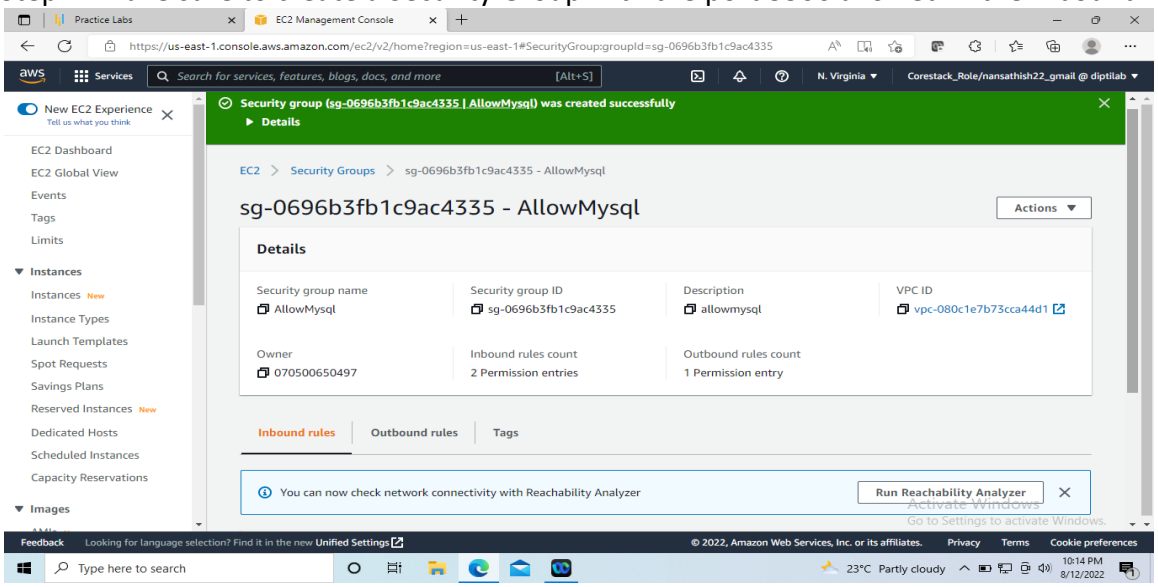
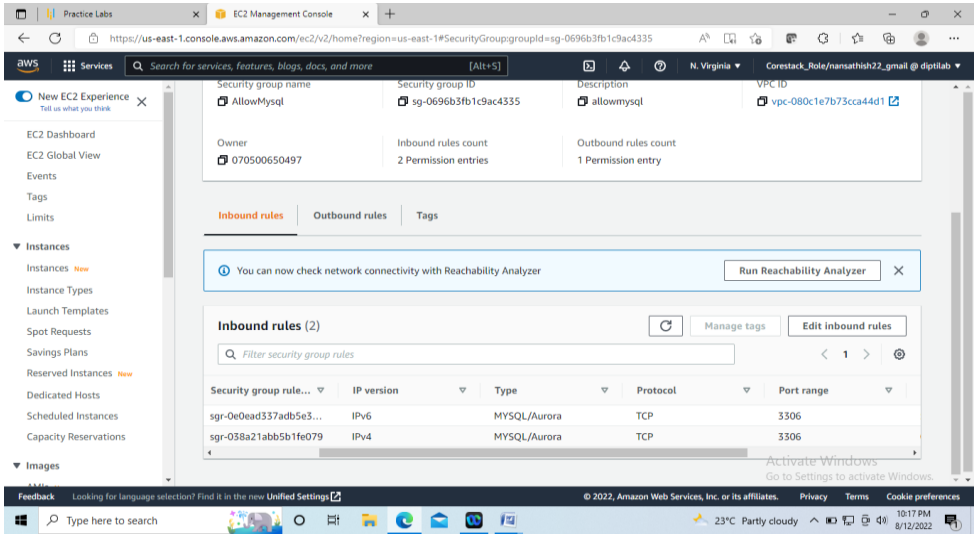
Managing tightly coupled architecture using Amazon SQS

Steps to be followed:

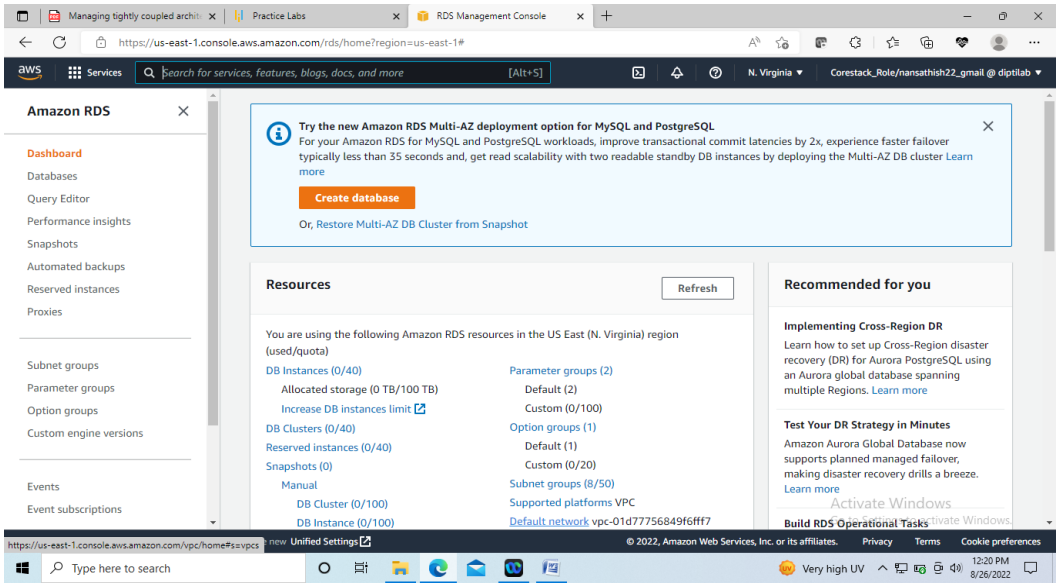
1. Create MySQL Database using RDS Service.
2. Create SQS Queue.
3. Connect through SQL Client and create a table.
4. Create a frontend and backend server using EC2 instance
5. Connect the SQS queue with the front end server to insert entries into MySQL dB in RDS service

Step 1: Make sure to create a Security Group with the port 3306 allowed in the Inbound rules.

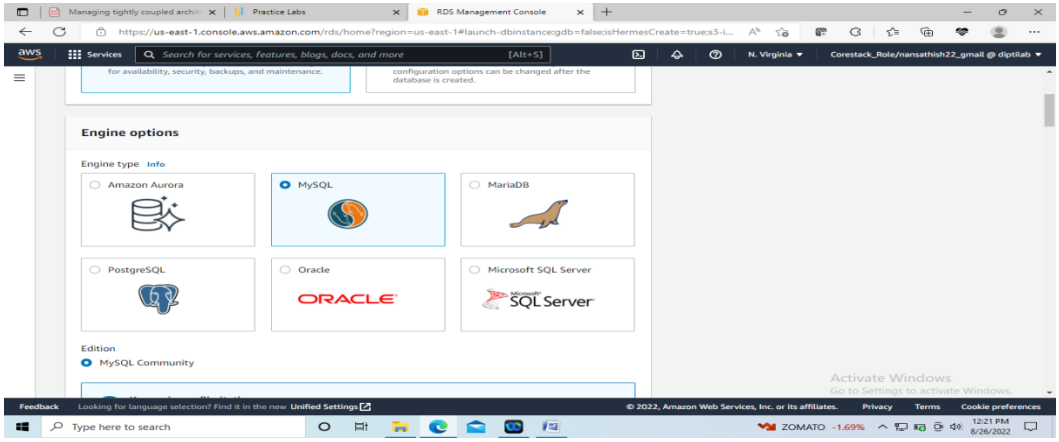




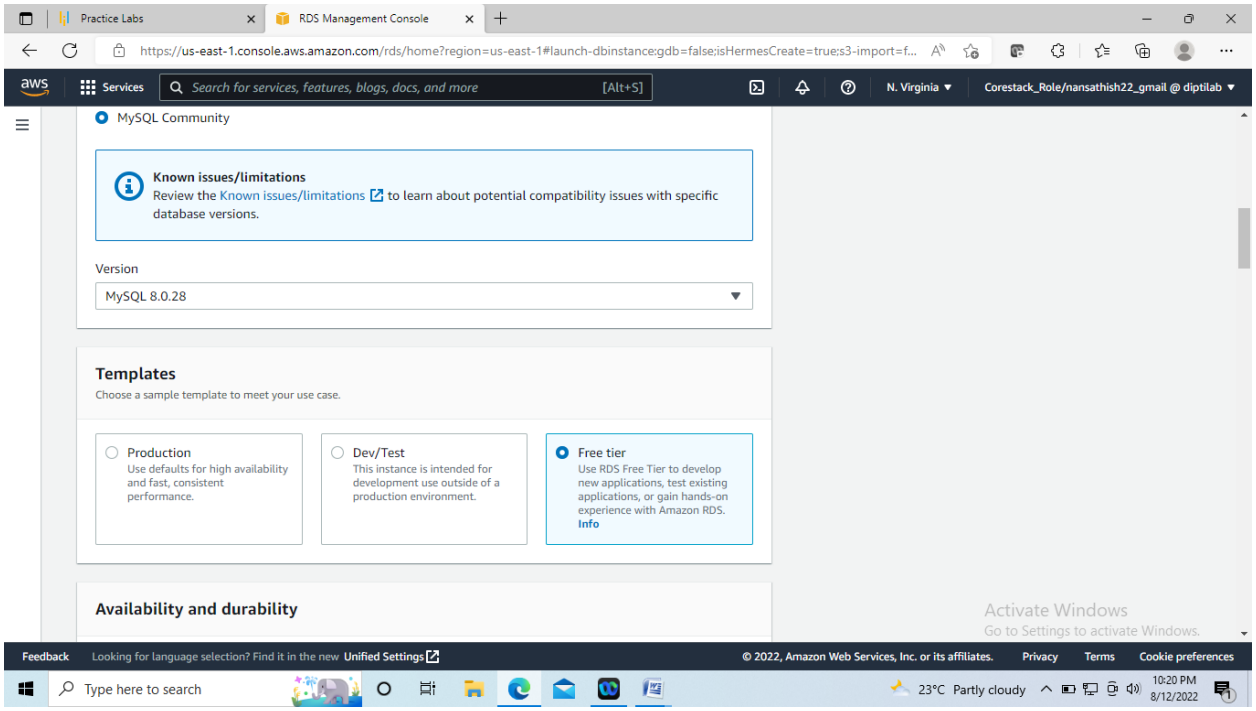
Step 2: Go to the RDS Management Console and click on Create Database.



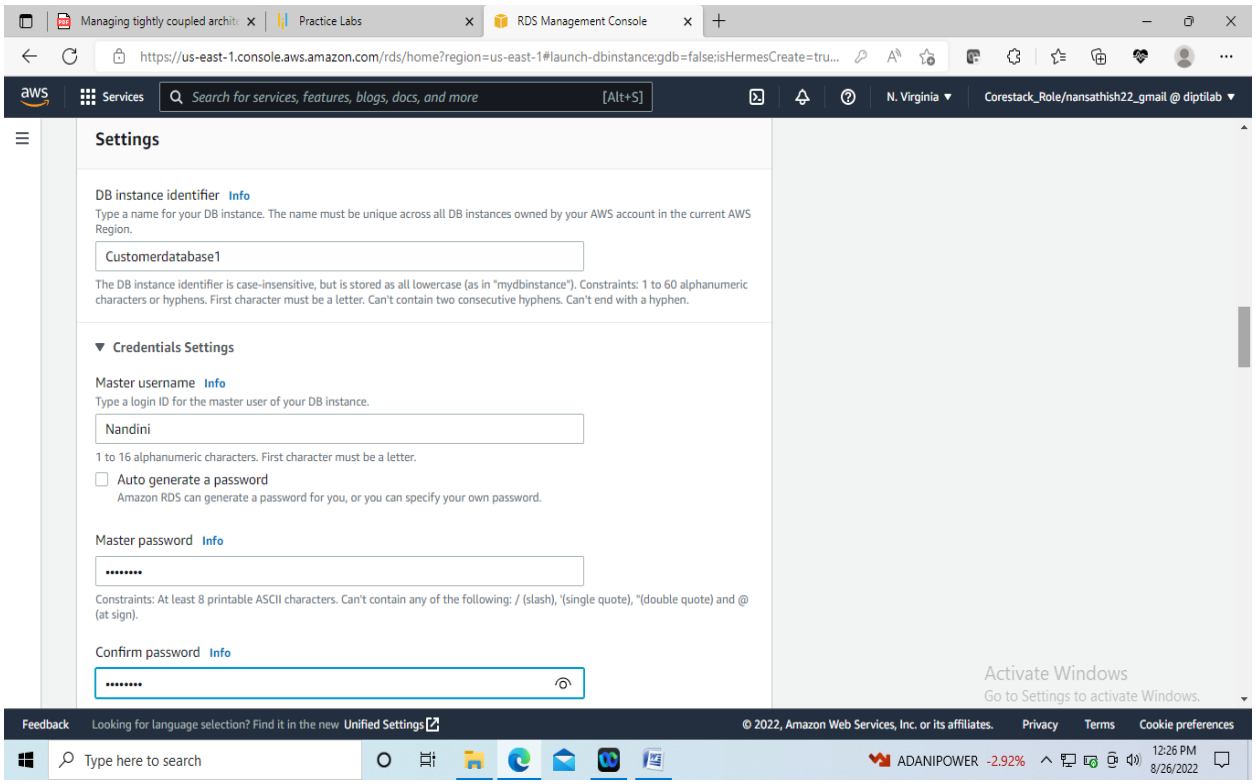
Step 3: Select MySQL as the Database.



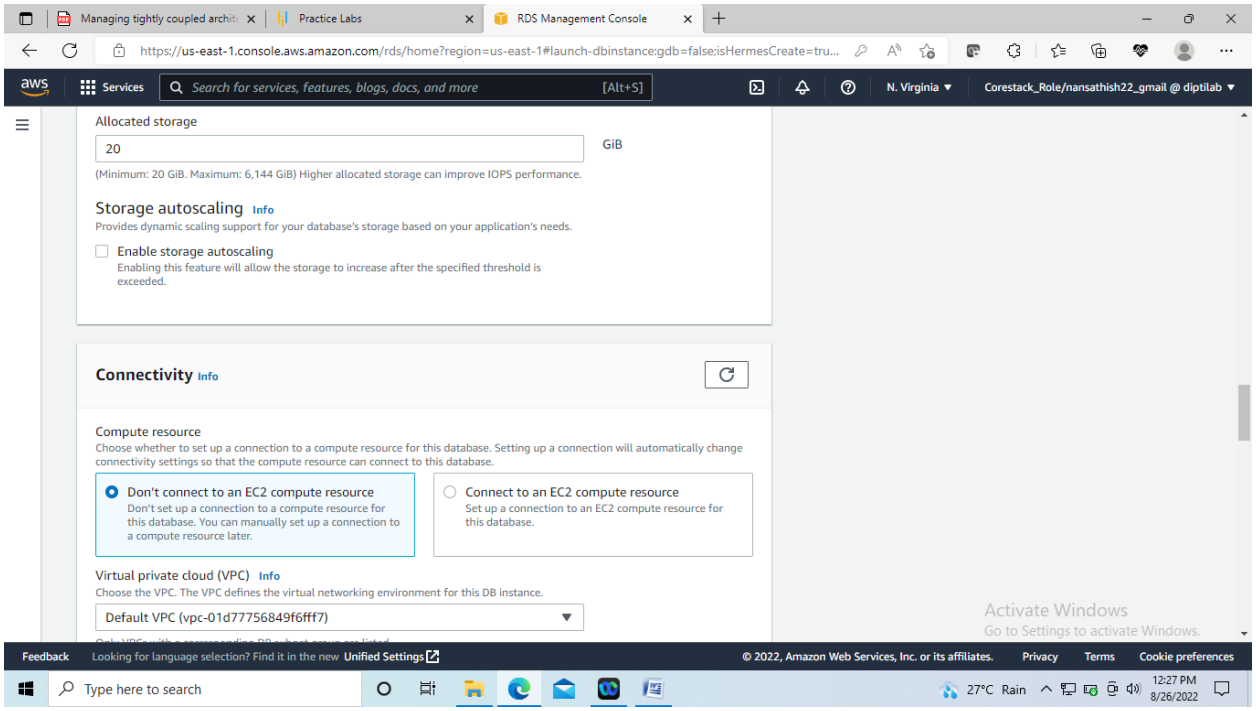
Step 4: Select Free tier for the templates. This will make sure all the settings for the RDS are for the AWS Free Tier (https://aws.amazon.com/free/). Specify the DB instance identifier as Customerdatabase1



