) [CloudWatch](#) [Simple Notification Service](#) [Route 53](#) [CloudFront](#) [AWS FIS](#) [IAM](#)

New VPC Experience Tell us what you think

VPC dashboard [New](#)
EC2 Global View New

Filter by VPC: [Select a VPC](#)

Virtual private cloud
Your VPCs
Subnets
Route tables
Internet gateways
Egress-only internet gateways
Carrier gateways
DHCP option sets
Elastic IPs
Managed prefix lists
Endpoints
Endpoint services
NAT gateways
Peering connections

Security
Network ACLs
Security groups

Network Analysis
Reachability Analyzer
Network Access Analyzer

Route table rtb-0b71c662fc25fb83e | web-RT was created successfully.

VPC > Route tables > **rtb-0b71c662fc25fb83e / web-RT**

[Actions](#)

You can now check network connectivity with Reachability Analyzer [Run Reachability Analyzer](#)

Details Info

Route table ID rtb-0b71c662fc25fb83e	Main <input checked="" type="checkbox"/> No	Explicit subnet associations =	Edge associations =
VPC vpc-0f032fa0af9e6357f web-vpc	Owner ID 914141388779		

[Routes](#) [Subnet associations](#) [Edge associations](#) [Route propagation](#) [Tags](#)

Explicit subnet associations (0) [Edit subnet associations](#)

Subnet ID	IPv4 CIDR	IPv6 CIDR
No subnet associations You do not have any subnet associations.		

Subnets without explicit associations (2) [Edit subnet associations](#)

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
You do not have any subnet associations.		

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

VPC dashboard EC2 Global View New

Filter by VPC: Select a VPC

Virtual private cloud Your VPCs Subnets Route tables Internet gateways Egress-only internet gateways DHCP option sets Elastic IPs Managed prefix lists Endpoints Endpoint services NAT gateways Peering connections

Security Network ACLs Security groups

Network Analysis Reachability Analyzer Network Access Analyzer

DNS firewall Rule groups Domain lists

Network Firewall

You can now check network connectivity with Reachability Analyzer

Run Reachability Analyzer

Details Info

Route table ID: rtb-031013f268408fdee Main: No Explicit subnet associations: - Edge associations: -

VPC: vpc-024a44812f7630f8a | prafect-vpc Owner ID: 914141388779

Routes Subnet associations Edge associations Route propagation Tags

Explicit subnet associations (0)

Find subnet association

Name Subnet ID IPv4 CIDR IPv6 CIDR

No subnet associations You do not have any subnet associations.

Edit subnet associations

Subnets without explicit associations (6)

The following subnets have not been explicitly associated with any route tables and are therefore associated with the main route table:

Find subnet association

Name Subnet ID IPv4 CIDR IPv6 CIDR

data-private01	subnet-0e897818fc46ee889	10.0.5.0/24	-
web-public02	subnet-063a9789f581f151d	10.0.2.0/24	-
app-private02	subnet-06c007c74f2f7740f	10.0.4.0/24	-
app-private01	subnet-050cdc2ef3b68f4e6	10.0.3.0/24	-
web-public01	subnet-08ac1355d5fa03389	10.0.1.0/24	-
data-private02	subnet-07f790de306475104	10.0.6.0/24	-

Edit subnet associations

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

VPC > Route tables > rtb-031013f268408fdee > Edit subnet associations

Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (2/6)

Filter subnet associations

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
data-private01	subnet-0e897818fc46ee889	10.0.5.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
<input checked="" type="checkbox"/> web-public02	subnet-063a9789f581f151d	10.0.2.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
<input type="checkbox"/> app-private02	subnet-06c007c74f2f7740f	10.0.4.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
<input type="checkbox"/> app-private01	subnet-050cdc2ef3b68f4e6	10.0.3.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
<input checked="" type="checkbox"/> web-public01	subnet-08ac1355d5fa03389	10.0.1.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
<input type="checkbox"/> data-private02	subnet-07f790de306475104	10.0.6.0/24	-	Main (rtb-042d02a2a4ea6a8c0)

Selected subnets

subnet-063a9789f581f151d / web-public02 subnet-08ac1355d5fa03389 / web-public01

Save associations

Web Subnets associated successfully

The screenshot shows the AWS VPC Route Tables page. The route table rtb-031013f268408fdee is selected. It has no main entry and two explicit subnet associations: subnet-063a9789f581f151d (IPv4 CIDR 10.0.2.0/24) and subnet-08ac1353d5fa03389 (IPv4 CIDR 10.0.1.0/24). There are also four subnets without explicit associations.

Add Route to Internet Gateway

Web-subnet needs to have internet connectivity so need to add route from internet gateway
Add Internet gateway as route

The screenshot shows the routes section for route table rtb-031013f268408fdee. It contains one route to destination 10.0.0.0/16 with target local, status active, and propagation disabled.

The screenshot shows the 'Edit routes' dialog for route table rtb-031013f268408fdee. A new route is being added to destination 10.0.0.0/16 with target local, status active, and propagation disabled. The 'Add route' button is highlighted with a red circle.

Destination: 0.0.0.0/0

Target: Internet gateway

The screenshot shows the 'Edit routes' page for a specific route table. A new route is being added for destination 0.0.0.0/0. The target is set to 'local' (1). In the dropdown menu for the target, 'Internet Gateway' is selected (2), and its ID is shown in the input field.

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
0.0.0.0/0	Internet Gateway		No

The screenshot shows the 'Edit routes' page for a different route table. A new route is being added for destination 0.0.0.0/0. The target is set to 'igw-' (1) and then specifically to 'igw-023bc1ddebab1a1be (web-igw)' (2).

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
0.0.0.0/0	igw-023bc1ddebab1a1be (web-igw)		No

The screenshot shows the 'rtb-031013f268408fdee / web-RT' route table details. It lists two routes: one for 0.0.0.0/0 targeting 'igw-023bc1ddebab1a1be' and another for 10.0.0.0/16 targeting 'local'. Red arrows point to both the destination and target columns of the first route row.

Details	Info
Route table ID rtb-031013f268408fdee	Main No
VPC vpc-024a44812f7630f8a prefect-vpc	Owner ID 914141388779
Explicit subnet associations 2 subnets	
Edge associations -	

Routes (2)

Destination	Target	Status	Propagated
0.0.0.0/0	igw-023bc1ddebab1a1be	Active	No
10.0.0.0/16	local	Active	No

1. Create App Route table

1. Name: App-RT
2. Select the VPC: web-vpc
3. Subnet Associations
 1. Select – app-private01
 2. Select – web-private02
4. Routes – Add internet gateway as route from 0.0.0.0/0
 1. Destination: 0.0.0.0/0
 2. Target: Select internet gateway: web-igw

VPC > Route tables > Create route table

Create route table Info

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.
app-RT 1

VPC
The VPC to use for this route table.
vpc-024a44812f7650f8a (prefect-vpc) 2

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.

Key	Value - optional
Q Name	Q app-RT 3

Add new tag
You can add 49 more tags.

Create route table

App subnet association

VPC > Route tables > rtb-0aa95fd6235cf234b / app-RT

rtb-0aa95fd6235cf234b / app-RT

You can now check network connectivity with Reachability Analyzer 1 2

Actions

Details Info

Route table ID rtb-0aa95fd6235cf234b	Main <input checked="" type="checkbox"/> No	Explicit subnet associations -	Edge associations -
VPC vpc-024a44812f7650f8a prefect-vpc	Owner ID 914141388779		

Subnet associations 1

Edit subnet associations 2

Explicit subnet associations (0)

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
No subnet associations You do not have any subnet associations.			

Subnets without explicit associations (4)

The following subnets have not been explicitly associated with any route tables and are therefore associated with the main route table:

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
data-private01	subnet-0e897818fc46ee889	10.0.5.0/24	-
app-private02	subnet-06c007c74f27740f	10.0.4.0/24	-
app-private01	subnet-050cd2ef3b68f4e6	10.0.3.0/24	-
data-private02	subnet-07f790de306475104	10.0.6.0/24	-

Edit subnet associations 3 4

VPC > Route tables > rtb-0aa95fd6235cf234b > Edit subnet associations

Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (2/6)

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
data-private01	subnet-0e897818fc46ee889	10.0.5.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
web-public02	subnet-063a9789f581f151d	10.0.2.0/24	-	rtb-031013f268408fdee / web-RT
app-private02	subnet-06c007c74f2f7740f	10.0.4.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
app-private01	subnet-050cdc2ef3b68f4e6	10.0.3.0/24	-	Main (rtb-042d02a2a4ea6a8c0)
web-public01	subnet-08ac1353d5fa03389	10.0.1.0/24	-	rtb-031013f268408fdee / web-RT
data-private02	subnet-07f790de506475104	10.0.6.0/24	-	Main (rtb-042d02a2a4ea6a8c0)

Selected subnets

- subnet-050cdc2ef3b68f4e6 / app-private01 (1)
- subnet-06c007c74f2f7740f / app-private02 (2)

Save associations (3)

App Subnets associated successfully

You have successfully updated subnet associations for rtb-0aa95fd6235cf234b / app-RT.

rtb-0aa95fd6235cf234b / app-RT

Details Info

Route table ID rtb-0aa95fd6235cf234b	Main No	Explicit subnet associations 2 subnets	Edge associations -
VPC vpc-024a44812f7630f8a prefect-vpc	Owner ID 914141388779		

Subnet associations

Explicit subnet associations (2)

Name app-private02	Subnet ID subnet-06c007c74f2f7740f	IPv4 CIDR 10.0.4.0/24	IPv6 CIDR -
app-private01	subnet-050cdc2ef3b68f4e6	10.0.3.0/24	-

Subnets without explicit associations (2)

Name data-private01	Subnet ID subnet-0e897818fc46ee889	IPv4 CIDR 10.0.5.0/24	IPv6 CIDR -
data-private02	subnet-07f790de506475104	10.0.6.0/24	-

1. Create Security Groups

1. Create one security group for web public subnets

1. Name: web-SG

2. VPC: prefect-vpc

3. Inbound rule:

1. Type: HTTP

2. Protocol: TCP

3. Port Range: 80

4. Source: anywhere : 0.0.0.0/0

Create security group

Basic details

Security group name: web-SG (1)

Description: Allows internet access to web subnets (2)

VPC: vpc-024a44812f7630f8a (3)

Inbound rules

Type	Protocol	Port range	Source	Description - optional
HTTP (4)	TCP (5)	80 (6)	Anywhere... (5)	0.0.0.0/0 (6)

Add rule

Outbound rules

Type	Protocol	Port range	Destination	Description - optional
All traffic	All	All	Custom	0.0.0.0/0

sg-01ff419fd0cd6fe91 - web-SG

Details

Security group name: web-SG	Security group ID: sg-01ff419fd0cd6fe91	Description: Allows internet access to web subnets	VPC ID: vpc-024a44812f7630f8a
Owner: 914141388779	Inbound rules count: 1 Permission entry	Outbound rules count: 1 Permission entry	

Inbound rules (1/1)

Name	Security group rule...	IP version	Type	Protocol	Port range	Source
-	sgr-068cd11e9be8232...	IPv4	HTTP	TCP	80	0.0.0.0/0

1. Create second security group for app private subnets

1. Name: app-SG
2. VPC: prefect-vpc
3. Inbound rule 1:
 1. Type: Custom TCP
 2. Protocol: TCP
 3. Port Range: custom
 4. Source: Security group ref : web-SG

Create security group

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group:

Basic details

Security group name **app-SG** 1
Name cannot be edited after creation.

