

Step 1: VPC and Subnet Creation

A. Creation of VPC

The screenshot shows two consecutive screenshots of the AWS VPC console.

Screenshot 1: VPC Details

The top screenshot shows the "Details" tab of a newly created VPC named "vpc-07c64a12c763718c5 / Project1VPC".

VPC ID	State	DNS hostnames	DNS resolution
vpc-07c64a12c763718c5	Available	Disabled	Enabled

Other details include:

- Tenancy: Default, DHCP option set: dopt-229ee459
- Default VPC: No, IPv4 CIDR: 10.0.0.0/16
- Network Address Usage: metrics, Disabled
- Route 53 Resolver DNS: Firewall rule groups
- IPv6 pool: -
- Owner ID: 032286224389
- Main route table: rtb-0e50b275b47d57c7c
- Main network ACL: acl-0b88236fee7341254
- IPv6 CIDR (Network border group): -

Screenshot 2: Edit VPC Settings

The bottom screenshot shows the "Edit VPC settings" page for the same VPC.

VPC details:

- VPC ID: vpc-07c64a12c763718c5
- Name: Project1VPC

DHCP settings:

- DHCP option set: dopt-229ee459

DNS settings:

- Enable DNS resolution
- Enable DNS hostnames

b. Creation of public subnet

The screenshot shows the 'Create subnet' page in the AWS VPC console. In the 'VPC' section, the VPC ID is set to 'vpc-07c64a12c763718c5 (Project1VPC)'. Under 'Associated VPC CIDRs', the IPv4 CIDR is listed as '10.0.0.0/16'. In the 'Subnet settings' section, a new subnet is being created with the name 'public-subnet'. The page includes standard AWS navigation and status bars.

The screenshot shows the 'Edit subnet settings' page for the subnet 'public-subnet'. In the 'Subnet' section, the Subnet ID is 'subnet-07acb47c10e90d9f7' and the Name is 'public-subnet'. Under 'Auto-assign IP settings', the 'Enable auto-assign public IPv4 address' checkbox is checked. In the 'Resource-based name (RBN) settings' section, there are two unchecked checkboxes: 'Enable resource name DNS A record on launch' and 'Enable resource name DNS AAAA record on launch'. The page includes standard AWS navigation and status bars.

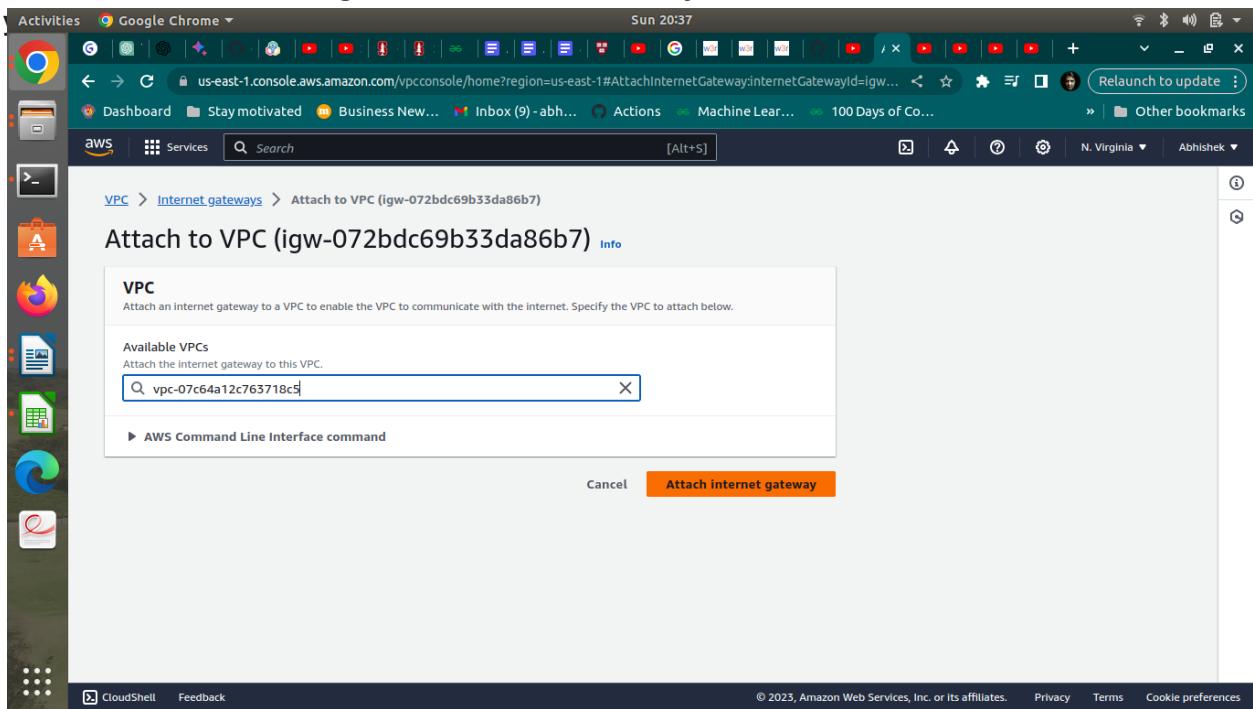
c. Creation of private subnet

The screenshot shows the 'Create subnet' wizard in the AWS VPC console. The first step, 'VPC', is selected. In the 'VPC ID' section, 'vpc-07c64a12c763718c5 (Project1VPC)' is chosen from a dropdown. Under 'Associated VPC CIDRs', the IPv4 CIDR '10.0.0.0/16' is listed. The second step, 'Subnet settings', is shown below. It contains a section for 'Subnet 1 of 1' where the 'Subnet name' is set to 'private-subnet'. A note indicates the name can be up to 256 characters long. At the bottom, there are 'CloudShell', 'Feedback', and copyright information.