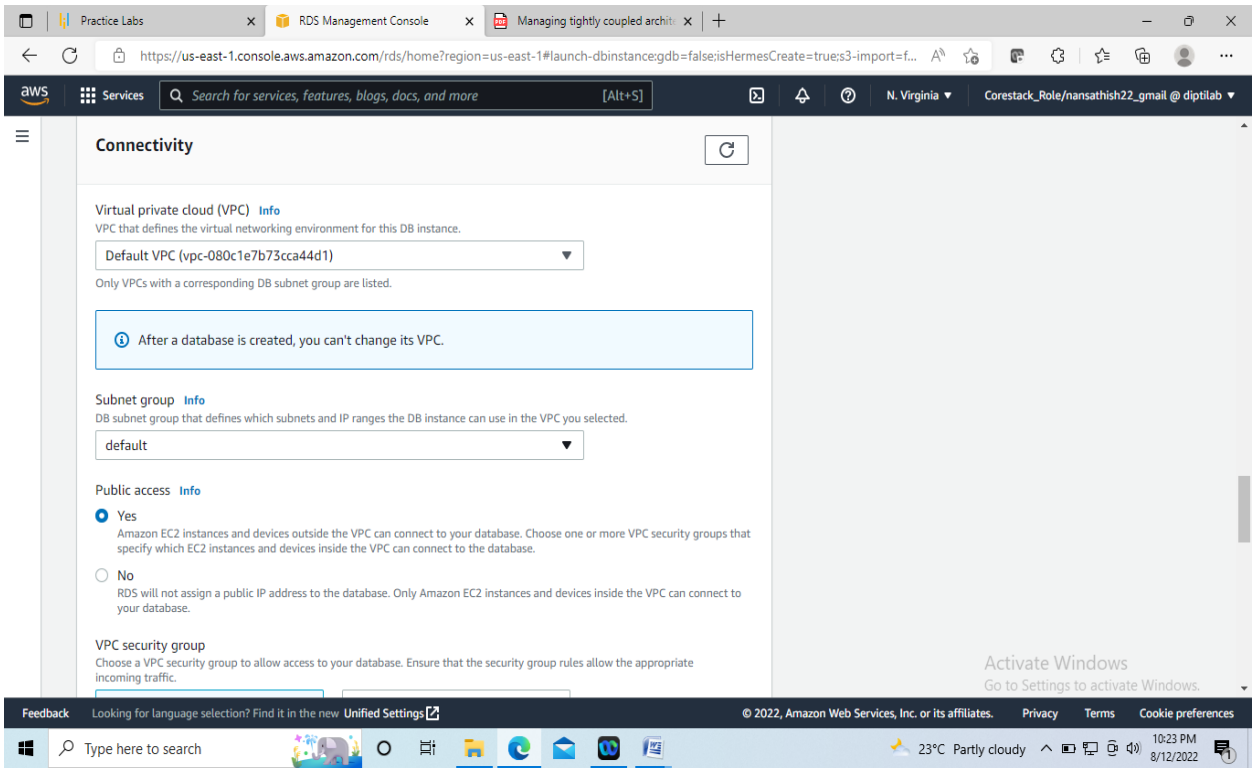
Step 5: Specify the username and the password.



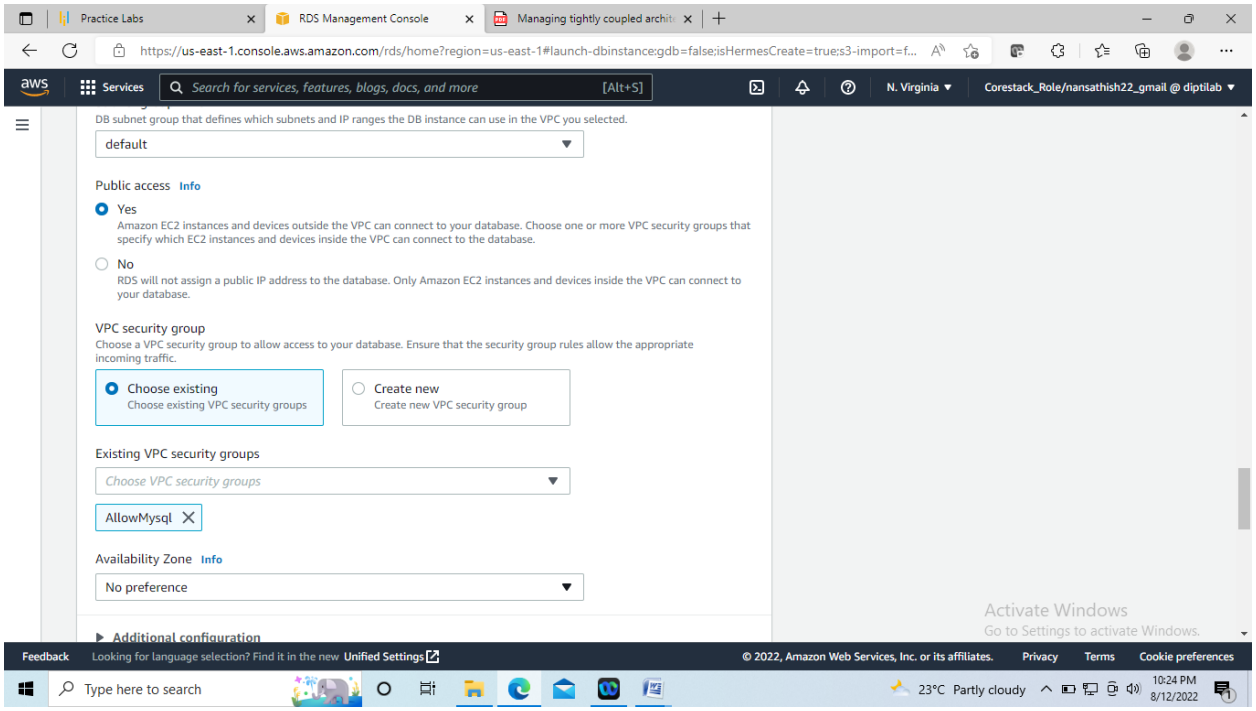
Step 6: Uncheck Storage autoscaling.



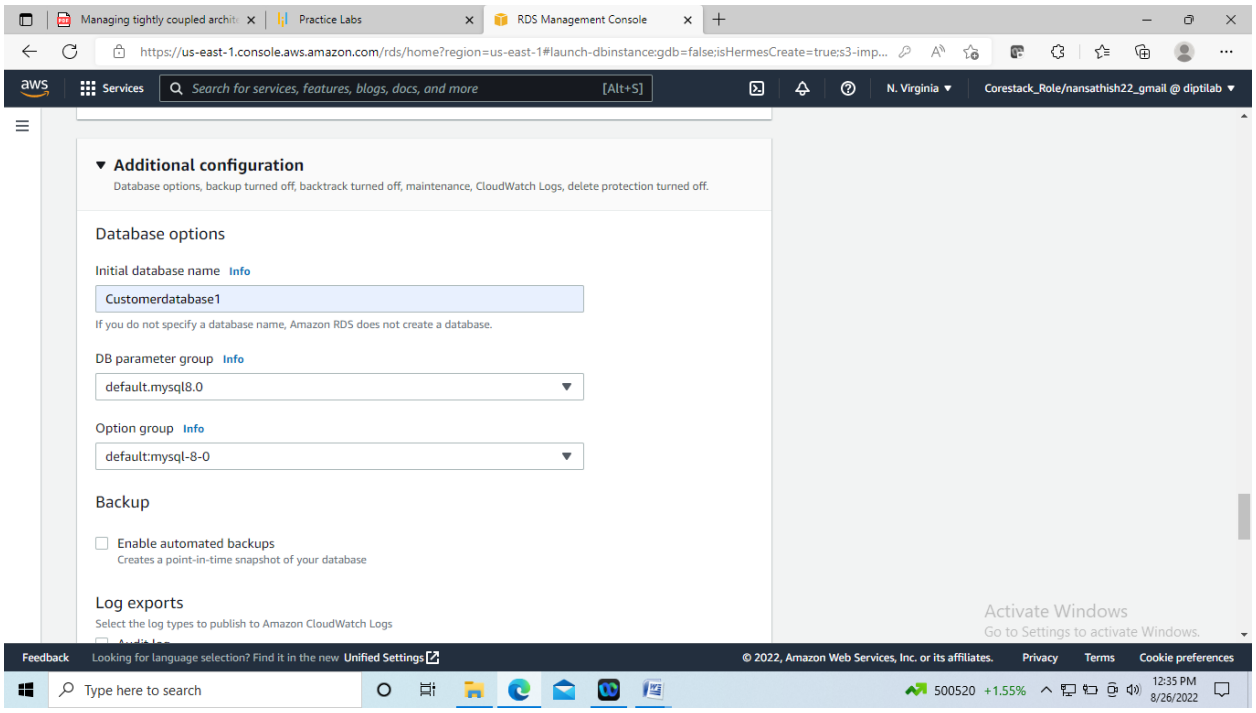
Step 7: Under Connectivity, for Publicly accessible as Yes.



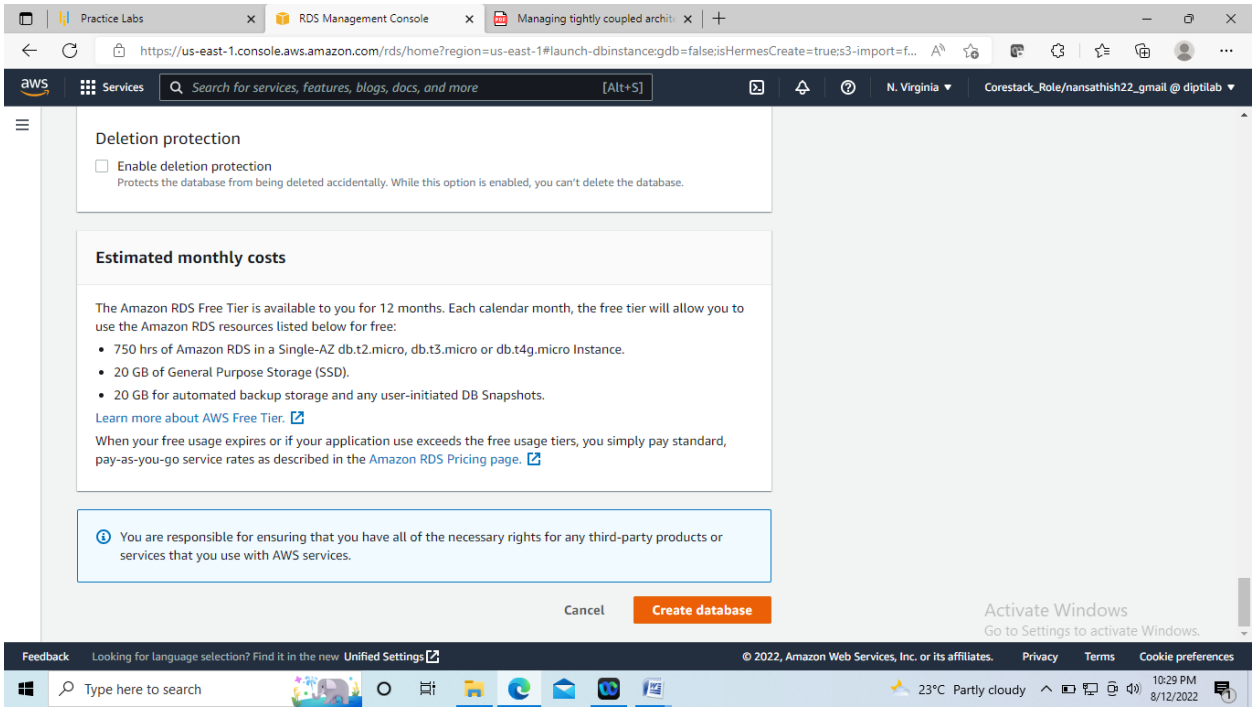
Step 8: Select the AllowMySQL Security Group created earlier.



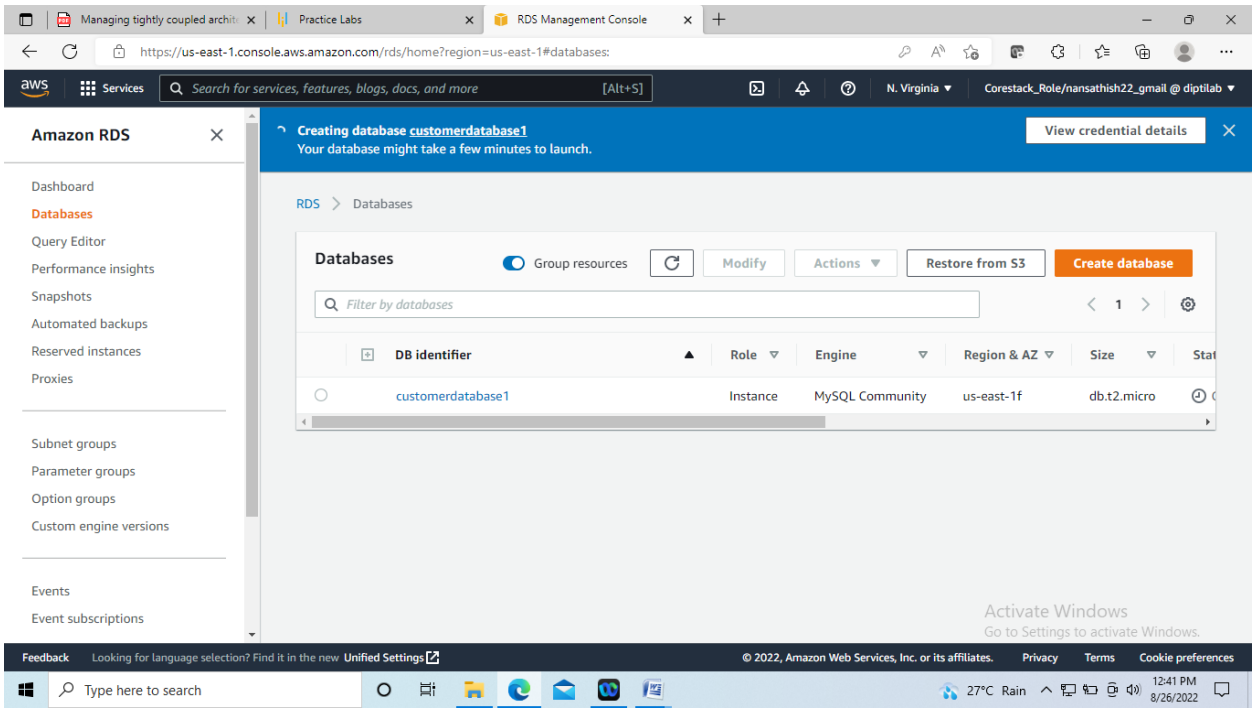
Step 9: For the Initial database name, specify Customerdatabase1. Disable the Backup.



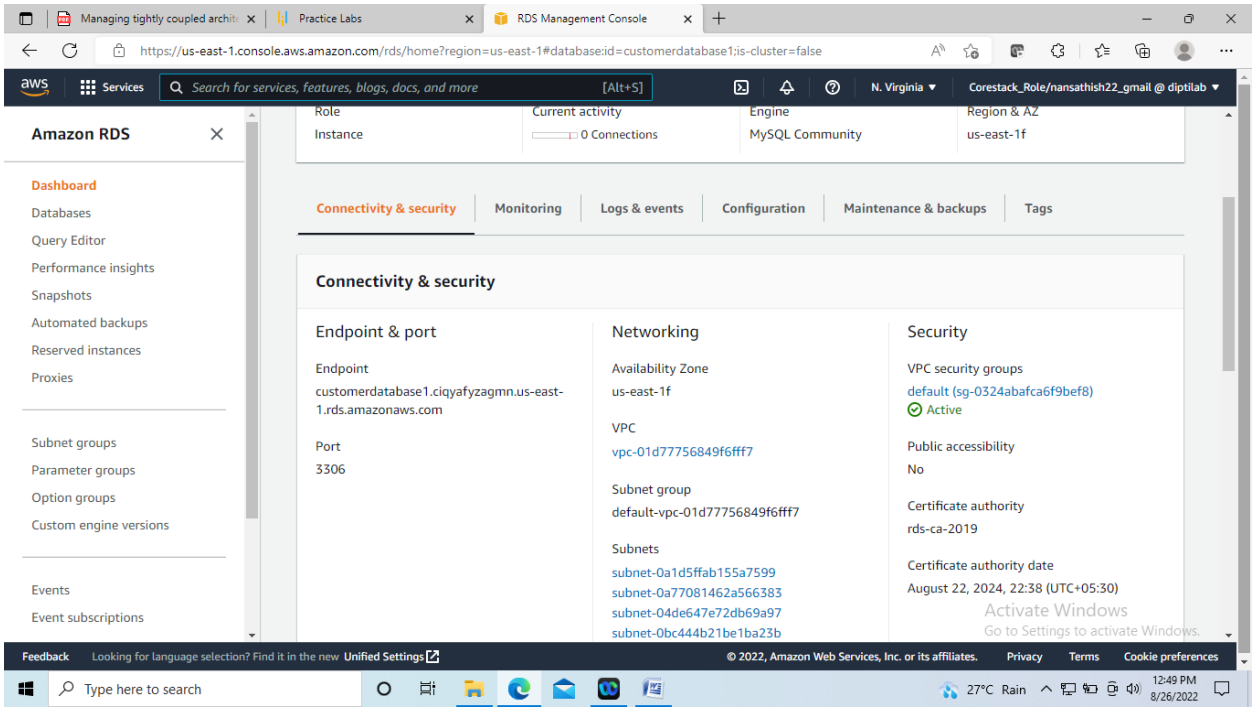
Step 10: Finally, click on Create Database.