Description **Allow inbound traffic from web-SG only** 2

VPC **vpc-024a44812f7630f8a** 3

Inbound rules

Type	Protocol	Port range	Source
Custom TCP	TCP	0	Custom

Add rule 4

Outbound rules

Type	Protocol	Port range	Destination	Description - optional
All traffic	All	All	Custom	0.0.0.0/0 5

sg-05955a1727b715e72 - app-SG

Details

Security group name: app-SG
Security group ID: sg-05955a1727b715e72
Description: Allow inbound traffic from web-SG only
VPC ID: vpc-024a44812f7630f8a

Owner: 914141388779
Inbound rules count: 1 Permission entry
Outbound rules count: 1 Permission entry

Inbound rules (1/1)

Name	Security group rule...	IP version	Type	Protocol	Port ra...	Source
sgr-03637bf40ec16ba64	-	-	Custom TCP	TCP	0	sg-01ff419fd0cd6fe91 / web-SG

1. Create second security group for app private subnets
 1. Name: db-SG
 2. VPC: prefect-vpc
 3. Inbound rule 1:
 1. Type: Custom TCP
 2. Protocol: TCP
 3. Port Range: custom
 4. Source: Security group ref : app-SG

Create security group [Info](#)

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group

Basic details

Security group name [Info](#) **1**
db-SG

Description [Info](#) **2**
Allow traffic from app-SG only

VPC [Info](#) **3**
vpc-024a44812f7630f8a

Inbound rules [Info](#)

Type Info 4	Protocol Info	Port range Info	Source Info 5
Custom TCP	TCP	0	Custom app-SG 6

Add rule

Outbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Destination Info	Description - optional Info
All traffic	All	All	Custom 0.0.0.0/0 X	

Add rule

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Security group (sg-07b9a1eda87c5b837 | db-SG) was created successfully

Details

Virtual private cloud

Your VPCs Subnets Route tables Internet gateways Egress-only internet gateways DHCP option sets Elastic IPs Managed prefix lists Endpoints Endpoint services NAT gateways Peering connections

Security groups

Network ACLs Security groups

Network Analysis Reachability Analyzer Network Access Analyzer

DNS firewall

sg-07b9a1eda87c5b837 - db-SG

Actions

Details

Security group name db-SG	Security group ID sg-07b9a1eda87c5b837	Description Allow traffic from app-SG only	VPC ID vpc-024a44812f7630f8a
Owner 914141388779	Inbound rules count 1 Permission entry	Outbound rules count 1 Permission entry	

Inbound rules Outbound rules Tags

You can now check network connectivity with Reachability Analyzer Run Reachability Analyzer

Inbound rules (1/1)

Name	Security group rule...	IP version	Type	Protocol	Port ra...	Source
-	sgr-0ebdde1f2b2d3e125	-	Custom TCP	TCP	0	sg-05955a1727b715e72 / app-SG

❖ Phase 2: Create Launch Template

14. Choose target group: instances
15. Target Group name: web-TG
 1. Protocol: TCP
 2. Port: 80
 3. VPC: web-vpc

The screenshot shows two views of the AWS EC2 Launch Templates interface.

Top View: The main title is "EC2 launch templates" with the subtitle "Streamline, simplify and standardize instance launches". A callout arrow points to the "Create Launch template" button in the "New launch template" card.

Bottom View: This is a detailed view of the "Create launch template" form.

- Launch template name and description:**
 - Launch template name: **prefect-template** (marked with a red circle)
 - Template version description: **v1** (marked with a red circle)
- Auto Scaling guidance:**
 - Select this if you intend to use this template with EC2 Auto Scaling
 - Provide guidance to help me set up a template that I can use with EC2 Auto Scaling
- Launch template contents:**
 - Application and OS Images (Amazon Machine Image):** An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below.
 - Search bar: "Search our full catalog including 1000s of application and OS images"
- Summary:**
 - Software Image (AMI): Canonical, Ubuntu, 18.04 LTS, ...read more
 - ami-03a5def9b0190cef7
 - Virtual server type (instance type):
 - Firewall (security group):
 - Storage (volumes): 1 volume(s) - 8 GiB
 - Free tier:** In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on Free tier AMIs per month, 30 GiB of EBS storage, 2 million I/Os, 1 GiB of snapshots, and 100 GiB of bandwidth to the internet.

At the bottom right of the summary section is a "Create launch template" button.

Application and OS Images (Amazon Machine Image) Info

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below.

Quick Start

Don't include in launch template Amazon Linux macOS Ubuntu Windows > **ubuntu** 1 Browse more AMIs

Ubuntu Server 18.04 LTS (HVM), SSD Volume Type 2
ami-03a5def6b0190cef7 (64-bit x86) / ami-01f77a1840c5e7 (64-bit Arm)
Virtualization type: ENA enabled: true Root device type: ebs

Free tier eligible

Description: Canonical, Ubuntu, 18.04 LTS, amd64 bionic image build on 2023-01-31

Architecture: 64-bit (x86) AMI ID: ami-03a5def6b0190cef7 Verified provider

Summary

Software Image (AMI): Canonical, Ubuntu, 18.04 LTS...read more
ami-03a5def6b0190cef7

Virtual server type (instance type): t2.micro

Firewall (security group): -

Storage (volumes): 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month. 30 GiB of EBS storage, 2 million I/Os, 1 GiB of snapshots, and 100 GiB of bandwidth to the internet.

Cancel **Create launch template**

Instance type Info

3 Manually select instance type: Select an instance type that meets your computing, memory, networking, or storage needs.

4 Specify instance type attributes: Specify instance attributes that match your compute requirements.

Instance type: t2.micro
Amazon Linux 1 CPU, 1 GiB Memory
On-Demand Linux pricing: 0.0116 USD per Hour
On-Demand SUSE pricing: 0.0116 USD per Hour
On-Demand Windows pricing: 0.0162 USD per Hour
On-Demand RHEL pricing: 0.0116 USD per Hour

Free tier eligible

Compare instance types

Key pair (login) Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Create key pair

Quick Start

Don't include in launch template Amazon Linux macOS Ubuntu Windows > **ubuntu** 1 Browse more AMIs

Ubuntu Server 18.04 LTS (HVM), SSD Volume Type 2
ami-03a5def6b0190cef7 (64-bit x86) / ami-01f77a1840c5e7 (64-bit Arm)
Virtualization type: ENA enabled: true Root device type: ebs

Description: Canonical, Ubuntu, 18.04 LTS, amd64 bionic image build on 2023-01-31

Architecture: 64-bit (x86) AMI ID: ami-03a5def6b0190cef7 Verified provider

Summary

Software Image (AMI): Amazon Linux 2 AMI 2.0.20220912.1 x86_64 HVM gp2

Virtualization type: ENA enabled: true Root device type: ebs

Create key pair

Key pairs allow you to connect to your instance securely.

Enter the name of the key pair below. When prompted, store the private key in a secure and accessible location on your computer. You will need it later to connect to your instance. [Learn more](#) 2

Key pair name: 1 web-key

The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type:

- RSA RSA encrypted private and public key pair
- ED25519 ED25519 encrypted private and public key pair (Not supported for Windows instances)

Private key file format:

- .pem For use with OpenSSH
- .ppk For use with PuTTY

Cancel **Create key pair** 3

Key pair (login) Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name: web-key

Top Screenshot (AWS VPC Launch Configuration):

- Key pair (login) Info:** Key pair name: prefect-key (highlighted with red circle 1).
- Network settings Info:**
 - Subnet Info: Don't include in launch template.
 - Firewall (security group) Info: Select existing security group (highlighted with red circle 2). Option 4 is shown in the dropdown.
 - Common security groups Info: app-SG selected (highlighted with red circle 3).
 - Advanced network configuration: Network interface 1 (Device index 0), Subnet info (Security groups: app-SG), Primary IP info, Secondary IP info, IPv4 Prefixes info, IPv6 Prefixes info, Elastic Fabric Adapter info.
- Summary:** Software Image (AMI): Canonical, Ubuntu, 18.04 LTS, ... (highlighted with red circle 4).
- Create launch template** button.

Bottom Screenshot (AWS Lambda Function Configuration):

- Nitro Enclave Info:** Don't include in launch template.
- License configurations Info:** Don't include in launch template.
- Metadata accessible Info:** Don't include in launch template.
- Metadata version Info:** Don't include in launch template.
- Metadata response hop limit Info:** Don't include in launch template.
- Allow tags in metadata Info:** Don't include in launch template.
- User data - optional Info:** User data content (highlighted with red circle 1):

```
#!/bin/bash
# Purpose: Install apache webserver and copy praful's portfolio web application
from github to apache webserver
# Author: Praful Patel
# Date & Time: SEP 24, 2022
#
sudo apt update
sudo apt install -y apache2
sudo ufw allow 'apache full'
sudo apt install software-properties-common
sudo add-apt-repository ppa:ondrej/php
sudo apt install git
sudo apt update
sudo apt install -y php7.4
sudo apt install php7.4-common php7.4-mysql php7.4-xml php7.4-xmllrpc php7.4-
curl php7.4-gd php7.4-imagick php7.4-cli php7.4-dev php7.4-imap php7.4-
mbstring php7.4-opcache php7.4-soap php7.4-zip php7.4-intl -y
sudo apt update
sudo apt install mysql-client-core-8.0
sudo git clone https://github.com/prafulpatel16/php-html-projects.git
sudo cp -r php-html-projects/iPortfolio1_emp/* /var/www/html/
sudo systemctl start apache2
```
- Summary:** Software Image (AMI): Canonical, Ubuntu, 18.04 LTS, ... (highlighted with red circle 2).
- Create launch template** button.

The screenshot shows the AWS EC2 Launch Templates page. The left sidebar has a 'Launch Templates' link under the 'Instances' section, which is highlighted with a red arrow. The main content area displays a table titled 'Launch templates (1) info'. The table has columns for 'Launch template ID' (lt-0c88746db53cdd2f3), 'Launch template name' (prefect-template), 'Default version' (1), and 'Latest ver'. A red arrow points to the 'Launch template name' column.

Launch template ID	Launch template name	Default version	Latest ver
lt-0c88746db53cdd2f3	prefect-template	1	1

❖ Phase 2: Create Target Group

16. Choose target group: instances
17. Target Group name: app-TG
 1. Protocol: TCP
 2. Port: 80
 3. VPC: web-vpc
18. Health checks
 1. Health check protocol: HTTP
19. Advanced health check
 1. Port: Traffic port
 2. Healthy threshold: 3
 3. Unhealthy threshold: 3
 4. Timeout: 4
 5. Interval: 10 seconds

The screenshot shows the AWS EC2 Target groups page. On the left, there's a sidebar with various navigation options like Instances, AMIs, Elastic Block Store, Network & Security, Load Balancing, Auto Scaling, and Target Groups (which is currently selected). The main area displays a table titled 'Target groups' with one row: 'No target groups'. A large red arrow points to the 'Create target group' button at the top right of the table.

This screenshot shows the 'Specify group details' step of the 'Create target group' wizard. It has two tabs: 'Step 1: Specify group details' (selected) and 'Step 2: Register targets'. The main area is titled 'Basic configuration' and contains a section for choosing a target type. Step 1 is highlighted with a red circle. Step 2 is also highlighted with a red circle. The wizard steps are numbered 1 through 6:

- 1** Choose a target type: Instances (selected)
- 2** Target group name: app-TG
- 3** Protocol: HTTP (selected), Port: 80
- 4** VPC: prefect-vpc (selected)
- 5** Protocol version: HTTP1 (selected)
- 6** Protocol version: HTTP2 (disabled)

gRPC
Send requests to targets using gRPC. Supported when the request protocol is gRPC.

Health checks

The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol: **HTTP** 1

Health check path:
Use the default path of "/" to ping the host, or specify a custom path if preferred.
 Up to 1024 characters allowed.

Advanced health check settings

Port: The port the load balancer uses when performing health checks on targets. The default is the port on which each target receives traffic from the load balancer unless you can specify a different port.