The screenshot shows the 'Create subnet' wizard in the AWS VPC console. The second step, 'Subnet settings', is selected. It shows the 'IPv4 VPC CIDR block' set to '10.0.0.0/16'. The 'IPv4 subnet CIDR block' is set to '10.0.2.0/24'. Under 'Tags - optional', a single tag 'Name: private-subnet' is added. At the bottom, there are 'Cancel' and a prominent yellow 'Create subnet' button.

Step 2 : Internet Gateway and VPC

a. Creation and Configuration of Internet Gateway



Sun 20:38

Internet gateway igw-072bdc69b33da86b7 successfully attached to vpc-07c64a12c763718c5

VPC > Internet gateways > igw-072bdc69b33da86b7

igw-072bdc69b33da86b7 / project-1-internet-gateway

Details

Internet gateway ID igw-072bdc69b33da86b7	State Attached	VPC ID vpc-07c64a12c763718c5 Project1VPC	Owner 032286224389
--	-------------------	---	-----------------------

Tags

Key	Value
Name	project-1-internet-gateway

Actions

Sun 21:23

Route tables (1/3)

rtb-0e50b275b47d57c7c

rtb-0e0edcd84f873d4af

public-route-table

Actions

Create route table

View details

Set main route table

Edit subnet associations

Edit edge associations

Edit route propagation

Edit routes

Manage tags

Delete route table

Details

Route table ID rtb-0e0edcd84f873d4af	Main No	Explicit subnet associations -	Edge associations -
VPC vpc-07c64a12c763718c5 Project1VPC	Owner ID 032286224389		

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b.Creation of public route table

Sun 21:21

Activities Google Chrome ▾ us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#CreateRouteTable: Relaunch to update Dashboard Stay motivated Business News... Inbox (9) - abh... Actions Machine Lear... 100 Days of Co... Other bookmarks N. Virginia Abhishek

aws Services Search [Alt+S]

Route table settings

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

public-route-table

VPC The VPC to use for this route table.

vpc-07c64a12c763718c5 (Project1VPC)

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

Name public-route-table Remove

Add new tag You can add 49 more tags.

Create route table

Sun 21:26

Activities Google Chrome ▾ us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#EditRoutes:RouteTableId=rtb-0eecdcd84f873d4af Relaunch to update Dashboard Stay motivated Business News... Inbox (9) - abh... Actions Machine Lear... 100 Days of Co... Other bookmarks N. Virginia Abhishek

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VPC > Route tables > rtb-0eecdcd84f873d4af > Edit routes

Edit routes

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
0.0.0.0/0	Internet Gateway	-	No
	igw-072bdc69b33da86b7		

Add route

Cancel Preview Save changes

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The screenshot shows a Google Chrome window with the AWS VPC console open. The URL in the address bar is `us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#EditRouteTableSubnetAssociations:RouteTableId=rtb-0e...`. The main content area displays a success message: "Updated routes for rtb-0e0eddc84f873d4af / public-route-table successfully". Below this, a breadcrumb navigation shows: VPC > Route tables > rtb-0e0eddc84f873d4af > Edit subnet associations. The main form is titled "Edit subnet associations" and asks "Change which subnets are associated with this route table." It contains two sections: "Available subnets (1/2)" and "Selected subnets". The "Available subnets" table has columns: Name, Subnet ID, IPv4 CIDR, IPv6 CIDR, and Route table ID. It lists one subnet: "private-subnet" (subnet-057a34a4d4191b040, 10.0.2.0/24, Main (rtb-0e50b275b47d57c7)). The "Selected subnets" section shows one subnet selected: "public-subnet" (subnet-07acb47c10e90d9f7, 10.0.1.0/24, Main (rtb-0e50b275b47d57c7)). At the bottom right are "Cancel" and "Save associations" buttons.

c.Creation of NAT gateway

Sun 22:12

Activities Google Chrome ▾ us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#CreateNatGateway: Relaunch to update Dashboard Stay motivated Business News... Inbox (9) - abh... Actions Machine Lear... 100 Days of Co... N. Virginia Abhishek

Select a connectivity type for the NAT gateway.

Public
 Private

Elastic IP allocation ID [Info](#)
Assign an Elastic IP address to the NAT gateway.
elppalloc-014dbb13f4e778609 [Allocate Elastic IP](#)

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.

Key	Value - optional
<input type="text" value="Name"/>	<input type="text" value="public-net-gateway"/>

Add new tag

You can add 49 more tags.

Cancel [Create NAT gateway](#)

Sun 22:13

Activities Google Chrome ▾ us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#NatGatewayDetails:natGatewayId=nat-0e3588955712fa0de Relaunch to update Dashboard Stay motivated Business News... Inbox (9) - abh... Actions Machine Lear... 100 Days of Co... N. Virginia Abhishek

VPC dashboard X

EC2 Global View [View](#)

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**

NAT gateway nat-0e3588955712fa0de | public-net-gateway was created successfully.

