

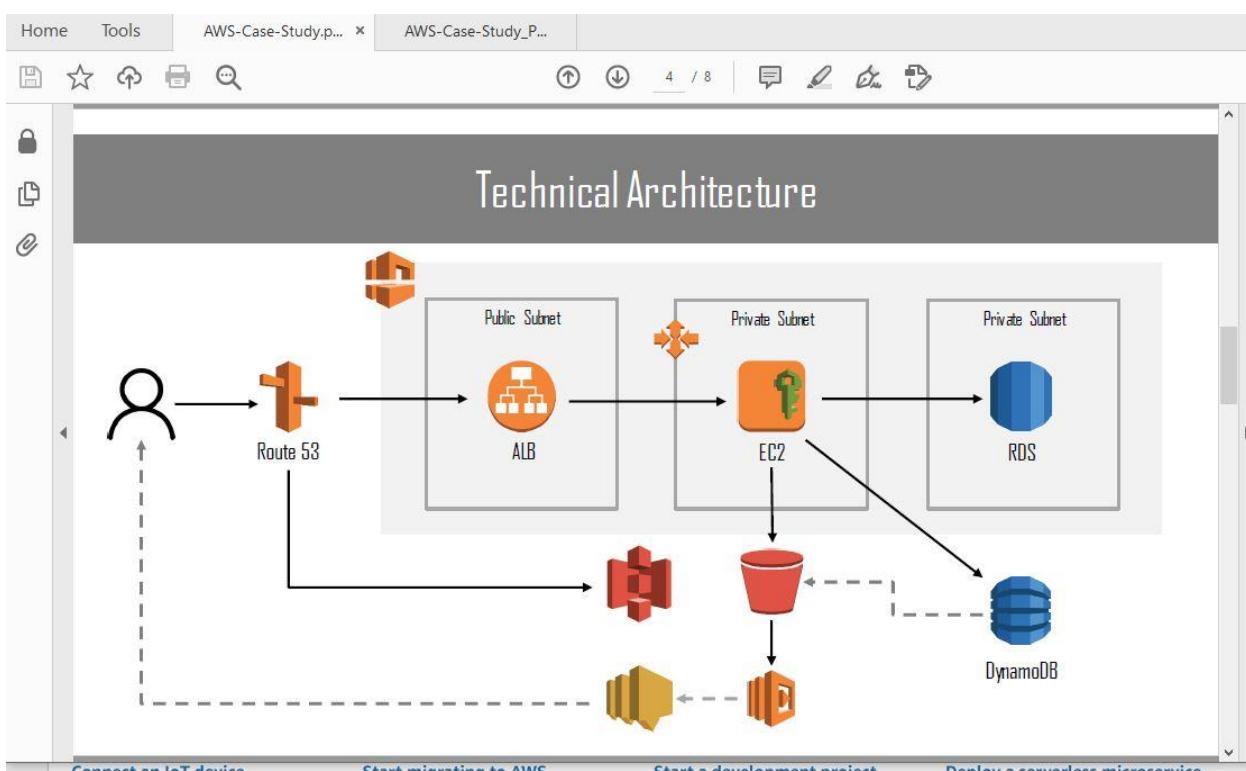
AWS Project Work – Case Study

Problem Statement:

A firm wants to launch their new application. To reduce cost it has been decided that the entire application will be hosted on AWS. It's a photo and video storage application. This application will store movies and videos, and customers can also upload photos and their custom made videos using this application.

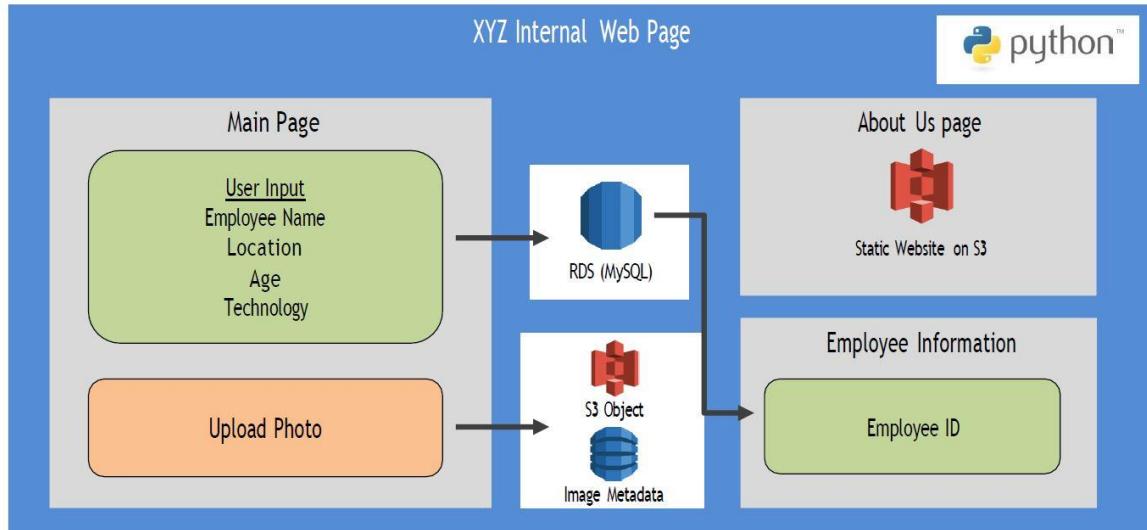
To buy videos, movies and wallpapers stored in the application customers have to pay some amount using their credit card. Customer will have to provide their home address and some other personal information as well.

Technical Architecture

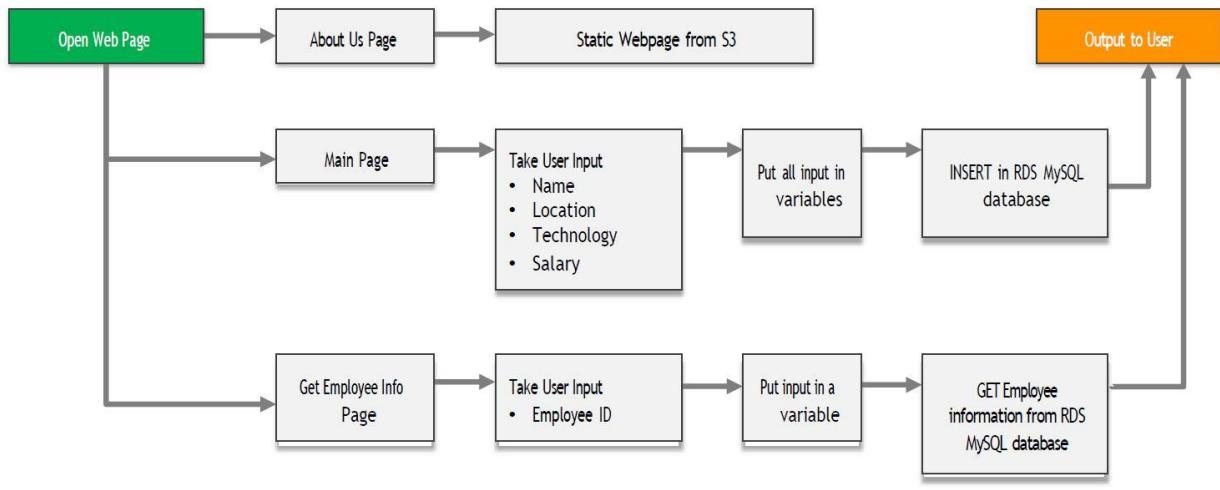


Application Architecture:

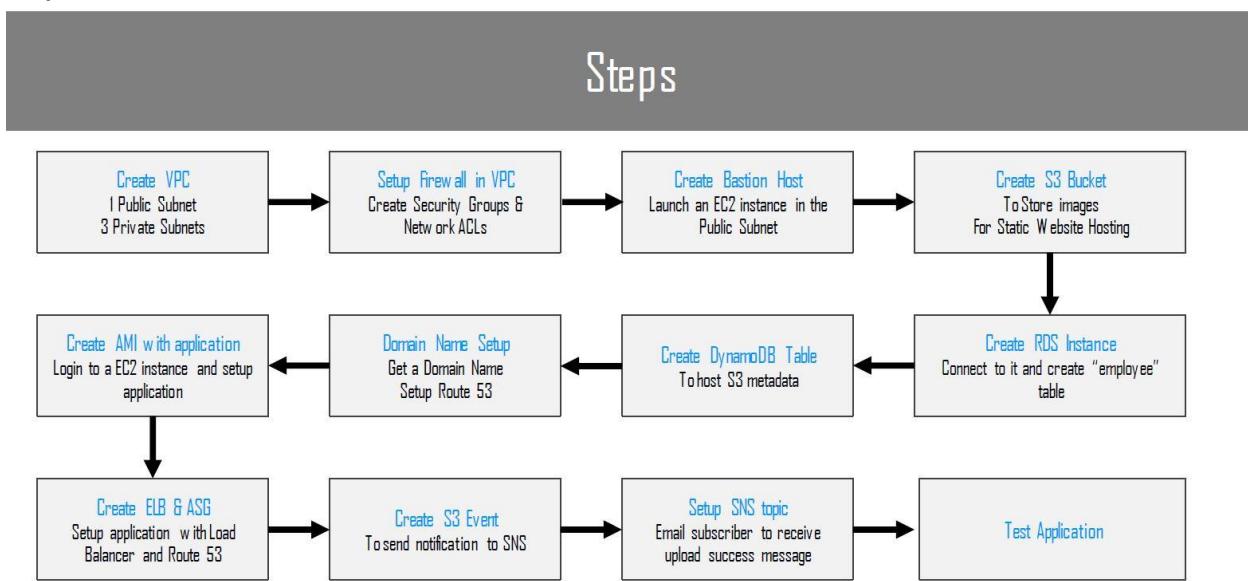
Application Architecture

**Application Logic:**

Application Logic



Steps



Step 1 & 2. Create VPC – Create 2 public subnets & 1 private subnet

VPC > Your VPCs > vpc-06c7b5a78163bff3c / project-VPC

Details		Info	
VPC ID	vpc-06c7b5a78163bff3c	State	Available
Tenancy	Default	DHCP options set	dopt-a0720ccb
Default VPC	No	IPv4 CIDR	20.20.0.0/16
Route 53 Resolver DNS Firewall rule groups	-	Owner ID	761070262355
		DNS hostnames	Disabled
		Main route table	rtb-04694f7ee4b6c00b1
		IPv6 pool	-
		DNS resolution	Enabled
		Main network ACL	acl-0e58bb8d3fbfbfc63b4
		IPv6 CIDR	-

CIDRs | Flow logs | Tags

IPv4 CIDRs

CIDR	Status
20.20.0.0/16	Associated

Create Subnets – Create 3 subnets (1 private & 2 public)

a. Create Public Subnet

VPC ID

Create subnets in this VPC.

▼**Associated VPC CIDRs**

IPv4 CIDRs

20.20.0.0/16

Subnet settings

Specify the CIDR blocks and Availability Zone for the subnet.

Subnet 1 of 1**Subnet name**

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

▼

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.

