



School of Computer Science, Engineering and Applications(SCSEA)

B.C.A. TY (CCSA)

Subject : Infrastructure Orchestration (P)

Name of the Student: Prakhar Anil Sharma

PRN: 20220801121

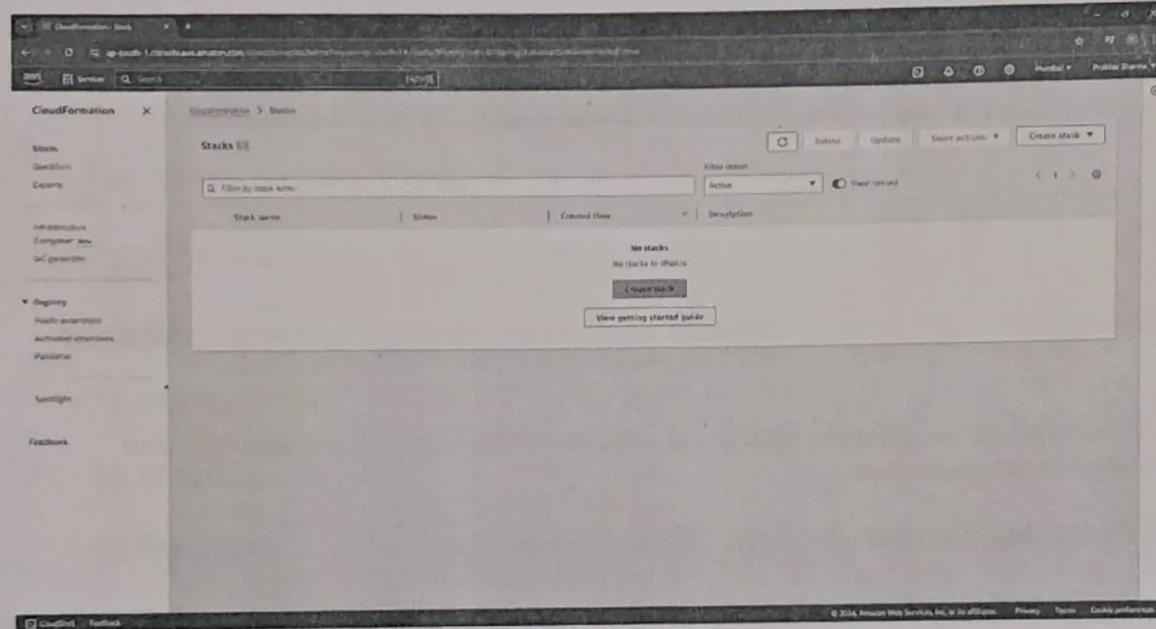
Title of Practical : YAML CloudFormation Template for AWS: Creating a VPC with Public and Private Subnets and Deploying EC2 Instances with SNS Integration

Step-1] Sign in to AWS Management Console .

Step-2] Search for CloudFormation .

Step-3] Click on Stacks .

Step-4] Click on Create Stack .



Step-5] In Prerequisite – Prepare template , select Choose an existing template .

Step-6] In Specify template , select Template source as Upload a template .



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The screenshot shows the AWS CloudFormation 'Create stack' wizard. The left sidebar lists 'CloudFormation' services like Stacks, StackSets, Exports, Infrastructure Composer, IaC generator, Registry, Spotlight, and Feedback. The main panel is titled 'Create stack' and 'Step 1: Create stack'. It has four tabs: Step 1 (selected), Step 2 (Specify stack details), Step 3 (Configure stack options), and Step 4 (Review and create). Under Step 1, there's a 'Prerequisite – Prepare template' section with a note about creating a template from existing resources. Below it is a 'Prepare template' section with three options: 'Choose an existing template' (radio button selected), 'Use a sample template' (radio button), and 'Build from Infrastructure Composer' (radio button). The 'Choose an existing template' section includes a link to 'Upload or choose an existing template.' Further down are sections for 'Specify template' (info: A template is a JSON or YAML file that describes your stack's resources and properties) and 'Template source' (Amazon S3 URL, Upload a template file, Sync from Git). At the bottom, there's a note about the generated S3 URL and a 'View in Infrastructure Composer' link. The bottom navigation bar includes 'CloudShell', 'Feedback', and links to '© 2024, Amazon Web Services, Inc. or its affiliates.', 'Privacy', 'Terms', and 'Cookie preferences'.