VPC > [NAT_gateways](#) > nat-0e3588955712fa0de

nat-0e3588955712fa0de / public-net-gateway

[Actions](#)

Details [Info](#)

NAT gateway ID	Connectivity type	State	State message
nat-0e3588955712fa0de	Public	Pending	-
NAT gateway ARN	Primary public IPv4 address	Primary private IPv4 address	Primary network interface ID
arn:aws:ec2:us-east-1:032286224389:natgateway/nat-0e3588955712fa0de	-	-	-
VPC	Subnet	Created	Deleted
vpc-07c64a12c763718c5 / Project1VPC	subnet-07acb47c10e90d9f7 / public-subnet	Sunday, 3 December 2023 at 22:12:32 GMT+5:30	-

[Secondary IPv4 addresses](#) [Monitoring](#) [Tags](#)

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The screenshot shows the AWS VPC console with the URL <https://us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#NatGateways>. The page displays a table titled "NAT gateways (1/1) Info" with one entry: "public-net-gateway" (nat-0e3588955712fa0de). The table includes columns for Name, NAT gateway ID, Connectivity type, State, State message, and Primary. The "Details" tab is selected, showing the NAT gateway ID, Connectivity type (Public), and State (Available). The State message indicates "Available".

D. Creation of private route tables

The screenshot shows the AWS VPC console with the URL <https://us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#RouteTables>. The page displays a table titled "Route tables (4) Info" with five entries: an unnamed route table (rtb-b4dffbc), another unnamed route table (rtb-0e50b275b47d57c7c), "public-route-table" (rtb-0eedcd84f873d4af), "private-route-table" (rtb-00064c0869f8c62f), and an unnamed route table (rtb-00064c0869f8c62f). The table includes columns for Name, Route table ID, Explicit subnet associations, Edge associations, and Main. The "private-route-table" is marked as "No" for Main. The "Select a route table" section is visible below the table.

The screenshot shows a Google Chrome window with the AWS VPC console open. The URL in the address bar is `us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#EditRouteTableSubnetAssociations:RouteTableId=rtb-00064c0869f8c622f`. The page title is "Edit subnet associations". The main content area displays a table titled "Available subnets (1/2)". The table has columns: Name, Subnet ID, IPv4 CIDR, IPv6 CIDR, and Route table ID. There are two rows: "private-subnet" (selected) and "public-subnet". The "Selected subnets" section contains the selected subnet. At the bottom right are "Cancel" and "Save associations" buttons.

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
private-subnet	subnet-037a34a4d4191b040	10.0.2.0/24	-	Main (rtb-0e50b275b47d57c7c)
public-subnet	subnet-07acb47c10e90d9f7	10.0.1.0/24	-	rtb-0e0ddcd84f873d4af / public

Available subnets (1/2)

Selected subnets

subnet-037a34a4d4191b040 / private-subnet X

Cancel Save associations

Step 3 : Creation of database and application servers

a.Creation of application server

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Quick Start

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Amazon Machine Image (AMI)

Amazon Linux 2023 AMI ami-0230bd60aa48260c6 (64-bit (x86)) / ami-04c97e62cb19d53f1 (64-bit (Arm)) Free tier eligible

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

Description

Amazon Linux 2023 AMI 2023.2.20231113.0 x86_64 HVM kernel-6.1

Architecture AMI ID Verified provider

64-bit (x86) ami-0230bd60aa48260c6

Summary

Number of instances Info 1

Software Image (AMI) Amazon Linux 2023 AMI 2023.2.2...read more ami-0230bd60aa48260c6

Virtual server type (instance type) t2.micro

Firewall (security group) New security group

Storage (volumes) 1 volume(s) - 8 GB

Cancel Launch instance Review commands

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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 - required gl-aws-core-assignment Create new key pair

Network settings Info

VPC - required Info

vpc-07c64a12c763718c5 (Project1VPC) 10.0.0.0/16

Subnet Info

subnet-07acb47c10e90d9f7 public-subnet

VPC: vpc-07c64a12c763718c5 Owner: 032286224389 Availability Zone: us-east-1d IP addresses available: 250 CIDR: 10.0.1.0/24

Create new subnet

Auto-assign public IP Info

Enable

Summary

Number of instances Info 1

Software Image (AMI) Amazon Linux 2023 AMI 2023.2.2...read more ami-0230bd60aa48260c6

Virtual server type (instance type) t2.micro

Firewall (security group) New security group

Storage (volumes) 1 volume(s) - 8 GB

Cancel Launch instance Review commands

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us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#InstanceDetails:instanceId=i-092eec79c17232071 Relaunch to update

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EC2 Dashboard

Inbound rules

Name	Security group rule ID	Port range	Protocol	Source
-	sgr-0a2090ff0436a6ca9	3306	TCP	0.0.0.0/0
-	sgr-033aede3f1dc97ef5	All	All	0.0.0.0/0
-	sgr-06594c5bc194f3ca1	8065	TCP	0.0.0.0/0
-	sgr-0a6082bc21164e544	443	TCP	0.0.0.0/0
-	sgr-0f7f687b524da3e0b	80	TCP	0.0.0.0/0
-	sgr-02ea0aa75d097092d	22	TCP	0.0.0.0/0

Outbound rules

Name	Security group rule ID	Port range	Protocol	Destination
-	sgr-00cfde29f141902e0	All	All	0.0.0.0/0

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The screenshot shows the AWS EC2 security group configuration for an instance. The 'Inbound rules' section lists six rules allowing traffic from 0.0.0.0/0 on ports 3306, All, 8065, 443, 80, and 22 respectively. The 'Outbound rules' section lists one rule allowing all traffic to 0.0.0.0/0. The sidebar on the left shows navigation links for EC2 Dashboard, Instances, Launch Templates, and other services like CloudWatch Metrics.