▼**IPv4 CIDR block Info**X▼ **Tags - optional**

Key

Value - optional

XX

Remove

You can add 49 more tags.

b. Click <Add new subnet> then create Public Subnet 2

Subnet 2 of 2

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

public-02-subnet

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

IPv4 CIDR block [Info](#)

20.20.2.0/24

▼ Tags - optional

Key	Value - optional	Remove
Q Name	Q public-02-subnet	X Remove

Add new tag

You can add 49 more tags.

Remove

Add new subnet

Cancel Create subnet

c. Create Private subnet

Subnet 3 of 3

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

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.

▼

IPv4 CIDR block [Info](#)

X

▼ Tags - optional

Key	Value - optional
<input style="width: 100%; border: 1px solid #ccc; padding: 2px; margin-bottom: 5px;" type="text" value="Name"/> X	<input style="width: 100%; border: 1px solid #ccc; padding: 2px; margin-bottom: 5px;" type="text" value="private-01-subnet"/> X
Add new tag Remove	

You can add 49 more tags.

Remove

Add new subnet

Cancel Create subnet

d. Create Internet Gateway and Attach to VPC via <Actions> button

The screenshot shows the 'Create internet gateway' configuration page. At the top, the breadcrumb navigation shows 'VPC > Internet gateways > Create internet gateway'. The main title is 'Create internet gateway' with an 'Info' link. A descriptive text explains that an internet gateway connects a VPC to the internet and asks to specify a name. Below this, the 'Internet gateway settings' section has a 'Name tag' field containing 'project-IGW'. The 'Tags - optional' section allows adding tags with a key of 'Name' and value of 'project-IGW'. An 'Add new tag' button is present, along with a note that 49 more tags can be added. At the bottom right are 'Cancel' and 'Create internet gateway' buttons.

Attached:

The screenshot shows the 'igw-06d8eec6fb32fd4ab / project-IGW' details page. The top bar indicates the gateway was successfully attached. The breadcrumb navigation shows 'VPC > Internet gateways > igw-06d8eec6fb32fd4ab'. The main content area includes a 'Details' tab and an 'Info' link. It displays the Internet gateway ID ('igw-06d8eec6fb32fd4ab'), State ('Attached'), VPC ID ('vpc-06c7b5a78163bff3c | project-VPC'), and Owner ('761070262355'). The 'Tags' section shows one tag: 'Name' with value 'project-IGW'. There are 'Manage tags' and navigation buttons for the tags list.

e. Create NAT Gateway

VPC > NAT gateways > Create NAT gateway

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.

The name can be up to 256 characters long.

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

Connectivity type
Select a connectivity type for the NAT gateway.

Public
 Private

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

Tags

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

VPC > NAT gateways > nat-0cd906bd243982190

nat-0cd906bd243982190 / project-NAT Delete

Details <small>Info</small>			
NAT gateway ID nat-0cd906bd243982190	Connectivity type Public	State Pending	State message <small>Info</small> -
Elastic IP address -	Private IP address -	Network interface ID -	VPC vpc-06c7b5a78163bfff3c / project-VPC
Subnet subnet-0e3b29cd1dbaaede7 / public-01-subnet	Created 2021/08/21 11:56 GMT-5	Deleted -	

Monitoring Tags

f. Configure Route Tables

Public

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.

public-route

VPC

The VPC to use for this route table.

vpc-06c7b5a78163bff3c (project-VPC)



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



Remove

Add new tag

You can add 49 more tags.

Cancel

Create route table

Edit public route table

VPC > Route tables > rtb-07a3cd9597bad40f6 > Edit routes

Edit routes

Destination	Target	Status	Propagated
20.20.0.0/16	Q local X	Active	No
Q 0.0.0.0/0	Q igw-06d8ec6fb32fd4ab X	-	No
<button>Add route</button>			

Cancel Preview Save changes

Associate subnets (public-01 and public-02) with Route Table by selecting <Subnet associations>

VPC > Route tables > rtb-07a3cd9597bad40f6 > Edit subnet associations

Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (2/3)						
<input type="text"/> Filter subnet associations						
Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID		
<input checked="" type="checkbox"/> public-02-subnet	subnet-0e0d1726f99fc8956	20.20.2.0/24	-	Main (rtb-04694f7ee4b6c00b1)	<	>
<input type="checkbox"/> private-01-subnet	subnet-02015e1c088372d76	20.20.3.0/24	-	Main (rtb-04694f7ee4b6c00b1)		
<input checked="" type="checkbox"/> public-01-subnet	subnet-0e3b29cd1dbaaede7	20.20.1.0/24	-	Main (rtb-04694f7ee4b6c00b1)		

Selected subnets

subnet-0e3b29cd1dbaaede7 / public-01-subnet X | subnet-0e0d1726f99fc8956 / public-02-subnet X

Cancel Save associations

Create Private Route Table

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.

private-route

VPC

The VPC to use for this route table.

vpc-06c7b5a78163bff3c (project-VPC)

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

Name

Value - optional

private-route

[Remove](#)

[Add new tag](#)

You can add 49 more tags.

[Cancel](#)

[Create route table](#)

Edit private route table

VPC > Route tables > rtb-0fe65664cba176441 > Edit routes

Edit routes

Destination	Target	Status	Propagated
20.20.0.0/16	Q local	Active	No
Q 0.0.0.0/0	Q nat-0cd906bd243982190	-	No

[Add route](#)

[Cancel](#) [Preview](#) [Save changes](#)

Associate subnets (private-01) with Route Table by selecting <Subnet associations>

The screenshot shows the 'Edit subnet associations' page for a specific route table. It lists available subnets and selected subnets. The selected subnet is 'private-01-subnet' (subnet-02015e1c088372d76). The 'Save associations' button is visible at the bottom right.

Available subnets (1/3)						
	Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID	
<input type="checkbox"/>	public-02-subnet	subnet-00d1726f99fc8956	20.20.2.0/24	-	rtb-07a3cd9597bad40f6 / public-route	
<input checked="" type="checkbox"/>	private-01-subnet	subnet-02015e1c088372d76	20.20.3.0/24	-	Main (rtb-04694f7ee4b6c00b1)	
<input type="checkbox"/>	public-01-subnet	subnet-0e3b29cd1dbaaede7	20.20.1.0/24	-	rtb-07a3cd9597bad40f6 / public-route	

Selected subnets	
subnet-02015e1c088372d76 / private-01-subnet	X

g. Create Security Group

The screenshot shows the 'Create security group' page. The security group is named 'project-SG' and is associated with the VPC 'vpc-06c7b5a78163bff3c'. The 'Inbound rules' section is shown, with a single rule allowing all traffic from anywhere to port 0.0.0.0/0.

Basic details						
Security group name <small>Info</small>						
<input type="text" value="project-SG"/>		Name cannot be edited after creation.				
Description <small>Info</small>						
<input type="text" value="project-SG"/>						
VPC <small>Info</small>						
<input type="text" value="vpc-06c7b5a78163bff3c"/>						
Inbound rules <small>Info</small>						
Type <small>Info</small>	Protocol <small>Info</small>	Port range <small>Info</small>	Source <small>Info</small>	Description - optional <small>Info</small>		
All traffic	All	All	Anywhere- <small>...</small>	<input type="text" value="0.0.0.0/0"/>	X	<input type="button" value="Delete"/>
<input type="button" value="Add rule"/>						

h. Check Network ACLs – no changes

The screenshot shows the 'Network ACLs (2)' page. There are two Network ACLs listed: 'acl-0e58b8d3fbfb63b4' (Associated with 3 Subnets) and 'acl-e9034082' (Associated with 2 Subnets). Both are marked as Default and have 2 Inbound and 2 Outbound rules each.

Network ACLs (2) <small>Info</small>							
<input type="button" value="Actions"/> <input type="button" value="Create network ACL"/>							
	Name	Network ACL ID	Associated with	Default	VPC ID	Inbound rules count	Outbound rules count
<input type="checkbox"/>	-	acl-0e58b8d3fbfb63b4	3 Subnets	Yes	vpc-06c7b5a78163bff3c / project-VPC	2 Inbound rules	2 Outbound rules
<input type="checkbox"/>	-	acl-e9034082	2 Subnets	Yes	vpc-6391f408	2 Inbound rules	2 Outbound rules

VPC is now completed, as well as the firewall (attaching NAT GWY to private subnet and public subnets to IGW and the private subnet is not attached to IGW)



Step 3. Create Bastion Host

Launch two EC2 instances (1) in the public subnet (Ubuntu) &(2) private subnet

a. EC2 Instance in the public subnet

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 3: Configure Instance Details
Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and i

Number of Instances	1	Launch into Auto Scaling Group
Purchasing option	<input type="checkbox"/> Request Spot Instances	
Network	vpc-06c7b5a78163bff3c project-VPC	<input type="button"/> Create new VPC
Subnet	subnet-0e3b29cd1dbaaed7 public-01-subnet us- 250 IP Addresses available	<input type="button"/> Create new subnet
Auto-assign Public IP	Enable	
Placement group	<input type="checkbox"/> Add instance to placement group	
Capacity Reservation	Open	
Domain join directory	No directory	<input type="button"/> Create new directory
IAM role	None	<input type="button"/> Create new IAM role
Shutdown behavior	Stop	
Stop - Hibernate behavior	<input type="checkbox"/> Enable hibernation as an additional stop behavior	
Enable termination protection	<input type="checkbox"/> Protect against accidental termination	
Monitoring	<input type="checkbox"/> Enable CloudWatch detailed monitoring Additional charges apply.	
Tenancy	Shared - Run a shared hardware instance	Additional charges will apply for dedicated tenancy.
Elastic Inference	<input type="checkbox"/> Add an Elastic Inference accelerator Additional charges apply.	

Add Tags: Name Bastion Host

Security Group – Select project-SG

Use existing key pair: project

b. EC2 Instance in the private subnet

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 3: Configure Instance Details

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

Number of instances	1	Launch into Auto Scaling Group
Purchasing option	<input type="checkbox"/> Request Spot Instances	
Network	vpc-06c7b5a78163df3c project-VPC	<input type="checkbox"/> Create new VPC
Subnet	subnet-02015e1c088372d76 private-01-subnet us	<input type="checkbox"/> Create new subnet 251 IP Addresses available
Auto-assign Public IP	Use subnet setting (Disable)	
Placement group	<input type="checkbox"/> Add instance to placement group	
Capacity Reservation	Open	
Domain join directory	No directory	<input type="checkbox"/> Creates new directory
IAM role	None <input type="checkbox"/> Create new IAM role	
Shutdown behavior	Stop	
Stop - Hibernate behavior	<input type="checkbox"/> Enable hibernation as an additional stop behavior	
Enable termination protection	<input type="checkbox"/> Protect against accidental termination	
Monitoring	<input type="checkbox"/> Enable CloudWatch detailed monitoring Additional charges apply.	
Tenancy	Shared - Run a shared hardware instance <input type="checkbox"/> Additional charges will apply for dedicated tenancy.	
Elastic Inference	<input type="checkbox"/> Add an Elastic Inference accelerator Additional charges apply.	