Traffic port

Override

Healthy threshold: The number of consecutive health check successes required before considering an unhealthy target healthy. **5** 2

Unhealthy threshold: The number of consecutive health check failures required before considering a target unhealthy. **2** 3

Timeout: The amount of time, in seconds, during which no response means a failed health check. **5** 4 seconds
2-100
5-300

Interval: The approximate amount of time between health checks of an individual target. **30** 5 seconds
5-300

Success codes: The HTTP codes to use when checking for a successful response from a target. You can specify multiple values (for example, "200,202") or a range (for example, "200-299"). **200** 6

Tags - optional
Consider adding tags to your target group. Tags enable you to categorize your AWS resources so you can more easily manage them.

Next 7

EC2 > Target groups > Create target group

Step 1: Specify group details

Register targets

This is an optional step to create a target group. However, to ensure that your load balancer routes traffic to this target group you must register your targets.

Step 2: Register targets

Available instances (0)

Instance ID	Name	State	Security groups	Zone	Subnet ID
No Available instances					

No selected

Ports for the selected instances
Ports for routing traffic to the selected instances.

1-65535 (separate multiple ports with commas)

Review targets

Targets (0)

Remove	Health status	Instance ID	Name	Port	State	Security groups	Zone	Subnet ID
No instances added yet								

Specify instances above, or leave the group empty if you prefer to add targets later.

0 pending

Create target group 8

The screenshot shows the AWS EC2 Target Groups interface. At the top, a green banner indicates "Successfully created target group: app-TG". Below this, the "Target groups (1) Info" section displays a table with one row for the newly created target group. The columns in the table are Name, ARN, Port, Protocol, Target type, Load balancer, and VPC ID. The "Name" column shows "app-TG", the "Protocol" column shows "HTTP", and the "VPC ID" column shows "vpc-024a44812f7630f8a". A red arrow points to the "app-TG" entry in the table. At the bottom of the page, a modal window titled "0 target groups selected" with the sub-instruction "Select a target group above." is visible.

❖ Phase 4: Deploy Application Load Balancer

20. Create Launch template
21. Create Application Load Balancer

1. Name: prefect-ALB
2. Scheme: internet-facing
3. Ip address: ipv4
4. Network mapping:
 1. Select VPC: prefect-vpc
 2. Mappings: select: us-east-2a, us-east2b
 3. Security Groups: select: web-SG
 4. Listener:
 1. HTTP:80
 2. Default action: Target Group

EC2 VPC CloudWatch Simple Notification Service Route 53 CloudFront AWS FIS IAM

EC2 > Load balancers > Select load balancer type

A complete feature-by-feature comparison along with detailed highlights is also available. [Learn more](#)

Select load balancer type

Load balancer types

Application Load Balancer Info	Network Load Balancer Info	Gateway Load Balancer Info
Choose an Application Load Balancer when you need a flexible feature set for your 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.	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 applications. Operating at the connection level, Network Load Balancers are capable of handling millions of requests per second securely while maintaining ultra-low latencies.	Choose a Gateway Load Balancer when you need to deploy and manage a fleet of third-party virtual appliances that support GENEVE. These appliances enable you to improve security, compliance, and policy controls.
Create	Create	Create

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

EC2 > Load balancers > Create Application Load Balancer [Info](#)

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When the load balancer receives a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

Create Application Load Balancer [Info](#)

▶ How Elastic Load balancing works

Basic configuration

Load balancer name
Name must be unique within your AWS account and cannot be changed after the load balancer is created.
prefect-ALB 1

A maximum of 52 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Scheme [Info](#)
Scheme cannot be changed after the load balancer is created.
 Internet-facing 2
An internet-facing load balancer routes requests from clients over the internet to targets. Requires a public subnet. [Learn more](#)

Internal
An internal load balancer routes requests from clients to targets using private IP addresses.

IP address type [Info](#)
Select the type of IP addresses that your subnets use.
 IPv4 3
Recommended for internal load balancers.

Dualstack
Includes IPv4 and IPv6 addresses.

Network mapping [Info](#)

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC [Info](#)
Select the virtual private cloud (VPC) for your targets. Only VPCs with an internet gateway are enabled for selection. The selected VPC cannot be changed after the load balancer is created. To confirm the VPC for your targets, view your [target groups](#).

prefect-vpc 4
vpc-024a44812f7650f
IPv4: 10.0.0.0/16

Network mapping Info
The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC Info
Select the virtual private cloud (VPC) for your targets. Only VPCs with an internet gateway are enabled for selection. The selected VPC cannot be changed after the load balancer is created. To confirm the VPC for your targets, view your target groups [\[?\]](#)

web-vpc
vpc-0f032fa0af9e6557f
IPv4: 10.0.0.0/16

Mappings Info
Select at least two Availability Zones and one subnet per zone. The load balancer routes traffic to targets in these Availability Zones only. Availability Zones that are not supported by the load balancer or the VPC are not available for selection.

us-east-1a

Subnet
subnet-05d667e65d7d4214 1 web-subnet01 ▾

IPv4 settings
Assigned by AWS

us-east-1b

Subnet
subnet-01224earfb85af2836 2 web-subnet02 ▾

IPv4 settings
Assigned by AWS

Security groups Info
A security group is a set of firewall rules that control the traffic to your load balancer.

Network mapping Info
The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC Info
Select the virtual private cloud (VPC) for your targets. Only VPCs with an internet gateway are enabled for selection. The selected VPC cannot be changed after the load balancer is created. To confirm the VPC for your targets, view your target groups [\[?\]](#)

prefect-vpc
vpc-024a448137f630f9a 1

Mappings Info
Select at least two Availability Zones and one subnet per zone. The load balancer routes traffic to targets in these Availability Zones only. Availability Zones that are not supported by the load balancer or the VPC are not available for selection.

us-east-2a (use2-az1) 2

Subnet
subnet-08ac1355d5fa03589 3 web-public01 ▾

IPv4 settings
Assigned by AWS

us-east-2b (use2-az2)

Subnet
subnet-065a9789f581f151d 4 web-public02 ▾

IPv4 settings
Assigned by AWS

Security groups Info
A security group is a set of firewall rules that control the traffic to your load balancer.

Security groups
Select up to 5 security groups
Create new security group 5

web-SG sg-019419fd0cd0dfe91 X
VPC vpc-024a448137f630f9a

Listeners and routing

A Listener is a process that checks for connection requests using the port and protocol you configure. The rules that you define for a Listener determine how the load balancer routes requests to its registered targets.

Listener HTTP:80

Protocol: **HTTP** Port: **80** Default action: **Info** Forward to: **app-TG** Target type: Instance, IPv4 Create target group

Add listener

Add-on services - optional

AWS Global Accelerator Info

Create an accelerator to get static IP addresses and improve the performance and availability of your applications. Additional charges apply

Tags - optional

Consider adding tags to your load balancer. Tags enable you to categorize your AWS resources so you can more easily manage them. The 'Key' is required, but 'Value' is optional. For example, you can have Key = production-webserver, or Key = webserver, and Value = production.

Summary

Review and confirm your configurations. Estimate costs

Basic configuration

- prefect-ALB
 - Internet-facing
 - IPv4

Security groups

- web-SG
 - sg-01ff419f05c6fe91

Network mapping

- VPC: vpc-024a44812f7630f8a
 - prefect-vgc
 - us-east-2a
 - subnet-0bac1353d5fa03389
 - web-public01
 - us-east-2b
 - subnet-063a9789f581f151d
 - web-public02

Listeners and routing

- HTTP:80 defaults to app-TG

Load balancer created successfully

New EC2 Experience

Tell us what you think

EC2 Dashboard

EC2 > **Load balancers** > **prefect-ALB**

prefect-ALB

Details

arn:aws:elasticloadbalancing:us-east-2:914141388779:loadbalance/app/prefect-ALB/fbde1ec1176bdcb

Load balancer type	Application	DNS name	prefect-ALB-784003759.us-east-2.elb.amazonaws.com (A Record)	Status	Provisioning
IP address type	IPv4	Scheme	Internet-facing	Availability Zones	subnet-08ac1353d5fa03389 (us-east-2a (use2-az1)) subnet-063a9789f581f151d (us-east-2b (use2-az2))
Date created	March 2, 2023, 16:59 (UTC-06:00)	Hosted zone	Z3AADJGX6KTTL2		

Listeners (1)

A listener checks for connection requests on its port and protocol. Traffic received by the listener is routed according to its rules.

Protocol:Port	ARN	Security policy	Default SSL cert	Default routing rule	Rules	Tags
HTTP:80		Not applicable	Not applicable	1. Forward to	1 (100%)	0
					Group-level stickiness: Off	

Verify that ALB URL is accessible

Copy ALB DNS

prefect-ALB-784003759.us-east-2.elb.amazonaws.com

Open Browser and access the url



Go to Target Group

A screenshot of the AWS EC2 Target Groups console. The left sidebar shows navigation options like VPC, Route 53, EC2, S3, CloudFront, Certificate Manager, CloudWatch, Simple Notification Service, AWS FIS, IAM, and more. The main panel shows a target group named "app-TG". The "Details" section shows the ARN: arn:aws:elasticloadbalancing:us-east-2:9141138779:targetgroup/app-TG/b437236b2035e87b, Protocol: Port HTTP: 80, Load balancer: prefect-ALB, and VPC: vpc-024a44812f7630f8a. Below this, a table shows Total targets (0), Healthy (0), Unhealthy (0), Unused (0), Initial (0), and Draining (0). The "Targets" tab is selected. At the bottom, there is a section titled "Registered targets (0)" with a "Register targets" button, which has a red arrow pointing to it.

❖ Phase 5: Deploy Auto Scaling Group

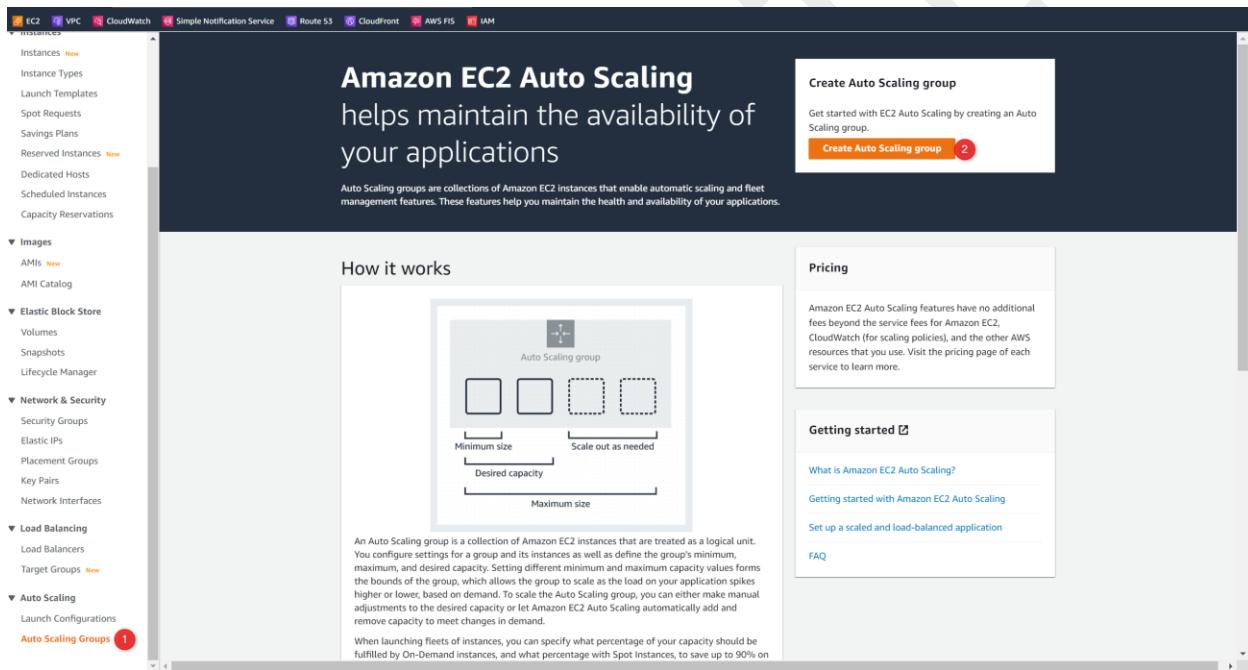
22. Name: prefect-ASG

23. Launch template: prefect-template, version: 1

24. Network:

1. VPC: prefect-vpc
2. Availability Zones: us-east-2a, us-east-2b
3. Load Balancing: Attach to and existing load balancer

4. Choose Target Group: app-TG
5. Health Check: ELB: 300 seconds
6. Group Size:
 1. Units
 2. Desired Capacity: 2
 3. Minimum Capacity: 2
 4. Maximum Capacity: 4
7. Scaling Policies:
 1. Name: Target Tracking Policy
 2. Metric Type: Average CPU Utilization
 3. Target Value: 50
 4. Warm up: 300 seconds



VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1 Choose launch template or configuration

Step 2 Choose instance launch options

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

Choose launch template or configuration Info

Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group. If you currently use launch configurations, you might consider migrating to launch templates.