The screenshot shows two consecutive steps in the AWS Cloud9 environment:

Step 1: Firewall (security groups) Info

This screen is part of the EC2 instance creation wizard. It shows the configuration of a new security group named "launch-wizard-3". The "Inbound Security Group Rules" section contains one rule: "Security group rule 1 (TCP, 22, 0.0.0.0/0)" with "ssh" as the type, "TCP" as the protocol, and port "22". The "Source type" is set to "Anywhere". A description "e.g. SSH for admin desktop" is provided.

Step 2: Instances (1/1) Info

This screen shows the summary of the launched instance. The instance is named "gl-aws-core-as..." with ID "i-092eec79c17232071". It is currently "Running" (green status), has an "t2.micro" instance type, and is in the "us-east-1" region. The status is "Initializing". The "Launch instances" button is highlighted in orange.

b. Creation of database server

Sun 23:26

Activities Google Chrome ▾

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VPC - required Info
vpc-07c64a12c763718c5 (Project1VPC)
10.0.0.0/16

Subnet Info
subnet-057a34a4d4191b040 private-subnet
VPC: vpc-07c64a12c763718c5 Owner: 032286224389 Availability Zone: us-east-1d IP addresses available: 251 CIDR: 10.0.2.0/24

Create new subnet

Auto-assign public IP Info
Disable

Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
 Create security group
 Select existing security group

Security group name - required
launch-wizard-4

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and _-/.@#=;&!\$*

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Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
 Create security group
 Select existing security group

Security group name - required
launch-wizard-4

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and _-/.@#=;&!\$*

Description - required Info
launch-wizard-4 created 2023-12-03T17:50:17.842Z

Inbound Security Group Rules

Security group rule 1 (TCP, 22, 0.0.0.0/0)

Type Info Protocol Info Port range Info
ssh TCP 22

Source type Info Source Info Description - optional Info
Anywhere Add CIDR, prefix list or security group
e.g. SSH for admin desktop
0.0.0.0/0

Cancel Launch instance Review commands

The image consists of two vertically stacked screenshots of the AWS EC2 console in Google Chrome.

Screenshot 1: Security Group Rules

This screenshot shows the inbound and outbound rules for a specific security group. The URL is `us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#InstanceDetails:instanceId=i-06379fa139132ddfb`.

Inbound rules:

Name	Security group rule ID	Port range	Protocol	Source
-	sgr-0e7dfee36e2a6a05	80	TCP	0.0.0.0/0
-	sgr-09c4a0b3c3eebe34e	3306	TCP	0.0.0.0/0
-	sgr-015a8fc9aa9f52a9	All	All	0.0.0.0/0
-	sgr-0fd074659b416af6	443	TCP	0.0.0.0/0
-	sgr-094b9b91c56ff79e1	22	TCP	0.0.0.0/0
-	sgr-0a3bb66ae2a8a83da	8065	TCP	0.0.0.0/0

Outbound rules:

Name	Security group rule ID	Port range	Protocol	Destination
-	sgr-0632c29a9313d659f	All	All	0.0.0.0/0

Screenshot 2: Instances Overview

This screenshot shows the list of instances. The URL is `us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:`

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Av.
gl-aws-core-as...	i-092eec79c17232071	Running	t2.micro	2/2 checks passed	No alarms	us-
database-server	i-06379fa139132ddfb	Running	t2.micro	2/2 checks passed	No alarms	us-

Select an instance:

Step 4: Application and Database Installation and Testing

a. Installation and configuration of MySQL

```

Activities Terminal Sat 19:46
ec2-user@ip-10-0-1-88:~$ sudo yum update
[ec2-user@ip-10-0-1-88 ~]$ sudo yum update
Last metadata expiration check: 0:20:18 ago on Sat Dec 9 13:51:09 2023.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-10-0-1-88 ~]$ sudo rpm -Uvh https://dev.mysql.com/get/mysql80-community-release-el7-3.noarch.rpm
Retrieving https://dev.mysql.com/get/mysql80-community-release-el7-3.noarch.rpm
error: Failed dependencies:
      mysql57-community-release conflicts with mysql80-community-release-el7-3.noarch
[ec2-user@ip-10-0-1-88 ~]$ ls
[ec2-user@ip-10-0-1-88 ~]$ wget http://dev.mysql.com/get/mysql57-community-release-el7-9.noarch.rpm
URL transformed to HTTPS due to an HSTS policy
--2023-12-09 14:12:43- https://dev.mysql.com/get/mysql57-community-release-el7-9.noarch.rpm
Resolving dev.mysql.com (dev.mysql.com)... 23.0.26.132, 2600:1408:c400:1881::2e31, 2600:1408:c400:188c::2e31
Connecting to dev.mysql.com (dev.mysql.com)|23.0.26.132|:443... connected.
HTTP request sent, awaiting response... 302 Moved Temporarily
Location: https://repo.mysql.com/mysql57-community-release-el7-9.noarch.rpm [following]
--2023-12-09 14:12:43- https://repo.mysql.com/mysql57-community-release-el7-9.noarch.rpm
Resolving repo.mysql.com (repo.mysql.com)... 23.0.229.9, 2600:1408:c400:182::1d68, 2600:1408:c400:195::1d68
Connecting to repo.mysql.com (repo.mysql.com)|23.0.229.9|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 9224 (9.0K) [application/x-redhat-package-manager]
Saving to: 'mysql57-community-release-el7-9.noarch.rpm'

mysql57-community-release-el7-9.noa 100%[=====] 9.01K ---KB/s in 0s
2023-12-09 14:12:44 (213 MB/s) - 'mysql57-community-release-el7-9.noarch.rpm' saved [9224/9224]

[ec2-user@ip-10-0-1-88 ~]$ sudo yum localinstall mysql57-community-release-el7-9.noarch.rpm
Last metadata expiration check: 0:22:22 ago on Sat Dec 9 13:51:09 2023.
Dependencies resolved.
=====
Package           Architecture   Version       Repository    Size
=====
Downgrading:
  mysql57-community-release      noarch        el7-9        @commandline  9.0 k
=====
Activities Terminal Sat 19:47
ec2-user@ip-10-0-1-88:~$ dependencies resolved.
=====
Package           Architecture   Version       Repository    Size
=====
Downgrading:
  mysql57-community-release      noarch        el7-9        @commandline  9.0 k
=====
Transaction Summary
=====
Downgrade 1 Package
=====
Total size: 9.0 k
Downloading Packages:
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing
    Downgrading      : mysql57-community-release-el7-9.noarch
  Cleanup
    : mysql57-community-release-el7-11.noarch
  Verifying
    : mysql57-community-release-el7-9.noarch
  Verifying
    : mysql57-community-release-el7-11.noarch
  Downgraded:
    mysql57-community-release-el7-9.noarch
  Complete!
[ec2-user@ip-10-0-1-88 ~]$ sudo yum install mysql-community-server -y --nogpgcheck
Last metadata expiration check: 0:23:02 ago on Sat Dec 9 13:51:09 2023.
Dependencies resolved.
=====
Package           Architecture   Version       Repository    Size
=====
Installing:
  mysql-community-server          x86_64        5.7.44-1.el7      mysql57-community  184 M
  libcrypt-compat                x86_64        4.4.33-7.amzn2023  amazonlinux       92 k
=====