Cancel Previous **Review and Launch** Next

Add Tags: Name Application Server

Security Group – Select project-SG

Use existing key pair: project

See Instances Below:

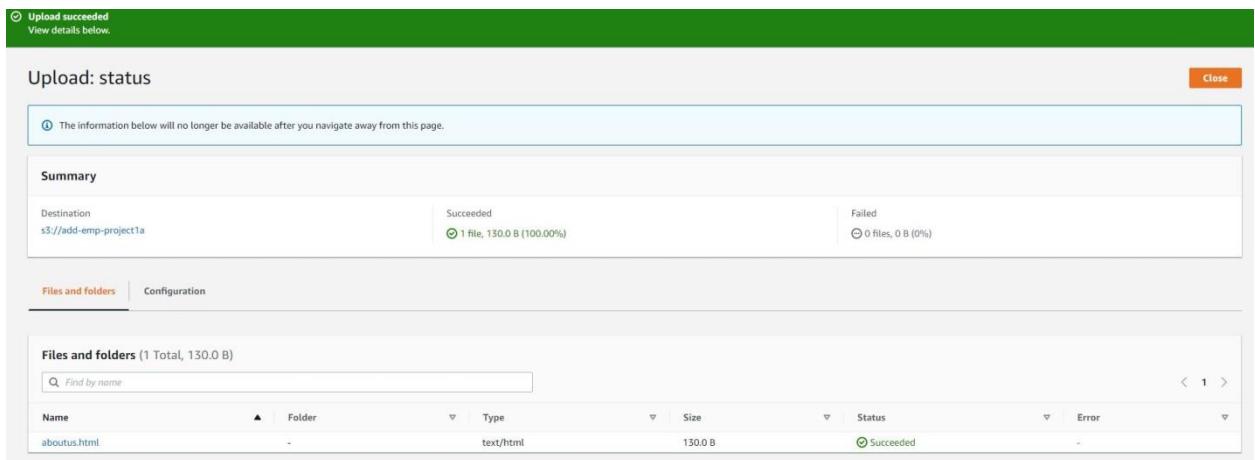
Instances (3) Info										
<input type="button" value="C"/> Connect <input type="button" value="Instance state ▾"/> Actions ▾ <input style="background-color: orange; color: white; border: none; padding: 2px 10px;" type="button" value="Launch instances"/> <input type="button" value="▼"/>										
<input type="button" value="Filter instances"/>										
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	
RDInst	i-0ee705a78ed0cf5e8	<input type="radio"/> Terminated	t2.micro	-	No alarms <input style="border: none;" type="button" value="+"/>	us-east-2c	-	-	-	
Bastion-Host	i-04fd8ad556f2e01d8	<input checked="" type="radio"/> Running	t2.micro	<input checked="" type="radio"/> 2/2 checks passed	No alarms <input style="border: none;" type="button" value="+"/>	us-east-2c	-	18.117.194.122	-	
Application Server	i-0d29e0b810d81c198	<input type="radio"/> Pending	t2.micro	-	No alarms <input style="border: none;" type="button" value="+"/>	us-east-2a	-	-	-	

Step 3 is completed



Step 4. Create S3 Bucket – To store images for Static Website Hosting

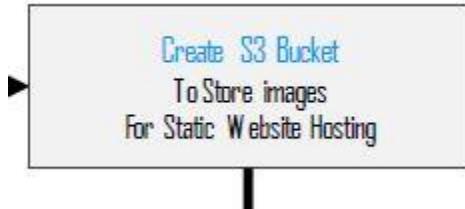
- a. **Create bucket named add-emp-project1a**
Block all public access
Enable Versioning
- b. **Upload aboutus.html file to above mentioned bucket (I had to modify file in sublime.txt)**



The screenshot shows the AWS S3 upload status page. At the top, a green header bar indicates "Upload succeeded" with a link to "View details below". Below this, the title "Upload: status" is displayed, along with a note that the information will no longer be available after navigating away. A "Close" button is in the top right corner.

The main area is divided into sections: "Summary", "Files and folders", and "Configuration". The "Summary" section shows the destination as "s3://add-emp-project1a" and lists one succeeded file ("aboutus.html") and zero failed files. The "Files and folders" section shows a single entry for "aboutus.html" with details: Name (aboutus.html), Folder (-), Type (text/html), Size (130.0 B), Status (Succeeded), and Error (-). Navigation arrows are visible at the bottom of the file list.

Step 4 is completed. We will configure Static Website Hosting later



Step 5. Create RDS Instance

a. Create RDS Instance

Choose a database creation method Info

Standard create
You set all of the configuration options, including ones for availability, security, backups, and maintenance.

Easy create
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options

Engine type Info

Amazon Aurora 

MySQL 

MariaDB 

PostgreSQL 

Oracle 

Microsoft SQL Server 

Edition

MySQL Community

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

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](#)

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.

database-for-project

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.

admin

1 to 16 alphanumeric characters. First character must be a letter.

Auto generate a password

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

Master password [Info](#)

Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), '(single quote), "(double quote) and @ (at sign).

Confirm password [Info](#)

DB instance class

DB instance class [Info](#)

- Standard classes (includes m classes)
- Memory optimized classes (includes r and x classes)
- Burstable classes (includes t classes)

db.t2.micro

1 vCPUs 1 GiB RAM Not EBS Optimized



Include previous generation classes

Storage

Storage type [Info](#)

General Purpose SSD (gp2)



Allocated storage

20

GiB

(Minimum: 20 GiB, Maximum: 16,384 GiB) Higher allocated storage **may improve** IOPS performance.

Storage autoscaling [Info](#)

Provides dynamic scaling support for your database's storage based on your application's needs.

Enable storage autoscaling

Enabling this feature will allow the storage to increase once the specified threshold is exceeded.

Availability & durability

Multi-AZ deployment [Info](#)

- Create a standby instance (recommended for production usage)
Creates a standby in a different Availability Zone (AZ) to provide data redundancy, eliminate I/O freezes, and minimize latency spikes during system backups.
- Do not create a standby instance

Connectivity



Virtual private cloud (VPC) [Info](#)

VPC that defines the virtual networking environment for this DB instance.

project-VPC (vpc-06c7b5a78163bff3c)



Only VPCs with a corresponding DB subnet group are listed.

- After a database is created, you can't change its VPC.

Subnet group [Info](#)

DB subnet group that defines which subnets and IP ranges the DB instance can use in the VPC you selected.

Create new DB Subnet Group



Public access [Info](#)

Yes

Amazon EC2 instances and devices outside the VPC can connect to your database. Choose one or more VPC security groups that specify which EC2 instances and devices inside the VPC can connect to the database.

No

RDS will not assign a public IP address to the database. Only Amazon EC2 instances and devices inside the VPC can connect to your database.

your database.

VPC security group

Choose a VPC security group to allow access to your database. Ensure that the security group rules allow the appropriate incoming traffic.

Choose existing

Choose existing VPC security groups

Create new

Create new VPC security group

Existing VPC security groups

Choose VPC security groups ▾

project-SG X

Availability Zone [Info](#)

us-east-2a ▾

► Additional configuration

Database authentication

Database authentication options [Info](#)

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.

▼ Additional configuration

Database options, backup disabled, backtrack disabled, Enhanced Monitoring disabled, maintenance, CloudWatch Logs, delete protection disabled

Database options

Initial database name [Info](#)

project

If you do not specify a database name, Amazon RDS does not create a database.

DB parameter group [Info](#)

default.mysql8.0



Option group [Info](#)

default:mysql-8-0



Backup

Enable automated backups

Creates a point-in-time snapshot of your database

Monitoring

Enable Enhanced monitoring

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

Log exports

Select the log types to publish to Amazon CloudWatch Logs

Audit log

Error log

General log

Slow query log

IAM role

The following service-linked role is used for publishing logs to CloudWatch Logs.

RDS service-linked role

-  Ensure that general, slow query, and audit logs are turned on. Error logs are enabled by default. [Learn more](#)

Maintenance

Auto minor version upgrade [Info](#)

Enable auto minor version upgrade

Enabling auto minor version upgrade will automatically upgrade to new minor versions as they are released. The automatic upgrades occur during the maintenance window for the database.

Maintenance window [Info](#)

Select the period you want pending modifications or maintenance applied to the database by Amazon RDS.

Select window

No preference

Deletion protection

Enable deletion protection

Protects the database from being deleted accidentally. While this option is enabled, you can't delete the database.

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 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.](#) 

Step 5 is completed.



[Create RDS Instance](#)

Connect to it and create "employee" table

Step 6. Create DynamoDB Table – To host S3 metadata

a. Create DynamoDB Table

Table name & Primary key must be the same name as in the python code:

```
try:  
    dynamodb_client = boto3.client('dynamodb', region_name='us-east-2')  
    dynamodb_client.put_item(  
        TableName='employee_image_table',  
        Item={  
            'empid': {  
                'N': emp_id  
            },  
            'image_url': {  
                'S': object_url  
            }  
        }  
    )  
  
except Exception as e:
```

Create DynamoDB table

DynamoDB is a schema-less database that only requires a table name and primary key. The table's primary key is made up of one or two attributes that uniquely identify items, partition the data, and sort data within each partition.

Table name* ⓘ

Primary key* Partition key
 Number ⓘ
 Add sort key

Table settings

Default settings provide the fastest way to get started with your table. You can modify these default settings now or after your table has been created.

Use default settings

- No secondary indexes.
- Provisioned capacity set to 5 reads and 5 writes.
- Basic alarms with 80% upper threshold using SNS topic "dynamodb".
- Encryption at Rest with DEFAULT encryption type.

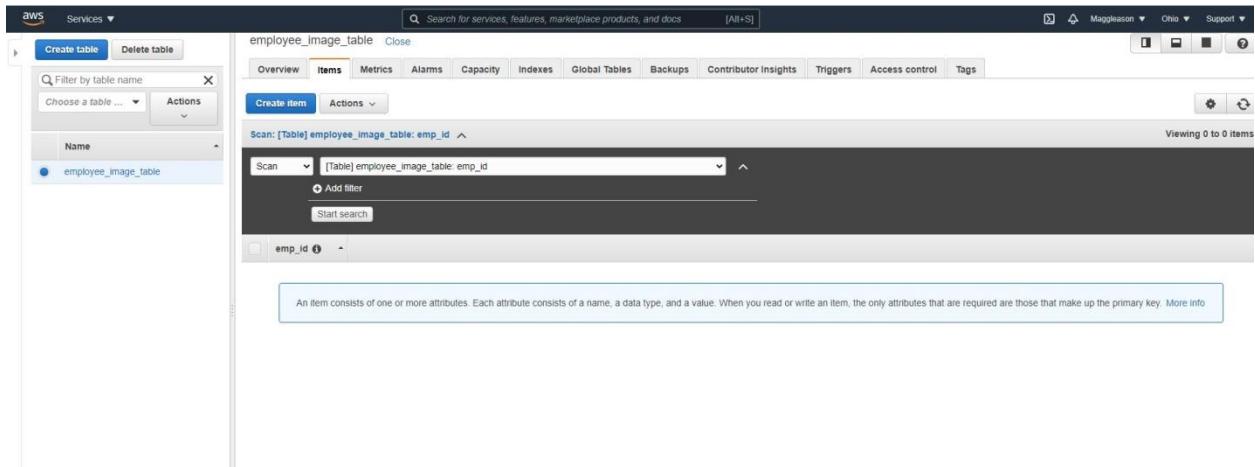
ⓘ You do not have the required role to enable Auto Scaling by default.
Please refer to documentation.

+ Add tags NEW!