Step 11: Once the database is configured, it will show the status as creating, and then, after some time, it displays the status finally created.

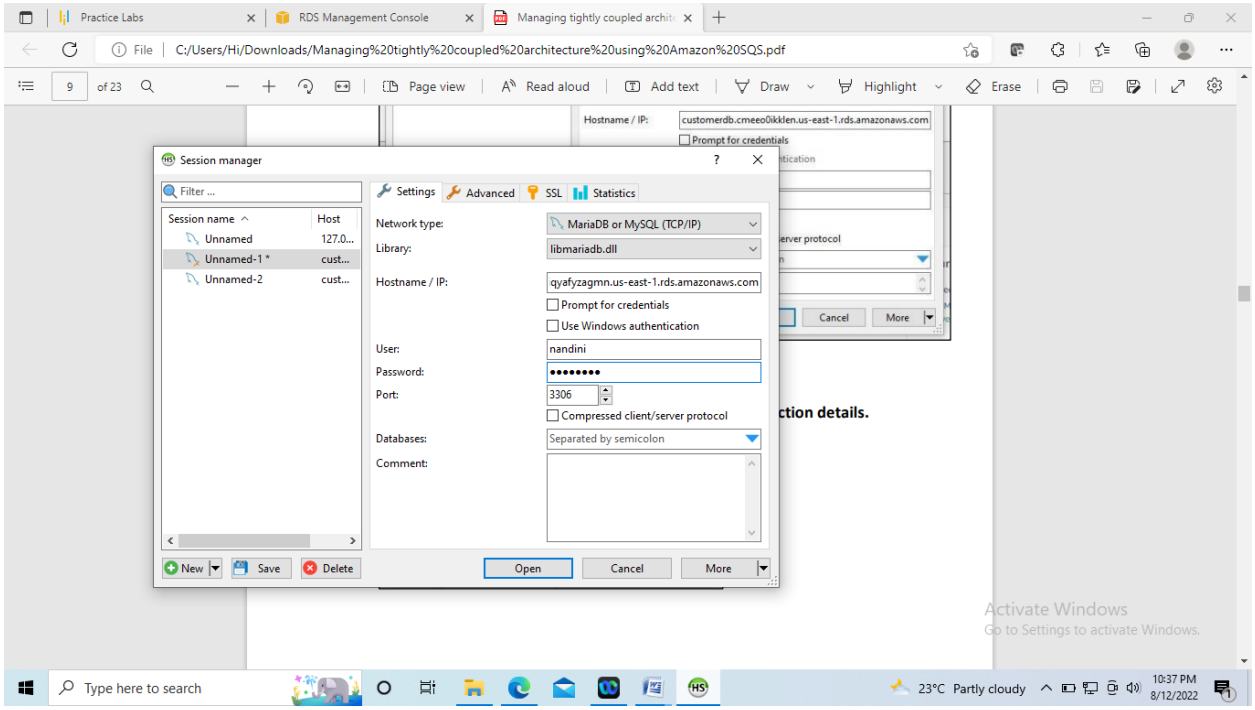


Step 12: After a few minutes, the database should be in available status, and the endpoint would be populated.

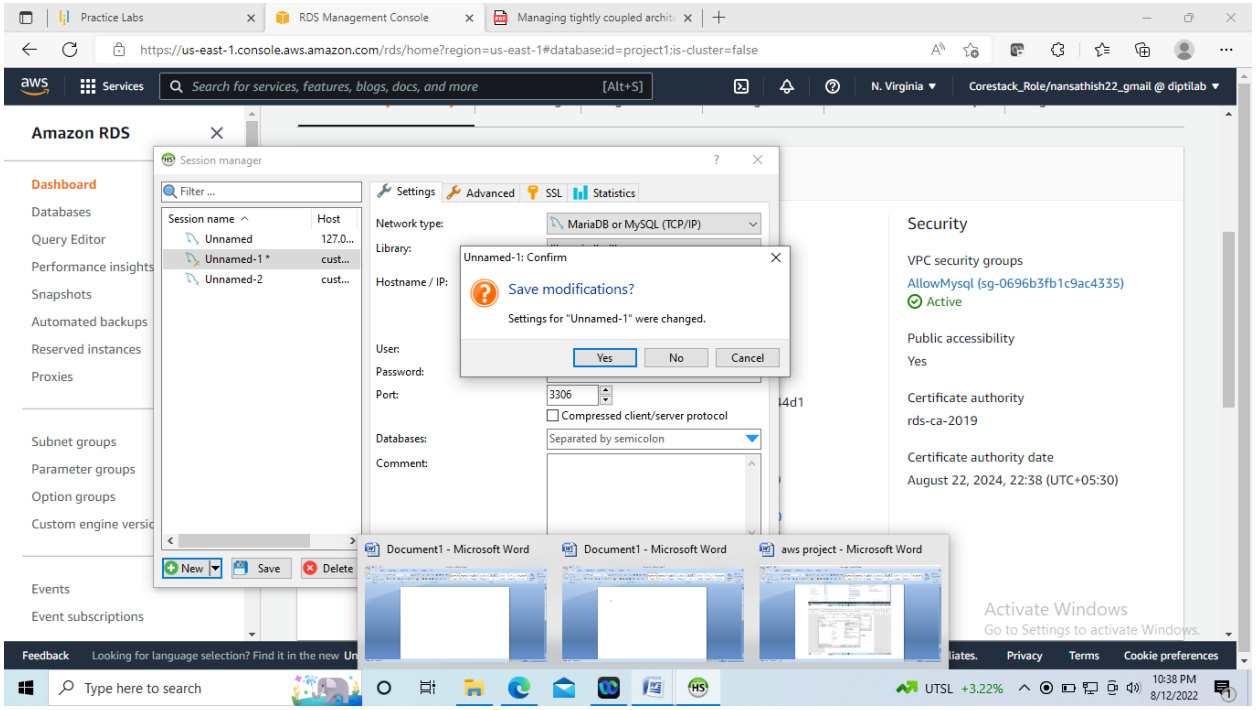


Step 13: Download the HeidiSQL (https://www.heidisql.com/download.php) by clicking on Installer, 32/64 bit combined and install it as any other application.

Step 14: Launch HeidiSQL once the installation is complete and enter the RDS/MySQL endpoinp/user/password. Then, click on Open

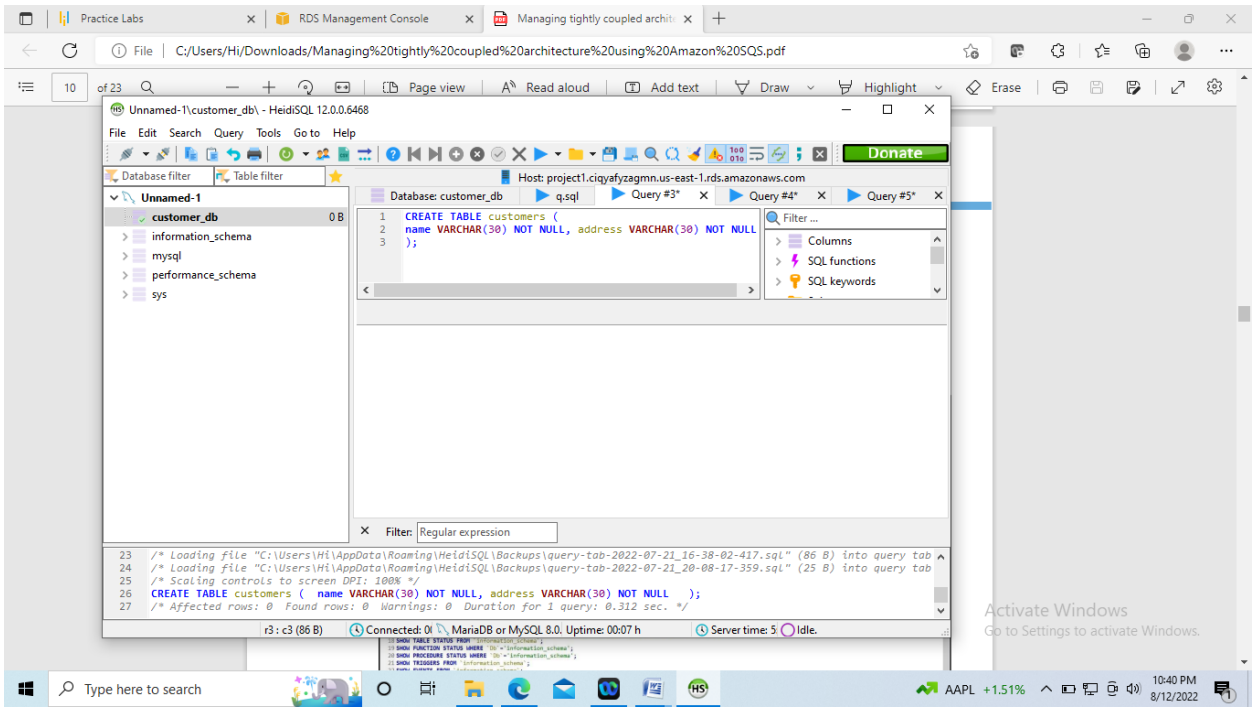


Step 15: Click on Yes when prompted. This will store the connection details.

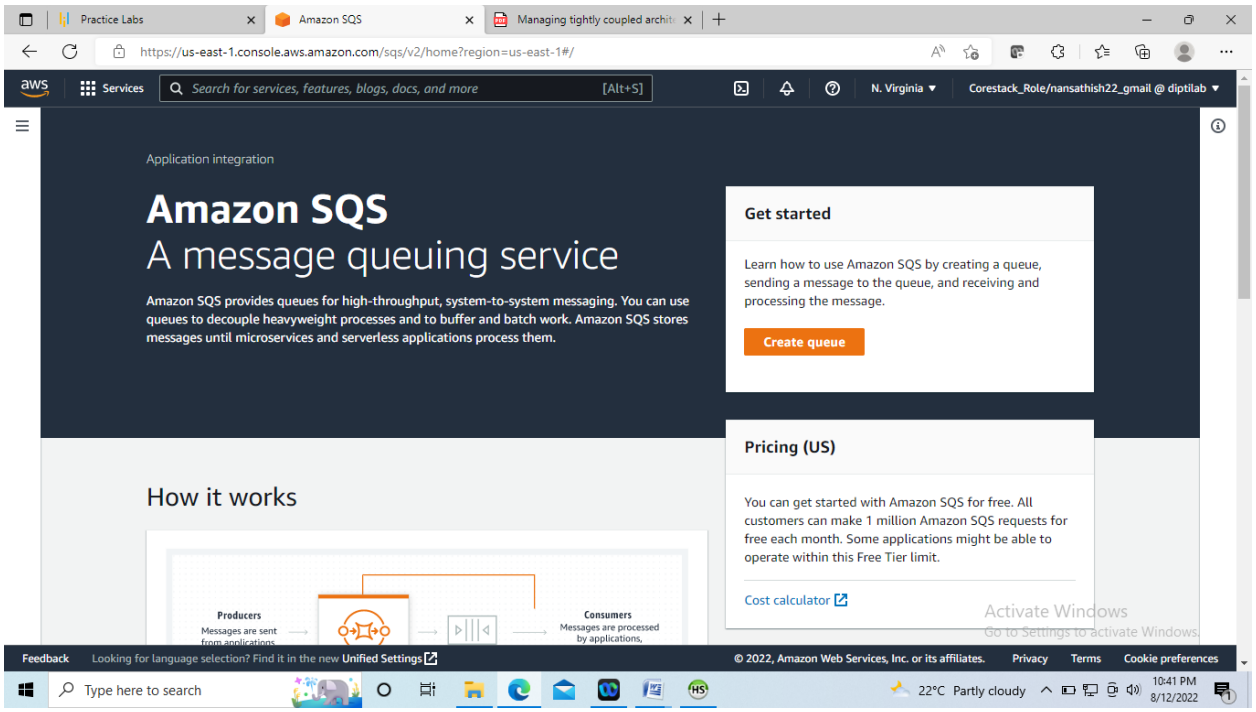


Step 16: In the HeidiSQL, make sure to select Customerdatabase1 in the top left pane, go to the Query tab, copy the below DDL statement and click on Execute to create a table.

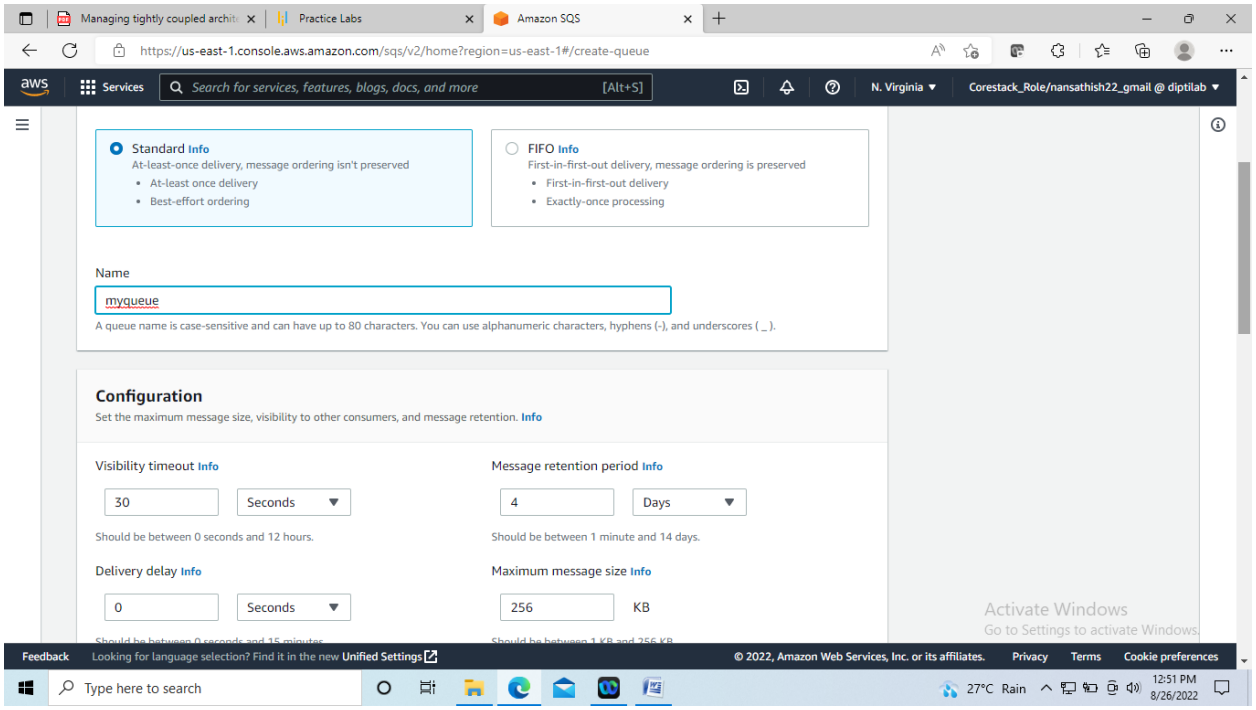
CREATE TABLE customers (name VARCHAR(30) NOT NULL, address VARCHAR(30) NOT NULL);

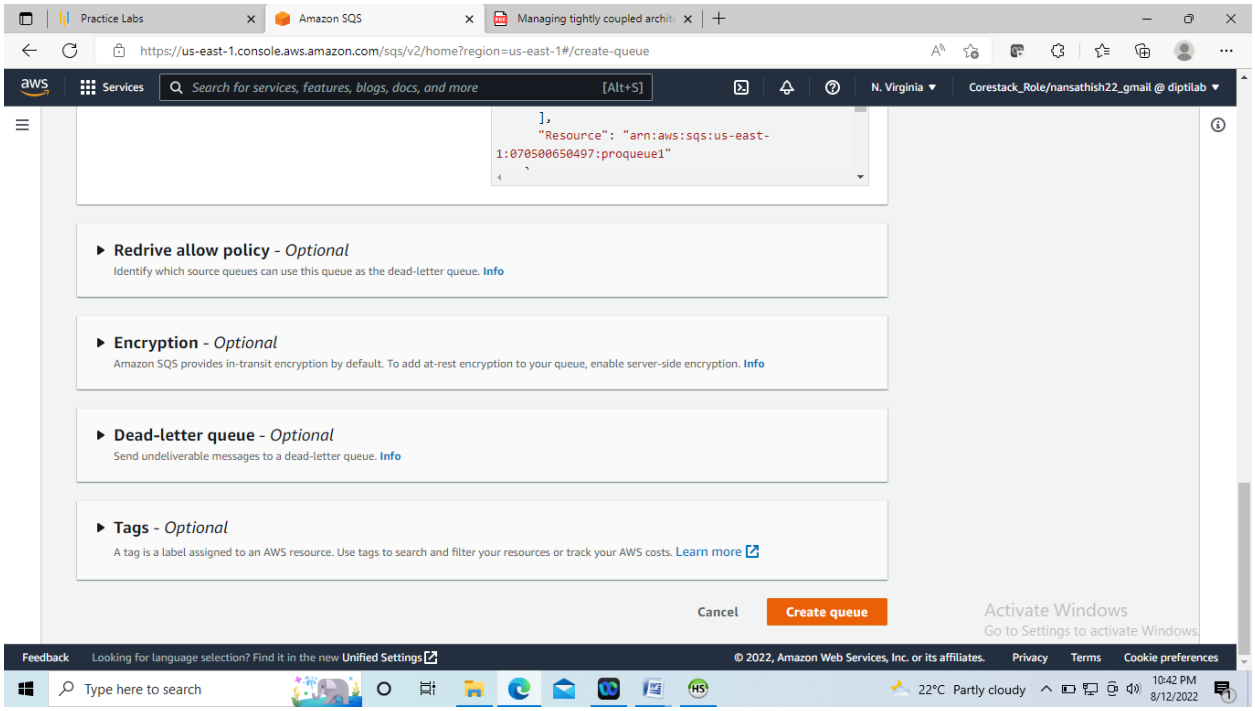


Step 17: Go to the SQS Management Console and click on Create Queue.