```

Activities Terminal Sat 19:47 ec2-user@ip-10-0-1-88:~

```
(2/6): ncurses-compat-libs-6.2-4.20200222.amzn2023.0.4.x86_64.rpm      2.7 MB/s | 322 kB   00:00
(3/6): mysql-community-common-5.7.44-1.el7.x86_64.rpm                  5.7 MB/s | 313 kB   00:00
(4/6): mysql-community-libs-5.7.44-1.el7.x86_64.rpm                   20 MB/s | 3.0 MB   00:00
(5/6): mysql-community-client-5.7.44-1.el7.x86_64.rpm                 47 MB/s | 31 MB    00:00
(6/6): mysql-community-server-5.7.44-1.el7.x86_64.rpm                61 MB/s | 184 MB   00:02
Total                                         69 MB/s | 219 MB   00:03

Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing :                                                 1/1
Installing  : mysql-community-common-5.7.44-1.el7.x86_64          1/6
Installing  : mysql-community-libs-5.7.44-1.el7.x86_64           2/6
Running scriptlet: mysql-community-libs-5.7.44-1.el7.x86_64       2/6
Installing  : libCRYPT-compat-4.4.33-7.amzn2023.x86_64          3/6
Installing  : ncurses-compat-libs-6.2-4.20200222.amzn2023.0.4.x86_64 4/6
Installing  : mysql-community-client-5.7.44-1.el7.x86_64          5/6
Running scriptlet: mysql-community-server-5.7.44-1.el7.x86_64       6/6
Installing  : mysql-community-server-5.7.44-1.el7.x86_64          6/6
Running scriptlet: mysql-community-server-5.7.44-1.el7.x86_64       6/6
/usr/lib/tmpfiles.d/mysql.conf:23: Line references path below legacy directory /var/run/, updating /var/run/mysqld → /run/mysqld; please update the tmpfiles.d drop-in file accordingly.

Verifying   : ncurses-compat-libs-6.2-4.20200222.amzn2023.0.4.x86_64      1/6
Verifying   : libCRYPT-compat-4.4.33-7.amzn2023.x86_64             2/6
Verifying   : mysql-community-client-5.7.44-1.el7.x86_64            3/6
Verifying   : mysql-community-common-5.7.44-1.el7.x86_64            4/6
Verifying   : mysql-community-libs-5.7.44-1.el7.x86_64             5/6
Verifying   : mysql-community-server-5.7.44-1.el7.x86_64            6/6

Installed:
libCRYPT-compat-4.4.33-7.amzn2023.x86_64 mysql-community-client-5.7.44-1.el7.x86_64 mysql-community-common-5.7.44-1.el7.x86_64
mysql-community-libs-5.7.44-1.el7.x86_64  mysql-community-server-5.7.44-1.el7.x86_64 ncurses-compat-libs-6.2-4.20200222.amzn2023.0.4.x86_64

Complete!
[ec2-user@ip-10-0-1-88 ~]$ sudo systemctl start mysqld.service
```

```

Activities Terminal Sat 19:52
ec2-user@ip-10-0-1-88:~ 69 MB/s | 219 MB 00:03

Total
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : mysql-community-common-5.7.44-1.el7.x86_64 1/6
Installing : mysql-community-libs-5.7.44-1.el7.x86_64 2/6
Running scriptlet: mysql-community-libs-5.7.44-1.el7.x86_64 2/6
Installing : libcrypt-compat-4.4.33-7.amzn2023.x86_64 3/6
Installing : ncurses-compat-libs-6.2-4.20200222.amzn2023.0.4.x86_64 4/6
Installing : mysql-community-client-5.7.44-1.el7.x86_64 5/6
Running scriptlet: mysql-community-server-5.7.44-1.el7.x86_64 6/6
Installing : mysql-community-server-5.7.44-1.el7.x86_64 6/6
Running scriptlet: mysql-community-server-5.7.44-1.el7.x86_64 6/6
/usr/lib/tmpfiles.d/mysql.conf:23: Line references path below legacy directory /var/run/, updating /var/run/mysqld → /run/mysqld; please update the tmpfiles.d/ drop-in file accordingly.
Verifying : ncurses-compat-libs-6.2-4.20200222.amzn2023.0.4.x86_64 1/6
Verifying : libcrypt-compat-4.4.33-7.amzn2023.x86_64 2/6
Verifying : mysql-community-client-5.7.44-1.el7.x86_64 3/6
Verifying : mysql-community-common-5.7.44-1.el7.x86_64 4/6
Verifying : mysql-community-libs-5.7.44-1.el7.x86_64 5/6
Verifying : mysql-community-server-5.7.44-1.el7.x86_64 6/6
Installed:
libcrypt-compat-4.4.33-7.amzn2023.x86_64 mysql-community-client-5.7.44-1.el7.x86_64 mysql-community-common-5.7.44-1.el7.x86_64
mysql-community-libs-5.7.44-1.el7.x86_64 mysql-community-server-5.7.44-1.el7.x86_64 ncurses-compat-libs-6.2-4.20200222.amzn2023.0.4.x86_64
Complete!
[ec2-user@ip-10-0-1-88 ~]$ sudo systemctl start mysqld.service
[bash: sudo systemctl start mysqld.service: command not found
[ec2-user@ip-10-0-1-88 ~]$ sudo systemctl start mysqld.service
[ec2-user@ip-10-0-1-88 ~]$ sudo grep 'temporary password' /var/log/mysqld.log | awk '{print $NF}'
u48#StyW>%=f
Activities Terminal Sat 19:52
ec2-user@ip-10-0-1-88:~ 69 MB/s | 219 MB 00:03

File Edit View Search Terminal Help
[ec2-user@ip-10-0-1-88 ~]$ sudo systemctl start mysqld.service
[ec2-user@ip-10-0-1-88 ~]$ sudo grep 'temporary password' /var/log/mysqld.log | awk '{print $NF}'
u48#StyW>%=f
[ec2-user@ip-10-0-1-88 ~]$ mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 2
Server version: 5.7.44

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owners.

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

mysql> ALTER USER 'root'@'localhost' IDENTIFIED BY 'Password42!';
Query OK, 0 rows affected (0.00 sec)

mysql> exit;
Bye
[ec2-user@ip-10-0-1-88 ~]$ wget https://d6opu47qoi4ee.cloudfront.net/install_mysql_linux.sh
--2023-12-09 14:26:54-- https://d6opu47qoi4ee.cloudfront.net/install_mysql_linux.sh
Resolving d6opu47qoi4ee.cloudfront.net (d6opu47qoi4ee.cloudfront.net)... 3.162.115.128, 3.162.115.161, 3.162.115.180, ...
Connecting to d6opu47qoi4ee.cloudfront.net (d6opu47qoi4ee.cloudfront.net)|3.162.115.128|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 189 [text/x-sh]
Saving to: 'install_mysql_linux.sh'

install_mysql_linux.sh          100%[=====] 189 --.KB/s   in 0s
2023-12-09 14:26:55 (99.1 MB/s) - 'install_mysql_linux.sh' saved [189/189]

[ec2-user@ip-10-0-1-88 ~]$ chmod +x install_mysql_linux.sh
[ec2-user@ip-10-0-1-88 ~]$ sudo ./install_mysql_linux.sh
mysql: [Warning] Using a password on the command line interface can be insecure.
[ec2-user@ip-10-0-1-88 ~]$ 
```

b. Installation and configuration of Mattermost

Sat 23:03
ec2-user@ip-10-0-1-88:/opt/mattermost

```
File Edit View Search Terminal Help
~~~ V-' '-->
~~~_/_/
~~_/_/
_/_/`_/
Last login: Sat Dec 9 13:49:36 2023 from 106.221.235.239
[ec2-user@ip-10-0-1-88 ~]$ wget https://d6opu47qoi4ee.cloudfront.net/install_mattermost_linux.sh
--2023-12-09 17:21:35-- https://d6opu47qoi4ee.cloudfront.net/install_mattermost_linux.sh
Resolving d6opu47qoi4ee.cloudfront.net (d6opu47qoi4ee.cloudfront.net)... 3.162.115.193, 3.162.115.128, 3.162.115.161, ...
Connecting to d6opu47qoi4ee.cloudfront.net (d6opu47qoi4ee.cloudfront.net)|3.162.115.193|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 592 [text/x-sh]
Saving to: 'install_mattermost_linux.sh'

install_mattermost_linux.sh      100%[=====]      592  ---KB/s   in 0s

2023-12-09 17:21:36 (14.0 MB/s) - 'install_mattermost_linux.sh' saved [592/592]

[ec2-user@ip-10-0-1-88 ~]$ sudo yum install dos2unix -y
Last metadata expiration check: 3:30:48 ago on Sat Dec 9 13:51:09 2023.
Dependencies resolved.
=====
Package          Architecture      Version       Repository      Size
Installing:
dos2unix         x86_64          7.4.2-2.amzn2023.0.2      amazonlinux    236 k

Transaction Summary
=====
Install 1 Package

Total download size: 236 k
Installed size: 692 k
Downloading Packages:
dos2unix-7.4.2-2.amzn2023.0.2.x86_64.rpm
=====
Total                                         1.2 MB/s | 236 kB   00:00
914 kB/s | 236 kB   00:00

Activities Terminal
Sat 23:04  
ec2-user@ip-10-0-1-88:/opt/mattermost
```