Step-7] Now open a code editor like VSCode and write your YAML Script in it and save it on your PC/Laptop with .yaml extension .

AWSTemplateFormatVersion: '2010-09-09'

Description: CloudFormation template to create a VPC with public and private subnets, launch EC2 instances (CentOS & Ubuntu), and notify via SNS.

Parameters:

KeyPair:



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Description: Name of the existing EC2 KeyPair to enable SSH access to the instances

Type: AWS::EC2::KeyPair::KeyName

InstanceType:

Description: EC2 instance type for both instances

Type: String

Default: t2.micro

AllowedValues:

- t2.micro
- t2.small
- t2.medium

EmailAddress:

Description: Email address to send notification after instance creation

Type: String

Default: "20220801121@dypiu.ac.in"



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Resources:

VPC

MyVPC:

Type: AWS::EC2::VPC

Properties:

CidrBlock: 10.0.0.0/16

EnableDnsSupport: true

EnableDnsHostnames: true

Tags:

- Key: Name

Value: VPC-CCSA-TY-1121

Internet Gateway

InternetGateway:

Type: AWS::EC2::InternetGateway

AttachGateway:



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Type: AWS::EC2::VPCGatewayAttachment

Properties:

VpcId: !Ref MyVPC

InternetGatewayId: !Ref InternetGateway

Public Subnet in ap-south-1a

PublicSubnetA:

Type: AWS::EC2::Subnet

Properties:

VpcId: !Ref MyVPC

CidrBlock: 10.0.1.0/24

MapPublicIpOnLaunch: true

AvailabilityZone: ap-south-1a

Tags:

- Key: Name

Value: PublicSubnetA

Public Subnet in ap-south-1b



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PublicSubnetB:

Type: AWS::EC2::Subnet

Properties:

VpcId: !Ref MyVPC

CidrBlock: 10.0.2.0/24

MapPublicIpOnLaunch: true

AvailabilityZone: ap-south-1b

Tags:

- Key: Name

Value: PublicSubnetB

Private Subnet in ap-south-1a

PrivateSubnetA:

Type: AWS::EC2::Subnet

Properties:

VpcId: !Ref MyVPC

CidrBlock: 10.0.3.0/24

AvailabilityZone: ap-south-1a



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Tags:

- Key: Name

Value: PrivateSubnetA

Private Subnet in ap-south-1b

PrivateSubnetB:

Type: AWS::EC2::Subnet

Properties:

VpcId: !Ref MyVPC

CidrBlock: 10.0.4.0/24

AvailabilityZone: ap-south-1b

Tags:

- Key: Name

Value: PrivateSubnetB

Route Table for Public Subnets

PublicRouteTable:

Type: AWS::EC2::RouteTable



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Properties:

VpcId: !Ref MyVPC

Tags:

- Key: Name

Value: PublicRouteTable-CCSA-TY-1121

PublicRoute:

Type: AWS::EC2::Route

Properties:

RouteTableId: !Ref PublicRouteTable

DestinationCidrBlock: 0.0.0.0/0

GatewayId: !Ref InternetGateway

PublicSubnetARouteTableAssociation:

Type: AWS::EC2::SubnetRouteTableAssociation

Properties:

SubnetId: !Ref PublicSubnetA

RouteTableId: !Ref PublicRouteTable



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PublicSubnetBRouteTableAssociation:

Type: AWS::EC2::SubnetRouteTableAssociation

Properties:

SubnetId: !Ref PublicSubnetB

RouteTableId: !Ref PublicRouteTable

Elastic IP for the NAT Gateway

NatEIP:

Type: AWS::EC2::EIP

NAT Gateway for Private Subnets

NatGateway:

Type: AWS::EC2::NatGateway

Properties:

AllocationId: !GetAtt NatEIP.AllocationId

SubnetId: !Ref PublicSubnetA # NAT Gateway in Public Subnet A



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Route Table for Private Subnets

PrivateRouteTable:

Type: AWS::EC2::RouteTable

Properties:

VpcId: !Ref MyVPC

Tags:

- Key: Name

Value: PrivateRouteTable-CCSA-TY-1121

PrivateRoute:

Type: AWS::EC2::Route

Properties:

RouteTableId: !Ref PrivateRouteTable

DestinationCidrBlock: 0.0.0.0/0

NatGatewayId: !Ref NatGateway

PrivateSubnetARouteTableAssociation:

Type: AWS::EC2::SubnetRouteTableAssociation



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Properties:

SubnetId: !Ref PrivateSubnetA

RouteTableId: !Ref PrivateRouteTable

PrivateSubnetBRouteTableAssociation:

Type: AWS::EC2::SubnetRouteTableAssociation

Properties:

SubnetId: !Ref PrivateSubnetB

RouteTableId: !Ref PrivateRouteTable

Security Group for Public EC2 Instance

PublicSecurityGroup:

Type: AWS::EC2::SecurityGroup

Properties:

GroupDescription: Allow SSH and HTTP access

VpcId: !Ref MyVPC

SecurityGroupIngress:

- IpProtocol: tcp



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FromPort: 22

ToPort: 22

CidrIp: 0.0.0.0/0

- IpProtocol: tcp

FromPort: 80

ToPort: 80

CidrIp: 0.0.0.0/0

Public EC2 Instance (CentOS)

PublicEC2Instance:

Type: AWS::EC2::Instance

Properties:

InstanceType: !Ref InstanceType

KeyName: !Ref KeyPair

SubnetId: !Ref PublicSubnetA # Use PublicSubnetA for ap-south-1a

ImageId: ami-064ac61091898694e

SecurityGroupIds:



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- !Ref PublicSecurityGroup

Tags:

- Key: Name

Value: PublicCentOSInstance-CCSA-TY-1121

Private EC2 Instance (Ubuntu)

PrivateEC2Instance:

Type: AWS::EC2::Instance

Properties:

InstanceType: !Ref InstanceType

KeyName: !Ref KeyPair

SubnetId: !Ref PrivateSubnetA # PrivateSubnetA for ap-south-1a

ImageId: ami-0dee22c13ea7a9a67

Tags:

- Key: Name

Value: PrivateUbuntuInstance-CCSA-TY-1121

SNS Topic for email notification

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SNSTopic:

Type: AWS::SNS::Topic

Properties:

Subscription:

- Endpoint: !Ref EmailAddress

Protocol: email

TopicName: EC2InstanceCreationTopic-CCSA-TY-1121

SNS Notification after EC2 creation

NotifyInstanceCreation:

Type: AWS::SNS::TopicPolicy

Properties:

Topics:

- !Ref SNSTopic

PolicyDocument:

Version: '2012-10-17'

Statement:

- Effect: Allow



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Principal: "*"

Action: "SNS:Publish"

Resource: !Ref SNSTopic

Outputs:

PublicEC2InstanceID:

Description: Public EC2 CentOS Instance ID

Value: !Ref PublicEC2Instance

PrivateEC2InstanceID:

Description: Private EC2 Ubuntu Instance ID

Value: !Ref PrivateEC2Instance

SNSTopicArn:

Description: SNS Topic ARN for notifications

Value: !Ref SNSTopic



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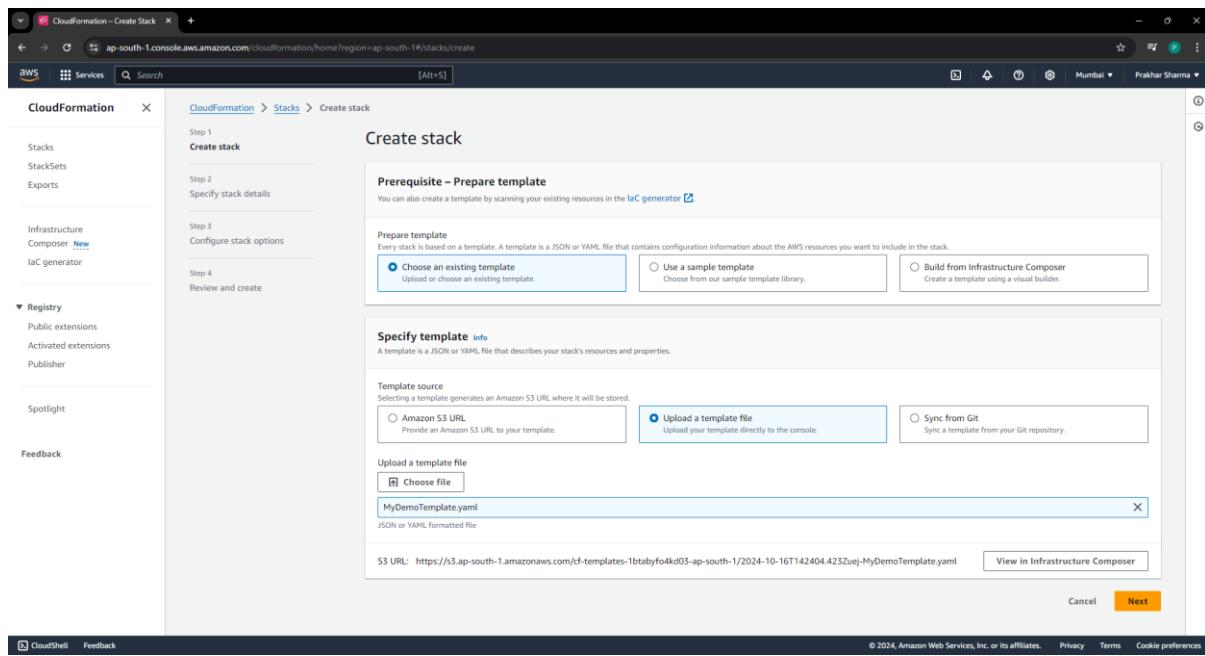
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Step-8] Now go back to your AWS browser tab.

Step-9] Now click on choose file.

Step-10] Now select your YAML Script and upload it .



The screenshot shows the AWS CloudFormation 'Create Stack' wizard. The left sidebar shows navigation options like CloudFormation, Services, and Infrastructure Composer. The main panel is titled 'Create stack' and 'Prerequisite – Prepare template'. It provides instructions to scan existing resources or use Infrastructure Composer. Under 'Prepare template', the 'Choose an existing template' radio button is selected, with a note to upload or choose an existing template. Below this, there's a 'Specify template info' section with a note about a JSON or YAML file describing the stack's resources. Under 'Template source', the 'Upload a template file' radio button is selected, with a note to upload directly from the console. A file input field shows 'MyDemoTemplate.yaml'. At the bottom, there's a 'Next Step' button.

Step-11] Click on next .

Step-12] Enter a Stack name .

Step-13] In Parameters ,Select the already created Key Pair .



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A screenshot of the AWS CloudFormation 'Create Stack' wizard. The left sidebar shows navigation options like 'CloudFormation', 'Stacks', 'Exports', and 'Infrastructure Composer'. The main panel is titled 'Specify stack details' and contains four tabs: 'Step 1 Create stack' (selected), 'Step 2 Specify stack details' (active), 'Step 3 Configure stack options', and 'Step 4 Review and create'. Under 'Step 2', there's a 'Provide a stack name' field containing 'CCSA-BCA-TY-1121'. Below it, under 'Parameters', there are fields for 'EmailAddress' (20220801121@dypiu.ac.in) and 'InstanceType' (t2.micro). At the bottom right are 'Cancel', 'Previous', and 'Next' buttons, with 'Next' being highlighted.

Step-14] Click on next .

Step-15] In Permissions , select the IAM Role.



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A screenshot of the AWS CloudFormation 'Create Stack' wizard, Step 3: Configure stack options. The interface shows sections for 'Tags - optional', 'Permissions - optional', and 'Stack failure options'. The 'Permissions' section includes a note about IAM roles and a warning about AWS CloudFormation's use of the selected role. The 'Stack failure options' section allows selecting a roll-back behavior: 'Roll back all stack resources' (selected) or 'Preserve successfully provisioned resources'.

Step-16] Click on next.

Step-17] Review the settings , and click on submit .



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Wait for few minutes till your stack creation is complete

Step-18] Go to Events tab in stack, to monitor the creation process .