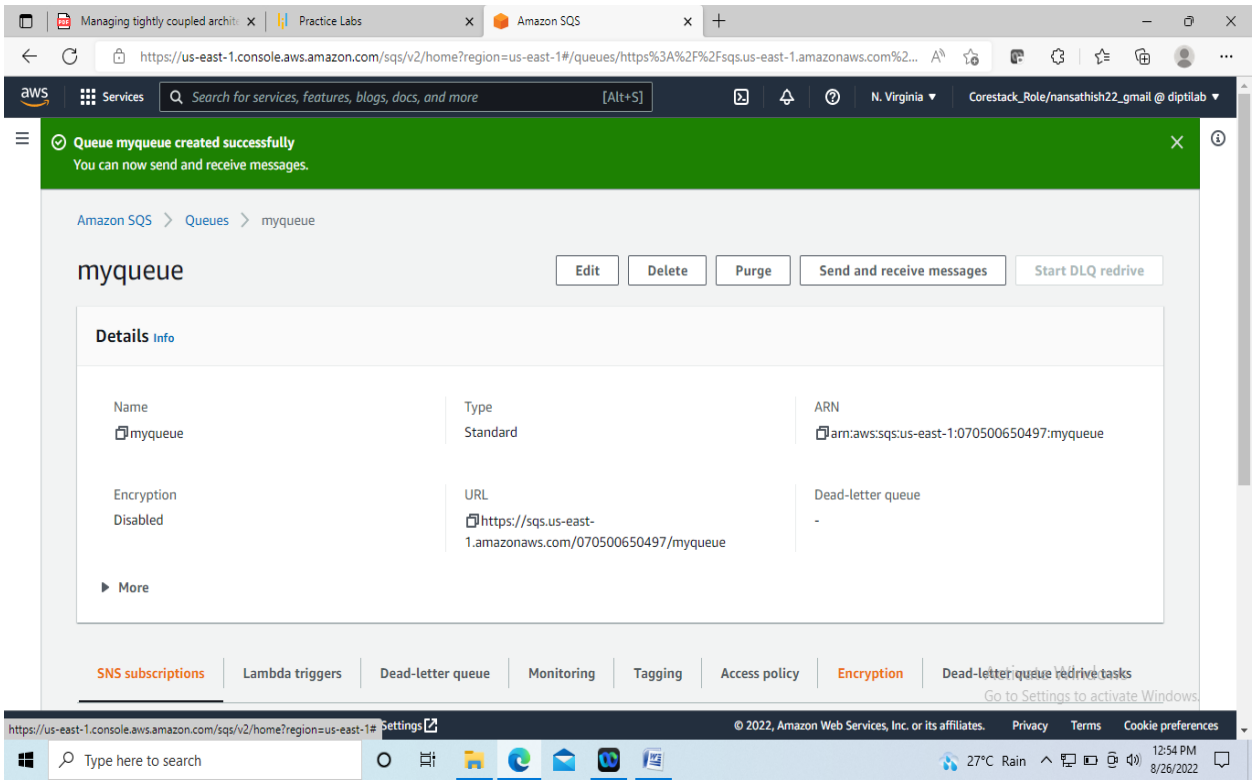


Step 18: Enter the Queue name as myqueue, proceed with the default options and click on Create queue.

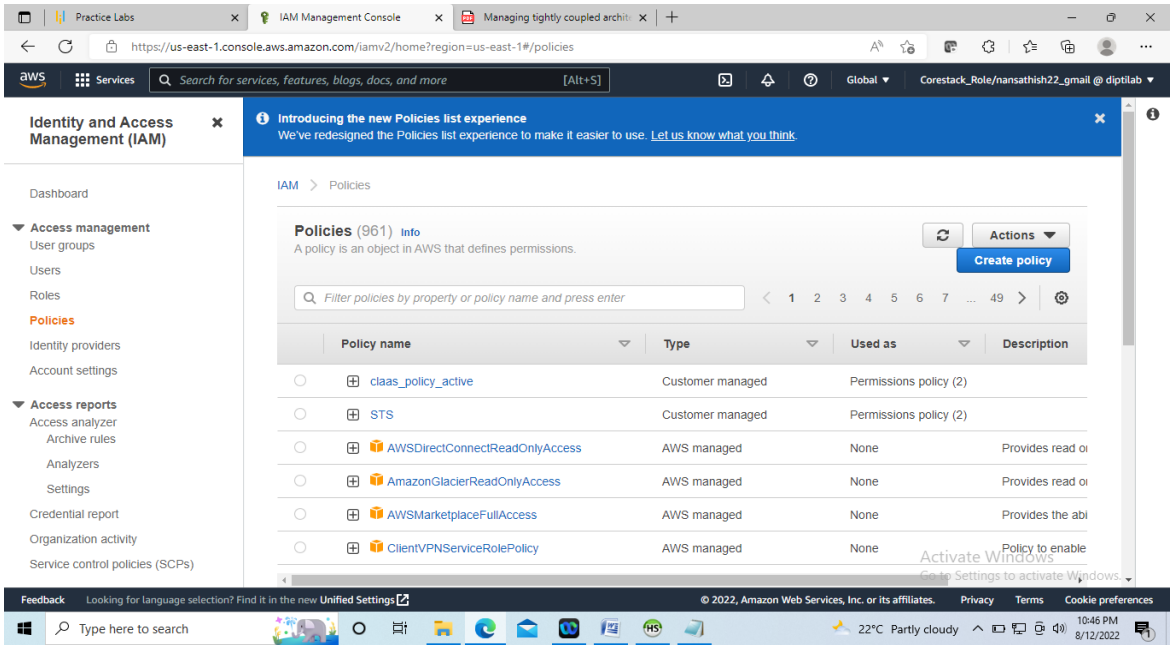




Step 19: Note down the Queue URL and the ARN.

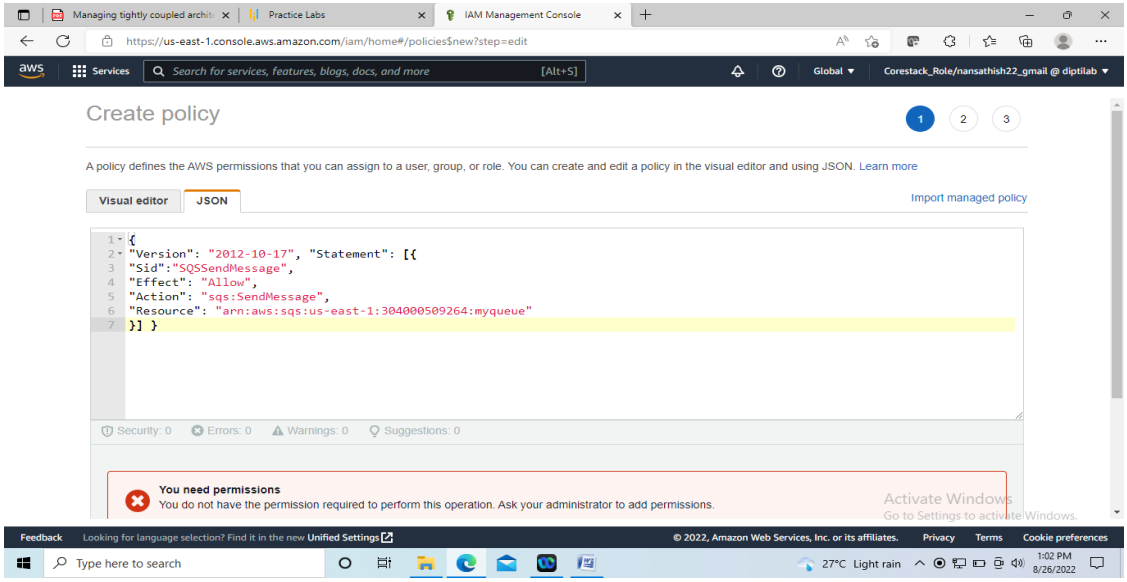


Step 20: Go to the IAM Management Console and go to Policies. Click on Create Policy.

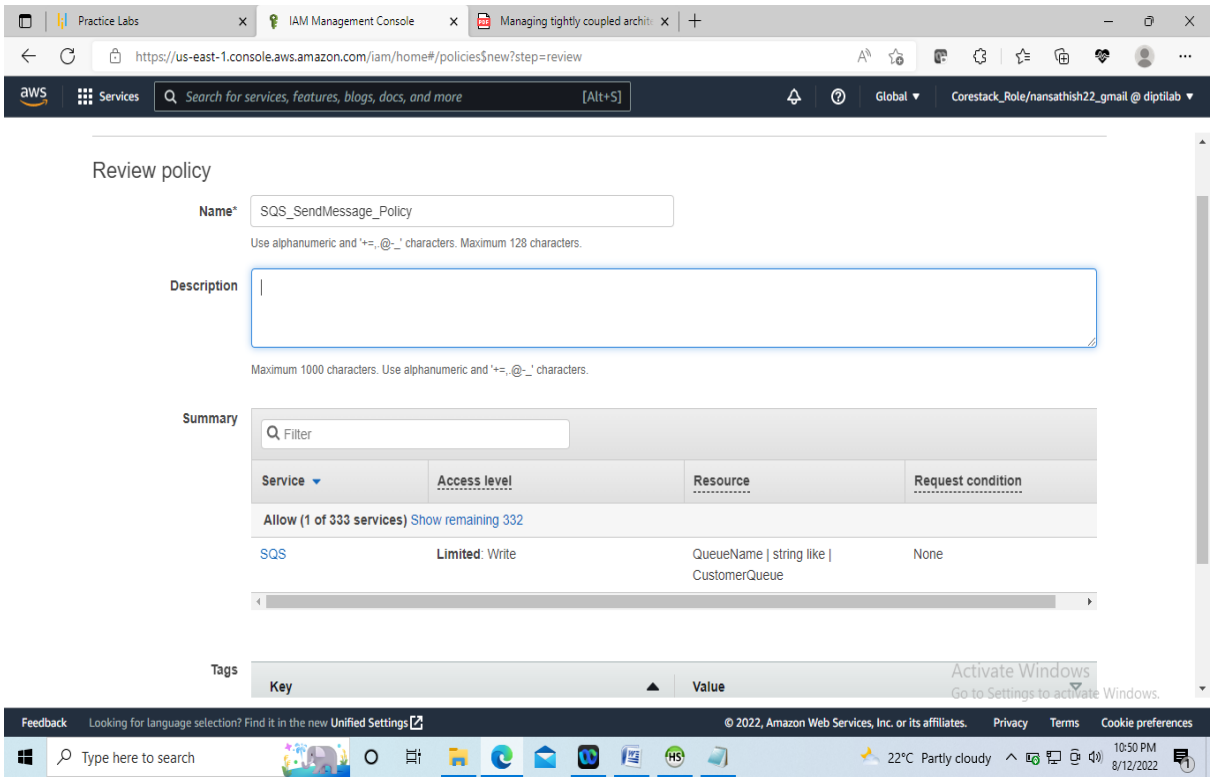


Step 21: Click on the JSON tab and paste the below JSON. Make sure to replace the Queue ARN with the one you obtained from the previous step. Click on Review Policy.

```
{
 "Version": "2012-10-17", "Statement": [{
"Sid":"SQSSendMessage",
 "Effect": "Allow",
 "Action": "sqs:SendMessage",
"Resource": "arn:aws:sqs:us-east-1:304000509264:myqueue"
}] }
```