Name

Auto Scaling group name
Enter a name to identify the group.
prefect-ASG 1

Must be unique to this account in the current Region and no more than 255 characters.

Launch template Info [Switch to launch configuration](#)

Launch template
Choose a launch template that contains the instance-level settings, such as the Amazon Machine Image (AMI), instance type, key pair, and security groups.
prefect-template 2

Create a launch template []

Version
Default (1) 3 []

Create a launch template version []

Description	Launch template	Instance type
v1	prefect-template [] lt-0c88746db53cd2f3	t2.micro
AMI ID	ami-0fa5def6b0190cef7	Security groups
Key pair name	prefect-key	Security group IDs
		sg-05955a1727b715e72 []

Additional details

Storage (volumes)
-

Date created
Thu Mar 02 2023 16:49:33 GMT-

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Choose instance launch options Info

Choose the VPC network environment that your instances are launched into, and customize the instance types and purchase options.

Step 2 Choose instance launch options

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

Network Info

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
Choose the VPC that defines the virtual network for your Auto Scaling group.
vpc-02444812f7630f8a (prefect-vpc) 1 []

10.0.0.0/16

Create a VPC []

Availability Zones and subnets
Define which Availability Zones and subnets your Auto Scaling group can use in the chosen VPC.
Select Availability Zones and subnets []

us-east-2a subnet-050cdc2ef3b68f4e6 (app-private01)	2 X
10.0.3.0/24	
us-east-2b subnet-06c007c74f2f7740f (app-private02)	3 X
10.0.4.0/24	

Create a subnet []

Instance type requirements Info [Override launch template](#)

You can keep the same instance attributes or instance type from your launch template, or you can choose to override the launch template by specifying different instance attributes or manually adding instance types.

Launch template	Version	Description
prefect-template [] lt-0c88746db53cd2f3	Default	v1
Instance type	t2.micro	

4 []

[Cancel](#) [Skip to review](#) [Previous](#) [Next](#)

Configure advanced options - optional Info

Choose a load balancer to distribute incoming traffic for your application across instances to make it more reliable and easily scalable. You can also set options that give you more control over health check replacements and monitoring.

Load balancing - optional Info

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

No load balancer
Traffic to your Auto Scaling group will not be fronted by a load balancer.

Attach to an existing load balancer
Choose from your existing load balancers.

Attach to a new load balancer
Quickly create a basic load balancer to attach to your Auto Scaling group.

Attach to an existing load balancer

Select the load balancers that you want to attach to your Auto Scaling group.

Choose from your load balancer target groups
This option allows you to attach Application, Network, or Gateway Load Balancers.

Choose from Classic Load Balancers

Existing load balancer target groups

Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.

Select target groups

app-TG HTTP X Application Load Balancer: prefect-ALB 3

Health checks - optional

Health check type Info
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 4

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

Monitoring Info

Choose instance launch options

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 1 2

Minimum capacity 2 2

Maximum capacity 3 4

Scaling policies - optional

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

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 5 Target Tracking Policy

Metric type 6 Average CPU utilization

Target value 7 50

Instances to warm up 8 300 seconds warm up before including in metric

Disable scale-in to create only a scale-out policy

Instance scale-in protection - optional

Instance scale-in protection
If protect from scale-in is enabled, newly launched instances will be protected from scale-in by default.

Enable instance scale-in protection

Auto Scale your Amazon EC2 Instances Ahead of Demand
Explore how the new predictive scaling policy of EC2 Auto Scaling helps you improve availability for your applications.

prefect-ASG, 1 Scaling policy created successfully

EC2 > Auto Scaling groups

Auto Scaling groups (1) Info

Name	Launch template/configuration	Instances	Status	Desired capacity	Min	Max	Availability Zones
prefect-ASG	prefect-template Version Default	0	Updating capacity...	2	2	4	us-east-2a, us-east-2b

Go to EC2 section and observe the EC2 servers

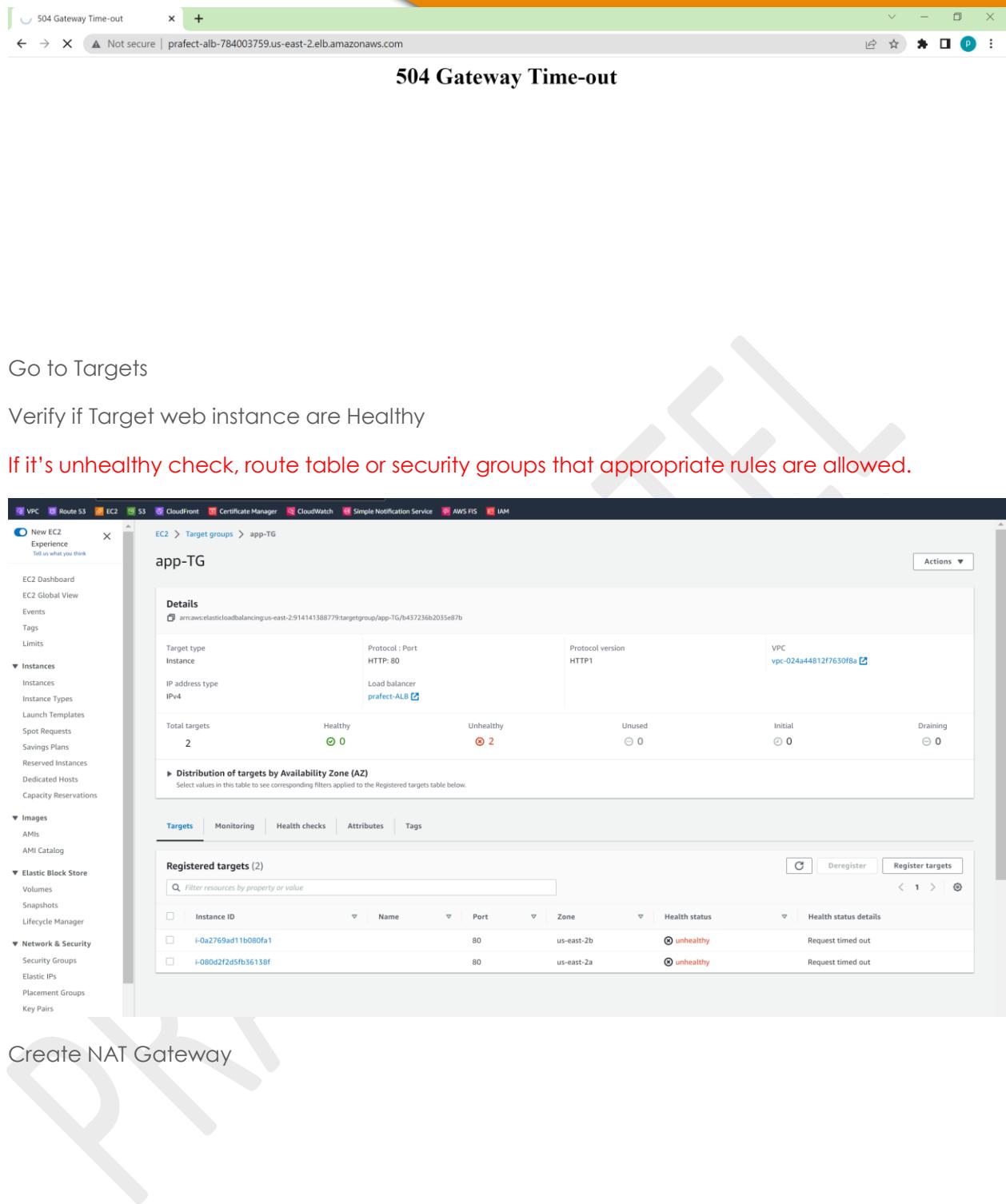
The screenshot shows the AWS EC2 Instances page. The left sidebar includes options like VPC, Route 53, CloudFront, Certificate Manager, CloudWatch, Simple Notification Service, AWS FIS, and IAM. Under the EC2 section, there are links for New EC2 Experience, EC2 Dashboard, EC2 Global View, Events, Tags, Limits, Instances, Instances Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, and Capacity Reservations. The main pane displays a table of instances with columns for Name, Instance ID, Instance state, Instance type, Status check, Alarm status, Availability Zone, Public IPv4 DNS, Public IPv4 IP, and Elastic IP. Two instances are listed: Instance 1 (i-080d2f2d5fb36138f) and Instance 2 (i-0a2769ad11b080fa1), both marked as Running.

Go to ALB and copy DNS

The screenshot shows the AWS Load Balancers page. The left sidebar includes links for Events, Tags, Limits, Instances, Instances Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, AMI Catalog, Elastic Block Store, Volumes, Snapshots, Lifecycle Manager, Network & Security, Security Groups, Elastic IP, Placement Groups, Key Pairs, Network Interfaces, and Load Balancing. Under Load Balancing, there is a link for Load Balancers. The main pane shows a table of load balancers with columns for Name, DNS name, State, VPC ID, Availability Zones, Type, Date created, and Instance ID. One load balancer is listed: 'prefect-ALB' (DNS name: prefect-ALB-784003759.us-east-2.elb.amazonaws.com). Below the table, the details for the 'prefect-ALB' load balancer are displayed, including its network configuration, security settings, monitoring, integrations, attributes, and tags.

Access Web Application from Browser

url: [iPortfolio Bootstrap Template - Index \(web-alb-577355044.us-east-1.elb.amazonaws.com\)](http://Portfolio Bootstrap Template - Index (web-alb-577355044.us-east-1.elb.amazonaws.com))



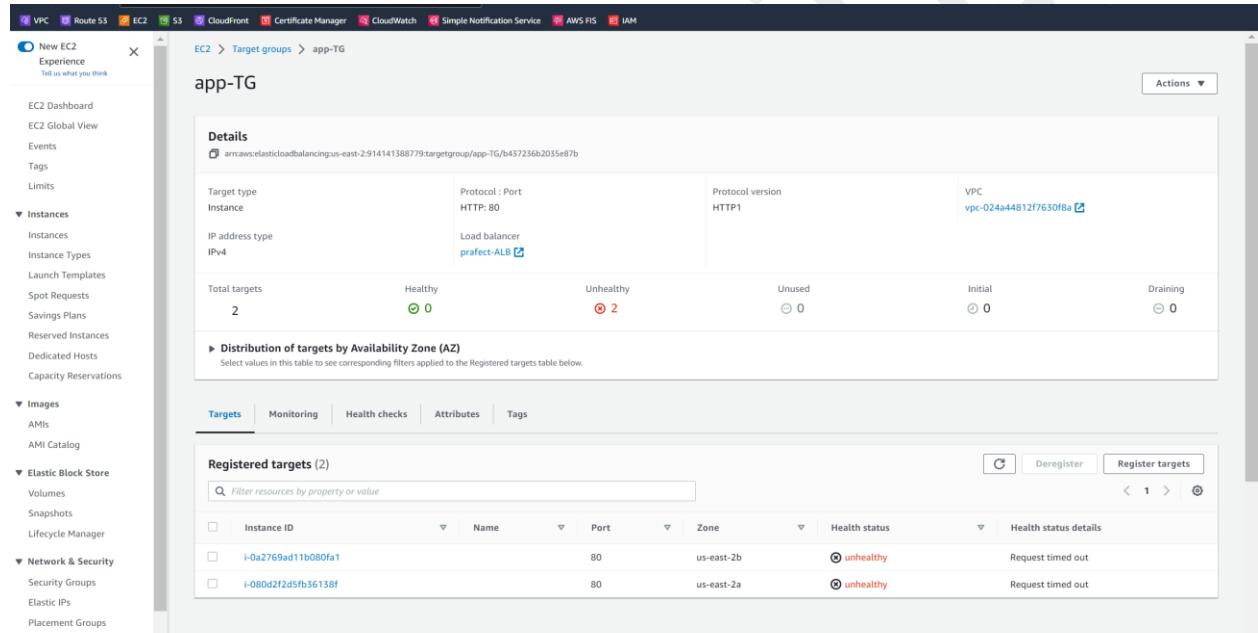
504 Gateway Time-out

Not secure | praefect-alb-784003759.us-east-2.elb.amazonaws.com

Go to Targets

Verify if Target web instance are Healthy

If it's unhealthy check, route table or security groups that appropriate rules are allowed.