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Timestamp	Logical ID	Status	Detailed status	Status reason
2024-10-16 19:55:09 UTC+0530	PrivateSubnetA	CREATE_IN_PROGRESS	-	-
2024-10-16 19:55:09 UTC+0530	PublicSecurityGroup	CREATE_IN_PROGRESS	-	-
2024-10-16 19:55:09 UTC+0530	MyVPC	CREATE_COMPLETE	-	-
2024-10-16 19:55:06 UTC+0530	NotifyInstanceCreation	CREATE_COMPLETE	-	-
2024-10-16 19:55:06 UTC+0530	NotifyInstanceCreation	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:55:05 UTC+0530	NotifyInstanceCreation	CREATE_IN_PROGRESS	-	-
2024-10-16 19:55:05 UTC+0530	SNSTopic	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-10-16 19:55:04 UTC+0530	SNSTopic	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:54:58 UTC+0530	NatEIP	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-10-16 19:54:58 UTC+0530	InternetGateway	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-10-16 19:54:58 UTC+0530	MyVPC	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:54:58 UTC+0530	NatEIP	CREATE_IN_PROGRESS	-	Resource creation initiated

Timestamp	Logical ID	Status	Detailed status	Status reason
2024-10-16 19:55:13 UTC+0530	PublicSubnetA	CREATE_COMPLETE	-	-
2024-10-16 19:55:13 UTC+0530	PublicSubnetB	CREATE_COMPLETE	-	-
2024-10-16 19:55:13 UTC+0530	InternetGateway	CREATE_COMPLETE	-	-
2024-10-16 19:55:13 UTC+0530	PrivateSubnetB	CREATE_COMPLETE	-	-
2024-10-16 19:55:13 UTC+0530	PrivateSubnetA	CREATE_COMPLETE	-	-
2024-10-16 19:55:13 UTC+0530	PublicSecurityGroup	CREATE_COMPLETE	-	-
2024-10-16 19:55:12 UTC+0530	PublicSecurityGroup	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:55:12 UTC+0530	AttachGateway	CREATE_COMPLETE	-	-
2024-10-16 19:55:11 UTC+0530	PublicRouteTable	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-10-16 19:55:11 UTC+0530	PrivateRouteTable	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-10-16 19:55:10 UTC+0530	PublicSubnetB	CREATE_IN_PROGRESS	-	Resource creation initiated



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Timestamp	Logical ID	Status	Detailed status	Status reason
2024-10-16 19:55:21 UTC+0530	PrivateRouteTable	CREATE_COMPLETE	-	-
2024-10-16 19:55:21 UTC+0530	PublicRouteTable	CREATE_COMPLETE	-	-
2024-10-16 19:55:17 UTC+0530	PublicEC2Instance	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-10-16 19:55:15 UTC+0530	PublicEC2Instance	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:55:15 UTC+0530	PublicSubnetARouteTableAssociation	CREATE_COMPLETE	-	-
2024-10-16 19:55:15 UTC+0530	PrivateEC2Instance	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:55:15 UTC+0530	PublicSubnetBRouteTableAssociation	CREATE_COMPLETE	-	-
2024-10-16 19:55:15 UTC+0530	PrivateSubnetBRouteTableAssociation	CREATE_COMPLETE	-	-
2024-10-16 19:55:15 UTC+0530	PublicSubnetARouteTableAssociation	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:55:15 UTC+0530	NatGateway	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:55:15 UTC+0530	PublicSubnetBRouteTableAssociation	CREATE_IN_PROGRESS	-	Resource creation initiated

Timestamp	Logical ID	Status	Detailed status	Status reason
2024-10-16 19:57:22 UTC+0530	CCSA-BCA-TY-1121	CREATE_COMPLETE	-	-
2024-10-16 19:57:21 UTC+0530	PrivateRoute	CREATE_COMPLETE	-	-
2024-10-16 19:57:21 UTC+0530	PrivateRoute	CREATE_IN_PROGRESS	-	Resource creation initiated
2024-10-16 19:57:20 UTC+0530	PrivateRoute	CREATE_IN_PROGRESS	-	-
2024-10-16 19:57:19 UTC+0530	NatGateway	CREATE_COMPLETE	-	-
2024-10-16 19:55:47 UTC+0530	PublicEC2Instance	CREATE_COMPLETE	-	-
2024-10-16 19:55:36 UTC+0530	PrivateEC2Instance	CREATE_COMPLETE	-	-
2024-10-16 19:55:35 UTC+0530	SNSTopic	CREATE_COMPLETE	-	-
2024-10-16 19:55:24 UTC+0530	NatGateway	CREATE_IN_PROGRESS	CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-10-16 19:55:22 UTC+0530	PublicRoute	CREATE_COMPLETE	-	-

Step-19] Go to VPC .