Additional charges may apply if you exceed the AWS Free Tier levels for CloudWatch or Simple Notification Service. Advanced alarm settings are available in the CloudWatch management console.

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

We will come back to add data to table.



Step 7. Create Domain Name Setup – Get Domain Name Setup Route 53

a. Create a hosted zone which I obtained domain name from freenom. Com

A screenshot of the AWS Route 53 Hosted Zones page. The URL in the address bar is 'Route 53 > Hosted zones > helpnow.ml'. The main header shows 'helpnow.ml' with 'Info' and three buttons: 'Delete zone', 'Test record', and 'Configure query logging'. Below this, there's a 'Hosted zone details' section with a 'Edit hosted zone' button. Underneath, there are tabs for 'Records (2)', 'DNSSEC signing', and 'Hosted zone tags (0)'. The 'Records (2)' tab is selected. It shows a table with two entries. The first entry is for 'helpnow.ml' with Type 'NS' and Value 'ns-1114.awsdns-11.org.', 'ns-1752.awsdns-27.co.uk.', 'ns-18.awsdns-02.com.', and 'ns-667.awsdns-19.net.'. The second entry is for 'helpnow.ml' with Type 'SOA' and Value 'ns-1114.awsdns-11.org. awsdns-hostmaster.amazon.com. 1 7200 900 1209600 86400'. There are also buttons for 'Delete record', 'Import zone file', and 'Create record'.

b. Add NameServers to Freenom

The screenshot shows a web interface for managing domain DNS settings. At the top, it says "Managing helpnow.ml". Below the header, there are tabs for "Information", "Upgrade", "Management Tools", and "Manage Freenom DNS". A success message "Changes Saved Successfully!" is displayed in a blue bar. The main section is titled "Nameservers" and contains instructions: "You can change where your domain points to here. Please be aware changes can take up to 24 hours to propagate." There are two radio button options: "Use default nameservers (Freenom Nameservers)" (unchecked) and "Use custom nameservers (enter below)" (checked). Below these options, five name servers are listed with their corresponding IP addresses:

- Nameserver 1: NS-1114.AWSDNS-11.ORG
- Nameserver 2: NS-1752.AWSDNS-27.CO.UK
- Nameserver 3: NS-18.AWSDNS-02.COM
- Nameserver 4: NS-667.AWSDNS-19.NET
- Nameserver 5: (empty)

A blue "Change Nameservers" button is located at the bottom of the list.

Step 7 is completed.



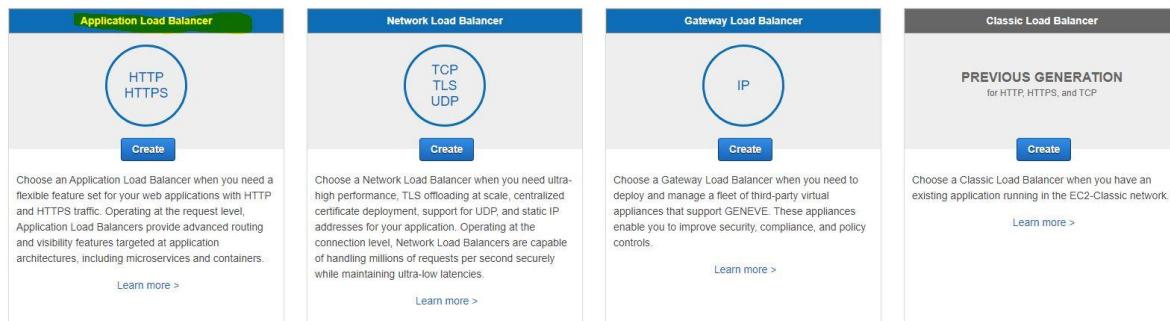
Step 8. Create AMI with Application – we will come back to

Step 9. Create ELB & ASG – Setup application with Load Balancer and Route 53

- To create 'A' record in Route 53 I need an endpoint, so I will need to create an Application ELB under EC2**

Select load balancer type

Elastic Load Balancing supports four types of load balancers: Application Load Balancers, Network Load Balancers, Gateway Load Balancers, and Classic Load Balancers. Choose the load balancer type that meets your needs. Learn more about which load balancer is right for you.



b. Configure Application Load Balancer – Step 1 – check ONLY Availability Zones with public subnets

1. Configure Load Balancer 2. Configure Security Settings 3. Configure Security Groups 4. Configure Routing 5. Register Targets 6. Review

Step 1: Configure Load Balancer

To configure your load balancer, provide a name, select a scheme, specify one or more listeners, and select a network. The default configuration is an internet-facing load balancer in the selected network with a listener that receives HTTP traffic on port 80.

Name: project-ALB
Scheme: Internet-facing
IP address type: IPv4

Listeners

A listener is a process that checks for connection requests, using the protocol and port that you configured.

Load Balancer Protocol	Load Balancer Port
HTTP	80

Add listener

Availability Zones

Specify the Availability Zones to enable for your load balancer. The load balancer routes traffic to the targets in these Availability Zones only. You can specify only one subnet per Availability Zone. You must specify subnets from at least two Availability Zones to increase the availability of your load balancer.

VPC	Availability Zones	Load Balancer Port
vpc-06c7b5a78163bft3c (20.20.0.0/16) project-VPC	<input checked="" type="checkbox"/> us-east-2a subnet-02015e1c088372d76 (private-01-subnet)	
	<input checked="" type="checkbox"/> us-east-2b subnet-0e0d1726199fc8956 (public-02-subnet)	
	IPv4 address	Assigned by AWS
	<input checked="" type="checkbox"/> us-east-2c subnet-0e3b29cd1dbaaede7 (public-01-subnet)	

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

Step 2. Next

Step 3.

The screenshot shows the AWS Lambda console with the title "Step 3. Configure Security Groups". Below the title, it says "A security group is a set of firewall rules that control the traffic to your load balancer. On this page, you can add rules to allow specific traffic to reach your load balancer. First, decide whether to create a new security group or select an existing one." There are two options: "Create a new security group" (radio button) and "Select an existing security group" (radio button, which is selected). A table lists existing security groups:

Security Group ID	Name	Description	Actions
sg-0a2ae6538b9a59629	default	default VPC security group	Copy to new
sg-04548c96142048b2c	project-SG	project-SG	Copy to new

Step 4.

The screenshot shows the AWS Lambda console with the title "Step 4: Configure Routing". Below the title, it says "Your load balancer routes requests to the targets in this target group using the protocol and port that you specify here. It also performs health checks on the targets using these settings. The target group you specify in this step will apply to all of the listeners configured on this load balancer. You can edit or add listeners after the load balancer is created." The "Target group" section shows the following configuration:

- Target group: TARGET-project
- Name: TARGET-project
- Target type: Instance (selected)
- Protocol: HTTP (selected)
- Port: 80
- Protocol version:
 - HTTP1 (selected): Send requests to targets using HTTP/1.1. Supported when the request protocol is HTTP/1.1 or HTTP/2.
 - HTTP2: Send requests to targets using HTTP/2. Supported when the request protocol is HTTP/2 or gRPC, but gRPC-specific features are not available.
 - gRPC: Send requests to targets using gRPC. Supported when the request protocol is gRPC.

The "Health checks" section shows:

- Protocol: HTTP (selected)
- Path: /

At the bottom right, there are buttons for "Cancel", "Previous", and "Next: Register Targets".

Step 5.

The screenshot shows the AWS Lambda console with the title "Step 5: Register Targets". Below the title, it says "Register targets with your target group. If you register a target in an enabled Availability Zone, the load balancer starts routing requests to the targets as soon as the registration process completes and the target passes the initial health checks." The "Registered targets" section shows:

To deregister instances, select one or more registered instances and then click Remove.

Remove	Instance	Name	Port	State	Security groups	Zone
No instances available.						

The "Instances" section shows:

To register additional instances, select one or more running instances, specify a port, and then click Add. The default port is the port specified for the target group. If the instance is already registered on the specified port, you must specify a different port.

Add to registered	on port					
Search Instances	X					
Instance	Name	State	Security groups	Zone	Subnet ID	Subnet CIDR
i-0d29e0b810d81c198	Application Server	running	project-SG	us-east-2a	subnet-02015e1c088372d76	20.20.3.0/24
i-04f8ad5562e01d8	Bastion-Host	running	project-SG	us-east-2c	subnet-0e3b29cd1dbaaede7	20.20.1.0/24

At the bottom right, there are buttons for "Cancel", "Previous", and "Next: Review".

Click <Add to Registered> Button!!!

1. Configure Load Balancer 2. Configure Security Settings 3. Configure Security Groups 4. Configure Routing 5. Register Targets 6. Review

Step 5: Register Targets
Register targets with your target group. If you register a target in an enabled Availability Zone, the load balancer starts routing requests to the targets as soon as the registration process completes and the target passes the initial health checks.

Registered targets
To deregister instances, select one or more registered instances and then click Remove.

Remove	Instance	Name	Port	State	Security groups	Zone
	i-0d29e0b810d81c198	Application Server	80	running	project-SG	us-east-2a

Instances
To register additional instances, select one or more running instances, specify a port, and then click Add. The default port is the port specified for the target group. If the instance is already registered on the specified port, you must specify a different port.

Add to registered	on port	80				
Search Instances	x					
Instance	Name	State	Security groups	Zone	Subnet ID	Subnet CIDR
i-0d29e0b810d81c198	Application Server	running	project-SG	us-east-2a	subnet-02015e1c088372d76	20.20.3.0/24
i-04fd8ad55662e01d8	Bastion-Host	running	project-SG	us-east-2c	subnet-0e3b29cd1dbaaede7	20.20.1.0/24

Step 6 & 7. Review & Create

Create Load Balancer Actions ▾

Filter by tags and attributes or search by keyword

Name	DNS name	State	VPC ID	Availability Zones	Type	Created At	Monitoring
project-ALB	project-ALB-1391853468.us-east-2.elb.amazonaws.com	Provisioning	vpc-0fc7b5a78163bf3c	us-east-2b, us-east-2c	application	August 21, 2021 at 2:38:02 ...	