The screenshot shows the AWS EC2 Target Groups console. The left sidebar navigation includes: New EC2 Experience, EC2 Dashboard, EC2 Global View, Events, Tags, Limits, Instances (selected), Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images (AMIs, AMI Catalog), Elastic Block Store (Volumes, Snapshots, Lifecycle Manager), Network & Security (Security Groups, Elastic IPs, Placement Groups, Key Pairs), and Lambda.

The main content area displays the "app-TG" target group details:

- Details:** arn:aws:elasticloadbalancing:us-east-2:914141388779:targetgroup/app-TG/b437236b2035e87b
- Target type:** Instance
- Protocol : Port:** HTTP: 80
- Protocol version:** HTTP1
- VPC:** vpc-024a44812f7630f8a
- Total targets:** 2
- Healthy:** 0
- Unhealthy:** 2
- Unused:** 0
- Initial:** 0
- Draining:** 0

Distribution of targets by Availability Zone (AZ):

Availability Zone	Count
us-east-2b	1
us-east-2a	1

Registered targets (2):

Instance ID	Name	Port	Zone	Health status	Health status details
i-0a2769ad11b080fa1		80	us-east-2b	unhealthy	Request timed out
i-080d2f2d5fb36138f		80	us-east-2a	unhealthy	Request timed out

Create NAT gateway Info

A highly available, managed Network Address Translation (NAT) service that instances in private subnets can use to connect to services in other VPCs, on-premises networks, or the internet.

NAT gateway settings

Name - *optional*
Create a tag with a key of 'Name' and a value that you specify.

1

The name can be up to 256 characters long.

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

2

Connectivity type
Select a connectivity type for the NAT gateway.

Public 3

Private

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

4

Additional settings Info

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.

NAT Gateway created

NAT gateways (1/1) Info

Name	NAT gateway ID	Connectivit...	State	Primary public I...	Primary priv...
prefect-NAT	nat-03a9026de10327a1a	Public	Available	52.14.221.131	10.0.1.123

nat-03a9026de10327a1a / prefect-NAT

Details Secondary IPv4 addresses Monitoring Tags

Details			
NAT gateway ID <input type="text" value="nat-03a9026de10327a1a"/>	Connectivity type <input type="text" value="Public"/>	State <input type="text" value="Available"/>	State message <input type="text" value="-"/>
NAT gateway ARN <input type="text" value="arn:aws:ec2:us-east-2:91414138879:natgateway/nat-03a9026de10327a1a"/>	Primary public IPv4 address <input type="text" value="52.14.221.131"/>	Primary private IPv4 address <input type="text" value="10.0.1.123"/>	Primary network interface ID <input type="text" value="eni-0229dae5472c7545b"/>
VPC <input type="text" value="vpc-024a44812f7630f8a / prefect-vpc"/>	Subnet <input type="text" value="subnet-08ac1353d5fa03389 / web-public01"/>	Created <input type="text" value="Thursday, March 2, 2023 at 18:52:02 CST"/>	Deleted <input type="text" value="-"/>

Add route to application private route table: APP-RT route table

VPC dashboard Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Route tables (4) info

Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC
-	rtb-02501b4d7593da6e5	-	-	Yes	vpc-05f5e3d6d1ff2c3fb
-	rtb-042d02a2a4ea6a8c0	-	-	Yes	vpc-024a44812f7630f8a prefect-vpc
app-RT	rtb-0aa95fd6235cf234b	2 subnets	-	No	vpc-024a44812f7630f8a prefect-vpc
web-RT	rtb-031013f268408fdee	2 subnets	-	No	vpc-024a44812f7630f8a prefect-vpc

Select a route table

VPC dashboard Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

rtb-0aa95fd6235cf234b / app-RT

You can now check network connectivity with Reachability Analyzer Run Reachability Analyzer

Details **Info**

Route table ID rtb-0aa95fd6235cf234b	Main No	Explicit subnet associations 2 subnets	Edge associations -
VPC vpc-024a44812f7630f8a prefect-vpc	Owner ID 914141388779		

Routes **Subnet associations** **Edge associations** **Route propagation** **Tags**

Routes (2)

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No

Edit routes

Edit Route – Add NAT gateway

Destination: 0.0.0.0/0

Target: NAT Gateway

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

VPC > Route tables > rtb-0aa95fd6235cf234b > Edit routes

Edit routes

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
Q. 0.0.0.0/0 1	nat- 2 nat-03a9026de10327a1a (prefect-NAT)	-	No

Add route Cancel Preview Save changes 3

The screenshot shows the AWS VPC Route Tables page. The route table ID is rtb-0aa95fd6235cf234b, associated with the VPC vpc-024a44812f7630f8a. It has two explicit subnet associations: subnets 2 and 3. There are two routes defined:

Destination	Target	Status	Propagated
0.0.0.0/0	nat-03a9026de10327a1a	Active	No
10.0.0.0/16	local	Active	No

Now go back to TARGET Group

Verify now that Targets are healthy

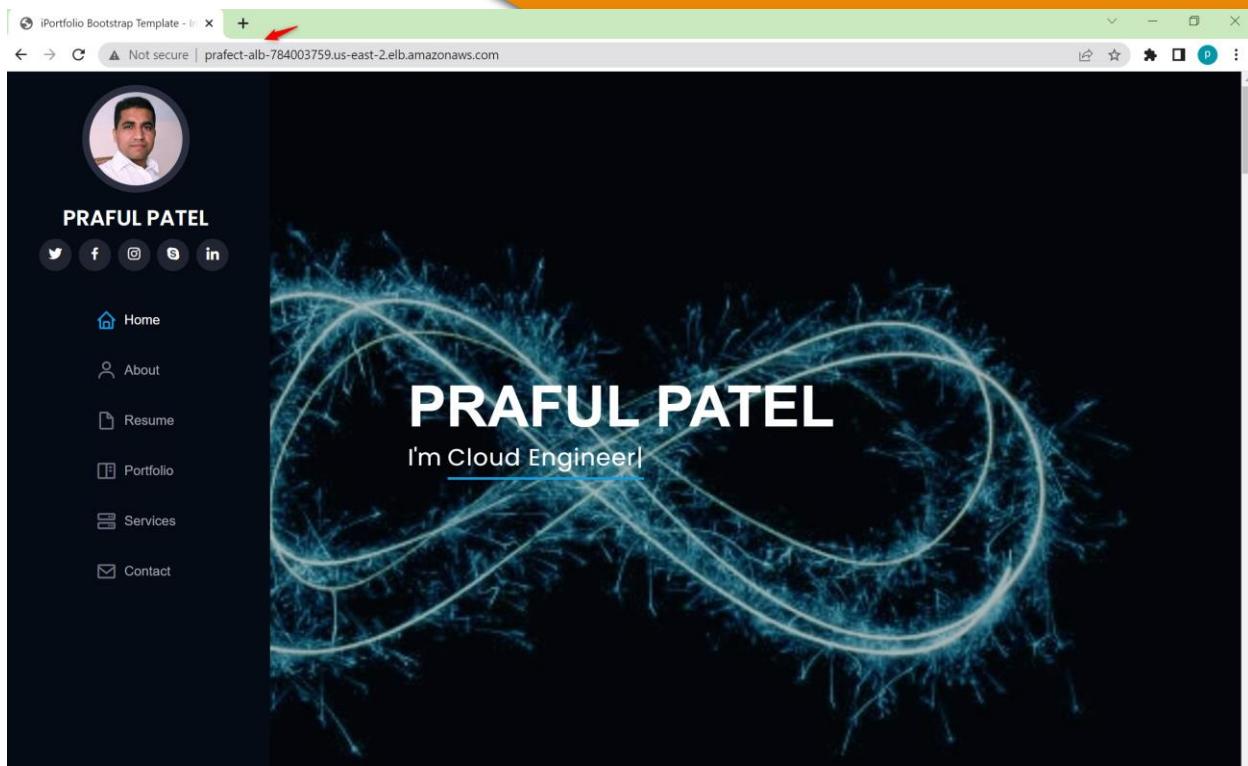
The screenshot shows the AWS EC2 Target Groups page. The target group is app-TG, associated with the VPC vpc-024a44812f7630f8a. It has three total targets, with two healthy and one unhealthy. The healthy targets are i-01517ec55cb9bc9e5 and i-0af69caf015bb833f.

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
3	2	0	0	0	1

Verify web application is accessible from browser

ALB URL:

prefect-ALB-784003759.us-east-2.elb.amazonaws.com



Note:

If web application source code is in Private APP subnet then while creating Launch template enable public ip in order to access the server from SSH

In order to download the packages and install the web server into private APP subnet following configuration is needed.

NAT Gateway : Launch nat gateway into Web-public subnet

App-RT : Add NAT gateway route to APP-Route table

RDS Database creation

Create MYSQL Database

1.Create DB Subnet Group

Create DB subnet group

To create a new subnet group, give it a name and a description, and choose an existing VPC. You will then be able to add subnets related to that VPC.

Subnet group details

Name
db-subnetGroup 1

Must contain from 1 to 255 characters. Alphanumeric characters, spaces, hyphens, underscores, and periods are allowed.

Description

VPC
Choose a VPC identifier that corresponds to the subnets you want to use for your DB subnet group. You won't be able to choose a different VPC identifier after your subnet group has been created.

2. **prefect-vpc (vpc-024a44812f7650f8a)** 2

Add subnets

Availability Zones
Choose the Availability Zones that include the subnets you want to add.
Choose an availability zone 3

3. us-east-2a 3 us-east-2b 4 4

Subnets
Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.
Select subnets 5

5. subnet-0e897818fc46ee889 (10.0.5.0/24) 5

6. subnet-07f790de306475104 (10.0.6.0/24) 6

Add subnets

Availability Zones
Choose the Availability Zones that include the subnets you want to add.
Choose an availability zone 3

us-east-2a 3 us-east-2b 4 4

Subnets
Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.
Select subnets 5

subnet-0e897818fc46ee889 (10.0.5.0/24) 5

subnet-07f790de306475104 (10.0.6.0/24) 6

Subnets selected (2)

Availability zone	Subnet ID	CIDR block
us-east-2a	subnet-0e897818fc46ee889	10.0.5.0/24
us-east-2b	subnet-07f790de306475104	10.0.6.0/24

Create

Successfully created db-subnetGroup. View subnet group

Subnet groups (2)

Name	Description	Status	VPC
db-subnetgroup	mysql db subnet group	Complete	vpc-024a44812f7650f8a

2. Create Database

The screenshot shows the Amazon RDS Dashboard. On the left sidebar, there are several navigation options: Dashboard, Databases, Query Editor, Performance insights, Snapshots, Exports in Amazon S3, Automated backups, Reserved instances, Proxies, Subnet groups, Parameter groups, Option groups, Custom engine versions, Events, Event subscriptions, Recommendations (0), and Certificate update. In the main content area, there is a callout box with the text: "Try the new Amazon RDS Multi-AZ deployment option for MySQL and PostgreSQL. For your Amazon RDS for MySQL and PostgreSQL workloads, improve transactional commit latencies by 2x, experience faster failover typically less than 35 seconds and, get read scalability with two readable standby DB instances by deploying the Multi-AZ DB cluster. Learn more". Below this, a large red arrow points to the "Create database" button. The "Resources" section lists various resources: DB Instances (0/40), DB Clusters (0/40), Snapshots (0), and Automatored. The "Recommended for you" section includes links to "Migrate SSRS to RDS for SQL Server", "Time-Series Tables in PostgreSQL", "Implementing Cross-Region DR", and "Build RDS Operational Tasks".