File Edit View Search Terminal Help

```
install_mattermost_linux.sh      100%[=====]      592  ---KB/s   in 0s

2023-12-09 17:21:36 (14.0 MB/s) - 'install_mattermost_linux.sh' saved [592/592]

[ec2-user@ip-10-0-1-88 ~]$ sudo yum install dos2unix -y
Last metadata expiration check: 3:30:48 ago on Sat Dec 9 13:51:09 2023.
Dependencies resolved.
=====
Package          Architecture      Version       Repository      Size
Installing:
dos2unix         x86_64          7.4.2-2.amzn2023.0.2      amazonlinux    236 k

Transaction Summary
=====
Install 1 Package

Total download size: 236 k
Installed size: 692 k
Downloading Packages:
dos2unix-7.4.2-2.amzn2023.0.2.x86_64.rpm
=====
Total                                         1.2 MB/s | 236 kB   00:00
914 kB/s | 236 kB   00:00

Total
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing           :
  Installing : dos2unix-7.4.2-2.amzn2023.0.2.x86_64
  Running scriptlet: dos2unix-7.4.2-2.amzn2023.0.2.x86_64
  Verifying        : dos2unix-7.4.2-2.amzn2023.0.2.x86_64
 1/1
 1/1
 1/1
 1/1

Installed:
  dos2unix-7.4.2-2.amzn2023.0.2.x86_64
 1/1

Complete!
[ec2-user@ip-10-0-1-88 ~]$ sudo dos2unix install_mattermost_linux.sh
```

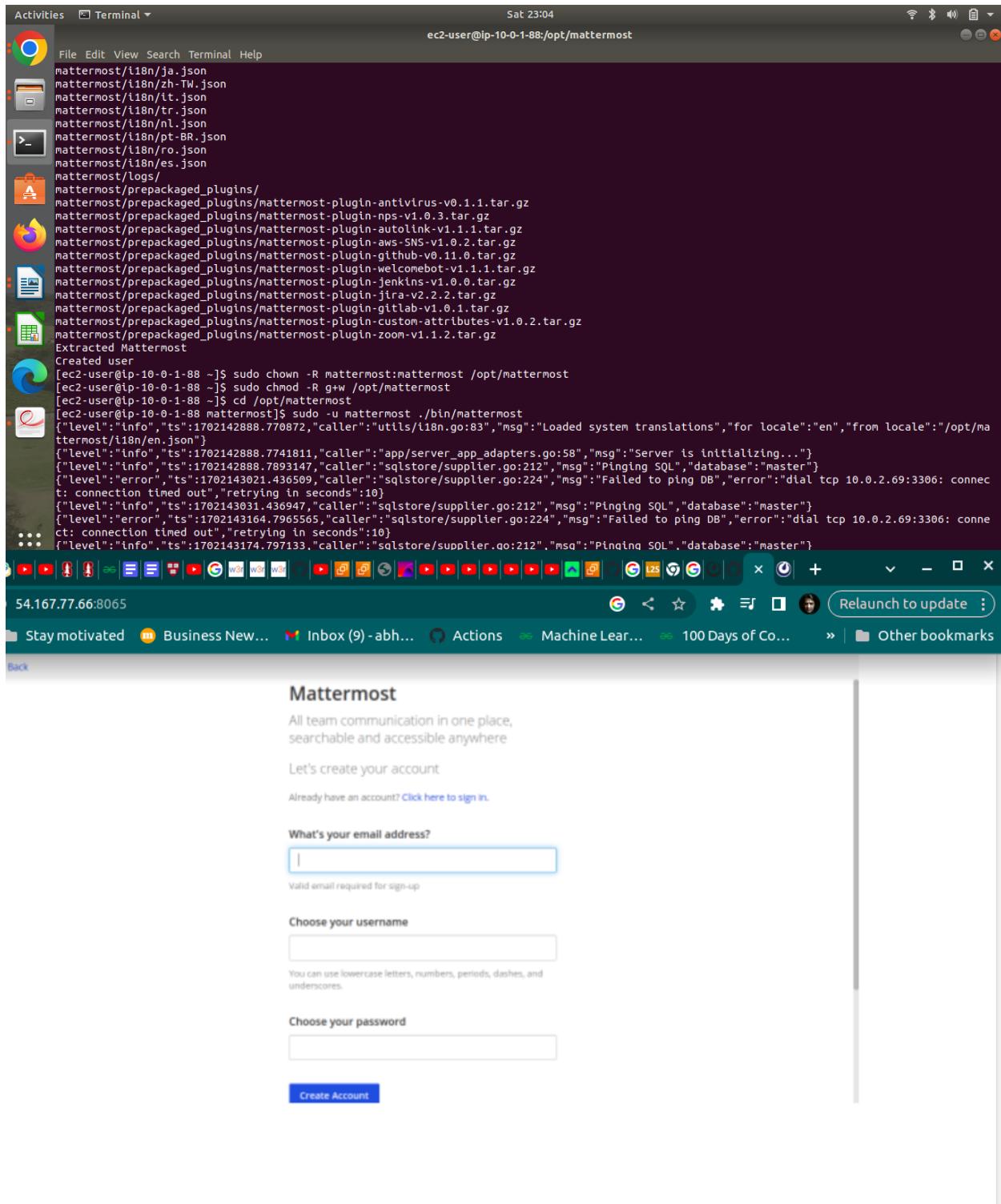
Activities Terminal Sat 23:04
ec2-user@ip-10-0-1-88:/opt/mattermost

```
File Edit View Search Terminal Help
verifying : dos2unix-7.4.2-2.amzn2023.0.2.x86_64
Installed:
dos2unix-7.4.2-2.amzn2023.0.2.x86_64

Complete!
[ec2-user@ip-10-0-1-88 ~]$ sudo dos2unix install_mattermost_linux.sh
dos2unix: converting file install_mattermost_linux.sh to Unix format...
[ec2-user@ip-10-0-1-88 ~]$ chmod +x install_mattermost_linux.sh
[ec2-user@ip-10-0-1-88 ~]$ sudo ./install_mattermost_linux.sh 10.0.2.69
rm: cannot remove '/opt/mattermost': No such file or directory
Resolving releases.mattermost.com (releases.mattermost.com)... 13.32.208.23, 13.32.208.31, 13.32.208.100, ...
Connecting to releases.mattermost.com (releases.mattermost.com)|13.32.208.23|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 155314485 (148M) [application/x-gzip]
Saving to: 'mattermost-5.19.0-linux-amd64.tar.gz'

mattermost-5.19.0-linux-amd64.tar.g 100%[=====] 148.12M 23.6MB/s in 6.5s
2023-12-09 17:26:02 (22.9 MB/s) - 'mattermost-5.19.0-linux-amd64.tar.gz' saved [155314485/155314485]

Downloaded Mattermost
mattermost/
mattermost/client/
mattermost/client/18.11f0f217b22217f7cd67.js
mattermost/client/icon_16x16.png
mattermost/client/14.ec1c246b041acc156729.js.map
mattermost/client/32.b198dd14910d696658c.js
mattermost/client/11.fa060d5c7252f0465e34.js
mattermost/client/manifest.json
mattermost/client/7.b918bf719444beb9f76.js.map
mattermost/client/images/
mattermost/client/images/img_trans.gif
mattermost/client/images/favicon/
mattermost/client/images/favicon-32x32.png
mattermost/client/images/favicon/apple-touch-icon-60x60.png
mattermost/client/images/favicon/favicon-96x96.png
mattermost/client/images/favicon/apple-touch-icon-144x144.png
```