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Step-20] Check Your VPC ,subnet ,internet gateway, route table and instances are launched successfully.

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP option set	Main route table
vpc-08ffe06795a9ec200	Available	172.31.0.0/16	-	dopt-0312c548bcd28...	rtb-0b60906ce6f59651f	acl-0
VPC-CCSA-TY-1121	Available	10.0.0.0/16	-	dopt-0312c548bcd28...	rtb-09dea2c90c3b2c30b	acl-0



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Name	Subnet ID	State	VPC	IPv4 CIDR	IPv6 CIDR	IPv6 CIDR association ID
PublicSubnet0	subnet-0a0d83b0d9127339	Available	vpc-06bef84274bd3eaa4 VPC-...	10.0.2.0/24	-	-
-	subnet-0ef756fe7b640093	Available	vpc-08ffe06795a9ec200	172.31.0.0/20	-	-
PrivateSubnetA	subnet-0408f5c9b3a6868c5	Available	vpc-06bef84274bd3eaa4 VPC-...	10.0.3.0/24	-	-
PrivateSubnetB	subnet-0de8698a1f632d72e	Available	vpc-06bef84274bd3eaa4 VPC-...	10.0.4.0/24	-	-
my-subnet-03	subnet-0d3363b8c985f4b00	Available	vpc-08ffe06795a9ec200	172.31.32.0/20	-	-
my-subnet-2	subnet-04f6cb047e5d247c	Available	vpc-08ffe06795a9ec200	172.31.16.0/20	-	-
PublicSubnetA	subnet-0e8ab98368e639fa7	Available	vpc-06bef84274bd3eaa4 VPC-...	10.0.1.0/24	-	-

Name	Route table ID	Explicit subnet associations	Edge associations	Main	VPC	Owner ID
PrivateRouteTable-CCSA-TY-1121	rtb-07858a905147cd3718	2 subnets	-	No	vpc-06bef84274bd3eaa4 VPC-...	891377273858
-	rtb-0b4ed08518247c432a	-	-	No	vpc-08ffe06795a9ec200	891377273858
SQS-demo	rtb-034c4df6c149faa95	2 subnets	-	No	vpc-06bef84274bd3eaa4 VPC-...	891377273858
PublicRouteTable-CCSA-TY-1121	rtb-034c4df6c149faa95	2 subnets	-	No	vpc-06bef84274bd3eaa4 VPC-...	891377273858
-	rtb-0b60906ccedf59651f	-	-	Yes	vpc-08ffe06795a9ec200	891377273858
-	rtb-09dea2c90c3b2c30b	-	-	Yes	vpc-06bef84274bd3eaa4 VPC-...	891377273858



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The screenshot shows the AWS VPC dashboard with the 'Internet gateways' section selected. It displays two entries: 'igw-01e6dc6e7996d2bd' and 'demo-gateway'. Both are attached to the 'VPC-CCSA-T...' VPC and have an 'Attached' state.

Name	Internet gateway ID	State	VPC ID	Owner
igw-01e6dc6e7996d2bd	Attached	vpc-06bef84274bd3sea4 VPC-CCSA-T...	891377273858	
demo-gateway	Attached	vpc-08ffe06795a9ec200	891377273858	

The screenshot shows the AWS VPC dashboard with the 'NAT gateways' section selected. It displays one entry: 'nat-03061923538d7dd4f'. The gateway is 'Public' and 'Available', connected to the 'Primary public IP' 3.109.131.144 and 'Primary private IP' 10.0.1.211.

Name	NAT gateway ID	Connectivity...	State	Primary public I...	Primary private I...	Primary network...	VPC
-	nat-03061923538d7dd4f	Public	Available	3.109.131.144	10.0.1.211	eni-0fe91278e4ddf...	vpc-06bef84274bd5



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Step-21]Open your Gmail and open the AWS Notification mail.



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greet
Gaurav
15/10/23