Select MySQL

The screenshot shows the "Create database" wizard. At the top, it says "RDS > Create database". Below that, it says "Choose a database creation method" with two options: "Standard create" (selected) and "Easy create". Under "Engine options", there are seven engine types: Aurora (MySQL Compatible), Aurora (PostgreSQL Compatible), MySQL (selected), MariaDB, PostgreSQL, Oracle, and Microsoft SQL Server. A red arrow points to the "MySQL" option. At the bottom, it says "Edition" with "MySQL Community" selected.

Edition
MySQL Community 1

Known issues/limitations
Review the [Known issues/limitations](#) to learn about potential compatibility issues with specific database versions.

Hide filters

Show versions that support the Multi-AZ DB cluster [Info](#)
Create a Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.

Show versions that support the Amazon RDS Optimized Writes [Info](#)
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Engine Version
MySQL 8.0.28 2

Templates
Choose a sample template to meet your use case.

- Production**
Use defaults for high availability and fast, consistent performance.
- Dev/Test**
This instance is intended for development use outside of a production environment.
- Free tier**
Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS. [Info](#) 3

Db instance name: mysql

User: admin

Password: Passw0rd!

Availability and durability

Deployment options [Info](#)
The deployment options below are limited to those supported by the engine you selected above.

- Multi-AZ DB Cluster - new**
Creates a DB cluster with a primary DB instance and two readable standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy and increases capacity to serve read workloads.
- Multi-AZ DB instance (not supported for Multi-AZ DB cluster snapshot)**
Creates a primary DB instance and a standby DB instance in a different AZ. Provides high availability and data redundancy, but the standby DB instance doesn't support connections for read workloads.
- Single DB instance (not supported for Multi-AZ DB cluster snapshot)**
Creates a single DB instance with no standby DB instances.

Settings

DB instance identifier [Info](#)
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region. 1
mysql

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

Credentials Settings

Master username [Info](#)
Type a login ID for the master user of your DB instance. 2
admin

Manage master credentials in AWS Secrets Manager
Manage master user credentials in Secrets Manager. RDS can generate a password for you and manage it throughout its lifecycle.

If you manage the master user credentials in Secrets Manager, some RDS features aren't supported.
[Learn more](#) 3

Auto generate a password
Amazon RDS can generate a password for you, or you can specify your own password.

Master password [Info](#)

The screenshot shows the 'Instance configuration' section of the AWS RDS console. It includes fields for 'DB instance class' (set to 'db.t3.micro'), 'Allocated storage' (set to 20 GiB), and 'Maximum storage threshold' (set to 1000 GiB). A red circle labeled '1' is on the 'Allocated storage' input field.

Storage

Storage type: General Purpose SSD (gp2) (2)

Allocated storage: 20 GiB (3)

Storage autoscaling: Enable storage autoscaling

Maximum storage threshold: 1000 GiB

Dbsubnet group: select db-subnetGroup

The screenshot shows the 'Connectivity' and 'DB subnet group' sections of the AWS RDS console. Under 'Compute resource', 'Don't connect to an EC2 compute resource' is selected (1). Under 'Virtual private cloud (VPC)', 'prefect-vpc' is chosen (2). Under 'DB subnet group', 'Create new DB Subnet Group' is selected (3). Under 'Public access', 'No' is selected (4). Under 'VPC security group (firewall)', 'Choose existing' is selected (5), and 'db-SG' is chosen from the dropdown (6).

Compute resource

Virtual private cloud (VPC): prefect-vpc (2)

DB subnet group: Create new DB Subnet Group (3)

Public access: No (4)

VPC security group (firewall): Choose existing (5)

Existing VPC security groups: db-SG (6)

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Availability Zone [Info](#) 1
us-east-2a

RDS Proxy
RDS Proxy is a fully managed, highly available database proxy that improves application scalability, resiliency, and security.
 Create an RDS Proxy [Info](#)
RDS automatically creates an IAM role and a Secrets Manager secret for the proxy. RDS Proxy has additional costs. For more information, see [Amazon RDS Proxy pricing](#).

Certificate authority - optional [Info](#)
Using a server certificate provides an extra layer of security by validating that the connection is being made to an Amazon database. It does so by checking the server certificate that is automatically installed on all databases that you provision.
rds-ca-2019 (default) 2
If you don't select a certificate authority, RDS chooses one for you.

[▶ Additional configuration](#)

Database authentication

Database authentication options [Info](#) 3
 Password authentication
Authenticates using database passwords.
 Password and IAM database authentication
Authenticates using the database password and user credentials through AWS IAM users and roles.
 Password and Kerberos authentication
Choose a directory in which you want to allow authorized users to authenticate with this DB instance using Kerberos Authentication.

Monitoring

Monitoring
 Enable Enhanced monitoring
Enabling Enhanced monitoring metrics are useful when you want to see how different processes or threads use the CPU.

Monitoring
 Password and Kerberos authentication
Choose a directory in which you want to allow authorized users to authenticate with this DB instance using Kerberos Authentication.

Monitoring
 Enable Enhanced monitoring
Enabling Enhanced monitoring metrics are useful when you want to see how different processes or threads use the CPU.

[▶ Additional configuration](#)
Database options, encryption turned on, backup turned on, backtrack turned off, maintenance, CloudWatch Logs, delete protection turned off.

Estimated monthly costs

The Amazon RDS Free Tier is available to you for 12 months. Each calendar month, the free tier will allow you to use the Amazon RDS resources listed below for free.

- 750 hrs of Amazon RDS in a Single-AZ db.t2.micro, db.t3.micro or db.t4g.micro Instance.
- 20 GB of General Purpose Storage (SSD).
- 20 GB for automated backup storage and any user-initiated DB Snapshots.

[Learn more about AWS Free Tier](#)

When your free usage expires or if your application use exceeds the free usage tiers, you simply pay standard, pay-as-you-go service rates as described in the [Amazon RDS Pricing page](#).

Important You are responsible for ensuring that you have all of the necessary rights for any third-party products or services that you use with AWS services.

[Cancel](#) [Create database](#)



Mysql Database instance created

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Amazon RDS

- Dashboard
- Databases**
- Query Editor
- Performance insights
- Snapshots
- Exports in Amazon S3
- Automated backups
- Reserved instances
- Proxies
- Subnet groups
- Parameter groups
- Option groups
- Custom engine versions
- Events
- Event subscriptions

RDS > Databases

Consider creating a Blue/Green Deployment to minimize downtime during upgrades
You may want to consider using Amazon RDS Blue/Green Deployments and minimize your downtime during upgrades. A Blue/Green Deployment provides a staging environment for changes to production databases. [RDS User Guide](#) [Aurora User Guide](#)

DB identifier	Role	Engine	Region & AZ	Size	Status	Actions	CPU	Current
mysql1	Instance	MySQL Community	us-east-2a	db.t3.micro	Available	-	3.10%	

VPC Route 53 EC2 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Amazon RDS

- Dashboard
- Databases**
- Query Editor
- Performance insights
- Snapshots
- Exports in Amazon S3
- Automated backups
- Reserved instances
- Proxies
- Subnet groups
- Parameter groups
- Option groups
- Custom engine versions
- Events
- Event subscriptions
- Recommendations (0)
- Certificate update

RDS > Databases > mysql1

mysql1

Modify Actions ▾

DB identifier	CPU	Status	Class
mysql1	3.10%	Available	db.t3.micro
Role	Current activity	Engine	Region & AZ
Instance	0 Connections	MySQL Community	us-east-2a

Connectivity & security Monitoring Logs & events Configuration Maintenance & backups Tags

Connectivity & security

Endpoint & port	Networking	Security
Endpoint mysql1.cagenemjwd5.us-east-2.rds.amazonaws.com	Availability Zone us-east-2a	VPC security groups db-SG (sg-07b9a1eda87c5b837) Active
Port 3306	VPC prefect-vpc (vpc-024a44812f7630f8a)	Publicly accessible No
	Subnet group db-subnetgroup	Certificate authority Info rds-ca-2019
	Subnets subnet-07f790de506475104	Certificate authority date August 22, 2024, 11:08 (UTC-06:00)
	subnet-0e897818fc46ee889	DB instance certificate expiration date August 22, 2024, 11:08 (UTC-06:00)
	Network type IPv4	

The screenshot shows the AWS RDS console for a MySQL database named 'mysql2'. The 'Configuration' tab is selected. A red arrow points to the 'Engine version' field, which displays '5.7.37'. Other visible details include the instance class 'db.t3.micro', storage type 'General Purpose SSD (gp2)', and performance insights status.

Webserver to database connection parameters:

Need to update the parameters

The screenshot shows a GitHub commit for a file named 'db.php'. Four lines of code are circled with red numbers 1 through 4, corresponding to the connection parameters: \$servername, \$username, \$password, and \$dbname. The commit message indicates a new project folder 'emp1' was added.

```

1 <?php
2   1 $servername='mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com';
3   2 $username='admin';
4   3 $password='admin123456';
5   4 $dbname = "contacts";
6 $conn=mysqli_connect($servername,$username,$password,"$dbname");
7 if(!$conn){
8     die('Could not Connect MySql Server:' .mysqli_error());
9 }
10 ?>

```

New DB connection parameters:

Servername: mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com

Username: admin

Password: Passw0rd!

Dbname: contacts

Go to web source code file: db.php

Parameter updated to web file

main → php-html-projects / iPortfoliov1_emp / forms / db.php < Jump to ↻

prafulpatel16 updated db.php

1 contributor

11 lines (10 sloc) | 316 Bytes

```

1  <?php
2      $servername='mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com';
3      $username='admin';
4      $password='Passw0rd!';
5      $dbname = "contacts";
6      $conn=mysqli_connect($servername,$username,$password,$dbname);
7      if(!$conn){
8          die('Could not Connect MySQL Server:' .mysqli_error());
9      }
10 ?>

```

[Raw](#) [Blame](#) [Edit](#) [Copy](#) [Delete](#)

[Give feedback](#)

Create or modify the Launch template

Update Security Group



VPC Route 53 S3 CloudFront Certificate Manager CloudWatch Simple Notification Service AWS FIS IAM

Select a VPC

Virtual private cloud

Your VPCs Subnets Route tables Internet gateways Egress-only internet gateways DHCP option sets Elastic IPs Managed prefix lists Endpoints Endpoint services NAT gateways Peering connections

Security

Network ACLs Security groups

Security Groups (5) Info

Filter security groups

Actions Export security groups to CSV Create security group

sg-0d4e27bb4b706d83c default vpc-05f3e3d6d1ff2c3fb default VPC security gr... 914141388779 1 Permission entry

sg-0e968fce6f058c4fd default vpc-024a44812f7630f8a default VPC security gr... 914141388779 1 Permission entry

sg-05955a1727b715e72 app-SG vpc-024a44812f7630f8a Allow inbound traffic fr... 914141388779 2 Permission entries

sg-07b9a1eda87c5b837 db-SG vpc-024a44812f7630f8a Allow traffic from app-... 914141388779 1 Permission entry

sg-01ff419fd0cd6fe91 web-SG vpc-024a44812f7630f8a Allows internet access ... 914141388779 2 Permission entries

Edit inbound rules:

sg-05955a1727b715e72 - app-SG

Details

Security group name app-SG	Security group ID sg-05955a1727b715e72	Description Allow inbound traffic from web-SG only	VPC ID vpc-024a44812f7630f8a
Owner 914141388779	Inbound rules count 2 Permission entries	Outbound rules count 1 Permission entry	

Inbound rules Outbound rules Tags

You can now check network connectivity with Reachability Analyzer Run Reachability Analyzer

Inbound rules (2)

Name	Security group rule...	IP version	Type	Protocol	Port range	Source
-	sgr-03637bf40ec168a64	-	All TCP	TCP	0 - 65535	sg-01ff419fd0cd6fe91...