Step 22: Enter the policy name as SQS_SendMessage_Policy and click on Create policy.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Review policy
Name*
SQS_SendMessage_Policy
Use alphanumeric and '+=,.@-_' characters. Maximum 128 characters.
Description
Maximum 1000 characters. Use alphanumeric and '+=,.@-_' characters.
Summary
Filter
Service
Access level
Resource
Request condition
Allow (1 of 333 services) Show remaining 332
SQS
Limited: Write
QueueName | string like | CustomerQueue
None
Tags
Key
Value
Activate Windows
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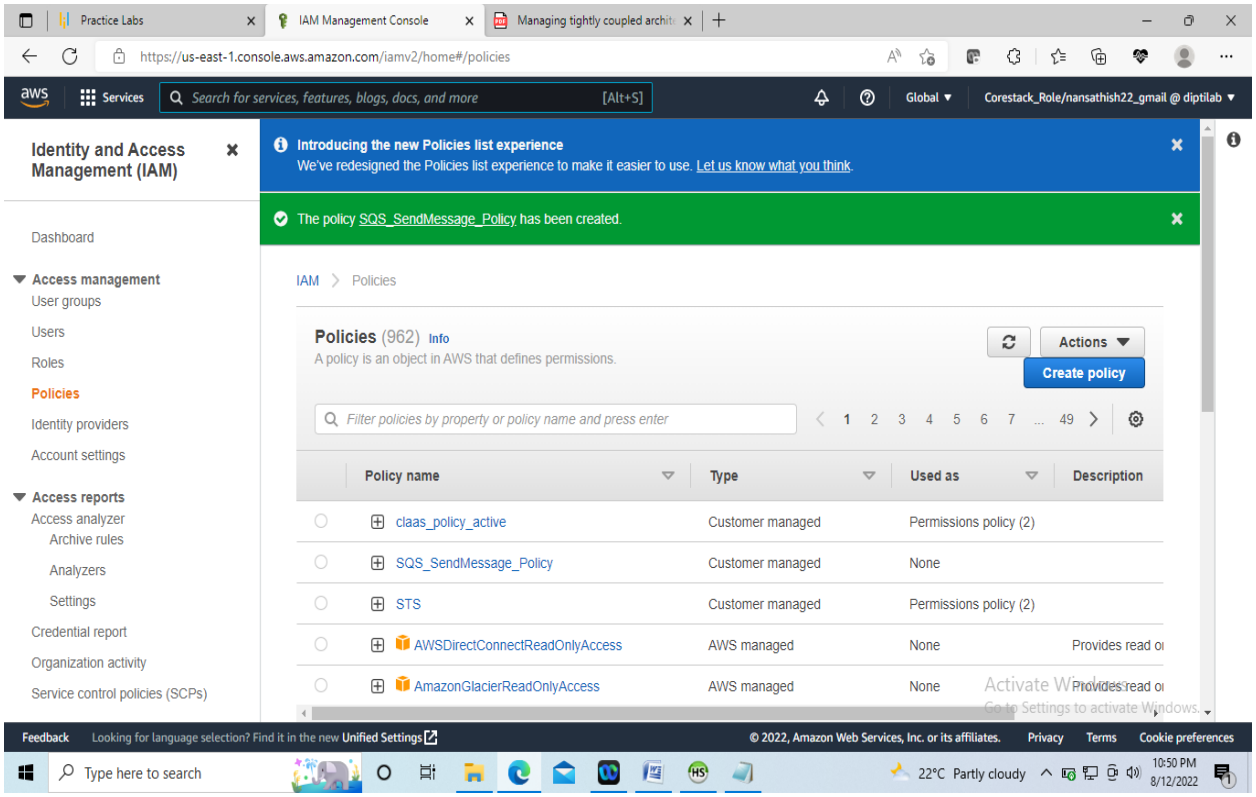
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Identity and Access Management (IAM)
Introducing the new Policies list experience
We've redesigned the Policies list experience to make it easier to use. Let us know what you think.
The policy SQS_SendMessage_Policy has been created.
Dashboard
Access management
User groups
Users
Roles
Policies
Identity providers
Account settings
Access reports
Access analyzer
Archive rules
Analyzers
Settings
Credential report
Organization activity
Service control policies (SCPs)
IAM > Policies
Policies (962) Info
A policy is an object in AWS that defines permissions.
Actions
Create policy
Filter policies by property or policy name and press enter
1 2 3 4 5 6 7 ... 49
Policy name
Type
Used as
Description
claas_policy_active
Customer managed
Permissions policy (2)
SQS_SendMessage_Policy
Customer managed
None
STS
Customer managed
Permissions policy (2)
AWSDirectConnectReadOnlyAccess
AWS managed
None
Provides read o
AmazonGlacierReadOnlyAccess
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None
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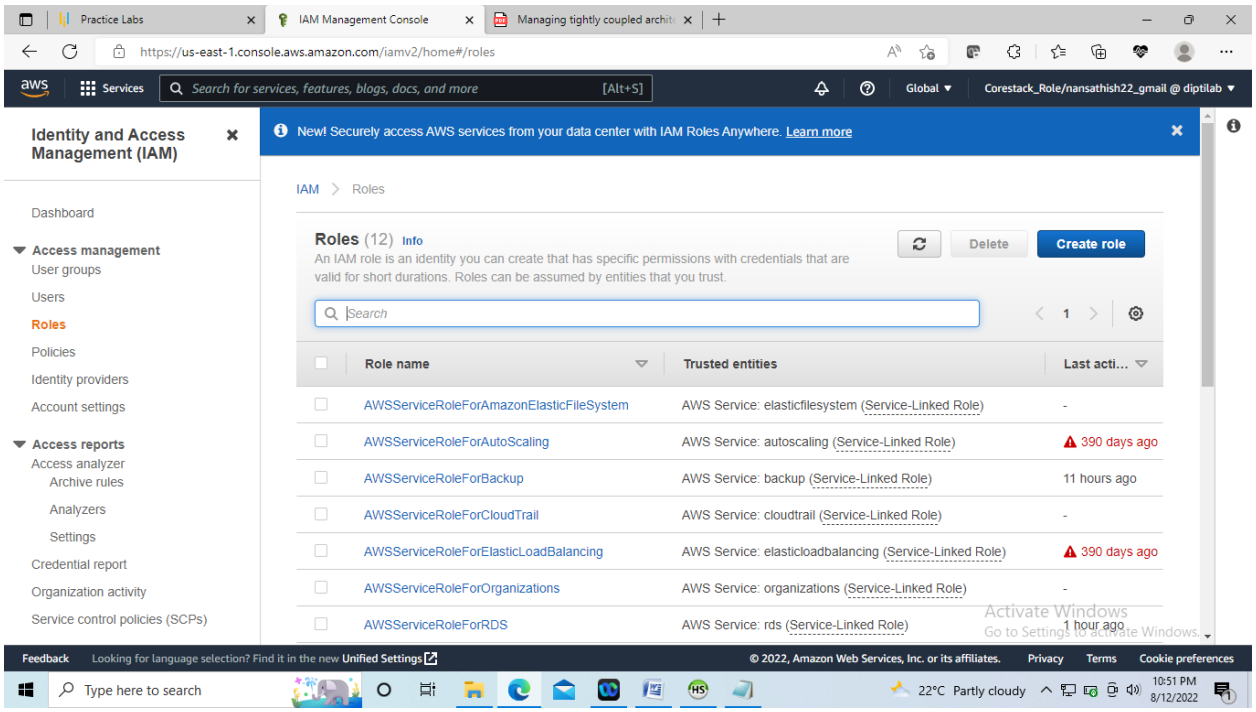
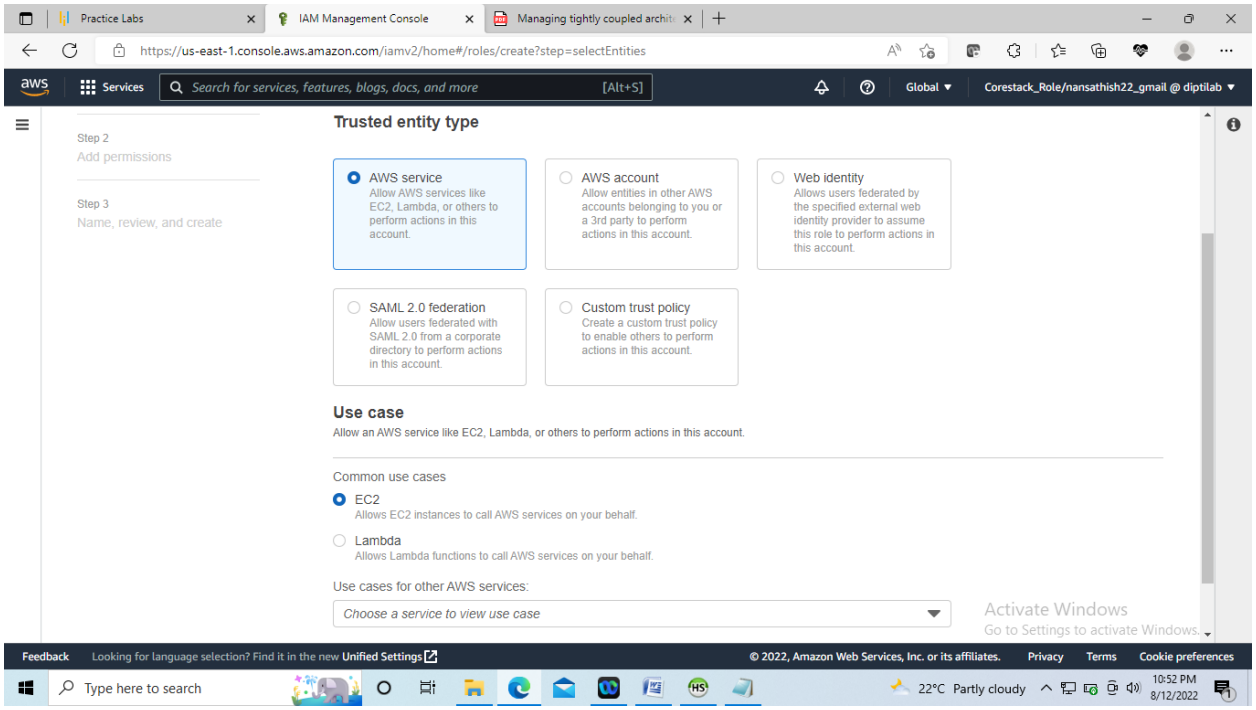
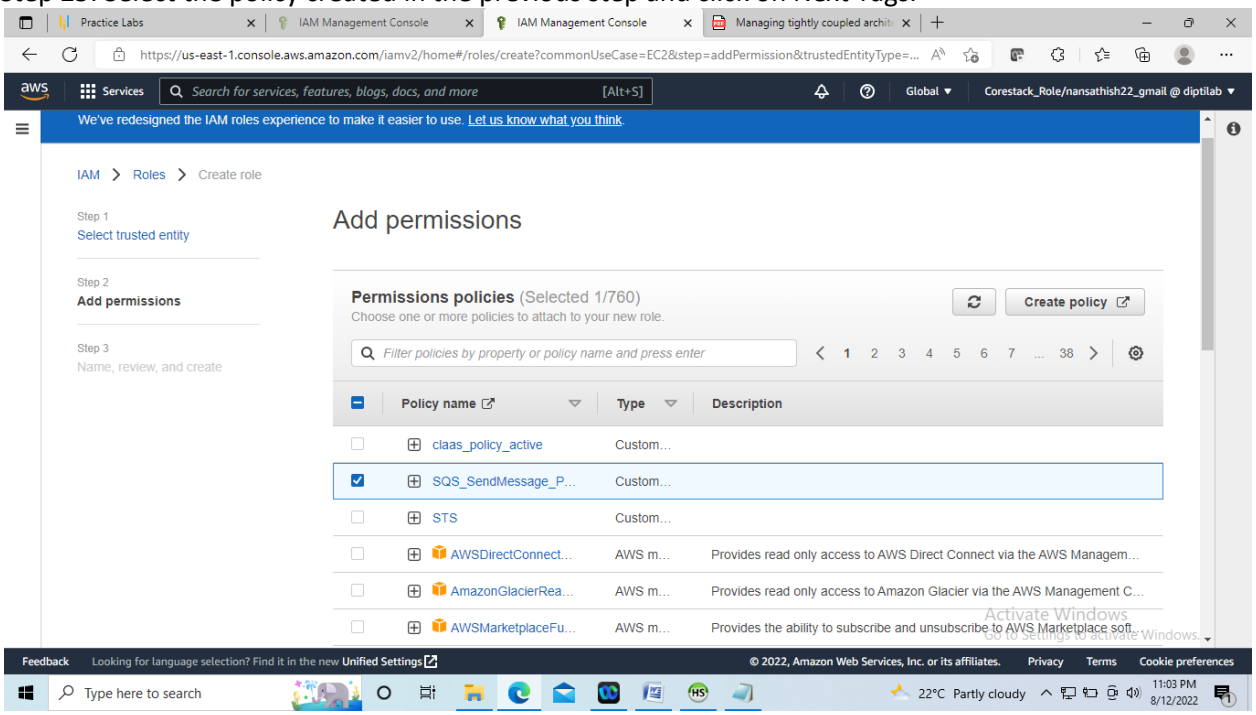
Step 23: Click on Roles and click on Create Role.



Step 24: Select EC2 as the service and click on Next Permissions.

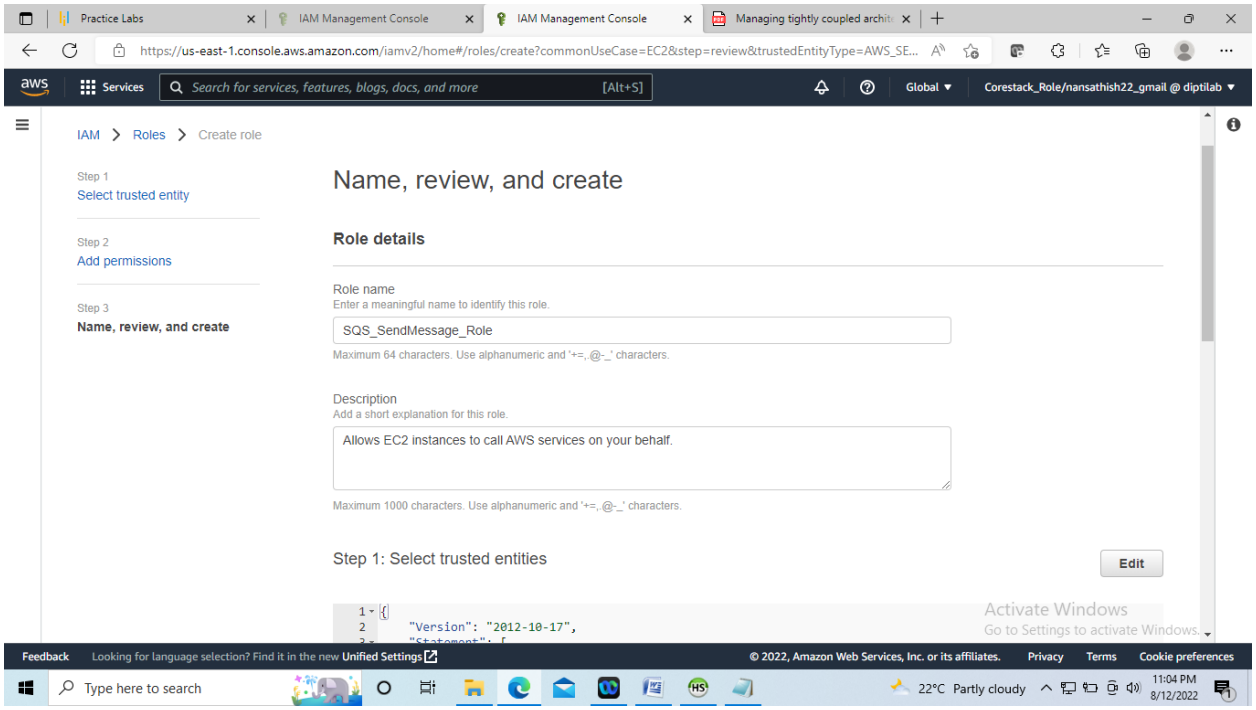


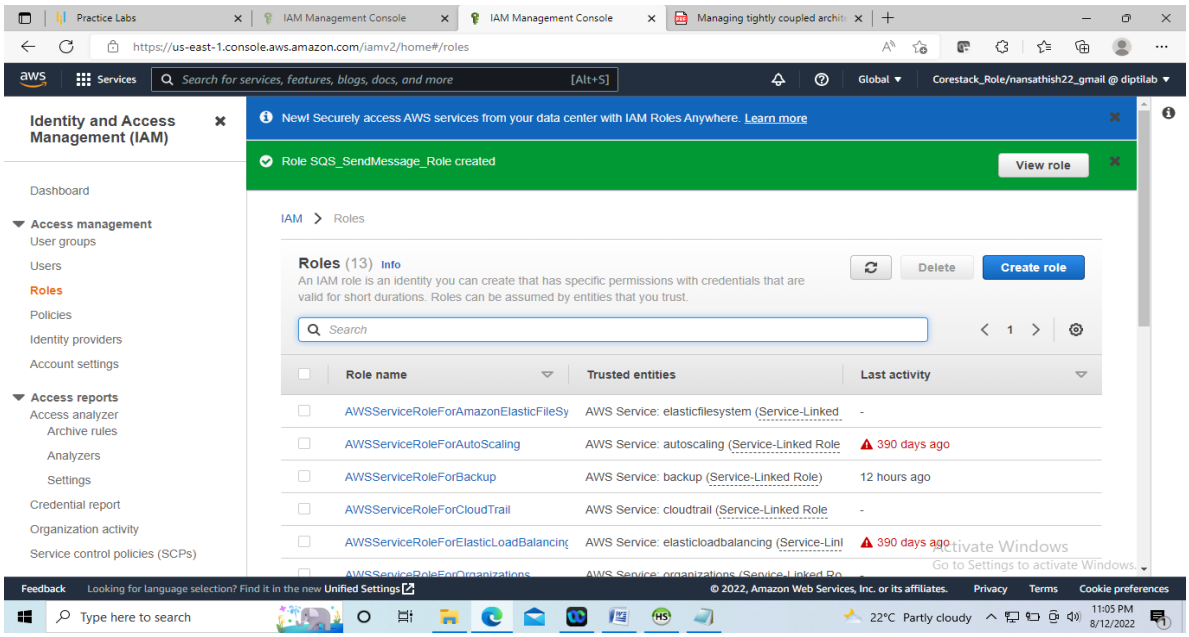
Step 25: Select the policy created in the previous step and click on Next Tags.



Step 26: Tags are optional. Click on Next Review.

Step 27: Enter the Role name as SQS_SendMessage_Role and click on Create Role.