Basic Configuration

Name	project-ALB
ARN	arn:aws:elasticloadbalancing:us-east-2:761070262355:loadbalancer/app/project-ALB/c1b3b4fc71174985
DNS name	project-ALB-1391853468.us-east-2.elb.amazonaws.com (A Record)

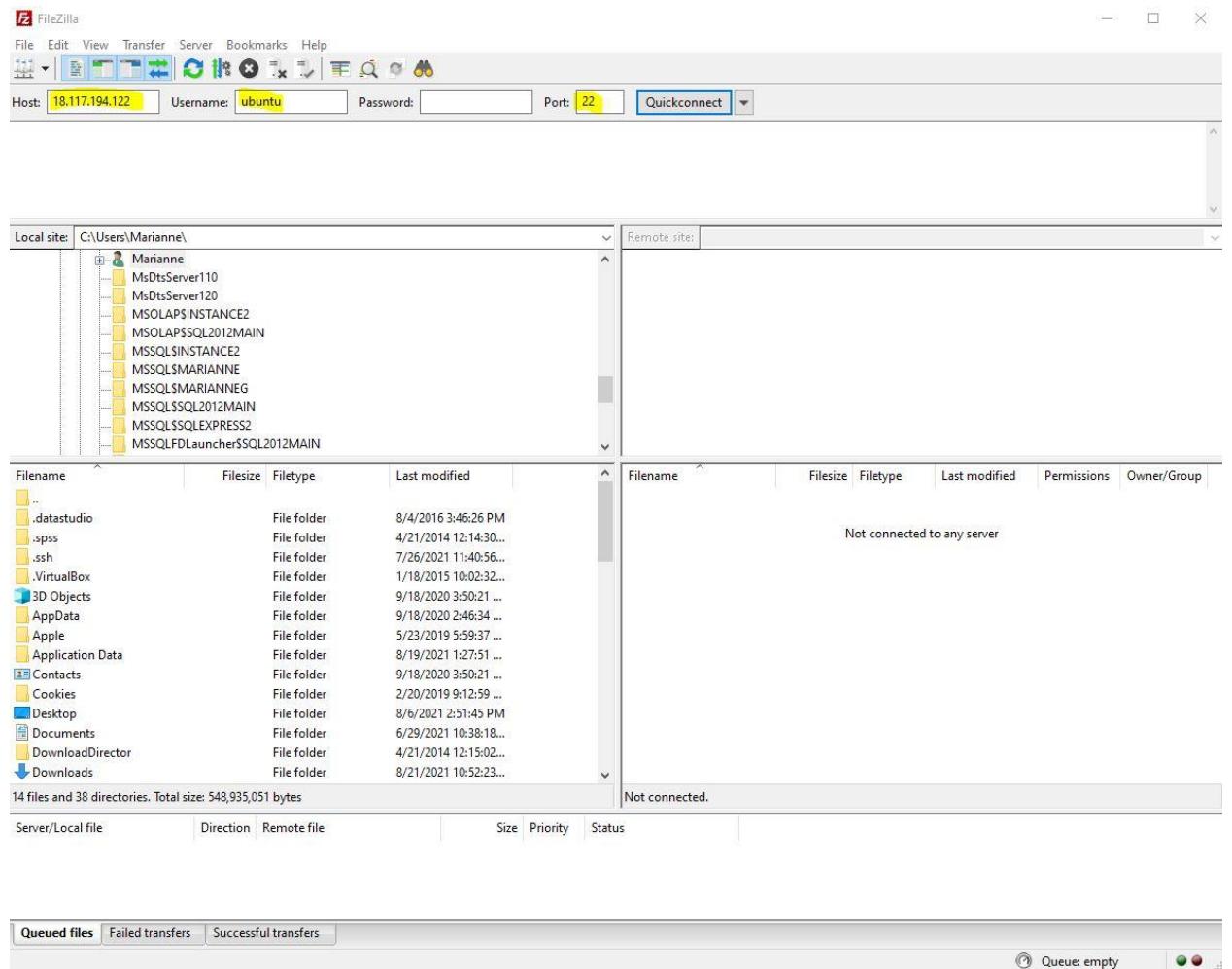
Step 8. Configure Instances – Application Server

a. Login to Bastion Host using Public IP address

Update instance, then all the work needs to be done inside the Application Server

So we are currently logged in inside the Bastion Host and we need to login inside the Application Server; therefore, I need the key file

To do this open FileZilla => Copy Public IP address of Bastion Host Instance then go to Edit => Settings => SFTP => Add key file =>



Drag and drop project.pem to Remote Site: /home/Ubuntu folder

The screenshot shows the FileZilla interface with two panes. The left pane (Local site) shows the contents of 'C:\Users\Marieanne\Downloads'. The right pane (Remote site) shows the contents of '/home/ubuntu' on an Ubuntu server. A file named 'project.pem' is selected in the local pane and is being transferred to the remote site.

Local site: C:\Users\Marieanne\Downloads

- Connected to 18.117.194.122
- Starting upload of C:\Users\Marieanne\Downloads\project.pem
- File transfer successful, transferred 1,700 bytes in 1 second
- Retrieving directory listing of "/home/ubuntu"...
- Listing directory /home/ubuntu
- Directory listing of "/home/ubuntu" successful

Remote site: /home/ubuntu

Filename	Filesize	Filetype	Last modified	Permissions	Owner/Group
..		File folder	8/21/2021 2:43...	drwx-----	ubuntu ubu...
.cache		File folder	8/21/2021 12:5...	drwx-----	ubuntu ubu...
.ssh		File folder	8/21/2021 12:5...	drwx-----	ubuntu ubu...
.bash_logout	220	BASH_LOG...	2/25/2020 6:03...	-rw-r--r--	ubuntu ubu...
.bashrc	3,771	BASHRC File	2/25/2020 6:03...	-rw-r--r--	ubuntu ubu...
.profile	807	PROFILE File	2/25/2020 6:03...	-rw-r--r--	ubuntu ubu...
sudo_as_admin_succ...	0	SUDO_AS...	8/21/2021 2:44...	-rw-r--r--	ubuntu ubu...
project.pem	1,700	PEM File	8/21/2021 2:59...	-rw-rw-r--	ubuntu ubu...

Selected 1 file. Total size: 1,700 bytes

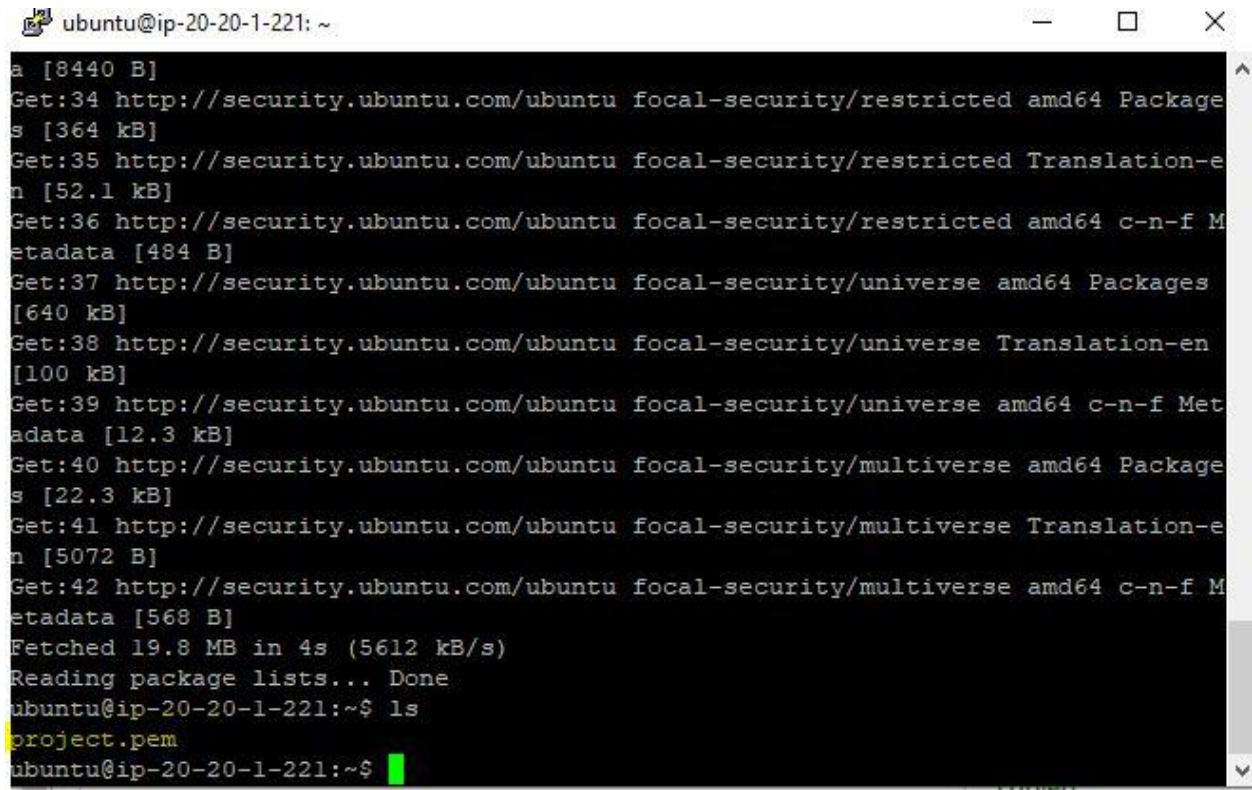
5 files and 2 directories. Total size: 6,498 bytes

Server/Local file Direction Remote file Size Priority Status

Queued files Failed transfers Successful transfers (1)

Queue: empty

Check in Ubuntu to see if you have the key:



```
ubuntu@ip-20-20-1-221: ~
a [8440 B]
Get:34 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [364 kB]
Get:35 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [52.1 kB]
Get:36 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 c-n-f Metadata [484 B]
Get:37 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [640 kB]
Get:38 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [100 kB]
Get:39 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [12.3 kB]
Get:40 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [22.3 kB]
Get:41 http://security.ubuntu.com/ubuntu focal-security/multiverse Translation-en [5072 B]
Get:42 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f Metadata [568 B]
Fetched 19.8 MB in 4s (5612 kB/s)
Reading package lists... Done
ubuntu@ip-20-20-1-221:~$ ls
project.pem
ubuntu@ip-20-20-1-221:~$
```

DO NOT FORGET THIS STEP: chmod 400 project.pem

Before logging into Application instance

Now login inside my Application Server – copy private IP address of Application Server instance. Now I am inside my Application Server

```

ubuntu@ip-20-20-3-212:~$ 
Get:40 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Package
s [22.3 kB]
Get:41 http://security.ubuntu.com/ubuntu focal-security/multiverse Translation-e
n [5072 B]
Get:42 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f M
etadata [568 B]
Fetched 19.8 MB in 4s (5612 kB/s)
Reading package lists... Done
ubuntu@ip-20-20-1-221:~$ ls
project.pem
ubuntu@ip-20-20-1-221:~$ chmod 400 project.pem
ubuntu@ip-20-20-1-221:~$ ssh -i
option requires an argument -- i
usage: ssh [-i6AaCfGgKkMNNqstTtVvXxYy] [-B bind_interface]
           [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]
           [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]
           [-i identity_file] [-J [user@]host[:port]] [-L address]
           [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]
           [-Q query_option] [-R address] [-S ctl_path] [-W host:port]
           [-w local_tun[:remote_tun]] destination [command]
ubuntu@ip-20-20-1-221:~$ ssh -i project.pem ubuntu@20.20.3.212
The authenticity of host '20.20.3.212 (20.20.3.212)' can't be established.
ECDSA key fingerprint is SHA256:JVer72WuXuUE/6YYyBsw6opK14xAUCmcBCW1Y04W6/A.
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added '20.20.3.212' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 20.04.2 LTS (GNU/Linux 5.4.0-1045-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Sat Aug 21 20:12:56 UTC 2021

System load: 0.0          Processes:          100
Usage of /:   16.4% of 7.69GB  Users logged in:      0
Memory usage: 22%          IPv4 address for eth0: 20.20.3.212
Swap usage:   0%

* Super-optimized for small spaces - read how we shrank the memory
  footprint of MicroK8s to make it the smallest full K8s around.

https://ubuntu.com/blog/microk8s-memory-optimisation

1 update can be applied immediately.
To see these additional updates run: apt list --upgradable

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-20-20-3-212:~$ 