Add rule

Type: MySQL/Aurora

Protocol: TCP

Port range: 3306

Source : custom: db_SG

Edit inbound rules Info

Inbound rules control the incoming traffic that's allowed to reach the instance.

Inbound rules Info

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sgr-03637bf40ec168a64	All TCP	TCP	0 - 65535	Custom	sg-01ff419fd0cd6fe91
sgr-0450088d4450b08bb	SSH	TCP	22	Custom	71.17.81.216/32
-	MySQL/Aurora	TCP	3306	Custom	0e968fce6f058c4fd db-SG sg-01ff419fd0cd6fe91 07b9a1ed87c5b837 web-SG sg-01ff419fd0cd6fe91

Add rule

Source

Description

Prefix lists

com.amazonaws.us-east-1
pl-035da5473f4b423a4
com.amazonaws.us-east-1

Cancel Preview changes Save rules

Inbound security group rules successfully modified on security group (sg-05955a1727b715e72 - app-SG)

sg-05955a1727b715e72 - app-SG

Details

Security group name	Security group ID	Description	VPC ID
app-SG	sg-05955a1727b715e72	Allow inbound traffic from web-SG only	vpc-024a44812f7630fb8
Owner	Inbound rules count	Outbound rules count	
91414138879	3 Permission entries	1 Permission entry	

Inbound rules | Outbound rules | Tags

You can now check network connectivity with Reachability Analyzer | Run Reachability Analyzer

Inbound rules (3)

Name	Security group rule...	IP version	Type	Protocol	Port range	Source
-	sgr-05637bf40ec168a64	-	All TCP	TCP	0 - 65535	sg-01ff419fd0cd6fe91 / web-SG
-	sgr-04d9afdfdc5862193	-	MySQL/Aurora	TCP	3306	sg-07b9a1eda87c5b837 / db-SG

Access rds db instance from one of web server

3.143.110.192

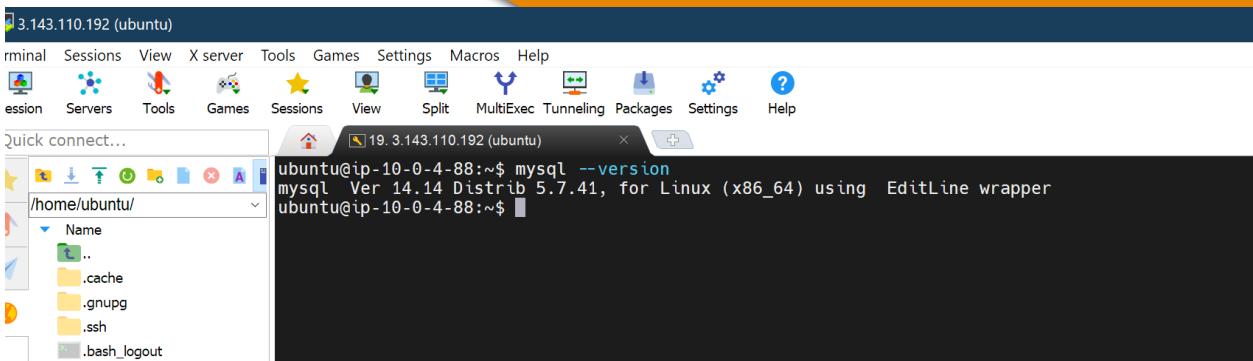
Install **sudo apt-get install mysql-server mysql-client**

```
3.143.110.192 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunnelling Packages Settings Help
X server Exit

Quick connect...
/home/ubuntu/
Name
.. .cache .gnupg .ssh .bash_logout .bashrc .profile .Xauthority
19.3.143.110.192 (ubuntu)
Hit:1 http://us-east-2.ec2.archive.ubuntu.com/ubuntu bionic InRelease
Hit:2 http://us-east-2.ec2.archive.ubuntu.com/ubuntu bionic-updates InRelease
Hit:3 http://us-east-2.ec2.archive.ubuntu.com/ubuntu bionic-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu bionic-security InRelease
Hit:5 http://ppa.launchpad.net/ondrej/php/ubuntu bionic InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
36 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@ip-10-0-4-88:~$ sudo apt-get install mysql-server mysql-client
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
libaio1 libcgifast-perl libcgipm-perl libencode-locale-perl libevent-core-2.1-6 libfcgi-perl libhtml-parser-perl
libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-message-perl libio-html-perl liblwp-mediatypes-perl
liburi-perl mysql-client 5.7 mysql-client-core 5.7 mysql-common mysql-server 5.7 mysql-server-core 5.7
Suggested packages:
libdata-dump-perl libipc-sharedcache-perl libwww-perl mailx tinyca
The following NEW packages will be installed:
libaio1 libcgifast-perl libcgipm-perl libencode-locale-perl libevent-core-2.1-6 libfcgi-perl libhtml-parser-perl
libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-message-perl libio-html-perl liblwp-mediatypes-perl
liburi-perl mysql-client mysql-client-core 5.7 mysql-common mysql-server mysql-server-core 5.7
mysql-server-core 5.7
0 upgraded, 21 newly installed, 0 to remove and 36 not upgraded.
Need to get 20.1 MB of archives.
After this operation, 157 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us-east-2.ec2.archive.ubuntu.com/ubuntu bionic/main amd64 mysql-common all 5.8+1.0.4 [7308 B]
Get:2 http://us-east-2.ec2.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libaio1 amd64 0.3.10-Subuntu0.1 [6476 B]
Get:3 http://us-east-2.ec2.archive.ubuntu.com/ubuntu bionic-updates/main amd64 mysql-client-core 5.7 amd64 5.7.41-0ubuntu0.18.04.1 [6758 KB]
```

Verify that mysql is installed

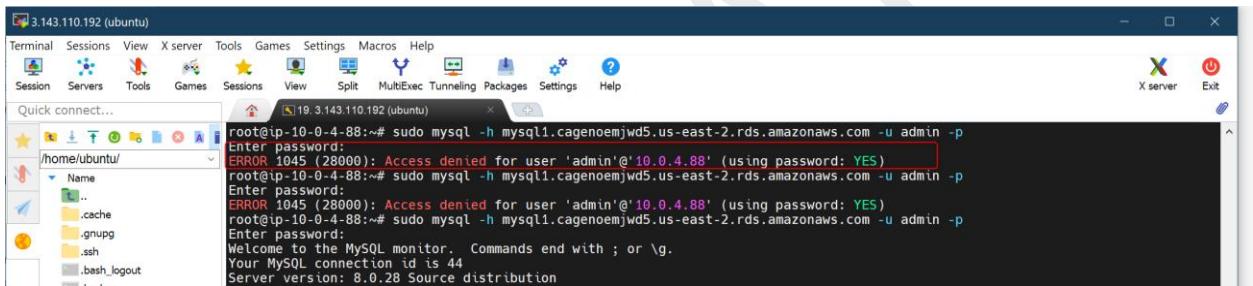
Mysql --version



Access RDS mysql db instance

```
sudo mysql -u admin -p -h mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com
```

Error: accessing mysql database



Note: if getting this error accessing RDS database

Solution: Go to web-SG, Add MY IP as source for MYSQL/Aurora 3306

Name	Security group rule...	IP version	Type	Protocol	Port range	Source
-	sgr-081cd1f6e65085b71	IPv4	All TCP	TCP	0 - 65535	0.0.0.0/0
-	sgr-081cba4786f1ea171	IPv4	MYSQL/Aurora	TCP	3306	7 ... 32
-	sgr-068cd11e9be8232...	IPv4	HTTP	TCP	80	0.0.0.0/0

Successfully established mysql rds instance

```
sudo mysql -u admin -p -h mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com
```

```
root@ip-10-0-4-88:~# sudo mysql -h mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com -u admin -p
Enter password:
ERROR 1045 (28000): Access denied for user 'admin'@'10.0.4.88' (using password: YES)
root@ip-10-0-4-88:~# sudo mysql -h mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com -u admin -p
Enter password:
ERROR 1045 (28000): Access denied for user 'admin'@'10.0.4.88' (using password: YES)
root@ip-10-0-4-88:~# sudo mysql -h mysql1.cagenoemjwd5.us-east-2.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 44
Server version: 8.0.28 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show databases;
```

Create a New Database

```
mysql> create database contacts;
```

Verify that database 'contacts' is created

```
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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

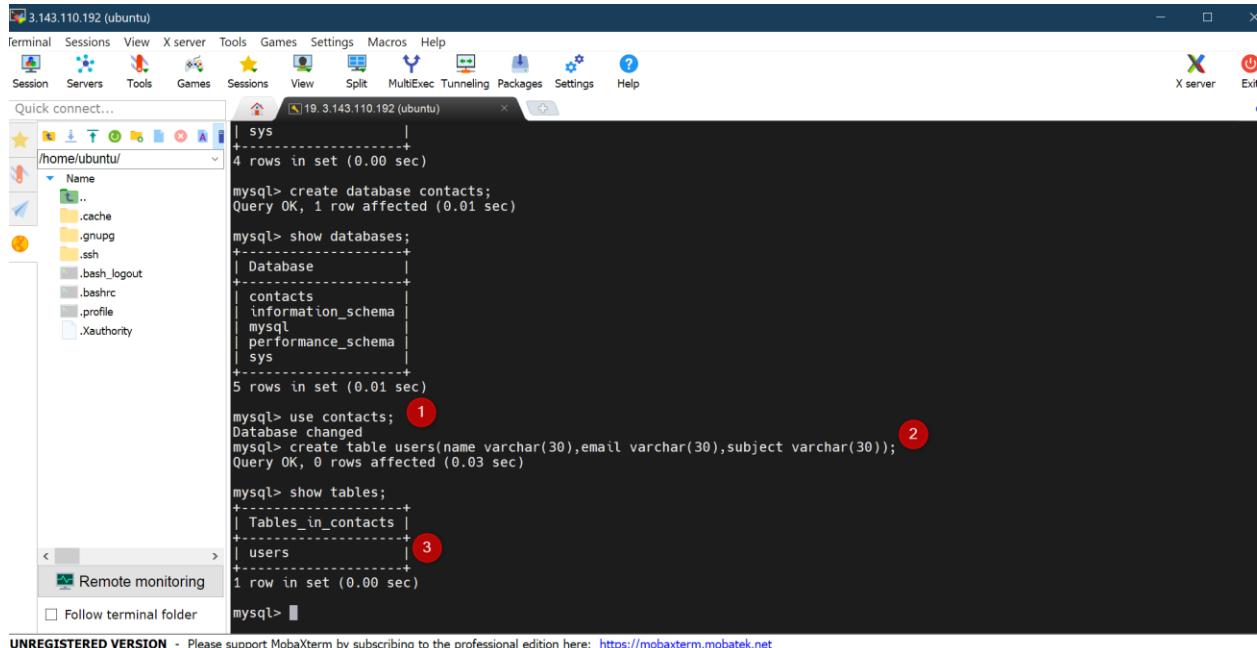
mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
4 rows in set (0.00 sec)

mysql> create database contacts; 1
Query OK, 1 row affected (0.01 sec)

mysql> show databases; 2
+-----+
| Database |
+-----+
| contacts 3 |
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.01 sec)
```