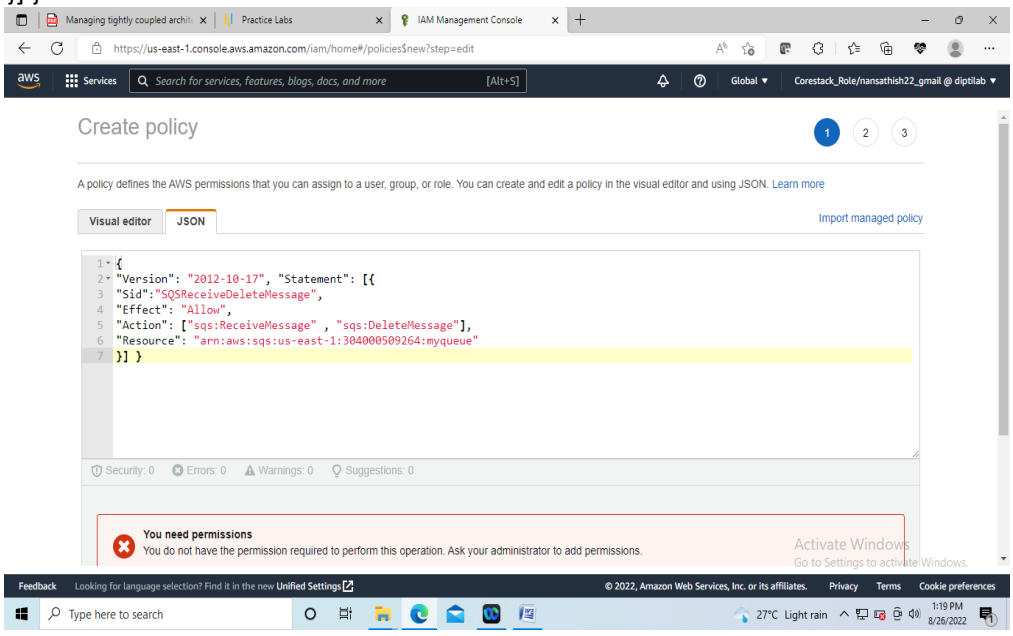


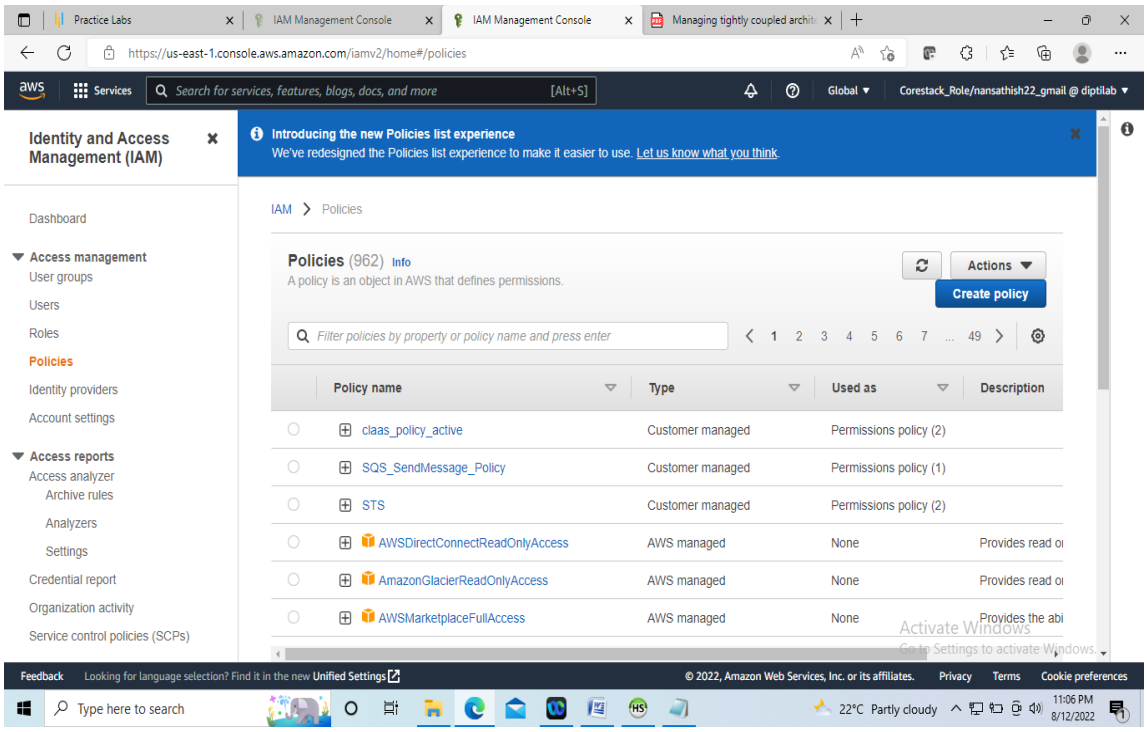


Step 28: Create another Policy called SQS_ReceiveDeleteMessage_Policy with the below JSON.

Make sure to replace the SQS Queue ARN. Create a role called SQS_ReceiveDeleteMessage_Role and attach the policy to it.

```
{
"Version": "2012-10-17",
 "Statement": [{ "Sid":"SQSReceiveDeleteMessage",
 "Effect": "Allow",
 "Action": ["sqs:ReceiveMessage" ,
"sqs:DeleteMessage"],
"Resource": "arn:aws:sqs:us-east-1:304000509264:myqueue"
 }] }
```

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AWSDirectConnectReadOnlyAccess
AWS managed
None
AmazonGlacierReadOnlyAccess
AWS managed
None
AWSMarketplaceFullAccess
AWS managed
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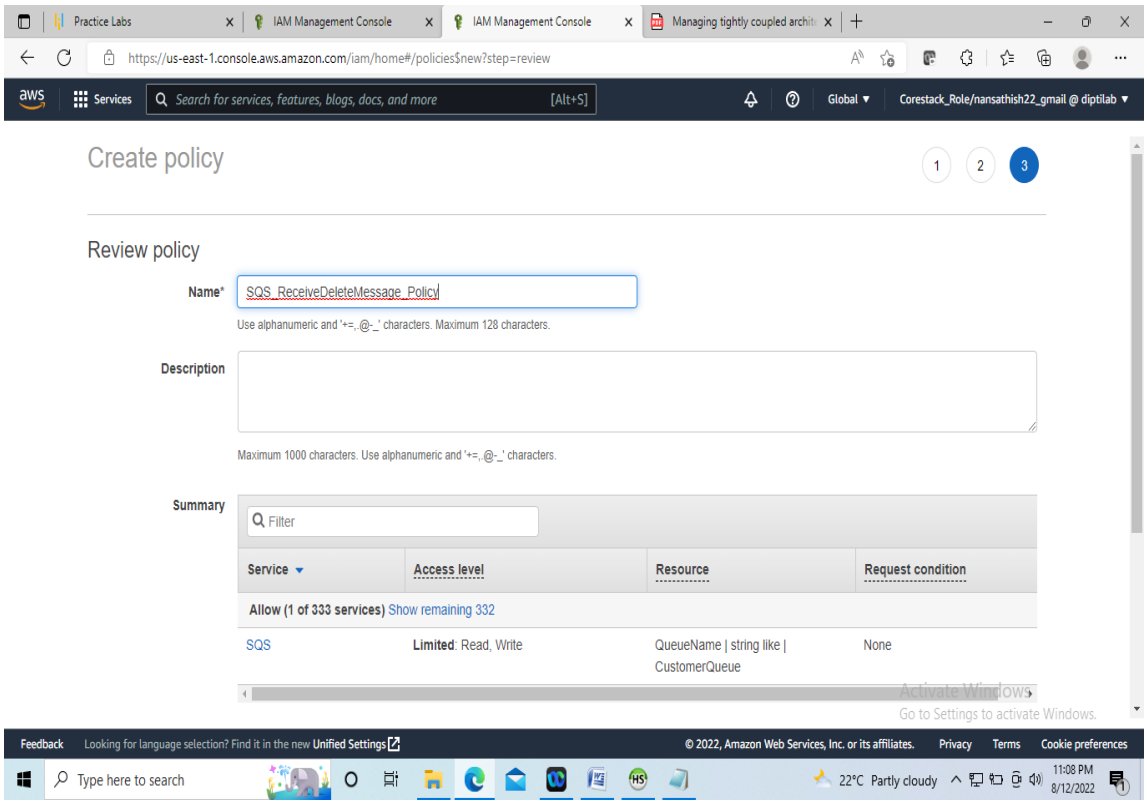
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1
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3
Review policy
Name*
SQS_ReceiveDeleteMessage_Policy
Use alphanumeric and '+=,.@-_' characters. Maximum 128 characters.
Description
Maximum 1000 characters. Use alphanumeric and '+=,.@-_' characters.
Summary
Filter
Service
Access level
Resource
Request condition
Allow (1 of 333 services) Show remaining 332
SQS
Limited: Read, Write
QueueName | string like | CustomerQueue
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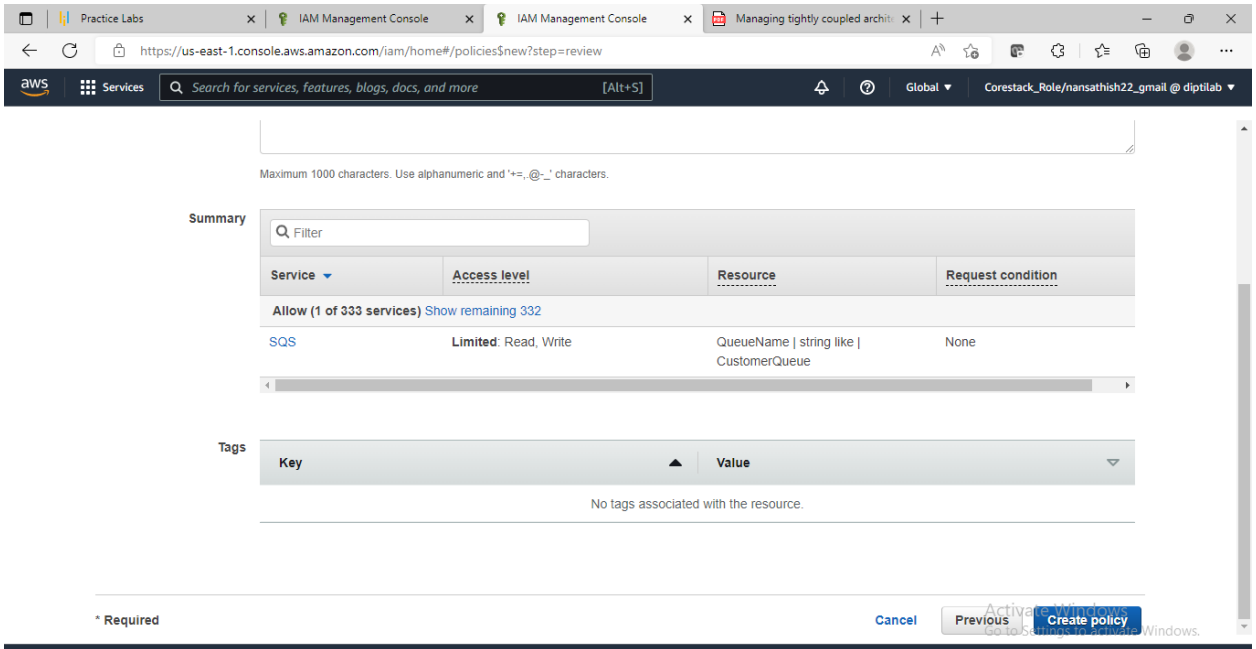
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Key
Value
No tags associated with the resource.
* Required
Cancel
Previous
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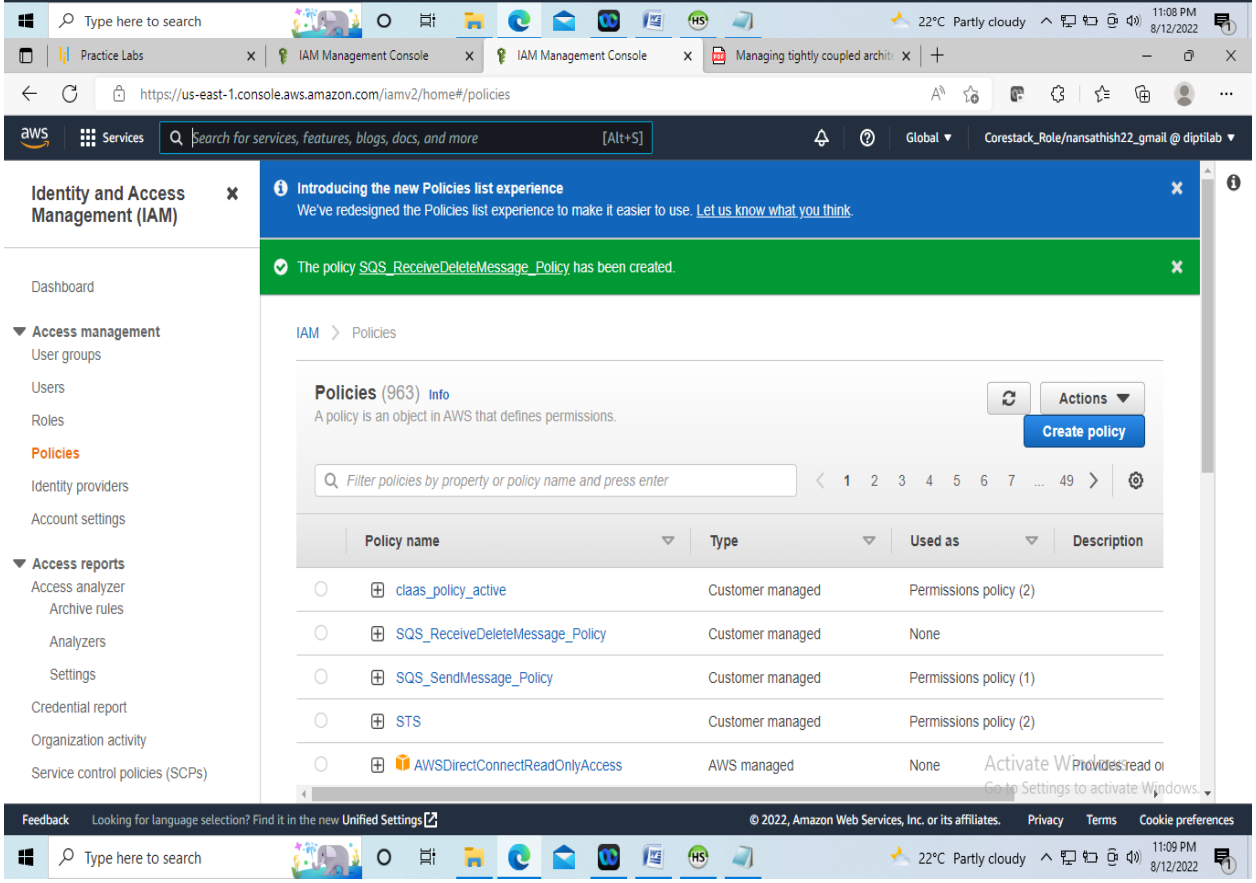
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The policy SQS_ReceiveDeleteMessage_Policy has been created.
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Account settings
Access reports
Access analyzer
Archive rules
Analyzers
Settings
Credential report
Organization activity
Service control policies (SCPs)
IAM
Policies
Policies (963) Info
A policy is an object in AWS that defines permissions.
Actions
Create policy
Filter policies by property or policy name and press enter
1 2 3 4 5 6 7 ... 49
Policy name
Type
Used as
Description
claas_policy_active
Customer managed
Permissions policy (2)
SQS_ReceiveDeleteMessage_Policy
Customer managed
None
SQS_SendMessage_Policy
Customer managed
Permissions policy (1)
STS
Customer managed
Permissions policy (2)
AWSDirectConnectReadOnlyAccess
AWS managed
None
Activate Windows
Go to Settings to activate Windows.
Feedback
Looking for language selection? Find it in the new Unified Settings
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Type here to search
22°C Partly cloudy
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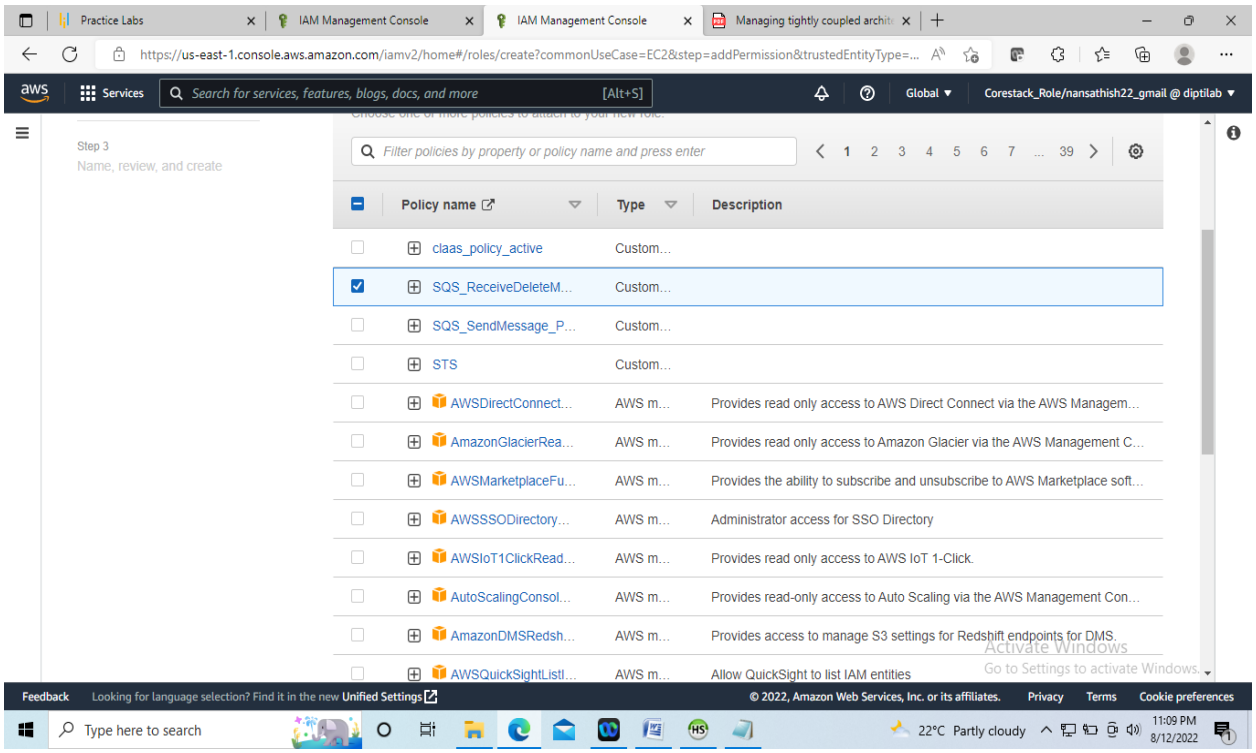
8/12/2022