```

**Then update the Application Server then install the client
Sudo apt-get install mysql-client**

Now login to RDS using the below command. First, go to your database and copy your endpoint:

database-for-project.cyt8yhecunyb.us-east-2.rds.amazonaws.com

Ubuntu Command:

```
mysql -h database-for-project.cyt8yhecunyb.us-east-2.rds.amazonaws.com -u admin -p
```

```
Get:34 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [364 kB]
Get:35 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [52.1 kB]
Get:36 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 c-n-f Metadata [484 B]
Get:37 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [640 kB]
Get:38 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [100 kB]
Get:39 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [12.3 kB]
Get:40 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [22.3 kB]
Get:41 http://security.ubuntu.com/ubuntu focal-security/multiverse Translation-en [5072 B]
Get:42 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f Metadata [568 B]
Fetched 19.8 MB in 3s (5819 kB/s)
Reading package lists... Done
ubuntu@ip-20-20-3-212:~$ sudo apt-get install mysql-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  mysql-client-8.0 mysql-client-core-8.0 mysql-common
The following NEW packages will be installed:
  mysql-client mysql-client-8.0 mysql-client-core-8.0 mysql-common
0 upgraded, 4 newly installed, 0 to remove and 103 not upgraded.
Need to get 4261 kB of archives.
After this operation, 65.1 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 focal-updates/main amd64 mysql-client-core-8.0 amd64 8.0.26-0ubuntu0.20.04.2 [4222 kB]
Get:2 http://us-east-2.ec2.archive.ubuntu.com/ubuntu focal/main amd64 mysql-common all 5.8+1.0.5ubuntu2 [7496 B]
Get:3 http://us-east-2.ec2.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-client-8.0 amd64 8.0.26-0ubuntu0.20.04.2 [22.0 kB]
Get:4 http://us-east-2.ec2.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-client all 8.0.26-0ubuntu0.20.04.2 [9416 B]
Fetched 4261 kB in 0s (36.0 MB/s)
Selecting previously unselected package mysql-client-core-8.0.
(Reading database ... 60149 files and directories currently installed.)
Preparing to unpack .../mysql-client-core-8.0_8.0.26-0ubuntu0.20.04.2_amd64.deb ...
Unpacking mysql-client-core-8.0 (8.0.26-0ubuntu0.20.04.2) ...
Selecting previously unselected package mysql-common.
Preparing to unpack .../mysql-common_5.8+1.0.5ubuntu2_all.deb ...
Unpacking mysql-common (5.8+1.0.5ubuntu2) ...
Selecting previously unselected package mysql-client-8.0.
Preparing to unpack .../mysql-client-8.0_8.0.26-0ubuntu0.20.04.2_amd64.deb ...
Unpacking mysql-client-8.0 (8.0.26-0ubuntu0.20.04.2) ...
Selecting previously unselected package mysql-client.
Preparing to unpack .../mysql-client_8.0.26-0ubuntu0.20.04.2_all.deb ...
Unpacking mysql-client (8.0.26-0ubuntu0.20.04.2) ...
Setting up mysql-common (5.8+1.0.5ubuntu2) ...
update-alternatives: using /etc/mysql/my.cnf.fallback to provide /etc/mysql/my.cnf (my.cnf) in auto mode
Setting up mysql-client-core-8.0 (8.0.26-0ubuntu0.20.04.2) ...
Setting up mysql-client-8.0 (8.0.26-0ubuntu0.20.04.2) ...
Processing triggers for man-db (2.9.1-1) ...
ubuntu@ip-20-20-3-212:~$ mysql -h database-for-project.cyt8yhecunyb.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 31
Server version: 8.0.23 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:

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

```
mysql> use project;
Database changed
mysql> show tables;
Empty set (0.00 sec)
```

Now Create an Employee table using sql command:

```
mysql> CREATE TABLE employee (emp_id VARCHAR(20), first_name VARCHAR(20), last_name VARCHAR(20), primary_skills VARCHAR(20), location VARCHAR(20));
Query OK, 0 rows affected (0.01 sec)

mysql> describe employee;
+-----+-----+-----+-----+-----+
| Field    | Type   | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| emp_id   | varchar(20) | YES |   | NULL    |       |
| first_name | varchar(20) | YES |   | NULL    |       |
| last_name  | varchar(20) | YES |   | NULL    |       |
| primary_skills | varchar(20) | YES |   | NULL    |       |
| location   | varchar(20) | YES |   | NULL    |       |
+-----+-----+-----+-----+-----+
5 rows in set (0.01 sec)
```

Exit mysql by typing

```
mysql> exit
```

This takes me back to the Application Server Instance prompt.

Now we need to install the GitHub on the instance by using the below command:

Sudo apt-get install git

```
ubuntu@ip-20-20-3-212:~$ mysql> describe employee;
+-----+-----+-----+-----+-----+
| Field      | Type       | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| emp_id     | varchar(20) | YES  |     | NULL    |       |
| first_name | varchar(20) | YES  |     | NULL    |       |
| last_name  | varchar(20) | YES  |     | NULL    |       |
| primary_skills | varchar(20) | YES  |     | NULL    |       |
| location   | varchar(20) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+
5 rows in set (0.01 sec)

mysql> exit
Bye
ubuntu@ip-20-20-3-212:~$ ls
ubuntu@ip-20-20-3-212:~$ sudo apt-get install git
Reading package lists... Done
Building dependency tree
Reading state information... Done
git is already the newest version (1:2.25.1-1lubuntu3.1).
git set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 103 not upgraded.
ubuntu@ip-20-20-3-212:~$
```

Now we need to install the application (website code in GitHub repository)

```
mysql> exit
Bye
ubuntu@ip-20-20-3-212:~$ ls
ubuntu@ip-20-20-3-212:~$ sudo apt-get install git
Reading package lists... Done
Building dependency tree
Reading state information... Done
git is already the newest version (1:2.25.1-1lubuntu3.1).
git set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 103 not upgraded.
ubuntu@ip-20-20-3-212:~$ git clone https://github.com/sauravinside/aws-code-main.git
Cloning into 'aws-code-main'...
remote: Enumerating objects: 33, done.
remote: Counting objects: 100% (33/33), done.
remote: Compressing objects: 100% (29/29), done.
remote: Total 33 (delta 8), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (33/33), 9.77 KiB | 1000.00 KiB/s, done.
ubuntu@ip-20-20-3-212:~$ ls
aws-code-main
ubuntu@ip-20-20-3-212:~$
```

Files in GitHub Repository:

```
ubuntu@ip-20-20-3-212:~$ cd aws-code-main/
ubuntu@ip-20-20-3-212:~/aws-code-main$ ls
EmpApp.py  README.md  __pycache__  config.py  templates
ubuntu@ip-20-20-3-212:~/aws-code-main$ sudo su
root@ip-20-20-3-212:/home/ubuntu/aws-code-main#
```

Now we need to change config.py file, using the command:

Nano config.py

Original File Contents:

```
root@ip-20-20-3-212: /home/ubuntu/aws-code-main
GNU nano 4.8
customhost = "database-1.coghw13fhego.us-east-2.rds.amazonaws.com"
customuser = "root"
custompass = "root1234"
customdb = "employee2"
custombucket = "adtemp-1"
customregion = "us-east-2"
```

Needs to change to:

Where **customhost** is endpoint for RDS; **customuser** is username for RDS; **custompass** is password for RDS; **customdb** is database name for RDS; **custombucket** is S3 bucket name; and **customregion** is Ohio region (us-east-2), then save and exit

```
root@ip-20-20-3-212: /home/ubuntu/aws-code-main
GNU nano 4.8
customhost = "database-for-project.cyt8yhecunyb.us-east-2.rds.amazonaws.com"
customuser = "admin"
custompass = "admin123"
customdb = "project"
custombucket = "add-emp-project1"
customregion = "us-east-2"
```

Now open application main code using command:

nano Empapp.py

Need to find DynamoDB section:

```
try:  
    dynamodb_client = boto3.client('dynamodb', region_name='us-east-2')  
    dynamodb_client.put_item(  
        TableName='employee_image_table',  
        Item={  
            'empid': {  
                'N': emp_id  
            },  
            'image_url': {  
                'S': object_url  
            }  
        }  
    )
```

No changes needed.

Now I need to install python using the command:

```
sudo apt-get install python3 -y
```

Now I need to install python and related frameworks in which the code is dependent on, using the commands:

```
sudo apt-get install python3-flask  
sudo apt-get install python3-pymysql  
sudo apt-get install python3-boto3
```

All completed successfully.

Step 10. Create IAM Role

a. Create Role

Create role

1 2 3 4

Select type of trusted entity



Allows AWS services to perform actions on your behalf. [Learn more](#)

Choose a use case

Common use cases

EC2

Allows EC2 instances to call AWS services on your behalf.

Lambda

Allows Lambda functions to call AWS services on your behalf.

Or select a service to view its use cases

API Gateway	CodeBuild	EMR Containers	IoT SiteWise	RDS
AWS Backup	CodeDeploy	ElastiCache	IoT Things Graph	Redshift
AWS Chatbot	CodeGuru	Elastic Beanstalk	KMS	Rekognition
AWS Marketplace	CodeStar Notifications	Elastic Container Registry	Kinesis	RoboMaker
AWS Support	Comprehend	Elastic Container Service	Lake Formation	S3
Amplify	Config	Elastic Transcoder	Lambda	SMS
AppStream 2.0	Connect	ElasticLoadBalancing	Lex	SNS
AppSync	DMS	EventBridge	License Manager	SWF
Application Auto Scaling	Data Lifecycle Manager	Forecast	MQ	SageMaker
Application Discovery	Data Pipeline	GameLift	Machine Learning	Security Hub

* Required

Cancel

Next: Permissions

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b. Choose Services / Policies:

DynamoDBFullAccess
RDSFullAccess
S3FullAccess

c. Create IAM Role

Create role

1 2 3 4

Add tags (optional)

IAM tags are key-value pairs you can add to your role. Tags can include user information, such as an email address, or can be descriptive, such as a job title. You can use the tags to organize, track, or control access for this role. [Learn more](#)

Key	Value (optional)	Remove
Role Name	project-ROLE	x
Add new key		

You can add 49 more tags.

d. Create IAM Role

Create role

1 2 3 4

Review

Provide the required information below and review this role before you create it.

Role name* project-ROLE-new

Use alphanumeric and '+-, @-' characters. Maximum 64 characters.

Role description Allows EC2 Instances to call AWS services on your behalf.

Maximum 1000 characters. Use alphanumeric and '+-, @-' characters.

Trusted entities AWS service: ec2.amazonaws.com

- Policies**
- AmazonS3FullAccess [?](#)
 - AmazonDynamoDBFullAccess [?](#)
 - AmazonRDSFullAccess [?](#)

Permissions boundary Permissions boundary is not set

The new role will receive the following tag

Key	Value
Role Name	project-ROLE

* Required

[Cancel](#) [Previous](#) [Create role](#)

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[Privacy Policy](#)

e. IAM Role Completed

The screenshot shows the AWS IAM Roles page. A green header bar at the top indicates that the role 'project-ROLE-new' has been created. Below the header, the page title is 'IAM > Roles'. The main content area displays a table of roles. A search bar at the top left shows the query 'project'. The table has columns for 'Role name', 'Trusted entities', and 'Last activity'. One row is highlighted, showing 'project-ROLE-new' with 'AWS Service: ec2' under Trusted entities.

Now I need to add the role, so I need to go to my instances and select my Application Server, then go to <Actions> then scroll down to Security and choose Modify IAM role

The screenshot shows the 'Modify IAM role' dialog box. The URL in the browser is 'EC2 > Instances > i-0d29e0b810d81c198 > Modify IAM role'. The dialog has a section titled 'Modify IAM role' with an 'Info' link. It says 'Attach an IAM role to your instance.' Below this is an 'Instance ID' field containing 'i-0d29e0b810d81c198 (Application Server)'. Under 'IAM role', it says 'Select an IAM role to attach to your instance or create a new role if you haven't created any. The role you select replaces any roles that are currently attached to your instance.' A dropdown menu shows 'project-ROLE-new' selected. To the right of the dropdown is a 'Create new IAM role' button with a plus sign icon. At the bottom right are 'Cancel' and 'Save' buttons.

Then Save.

RESULTS:

Now we will test our application:

- **So I need to run my main application code (EmpApp.py) using the command**
sudo python3 EmpApp.py
- **The application is running successfully**
- **Open a duplicate session of PuTTy and ssh into application server again**