► Create a tables inside database 'Contacts'

- ▶ mysql> use contacts;
- ▶ mysql> create table users(name varchar(30),email varchar(30),subject varchar(30));
- ▶ 6.Verify that table 'user's is created
- ▶ mysql> show tables;



```

3.143.110.192 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
19.3.143.110.192 (ubuntu) x
| sys
+-----+
| |
4 rows in set (0.00 sec)

mysql> create database contacts;
Query OK, 1 row affected (0.01 sec)

mysql> show databases;
+-----+
| Database |
+-----+
| contacts |
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.01 sec)

mysql> use contacts; 1
Database changed

mysql> create table users(name varchar(30),email varchar(30),subject varchar(30));
Query OK, 0 rows affected (0.03 sec)

mysql> show tables;
+-----+
| Tables_in_contacts |
+-----+
| users |
+-----+
1 row in set (0.00 sec)

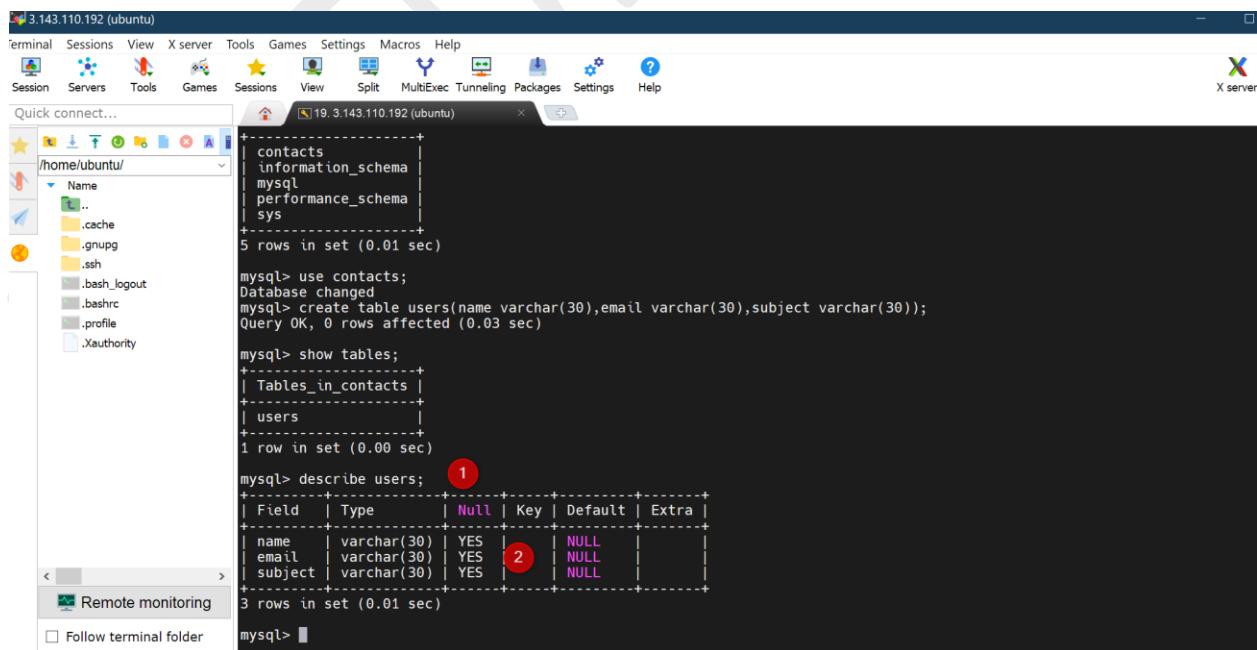
mysql> 2
mysql> 3

```

UNREGISTERED VERSION - Please support MobaXterm by subscribing to the professional edition here: <https://mobaxterm.mobatek.net>

Describe table and check if the fields are exist

mysql> Describe users;



```

3.143.110.192 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
19.3.143.110.192 (ubuntu) x
+-----+
| contacts |
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.01 sec)

mysql> use contacts;
Database changed

mysql> create table users(name varchar(30),email varchar(30),subject varchar(30));
Query OK, 0 rows affected (0.03 sec)

mysql> show tables;
+-----+
| Tables_in_contacts |
+-----+
| users |
+-----+
1 row in set (0.00 sec)

mysql> describe users; 1
+-----+-----+-----+-----+-----+
| Field | Type   | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| name  | varchar(30)| YES | NO  | NULL    |       |
| email | varchar(30)| YES | NO  | NULL    |       |
| subject | varchar(30)| YES | NO  | NULL    |       |
+-----+-----+-----+-----+-----+
3 rows in set (0.01 sec)

mysql> 2
mysql> 3

```

Install Telnet utility & check DB Connection

- ▶ Sudo apt-get install telnet

```
root@ip-10-0-4-88:~# sudo apt-get install telnet
Reading package lists... Done
Building dependency tree
Reading state information... Done
telnet is already the newest version (0.17-41).
telnet set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 36 not upgraded.
root@ip-10-0-4-88:~#
```

- ▶ Test RDS DB connection from Web to DB
- ▶ Telnet <RDS MySQL Endpoint> <MySQL port>
- ▶ telnet mysql2021.cnliikk0jg8xf.ca-central-1.rds.amazonaws.com 3306
- ▶

```
root@ip-10-0-4-88:~# sudo apt-get install telnet
Reading package lists... Done
Building dependency tree
Reading state information... Done
telnet is already the newest version (0.17-41).
telnet set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 36 not upgraded.
root@ip-10-0-4-88:~# telnet mysql.cnagenmjwd5.us-east-2.rds.amazonaws.com 3306
Trying 10.0.5.17...
Connected to mysql.cnagenmjwd5.us-east-2.rds.amazonaws.com.
Escape character is '^]'.
```

- ▶ If connection is successfully established between both the VPC's then it show's like

```
root@ip-10-0-4-88:~# sudo apt-get install telnet
Reading package lists... Done
Building dependency tree
Reading state information... Done
telnet is already the newest version (0.17-41).
telnet set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 36 not upgraded.
root@ip-10-0-4-88:~# telnet mysql.cnagenmjwd5.us-east-2.rds.amazonaws.com 3306
Trying 10.0.5.17...
Connected to mysql.cnagenmjwd5.us-east-2.rds.amazonaws.com.
Escape character is '^]'.
```

Let's insert data to the database from web application

← → C Not secure | prefect-alb-784003759.us-east-2.elb.amazonaws.com

The screenshot shows a contact page for 'PRAFUL PATEL' on the left and a 'Contact Form' on the right. The contact page includes a profile picture, social media links (Twitter, Facebook, Instagram, LinkedIn), and a sidebar with navigation links: Home, About, Resume, Portfolio, Services, and Contact. The main content area displays location, email, and phone information, along with a map of a city center. The contact form on the right has fields for Name, Email, Subject, and a Submit button, each marked with a red circled number (1 through 4) corresponding to numbered steps in the process.

Contact

Magnam dolores commodi suscipit. Necessitatibus eius consequatur ex aliquid fuga eum quidem. Sit sint consectetur velit. Quisquam quos quisquam cupiditate. Et nemo qui suscipit alias ea. Quia fugiat sit in iste officiis commodi quidem hic quas.

Location:
Regina,CANADA

Email:
praful.patel@gmail.com

Call:
+1 5589 55928 55

Map:
A map showing the locations of various meeting rooms and centers in a city center, including Downtown Conference Center, The National September 11 Memorial & Museum, Chinatown, and Opus Meeting Rooms.

Contact Form

Please fill this form and submit to add employee record to the database.

Name 1

Email 2

Subject 3

Submit 4

New record successfully added

A screenshot of a browser window showing a successful record addition. The address bar shows the URL 'prefect-alb-784003759.us-east-2.elb.amazonaws.com/forms/insert.php'. A red arrow points to the message 'New record has been added successfully !' displayed on the page.

prefect-alb-784003759.us-east-2.elb.amazonaws.com/ 18.191.135.225 prefact-alb-784003759.us-east-2.elb.amazonaws.com/forms/insert.php

New record has been added successfully !

Screenshot of a web browser showing a contact page for Praful Patel.

The page includes a sidebar with navigation links: Home, About, Resume, Portfolio, Services, and Contact. The Contact section displays a profile picture of Praful Patel, his name "PRAFUL PATEL", and social media icons for Twitter, Facebook, Instagram, and LinkedIn.

The main content area has a heading "Contact" and a paragraph of placeholder text: "Magnam dolores commodi suscipit. Necessitatibus eius consequatur ex aliquid fuga eum quidem. Sit sint consectetur velit. Quisquam quos quisquam cupiditate. Et nimpedit suscipit alias ea. Quia fugiat sit in iste officiis commodi quidem hic quas."

On the right, there is a "Contact Form" with fields for Name, Email, and Subject, and a "Submit" button. A red arrow points to the "Email" field, which contains "alex@gmail.com".

A map of a city area is displayed, showing locations like "Downtown Conference Center", "CHINATOWN", and "Opus Meeting Rooms". A red pin marks a specific location on the map.

Screenshot of a browser window showing the confirmation message after submitting the contact form.

The URL in the address bar is "prefect-alb-784003759.us-east-2.elb.amazonaws.com/forms/insert.php".

The message "New record has been added successfully !" is displayed in the center of the page, with a red arrow pointing to it.

Verify from the backend database that data has successfully added from the web application

The screenshot shows a terminal window titled '23.18.191.135.225 (ubuntu)'. The terminal interface includes a menu bar with 'Terminal', 'Sessions', 'View', 'X server', 'Tools', 'Games', 'Settings', 'Macros', and 'Help'. Below the menu is a toolbar with icons for Session, Servers, Tools, Games, Sessions, View, Split, MultiExec, Tunneling, Packages, Settings, and Help.

The terminal window displays the following MySQL session:

```

affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show databases; ①
+-----+
| Database |
+-----+
| information_schema |
| contacts |
| innodb |
| mysql |
| performance_schema |
| sys |
+-----+
6 rows in set (0.00 sec)

mysql> use contacts; ②
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> select * from users; ③
+-----+-----+-----+
| name | email           | subject |
+-----+-----+-----+
| Praful | praful1611@outlook.com | test    |
| Alex   | alex@gmail.com     | this is just test |
+-----+-----+-----+
2 rows in set (0.00 sec)

mysql> ④

```

Annotations with red circles and numbers are present: ① points to the output of 'show databases'; ② points to the 'use contacts' command; ③ points to the 'select * from users' command; ④ points to the final empty line of the MySQL session.

❖ Improvements Tasks:

- ▶ Reduce security incidents
 - identity and access management
 - Firewalls(web application, network) and DDOS protection
 - Create & manage cryptographic key
 - Manage secrets, API keys, credentials
 - Security assessment for EC2 instances
 - Threat Detection
 - Manage security Alerts
 - Configure security controls for individual AWS services

- ▶ Reduce deployment time & maintenance
 - Automate provisioning
 - Observability of AWS resources
 - Track user action & API usage on AWS
 - Evaluate configuration of AWS resources
 - Centralize operations:
 - Automate actions with runbooks
 - Manage & patch instances
 - Schedule & govern changes



Congratulations!!!! 🎉

► **Clean up project resources:**

- ✓ EC2 instances
- ✓ Volumes
- ✓ Application Load balancer
- ✓ Auto scaling group
- ✓ NAT Gateway
- ✓ Elastic IP
- ✓ RDS DB instance
- ✓ RDS snapshots

PRAFUL PATEL