Practice Labs
IAM Management Console
IAM Management Console
Managing tightly coupled archit
https://us-east-1.console.aws.amazon.com/iamv2/home#/roles/create?commonUseCase=EC2&step=addPermission&trustedEntityType=...
Services
Search for services, features, blogs, docs, and more
[Alt+S]
Global
Corestack_Role/nansathish22_gmail @ diptilab
Step 3
Name, review, and create
Filter policies by property or policy name and press enter
1 2 3 4 5 6 7 ... 39
Policy name
Type
Description
claas_policy_active
Custom...
SQS_ReceiveDeleteM...
Custom...
SQS_SendMessage_P...
Custom...
STS
Custom...
AWSDirectConnect...
AWS m...
Provides read only access to AWS Direct Connect via the AWS Managem...
AmazonGlacierRea...
AWS m...
Provides read only access to Amazon Glacier via the AWS Management C...
AWSMarketplaceFu...
AWS m...
Provides the ability to subscribe and unsubscribe to AWS Marketplace soft...
AWSSSODirectory...
AWS m...
Administrator access for SSO Directory
AWSIoT1ClickRead...
AWS m...
Provides read only access to AWS IoT 1-Click.
AutoScalingConsol...
AWS m...
Provides read-only access to Auto Scaling via the AWS Management Con...
AmazonDMSRedsh...
AWS m...
Provides access to manage S3 settings for Redshift endpoints for DMS.
AWSQuickSightListI...
AWS m...
Allow QuickSight to list IAM entities
Activate Windows
Go to Settings to activate Windows.
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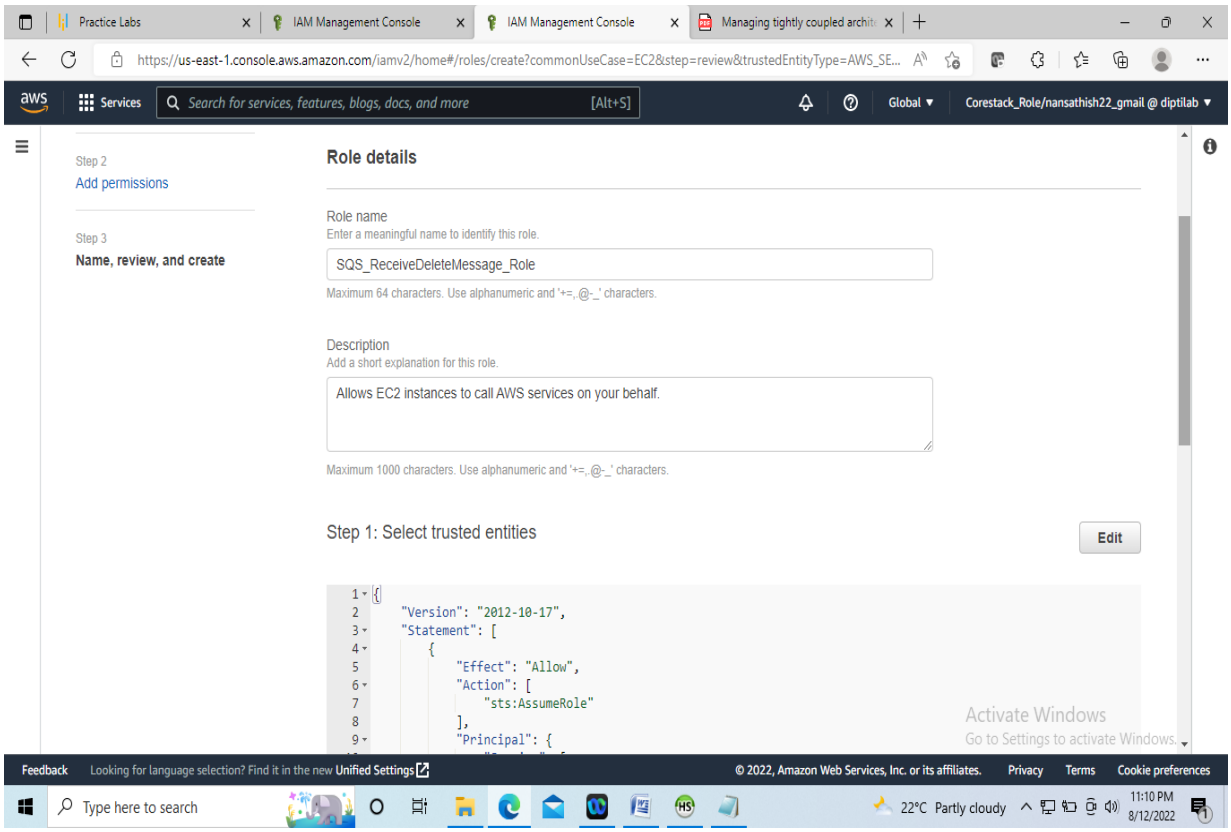
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IAM Management Console
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https://us-east-1.console.aws.amazon.com/iamv2/home#/roles/create?commonUseCase=EC2&step=review&trustedEntityType=AWS_SE...
Services
Search for services, features, blogs, docs, and more
[Alt+S]
Global
Corestack_Role/nansathish22_gmail @ diptilab
Step 2
Add permissions
Step 3
Name, review, and create
Role details
Role name
Enter a meaningful name to identify this role.
SQS_ReceiveDeleteMessage_Role
Maximum 64 characters. Use alphanumeric and '+=,.@-_' characters.
Description
Add a short explanation for this role.
Allows EC2 instances to call AWS services on your behalf.
Maximum 1000 characters. Use alphanumeric and '+=,.@-_' characters.
Step 1: Select trusted entities
Edit
{
"Version": "2012-10-17",
"Statement": [
{
"Effect": "Allow",
"Action": [
"sts:AssumeRole"
],
"Principal": {
Activate Windows
Go to Settings to activate Windows.
Feedback
Looking for language selection? Find it in the new Unified Settings
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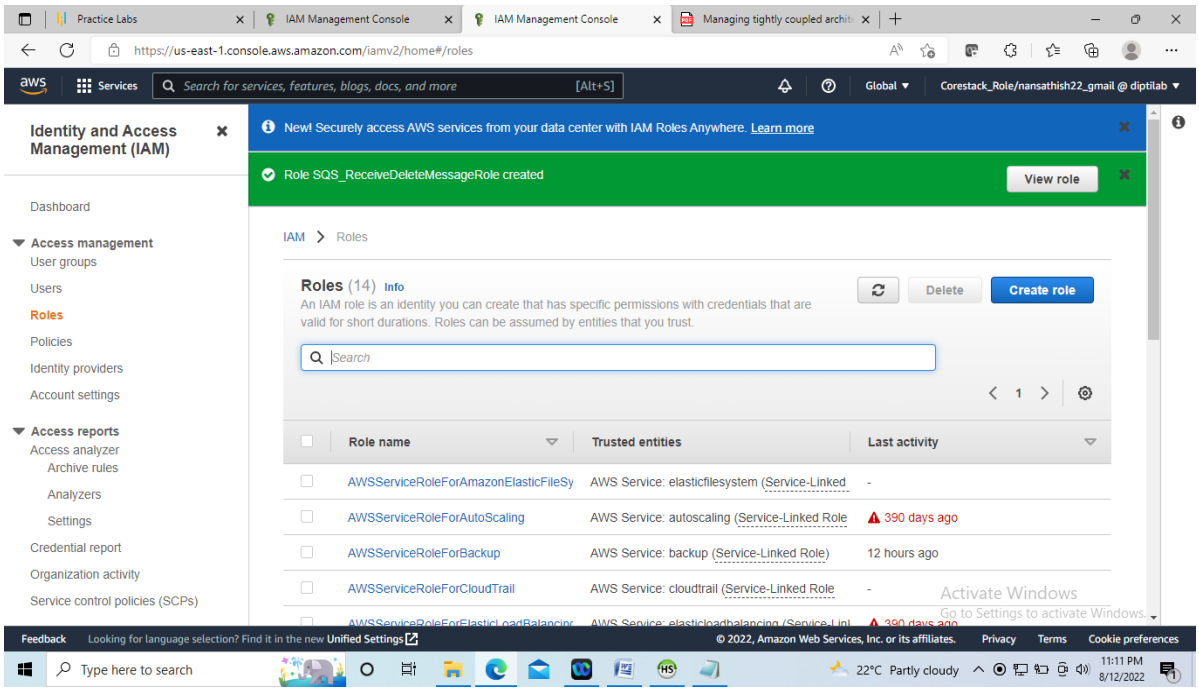
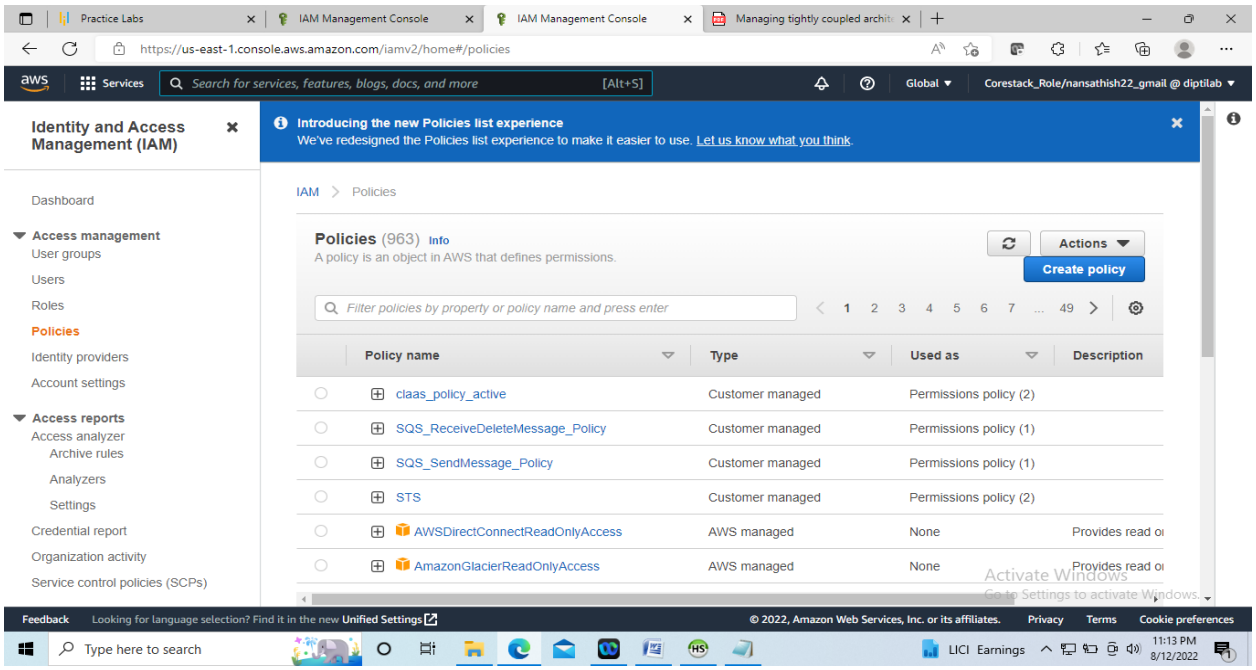
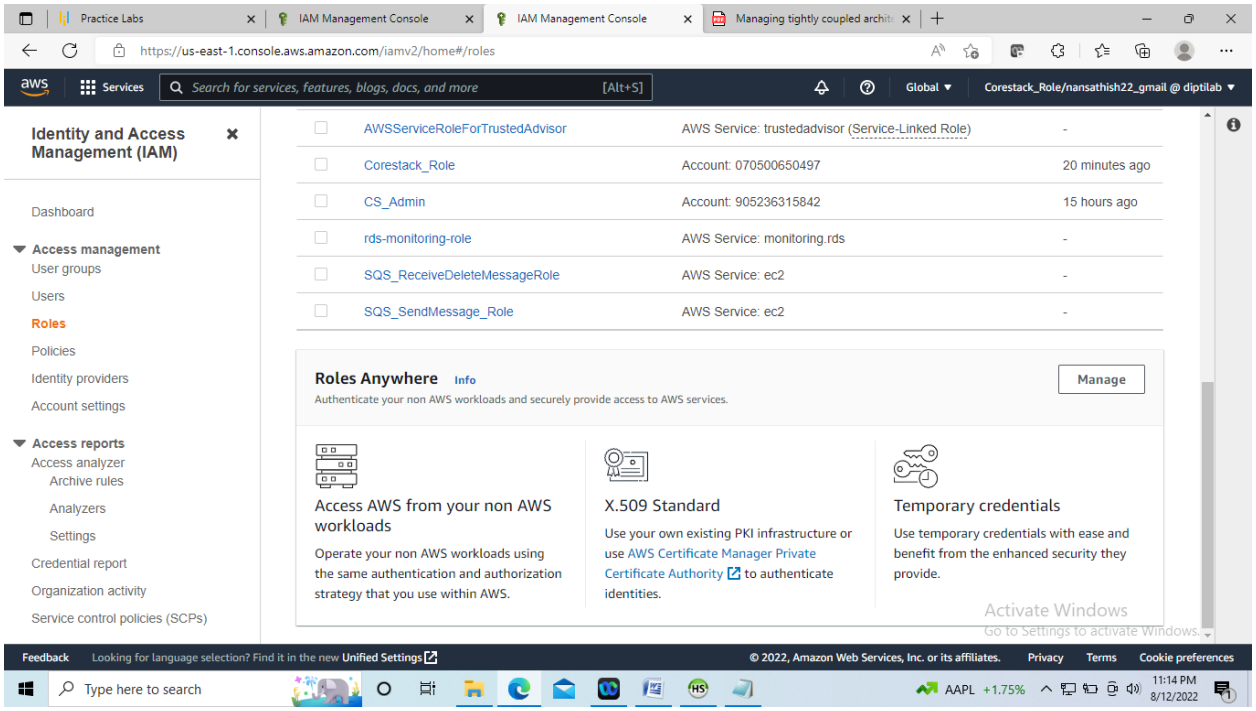
8/12/2022



Step 29: At the end, two policies and two roles should be created, as shown below.