```

root@ip-20-20-3-212:/home/ubuntu/aws-code-main
update-alternatives: using /usr/share/docutils/scripts/python3/rst2man to provide
update-alternatives: using /usr/share/docutils/scripts/python3/rst2odt to provide
update-alternatives: using /usr/share/docutils/scripts/python3/rst2odt_prestyle
update-alternatives: using /usr/share/docutils/scripts/python3/rst2pseudoxml to
update-alternatives: using /usr/share/docutils/scripts/python3/rst2s5 to provide
update-alternatives: using /usr/share/docutils/scripts/python3/rst2tex to prov
update-alternatives: using /usr/share/docutils/scripts/python3/rst2xml to provide
update-alternatives: using /usr/share/docutils/scripts/python3/rst2xml2 to provide
Setting up python3-boto3core (1.16.19+repack-lubuntu0.20.04.1) ...
Setting up python3-s3transfer (1.9.253-1) ...
root@ip-20-20-3-212:/home/ubuntu/aws-code-main# ls
EmpApp.py README.md __pycache__ config.py templates
root@ip-20-20-3-212:/home/ubuntu/aws-code-main# sudo python3 EmpApp.py
* Serving Flask app "EmpApp" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment
  Use a production WSGI server instead.
* Debug mode: on
* Running on http://0.0.0.0:80/ (Press CTRL+C to quit)
* Restarting with stat
* Debugger is active!
* Debugger PIN: 327-643-010

```

```

ubuntu@ip-20-20-3-212:~/aws-code-main
System information as of Sat Aug 21 21:50:32 UTC 2021
System load: 0.01 Processes: 110
Usage of /: 20.4% of 7.696GB Users logged in: 1
Memory usage: 31% IPv4 address for eth0: 20.20.3.212
Swap usage: 0%
* Super-optimized for small spaces - read how we shrank the memory
footprint of MicroK8s to make it the smallest full K8s around.

https://ubuntu.com/blog/microk8s-memory-optimisation

120 updates can be applied immediately.
46 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Last login: Sat Aug 21 20:12:57 2021 from 20.20.1.221
ubuntu@ip-20-20-3-212:~$ ls
aws-code-main
ubuntu@ip-20-20-3-212:~$ cd aws-code-main/
ubuntu@ip-20-20-3-212:~/aws-code-main$ ls
EmpApp.py README.md __pycache__ config.py templates
ubuntu@ip-20-20-3-212:~/aws-code-main$ 

```

Now need to go to Application Load Balancer and copy the DNS (project-ALB-1391853468.us-east-2.elb.amazonaws.com) and check it:

See below health check of ALB

EC2 > Target groups > TARGET-project

TARGET-project

arn:aws:elasticloadbalancing:us-east-2:761070262355:targetgroup/TARGET-project/86599200b1e1b717

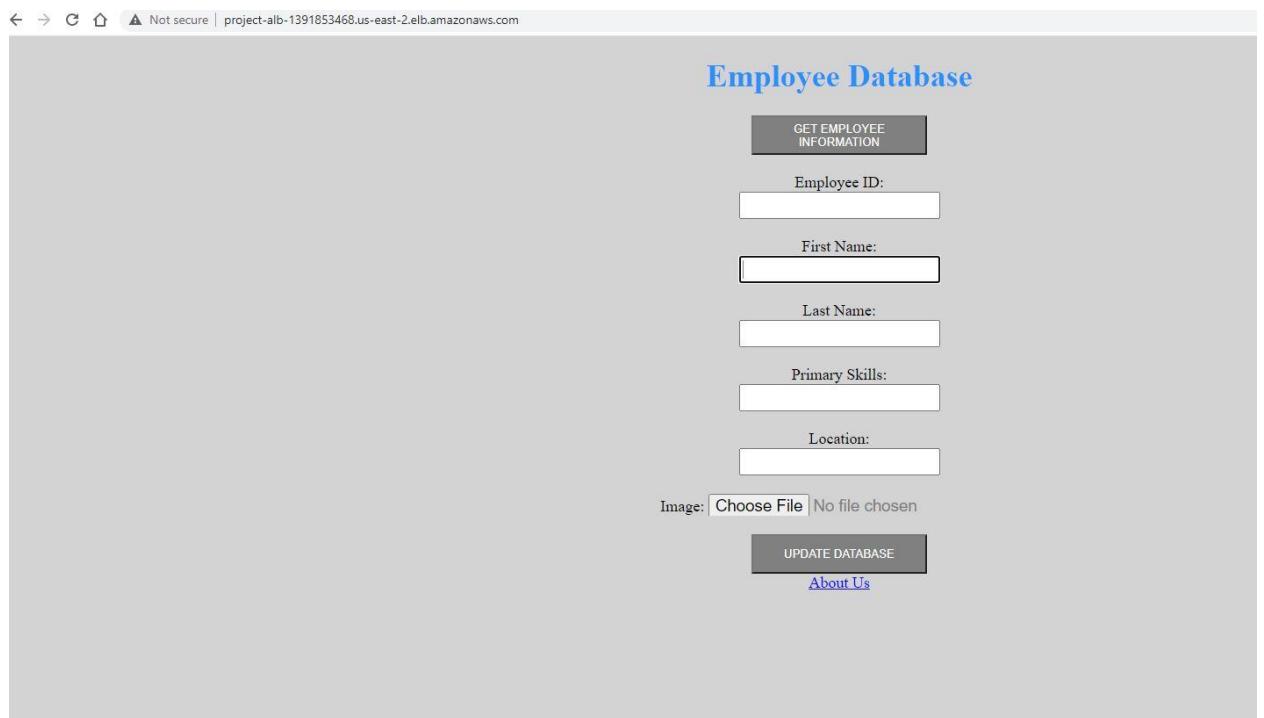
Details							
Target type	Instance	Protocol : Port	HTTP:80	Protocol version	HTTP1	VPC	vpc-06c7b5a78163bff3c
Load balancer	project-ALB	Total targets	1	Healthy	1	Unhealthy	0
				Unused	0	Initial	0
				Draining	0		0

Targets | Monitoring | Health checks | Attributes | Tags

Registered targets (1)

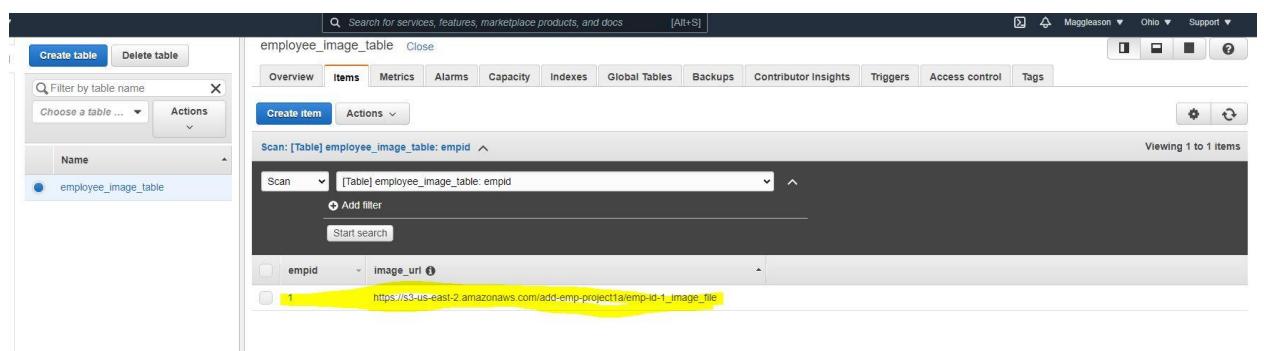
Instance ID	Name	Port	Zone	Health status	Health status details
i-0d29e0b810d81c198	Application Server	80	us-east-2a	healthy	healthy

Please see the below Employee Database home page



The screenshot shows a web-based employee database application. At the top, there are navigation icons and a URL bar indicating 'Not secure | project-alb-1391853468.us-east-2.elb.amazonaws.com'. The main title 'Employee Database' is centered at the top. Below it is a large grey button labeled 'GET EMPLOYEE INFORMATION'. To the right of this button are five input fields: 'Employee ID:' (empty), 'First Name:' (empty), 'Last Name:' (empty), 'Primary Skills:' (empty), and 'Location:' (empty). Below these fields is a file upload section with the label 'Image:' followed by a 'Choose File' button and a message 'No file chosen'. At the bottom right of the form area are two buttons: 'UPDATE DATABASE' and 'About Us'.

So below is the DynamoDB Table in which I uploaded data from the website:



The screenshot shows the AWS DynamoDB console for the 'employee_image_table'. The table has one item listed:

empid	image_url
1	https://s3-us-east-2.amazonaws.com/add-emp-project1a/emp-id-1_image_nie

Step 11. Create 'A' record in Route53

The screenshot shows the AWS Route 53 Hosted Zone Details page for the domain `helpnow.ml`. At the top, there are navigation links: `Route 53 > Hosted zones > helpnow.ml`, and buttons for `Delete zone`, `Test record`, and `Configure query logging`. Below this, a section titled `Hosted zone details` has a button `Edit hosted zone`. Under the `Records (3)` tab, there is a table listing the following records:

Record name	Type	Routing policy	Differences	Value/Route traffic to
<code>helpnow.ml</code>	A	Simple	-	<code>dualstack.project-alb-1391853468.us-east-2.elb.amazonaws.com.</code> <code>ns-1114.awsdns-11.org.</code> <code>ns-1752.awsdns-27.co.uk.</code> <code>ns-18.awsdns-02.com.</code> <code>ns-667.awsdns-19.net.</code>
<code>helpnow.ml</code>	NS	Simple	-	<code>ns-1114.awsdns-11.org.</code> <code>awsdns-hostmaster.amazon.com.</code> 1 7200 900 1209600 86400
<code>helpnow.ml</code>	SOA	Simple	-	

So now it's working with Route53 Domain Name (`helpnow.ml`):

The screenshot shows a web browser displaying a form titled `Employee Database`. The URL in the address bar is `Not secure | helpnow.ml`. The form consists of several input fields and buttons:

- `GET EMPLOYEE INFORMATION` button
- `Employee ID:` input field
- `First Name:` input field
- `Last Name:` input field
- `Primary Skills:` input field
- `Location:` input field
- `Image:` file input field with value `Choose File` and `No file chosen`
- `UPDATE DATABASE` button
- `About Us` link

Add Steve Johnson to the DataBase:

```
ubuntu@ip-20-20-3-212: ~
1 row in set (0.00 sec)

mysql> select * from employee;
+-----+-----+-----+-----+-----+
| emp_id | first_name | last_name | primary_skills | location |
+-----+-----+-----+-----+-----+
| 101    | Mari       | Anni      | AWS           | USA        |
| 1      | Mari       | Anni      | AWS           | Kansas City, MO |
| 100    | mari       | anne      | AWS           | USA        |
+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> select * from employee;
+-----+-----+-----+-----+-----+
| emp_id | first_name | last_name | primary_skills | location |
+-----+-----+-----+-----+-----+
| 101    | Mari       | Anni      | AWS           | USA        |
| 1      | Mari       | Anni      | AWS           | Kansas City, MO |
| 100    | mari       | anne      | AWS           | USA        |
| 200    | Steve      | Johnson   | AWS           | USA        |
+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql>
```

Make S3 bucket add-emp-project1a and aboutus.html public

Amazon S3 > add-emp-project1a

add-emp-project1a Info

Objects Properties **Permissions** Metrics Management Access Points

Permissions overview

Access
Objects can be public

Block public access (bucket settings)

Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that no one can access your objects, you can turn on Block public access for this bucket and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that you understand how they affect your objects within, you can customize the individual settings below to suit your specific storage use cases. [Learn more](#)

Edit

Block all public access

⚠ Off

- Block public access to buckets and objects granted through *new* access control lists (ACLs)
⚠ Off
- Block public access to buckets and objects granted through *any* access control lists (ACLs)
⚠ Off
- Block public access to buckets and objects granted through *new* public bucket or access point policies
⚠ Off
- Block public and cross-account access to buckets and objects through *any* public bucket or access point policies
⚠ Off

Enable Static Website Hosting

Amazon S3 => add-emp-project1a => Properties => Static website hosting

Edit static website hosting [Info](#)

Static website hosting

Use this bucket to host a website or redirect requests. [Learn more](#) 

Static website hosting

- Disable
- Enable

Hosting type

- Host a static website
Use the bucket endpoint as the web address. [Learn more](#) 
- Redirect requests for an object
Redirect requests to another bucket or domain. [Learn more](#) 

 For your customers to access content at the website endpoint, you must make all your content publicly readable. To do so, you can edit the S3 Block Public Access settings for the bucket. For more information, see [Using Amazon S3 Block Public Access](#) 

Index document

Specify the home or default page of the website.

aboutus.html

Error document - *optional*

This is returned when an error occurs.

error.html

Redirection rules - *optional*

Redirection rules, written in JSON, automatically redirect webpage requests for specific content. [Learn more](#) 

1 |

Now we need to configure AddEmp.html file. Get the endpoint from Static website hosting an edit html file as show below:

Static website hosting

Use this bucket to host a website or redirect requests. [Learn more](#)

Static website hosting

Enabled

Hosting type

Bucket hosting

Bucket website endpoint

When you configure your bucket as a static website, the website is available at the AWS Region-specific website endpoint of the bucket. [Learn more](#)

 <http://add-emp-project1a.s3-website.us-east-2.amazonaws.com> 

```
<button type="submit" style="background: grey; height: 30px; width: 100px; border: none; font-size: 1em; color: white; margin-bottom: 10px; font-weight: bold;">Submit
```

So now AboutUs page is working

    Not secure | add-emp-project1a.s3-website.us-east-2.amazonaws.com

This is my page about us

Now edit the other pages, AddEmpOutput.html by entering ALB DNS

```
GNU nano 4.8                                         AddEmpOutput.html                                         Modified
<!DOCTYPE html>
<html>
<head>
<center>
    <font color="DodgerBlue" size="5" style="font-family: avenir">
        <body hcolor="lightgrey">
            <h1>SAVE SUCCESSFUL</h1><br>
            <h2>Following Employee has been added to the database</h2><br>
            <h2>{ name }</h2><br>
            <title>Add Emp Output</title>
            <form action="http://Project-ALB-1391853468.us-east-2.elb.amazonaws.com/" autocomplete="on" method = "GET">
                <button type="submit" style="background: grey; height: 45px; width: 200px; color:white; font:oblique;">GO BACK</button><br><br>
            </form>
        </body>
    </font>
</center>
</head>
<body>
</body>
</html>
```

Test Results:

Ok After entering data the Go Back button returns us to the Employee Database homepage.

Now edit GetEmp.html and edit formaction to ALB endpoint as done above

Now edit GetEmpOutput.html and edit formaction to ALB endpoint as done above

Test Results ok except GetEmpOutput as expected.

Step 12. Create S3 Event – To send notification to SNS

Go to SNS in Amazon Console

a. Create a topic

The screenshot shows the 'Create topic' wizard in the Amazon SNS console. The top navigation bar shows 'Amazon SNS > Topics > Create topic'. The main title is 'Create topic'. A 'Details' section is open, showing two options for 'Type': 'FIFO (first-in, first-out)' and 'Standard'. The 'Standard' option is selected. Below the type section, there is a 'Name' field containing 'notify-marianne' and a note about character limits. There is also a 'Display name - optional' field containing 'My Topic' and a note about character limits. At the bottom of the 'Details' section, there is a note about encryption.

Amazon SNS > Topics > Create topic

Create topic

Details

Type [Info](#)
Topic type cannot be modified after topic is created

FIFO (first-in, first-out)

- Strictly-preserved message ordering
- Exactly-once message delivery
- High throughput, up to 300 publishes/second
- Subscription protocols: SQS

Standard

- Best-effort message ordering
- At-least once message delivery
- Highest throughput in publishes/second
- Subscription protocols: SQS, Lambda, HTTP, SMS, email, mobile application endpoints

Name

Maximum 256 characters. Can include alphanumeric characters, hyphens (-) and underscores (_).

Display name - optional
To use this topic with SMS subscriptions, enter a display name. Only the first 10 characters are displayed in an SMS message. [Info](#)

Maximum 100 characters, including hyphens (-) and underscores (_).

► **Encryption - optional**
Amazon SNS provides in-transit encryption by default. Enabling server-side encryption adds at-rest encryption to your topic.

▼ Access policy - optional

This policy defines who can access your topic. By default, only the topic owner can publish or subscribe to the topic. [Info](#)

Choose method

Basic

Use simple criteria to define a basic access policy

Advanced

Use a JSON object to define an advanced access policy.

Define who can publish messages to the topic

Only the topic owner

Only the owner of the topic can publish to the topic

Everyone

Anybody can publish

Only the specified AWS accounts

Only the specified AWS account IDs can publish to the topic

Define who can subscribe to this topic

Only the topic owner

Only the owner of the topic can subscribe to the topic

Everyone

Any AWS account can subscribe to the topic

Only the specified AWS accounts

Only the specified AWS account IDs can subscribe to the topic

Only requesters with certain endpoints

JSON preview

```
"Action": [
    "SNS:Publish",
    "SNS:RemovePermission",
    "SNS:SetTopicAttributes",
    "SNS:DeleteTopic",
    "SNS>ListSubscriptionsByTopic",
    "SNS:GetTopicAttributes",
    "SNS:Receive",
    "SNS>AddPermission",
    "SNS:Subscribe"
],
"Resource": "arn:aws:sns:us-east-2:761070262355:notify-marianne",
"Condition": {
    "StringEquals": {
        "AWS:SourceOwner": "761070262355"
```

► Delivery retry policy (HTTP/S) - optional

The policy defines how Amazon SNS retries failed deliveries to HTTP/S endpoints. To modify the default settings, expand this section. [Info](#)

b. Create subscription

Amazon SNS > Subscriptions > Create subscription

Create subscription

Details

Topic ARN
arn:aws:sns:us-east-2:761070262355:notify-marianne X

Protocol
The type of endpoint to subscribe
Email ▼

Endpoint
An email address that can receive notifications from Amazon SNS.
[REDACTED]

ⓘ After your subscription is created, you must confirm it. [Info](#)

► Subscription filter policy - optional
This policy filters the messages that a subscriber receives. [Info](#)

► Redrive policy (dead-letter queue) - optional
Send undeliverable messages to a dead-letter queue. [Info](#)

[Cancel](#) Create subscription

c. Create event to trigger the email so go to S3 => Properties => Event Notifications

Create event notification

Amazon S3 > add-emp-project1a > Create event notification

Create event notification [Info](#)

The notification configuration identifies the events you want Amazon S3 to publish and the destinations where you want Amazon S3 to send the notifications. [Learn more](#)

General configuration

Event name
A text input field for the event name, containing "notify-SNS".

Event name can contain up to 255 characters.

Prefix - *optional*
Limit the notifications to objects with key starting with specified characters.
A text input field for the prefix, containing "images/".

Suffix - *optional*
Limit the notifications to objects with key ending with specified characters.
A text input field for the suffix, containing ".jpg".

Event types

Specify at least one type of event for which you want to receive notifications. [Learn more](#)

All object create events
s3:ObjectCreated:
 Put
 s3:ObjectCreated:Put
 Post
 s3:ObjectCreated:Post
 Copy
 s3:ObjectCreated:Copy
 Multipart upload completed
 s3:ObjectCreated:CompletedMultipartUpload

Destination

i Before Amazon S3 can publish messages to a destination, you must grant the Amazon S3 principal the necessary permissions to call the relevant API to publish messages to an SNS topic, an SQS queue, or a Lambda function. [Learn more](#)

Destination

Choose a destination to publish the event. [Learn more](#)

- Lambda function
Run a Lambda function script based on S3 events.
 - SNS topic
Send notifications to email, SMS, or an HTTP endpoint.
 - SQS queue
Send notifications to an SQS queue to be read by a server.

Specify SNS topic

- Choose from your SNS topics
 - Enter SNS topic ARN

SNS topic

notify-marianne

[Cancel](#)

Save changes

Test Results:

Add information to Employee Database homepage and helpnow.ml and I should get an email.
Completed successfully.

Amazon S3 Notification Yahoo/Inbox

AWS Notifications <no-reply@sns.amazonaws.com> Tue, Aug 24 at 9:02 AM

To: [REDACTED]

Records [redacted]

If you wish to stop receiving notifications from this topic, please click or visit the link below to unsubscribe:
https://sns.us-east-2.amazonaws.com.unsubscribe.html?SubscriptionArn=arn:aws:sns:us-east-2:761070282355-notify-marianne_584eda44-ec23-484d-ad19-1ce6c7dd392&Endpoint=mariannedealeon@sbcglobal.net

Please do not reply directly to this email. If you have any questions or comments regarding this email, please contact us at <https://aws.amazon.com/support>

Step 12 is completed.



Step 13. Create AMI with application – Login to an EC2 instance and setup application

- a. Go to EC2 Instances (Select Application Server)
- b. Click on Actions
- c. Go to Image and templates
- d. Select Create image
- e. Completed

Step 13 is completed