Step 5: Answer the following questions

Q1 What is the default setting for DNS hostnames when a new VPC is created?

- a) Enabled
- b) Disabled
- c) Can be set during VPC creation
- d) Depends on the region used

Enter your answer here

b

**Q2 What is the term
used for the machine when we use it to log into the database server?**

- a) Bastion Host
- b) NAT Gateway
- c) Tunnel Interface
- d) SSH Gateway

Enter your answer here

a

**Q3 The database server security group in this
exercise has to keep port 3306 open. Which protocol uses this port to communicate?**

- a) HTTPS
- b) RDP
- c) TCP
- d) SCP

Enter your answer here

c

Q4 Which port is being used by Mattermost to communicate with the client application

- a) 8080
- b) 80
- c) 443
- d) 8065

Enter your answer here

d	
---	--

Q5 Which of the following is a reason why we cannot set the CIDR block for the public subnet to 10.0.2.0/16, assuming the values for the other CIDR blocks are the same as mentioned in the instructions?

- a) CIDR block overlaps with existing block
- b) CIDR block is not a valid CIDR
- c) CIDR block does not fall within the VPC
- d) There is no reason, this is a perfectly valid CIDR

Enter your answer here

C	
---	--

Q6 Assume that you have been asked to create 3 EC2 instances - application server, the database server and NAT instance . Each of these instances have their own security groups with a set of ports to be kept open. One of those ports is entirely unnecessary for the given architecture to function. Which of the ports given in the option below could it be?

- a) Port 22 on the NAT instances
- b) Port 3306 on the database server
- c) Port 443 on the NAT instance
- d) Port 22 on the application server

Enter your answer here

a	
---	--

Q7 Describe the steps you would take to increase security of the servers you have deployed so that they are not reachable from external sources

Explanation:

1. Database Server Security Group:

Allow incoming connections only from the public subnet where the application resides.

Restrict access to database resources, ensuring they are not reachable from external sources.

2. NAT Instance security Group:

Limit incoming connections to the NAT instance from the private subnet where the internal servers resides.

This ensures that external entities can't directly access servers but allows internal servers to Initiate outbound connections via the NAT Gateway.

BY implementing these measures, server remain isolated from the external access enhancing Security within the VPC.

Q8 Describe the steps required to deploy the given application in an autoscaling environment

Explanation:

To deploy the application in an autoscaling environment:

1. Provision EC2 Instance:

- Set up an EC2 instance with the application installed and configured as a reference.

2. Create AMI:

- Generate an Amazon Machine Image (AMI) from the configured instance to capture its state.

3. Launch Template:

- Create a launch template incorporating the AMI and defining required security group rules.

4. Autoscaling Group:

- Establish an Autoscaling group utilizing the launch template to dynamically scale instances based on demand.
- By following these steps, the application can seamlessly scale in response to varying workloads while maintaining a consistent and configured environment.