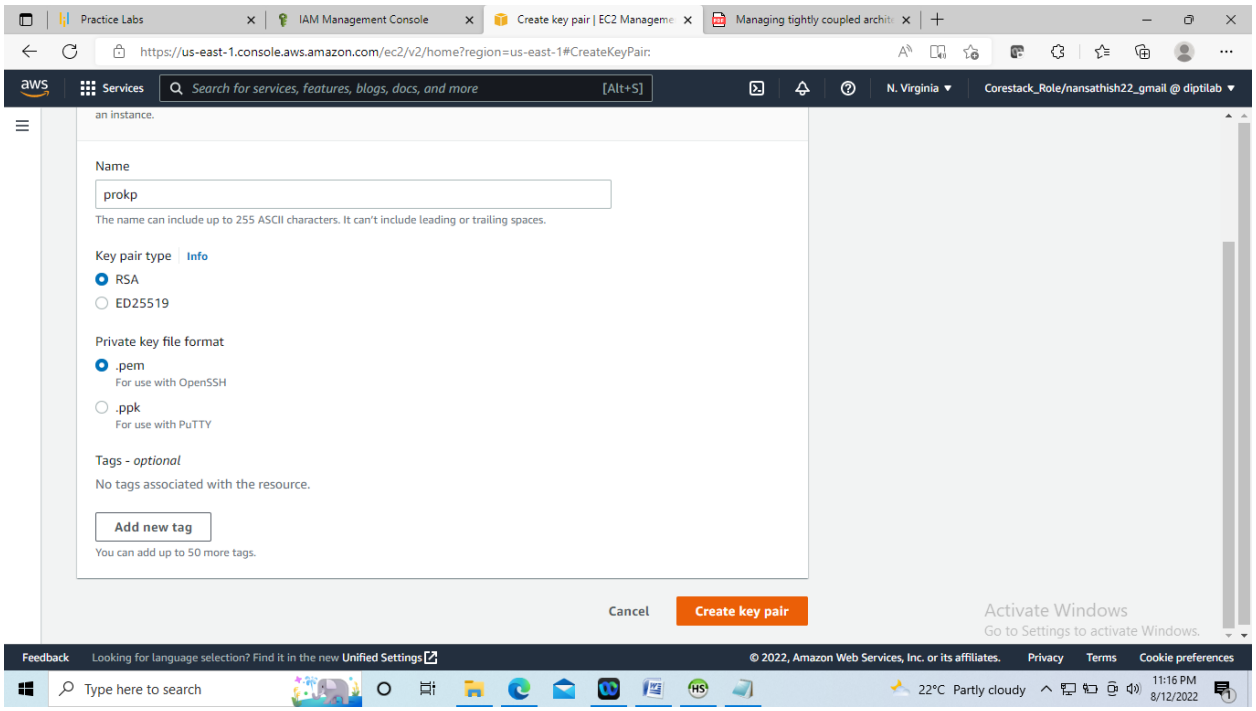


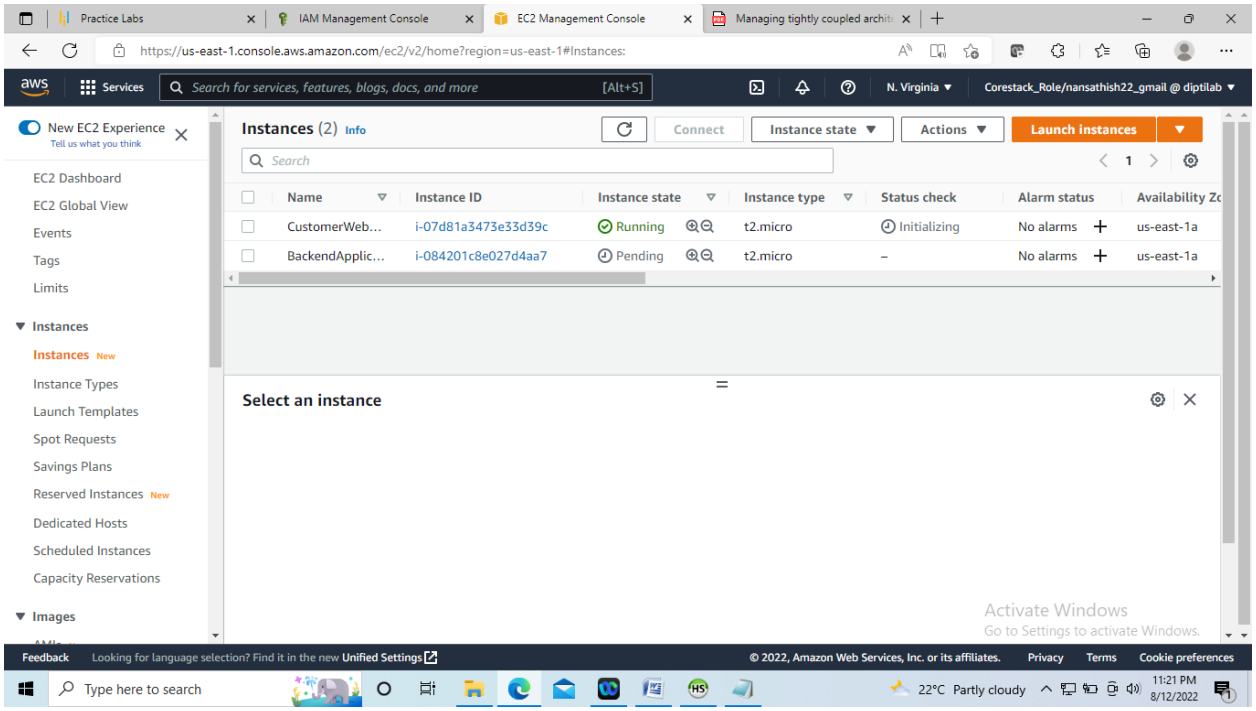


Step 30: Create two EC2 Instances and name them as CustomerWebApplication and BackendApplication with the below details.

Make sure to select the KeyPair. –

Amazon Linux 2 Kernel 5.10 AMI 2.0.20220805.0 x86_64 HVM gp2 - t2.micro - SecurityGroup with 22/SSH inbound

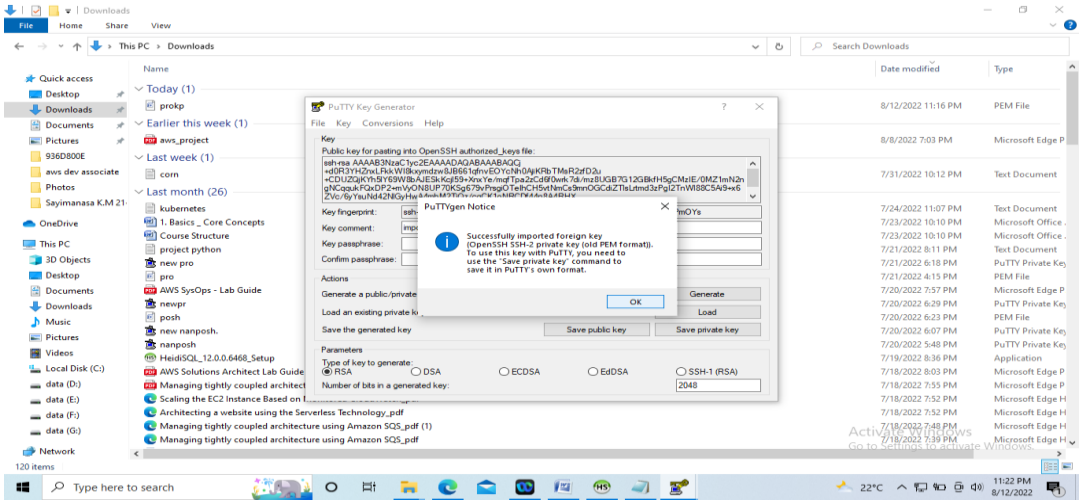




Step 31: Login to the EC2 instances via PuTTY. Execute the below commands on both the EC2 instances. See the exception.

Step 32: Attach the SQS_SendMessage_Role Role to the CustomerWebApplication EC2 Instance. Attach the SQS_ReceiveDeleteMessage_Role Role to the BackendApplication EC2 Instance.

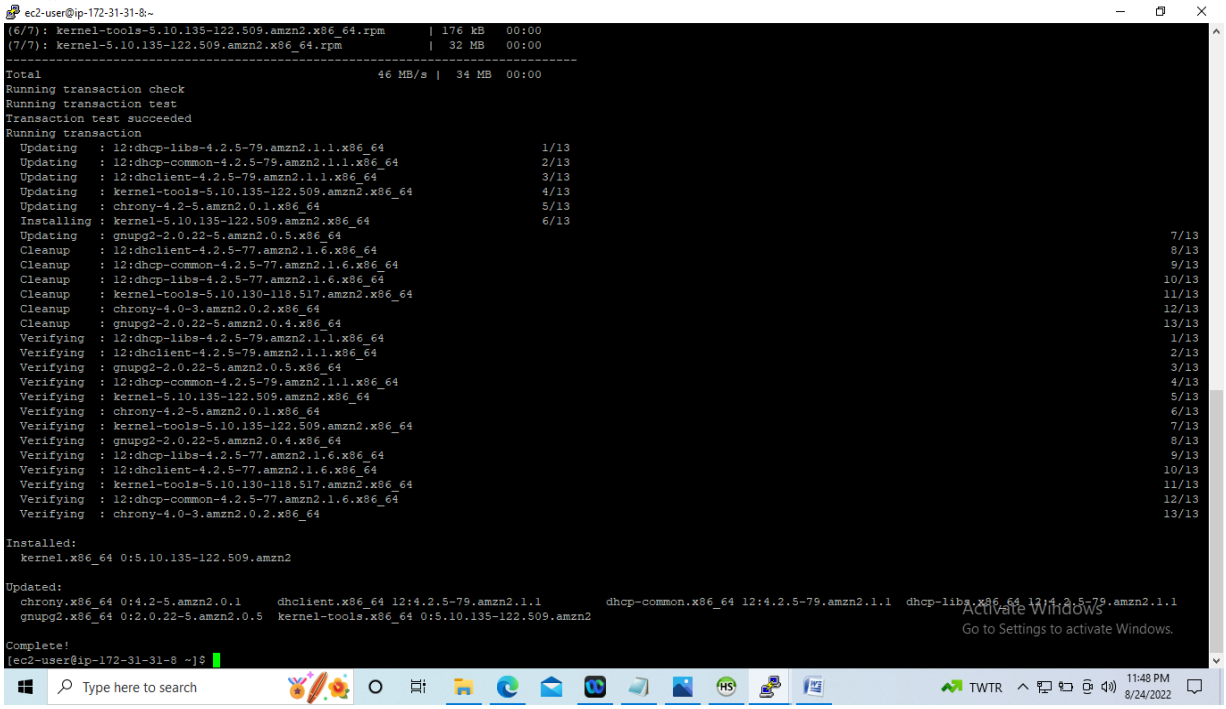
Generate private key using puttykeygen

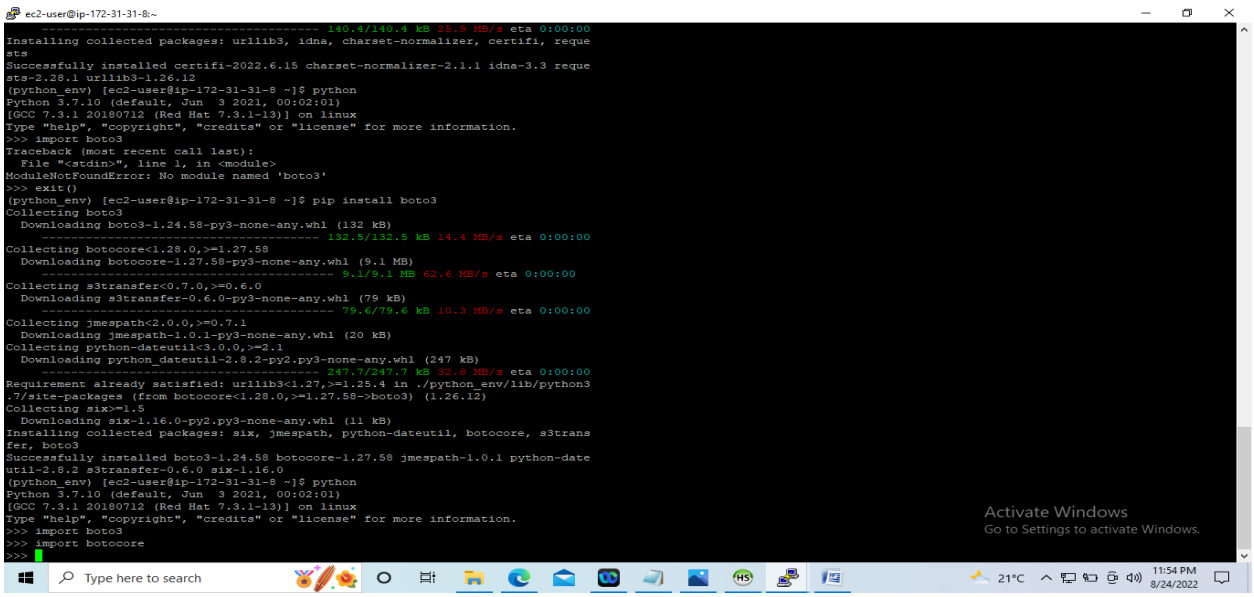


#become root

sudo su -
#get the list of softwares apt-get update
#install python
Sudo yum update –y

Sudo yum install python3 –y
#create env and activate
Python3 –m venv python_env
Source python_env/bin/activate
#install python lib
Pip install - -upgrade pip && pip install requests
#To execute pip commands apt install python-pip
 #install Python AWS SDK and MySQL drivers pip install boto3 pip install mysql-connector-python (only on the "BackendApplication" EC2 Instance) exit
 mkdir .aws
 echo -e "[default]\nregion=us-east-1" > .aws/config
Check :
Python
Import boto3
Import botocore
Exit()





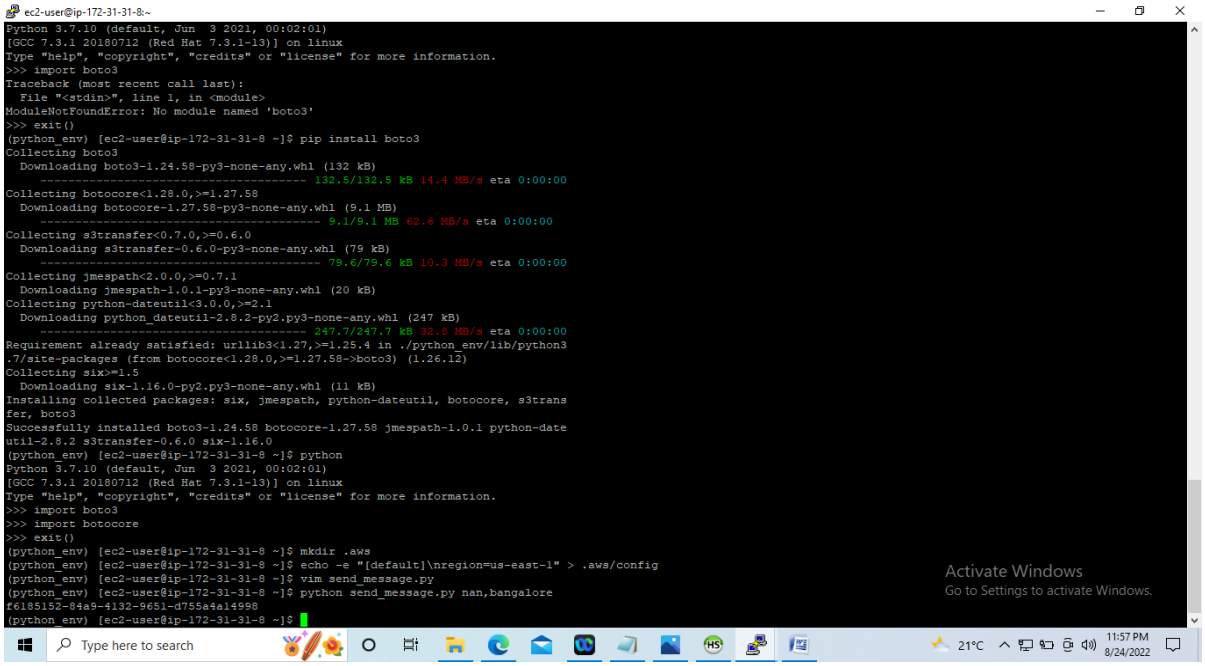
Step 33: Create a file send_message.py with the below code on the CustomerWebApplication EC2 instance.

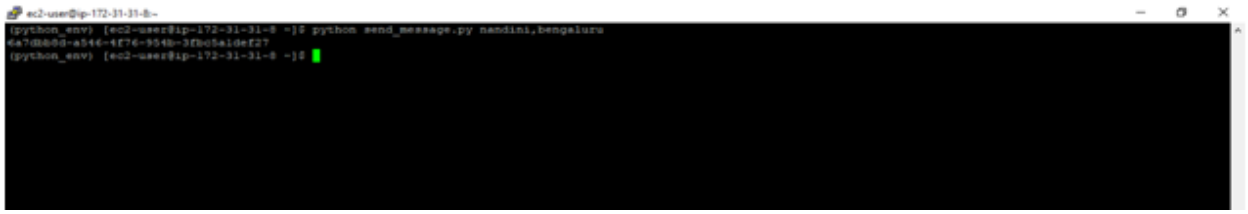
send_message.py

```
import sys

import boto3

sqs = boto3.client('sqs')

queue_url = 'https://sqs.us-east-1.amazonaws.com/070500650497/myqueue'

response = sqs.send_message( QueueUrl=queue_url, MessageBody=(sys.argv[1]) )

print(response['MessageId'])
```

Step 34: Execute the below commands to put the messages in the Queue.

python send_message.py nan,bangalore





Step 35: Create a file write_to_rds.py with the below code on the BackendApplication EC2 instance. Make sure to change the queue_url and the database details. The below program reads the message from Queue and inserts a row in the RDS/MySQL Database.

write_rds.py

```
import time
import boto3
import mysql.connector
sqs = boto3.client('sqs')
queue_url = 'https://sqs.us-east-1.amazonaws.com/070500650497/myqueue'
host = 'customerdatabase1.ciqyafyzagmn.us-east-1.rds.amazonaws.com'
user = 'Nandini'
password = 'nandini1'
database='Customerdatabase1'
mydb = mysql.connector.connect(host=host, user=user, password=password, database=database)
mycursor = mydb.cursor()
response = sqs.receive_message(QueueUrl=queue_url)
message = response['Messages'][0]
receipt_handle = message['ReceiptHandle']
sqs.delete_message( QueueUrl=queue_url, ReceiptHandle=receipt_handle )
print('Received and deleted message: %s' % message["Body"])
customerDetails = message["Body"]
```

```
customerDetailsList = customerDetails.split(',')
name = customerDetailsList[0]
address = customerDetailsList[1]
val = (name, address)
sql = "INSERT INTO customers (name, address) VALUES (%s, %s)"
mycursor.execute(sql, val)
mydb.commit()
print("Record inserted in the DB")
```

Step 36: Wait for a few minutes and execute the python write_to_rds.py command to get the message from the Queue and insert a row in the database.

Here, we are trying to mimic the backend application being down. Notice that the messages between the web application are not lost despite waiting for a few minutes or the backend application being down. This is how highly available applications are built.

Step 37: Go back to the HeidiSQL and execute the select * from customers query to fetch the customers details.